PERMITTING AND INTERCONNECTION OF SOLAR PV GENERATORS FOR
THE MARIN ENERGY AUTHORITY FEED-IN TARIFF PROGRAM

A Professional Project Presented to
The Faculty of California Polytechnic State University
San Luis Obispo

In Partial Fulfillment
Of the Requirements for the Degree
Master of City and Regional Planning

by
Stephen Rogers

June 2012

© 2012
Stephen Rogers
ALL RIGHTS RESERVED

COMMITTEE MEMBERSHIP

TITLE: Permitting and interconnection of solar PV
generators for the Marin Energy Authority Feed-in
Tariff Program

AUTHOR: Stephen Rogers

DATE SUBMITTED: June 2012

COMMITTEE CHAIR: Adrienne Greve, Ph.D., Assistant Professor

COMMITTEE MEMBER: Chris Clark, J.D., Lecturer

COMMITTEE MEMBER: Trevor Keith, Energy Program Coordinator, County
of San Luis Obispo

ABSTRACT

Permitting and Interconnection of solar PV generators for the Marin Energy Authority Feed-in Tariff Program

Lack of access to information on the cost and timeframe for the permitting and interconnection of distributed renewable energy generation facilities may hinder renewable energy capacity development. This issue is examined within the specific context of solar photovoltaic systems developed for participation in the Feed-in Tariff (FIT) program hosted by the Marin Energy Authority (MEA). A guide on the permitting and interconnection of solar PV generators for participation in the program was produced for the host agency. This guide seeks to assist property owners and solar developers in overcoming existing informational challenges. By providing an overview of the procedural requirements and process, as well as reference tools that highlights helpful resources and documents, the guide provides readers with an introductory tool for overcoming existing non-market barriers to participation in the MEA FIT program. In addition, a Recommendations Report has also been produced to provide the MEA with a discussion of existing procedural challenges faced by program participants. This report, which details the issues identified by those stakeholders that participated in the development of the guide, concludes with a series of recommended actions that the MEA may take to enhance the ability of potential FIT participants to accurately estimate and plan for the costs and timeframes associated with permitting a solar PV facility.

Keywords: Solar, Photovoltaic, Feed-in Tariff, Interconnection, Permitting

ACKNOWLEDGEMENTS

The greatest gratitude is given to my mother; without her I could never have come so far in so many ways. I would also like to thank Dr. Adrienne Greve and the project advisory committee for their continued guidance throughout the project. The staff of the Marin Energy Authority, representatives of the Marin community building and planning departments, and those at the Pacific Gas and Electric Company must also be recognized for their invaluable contributions during the data collection process. Finally, I am eternally grateful to my family and Jane Valetchikov for their continued support and unfaltering belief in my abilities.

TABLE OF CONTENTS

LIST OF TABLES	VIII
LIST OF FIGURES	IX
LIST OF ACRONYMS	X
GLOSSARY	XI
1.0 introduction	1
1.1 Community Choice Aggregation and Renewable Energy	3
1.2 Limited Participation in the MEA FIT	5
2.0 Project Scoping	8
2.1 Permitting and Interconnection Procedures	8
2.1.1 Permitting	9
2.1.2 Interconnection	10
2.2 Project Approach	13
3.0 Literature Review	15
3.1 Solar Leadership in Renewable Energy	15
3.2 Acceptance of Solar PV in Policy Structures	16
3.3 Feed-in Tariffs Globally and in California	17
3.5 Interconnection Standards and FERC Jurisdiction over MEA FITs	24
3.6 Local Agency Permitting for Distributed Generation	35
3.7 Studies on Municipal Permitting of Solar PV	37
4.0 Methodology	42
4.1 Project development	42
4.2 Literature Review	43
4.3 Survey Development	44
4.3.1 Participant Identification	44
4.3.2 PG&E	45
4.3.3 Private Sector Participants	46
4.3.4 Local Agency Representatives	48
4.4 Survey Development	49
4.5 Post Survey Interviews and Discussions	51
5.0 Assessment	53
6.0 Findings	57
6.1 Limited Stakeholder Experience	59
6.1.1 Interconnection	59
6.1.2 Permitting	61
6.2 Limited Data and Guiding Information	62
6.2.1 Interconnection	62
6.2.2 Permitting	68

6.3 Common Fast Track Screening Failures	72
6.4 Lack of Adequate Tools for Site Evaluation and Submission	73
6.5 Variation in Permitting Procedures	76
6.6 Common Issues Cited by Project Stakeholders	77
6.6.1 Permitting	78
6.6.2 Interconnection	81
6.2.3 Project Finance	83
7.0 Recommendations for MEA Action and Concluding Remarks	85
7.1 Recommendations	88
7.2 Conclusion	99
References	101
APPENDIX A: DATA COLLECTION TOOLS AND SURVEY RESPONSES	1
1.0 Initial Survey Forms	2
1.1 Solar Developer Survey	2
1.2 Planning Department Survey	6
1.3 Building Department Survey	11
1.4 Utility Survey	16
2.0 Survey Responses	19
2.1 Solar Developer Survey Responses	19
2.4 Utility Survey Response	27
3.0 In-person Interviews	28
3.1 Blank In-person Interview Questionnaire	28
3.2 In-person Interview Responses	30
3.2.1 Corte Madera	30
3.2.2 Larkspur	34
3.2.3 Marin County	37
3.2.4 Mill Valley	40
3.2.5 Ross	42
3.2.6 San Anselmo	44
3.2.7 San Rafael	46
3.2.8 Sausalito	48
3.2.9 Tiburon	50
APPENDIX B: Project Deliverables	1

LIST OF TABLES

Table		Page
1.	Common Issues Cited by Project Stakeholders	54
2.	PG&E Executed FIT Projects	57
3.	Current PG&E WDT Fast Track Study Indicators	58
4.	Current PG&E WDT “ <i>All Queued</i> ” Interconnection Request Indicators	64
5.	Building Permit Procedural Practices in Marin Communities	74

LIST OF FIGURES

Table		Page
1.	Reported Permit Review Times for the Communities of Marin	67

LIST OF ACRONYMS

AB	Assembly Bill
CAISO	California Independent Service Operator
CCA	Community Choice Aggregator
CPUC	California Public Utilities Commission
DG	Distributed Generation
EPC	Engineering, Procurement & Construction
FER	Federal Energy Regulatory Committee
FIT	Feed-in Tariff
GF	Generator Facility
GIP	Generator Interconnection Process
GIS	PG&E Generator Interconnection Services Department
IOU	Investor Owned Utility
IPCC	International Panel on Climate Change
kW	kilowatt
LGIP	Large Generator Interconnection Process
MCE	Marin Clean Energy
MEA	Marin Energy Authority
MW	Megawatt
NEC	National Electric Code
NEM	Net Energy Metering
PG&E	Pacific Gas and Electric Company
PURPA	Public Utilities Regulatory Policies Act (1978)
PV	Photovoltaic
QF	Qualifying Facility
RAM	Renewable Auction Mechanism
ROI	Return on investment
RPS	Renewables Portfolio Standard
SB	Senate Bill
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SGIP	Small Generator Interconnection Process
WDT	Wholesale Distribution Tariff

GLOSSARY

Feed-in Tariff (FIT)	A financial mechanism that uses standard-offer contracts for increasing renewable energy generation capacity. This mechanism reduces the perceived investment risk by increasing the transparency of the investment return through the use of long-term (10 years plus) power purchase agreements with established compensation rates for generation resources. Feed-in Tariffs are considered wholesale procurement programs as generators are not required to be customers of the entity hosting the program and are compensated at fixed rates other than those applied to retail customers.
Community Choice Aggregator (CCA)	A municipal public agency enabled by California Assembly Bill 117 to purchase electricity resources for participating consumers.
Distributed Generator (DG)	A small-scale energy generation facility located in close proximity to the point of resource consumption. When interconnecting to the electricity grid, distributed generators typically interconnect to the low-voltage distribution system.
Load Serving Entity (LSE)	An organization such as PG&E or the MEA that provides retail and/or wholesale energy to consumers through wholesale procurement services.
Net Energy Metering (NEM)	A retail generation program wherein participants receive on-bill credits for energy resources exported to the grid in excess of on-site consumption.
Public Goods Charge /Electric Program Investment Charge	A fee charge added to the bills of residential customers of the three California IOUs. The accumulated funds are to be spent on energy-related services and programs that are in the public interest. The Public Goods Charge was allowed to expire on January 1 of 2012. The CPUC has instituted the Electric Program Investment Charge in replacement.

Renewable Portfolio Standard (RPS)	The RPS is a program enacted by the California Legislature in 2002 under AB 1078. The RPS program mandates that a certain percentage of the electricity portfolio provided by independently owned utilities, electric service providers, and community choice aggregators be procured from renewable energy generators. The RPS program increases the percentage of required resources procured from renewable energy generators over time until meeting the current goal of 33% by 2020.
Qualifying Facility (QF)	Distributed combined heat-and-power generators or those renewable energy generators of 20 MWs or less that sell all exported generation resources to the utility providing distribution service. QF status originates from the directive established under PURPA for utility operators to provide grid access to independent power producers and to purchase the generation resources from qualifying generators.
Generator Interconnection Process (GIP)	The GIP is the standard approved by FERC and implemented by PG&E for wholesale generator interconnections. The GIP is an amalgamation of FERC's SGIP and LGIP and codified in the PG&E Wholesale Distribution Tariff (WDT).
Wholesale Distribution Tariff (WDT)	The WDT provides the rules and standards applicable to generators seeking interconnection to the utility controlled distribution system for wholesale purposes. The WDT is designed to meet FERC requirements for utility the provision of an Open Access Transmission Tariff.
Investor Owned Utilities (IOUs)	Privately held electric utilities. In California, this term commonly refers to PG&E, SDG&E, and SCE.

1.0 introduction

Feed-in Tariffs (FITs) are standardized contracts for the wholesale purchase of electricity from consumer-sited renewable energy generators. First introduced in California under Assembly Bill (AB) 1969 (2006), FITs are currently offered by the three investor-owned utilities (IOUs), as well as a select number of public utilities and community-based energy organizations such as the Marin Energy Authority (MEA). The MEA is a unique public agency in hosting the Marin Clean Energy (MCE) program, which procures wholesale electricity resources on behalf of participating retail customers. In addition to providing consumers with increasing access to renewable energy, the MCE program additionally provides the opportunity to leverage consumer energy demand toward developing the local capacity for renewable energy generation through power purchase agreements (PPAs) such as those provided in FITs.

This report details a study of permitting and interconnection procedures for solar photovoltaic (PV) generators seeking participation in the MEA FIT program. The study, which was performed in partial completion of the requirements for the Master's in City and Regional Planning (MCRP) at Cal Poly in San Luis Obispo, sought to provide the MEA with an educational resource to assist property owners and solar developers in overcoming non-market barriers related to participation in the FIT program. More specifically, the project focused on

developing a reference guide to support potential participants in more accurately integrating permitting and interconnection considerations into the process of planning for the development of a solar PV generator. In tandem with the development of the guide, the project additionally sought to provide the MEA with recommendations for further action on reducing non-market barriers to participation in the MEA FIT program.

Before proceeding, two points should be made clear to the reader. The first is that this report, while being an essential component of the Master's Project, is principally a complementary piece to the FIT Guide and Recommendations Report contained in appendix B. It is consequently recommended that readers refer to the above-mentioned documents whenever greater context is needed.

As a second point, readers may find it helpful to be aware that the approach of the Master's Project discussed in the following text largely focuses on the perspective of the private solar development industry. The complexity of the energy market is only scratched in this report. Stakeholders involved in the development and operation of renewable energy generators often have differing views that are sometimes in conflict. While attempting to provide a marginally balanced interpretation, the limited time and resources associated with this study did not allow full explanation of the perspectives embraced by all stakeholders.

As such, the author would like readers to be conscious that some assertions made here could very likely be argued in a different manner.

1.1 Community Choice Aggregation and Renewable Energy

This project coincides with an ongoing period of increasing government interest in the potential for solar PV and other renewable energy generation technologies to support greenhouse gas (GHG) emissions reductions, economic development, and energy security. Since the passing of the Public Utilities Regulatory Policies Act (PURPA) of 1978, distributed generation (DG) of renewable energy has received growing public support in the form of continuing legislative and regulatory action focused on creating a decentralized model for the generation, transmission, and distribution of electricity. Under the emerging open market approach in California, there has been a proliferation of renewable energy policies that range from subsidies for generator development to requirements for utilities and other load serving entities (LSEs) to purchase an increasing portion of their resource portfolios from renewable energy generators.

California Assembly Bill (AB) 117 (2002) is an example of the diversity in approaches to market transformation embraced in California. In 1996, the Electric Utility Restructuring Act (AB 1890) recognized the right of consumers to choose their electricity supplier. Building upon this, AB 117 established the opportunity for municipal governments to form Community Choice Aggregators (CCAs) in order to purchase electricity on behalf of those consumers choosing to

participate. Originally formed by the County of Marin and seven of the towns and cities within Marin, the MEA is the first operational CCA in California. With membership recently expanded to include the three remaining municipal governments of Marin, the MEA's MCE program is expected to deliver a resource portfolio containing 50% renewable energy to approximately 96,000 customers in the summer of 2012 (Marin Energy Authority, 2012).

In addition to greater public control over the local energy portfolio, energy aggregators can assist in developing the capacity for renewable energy generation by hosting procurement programs. Through such programs, energy aggregators are thought to reduce transaction costs and information barriers that might otherwise act as disincentives to consumer-sited capacity development (Weston, Harrington, Moskovitz, Shirley, Cowart, & Sedano, 2001). The MEA currently hosts two of such programs. The first is known as Net Energy Metering (NEM), which allows customers of the MCE program owning solar PV or other renewable energy generation systems to receive retail-rate credits for excess electricity exported to the grid. The second is the FIT program, which uses standard-form (otherwise known as standard-offer) contracts to provide renewable energy generators with fixed wholesale rates for electricity exported over periods ranging from 10 to 20 years.

Whether participating in an NEM or FIT program, the electricity generated by participants is delivered to MCE customers through the Pacific Gas and Electric Company (PG&E) distribution grid. This delivery model is founded upon the partnership between the MEA and PG&E that allows MCE customers continued access to the existing electricity infrastructure. In this manner, the MEA offers residents and businesses in Marin the opportunity to become active participants in transforming the regional energy system to be more locally focused and environmentally friendly.

1.2 Limited Participation in the MEA FIT

Though the MEA FIT program was launched in late 2010, participation has been limited. During the development of the guide on interconnection and permitting between the fall of 2011 and the spring of 2012, the MEA had only received two applications for FIT participation. This level of interest was below expectations and drove MEA staff to evaluate opportunities for improving involvement in the program. In conjunction with the long-term contract, the rate structure provided by FIT programs is considered an essential element for mitigating participant concerns associated with the return on investment for renewable energy projects (Santander, 2008). As such, the MEA initially looked towards the rate structure as a potential element in need of revision.

Concern that the MEA FIT program had included a poor rate structure led to public review of the rate adequacy during an outreach event hosted in the summer of 2011. It was at this event that the author witnessed property owners and renewable energy developers raising the issue of project interconnection and permitting as barriers to participation. More specifically, those in attendance asserted that the rates provided by the MEA assured adequate project returns, but that project feasibility remained questionable due to the complexity of anticipating the costs, timeframes, and requirements associated with interconnection and permitting. The feasibility of participation was thus suggested to be greatly influenced by access to information that supported property owners in understanding how permitting and interconnection procedures would effect over-all development costs and timeframes.

Some of the public review participants suggested that the MEA undertake an ombudsman role to assist property owners and project developers in more efficiently navigating the permitting and interconnection process. Though it was agreed that such a role could be beneficial, the limited resources of the MEA, in combination with a lack of current participants, made this recommendation appear somewhat impractical. Nonetheless, the need for providing property owners and project developers with some form of interconnection and permitting assistance was acknowledged.

Based upon the public comment witnessed at the stakeholder review event, the development of a guide on permitting and interconnection was recommended by the author. This product was proposed as an intermediary tool that would assist the MEA in making the interconnection and permitting process more readily understandable to property owners and solar developers. The process for developing the guide was additionally suggested to allow an opportunity to provide the MEA with a more in-depth understanding of the challenges faced by the public in working with municipal governments and the local utility on the interconnection and permitting process. Under the approval of the Executive Director of the MEA, the development of the guide was initiated with a focus on increasing the transparency of the interconnection and permitting procedures while educating readers regarding project design and planning considerations for reducing installed costs and development timeframes.

2.0 Project Scoping

The guide developed for the project was to provide property owners and solar developers with an introductory explanation of the interconnection and permitting procedures relevant to participation in the ME FIT program. To identify pertinent information to be included in the guide, an examination of existing literature was performed in conjunction with a study of the municipal permitting procedures and the utility procedures for interconnection. This process involved a review of publically available data on interconnection as well as the administration of surveys to four stakeholder groups. The choice of this methodology was deemed most appropriate by the author given the assertions of the public review event regarding the lack of ability to evaluate project feasibility from existing resources on permitting and interconnection provided by the utility and municipal permitting agencies.

2.1 Permitting and Interconnection Procedures

The requirements set forth by the MEA for program participation established the majority of parameters that served to guide the study process and the development of the guide. These include that the generation project be located within the MEA service territory, of a capacity of no more than one (1) megawatt (MW), and accepting of the wholesale compensation rates defined by the MEA for the FIT program. Participation is further constrained to only those technologies eligible for the California Renewables Portfolio Standard (RPS).

The list of eligible technologies was far too large for the time and resources available for the study project. As such, the MEA was consulted to identify the technology of greatest interest. In response, staff expressed that solar PV was thought to be the technology of greatest interest within the agency service territory. Given that solar PV was the fastest growing RENEWABLE ENERGY technology worldwide between 2000 and 2010, and in light of the State authorizations for the cumulative development of 9,000 MW of solar PV by 2016, the recommendations of the MEA seemed most appropriate (California's Clean Energy Future, 2011, International Energy Agency, 2011).

2.1.1 Permitting

In California, all generation projects of less than 50 MWs are permitted by the municipal government having jurisdiction over the property where the project is to be sited (State of California, 2007). The State has, however, provided guidance as to limitations on the permitting process for solar generation projects via AB 2473 (2004). Known as the New Solar Rights Act, this law directs municipal governments to limit project review to non-discretionary permitting unless specific concerns regarding public health and safety are identified (Legalinfo.ca.gov, 2004).

The focus of the guide on providing readers with information pertaining to permitting practices for solar PV installations participating in the MEA FIT program required review of those procedures implemented in the 12 jurisdictions within the MEA service territory. An initial review of online documents made available by the planning and building departments in these communities revealed little information on the requirements and costs associated with the permit process. The author consequently determined that a need existed to seek experiential data from agency officials responsible for managing these procedures. The initial design of the guide development process assumed that both the planning and building permitting procedures implemented by the local governments in Marin were appropriate for review. Survey responses and discussions with planning and building staff redirected the project scope when noting that AB 2473 is typically interpreted as limiting local agency review of solar PV projects to be contained within the building department. In light of this, the study process more thoroughly reviewed the building permit process while noting any permitting review cited as commonly undertaken by the planning staff during the process for issuing a building permit to solar PV projects.

2.1.2 Interconnection

A number of interconnection options exist for those projects seeking participation in the MEA FIT program. Initial research revealed the first consideration in scoping the study of interconnection costs and timeframes was whether projects would be seeking connection to the distribution system or the transmission

system. This distinction is of importance as these systems are managed separately. More specifically, the California Independent Service Operator (CAISO) manages the transmission system, which provides high voltage transmission of bulk electricity over long distances, with oversight provided by the Federal Energy Regulatory Commission (FERC). The distribution system, which takes lower voltage power that has been stepped down at substations to end use customers, is generally managed by IOUs or public utilities with oversight provided by the California Public Utilities Commission (CPUC). As an exception to this structure, FERC has jurisdiction over distribution level interconnections when conducted for the purpose of a wholesale purchase agreement such as that offered by FITs (Keyes and Fox, 2008). While MEA FIT participants are technically eligible for interconnection to either system, early discussions with a solar developer revealed that transmission interconnections typically incurred costs and timeframes that would be excessive and overly burdensome for generators of one (1) MW or less. Knowledge of this thus resulted in the scoping of the guide to focus on distribution interconnections as this path was thought to be that most likely to be chosen by a property owner pursuing participation in the MEA FIT program.

Distribution interconnections in the MEA service territory are conducted under the authority of PG&E, which uses interconnection standards that have been authorized by either the California Public Utilities Commission (CPUC), or the

Federal Energy Regulatory Committee (FERC). Rule 21 is a statewide interconnection standard approved by the CPUC. This standard is applied to those projects that fall under the authorization given by FERC to the CPUC and other state utility commissions to regulate generators seeking interconnection for participation in a retail-rate based program or those registered as Qualifying Facilities (QF) under PURPA. QF status refers to either combined-heat-and-power generators or those renewable energy generators of 20 MWs or less that sell all generation resources to the utility providing the generator with distribution services (Schmidt & Burwen, 2012). Solar PV generators seeking participation in the MEA FIT program are not eligible for QF status as the generation resources are “wheeled” through the PG&E distribution system to MCE customers.

Those wholesale interconnections that do not qualify for QF status are interconnected under the authority vested in FERC. To guide the interconnection process, FERC created a Large Generator Interconnection Procedure (LGIP) and a Small Generator Interconnection Process (SGIP). Utilities are directed to develop LGIP and SGIP interconnection procedures that mirror those of the FERC and codify them within the utility’s Wholesale Distribution Tariff (WDT), which is then submitted to FERC for review and approval. It may be noted that PG&E sought and received the approval of FERC to streamline these procedures into a single Generator Interconnection Process (GIP) in 2011.

The PG&E GIP offers applicants three different study tracks for assessing the viability and cost of interconnection. These tracks, which are respectively titled Fast Track Study, Independent Study, and Cluster Study, differ according to cost, timeframe, and approach to study. The same initial discussion with a solar developer that was noted earlier clarified the need to focus on the Fast Track Study as the other tracks included much greater potential for cost burdens that are likely to relegate renewable energy projects of 1 MW or less financially feasible.

2.2 Project Approach

As a result of the multi-jurisdictional nature of the interconnecting and permitting process, pertinent information is dispersed between multiple agencies. One effect of this is the need for property owners and project developers to gather information from dispersed sources. This is further complicated when considering that the applicable procedures are typically designed for a whole host of circumstances rather than those specifically pertinent to the technology type or project size of interest to the applicant.

The development of the guide consequently sought to consolidate and downscale information archived in multiple locations to a single source that is easily read and consisting of pertinent information to developing solar PV facilities for the MEA FIT program. This objective suggested the need for a

framework that would allow for the identification of relevant issues, an examination of procedures for the presence of these issues, and finally generation of approaches for overcoming any identified barriers via the experiential knowledge of stakeholders experienced in the applicable. A work plan was accordingly developed to meet these objectives. Included in the associated scope of work was a literature review focused on issue identification, an online review of all pertinent procedural documents, and a survey of stakeholders with experience in the permitting and interconnection of solar PV projects similar to those likely to participate in the MEA program.

3.0 Literature Review

While the study and products are narrowly focused on solar PV interconnection and permitting for FITs, it is necessary to place the subject matter within the broader context of renewable energy acceptance and the transformation of energy systems at the state, federal, and global level. Beginning with the emerging importance of renewable energy and the rapid growth of the solar industry, the following review initially addresses the need for broad acceptance and enabling policy structures that move beyond financial mechanisms. Feed-in tariffs (FITs) are then discussed within the context of global success and marginal adoption in the United States. While noting the potential for conflict between state, federal, and local policies, the discussion concludes with a review of existing perspectives regarding inefficiencies and barriers to development within permitting and interconnection procedures.

3.1 Solar Leadership in Renewable Energy

Behind implementation of energy efficiency standards for new development and retrofits to existing structures, the 2003 California Energy Action Plan addresses renewable energy generation as the preferred method for meeting the state's energy demand (California's Clean Energy Future, 2010). Accordingly, the State government has developed incentives and rebate programs seeking to add an additional 7,400 MWs of renewable energy generation capacity beyond that associated with the RPS program by 2016 (California's Clean Energy Future, 2011). In-state generation of renewable energy is already strong and growing.

Between 2002 and 2010, in-state generation grew by 270,126 gigawatt-hours (GWh) and totaled 14% of the in-state electricity generation portfolio (State of California, 2012).

Globally, 19% of the world energy supply is derived from renewable resources (IPCC, 2011). Of the various technologies, solar PV is growing at the greatest speed with a 53% growth in installed capacity during 2009 (International Energy Agency, 2011, IPCC, 2011). While the majority of capacity is located in Europe, the US continues to be a leader with installations doubling in 2010 (Sherwood, 2011).

3.2 Acceptance of Solar PV in Policy Structures

California remains at the forefront of the US Market for solar PV. The state is home to 28% of the overall installed capacity and witnessed an 18% growth in installed capacity between 2009 and 2010 (Sherwood, 2011). While installed solar PV capacity in California totaled only 252 MWs during that period, a 2012 assessment of technical potential for distributed solar PV provided that the state could reach 15,000 MW by 2020 if action is taken to overhaul to the existing interconnection requirements and permitting standards (Sherwood, 2011, and Energy and Environmental Economic, 2012). The International Panel on Climate Change (IPCC, 2011) has echoed similar sentiments in noting that existing regulatory and institutional barriers may impede the deployment of solar PV technologies in many markets across the globe.

Attention towards non-market barriers such as the costs, timeframes, and administrative complexities of interconnection and permitting procedures highlight the need for renewable energy policy development to recognize the importance of social and institutional acceptance. In discussing the DG model for renewable energy capacity growth, Wuestenhagen, Wolsink, & Buerer (2007) argue that social and political acceptance of renewable energy is embodied in the policies and procedures associated with industry regulation. These authors further assert that these forms of acceptance are particularly important to renewable energy development because of the inherent reliance on citizen property as an element of infrastructure development (Wuestenhagen, Wolsink, & Buerer, 2007). The IPCC (2011) notes that while social acceptance of renewable energy is increasing, the need for enabling policies that create transparency in administrative procedures is integral to reducing investment risk and facilitating deployment.

3.3 Feed-in Tariffs Globally and in California

Feed-in Tariffs (FITs) are one of a number of market-based mechanisms developed to increase the expansion of renewable energy generation capacity. In comparison to market forcing structures such as RPS programs or the retail rate crediting associated with NEM structures, FITs rely on standard offer contracts that provide assurance regarding the rate of return over long periods of time (Rickerson, Benhold & Bradbury 2008). This approach to market support

through the reduction of transaction costs and the transparent communication of potential investment returns is designed to overcome the upfront and intensive use of financed capital often associated with renewable energy development (Brown & Jacobs, 2011).

Globally, 75% of solar PV capacity between 2001 and 2008 was developed under a FIT contract (Fink, Porter, & Rogers, 2010). Success has been particularly notable in Denmark, Spain, and Germany, where FITs were leveraged as a tool for aggressively developing renewable energy projects even before the turn of the millennium. By 2000, Feed-in tariffs (FITs) were the financial mechanism associated with 80% of the installed wind generation capacity throughout Europe (Menanteu, Finon, & Lamy, 2003). With 77% of renewable energy generation having been developed under FIT contracts between 1998 and 2009, Germany emerged as the clear leader in implementing FIT programs (Fink, Porter, & Rogers, 2010).

The use of FIT programs in the United States is somewhat uncharted in comparison to the European experience. Oddly, some consider the standard-offer contracts that developed as a result of PURPA purchase mandates to be proto-examples of FITs (Lesser & Su, 2007). Nonetheless, policies focused on procurement mandates such as the RPS program have typically received political preference in the US over procurement incentive programs such as FITs. In

California, FITs were not implemented until the passing of AB 1969 in 2006. While eligibility was originally limited to public water and wastewater facilities, SB 32 (2009) modified the eligibility of mandated FIT programs to include all renewable energy generators regardless of whether or not the facility is associated with a government water or wastewater facility (California Public Utilities Commission, 2007).

Even with legislative approval and the continued growth of distributed renewable energy generation, Couture and Cory (2009) estimated that less than 3% of installed renewable energy renewable energy generation capacity in California was under FIT contract in 2009. It may be noted that research has failed to identify any more current estimates of California renewable energy capacity under FIT contract. It does seem, however, that participation in FIT programs is growing as PG&E has received applications in excess of their allotted capacity for generators not associated with public water or wastewater facilities (Pacific Gas and Electric Company, 2012d). SCE and SDG&E have not exceeded capacity but do report to have executed 75.3 MWs and 15 MWs, respectively (Southern California Edison, 2012, and San Diego Gas and Electric, 2011).

The obvious question to be asked is why have FITs not resulted in similar renewable energy capacity gains in California? A leading response to this question is that European programs are supported by more comprehensive

policy environments that enable FIT participation through the reduction of non-market barriers. For example, FIT policies in Germany incentivized early participation by offering above market-rates for generation resources through programs implemented at both the local and national level (Menanteu, Finon, & Lamy, 2003). In comparison, the United States lacks a federal mandate for FIT and has been witness to relatively few examples of FIT programs being implemented by local jurisdictions. At the same time, compensation for FIT contracts in California have been criticized for providing limited incentive for participation by implementing rate structures based only on the avoided costs associated with fossil fuel procurement and transmission (Couture & Cory, 2009). This is in contrast with the examples of success in countries such as Germany where utilities were required to purchase renewable energy from generators under FIT contracts at rates as high as 90% of the going retail rate (Lesser and Su, 2007).

Approaches taken in the US also differ from those in Europe with regards to cost allocation for transmission and distribution upgrades, as well as the prioritization of grid access for renewable energy generators. European regulation of grid access provide small-scale renewable energy generators with priority in interconnection queues and the opportunity to pass much of the costs for upgrading infrastructure to accommodate generators on to ratepayers (Fink, Porter, & Rogers, 2010). The IPCC (2011) notes that small-scale renewables

face greater sensitivities to administrative and procedural costs and timeframes due to the smaller economies of scale. In comparison, regulation of the interconnection market in the United States occurs within an environment focused on providing non-discriminatory access and limiting ratepayer exposure to the costs of system improvements (Fink, Porter, & Rogers, 2010). This is unfortunate for those owning DG facilities as the interconnection of small-scale generators to the electricity grid can require improvements to manage the introduction of bi-directional power flows (Purchala, Belmans, Leuven, Exarchakos, & Hawkes, n.d.). In combination with a focus on maintaining central grid reliability, these policy preferences can create financial challenges for small-scale renewable energy projects (IPCC, 2011).

3.3 The Impact of Soft Costs on the Development of Distributed Renewable Energy Generation Capacity

In moving towards an open market that accommodates distributed generation services, the domestic energy system is transforming in a number of ways. Old policies structured around an environment containing a limited number of players with access to large capital resources and the ability to financially bear lengthy development timeframes are being challenged by an increasing number of market participants who rely on financial models wherein the costs of regulatory compliance, infrastructure improvements, and construction delays are more likely to have a meaningful impact on project feasibility (Kartseva, Gordijn, &

Akkermans, 2003). While California's host of rebates, incentives, and financial mechanisms communicate an environment that welcomes these participants, wholesale generators such as those pursuing FIT arrangements face a multi-jurisdictional atmosphere wherein federal interconnection standards and municipal permitting procedures have been established largely without regard to the State's interests in increasing the capacity for renewable energy generation.

With regards to grid access, proponents of distributed renewable energy assert that federal interconnection policies focused on shielding ratepayers from infrastructure improvement costs and providing non-discriminatory access is in direct conflict with the State policies that establish mechanisms to support renewable energy development (Morton & Peabody, 2010). For smaller generation projects, interconnection and permitting costs represent a greater portion of the overall installed cost and can become financially prohibitive (Prabhu, 2005). As a result, regulatory procedures that lack transparency, increase development timeframes, or include overly burdensome administrative requirements can hinder the rate of renewable energy development and negatively affect investor perceptions of risk (IPCC, 2011).

The costs and financial impacts of compliance structures such as permitting and interconnection is sometimes labeled "soft-costs". This term denotes the difference between these expenses and those associated with the hardware

components of a generation system. Pitt (2008) reports that on average, soft costs account for a larger portion of total project costs and development timelines in the US when compared to Europe and Japan. This results in a disincentive for development that is disproportionately felt by smaller distributed generation projects (Pitt, 2008). In recent years, the solar industry has witnessed increasing innovation and system performance amidst declining module costs (IPCC, 2011). In this environment, the importance of managing “soft costs” as to not significantly impede development is increased as they continue to account for an increasing amount of total cost.

Recognition of the potential for soft costs to affect solar PV deployment has increased attention towards valuing the incurred costs. Permitting and interconnection for residential solar PV systems are estimated to account for between 13% and 30% of total project cost (Pitt, 2008, and Quinn, Safrine, & Clement, 2011). While focused more specifically on the effect of permitting, Sun Run (2011) has further estimated permitting costs to average \$2,526 per project, while projecting that permitting fees will result in a nationwide “tax” of \$1 billion on solar development between 2011 and 2016.

When assessing the impact of permitting and interconnection, it may be appropriate to measure costs beyond direct permit fees and infrastructure improvements. Solar developers have noted that managing variations in

procedures and standards between jurisdictions require personnel time, which drives up to the overall costs passed to the end stage property owner and investors (Quinn, Safrine, & Clement, 2011). In addition, inexperienced or uneducated staff may unintentionally increase costs by delaying a project during the plan review or inspection process due to lack of information on community specific procedures (Pitt, 2008).

3.5 Interconnection Standards and FERC Jurisdiction over MEA FITs

In opening wholesale grid access to independent power producers, the process of deregulation increased market competition and the demand for standardized interconnection procedures that allowed small-scale producers to provide generation resources in a cost competitive manner (Slocum, 2008). Under the more traditional centralized model, generator access to the grid was limited to high voltage transmission interconnection managed on a case-by case basis (Keyes & Fox, 2008). As such, utility experience in connecting small-scale generators at the low voltage distribution system has historically been relatively limited (Varnado & Sheehan, 2009). Guidance on the interconnection of small-scale interconnections emerged first in 2003 when the CPUC developed the standard known Rule 21. In California, Rule 21 applies to the interconnection of generators associated with NEM programs or other programs associated with a retail energy exchanges, or for those generators with QF status (Keyes & Fox, 2008).

Following Rule 21, FERC issued Order 2006 (2005), which established the Small Generator (20 MWs or less) Interconnection Procedure (SGIP). The SGIP provides an interconnection standard for those distributed generation facilities under FERC jurisdiction, which includes generators connecting to transmission lines (those of 60 kilovolts (kV) or more), as well as wholesale generators connecting to distribution lines with the intent to sell energy resources to an LSE other than that which provides the distribution service (Michaud, 2007). The SGIP, as well as its partnering Larger Generator Interconnection Procedure (LGIP) are unique in comparison to Rule 21 in that both standards are models that utilities are directed to draft mirroring procedures, which are then submitted to FERC for approval as part of the utilities' Open Access Transmission Tariffs (Keyes & Fox, 2008, and Michaud, 2007).

In responding to increased applications for interconnection, these interconnection standards seek to address the particular and differing concerns of both distributed generators and the utilities. Varnado and Sheehan (2009) detailed these concerns as follows. From the perspective of a utility, interconnection of renewable energy generators, and particularly those like solar PV that follow intermittent production schedules, raise concerns as to the utility's ability to assure that consumers are provided reliable and uninterrupted service without threat to public safety. A secondary concern is worker safety. This refers to the

ability of utilities to manage the potential for renewable energy generators to energize the areas around the facility during periods of grid failure or planned outage. For distributed generators, it is important that utilities provide equal, consistent, and transparent treatment through defined timelines and cost responsibilities. It is additionally important for the interconnection process to minimize transaction costs and the need for legal counsel.

In assessing Rule 21 and the SGIP, Keyes and Fox (2008) discuss how the above noted considerations are met. In terms of meeting the needs of utilities regarding the management of generator impacts on grid safety, reliability, and quality, each interconnection standard requires the use of certified equipment and employs technical screens that identify the need for further engineering study. For generators that are not employing certified equipment, or those that exceed the capacity requirements of the “Fast Track” study process, applicants are offered alternative processes that focus more fully on performing in-depth engineering studies to identify grid impacts and the need for system improvements. Finally, each interconnection standard provides clarity on when and to what extent generators are required to carry insurance for damage to grid facilities. Keyes and Fox (2008) note that Rule 21 is less clear on insurance requirements, but does permit instances in which generators are not required to carry insurance beyond general property insurance.

Rule 21 and the SGIP standards provide a streamlined interconnection process that seeks transparency. As part of this, each standard includes a formal application, a standard interconnection agreement, estimated timeframes for each stage of review in the three study processes, and clarification regarding financial responsibilities for study deposits and any necessary infrastructure improvements. The standards also establish dispute resolution procedures for

when an impasse is reached in either the project review process or the negotiation of an interconnection agreement.

Keyes and Fox (2008) found the SGIP to set “a reasonable standard” for accommodating interconnections up to 20 MWs (p. 24). Nonetheless, Rule 21 received a higher grading (a “B” rather than the standard of “C” established for the SGIP). This advantage was attributed to the increased clarity of Rule 21 on the issue of requiring a system disconnect (SGIP leaves this decision to the implementing utility), as well as the waiving of certain interconnection costs for net metering and any study costs up to \$5,000, and for shortening review timelines in net energy metering cases to approximately 30 days.

Fink, Porter, and Rogers (2010) argue that clearly setting capacity limits, implementing concise standardized forms, establishing transparent fee schedules, limiting requirements for liability insurance, and providing dispute resolution remain the most important aspects of interconnection standards that are essential to reducing barriers against small generation participation. Though these characteristics are all met by the SGIP standard, there remains contention over the necessity of, and extent to which the interconnection standards meets these requirements. Regarding this, Keyes and Fox (2008) admit that their evaluation of interconnection standards prefers timely grid integration and limited generator cost responsibility over the more conservative protections for safety,

and grid reliability. They also note that at the core of this preference is the issue of upfront cost allocation to the generator versus ratepayer allocation via transmission and distribution service charges.

Keyes and Fox (2008) argue that the SGIP may be more conservative and thus burdensome for generators when compared to other leading interconnection standards. They also assert that this overly conservative nature may not be necessary as most utilities, and especially those in California, presently have much more experience than in recognizing hazardous conditions created by distributed generators than at the initial implementation of the SGIP. In discussing the growing experience of utilities in the interconnection of DG, Keyes and Fox (2008) argue that the allocation of upgrade costs to the generator is worth contesting given that ratepayers benefit from increased generator interconnections. This is due to early interconnections resulting in reduced demand on the grid (as most generators first supplement on-site consumption), enhanced environmental conditions due to renewable energy substitution for fossil fuels, gained experience in improving energy planning models to include more DG, and avoidance of expenditures related to the need for additional fossil fuel power plants or any associated transmission upgrades. As a final contention, Keyes and Fox (2008) argue that there is limited need for insurance requirements as safeguards for grid workers and infrastructure protection since

there are no known examples of hazardous conditions resulting from solar PV installations in the history of DG interconnection in the US.

These issues, as well as the attainability of interconnection at a reasonable cost for small generators, arose during more recent efforts to combine the SGIP and LGIP standards. In containing differing approaches to evaluating and accommodating generators interconnection requests, the CAISO and the three Investor Owned Utilities (IOUs) came to view the separation between the SGIP and LGIP as burdensome and unnecessary. The process for integrating the standards was first initiated by the CAISO in order to create a single Generator Interconnection Procedure (GIP). Reasoning provided to FERC at the time of the request focused on the need to overcome a rising backlog resulting from the combination of increased interconnection requests and the challenge of assessing cumulative grid impacts through two separated interconnection programs (CAISO, 2010).

Stating similar reasons, as well as the need to be consistent with the CAISO, PG&E also sought FERC approval in moving the organization's multiple wholesale interconnection procedures into a single GIP. This request was approved in 2011 by FERC Order No. 2006 (FERC, 2011). The most significant revision to the previously existing structure was the replacement of the serial study process that the SGIP used for those generators who failed the initial Fast

Track technical screens. In supplement, small-scale generators were now eligible for the LGIP Independent or Cluster study procedures.

The movement from separate LGIP and SGIP standards to the singular GIP raised a number of issues for the distributed generator industry. During their initial review, Keyes and Fox (2008) noted that the SGIP was not of great concern as the majority of small generators seeking distribution interconnections would do so under Rule 21 as a result of either participation in NEM program or eligibility as a QF. Since that assessment, however, the California Legislature passed SB 32 (2009), which, in combination with the RPS program, the Renewable Auction Mechanism, and Governor's Goal of 12,000 MWs of distributed generation by 2020, has increased the demand for wholesale interconnections. In association with this, consortiums like the Solar Energy Industries Association (SEIA) assert that managing the timeframe and cost of wholesale interconnections of non-QF facilities is increasingly pertinent to achievement of the goals set forth by the State Legislature (Solar Energy Industries Association, 2010).

SEIA, the Clean Coalition, the CPUC, the Interstate Renewable Energy Council (IREC), and the FIT Coalition raised multiple concerns during the FERC GIP proceedings regarding the impact of removing the serial study process upon the feasibility of small-scale generation projects. FERC eventually agreed with the

arguments of the IOUs regarding current backlogs in the interconnection review process and the potential for reducing costs and delays by moving to an annual cluster study process. While the industry groups largely disagreed with FERC's decision, they were successful in identifying the following issues as relevant barriers currently facing small-scale distributed renewable energy generation seeking wholesale, non-QF arrangements (e.g. MEA FIT participants) (Lewis, 2010, Longnecker & Huant, 2010, Solar Energy Industries Association, 2010, and Federal Energy Regulatory Commission, 2011).

- Generators are rarely able to pass Fast Track screens, thus necessitating additional costs and study delays through supplemental review or removal to the much more costly and lengthy Independent Study or Cluster Study processes. This is largely associated with screen 10, which requires that no improvements or upgrades be required for Fast Track interconnections. According to SEIA and other industry advocates, this technical screen is impractical and impassable, as all generators require, at the least, interconnection facilities for establishing access to the grid. Screen 2, which requires that the interconnecting generator, in aggregate with other generators, consume no more than 15% Peak Line Load, was also highlighted as unrealistic and unnecessary given advances in grid management and the political mandate for increased deployment of DG.

- Generators in the Fast Track are subject to an unreasonable liability for future upgrades and engineering costs. This refers to the in-perpetuity requirement contained in the interconnection agreement stating that interconnecting generators must assume responsibility for any future infrastructure improvements deemed necessary. While the utilities provide that the requirement only refers to improvements identified during construction of the interconnection facilities, industry groups contend that the contractual language is overly vague and deters renewable energy deployment by increasing the perceived financial risk of seeking a wholesale interconnection.
- Movement from the serial study process of the SGIP to the cluster study process is likely to move average generator interconnection length for those unable to interconnect under the Fast Track process from approximately 350 days to between 420 and 720 days. This is asserted to substantially affect the feasibility of small generators by significantly reducing the ability to move quickly through the development process while additionally increasing the potential cost burden as a result of cumulative review with other generation projects.
- Lack of transparency in the cost of supplemental review during the Fast Track study process.
- Lack of information available to generator applicants regarding suitability of infrastructure prior to request for interconnection.

- Lack of data on experienced interconnection costs and timeframes. More specifically, the industry groups have argued that costs and timeframes are likely to exceed those provided in the GIP and that actual data on processing times, rate of the Fast Track failure, and reasons for failure of Fast Track screening would substantially improve the ability of generators to better site, design, and plan for their proposed project.
- And finally, lack of transparency in how clusters would be defined and evaluated under the GIP standard.

In response to these considerations, those representing renewable energy industry interests in the FERC proceedings suggested the following improvements to the wholesale interconnection process (Lewis, 2010, Longnecker & Huant, 2010, Solar Energy Industries Association, 2010, and Federal Energy Regulatory Commission, 2011):

- Increased staff in utility departments for managing interconnection requests;
- Development of limitations on Fast Track cost responsibilities to be only those noted in any supplemental review documents, facilities studies, and interconnection agreements;
- Development of digital tools to assist in siting generators only in those areas with existing infrastructure and capacity appropriate for accommodating the given load of the proposed project. This is

recommended as means of reducing the likelihood for generators to bare the cost of expensive infrastructure upgrades as a result of unknown circumstantial conditions associated with grid infrastructure at the proposed project site;

- Increasing the capacity limit of Fast Track Screen 2 from 15% to 30%;
- Requiring utilities to include an open stakeholder process when revising their WDTs rather than simply seeking the approval of FERC;
- Requiring utilities to provide information regarding current interconnection queues, project status, technology type, timing, and other information to assist project applicants in better preparing for the interconnection process;

3.6 Local Agency Permitting for Distributed Generation

Numerous advocates of distributed renewable energy have asserted that municipal permitting procedures may either support or obstruct capacity development (Utility Consumer's Action Network, 2006, Wuestenhagen, Wolsink & Buerer, 2007, and IPCC, 2011). Permitting procedures may restrict renewable energy development by levying unnecessary or overly burdensome permit costs, design restrictions, or development delays as a result of aesthetic considerations, or a lack of knowledge or experience (Greaney, 2011).

The state of California has long recognized this and has responded through the implementation of a number of laws seeking to limit municipal aversions to

technologies such as solar PV. The history of locally focused solar enabling policy is substantial and largely originates with AB 3250 (1978). Beginning with the California *Solar Rights Act of 1978* (AB 3250), the State recognized the need to support consumer solar development by establishing the right of property owners to be protected against loss of solar access due to structural development on adjoining properties (State of California, California Energy Commission, & California Public Utilities Commission, 2011). In addition, AB 3250 also voided any property restrictions placed on property owners against developing solar power facilities by private homeowners associations.

Concurrent to the Solar Rights Act, the California Legislature also passed AB 2331 (1978). Known as the *Solar Shade Act*, AB 2331 required that trees and shrubs planted after the installation of a solar power facility must be maintained as to not reduce the exposure of the generation facility to sunlight (State of California, California Energy Commission, & California Public Utilities Commission, 2011). Though the combination of these laws established a foundation supporting consumer sited DG, it was not until 2004 that the State Legislature approached the municipal permitting process as an opportunity to reduce barriers to developing the capacity to generate solar energy.

The *New Solar Rights Act* (AB 2473, 2004) took a long awaited step forward in removing the ability of local governments to unduly restrict solar development.

This is achieved by directing local governments to limit solar PV project review to nondiscretionary procedures such as building permit reviews (Legalinfo.com, 2004). In limiting the ability of planning departments to review projects, AB 2473 reduces municipal expenditures while also shielding property owners and project developers from costly procedures like environmental review or design review. At the same time, the law also establishes that municipal mandates for design alterations based upon aesthetic concerns may not increase total project cost by more than \$2000 or decrease project efficiency by more than 20%. Under AB 2473, municipalities do retain the right to direct projects to more extensive review should the building official provide written findings noting a significant potential for proposed solar PV projects to create adverse affects to public health and safety. These declarations must be quantifiable, unavoidable, and based upon established standards or policies directly related to the health and public safety of the community (Anders, Grigsby, & Kuduk, 2007).

3.7 Studies on Municipal Permitting of Solar PV

In conducting a national survey of residential solar PV systems, Sun Run (2011) found that permit fees on average added \$2,516 to the cost of system installation. This included the cost of customizing standard plans and applications to meet local requirements, time required to submit the application in person, time spent identifying local building code variations, time spent at system installations, delays in project development as a result of coordinating

construction schedules with varying permit review time periods, and increased expenditures on sales and marketing resulting from consumer mistrust of solar developers when permitting delays occurred. In response to these issues, Sun Run (2011) has suggested the following local agency process improvements:

- Adoption of the standardized permitting processes for residential solar PV systems of 10 kW or less, as specified in the Solar ABC's Expedited Permit Process for PV Systems (Brooks, 2011);
- Reduction of permitting fees to \$250 or the cost of issuance;
- Permit review period of no more than three business days;
- Electronic submission of permit applications;
- Elimination of "in-process" (prior to completion) inspections;
- And reduction of inspection time periods to two hours or less.

In California, at least three studies have focused on discrepancies in solar PV permitting costs between communities. Beginning in 2006, the Utility Consumers' Action Network (UCAN, 2006) examination of fees in San Diego County found that costs for solar PV permits ranged from as low as \$22.50 to \$500 and were assessed according to both flat fee structures and valuation structures amongst the 17 communities surveyed. The study further found that the permit submission materials also varied between communities, and that in some cases agencies surveyed for the study did not have standardized submission requirements. In assessing these findings, UCAN (2006) suggested

that the ambiguous permitting environment in San Diego hindered solar PV development due to the lack of process transparency and, in some communities, the exaction of permit fees that were unnecessarily high.

Focusing on the Bay Area, Solar Tech (2011), in conjunction with San Jose State University performed a study of solar permitting and inspection processes in the San Francisco Bay Area (Bay Area). In addition to speaking with municipal agencies, the study also surveyed solar developers with installation experience in the study area. The organization found that permitting agencies and solar developers in the Bay Area reported the following (Solar Tech, 2011):

- Limited staff exposure to training specifically oriented towards solar issues;
- Variation in the use of guidelines for declaring standards in permit review and project inspection;
- The existence of plan review periods that ranged from less than one day to more than a week;
- Variation in the time period reported for scheduling and completing inspections;
- Variation in inspection failure rates and causes of inspection failure.
 - Reasoning cited for inspection failure included:
 - Electrical issues including inadequate grounding and mismanagement of pre-existing electrical issues;

- Improper signage/labeling;
- Inconsistency with approved plans;)
- Failure of Cal Fire inspections)

In response, Solar Tech (2011) offered the following recommendations:

- Development of statewide permitting standards;
- Formation of local coalitions to develop regional standards based upon government and industry collaborations in substitution of statewide guidance.

A report produced by the Sierra Club in early 2011 more specifically addresses the permitting environment in Marin County. As part of an ongoing study process to review solar PV permit fees across California, the report detailed the variation in permit assessment fees in the cities towns and County of Marin. While reporting that fees for properties zoned commercial in the County of Marin can reach as high as \$27,000 for a 131 kW roof-mounted solar PV installation, the authors assert that fees based on the valuation method (rather than a flattened rate for all projects) is unreasonable given the limited time required for review (Crawford, Mills, Newick, & Troyer, 2011). The study additionally reported that commercial PV permit fees averaged about \$6,000 per 131 kW project and thus exceeded the max cost recovery amount of \$2,540 suggested by the authors. For residential projects of 3 kW capacities, the authors have suggested a max fee of

\$485, which was met by all but two of the Marin communities. In response to their findings, Crawford et al. (2011) recommend that the Marin communities (1) streamline permitting procedures to incorporate fire, planning, and building review into a single process; and (2) assess fees according to the Excel-based calculator provided in their report.

4.0 Methodology

In seeking a comprehensive overview of wholesale solar PV interconnection and permitting for MEA FIT participants, the study project employed the use of a literature review, surveys, and a number of in-person and over-the-phone discussions. A review of data on PG&E executed FIT contracts and existing wholesale interconnection requests was also included. Stakeholders identified for project participation included solar developers, PG&E representatives, and community development officials. Details regarding the selection of these methodologies and stakeholders is described below but was generally founded in the focus of the guide development process on expanding upon existing resources to provide property owners and solar developers more clarity regarding the application of permitting and interconnection procedures relevant to participation in the MEA FIT program.

4.1 Project development

The project was initially framed based on interactions with the MEA during a summer internship. As a result of a public meeting on the MEA FIT rate structure, the reference guide was suggested by the author. This was done in response to stakeholder recommendations during the public review regarding the need for the MEA to leverage existing relationships with local governments and the utility to assist distributed generators in regulatory compliance prior to project

development. The limited staff and resources of the MEA were noted as barriers to the development of such a role. The reference guide was thus suggested as a supplemental tool to assist property owners and solar developers in navigating the complex and often confusing permitting and interconnection procedures.

4.2 Literature Review

The initial stages of the project were informed by the literature review presented earlier. Subjects of review included regulation of interconnection procedures, regulation of solar PV permitting procedures, assessments of barriers to small-scale distributed generation, and procedural structures and actions that may support increased participation in small-scale distributed generation programs.

Literature formats reviewed for the project included:

- Industry reports and studies;
- Government sponsored research and industry evaluations;
- Responses and decisions submitted in regulatory proceedings;
- Local agency board meeting packets;
- Construction and zoning regulations;
- Procedural applications and guiding documents;
- Utility tariff and procedural documents.

The literature review was concentrated on procedural issues related to the timeframe, submittal requirements, and costs associated with the interconnection and permitting of residential and commercial solar PV facilities for FIT

participation. As discussed in the literature review, a number of issues were identified as being of current industry concern regarding increased adoption of small-scale distributed solar PV generation. The central topics related to solar PV permitting included agency inexperience with solar PV permitting, inconsistency between agency approaches to solar PV permitting, and the variation in cost of solar PV permitting between agencies. The review of interconnection literature focused on the jurisdictional right of state and federal agencies over interconnection procedures, the essential aspects of interconnection standards, the cost and time frame required for interconnection, and the differing perspectives regarding the conflict between grid safety and aversion to ratepayer cost allocation versus reduced costs for DG developers and increased ability to pass the screening process.

4.3 Survey Development

Four surveys were developed for the separate stakeholder groups identified as pertinent to the focus of the study project. Each survey was informed by the literature review and any preliminary discussions with stakeholders. The process and associated challenges experienced in identifying survey participants and developing the surveys is described below.

4.3.1 Participant Identification

Existing studies on interconnection and permitting of DG helped to identify the four stakeholder groups that would be sought for participation in the study.

These included: public planning departments, building departments, representatives from the PG&E Wholesale Interconnection Department, and solar developers experienced in the FIT interconnection process within the PG&E service territory.

Communication with these groups was initiated during the early stages of project development. In most cases, this involved Internet searches for contact information followed by email requests for participation. The process was more difficult than anticipated, and in hindsight, included the following assumptions that were generally found to be incorrect:

- Representatives from local public agencies were expected to be willing participants due to pre-existing community relationships with the MEA;
- Solar developers experienced with the PG&E wholesale interconnection process were thought to be easily identified using public queue information provided by PG&E;
- Participation from PG&E representatives was envisioned to be difficult as a result of a challenging past history between PG&E and the MEA.

4.3.2 PG&E

Triangulation of information regarding interconnection procedures, costs, and timeframes was the underlying motivation for seeking the inclusion of the utility in the data collection process. In pursuit of a survey participant, PG&E Generator

Interconnection Services (GIS) was contacted by email. This initially resulted in a response with directions to further contact another colleague of the respondent. Initial electronic communications with this individual noted that his role was to assist applicants in navigating the PG&E GIP, which is the appropriate interconnection standard to be followed by projects seeking participation in the MEA FIT. The representative proved very helpful in responding to the survey, making recommendations regarding additional survey participants in his department, and in participating in a brief follow-up interview.

4.3.3 Private Sector Participants

The initial project design assumed that surveying solar developers experienced in the subject matter of the project would be necessary for identifying any differences between stated procedures and actual experiences. It was realized early in the literature process that FIT projects are rare in comparison to overall solar PV development in California. It was further found that publically available data on current interconnection requests did not provide identifying information, and only one request had been made within Marin County. It may be noted that this particular request was already known to be a current applicant to the MEA program with which contact had been previously established. The review of PG&E data also noted that none of the 70 queued solar PV projects had achieved interconnection and commercial operation at the time of examination.

A review of public data on PG&E executed FIT projects did provide limited information that allowed for the identification of project owners. Interestingly, this data noted that only four companies held the 26 solar PV FIT projects having a capacity of 1 MW or less. Each of the four organizations was contacted to request participation in the survey process. To seek additional participation, Internet searches were conducted to identify solar PV developers and other industry participants that might have experience in developing projects with capacities as large as 1 MW. These searches included direct contact with solar PV development organizations, as well organizations known to assist with private lobbying and the development of industry standards. This process resulted in contact with 25 solar industry participants, of which 17 were solar installers or property owners. In addition, the author attended the Solar Tech Solar Leadership Conference in March of 2012. This resulted in the identification of two additional solar developers appropriate for participation.

Including those developers contacted at the conference and the four identified from the PG&E data, only 10 responses were received. The majority of these responses stated that the organization neither had experience in the area of interest nor knew of any other organizations to contact. In one case, the author was contacted and asked whether he was impersonating another solar developer seeking to uncover trade secrets. This notion helped provide insight as to possible reasons for the limited response for participation requests.

The contact process ultimately resulted in three confirmed commitments to participate in the survey. Surveys were delivered electronically with instructions and a requested date of completion. Though reminders were sent, only two of three confirmed participants submitted responses.

4.3.4 Local Agency Representatives

Each of the planning and building departments in the communities of Marin County was contacted separately in order to request participation in the survey. In most cases, contact was initiated through an email that explained the purpose and background for the project. Wherever possible, specific employees were contacted rather than sending requests to the general department email address. In most cases, contact was initiated with the Community Development Director, the Planning Director, or the Chief Building Official.

This effort proved more challenging than anticipated. From the onset, there was limited response from the agencies contacted. Of those responses received, many were opposed to participation. Reasons given included general avoidance of survey participation, lack of time or staff, and the belief that the particular agency or jurisdiction had too little involvement or experience in the project subject matter.

In response, multiple emails urging participation were required for some jurisdictions. In the end, 10 of 12 planning agencies confirmed a willingness to participate. Of the 12 building departments contacted, only six responded with a confirmation to participate. Of the remaining six, three replies denying participation were received.

Only six responses were ultimately received. These were split equally between building and planning departments, but were not supplied by the same jurisdiction in all cases. Follow-up interviews were eventually conducted to supplement the lack of participation.

4.4 Survey Development

Four separate surveys were constructed for the three stakeholder groups (separate surveys were used for planning and building departments). Surveys included both multiple choice and open-ended questions, and ranged in length from 12 to 26 questions. In the case of multiple-choice questions, respondents were additionally provided space to provide additional relevant information. Blank survey forms, as well as the responses provided, are provided in appendix A of this report.

The questions included in each survey were developed from both the literature review and preliminary contact with various stakeholders. The subjects

addressed in each survey included procedural application, cost, timeframe, and reoccurring issues that resulted in either project delays or increased financial burdens. Questions were generally sought to confirm publically available information or to develop supplemental insight in cases where the necessary information was not readily available in online documents. Survey questions addressed to public agencies focused solely on aspects of the permitting procedure including the timeframe for plan review, the role of the planning department in reviewing solar PV projects, and any mistakes commonly made by applicants that result in increased permit costs or delays in the project review process. Those questions addressed to PG&E representatives focused narrowly on the Fast Track interconnection process including the overall timeframe for completion, the costs associated with Supplemental Review, and recommendations for avoiding failure of the Fast Track screening process. Surveys sent to solar developers were informed by the responses of the stakeholders and sought to further confirm information previously collected and to provide additional insight into permitting and interconnection challenges from the perspective of the applicant.

Each survey was originally drafted to include a large number of questions. These were then edited and unnecessary questions were removed in pursuit of increasing the likelihood of participant response. Once a first draft was completed, a faculty advisor in the City and Regional Planning Department

reviewed each survey. This process assisted in developing a second draft with even fewer questions that more readily focused on multiple-choice answers.

Once completed, the surveys were developed into an online format using Google-Docs. In addition to being free of charge and easy for survey respondents to use, this service was chosen because it allowed survey responses to be easily downloaded as a Microsoft Excel spreadsheet. Thus the format was thought to be the most cost efficient method that minimized participant effort while providing easy to analyze response structure.

4.5 Post Survey Interviews and Discussions

Post-survey in-person interviews were conducted with planning and building representatives in most of the communities that did not submit a survey response. In addition, interviews were also sought when clarification as to the provided survey response was needed. Multiple discussions were also conducted over-the-phone with representatives from the PG&E Wholesale Generator Interconnections Department. These discussions generally sought to clarify and compliment the survey response provided.

Interviews with planning and building officials took place during March of 2011 and were conducted in-person. This process sought contact with the nine communities for which no response from either the building or planning

department was received. For most agencies, the process involved a discussion with the counter staff of the building department followed by a brief discussion with a representative of the planning department. In very few instances the interview included discussions with the agency building official.

As a general observation, it was found that planning and building staff were more forthcoming with information than expected. In comparison to the generally uncooperative email responses, representatives contacted in-person were found to be welcoming and mostly willing to discuss the solar PV permitting procedure.

Each interview employed the use of guiding questions developed from the surveys originally submitted to the departments. In recognition of the directive to limit discretionary review of solar PV projects provided in AB 2473, building departments were treated as the front line of the solar permitting process and so became the central focus for understanding localized approaches to the issuance of solar PV building permits. Questions directed to the planning department were reduced to a single inquiry regarding what role the department performs in the process for reviewing solar PV building permits. Interviews were largely informal and allowed for open-ended responses. While the questionnaire tool was employed, the format was more conversational. This allowed for representatives to provide experiential information that may have been missed should the process have followed strict adherence to the interview tool.

5.0 Assessment

The literature reviewed informed the focus of the assessment process by establishing increased procedural transparency, the minimization of project cost, and the avoidance of any development delays as the primary subjects of interest. These considerations thus directed the process of procedural review and survey assessment towards the development of a condensed resource guide highlighting the points of submission and associated submission requirements, costs, and timeframes for each stage of the permitting and interconnection process. In conjunction with this, the assessment process additionally sought to provide recommendations for MEA action to reduce any barriers to FIT participation stemming from those procedures examined in the process of developing the guide.

The surveys and interviews provided complementary information that was comparatively assessed against the procedural information digitally available to the public online. This process began with the development of reference sheets on each of the PG&E GIP Fast Track interconnection process and the municipal permitting procedures implemented in MEA service territory. Together, these documents established an overview of the conditions faced by property owners and solar developers seeking participation in the MEA FIT program.

For the interconnection process, the development of the reference sheets focused on gathering information provided in the PG&E WDT and the associated

GIP Handbook. Timelines, factsheets, and the on-line Solar Photovoltaic and Renewable Auction Mechanism Map were reviewed as part of this process. The general focus remained on extracting information relevant to providing MEA FIT applicants with a general understanding of the interconnection requirements and a description of those resources available to assist in the process.

For the permitting process, a thorough review of each of the 12 agencies websites was conducted. The review sought information relevant to solar PV development, including agency contact information, submittal requirements and fee schedules, information regarding the inspection process and the scheduling of inspections, as well as any zoning considerations directly noted by the agencies as pertinent to solar PV projects. The review also sought identification of any existing resolutions, ordinances, or otherwise formal policies related to solar PV development.

Information gathered through survey and interview responses was used to verify the procedural understanding developed in the initial review process while also assisting in the identification of barriers or challenges to efficient project planning. Those responses associated with the permitting process informed of the differing community review time periods, submission requirements, and role of the planning staff in reviewing solar PV building permit applications. Likewise, responses to questions related to interconnection noted the points at which costs

and timeframes are variable as a result of the circumstantial nature of the interconnection process.

The experiential knowledge provided by the participating stakeholders confirmed that property owners and solar developers face practices that vary according to a number of project characteristics including location, zoning, proposed generation capacity, and existing infrastructure conditions. The survey responses were generally helpful in identifying important points of consideration for reducing project costs and timeframes. For the permitting process, this largely involved respondents noting common issues that could be avoided through more thorough and informed project planning and implementation. In terms of interconnecting, this largely focused on the need for applicants to integrate certain resources into the siting and application process as to reduce the potential for the presences of circumstantial elements that increase interconnection costs and timeframes.

Table 1: Common Issues Cited by Project Stakeholders

Stakeholder Cited Issues		Potential issues affecting cost and time of solar PV FIT project development (As noted by Study Participants)	Stakeholder Raising Issue		
			Utility (PG&E)	Solar Developer	Marin Community Permitting Agencies
<p>The survey and interview process asked participating stakeholders to note potential issues or challenges that affect the cost and timeframe for permitting and interconnecting solar PV projects. Responses were provided in an open format that allowed participants to freely express how these issues affect the associated procedure and what participants may do to reduce the likelihood to encounter the noted issues.</p> <p>These issues are further described in the findings sections and were incorporated in the development of guide as assist property owners and solar developers in reducing project costs and timeframes by avoiding common mistakes.</p>	Issue	Incomplete Application			X
		Inadequate Documents			X
		Inadequate System Labeling			X
		Inadequate Equipment			X
		Limited Property Owner Oversight			X
		Inexperience with Local Process			X
		Cost & Time Frame Ambiguity (Permitting)			X
		Poor Project Siting	X		
		Cost & Time Frame Ambiguity (Interconnection)		X	
		Inadequate Financial Security	X	X	
		Inadequate Site Control	X		
		Failure to secure FIT Agreement	X		

The assessment process was largely focused on informing the development of a number of informational tools to be inserted in either the guide or the recommendations report to be submitted to the MEA. The reference sheets were the first of these. One additional resource developed was a combined timeline displaying the approximate procedural scheduling for interconnection, permitting, and execution of a MEA FIT contract. Timelines were also created for the 10-kW interconnection process and the reported permit review periods.

6.0 Findings

Property owners and solar developers face significant challenges in anticipating the cost and timeframe for permitting and interconnecting solar PV facilities for participation in the MEA FIT program. The combination of survey responses and review of public data provided by PG&E denotes that limited experience with the interconnection and permitting of solar PV projects as large as 1 MW for wholesale participation exists. Costs and timeframes for permitting and interconnection were found to vary according to the jurisdictional, environmental, infrastructural, and technological characteristics of the project. The complexity of these circumstantial characteristics in combination with access to limited resources for understanding the implications of siting and design decisions upon permitting and interconnection costs and timeframes reduces the ability of property owners and solar developers to accurately estimate the installed costs of solar PV development for participation in the MEA FIT program.

With regards to interconnection, variation in cost and timeframe is most influenced by the incidental characteristics of the existing utility infrastructure and the presence of previously requested or already interconnected generation projects. Applicants are generally unable to anticipate these features, as there is a lack of information and tools to identify past experiences of prior applicants or existing site conditions. In some cases, applicants may face the potential for unlimited cost burdens and unpredictable timeframes prior to and at the time of submission. As such, integrating precise estimates of interconnection costs and

timeframes into project planning is difficult task that cannot necessarily be done in an accurate manner.

The permitting process may be equally difficult to predict. The time required for permit review ranged from over-the-counter to six weeks and was noted as being dependent on the availability of staff and the size of project. Likewise, survey responses noted the fee assessment method varied both amongst and within communities. Flat fee and valuation fee assessment methods were both found to be implemented. Some communities use both these methods and rely on project zoning to determine the appropriate assessment. The number of plan sets required for submission varied in size and number, and the procedures for scheduling inspections, as well as the time periods during which inspections are offered were additionally found to vary between communities.

Responses from the planning and building staff noted that experience with permitting solar PV was largely limited to small-scale residential projects. While these project may move quickly through the permitting project, standardized information as to how project design may avoid more significant review or what the costs or timeframe associated with an in-depth review was not found.

6.1 Limited Stakeholder Experience

6.1.1 Interconnection

Review of public data on PG&E executed FIT projects and currently queued interconnection requests reveals a limited experience in interconnecting projects within the defined interest of the study. With regards to FIT contracts executed by PG&E, an overwhelming number were found to employ solar PV technologies. Less than half of these, however, are designed with a capacity of 1 MW or less. None of the executed contracts had reached commercial operation at the time of review or were located in Marin County.

Table 2: PG&E Executed FIT Projects
Data Source: PG&E (2012a)

Overview of Current Information on PG&E Executed FIT Contracts for Solar PV (May 1, 2012)	
Percentage of PG&E Executed FIT Contracts that Employ Solar PV Technology (n=101)	78%
Percentage of Executed PG&E Solar PV FIT Contracts with a Capacity of 1 MW or Less (n=79)	37%
Percentage of PG&E Executed FIT Contracts Employing Solar PV that are of 10 kW or less in Capacity (n=101)	0
Number of PG&E Executed Solar PV FIT Contracts that have achieved Commercial Operation as of 1/5/12 (n=101)	0
Number of PG&E Executed FIT Contracts Employing Solar PV & Located in Marin County (n=101)	0

There were also no projects of 10 kilowatts (kW) or less. This indicator is considered to be of importance because the PG&E GIP permits expedited interconnection with reduced costs for certain generator projects of this size. In

Table 3: Current PG&E WDT Fast Track Study Indicators
Data Source: PG&E (2012b)

Review of Projects Currently Queued in PG&E WDT Fast Track Study (Interconnection Under GIP) Reviewed 5-1-12		
Indicator	Quantification	Finding
Number of Currently Active Interconnection Requests in the Fast Track Queue	150	
Percentage of projects listed in the Fast Track Queue as active, having Initial Review complete, and having initial review issued within maximum of 19 Calendar Days (15 Business Days) of Application Completion (n=86, project active & initial review complete)	9%	Once Application status is completed, PG&E is to issue the Initial review within 15 business days (19 calendar days at most). Only a small number of projects in the queue had the initial reviews issued within this time period.
Average number of days between application completion and Initial Review Issuance for projects listed in the Fast Track Queue as active & having Initial Review complete and issued	53	On average, the time period between application completion and initial review completion is 34 days longer than stipulated by the GIP.
Percentage of projects in the Fast Track queue that are active, have completed the Initial Review and pass initial review. (n=79, project active & initial review complete)	10%	At the time of review, 90% of Fast Track applicants having completed initial reviews did not pass the initial review.
Percentage of queued projects having completed study and passed Fast Track (n= 41, queued projects having completed study)	22%	For currently queued Fast Track projects, over 75% could not be interconnected through the Fast Track study.
Technical Screens commonly failed by Fast Track applicants currently in the queue (n= 79, projects having initial review completed)	Screen: Times Cited (% of Reviews Cited In) 2: 39 (49%) 4: 20 (25%) 5: 4 (5%) 6: 2 (3%) 9: 3 (4%) 10: 37 (47%)	Fast Track applicants most commonly fail the initial review for reasons related to exceeding the 15% of Peak Line Load, contributing to more than 10% of the maximum fault current in aggregate with other generators on the line, and triggering the need for distribution or network upgrades as a result of generator impact on the grid.
*Review of queued Fast Track projects with completed applications did not include 3 projects listed as having completed the Initial Review prior to the date of application.		

conjunction with this, the survey and interview responses noted that the majority of solar PV projects in their jurisdictions are located on smaller residential properties. As such there may be great potential for the expedited 10 kW interconnection processes to reduce the cost and timeframes for certain potential FIT participants. However, the lack of executed FIT contracts of this size

denotes that the process interconnection process set forth in the GIP has yet to be tested. The PG&E representative who responded to the survey confirmed this assumption as correct.

6.1.2 Permitting

Planning and building officials have noted limited land use capacity for accommodating large solar PV facilities in Marin. As noted above, the participating municipal representatives also reported that most submitted projects were located on residential properties. The majority of experience in permitting solar PV projects in the communities of Marin is thus mostly restricted to projects located on residential properties of limited size. Accommodating project proposals for projects as large as one (1) MW within existing permitting structures may consequently be challenging for the planning and building departments in Marin and thus result in unanticipated review costs and timeframes.

During the survey and interview process, building department staffs were asked to comment on whether people in the department had received training specifically related to solar PV. Respondents provided that, to their knowledge, building officials participated in continuing education that included review of solar PV practices. More insight into this subject was provided during an opportunity to discuss review and inspection issues with the Corte Madera Building Official.

During conversation, the official noted that he had attended the Bill Brooks lecture on the Solar ABC's Expedited Solar PV Permitting and Inspection process, but further asserted that review of larger systems as well as those incorporating increasingly innovative technologies provided a challenge due to lack of experience or knowledge of the included equipment. In association with this insight, the official suggested that additional training would be a welcomed help.

6.2 Limited Data and Guiding Information

The capacity to anticipate permitting and interconnection costs and timeframes affect the ability of property owners and solar developers to efficiently plan for and finance a solar PV project. As discussed here, currently implemented permitting and interconnection procedures do not provide property owners and solar developers with the capability to fully anticipate these considerations.

6.2.1 Interconnection

The PG&E GIP Fast Track procedure involves up to seven separate stages. The costs and timeframes associated with these stages are established in the PG&E GIP. To provide potential applicants with a more in-depth understanding of the actual interconnection experience, PG&E provides the public with two interconnection queue spreadsheets denoting all current interconnection requests. These spreadsheets provide the public with a bare minimum amount

of data for evaluating actual interconnection experiences associated with differing project sizes, locations, and chosen study tracks.

These data sets do not readily permit users to deduce the time periods experienced for all stages of the interconnection process. The data sets also fail to provide any information associated with the incurred cost of interconnection requests. Data is, however provided to estimate the actual experienced time of review for solar PV Fast Track applicants. In conducting the examination, it was noted that for most projects, the period experienced for initial review extended beyond that provided in the PG&E GIP. This suggests that the overall time period required for completing the interconnection process may take longer than provided in the GIP, thus making it difficult to accurately plan for project development. Survey responses on this subject varied. The representative from PG&E provided that the interconnection process for Fast Track projects generally occurred within a couple of weeks before or after the 52-week estimate provided in the GIP. One solar developer was in agreement with this, while another stated that the process might take as long as 80 weeks. Unfortunately, this information cannot be verified as neither of the public data sets provides a date for the completion of the final Engineering, Procurement, and Construction (EPC) phase of the interconnection process.

The cost of interconnection is also a concern for which there is a lack of available information. While the GIP requires Fast Track requests to provide an

application fee of \$500, there exist a range of additional costs of which there is no data available for. This begins with the Supplemental Review process and the cost of interconnection facilities. After an application is deemed complete, interconnection requests moved to the secondary stage of Initial Review. During this period, the project and the infrastructure existing at the proposed point of interconnection are evaluated against 10 technical screens. These screens largely focus on evaluating the impact of the generator on the grid with consideration to impacts on grid reliability and safety. If the proposed generator passes all ten screens then the project is allowed to move forward and the applicant is offered an interconnection agreement detailing the costs of installing any required interconnection facilities. If the project fails any of the 10 screens, the GIP grants PG&E the flexibility to either approve the project or require supplemental review. Review of the existing queue data provided that nearly half of all solar PV Fast Track applicants with projects of 1 MW or less required Supplemental Review. It was further found that 78% of projects having completed the Fast Track process have not been permitted to interconnect without examination under the more costly and time consuming Independent Study or Cluster Study procedures.

The GIP neither provides an estimate for the cost of Supplemental Review or the potential costs for any required interconnection facilities. Survey respondents were asked to reflect on whether it is possible to approximate these costs. The

Solar developers and the representative from PG&E provided that these costs were too circumstantial to allow for cost estimations. In further discussions, the PG&E representative suggested that the average costs of supplemental review and interconnection facilities were \$1500 and \$200,000, respectively, but additionally asserted that these costs can vary substantially. Likewise, one solar developer provided that it is impossible to accurately estimate these costs before entering Supplemental Review. The other solar developer response provided an estimated maximum of \$900,000 for the Supplemental Review and interconnection costs.

Table 4: Current PG&E WDT “*All Queued*” Interconnection Request Indicators
Data Source: PG&E (2012c)

Review of Projects Currently in PG&E WDT Queue (Interconnection under GIP) Reviewed 5-1-12		
Indicator	Quantification	Finding
Total Projects in WDT Queue	500	
Percentage of Queued Projects Employing Solar PV (n=500)	89%	The majority of wholesale generator projects seeking interconnection in the PG&E service territory employ solar PV.
Percentage of Queued Solar PV Projects Requesting Fast Track (n=443, queued, solar)	47%	Less than half of queued wholesale solar PV projects request Fast Track
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 MW or less (n=287, queued, solar, Fast Track)	72%	Majority of queued solar projects of 1 MW or less request Fast Track
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 or less, Active Status & Interconnection Agreement Tendered or Executed (n=52, queued, solar, Fast Track, ≤ 1 MW, Active status)	13%	There is a limited number of solar PV projects in the Fast Track that have completed the study process
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 or less with Active Status & Interconnection Agreement Tendered or Executed that Required Supplemental Review (n=7, queued, solar, Fast Track, ≤ 1 MW, Active status)	43%	Almost half of the currently queued solar PV projects of 1 MW or less that have completed the study require supplemental review.
Number of Queued Solar PV Projects of 1 MW or Less Located in Marin	1	PG&E has limited experience in interconnecting wholesale solar PV projects through the GIP process in Marin.
Percentage of Queued Solar PV Projects of 1 MW or Less Requesting Cluster Study (n=80 , queued, solar, ≤ 1 MW)	0%	No wholesale solar PV projects of 1 MW or less have requested Independent Study.
Percentage of Queued Solar PV Projects of 1 MW or Less Requesting Independent Study (n=80 , queued, solar, ≤ 1 MW)	6%	Very Few wholesale solar PV projects of 1 MW or less have requested Independent Study.

The GIP does not detail what potential interconnection facilities may be required or the costs for such facilities. This information is also not provided for those projects listed as having completed an interconnection agreement in the

publically available queue data. Given that the GIP places the cost of all necessary network or reliability improvements, as well as any interconnection facilities upon the applicant, generator projects face a significant potential for unknown costs when requesting a wholesale interconnection.

FIT projects face further uncertainty with regards to the possibility of failing the Fast Track procedure. This occurs when the results of the Initial Review and Supplemental Review find that the project cannot be interconnected without further in-depth engineering studies of the project impact in aggregate with other interconnected or requested generation project. When this occurs, applicants are forced to either retire their interconnection request or move to the Cluster Study or Independent Study process.

It is important to note that these study processes incorporate timeframes and costs differing from those included in the Fast Track procedure. When having to move a project review from the Fast Track to either of these procedures, the applicant will forfeit any expenditures made during the Fast Track evaluation while additionally being required to submit an initial deposit of \$50,000 plus an additional \$1,000 per MW of project capacity. In reviewing the public data on the Fast Track queue, it was found that only 22% of currently queued Fast Track requests incorporating solar PV facilities of 1 MW or less were deemed able to be connected via the Fast Track process. Thus the overwhelming number (78%) of

Fast Track applicants currently face either project cancelation or the requirement to extend the cost and timeframe for interconnection beyond that which was assumed at the time of submission.

6.2.2 Permitting

The cost and timeframe of permitting for solar PV facilities in Marin is also difficult to predict. The state has attempted to provide guidance on this issue through California Assembly Bill (AB) 2473 (2004), which limits the ability of local governments to apply discretionary review to solar PV projects unless specific and quantifiable concerns related to public health and safety are identified. While the law is generally interpreted as limiting review to building permits, actual implementation varies between communities.

In some Marin communities, planning departments do not review building permit applications for solar PV projects. In others, almost all projects must pass through design review. The case-by-case nature is typical of the development process but also complicates project planning as applicants may not be able to predict the level of review and required timeframe. Furthermore, review periods vary greatly between communities. A number of communities have established over-the-counter review processes for PV projects. Others, however, reported that review periods depend on a number of conditions including project zoning, project size, current workload, and available staff.

Local Agency

Solar PV Building Permit

Plan Review Timeframe

Reported plan review Timeframes assume that the department does not determine need for design review. Design review may be required if the project is inconsistent with zoning regulations or if the building department is concerned with other health or safety issues raised by the project. Applicants with projects requiring design review should work with the agency to determine extent of time required for further review.

Figure 1: Reported Permit Review Times for the Communities of Marin

The documentation of procedures intended for solar PV project permitting is also limited. Only two communities in Marin have passed solar ordinances or resolutions providing official guidelines on how a project will be reviewed. It was also found that only one community provides application materials specifically related to solar PV building permits.

Solar developers may be required to spend additional time identifying the process for scheduling an inspection or figuring out when construction is allowed. Though these are basic parameters influencing the completion of all permitted projects, it was found that some communities in Marin do not readily provide this information or even a building permit application online. As a result, solar developers do not have quick access to foundational information that affects the timeframe in which a solar PV project may be developed.

Mechanisms for establishing the cost of solar PV building permits also differentiate depending on project characteristics and location. In some communities a flat fee has been established. Others, however, assess permit fees through a valuation method based on the installed cost of the project. Identifying this information can be time consuming for property owners and solar developers since the information provided by municipal agencies online is often lacking clarity on this issue.

Solar PV projects also face cost uncertainty should the building official determine that further discretionary review is required. This more specifically speaks to the potential for projects to encounter environmental review under the California Environmental Quality Act or for community design review processes to require design alterations. Should the process associated with the California Environmental Quality Act result in the need for an Environmental Impact Report, the cost could potentially render the project financially infeasible. Similarly, alterations as a result of design review are likely to affect project output, thus impacting the return-on-investment (ROI) originally anticipated.

Predicting the likelihood of more in-depth review prior to submission will likely require contact with planning and building staff prior to project submission. In echoing this, the survey responses and interviews repeatedly noted that establishing early contact with municipal agencies was critical to minimizing permitting costs and timeframes. Associated with this, respondents also noted that understanding local building and zoning requirements and incorporating them into a project design is the most efficient manner for avoiding more in-depth project review when applying for building permits.

In speaking with planning and building staff, the Marin Map (<http://marinmap.org/dnn/>) was identified as a new resource for property owners and solar developers seeking information on project site constraints. This online

tool incorporates the use of a Geographic Information System user interface in order to provide users with data related to property zoning, soil conditions, environmental hazards, and other site conditions that may affect project design and permitting. Review of this tool found that information is not available for all communities. It was also recognized that the user interface may be challenging for those inexperienced in using Geographic Information System interfaces.

6.3 Common Fast Track Screening Failures

Review of the PG&E data set on existing Fast Track interconnection requests found that only 10% of projects having completed the Initial Review screening passed. The most commonly failed screens at this time are:

- 2.** GF (generation facility), in aggregate with other generation, shall not exceed 15% of Peak Load (49% failed).
- 4.** GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current (25% failed).
- 10.** No construction of facilities by PG&E (distribution or network upgrades) (47% failed).

With the exception of screen 10, which depends on existing infrastructure conditions, these screens refer to the distribution line Peak Load and maximum fault current limits at which PG&E automatically assumes the need for further engineering study of the impacts upon power reliability and grid safety associated

with a proposed project. In addressing the use of these technical limitations as point at which further review is warranted, Keyes and Fox (2008) note that since the development of the SGIP (the precursor for the current GIP) utilities have gained significant experience in connecting small-scale distributed generation to the grid. As such, the 15% and 10% limitations used in screens 2 and 4 are suggested to be outdated and unnecessarily low (Keyes & Fox, 2008). During FERC proceedings on combining the LGIP and SGIP into the GIP, the Solar Energy Industries Association (SEIA, 2010) further asserted that, given increased application for small-scale interconnection, the levels used in these screens are unrealistic and in conflict with increased DG capacity sought through programs like the RPS, FIT, or the CSI.

6.4 Lack of Adequate Tools for Site Evaluation and Submission

Study respondents repeatedly noted that the cost and timeframe of interconnecting and permitting those projects addressed in the guide is significantly influenced by conditions at the project location. As such, the ability to anticipate environmental and infrastructure conditions of a proposed site can significantly affect the estimation of interconnections and permitting costs and timeframes. Tools for anticipating and evaluating these conditions are thus important to identifying the level of funding needed to see a solar PV project through the development process.

Information provided by the participating representative from PG&E noted that the ability to pass the Fast Track Initial Screen is greatly improved when siting a project near distribution lines having substantial capacity and away from other existing or requested generation interconnections. Tools available to the public for the interconnection process include the PG&E Renewable Auction Mechanism (RAM) map and the two public data sets on existing interconnection requests. From the data sets and map, project developers may identify existing distribution lines, substations, and interconnection requests located within the county of the proposed project. These resources do not, however, provide data regarding existing and available line capacity or the specific location of requested projects. It is appropriate to additionally note that the two publically available data sheets on exiting interconnection requests lack consistency in the indicators provided to users. For example, those viewing the Fast Track only queue will find information on the period required for the Initial Review and whether or not a given project passed or failed the Fast Track, but is not given information regarding the county in which the project is located, the nearest substation, or whether the a failed Fast Track project continued through to a Cluster Study or the Independent Study. Likewise, those viewing the “All Projects” queue are provided with information regarding location and substation name, but are not provided with information regarding the length of the Initial Review period or whether a certain project passed the Fast Track process. In effect, the lack of data access and consistency ultimately limits the conclusions that may be drawn.

For siting considerations related to project permitting, the zoning and building codes, as well as the Marin Map are provided to the public online. As users may identify the development restraints for a given property with these tools, solar developers and property owners in Marin are regarded as having access to reasonably adequate siting resources. Room for improvement does, however, exist for providing potential applicants with case study information regarding experienced permitting costs and timeframes for projects that do not readily comply with identified development constraints.

It should also be noted that the data collection process did not identify any opportunities for applicants to submit either an interconnection request or a building application online. Online submission systems were noted by Sun Run (2011) as assisting in minimizing experienced costs by reducing expenditures by solar developers associated with in-person submissions. At the time of review, the PG&E website for wholesale interconnections did provide that an electronic submission process would be forthcoming. This was, however, consistently presented on the website over the 9-month study period. None of the responding municipal stakeholders suggested that online submission systems are currently under consideration.

6.5 Variation in Permitting Procedures

Variation between community procedures may increase development timeframes and costs, as solar developers are required to become familiar with the

Table 5: Variation Permitting and development requirements identified during the research process.

Solar PV Permitting: Procedural Variance

In conjunction with the review of online documents, survey responses and interviews helped identify the variations in procedural approaches amongst the communities of Marin. As detailed below, solar developers face varying submission requirements, fee structures, review periods and times during which construction is allowed. Likewise, property owners in some communities will encounter varying permit review periods and fees depending on the zoning of their project rather than the impact or benefit to the community.

Community	Submission	Flattened Building Permit Fees		Plan Review Return Period		Development Limitations	
	Plan Sets Required	Residential	Non Residential	Residential	Nonresidential	Expedited Permitting Process	Work allowed on Saturday
Belvedere	5	No		3 days	Up to 2 weeks	No	No
Corte Madera	4	Yes	No	3 Weeks		No	Yes
Fairfax	3	Yes-fees waived		Typically 1 day or less		Yes	Yes
Larkspur	3	Yes	No	Over-the-counter or within a week		Yes	Yes
Marin County (unincorporated)	4	Yes for projects under \$10,000		Approximately 1 week		No	No
Mill Valley	3	Flat-No Fee		Over-the-counter for 10 kW or less	3 Weeks	Yes-for Roof PV less than 10 kW	No
Novato	3	Yes		Over- the-counter or within a week		Yes	Yes
Ross	3	No		4-6 weeks		No	No
San Anselmo	3	Yes		A few days		No	Yes
San Rafael	3	Yes	No	Over-the-Counter	Up to 3 week	Yes for roof-mounted residential projects	Yes
Sausalito	4	No		5 days expedited, otherwise 2 weeks		Optional	Yes
Tiburon	3	Yes-Fees waived for projects that meet Town's Criteria		3-5 days, or less than 2 weeks		No	Yes
Summary	Requirements vary, but most jurisdictions require 3 plan sets.	Variation in approach to fee structure is common and often dependent upon property zoning.		Variation between jurisdictions is standard and often dependent on property zoning.		About half of the communities in Marin offer expedited solar PV plan review.	Most communities in Marin allow for a six day work week.

preferences and requirements of multiple agencies when working throughout a region. The potential for this was found to exist in Marin as those building permit

procedures examined varied across a number of permitting aspects. For example, the contents of plan sets, plan sizes, and the number of plan sets required for submitting a building permit varies amongst the building departments of Marin. Each community also uses a different building permit application and may differ according to the fee assessment structure used for solar PV projects. As noted earlier, reported review times also vary between communities and range from over-the-counter to 6 weeks long.

Table 5 indicates the need for solar developers seeking installation work throughout the MEA service territory to possess significant knowledge of up to 12 different permitting procedures. Developer Confusion over or misunderstanding of these procedures may delay the issuance of building permits or the completion of an inspection and thus increase development costs and timeframes. For solar developers, this result can limit attention and resources available for other projects and thus may affect overall profitability. Likewise, project owners and investors may be affected by delays when unexpected alterations to the commercial operation date of the solar PV project and the associated ability to begin receiving a return from project investment.

6.6 Common Issues Cited by Project Stakeholders

Study participants were asked identify common issues that increase project approval periods and costs. These issues, which are provided below, are likely avoidable through increased access to procedural requirements, agency

regulations, and data on infrastructure and environmental conditions. Resolving these issues through the provision of improved tools and guidance may thus assist in increasing procedural transparency and reducing the cost and timeframes associated with the permitting and interconnection of solar PV facilities for participation in the MEA FIT program.

6.6.1 Permitting

Building and planning staff that participated in the survey and interview process, as well as those participating solar developers, cited the following issues as common mistakes made by project applicants. These issues touch on the need for applicants to be familiar with the specific procedural requirements of each Marin community in which a project is submitted. Overlooking small details may result in submission of inadequate plans or improper installations that ultimately increase those project costs born by the property owner.

Incomplete Application

Applicants may experience delays in review and approval if applications for building permits are not accurately completed in full.

Inadequate Documents

Applicants may experience delays in review and approval for building permits if the submitted plans are inadequate. Examples of inadequacy cited by public agencies include:

- Improper scaling;
- Lack of information on mounting structures;
- Lack of notation of points of penetration;
- Inadequate identification of existing electrical system and points of connection;
- Inadequate identification of required system disconnects;
- Failure to submit labeling sheets meeting NEC requirements (See NEC Section 690);
- Out-of-date engineering calculations or failure to meet local building standards;
- Failure to adequately identify roof or site layout and system tilt;
- Inadequate identification of how the proposed system addresses the requirements of the municipal code (this may include building and zoning code, as well as any specific municipal ordinances related to solar energy systems).

Inadequate System Labeling

Applicants may fail inspection if labeling does not meet the National Electric Code (NEC) standards (Section 690) or is not located and posted as provided in the approved building plans.

Inconsistent Installation

Applicants may fail inspection if the system has not been installed as prescribed in the approved building plans.

Inadequate Equipment

Applicants may fail inspection if installed components are inadequate for the intended purpose. While many examples exist, agency representatives specifically noted inadequate service panels, inadequate or improper grounding methods, inadequate conduit, and improper mounting systems.

Limited Property Owner Oversight

Property owners should take an active role in developing a solar PV facility on their site. This includes understanding the legal framework; researching and selecting experienced designers/contractors/installers; and understanding the local permitting and utility interconnection process. By selecting appropriate parties to work with and developing a comprehensive understanding of the

associated procedures, property owners can play an active development role that avoids delays that are likely to increase the overall project cost.

Inexperience with Local Process

Applicants may face delays resulting from a lack of knowledge of local procedures such as the time periods during which over-the-counter plan reviews may be processed, or the time periods during which construction is allowed. As a result, project costs may increase due to shifting development schedules.

Cost & Timeframe Ambiguity (Permitting)

Applicants with projects that do not initially adhere to municipal code face additional uncertainty in the cost and timeframe for project approval due to the potential need for greater planning review. This issue is likely a greater concern for larger solar PV projects in Marin as most communities are not experienced in larger or nonresidential projects. This issue may also be due to permitting structures that set maximum kilowatt (kW) limits on streamlined project review.

6.6.2 Interconnection

Issues regarding the interconnection process were suggested by the participating representative from PG&E, as well as those participating solar developers.

These challenges highlight the complexity of the interconnection process and the

challenges faced in minimizing costs and timeframes through informed project siting.

Cost & Timeframe Ambiguity (Interconnection)

Solar PV FIT projects meeting the capacity limits set by the Marin Energy Authority (MEA) for the FIT program are anticipated to apply for interconnection under the PG&E wholesale distribution tariff (WDT) generator interconnection process (GIP) Fast Track. While the Fast Track is designed to reduce the time and cost of interconnecting relatively small distributed generation (DG) projects, the increasing number of applicants, as well as the increasing system load associated with DG FIT projects, may trigger additional costs and delays that cannot be fully anticipated prior to application for interconnection. In turn, increased interconnection costs as well as any associated delays in development schedules may increase overall project costs thus affecting financial efficiency and potentially feasibility. It may be noted that. To reduce the potential for significant cost increases or project delays as a result of the interconnection process, the utility recommends that projects be sited in areas of existing significant load (e.g. where urban development has been previously established) and where prior applications for interconnection do not previously exist. To assist in this process, applicants should take advantage of pre-application meetings with the utility, as well as an examination of the “Solar PV Renewable Auction Mechanism Program Map” provided by PG&E

(<http://www.pge.com/b2b/energysupply/wholesaleelectricssuppliersolicitation/PVRFO/pvmap/>).

Inadequate Site Control

As part of the PG&E WDT GIP, applicants are required to demonstrate site control of the property where the proposed solar PV generation facility is to be located. There are a number of ways by which applicants can meet this requirement, which are outlined in section 1.5 of the PG&E GIP. As inability to meet property control requirements will slow the interconnection process, applicants should ensure site control is established early on in the project planning process.

6.2.3 Project Finance

The participating solar developers noted the following issues related to project finance. While project finance has not been directly studied for the development of the guide, the process initiated in relation to concerns associated with project financing. As such, these issues are included to assist property owners in taking a more holistic approach to understanding the permitting and interconnection process.

Inadequate Financial Security

Solar developers have noted the importance of securing adequate investments to finance project design, permitting, interconnection, and construction. In providing

a standard contract with transparency in prices for resource compensation, FIT agreements provide investors with clear signals for evaluating the anticipated compensation associated with development of a solar PV facility. Those Solar developers surveyed noted that project financing should be an initial consideration rather than one tackled after interconnection and permitting have been completed. Waiting to secure financing till late in the development process may result in the inability to identify adequate funds, which may further delay or halt development and thus result in the forfeiture of any financial resources expended in project design, interconnection, and permitting. By working with developers experienced in the PG&E GIP and the permitting process implemented by the local jurisdiction, property owners may more accurately identify project costs and thus more easily develop financing plans.

Failure to Secure FIT Agreement

Though neither the utility, nor the agency with jurisdiction over project siting and development requires proof of a completed FIT agreement, project applicants should be aware that the process of completing a FIT agreement with the MEA is estimated to take approximately three to five months. Failure to begin the process in a timely manner may delay the commercial operation of the generation facility.

7.0 Recommendations for MEA Action and Concluding Remarks

In discussing the increasing number of applicants requesting interconnection, one PG&E representative noted that the wholesale generator interconnection program received requests for a cumulative total of 5,000 MWs last year. In addition, the PG&E website for the utility hosted FIT program reports that applications for the organization to accommodate power purchase requests from private-sector distributed generators have exceeded the program's cumulative capacity. Review of the PG&E data provided to the public on executed FIT contracts provides that 78% of the contracts are associated with solar PV facilities (PG&E, 2012a).

Taken together, this information leaves no doubt that there is increasing interest in developing solar PV generators for participation in wholesale markets. Developing this capacity has, however, been limited with regards to Marin County. By implementing a FIT program that complements that of PG&E, the MEA has taken a step forward in approaching this issue. The limited interest in the program, however, suggests that more action may be needed to increase participation.

This study has highlighted the complexity of the multijurisdictional policy arena implemented to provide oversight to the development of FIT projects. The regulatory environment for solar PV development relies on the interaction and

approval of many stakeholders, including consumers, utility providers, local governments, investors, and in some cases, unique institutions like the MEA. The roles of these stakeholders in developing the capacity for renewable energy generation are relatively new within the context of the American energy system. Historically, a production model where utilities worked exclusively with a limited number of power plants containing very large generation capacities has dominated the market for electricity. This structure generally relied on consumers and local governments as passive participants and resulted in only limited interconnection requests.

Today, the energy market is facing a period of rapid transformation wherein regulatory structures are increasingly accommodating technological innovations reliant on active consumer participation in energy generation (Kartseva, Gordijn, & Akkermans, 2003). As a result, local governments are emerging as influential actors in the siting of energy resources. Likewise, utilities are increasingly faced with the need to develop approaches to establishing grid access that is appropriate to economics and technical considerations relevant to small-scale generators.

Solar industry participants have noted that lack of coordination and consistency in the permitting and interconnection costs affect the feasibility solar PV projects. Such assertions highlight that the policy environment in which renewable energy

development occurs has a great impact on the success of market-based mechanisms like FITs. There is thus a need to coordinate action in a manner that is supportive to achieving transparency and understanding within the diffused renewable energy stakeholder network.

The MEA is uniquely situated to approach market and industry coordination. In developing the MCE program, the MEA has been empowered through the actions of the local governments in Marin to pursue increased consumption of renewable energy. The resulting MCE program places the MEA in close contact with consumers, PG&E, and regulatory agencies such as FERC and the CPUC.

There is an opportunity for the MEA to leverage these relationships in order to provide guidance on stakeholder action and policy coordination. The study presented here has examined the existing permitting and interconnection frameworks as to identify opportunities for improving the private sector planning process associated with the development of solar PV facilities for participation in FIT programs. As guided by the literature review, the research process focused on minimizing the costs and timeframe associated with the permitting and interconnection of solar PV generation facilities.

The following recommendations have been developed upon the knowledge gained throughout the research process. It may be noted that if the MEA were a

traditional local government, the following propositions would be formulated as policies to be adopted within formal tools such as a general plan or climate action plan. The MEA, however, functions as a joint-powers authority (JPA) under which staff seek the approval of the agency's Board of Directors (Board) for non-rate related actions. As such, the recommendations noted here will be provided as suggested programmatic actions that staff may formalize into action proposals to be submitted to the Board.

7.1 Recommendations

Recommended actions have been split according to the targeted stakeholder.

These include:

- Property Owners and Solar Developers;
- The community planning and building departments of the cities, towns, and County of Marin
- The Federal Energy Regulatory Commission (FERC) and PG&E.

Property Owners & Solar Developers

- 1. Seek Board Approval to publish and distribute the *MEA Feed-in Tariff Reference Guide on Solar PV Permitting and Interconnection in Marin County***

As a product of the research process, the reference guide provides an introductory overview of the MEA, the FIT program, and the permitting and

interconnection procedures relevant to developing a solar PV facility in any of the Marin communities. Throughout the document, readers are directed towards existing informational tools that support efficient project planning that minimizes permitting and interconnection costs and timeframes.

The guide additionally includes reference sheets on the building permit and inspection procedures implemented in each of the municipal jurisdictions in Marin. The guide also includes reference sheets for the PG&E GIP Fast Track study procedure. Included in each reference sheet is the contact information for the given organization, as well as links to any further guidance available on the Internet.

The guide thus provides readers with pertinent information that is otherwise spread across a diffuse set of organizations. In this regard, the guide is a stepping stage tool that approaches the non-market ambiguities facing potential participants in the MEA FIT program. Ultimately, the guide seeks to ensure that the MEA works towards a comprehensive approach for capacity development that recognizes that the success of financial mechanisms may be further enabled through attention to non-market barriers and process efficiencies.

2. Develop Case-Study Guidance on the Costs and Timeframe Associated with the Interconnection and Permitting of DG Projects Seeking Participation in the MEA FIT Program.

The standard offer contracts provided by FIT programs assist in communicating the ROI associated with compensation for generation resources over long periods of time. The FIT structure thus supports market transparency regarding the benefits of a distributed generation projects. The regulatory environment, however, additionally affects this ROI and can increase risk if the associated procedures are not readily transparent and consistent (IPCC, 2011).

The findings of the study highlighted a lack of experience in interconnecting and permitting solar PV projects of 1 MW or less in the communities of Marin County. Furthermore, in cases where experience does exist, project information is not necessarily readily available or formatted in a manner that supports the development of a transparent environment for solar PV development. The associated lack of reliable information available to assist property owners and solar developers in accurately planning for project costs and timeframes associated with regulatory compliance increases the perception of investment risk.

It is thus recommended that the MEA leverage its relationship as a FIT provider to develop case studies on the regulatory experience of successful program participants. By collecting and publishing information on the costs of permitting and interconnecting projects, the agency will further support transparency in the project development process. In turn, consumers and solar developers interested in the FIT program will be more enabled to accurately plan for project development.

3. Evaluate the Return-on-Investment for 10 kW Residential Solar PV Systems under MEA FIT Contracts in Comparison to a Standard Residential Net Energy Metering (NEM) Project.

The lack of eligibility for state sponsored rebate incentives for solar development increases the up-front costs experienced by FIT participants. As a result, property owners seeking to develop small-scale residential systems may be deterred from participation in the FIT program should they perceive that there is little benefit to developing a facility with capacity greater than their home consumption. This notion, however, has not been well researched.

Inverter based solar PV systems of 10 kW or less are eligible for streamlined interconnection procedures under the PG&E GIP. Furthermore, such systems are more likely to fall within the limits that

some jurisdictions in Marin have placed on streamlined permitting procedures. Building and planning officials in Marin have also expressed that the majority of permitting experience is associated with small-scale and often residential systems. It has been suggested that this is at least somewhat influenced by the limited availability of large lot parcels in most municipal jurisdictions located in Marin. There may thus be great potential for inverter based solar PV facilities of 10 kW or less to participate in the MEA FIT program.

It is recommended that the MEA work with the members of the solar industry to conduct a feasibility analysis and estimate the ROI for developing an inverter-based 10 kW solar PV facility on a residential property for participation in the FIT program. The assessment should examine the potential benefits in comparison to developing a similar system for participation in the NEM program. It is recommended that the MEA take further efforts to promote this type of participation in the FIT program should the study find the FIT evaluation to be economically viable and attractive.

Local Agency Planning and Building Departments

4. Coordinate Approaches to Solar PV Development between the Communities of Marin

The MEA is in a unique position to support cooperative progress on energy issues amongst the local governments of Marin. This is largely attributed to the formal decision of each jurisdiction in passing a resolution to join the organization. There is, however, only limited interaction between the MEA and the local jurisdictions at this time.

The findings of the study noted that permitting procedures in Marin vary greatly between communities. In addition, the Sierra Club (2011) also found that the fees for solar PV projects vary greatly between communities. As noted in the literature review, regional discrepancies in permitting fees, procedures, and inspections can increase the installed cost of developing solar PV facilities/

Industry participants have recommended standardization of approaches among communities as to allow developers the ability to shift expenditures related to researching community specific practices towards savings on installed costs. Local communities are also likely to benefit from standardizing procedures and submission requirements, as developers will be less likely to submit inadequate plans that require additional review

time. Creating a streamlined procedure throughout the MEA service territory may also allow for innovative permitting approaches. Examples of this might be a county-wide developer certification program that reduces review times for approved contractors, or a shared third-party PV plan review and inspection service.

Standardized permit review procedures are increasingly being implemented across the US with support from the solar Industry. Standardized permit review procedures are increasingly being implemented across the US with support from the solar Industry. One example structure is the Expedited Permit Process by Solar America Board for Codes and Standards (Solar ABCS, 2011). Using a standardized application and single line diagram, the program is intended to reduce review periods or questions of inadequacy in submitted plans. While this program is limited to solar PV systems of 15 kW or less, it remains a useful model of a working approach implemented in number communities. The MEA may also look to neighboring Sonoma County and the City of Santa Rosa for guidance from their Solar Sonoma County organization that is currently pursuing similar goals.

5. Increase Solar PV Education for Building and Inspection Officials, and Solar Installers

California continues to be a leading state for solar PV installations (Sherwood, 2010). This has put pressure on community building and inspection officials to keep up with fast-paced technological change that can be challenging to understand and difficult to integrate into the review process. Likewise, solar installers may be contractors that have migrated from other fields of the building industry and may be lacking knowledge in installation best practices.

Lack of adequate education may contribute to lengthened review periods, longer than necessary inspections, or failed inspections. All of these increase the length of time and resources expended on each project, and thus the overall cost. Facilitating training sessions would benefit market development by enhancing awareness of common solar PV installation errors and approaches for avoiding mistakes. Furthermore, it would benefit the solar PV community in Marin by bringing stakeholders together to build trust and mutual understanding. One possible funding source for this recommendation could be the MEA fair-share of the Public Goods Charge/Electric Program Investment Charge.

Participation in FERC Proceedings to Revise SGIP Practices

The MEA is an active participant in CPUC proceedings related to the oversight of consumer energy services in which the CCA is involved. This action should be

extended to activities that fall under the jurisdiction of FERC as related to wholesale generator interconnections. It is specifically recommended that the MEA participate in any proceedings at FERC held to revise the SGIP or the PG&E GIP in the future. Points of advocacy should include the following:

6. Revision of SGIP/GIP Technical Screens 2, 4 of the Fast Track Study Process

Technical screens 2, and 4 of the Fast Track Study are as follows:

2. GF (generation facility), in aggregate with other generation, shall not exceed 15% of Peak Load.
4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current.

These screens are two of the top 3 screens failed by applicants to the PGE WDT Fast Track study process. As previously noted, advocates of DG suggest that the limits set in these screens are unnecessarily conservative and inhibit the development of the capacity for small-scale renewable energy generation. In light of this, it is recommended that the MEA advocate for the revision of these screens to include peak load and maximum fault current limits that do not unnecessarily direct solar PV projects of 1 MW or less towards the more costly and time consuming Cluster Study or Independent Study procedures.

7. Require the Utility to Provide Additional information on Interconnection Data and Distribution Infrastructure

PG&E currently provides the public with two separate spreadsheets with information on ongoing interconnection requests. In addition, PG&E also provides an online map denoting distribution lines and substations. While the information is helpful, it is neither coordinated nor adequate.

It is recommended that the MEA advocate on behalf of interconnection applicants for PG&E to provide improved public data. The separate queue sheets should be coordinated as to provide the same classifications of interconnection data. Of specific note, the queue required by FERC Order No. 135 should denote the technology associated with the interconnection request, as well as the county in which the project is located, the interconnection substation name, whether or not a failed Fast Track request resulted in transfer to either the Cluster study or the Independent study, and the date of execution for any interconnection agreements. Information in the WDT interconnection queue for “all projects” should include that information which is provided in the Fast Track queue data. This would include technical screens failed, date of issuance of the initial screen findings, and date of issuance of the supplemental review findings. The two queue sheets should additionally provide the public with

information regarding the cost of any required upgrades and the date at which any EPC activities begin and end.

The Solar PV and Renewable Auction Mechanism (RAM) Map should also be updated to provide users with more helpful information. This should include current line capacity (used and available), as well as the indications of the number and capacity of currently interconnected and queued generators on the identified distribution lines.

These improvements would significantly assist property owners and solar developers in better anticipating the cost and timeframe associated with an interconnection request. The information is largely available in disaggregated data sets. It might be anticipated that the utility would cite that such information is not immediately useful due to the circumstantial nature impacts upon the interconnection process resulting from on-site infrastructure conditions. However, it seems rational that such information would at least provide the public with a window of measurement on actual experienced costs and timeframes.

7.2 Conclusion

Increasing integration of distributed renewable energy generation challenges the traditions of the American energy system. Over the course of the last hundred years, communities across the United States have come to rely on a centralized system for the generation, transmission, and distribution of electricity. Within this context, consumers were passive participants in a market structure involving only limited access for a small number of generators possessing very large capacities.

Increasing government attention towards GHG emissions reduction and energy security has supported a transformation towards a more open energy system. In turn, the State and Federal government have created a policy environment seeking to accommodate independent power producers. Throughout this process, regulators have focused on creating a market for renewable energy through the development of numerous financial mechanisms that support capacity development.

This transformation provides increasing opportunities for governments to encourage active citizen participation in the local energy system. In providing opportunities for leveraging consumer demand towards the development of the local capacity to generate renewable energy, the MEA is a prime example of an innovative approach to expanding the role of municipal governments in regional energy networks.

The financial mechanisms provided through the MCE, NEM, and FIT programs are important for increasing the integration of renewable energy in energy markets. Non-market barriers may, however, impede the progress of these programs. The study presented here notes the existence of significant challenges in planning for interconnection and permitting costs and timeframes. It also highlights numerous opportunities for reducing procedural barriers and increasing process transparency.

It is, of course, the responsibility of the government to ensure public health and safety. As such, local governments and utility providers must be cautious and diligent. Nonetheless, action should be coordinated at the local and regional level as to avoid conflict with state policies. Ensuring access to information and consistency in oversight procedure will assist in developing for a more unified path towards energy security, environmental prosperity, and economic development.

References

- Anders, S., Grigsby, K., & Kuduk C. A. (2007). *California's Solar Rights Act: A review of the statutes and relevant cases*. San Diego, CA: University of San Diego School of Law.
- Brooks, B. (2011) *Expedited permit process for PV systems: Standardized process for the review of small-scale PV systems*. Retrieved from <http://www.solarabcs.org/about/publications/index.html>
- Brown, J., & Jacobs, M. (2011). *Leveraging private investment: The role of public sector climate finance*. London, UK: The Overseas Development Institute.
- California Center for Sustainable Energy (2012). *SGIP's legislative and regulatory history*. Retrieved from <http://energycenter.org/index.php/incentive-programs/self-generation-incentive-program/sgip-background>
- California Independent Service Operator (2010). *Generator interconnection procedures: Straw proposal prepared for Small Generator Interconnection Procedures Stakeholder Initiative*. Folsom, CA: California Independent Service Operator.
- California Public Utilities Commission (2007). *Summary of Feed-in tariffs*. Retrieved from <http://www.cpuc.ca.gov/PUC/energy/Renewables/feedintariffssum.htm>
- California Public Utilities Commission (2009). *California solar initiative: California Public Utilities Commission staff progress report January 2009*. Retrieved from <http://www.cpuc.ca.gov/PUC/energy/Solar/evaluation.htm>
- California's Clean Energy Future (2010). *California's clean energy future: An overview of meeting California's energy and environmental goals in the electric power sector in 2020 and beyond*. Sacramento, CA: California Energy Commission.
- California's Clean Energy Future (2011). *Renewable Energy*. Retrieved from <http://www.cacleanenergyfuture.org/progress.html>

- Couture, T., & Cory, K. (2009). *State clean energy policies analysis (SCEPA) projects: An analysis of renewable energy feed-in tariffs in the united states (NREL/TP-6A2-4551)*. Golden, CO: National Renewable Energy Laboratory (NREL).
- Crawford, M., Mills, C., Newick, K., & Troyer, S. (2011). *Solar electric permit fees for commercial & residential installations in Marin County: A comparative report*. Retrieved from <http://lomaprietaglobalwarming.sierraclub.org/PVSurveyMarin.php>
- Database of Incentives for Renewables and Efficiency (2012). *California Feed-in Tariff*. Retrieved from http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA167
- Edison Electric Institute (2004). *State generation and transmission siting directory: Agencies, contacts and regulations*. Washington, D.C.: Edison Electric Institute.
- Energy and Environmental Economics (2012). *Technical potential for local distributed photovoltaic in California*. San Francisco, CA: Energy and Environmental Economics.
- Federal Energy Regulatory Commission (2011). *Order Conditionally Accepting Tariff Revisions and Denying Motions, 135 ¶ 62,094 (Docket No. ER11-3004-000)*. San Francisco, CA: Federal Energy Regulatory Commission.
- Fink, S., Porter, K., & Rogers, J. (2010). *The relevance of generation interconnection procedures to feed-in tariffs in the United States*. Golden, CO: National Renewable Energy Laboratory.
- Greaney, J. (2011) State and federal frameworks for distributed solar and wind projects. *Planning & Environmental Law*, 63(7), 9-11.
- Greenfield, L. (2010). *An overview of the Federal Energy Regulatory Commission and federal regulation of public utilities in the United States*. Washington, D.C.: The Federal Energy Regulatory Commission.
- International Energy Agency (2011). *Clean energy progress report*. Paris, FR: International Energy Agency.
- International Panel on Climate Change (2011). *Special report on renewable energy sources and climate change mitigation*. Retrieved from http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#2

- Kartseva, V., Gordijn, J. & Akkermans, H. (2003). *A desisgn perspective on networked business models: A study of distributed generation in the power industry sector*. Bled, Solvenia: eTransformation.
- Keyes, J.B., & Fox, K.T. (2008). *Comparison of the Four Leading Small Generator Interconnection Procedures*. Interstate Renewable Energy Council. Retrieved from http://www.solarabcs.org/interconnection/ABCS-07_studyreport.pdf.
- Legalinfo.ca.gov (2004). *AB 2473 Chaptered*. Retrieved from http://www.leginfo.ca.gov/pub/03-04/bill/asm/ab_2451-2500/ab_2473_bill_20040925_chaptered.html
- Lesser, J., and Su, X. (2007). Design of an economically efficient feed-in tariff structure for renewable energy development. *Energy Policy*, 31, 981-990.
- Lewis, C. (2010). *No Title (letter to President of CAISO on proposed CAISO creation of GIP)*. Palo Alto, CA: FIT Coalition.
- Longecker, R. & Haunt, T. (2010). *Stakeholder comments template, subject: Generator interconnection procedures straw proposal and meeting*. Folsom, CA: California Independent Service Operator.
- Marin Energy Authority (n.d.). *Feed-in tariff for disturbed renewable generation (FIT)*. Retrieved from: <https://marincleanenergy.info/feed-in-tariff>
- Marin Energy Authority (2010). *MEA feed-in tariff options: Marin Energy Authority Technical Committee September 20, 2010*. San Rafael, CA: Marin Energy Authority.
- Marin Energy Authority (2011). *MEA feed-in tariff mid-year review, July Technical Committee*. San Rafael, CA: Marin Energy Authority.
- Marin Energy Authority (2012). *Light Green 50% Renewable Energy*. Retrieved from <https://marincleanenergy.info/light-green-information>.
- Menanteu, P., Finon, D., & Lamy, M. (2003). Prices versus quantities: Choosing policies for prompting development of renewable energy. *Energy Policy*, 31, 799-812.
- Michaud, M. (2007). *A white paper on untangling FERC & state jurisdiction interconnection issues and opportunities for dispersed generation*. Lake Elmo, MN: North American Water Office.

- Morton, T., & Peabody, J. M. (2010). Feed-in tariffs: Misfits in the federal and state regulatory regime?. *The Electricity Journal*, 23(8), 17-26.
- Pacific Gas and Electric (2011). *Generator Interconnection Procedures Overview*. Retrieved from <http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml>
- Pacific Gas and Electric (2012a). *Existing Executed Feed-in Tariff Contracts*. Retrieved from <http://www.pge.com/b2b/energysupply/wholesaleelectricssuppliersolicitation/standardcontractsforpurchase/>
- Pacific Gas and Electric (2012b). *PG&E WDT Queue 03.02.2012 - In compliance with FERC Order 135 FERC ¶ 61,094 (April 29, 2011), Docket No. ER11-3004-000*. Retrieved from http://www.pge.com/includes/docs/word_xls/b2b/newgenerator/wholesalegeneratorinterconnection/PGE_WDT_Queue_New_Tariff.xls
- Pacific Gas and Electric (2012c). *PG&E WDT All Projects Queue 03.02.2012*. Retrieved from http://www.pge.com/includes/docs/word_xls/b2b/newgenerator/wholesalegeneratorinterconnection/PGE_WDT_All_Projects_Queue.xls
- Pacific Gas and Electric (2012d). *Standard contracts for purchase (Feed-in Tariffs)*. Retrieved from <http://www.pge.com/b2b/energysupply/wholesaleelectricssuppliersolicitation/standardcontractsforpurchase/>
- Pitt, D. (2008). *Taking the red tape out of green power: How to overcome permitting obstacles to small-scale distributed renewable energy*. Retrieved from www.newenergychoices.org/uploads/redTape-rep.pdf
- Prabhu, E., Michel, D. (2005). Interconnecting Distributed Generation: The California experience. *International Journal of Distributed Energy Resources*, 1(3), 185-195.
- Purchala, K, Belmans, R., Leuven, K., Exarchakos, L., and Hawkes, A. (n.d.). *Distributed generation and the grid integration issues*. Retrieved from http://www.eusustel.be/public/documents_publ/WP/WP3/WP%203.4.1%20Distributed%20generation%20and%20grid%20integration%20issues.pdf

- Quinn, A., Safrinet, C. & Clement, C. (2011). Economic and fiscal impact analysis Residential solar permitting reform.
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CC8QFjAA&url=http%3A%2F%2Fwww.sunrunhome.com%2Fuploads%2Fmedia_items%2Faecom-executive-summary.original.pdf&ei=DDrNTvb3HI3DsQLMjIXbDg&usg=AFQjCNF06ORJzstowhhtyNsn8Jj1gcJ1Gg&sig2=yUsqSXpjZeQ8h3X6fuUA
- Rickerson, W., Bennhold, F., & Bradbury, J. (2008). *Feed-in tariffs and renewable energy in the USA: A policy update*. Raleigh, NC: North Carolina Solar Center.
- Santander (2008). *The importance of feed in tariffs to attract financial resources*. Madrid, SP: Santander.
- San Diego Gas and Electric (2012). *Feed-in Tariffs for small renewable generation*. Retrieved from <http://sdge.com/node/654>
- Schmidt, Y., & Burwen, J. (2012). *The renewable jungle: A guide to California's renewables policies and programs*. San Francisco, CA: Division of Ratepayer Advocates.
- Sheaffer, P. (2011). *Interconnection of distributed generation to utility systems: Recommendations for technical requirements, procedures and agreements, and emerging issues*. Retrieved from www.raponline.org
- Sherwood, L. (2011). *U.S. solar market trends 2010*. Retrieved from <http://www.irecusa.org/news-events/publications-reports/>
- Slocum, T. (2008). *The failure of electricity deregulation: History, status and needed reforms*. Washington, D.C.: Public Citizen's Energy Program.
- Solar America Board for Codes and Standards (2011). *Expedited Permit Process Report*. Retrieved from <http://www.solarabcs.org/about/publications/reports/expedited-permit/>
- Solar Energy Industries Association (2010). *Joint motion to intervene and comments of environmental organizations (FERC Docket No. RM12-10-000)*. San Francisco, CA: Federal Energy Regulatory Committee.
- Solar Tech (2011). *Study of solar permitting and inspection*. Retrieved from <http://www.solartech.org/workforce-reports/view.download/10/21>

- Southern California Edison (2012). *Renewable & alternative power-CREST program*. Retrieved from <http://www.sce.com/EnergyProcurement/renewables/crest.htm>
- State of California (2007). *RPS project permitting barriers*. Retrieved from <http://www.cpuc.ca.gov/PUC/energy/Renewables/permittingbarriers.htm>
- State of California (2011). *History of Solar Energy in California*. Retrieved from <http://www.gosolarcalifornia.org/about/gosolar/california.php>
- State of California, California Energy Commission, and California Public Utilities Commission (2011). *Solar rights: Access to the sun for solar systems*. Retrieved from: http://www.gosolarcalifornia.ca.gov/solar_basics/rights.php
- State of California (2012). *Total electricity system power*. Retrieved from http://energyalmanac.ca.gov/electricity/total_system_power.html
- Sun Run (2011). *The impact of local permitting on the cost of solar power: How a federal effort to simplify processes can make solar affordable for 50% of American Homes*. Retrieved from www.sunrunhome.com/permitting
- U.S. Department of Energy (n.d.). *Provisions of AB 1890*. Retrieved from <http://www.eia.gov/cneaf/electricity/california/assemblybill.html>
- Utility Consumer's Action Network (2006). *Solar Panel Permitting Fee White Paper*. Retrieved from www.ucan.org/energy/electricity/solar_panel_permitting_fee_white_paper
- Varnado, L., & Sheehan, M. (2009). *Connecting to the grid: A guide to distributed generation interconnection issues*. Retrieved from <http://irecusa.org/wp-content/uploads/2009/11/Connecting-to-the-Grid-Guide-6th-edition.pdf>
- Weston, F., Harrington, C., Moskovitz, D., Shirley, W., Cowart, R., & Sedano, R. (2001). *Accommodating distributed resources in wholesale markets*. Gardiner, ME: The Regulatory Assistance Project.
- Wolk, L. (2006). *Solar energy system permit fees: Legislative intent*. Retrived from <http://www.solarpermitfees.org/WolkPVFeeLetter.pdf>
- Wustenhage, R., Wolsink M., & Buerer, M. (2007). Social acceptance of renewable energy innocation: An introduction to the concept. *Energy Policy*, 35, 2683-2691.

APPENDIX A: DATA COLLECTION TOOLS AND SURVEY RESPONSES

1.0 Initial Survey Forms

1.1 Solar Developer Survey

The following is a copy of digital survey sent to solar developers during the data collection process. The online form may be viewed at:

<https://docs.google.com/spreadsheet/viewform?formkey=dHBRamJtTVdaVVppRTNNbGREQmFIQkE6MQ>

Solar Developer Questionnaire on permitting and interconnection for Feed- in Tariff participation

The following questionnaire is being conducted as part of a culminating project for graduate studies in city and regional planning. The information collected will ultimately inform the development of regional guide on solar PV permitting and interconnection for participation in Feed-in Tariff programs in Marin County. All names or other identifying information offered by respondents will be removed from any published materials. In most instances where multiple-choice options are provided, a separate response box is provided below for any additional comments. Please mark all responses applicable and provide additional information when appropriate. Please respond to all questions to the best of your ability. Responses should centrally consider solar PV generation facilities developed as accessory uses either as rooftop systems, ground mounted systems, or solar parking bay systems. While all potential locations are of interest, please allow your responses to note any existing procedural distinctions between projects located on residential and nonresidential properties.

Respondents are also asked to be aware that this questionnaire addresses solar facilities developed for the purpose of selling excess generation resources back to load serving entities like PG&E or the Marin Energy Authority (MEA) through Feed-in Tariff (FIT) programs. As a final note, please consider solar PV projects as large as 1 megawatt (MW) in your response. It is requested that you return the questionnaire at your earliest convenience, but not later than March 12th. If you would like, you may also email more in-depth responses. Any questions or concerns may be directly submitted to me either by phone or email at: Stephen Rogers (313)434-4026 stevedrogers@gmail.com Thank you for your time and consideration. Your participation is greatly appreciated.

1. Please provide your name, title, and contact information You will not be identified in any published materials. Unless otherwise requested, your organization will also be removed from any published materials.

Is your organization previously submitted interconnection applications for solar PV systems of 1 MW or less through the PG&E Fast Track Wholesale Distribution Tariff (WDT) Generator Interconnection Process (GIP) or the Small Generator Interconnection Process (SGIP)?

- ☐ Yes
- ☐ No

2. Additional notes on interconnection experience

4. What considerations should property owners address when deciding between Net Energy Metering (NEM) or Feed-in Tariff (FIT) arrangements?

5. What procedural differences should interconnection applicants experienced with Rule 21 anticipate when applying for interconnection through the PG&E GIP? You may skip this question if your organization is not experienced in PG&E interconnection under Rule 21.

6. In what order are the following tasks generally pursued for FIT solar PV projects: system design; acquisition of financing; application for interconnection; application for local jurisdiction development review; application to establish a FIT agreement with a load serving entity? Please provide additional notes as necessary regarding nonlinear project progressions or other considerations that may impact the forward progression of a proposed FIT project.

7. Are there any considerations (siting, design, financing, etc.) particularly important when evaluating a property's potential for solar PV development for participation in a FIT program?

8. Approximately how long should property owner seeking to develop a solar PV system of 1 MW or less for Feed-in Tariff participation anticipate for the design, permitting, interconnection, and construction of the generation facilities?

9. In your experience, are the materials provided by PG&E regarding the generator interconnection process (GIP) adequate in assisting applicants to prepare for and move efficiently through the process?

- ☐ Yes
- ☐ No

10. Additional notes on the adequacy of PG&E interconnection resources Please note any thoughts on additional information or documentation that PG&E could provide to better assist GIP interconnection applicants

12. In your experience, does the interconnection process for wholesale generation (GIP) under the Fast Track usually fall within the procedural outline and timeframe provided by PG&E? PG&E reports that interconnection under the GIP Fast Track should take about 1.5 months for the review process, another 1-2 months for IA negotiation, and 6-8 months to the engineering, procurement and construction phase (so ~1 yr total). Responses may address reported time frames, costs, materials required, etc.

- ☐ Yes
- ☐ No

13. Additional notes on interconnection timing and procedural requirements

14. For GIP Fast Track applicants, do interconnection costs present significant challenges to the financial feasibility of solar PV projects of 1 MW or less seeking participation in a FIT program?

- ☐ Yes
- ☐ No

14. Additional notes on Fast Track interconnection costs under the GIP

15. Is it possible to estimate the cost of the supplemental review and potential capital improvements? If so, please provide an itemized ballpark range where possible or note what considerations should be included in estimations

16. In your experience, what conflicts or project planning issues are commonly encountered when applying for interconnection under the PG&E GIP Fast Track?

17. In your experience, what conflicts or project planning issues related to the local agency permitting of solar PV projects as large as 1MW are commonly encountered?

18. Do you have any recommendations or considerations related to project financing that are commonly overlooked by land owners or property managers?

The next few questions refer to the development of a regional local agency permitting and interconnection guide for Feed-in Tariff participation

19. With regards to local agency permitting requirements and zoning restrictions, what reference information would be helpful to solar PV developers managing projects in multiple communities (e.g. set-back requirements, design review procedures, material requirements for application)?

20. What informational guidance do you feel would assist property owners when considering Feed-in Tariff participation (e.g. metering issues, interconnection procedures, rate schedules) ?

21. In your opinion, do current permitting or interconnection regulations inhibit participation in Feed-in Tariff programs? If yes, please briefly describe how.

- ☐ Yes
- ☐ No

21. Additional notes on regulatory barriers to interconnection

22. Do you have recommendations for property managers or solar developers preparing to develop solar PV facilities for Feed-in Tariff participation?

23. How may local or regional public agencies better support customer participation in renewable energy markets?

24. May I contact you over the phone or in email for further clarification of your answers?

- ☐ Yes
- ☐ No

24. Additional notes on further contact

25. Are there other individuals or organizations you recommend contacting with regards solar PV development, permitting, or interconnection? If so, please provide a contact name or organization.

26. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?

- ☐ Yes
- ☐ No

1.2 Planning Department Survey

The following is a copy of digital survey sent to the planning departments throughout Marin County during the data collection process. The online form may be viewed at:

<https://docs.google.com/spreadsheet/viewform?formkey=dG1SOUVUNkJsc1ctcUdtOEJkRzVtSWc6MA>

Questionnaire on solar PV permitting in Marin community planning departments

The following questionnaire is being conducted as part of a culminating project for graduate studies in city and regional planning. The information collected will ultimately inform the development of regional guide on solar PV permitting and interconnection for participation in Feed-in Tariff programs in Marin County. All names or other identifying information offered by respondents will be removed from any published materials. Please respond to all applicable questions to the best of your ability. Responses should centrally consider solar PV generation facilities developed as accessory uses. These may be either as rooftop, ground mounted, or solar parking bay systems. Please allow your responses to note any existing procedural distinctions between projects located on residential and nonresidential properties. Respondents are also asked to be aware that this questionnaire addresses solar facilities developed for the purpose of selling excess generation resources to either PG&E or the Marin Energy Authority (MEA) through Feed-in Tariff (FIT) programs. As a final note, please consider solar projects as large as 1 megawatt (MW) in your response. While the square footage per kW of output is largely dependent on the efficiency of PV technology, a safe approximation is 110 square feet per kW. Using this average, a small residential facility of 7 kW might equate to 770 square feet. In comparison, a 1 MW generator might be as large as 110,000 square feet. Some jurisdictions may not have properties to accommodate such large developments. Regardless of this, your response remains important and should consider solar developments sized for capacities greater than on-site electricity consumption needs. In most instances where multiple-choice options are offered, a separate response box is provided below for any additional comments. Please mark all responses applicable and provide additional information when appropriate. It is requested that you return the questionnaire at your earliest convenience, but not later than Monday, February 27th. If you would like to, you may also email any more in-depth answers. Any questions or concerns may be directly submitted to the me either by phone or email at: Stephen Rogers [\(313\)434-4026](tel:3134344026)

stevedrogers@gmail.com Thank you for your time and consideration. Your participation is greatly appreciated.

1. What is your name, title, and contact information. This information is only for contact purposes and will not be published.

2. What is the appropriate phone and email contact for public questions regarding the solar permitting process in your jurisdiction. You may skip this question if the response is the same as question 1.

3. Does your jurisdiction require a conditional permit for development of a solar PV generators as an accessory structure or roof-top addition? If not, you may skip those questions that do not apply. Please briefly describe any other required authorization your planning department requires local solar PV development.

4. What are the common conditional requirements associated with authorization to develop solar PV projects in your jurisdiction. Please further note if the same requirements are typically applied to both residential and nonresidential projects.

5. Are solar PV(solar) projects subject to design review in your jurisdiction. If yes, please note when differing levels of review apply.

- ☐ Yes
- ☐ No

5. Additional notes on design review procedures for solar PV projects

6. Are proposed solar projects subject to a public hearing in your jurisdiction?

- ☐ Yes
- ☐ No

6. Additional notes on public hearing requirements

7. In general, should applicants with ground mounted accessory or rooftop solar projects anticipate the need for environmental review?

- ☐ Yes
- ☐ No

7. Additional notes on environmental review requirements for solar PV projects

8. What fees are typically assessed as part of planning approval for solar PV projects?

9. Are solar PV projects proposed on residential, commercial, and industrial properties subject to the same procedures and fees? If not, please note any points of distinction between project types.

- ☐ Yes
- ☐ No

9. Additional notes on procedural distinctions

10. Are permit applicants with projects seeking exportation and sale of excess generation resources subject to additional procedural requirements or fees? If yes, please note any additional requirements or fees.

- ☐ Yes
- ☐ No

10. Additional notes on requirements for solar PV projects planning to export resources

11. Does your jurisdiction require proposed solar PV projects seeking interconnection to the PG&E distribution system to submit a completed interconnection agreement prior to project authorization?

- ☐ Yes
- ☐ No

11. Additional notes on proof of an established interconnection agreement

12. What is the estimated time period for any required permitting process applicable to solar PV projects in your jurisdiction? Assume applicant submits all required materials on time. Please note any distinctions related to project size or type (roof top, ground mount, or solar parking bay).

- ☐ Over the Counter
- ☐ One Day
- ☐ A week or less
- ☐ Two weeks or less
- ☐ A month or less
- ☐ Less than six months
- ☐ More than six months

12. Additional notes on timeframe for project review

13. If plan sets are required, what plans are typically required for proposed solar PV projects? Please list the type (e.g. site, elevation, etc.) size and number of

any plans or calculations that applicants must submit. Please also note any structural or electrical calculations required.

14. Are property owners required to possess a business license when the proposed solar PV generation facility is intended to export excess energy to the grid for sale to PG&E or the Marin Energy Authority?

- ☐ Yes
- ☐ No

14. Additional notes on business license requirements related to wholesale PV generation facilities

15. Are ground mounted solar PV or solar PV parking bays facilities developed as accessory structures subject to existing zoning restrictions related to floor area ratio (FAR) or maximum lot coverage in your jurisdiction?

- ☐ Yes
- ☐ No

15. Additional notes on density restrictions

16. Does your jurisdiction require special or accessory structure setbacks for solar PV facilities?

- ☐ Yes
- ☐ No

16. Additional notes on setback restrictions

17. Approximately how many solar projects does your department review annually? If possible, please provide separate counts for residential and nonresidential reviews

18. To your knowledge, what is the largest installed solar project that your department has reviewed?

19. What are common applicant mistakes or shortfalls that tend to result in project approval delays?

20. Do you have any recommendations for property managers or solar developers preparing for the permitting process in your jurisdiction?

21. Are there any final comments you would like to note regarding solar siting and development in your jurisdiction? All thoughts or suggestions are appreciated.

22. May I contact you over the phone or in email for further clarification of your answers?

23. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?

- ☐ Yes
- ☐ No

1.3 Building Department Survey

The following is a copy of digital survey sent to the building departments throughout Marin County during the data collection process. The online form may be viewed at:

<https://docs.google.com/spreadsheet/viewform?formkey=dFNuTldjenQ2S0R4LUx5MTZjalhaSkE6MQ>

Questionnaire on solar PV permitting in Marin community building departments

The following questionnaire is being conducted as part of a culminating project for graduate studies in city and regional planning. The information collected will ultimately inform the development of regional guide on solar PV permitting and interconnection for participation in Feed-in Tariff programs in Marin County. All names or other identifying information offered by respondents will be removed from any published materials. Please respond to all applicable questions to the best of your ability. Responses should centrally consider solar PV generation facilities developed as accessory uses. These may be either as rooftop, ground mounted, or solar parking bay systems. Please allow your responses to note any existing procedural distinctions between projects located on residential and nonresidential properties. Respondents are also asked to be aware that this questionnaire addresses solar facilities developed for the purpose of selling excess generation resources to either PG&E or the Marin Energy Authority (MEA) through Feed-in Tariff (FIT) programs. As a final note, please consider solar projects as large as 1 megawatt (MW) in your response. While the square footage per kW of output is largely dependent on the efficiency of PV technology, a safe approximation is 110 square feet per kW. Using this average, a small residential facility of 7 kW might equate to 770 square feet. In comparison, a 1 MW generator might be as large as 110,000 square feet. Some jurisdictions may not have properties to accommodate such large developments. Regardless of this, your response remains important and should consider solar developments sized for capacities greater than on-site electricity consumption needs. In most instances where multiple-choice options are given, a separate response box is provided below for any additional comments. Please mark all responses applicable and provide additional information when appropriate. It is requested that you respond to the questionnaire at your earliest convenience, but not later than Monday, February 27th. If you would like, you may also email any more in-depth answers. Any questions or concerns may be directly submitted to the me either by phone or email at: Stephen Rogers [\(313\)434-4026](tel:3134344026) stevedrogers@gmail.com Thank you for your time and consideration. Your participation is greatly appreciated.

Building

1. What is your name, title, and contact information All identifying information will be removed from any published materials.

2. What is the appropriate phone and email contact for public questions regarding the solar permitting process in your jurisdiction.

- ☐ Same as above

2. Appropriate public contact information and/or additional notes if different than response to question 1.

3. What building permits are generally required for development of a solar PV generator in your jurisdiction?

4. Are solar projects proposed on residential and nonresidential properties subject to the same procedures and fees? If not, please note any points of distinction between project types.

- ☐ Yes
- ☐ No

4. Additional notes

5. Are permit applicants with projects seeking exportation and sale of excess generation resources subject to additional procedural requirements or fees? If yes, please note any additional requirements or fees.

- ☐ Yes
- ☐ No

5. Additional notes

6. Are proposed solar projects seeking interconnection to the PG&E distribution system required to submit a completed interconnection agreement prior to issuance of any required building permits?

- ☐ Yes
- ☐ No

6. Additional notes

7. What is the estimated time period for plan review and issuance of any building permits required for solar PV construction. Assume applicant submits all required

materials on time. Please note any distinctions related to project size or type (roof top, ground mount, or solar parking bay).

- ☐ Over the Counter
- ☐ One day or less
- ☐ A week or less
- ☐ A month or less
- ☐ Less than 6 months
- ☐ 6 months or more

7. Additional notes on project review time frame

8. What fees are typically assessed with building permit applications for developing solar PV projects?

9. What plans are required to be submitted when applying for a building permits for solar PV projects? Please list the type (e.g. site, elevation, etc.) , size and number of any plans or calculations that applicants must submit.

10. What is the building permit review procedure? Please provide a brief overview of the building permit review process implemented for solar PV projects in your jurisdiction

11. What applicant mistakes or shortfalls commonly result in project approval delays. Responses may include common design errors.

12. Approximately how many solar projects does your department review annually? Please provide a separate count for residential and non-residential

13. To your knowledge, what is the largest installed solar project that your department has processed?

14. How long are building permits issued for?

15. What are the construction hours for your jurisdiction?

Inspection

1. How many inspections are commonly required as part of issuance of building permits for the development of solar PV facilities?

2. How far in advance must inspections be scheduled?

- ☐ Day of
- ☐ Day Before
- ☐ Week of
- ☐ A week or more

2. Additional notes on inspection scheduling

3. What are the days and hours that inspections may be scheduled for in your jurisdiction?

4. What materials are required to be present during an inspection?

5. What issues or shortfalls are commonly encountered during inspection of solar PV facilities? Do project delays commonly result from these errors?

6. Are inspections commonly delayed as a result of requests outpacing the number of available officials?

- ☐ Yes
- ☐ No

6. Additional notes

7. Have the inspection officials in your jurisdiction attended any special training related to solar PV construction practices? If yes, please briefly note the type of training and if this is required by your department.

- ☐ Yes
- ☐ No

7. Additional notes

Concluding Questions

1. Do you have any recommendations for property managers or solar developers preparing for the permitting process in your jurisdiction?

2. May I contact you over the phone or in email for further clarification of your answers?

- ☐ Yes
- ☐ No

2. Additional notes on further contact

3. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?

- ☐ Yes
- ☐ No

1.4 Utility Survey

The following is a copy of digital survey sent to PG&E Wholesale Interconnection Representatives during the data collection process. The online form may be viewed at:

<https://docs.google.com/spreadsheet/viewform?formkey=dEYxTHJSUmVHY2hJTHFiUFhmRTR5YVE6MQ>

PG&E Interconnection under WDT-GIP Questionnaire

The following questionnaire is being conducted as part of a culminating project for graduate studies in city and regional planning. The information collected will ultimately inform the development of regional guide on solar PV permitting and interconnection for participation in Feed-in Tariff programs in Marin County. All names or other identifying information offered by respondents will be removed from any published materials. Please respond to all questions to the best of your ability. If applicable, responses should consider a range of facility types including roof-mount, ground-mount, and solar parking bay with generation capacities of 1 megawatt (MW) or less. In most instances where multiple-choice options are offered, a separate response box is provided below for any additional comments. Please mark all responses applicable and provide additional information when appropriate. It is requested that you return the questionnaire at your earliest convenience, but not later than the 22nd of February. If you would like, you may also email any more in-depth answers. Any questions or concerns may be directly submitted to me either by phone or email at: Stephen Rogers (313)434-4026 stevedrogers@gmail.com Thank you for your time and consideration, your participation is greatly appreciated.

1. Please provide your name and contact information, Position Title, length of service in current position, and responsibilities related to the PG&E Generator Interconnection Procedure (GIP) applicant assistance. All identifying information will be removed from any published materials.

2. What is the estimated time for completion of the GIP (including engineering, procurement, and construction (EPC)) under the Fast Track process for PV generators 1 MW or less?

- ☐ Less than 39 weeks
- ☐ Between 39 and 45 weeks
- ☐ Between 45 and 52 or less weeks
- ☐ 78 weeks or less

- ☐ 79 weeks or more
- ☐

2. Additional notes on Fast Track GIP time frame

3. With regard to interconnection of small PV generators (1MW or less) under the Fast Track procedure, which of the following issues commonly inhibit the interconnection process?

- ☐ Poor Project Siting
- ☐ Incomplete Application
- ☐ Insufficient funds or financing
- ☐ Failure of supplemental review/project moved to the Independent or Cluster Study process

3. Additional notes on common interconnection issues

4. What, if any, procedural differences should PV developers experienced in Fast Track under Rule 21 anticipate when applying for interconnection under the GIP Fast Track?

5. Do you have any suggestions related to PV siting, design, and interconnection preparation that may assist small generators in more efficiently navigating interconnection under the GIP.

6. Briefly, what is the difference in color for various distribution lines on the Solar PV and Renewable Action Mechanism (RAM) Program Map provided by PG&E. If an online Map Key is available, please provide a web address.

7. What is a ballpark average cost range that small generator (1 MW or less) applicants may anticipate paying to proceed through the supplemental review process of the Fast Track GIP?

8. Under what conditions should generators of 1 MW or less apply for interconnection under the Independent or Cluster Study tracks rather than Fast Track?

9. Are there other individuals at PG&E that I should contact regarding better preparation for applying to the Fast Track Generator Interconnection Procedure? If so, please provide a contact address or telephone.

10. May I contact you over the phone or in email for further clarification on your answers?

- ☐ Yes
- ☐ No

10. Additional notes on further contact

12. Would like a copy of the Permitting and Interconnection Guide Book upon completion?

- ☐ Yes
- ☐ No

2.0 Survey Responses

2.1 Solar Developer Survey Responses

The responses of the two participating solar developers are provided below. Participant identification has been removed to protect confidentiality.

Timestamp	2/27/12 7:30	3/26/12 11:01
1. Please Provide your name, title, and contact information	Solar Developer	Solar Developer
Is your organization previously submitted interconnection applications for solar PV systems of 1 MW or less through the PG&E Fast Track Wholesale Distribution Tariff (WDT) Generator Interconnection Process (GIP) or the Small Generator Interconnection Process (SGIP)?	Yes	Yes
3. Does your organization commonly advise property owners on whether to pursue Net Energy Metering (NEM) or Feed-in Tariff (FIT) arrangements?		
4. What considerations should property owners address when deciding between Net Energy Metering (NEM) or Feed-in Tariff (FIT) arrangements?	Interconnection cost and timeline	whether they want to offset their existing energy bill or sell the power back to the utility
7. Are there any considerations (siting, design, financing, etc...) particularly important when evaluating a property's potential for solar PV development for participation in a FIT program?	All of the above	local restrictions towards solar farms, finance-ability of the client, property fitness
8. Approximately how long should property owner seeking to develop a solar PV system of 1 MW or less for Feed-in Tariff participation anticipate for the design, permitting, interconnection, and construction of the generation facilities?	6 mo - 1.5 yrs	1 year - 18 months
9. In your experience, are the materials provided by PG&E regarding the generator interconnection process (GIP) adequate in assisting applicants to prepare for and move efficiently through the process?	No	Yes
11. Is there any additional information or documentation that PG&E could provide to better assist applicants in preparing for interconnection under the GIP?		
12. In your experience, does the interconnection process for wholesale generation (GIP) under the Fast Track usually fall within the procedural outline and time frame provided by PG&E?	No	Yes
14. For GIP Fast Track applicants, do interconnection costs present significant challenges to the financial feasibility of solar PV projects of 1 MW or less seeking participation in a FIT program?	Yes	Yes
16. In your experience, what conflicts or project planning issues are commonly encountered when applying for interconnection under the PG&E GIP Fast Track?	Uncertainty with cost and time	have not applied yet
17. In your experience, what conflicts or project planning issues related to the local agency permitting of solar PV projects as large as 1MW are commonly encountered?		solar farms are not allowed under land use restriction, but wind farms are.
19. With regards to local agency permitting requirements and zoning restrictions, what reference information would be helpful to solar PV developers managing projects in multiple communities (e.g. set-back requirements, design review procedures, material requirements for application)?		in person meeting with each local planning agency

20. What informational guidance do you feel would assist property owners when considering Feed-in Tariff participation (e.g. metering issues, interconnection procedures, rate schedules) ?		obtain financing commitment first
21. In your opinion, do current permitting or interconnection regulations inhibit participation in Feed-in Tariff programs? If yes, please briefly describe how.	Yes	Yes
22. Do you have recommendations for property managers or solar developers preparing to develop solar PV facilities for Feed-in Tariff participation?	Hire some one who has done it before	obtain funding first. nothing happens without the funding
23. How may local or regional public agencies better support customer participation in renewable energy markets?	few	update zoning uses
24. May I contact you over the phone or in email for further clarification of your answers?	Yes	Yes
25. Are there other individuals or organizations you recommend contacting with regards solar PV development, permitting, or interconnection? If so, please provide a contact name or organization.		
26. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?	Yes	Yes
2. Additional notes on interconnection experience	Challenging	
3. Additional notes regarding advising on tariff option		
10. Additional notes on the adequacy of PG&E interconnection resources		
13. Additional notes on interconnection timing and procedural requirements		
14. Additional notes on Fast Track interconnection costs under the GIP		the interconnection costs are an unknown in the process
21. Additional notes on regulatory barriers to interconnection		zoning laws in contra costa county do not allow for solar farms. wind farms are allowed, but only because the ordinance was written in 1947
24. Additional notes on further contact		
21. Additional notes		
6. In what order are the following tasks generally pursued for FIT solar PV projects: system design; acquisition of financing; application for interconnection; application for local jurisdiction development review; application to establish a FIT agreement with a load serving entity?	Preliminary design & economic analysis Site control Preliminary financing approval Interconnection application Financing PPA	system design; application for interconnection; application for local jurisdiction development review; application to establish a FIT agreement with a load serving entity, acquisition of financing
5. What procedural differences should interconnection applicants experienced with Rule 21 anticipate when applying for interconnection through the PG&E GIP?	I would be glad to discuss in detail	
18. Do you have any recommendations or considerations related to project financing that are commonly overlooked by land owners or property managers?		ideally, the land owner should have the tax appetite to absorb the 30% tax credit rather than trying to sell it on the market.
15. Is it possible to estimate the cost of the supplemental review and potential capital improvements?	No, not until you have applied	\$100,000 - \$900,000

2.2 Planning Department Survey Responses

The responses provided by those planning department representatives that completed and returned the online survey. Participant identification has been removed to protect confidentiality.

Timestamp		2/28/12 9:50
1. What is your name, title, and contact information.	Corte Madera	
2. What is the appropriate phone and email contact for public questions regarding the solar permitting process in your jurisdiction.	building@ci.corte-madera.ca.us (415) 927-5062	
3. Does your jurisdiction require a conditional permit for development of a solar PV generators as an accessory structure or roof-top addition?	<p>Resolution No. 3369 - Pursuant to AB 2473, local agencies must administratively approve applications to install solar energy systems through the issuance of a building permit or similar nondiscretionary permit provided that the application complies with the terms and conditions contained in AB 2473.</p> <p>Town of Corte Madera, Excerpts of Ordinance 922 Amending the 2010 California Fire Code Alternative Power Supplies</p> <p>Section 605.11 is hereby added to Chapter 6 and shall read as follows:</p> <p>605.11 Alternative Power Supplies. The use of an electrical power supply, (including, but not limited to, photovoltaic, wind, geothermal or fuel fired generators) other than the community's commercial source, currently Pacific Gas and Electric (PG&E), shall comply with section 605.11.1 through 605.11.3.</p> <p>605.11.1. Disconnect. The electrical service disconnect for the alternative power supply shall be located within eight feet from the PG&E electrical service disconnect on the same or an adjacent exterior wall. The disconnect shall be accessible to emergency personnel from the exterior without the use of ladders or other special equipment.</p> <p>Exception: Enphase or similar technology for solar equipment that de-energizes the system at the roof panels upon loss of A/C reference leaving no energized electrical potential inside the structure when the main breaker is tripped.</p> <p>605.11.2. Warning Sign. The following wording shall be placed on a permanent sign attached at the main PG&E electrical disconnect. The sign shall be red background with white letters or a white background with red letters. Minimum size 2-1/2" X 6" with a minimum 22pt. font. (Example below.)</p> <p>WARNING: This building supplied with an alternative power source. Alternate disconnect is: (describe location - on the right, below etc.) of this main disconnect. Both must be used.</p> <p>605.11.3. Required Conduit. All wiring that may contain electrical potential when the alternate service disconnect has been activated (such as the wiring between the solar arrays and the DC electrical disconnect on a photovoltaic system), shall be completely contained in metal conduit</p>	
4. What are the common conditional requirements associated with authorization to develop solar PV projects in your jurisdiction. Please further note if the same requirements are typically applied to both residential and nonresidential projects.		
5. Are solar PV(solar) projects subject to design review in your jurisdiction. If yes, please note when differing levels of review apply.	No	
6. Are proposed solar projects subject to a public hearing in your jurisdiction?	No	
7. In general, should applicants with ground mounted accessory or rooftop solar projects anticipate the need for environmental review?	No	
8. What fees are typically assessed as part of planning approval for solar PV projects?	No planning approval necessary therefore there are no planning fees. There are building permit fees which range from \$400 - \$600 depending on completeness of plans, complexity, etc.	
9. Are solar PV projects proposed on residential, commercial, and industrial properties subject to the same procedures and fees? If not, please note any points of distinction between project types.	Yes	
10. Are permit applicants with projects seeking exportation and sale of excess generation resources subject to additional procedural requirements or fees? If yes, please not any additional requirements or fees.	No	

11. Does your jurisdiction require proposed solar PV projects seeking interconnection to the PG&E distribution system to submit a completed interconnection agreement prior to project authorization?	No
12. What is the estimated time period for any required permitting process applicable to solar PV projects in your jurisdiction?	A month or less
13. If plan sets are required, what plans are typically required for proposed solar PV projects?	3 sets of plans on minimum of 11X17 paper. Roof plan showing panel location, inverter location, etc. Wire line diagram. Line voltage/ampereage. Electrical calculations in compliance with article 690 of C.E.C. Approved labeling schedule. Specifications.
14. Are property owners required to possess a business license when the proposed solar PV generation facility is intended to export excess energy to the grid for sale to PG&E or the Marin Energy Authority?	No
15. Are ground mounted solar PV or solar PV parking bays facilities developed as accessory structures subject to existing zoning restrictions related to floor area ratio (FAR) or maximum lot coverage in your jurisdiction?	Yes
16. Does your jurisdiction require special or accessory structure setbacks for solar PV facilities?	No
17. Approximately how many solar projects does your department review annually?	16 reviewed in 2010. 2 reviewed so far for 2012.
18. To your knowledge, what is the largest installed solar project that your department has reviewed?	San Clemente Place (Apartments) 33-39 San Clemente Dr. Valuation \$275,000.
20. Do you have any recommendations for property managers or solar developers preparing for the permitting process in your jurisdiction?	No
19. What are common applicant mistakes or shortfalls that tend to result in project approval delays?	Incompleteness of plans. Lack of informatin. Failure to show plans comply with code.
21. Are there any final comments you would like to note regarding solar siting and development in your jurisdiction?	No
22. May I contact you over the phone or in email for further clarification of your answers?	Yes
23. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?	Yes

Timestamp	2/29/12 8:53	3/5/12 8:34
1. What is your name, title, and contact information.	Tiburon	Belvedere
2. What is the appropriate phone and email contact for public questions regarding the solar permitting process in your jurisdiction.	Same as above	
3. Does your jurisdiction require a conditional permit for development of a solar PV generators as an accessory structure or roof-top addition?	No	No
4. What are the common conditional requirements associated with authorization to develop solar PV projects in your jurisdiction. Please further note if the same requirements are typically applied to both residential and nonresidential projects.	<p>Roof mounted: must be 8" or less above the plane of the roof surface in order to qualify for a "fee-waiver" permit. Otherwise, the installation simply has to meet minimum building and electrical code requirements.</p> <p>Ground mounted array: per state law, no design review is reacquired other than ensuring compliance with setback requirements.</p>	We are a very small, mostly residential community. Roof-top solar projects are typically granted design review exemption as long as they do not significantly alter roof lines (adding <6 inches height). Otherwise, we work with applicants to find a solution that will not trigger more extensive design review.
5. Are solar PV(solar) projects subject to design review in your jurisdiction. If yes, please note when differing levels of review apply.	No	No
6. Are proposed solar projects subject to a public hearing in your jurisdiction?	No	No
7. In general, should applicants with ground mounted accessory or rooftop solar projects anticipate the need for environmental review?	No	No
8. What fees are typically assessed as part of planning approval for solar PV projects?	<p>Roof mounted: None</p> <p>Ground mounted: \$35.00 for setback varification</p>	None, if an exemption is granted.
9. Are solar PV projects proposed on residential, commercial, and industrial properties subject to the same procedures and fees? If not, please note any points of distinction between project types.	Yes	Yes
10. Are permit applicants with projects seeking exportation and sale of excess generation resources subject to additional procedural requirements or fees? If yes, please not any additional requirements or fees.	No	No
11. Does your jurisdiction require proposed solar PV projects seeking interconnection to the PG&E distribution system to submit a completed interconnection agreement prior to project authorization?	No	No
12. What is the estimated time period for any required permitting process applicable to solar PV projects in your jurisdiction?	A week or less	A week or less
13. If plan sets are required, what plans are typically required for proposed solar PV projects?	<p>Roof mounted: must be 8" or less above the plane of the roof surface in order to qualify for a "fee-waiver" permit. Otherwise, the installation simply has to meet minimum building and electrical code requirements.</p> <p>Ground mounted array: per state law, no design review is reacquired other than ensuring compliance with setback requirements.</p>	Elevations, technical specs.

14. Are property owners required to possess a business license when the proposed solar PV generation facility is intended to export excess energy to the grid for sale to PG&E or the Marin Energy Authority?	No	No
15. Are ground mounted solar PV or solar PV parking bays facilities developed as accessory structures subject to existing zoning restrictions related to floor area ratio (FAR) or maximum lot coverage in your jurisdiction?	No	Yes
16. Does your jurisdiction require special or accessory structure setbacks for solar PV facilities?	Yes	No
17. Approximately how many solar projects does your department review annually?	Over the past 11 years we have averaged 19 installations per year, with approx. five percent issued to commercial parcels.	10-15 (residential)
18. To your knowledge, what is the largest installed solar project that your department has reviewed?	12 KVA	
20. Do you have any recommendations for property managers or solar developers preparing for the permitting process in your jurisdiction?	Ensure structural concerns are addressed-e.g. engineering and/or proprietary mounting systems.	
19. What are common applicant mistakes or shortfalls that tend to result in project approval delays?	Lack of panel attachment details to the roof, or lack of construction details for ground mounted array supporting structure.	Not enough detail about the PV facilities re: size
21. Are there any final comments you would like to note regarding solar siting and development in your jurisdiction?	We try to make it as easy as possible for applicants to get approval. If certain criteria is met, roof-top installations usually incur no permit fees.	
22. May I contact you over the phone or in email for further clarification of your answers?	Yes.	Yes
23. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?	Yes	Yes
1. Additional notes on omission or confidentiality		
5. Additional notes on design review procedures for solar PV projects	See question response #4.	
6. Additional notes on public hearing requirements		
7. Additional notes on environmental review requirements for solar PV projects		Projects are too small-scale
9. Additional notes on procedural distinctions		There are no industrial uses in Belvedere.
10. Additional notes on requirements for solar PV projects planning to export resources		N/A
11. Additional notes on proof of an established interconnection agreement		
12. Additional notes on time frame for project review		
14. Additional notes on business license requirements related to wholesale PV generation facilities		N/A
15. Additional notes on density restrictions		
16. Additional notes on setback restrictions		Unless they alter roof lines/building heights significantly

2.3 Building Department Survey Responses

The responses provided by those planning department representatives that completed and returned the online survey are provided below. Participant identification has been removed to protect confidentiality.

Timestamp	2/13/12 9:28	2/22/12 14:25	3/5/12 15:50
1. What is your name, title, and contact information	Fairfax	Belvedere	Novato
2. What is the appropriate phone and email contact for public questions regarding the solar permitting process in your jurisdiction.	Same as above		Same as above
3. What building permits are generally required for development of a solar PV generator in your jurisdiction?	Building and Electrical permits	"development of a solar PV generator" is not a common term, but if you are asking about the installation of a PV system.....We issue electrical/building permits for the installation of such things.	Building permit, sub type Solar
4. Are solar projects proposed on residential and nonresidential properties subject to the same procedures and fees? If not, please note any points of distinction between project types.	No	Yes	Yes
5. Are permit applicants with projects seeking exportation and sale of excess generation resources subject to additional procedural requirements or fees? If yes, please note any additional requirements or fees.	No		No
6. Are proposed solar projects seeking interconnection to the PG&E distribution system required to submit a completed interconnection agreement prior to issuance of any required building permits?	No	No	No
7. What is the estimated time period for plan review and issuance of any building permits required for solar PV construction.	One day or less	A week or less	Over the Counter , A week or less
8. What fees are typically assessed with building permit applications for developing solar PV projects?	Plan review fees on larger commercial projects and applicable state fees. All other town fees are waived.	\$55 base electrical permit, plus the direct cost of the plan review which runs about \$300 for a medium sized roof mounted 5-10 Kw system on a single family home.	\$208.18 Flat fee
9. What plans are required to be submitted when applying for a building permits for solar PV projects?	Site and roof , electrical schematic, calculations. Three sets are required	Per the building code, plans must fully describe the nature, location and extent of the work to be performed and demonstrate that the planned work complies with the minimum requirements of the code. A single line diagram of the proposed system is always required.	Site plan, roof plan showing array layout, electrical-line drawing, general info on system size,type, attachment etc. Free standing: site plan, structural plan for structure supporting array, electrical-line drawing, general info on system, size,type attachments etc.
10. What is the building permit review procedure?	Outside plan review on larger projects, in house on smaller ones	Fill out an application, submit the plans, review the plans, issue plan check comments if needed, resubmit the corrected plans, approve the plans, collect the fees and issue the permit, then inspect the installation. Same as any other project.	
11. What applicant mistakes or shortfalls commonly result in project approval delays.		Incomplete, unprofessional documentation.	Incomplete submittal
12. Approximately how many solar projects does your department review annually?	8 per year residential, and we have had only two commercial	Residential: 5-8 NonRes: none	For 2011 we issued 6 non-residential and 62 residential permits
13. To your knowledge, what is the largest installed solar project that your department has processed?	26kW	15 Kw	Can't recall
14. How long are building permits issued for?	6 Months	I have no idea what you mean.	Two years providing inspections there is not more than 180 days in between inspections.
15. What are the construction hours for your jurisdiction?	8-9 M,T,W,T,F,S. 9-9 Sunday	8-5 monday through friday No Weekends or Holidays	7am to 6pm Monday Through Friday 10am to 5pm Saturdays NO Construction Sundays or Federal Holidays
1. How many inspections are commonly required as part of issuance of building permits for the development of solar PV facilities?		1 One	Two
2. How far in advance must inspections be scheduled?	Day Before	Day Before	Day of
3. What are the days and hours that inspections may be scheduled for in your jurisdiction?	M-T 8-4	During normal construction hours, as stated above.	Monday through Thursday 7am to 4pm Closed every Friday, no inspections available
4. What materials are required to be present during an inspection?	Permit, approved plans, and ladder	Approved plans and job card are always required to be on site. Ladder.	Permit documents include inspection record sheet

5. What issues or shortfalls are commonly encountered during inspection of solar PV facilities?	Problems with old service panels not meeting current code requirements. Most common is the lack of grounding electrode system.	None, because we do a very good job at plan review.	Approved plans not on site Wrong size conductors used
6. Are inspections commonly delayed as a result of requests outpacing the number of available officials?	No	No	No
7. Have the inspection officials in your jurisdiction attended any special training related to solar PV construction practices?	Yes	Yes	Yes
1. Do you have any recommendations for property managers or solar developers preparing for the permitting process in your jurisdiction?		Hire competent professions that a licensed electrical contractors or electrical engineers to design the system and prepare the plans. Always clearly identify the point of connection and existing electrical system.	Complete the permit worksheet and your company information including City Business License up to date. All available on line at our City website.
2. May I contact you over the phone or in email for further clarification of your answers?	Yes	No	Yes
3. Would you like a copy of the Solar PV Permitting and Interconnection Guide when completed?	Yes	Yes	Yes
1. Any additional notes on omission or confidentiality.			
2. Appropriate public contact information and/or additional notes if different than response to question 1.		They can contact me or anyone in the building department	
4. Additional notes	Larger commercial projects require outside plan review		
5. Additional notes		I am unfamiliar with the terms you are using, but I'll assume you are referring to grid-tie systems. If so, then the answer is "no". A grid-tie system is very standard.	
6. Additional notes		Again, I assume you mean a grid-tie system.	
7. Additional notes on project review time frame		Most are 1 to 3 days. A large commercial system, which we do not have here in this town of 800 single family homes and 2 churches, would be 2 weeks.	For roof mounted systems, over the counter For free standing systems, Planning review is required and may take two or three days depending on location.
2. Additional notes on inspection scheduling			Automated inspection hot line allows same day inspections if called in prior to 6 AM. At 6:01 AM inspection is scheduled for next working day. Can schedule up to five working days in advance.
6. Additional notes			
7. Additional notes	NEC related to solar installations	These questions seem rather outdated. Building Departments have been issuing permits for PV systems for many years now. There should be nothing mysterious about the process at this point. However, when unqualified people try to apply for a permit, I think the tendency is for them to blame the jurisdiction for "permit delays" instead of owning up to the fact that their documentation is below industry standard.	CALBO classes on PV Systems
2. Additional notes on further contact			

2.4 Utility Survey Response

The responses of the one participating PG&E representative from the Wholesale Interconnections Department are provided below. The identity of the individual has been removed for confidentiality.

Timestamp	2/15/12 10:58
1. Please provide your name and contact information, Position Title, length of service in current position, and responsibilities related to the PG&E Generator Interconnection Procedure (GIP) applicant assistance.	PG&E Wholesale Distribution Project Manager
2. What is the estimated time for completion of the GIP (including engineering, procurement, and construction (EPC)) under the Fast Track process for PV generators 1 MW or less?	Between 45 and 52 or less weeks
3. With regard to interconnection of small PV generators (1MW or less) under the Fast Track procedure, which of the following issues commonly inhibit the interconnection process?	Poor Project Siting, Insufficient funds or financing, Failure of supplemental review/project moved to the Independent or Cluster Study process
4. What, if any, procedural differences should PV developers experienced in Fast Track under Rule 21 anticipate when applying for interconnection under the GIP Fast Track?	Typically, the main difference is Rule 21 is connecting behind an existing service, where the WDT GIP is a "greenfield" with no electric service. This automatically involves the scope of establishing an electrical connection, which adds the 6-8 month timeline referenced above.
5. Do you have any suggestions related to PV siting, design, and interconnection preparation that may assist small generators in more efficiently navigating interconnection under the GIP.	Use the PVRFO map to locate circuits that are heavily loaded. The more load on a circuit, the lower the chance of triggering expensive upgrades. Also, understand that PG&E is not a consulting company to help developers determine if a project is feasible. We supply information as requested.
Briefly, what is the difference in color for various distribution lines on the Solar PV and Renewable Action Mechanism (RAM) Program Map provided by PG&E. If an online Map Key is available, please provide a web address.	The colors have little significance, it is simply to help distinguish different circuits (i.e. 1101 vs. 1102). The thickness SOMETIMES shows a difference between distribution/transmission.
7. What is a ballpark average cost range that small generator (1 MW or less) applicants may anticipate paying to proceed through the supplemental review process of the Fast Track GIP?	Unfortunately, I'm uncomfortable answering this. These costs are completely circumstantial.
8. Under what conditions should generators of 1 MW or less apply for interconnection under the Independent or Cluster Study tracks rather than Fast Track?	If they anticipate connecting to a circuit with little load (ISP) or if they know other projects are connecting to the same area (Cluster) using the public queue
9. Are there other individuals at PG&E that I should contact regarding better preparation for applying to the Fast Track Generator Interconnection Procedure? If so, please provide a contact address or telephone.	Removed
10. May I contact you over the phone or in email for further clarification on your answers?	Yes
12. Would like a copy of the Permitting and Interconnection Guide Book upon completion?	Yes
1. Additional notes on omission or confidentiality	
2. Additional notes on Fast Track GIP time frame	about 1.5 months for review process, another 1-2 months for IA negotiation, and 6-8 months to complete capital work (so ~1 yr total)
3. Additional notes on common interconnection issues	-Poor Project Siting refers to locating projects where there is little load which triggers larger upgrades (reverse power flow) -Incomplete app does cause minor delays, but isn't as substantial -funds, etc relate back to the top point. Another issue that comes up often is the customer's challenge of securing a PPA to sell the power. If that doesn't happen, the project stalls indefinitely
10. Additional notes on further contact	GIS Senior PM with Fast Track experience

3.0 In-person Interviews

The survey process resulted in a limited number of replies, which were not adequate for meeting the scope of the project. In response, in-person interviews were conducted in those communities that did not respond to the survey. As most municipal governments interpret AB 2473 to limit solar PV project review to that of the building department, interview focused on discussions with building department staff. Planning staff was, however, consulted in each community to identify the particular role and considerations the planning staff manages when solar PV projects are submitted.

3.1 Blank In-person Interview Questionnaire

The following questionnaire was administered in each of the communities that did not respond to the initial survey. Questions were structured to mirror the original surveys submitted to both the building and planning departments. The questionnaires were additionally informed by the prior survey responses regarding the focus on building department review as a result of AB 2473.

In-person permitting questionnaire

Jurisdiction Name

1. Permits required?

2. Materials to be submitted (including number of copies & Sizing)?

3. Fees assessed (can check Sierra report)

4. Fee: Valuation or Flat (residential & commercial)

5. Difference in assessment Residential v. commercial

6. Review Return Period

**7. Planning Review: Subject to standard setback, height, lot coverage & FAR?
Additional Considerations of the Planning Department?**

8. Expiration period for building permit

9. Expedited Solar Review?

10. Fee Reduction for Solar?

11. Conditions leading to use permit or design review

12. Common Issues with application submission

13. Construction hours

14. Inspections required

16. PV training of building and inspection officials?

17. Recommendations for applicants?

Interview responses
Possibly notes from PG&E?

3.2 In-person Interview Responses

Building and planning staff provided the following responses. Interviews were mostly conducted at the department counter and during public hours. The format followed a more informal conversation structure that relied on the questionnaire to guide the process. This allowed additional but pertinent information to be expressed and recorded.

3.2.1 Corte Madera

Jurisdiction

Corte Madera

Contact Spoken with

Building Inspector/Official

Note: 1 man shop. Building Official works with a clerk, but is otherwise solely responsible for both plan check and project inspection

1. Permits required?

Building, Electrical, Plumbing (depending on project type-ground mounted may require)

2. Materials to be submitted (including number of copies & Sizing)?

Building official may require different materials depending on the parameters of the specific project.

Generally, 4 plan sets including the following plan are required:

Cover Sheet noting property owner; project location and address

Site Plan displaying set backs and project height; locations of inverters, combiner box, disconnect, main panel, points of roof penetration

Line Diagram displaying wiring type, conduit, and locations of disconnects

Specifications Sheet covering all panels, rails, and feet

Calculations sheet including up-to-date testing for A5 wind resistance

Sticker Page completed with required notification messages and intended location

Note: an engineering stamp is required for mounting plans

3. Fees assessed

For Single Family Residential:

Plan Review Deposit (\$160) & Building Permit of \$220

If time spent reviewing plan is less than \$160 of time, excess is credited to the cost of the building permit

For Non-residential or Muti-family:

Cost based on time of review with goal of cost recovery

Permit fee to be based on estimated cost of inspection

Note: Other state costs including BSC Green and SMIP fees will be collected.

4. Fee: Valuation or Flat (residential & commercial)

For Single Family Residential: Flat fee used for Permit

Non-residential and Multi-Family: Fee based on time of review and inspection, and thus is neither flat or valued.

5. Difference in assessment Residential v. commercial

The Building Department has arranged to provide review of fire department concerns for PV installations on single-family homes. Requirements for this review are set forth in Ordinance 922, which amends Chapter 6, Section 605.11 of the Corte Madera Municipal Code.

Projects located on non-residential or multi-family properties are required to be reviewed by the fire department. This review is routed through the building department and does not require additional action on the part of the applicant.

6. Review Return Period

The building official and staff reported that plans generally take 3 weeks to return assuming that all material is adequate and accurate.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

Town set-back, height, and lot coverage restrictions apply and are examined by the building official. Further planning review may examine the need for discretionary review if the building official identifies concerns related to safety, fire protection, public rights-of-way, and drainage or flood control systems. For further information, see Town Resolution No. 3369 (2004).

8. Expiration period for building permit

Building permits are issued for 6 months from the date of issuance. Completing an inspection generally allows for an automatic 6-month extension.

9. Expedited Solar Review?

No

10. Fee Reduction for Solar?

Fee has been flattened for Residential applicants.

12. Common Issues with application submission

The building official spoke about issues during both project submission and inspection. Applications were noted as generally improving though inconsistencies continue to present challenges. Applicants were noted to submit plans lacking technical information or including expired ratings. Labeling was highlighted as an issue both in application and in-field. Sticker templates need to be completed and accurately labeled. They must be located according to NEC standards and highlighted as such in the plans. Plans were noted as often lacking information regarding attachment materials, points of penetration, and structural calculations.

13. Construction hours

M-f 7-5, sat & sun 10-5

14. Inspections required

While only one inspection is required, the building official noted that projects often require a secondary visit due to unmet conditions. Reasons cited included labeling issues, in appropriate wiring and conduit uses.

15. Materials required at inspection?

Job permit, approved plans, ladder

16. PV training of building and inspection officials?

The building official/inspection official noted that he has attended two classes as part of continuing education efforts. One class was the Bill Brooks Solar ABCs seminar. It was noted that further materials and training would be of assistance. He also noted that both installers and inspectors would likely benefit as field operators were noted as sometimes lacking knowledge of their products.

17. Recommendations for applicants?

Review Resolution No. 3369 (2004)

Provide completed labeling templates in plans

Provide adequate and complete plans

Install to plan specifications

Ensure that your engineering calculations are up-to-date and meet A5 wind requirements

3.2.2 Larkspur

Jurisdiction

Larkspur

Contact Spoken with

Counter Attendant

1. Permits required?

Building, Electrical, Plumbing

2. Materials to be submitted

3 Plan sets of at least ledger size (11"x 17") and the application.

3. Fees assessed (can check Sierra report)

Residential: Flat Fee \$323

Non-residential: Standard building fee assessment including plan check fee, permit fee, electrical permit, plan duplication. Fees based on valuation. Sierra Club found valuation method to result in very high fees for non-residential projects.

4. Fee: Valuation or Flat (residential & commercial)

See above

5. Difference in assessment Residential v. commercial

No difference other than the fee valuation

6. Review Return Period

The Town has over the counter building and planning check on a first-come, first-serve basis on Tuesdays, Wednesdays, and Thursdays from 9 to 10 am. Otherwise, plan review takes 1-2 days on average.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

Chapter 18, Section 16.225 of the Larkspur Municipal Code (LMC) provides that roof-mounted PV projects located less than three feet above the roofline are exempt from zoning height restrictions. Ground mounted systems are subject to accessory structure setbacks and must be screened according to requirements provided in Chapter 18, Section 64.020 of the LMC. Roof mounted and ground

mounted projects that do not meet these requirements are subject to design review by the zoning administrator. Zoning administrator will consider maximum lot coverage requirements, setbacks, screening and height restrictions of the zoning district.

8. Expiration period for building permit

Permits are issued for 6 months with a one-time extension allowed upon completion of an inspection.

9. Expedited Solar Review?

Yes, over the counter review provided weekly.

10. Fee Reduction for Solar?

For residential projects, the fee has been flattened. Sierra Club has noted that valuation method results in very high fees for non-residential projects.

12. Common Issues with application submission

Common issues noted included failure to comply with building code, failure to provide a complete application package, and failure to show disconnect on plans.

13. Construction hours

M-F 7am – 6pm

Sat, Sun, and Holidays 9am-5

14. Inspections required

Generally one

15. Materials required at inspection?

Permit, approved plans, ladder

16. PV training of building and inspection officials?

Counter attendant unable to confirm whether officials have received specific training.

17. Recommendations for applicants?

Applicants may drop off plans for review at any time, but should come early on over-the-counter days if immediate return is desired. Plans should be complete and accurate to ensure processing time is reduced.

Make sure plans display roof layout and tilt, show disconnect, details of roofing attachments, include technical specifications, and adequately demonstrate criteria for exemption from further review under LMC 18.16.225.

3.2.3 Marin County

Jurisdiction

Marin County

Contact Spoken with

Counter Attendant

1. Permits required

Building & Electrical

2. Materials to be submitted (including number of copies & Sizing)?

4 Plan sets including local fire Authorization Letter to be acquired by applicant prior to issuance of the building permit. Plans are to be of a minimum size of 11" x 17". See Marin County Plan Review Guidelines for Photovoltaic Systems for specific scaling and informational requirements. Plan sets to include site plan, elevation plan, electrical plan, hazard signage (requirements determined by local fire prevention officer) plan, a copy of system specifications and operation manuals, and 2 sets of structural calculations.

3. Fees assessed (can check Sierra report)

For projects valued under \$10,000, the County assesses a flat permit fee of \$271.14. Projects valued greater than \$10,000 are subject to a road impact fee of 1% of project valuation. The County additionally requires a plan review fee, state fees including SMIP and BSC Green fees, and a planning surcharge. Ground mounted systems are also subject to site/encroachment review fee. Applicants may also be required to pay for fire department plan review.

The Sierra Club found that there may be additional charges for the fire department review. This fee is thought to double for nonresidential projects.

4. Fee: Valuation or Flat (residential & commercial)

Flat if under \$10,000, valued otherwise.

5. Difference in assessment Residential v. commercial

None noted

6. Review Return Period

Counter attendant provided that plans are usually returned within a week.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

As part of the building permit application, the planning department conducts a zoning review. The planner spoke with noted that the County contains over 40 zoning districts, many of which require design review for all projects. Beyond zoning requirements, projects may trigger further review if encroaching upon setback requirements or highly visible to the public. Ground mounted projects may be exempt from set back requirements at or below the grade when not exceeding a height of 18 inches in a conventional zoning district. See Chapter 22, Section 20.090 of the County of Marin Municipal Code for further information.

8. Expiration period for building permit

Permits are initially issued for one year with the requirement for construction to finish within two years.

9. Expedited Solar Review?

No

10. Fee Reduction for Solar?

No

11. Common Issues with application submission

The attendant noted that site plans are sometimes inadequate or not to scale. Applicants need to show setbacks and elevations.

12. Construction hours

M-F 7am-6pm with silent work allowed on Sundays and Holidays

14. Inspections required

The building department generally only requires one inspection. Local fire prevention officers may require separate inspections.

14. Materials required at inspection?

Permit & plans, ladder

16. PV training of building and inspection officials?

Continuing education not specified

17. Recommendations for applicants?

The County recommends that applicants review guiding materials and speak with staff. Often times the plans are not prepared adequately, which results in slowing

of the project development. It is recommended that property owners work closely with their installers to ensure plans meet County requirements.

3.2.4 Mill Valley

Jurisdiction

Mill Valley

Contact Spoken with

Counter attendant

1. Permits required?

Building, Electrical

2. Materials to be submitted (including number of copies & Sizing)?

Requirements are standardized for roof-mounted PV systems of 10 kW or less. Additional requirements beyond those listed here may be required of ground mounted projects or those projects larger than 10 kW.

Applicants are required to provide 3 complete plan sets including a site plan, a single line diagram, and listing information for mounting, conductor type, method of grounding, and PV modules. Minimum plan size is 11" x 17" Applicants must also complete the Photovoltaic Worksheet provided by the City and should use the attached checklist to ensure plan adequacy prior to submittal.

Building attendant noted that requirements may soon change if the City decides to formally integrate fire marshal recommendations.

3. Fees assessed

The building department counter attendant provided that Mill Valley does not collect fees on PV applications but does collect .001% of project valuation for State SMIP fee.

4. Fee: Valuation or Flat (residential & commercial)

Flat: no fee assessed

5. Difference in assessment Residential v. commercial

Nonresidential and ground mounted systems are subject to further review that may take up to 3 weeks.

6. Review Return Period

Residential projects to be located on roof tops are generally reviewed over-the-counter on Tuesdays and Thursdays if sized 10 kW or less. Nonresidential and ground-mounted projects require greater review lasting up to 3 weeks.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

Planning department will review for consistency with zoning requirements unless the system is less than 18 inches off the ground.

8. Expiration period for building permit

Building permits are issued for six months from the day the permit is pulled. Must have inspection at end of the six-month and request extension if necessary.

9. Expedited Solar Review?

Yes, for residential roof projects of 10 kW or less

10. Fee Reduction for Solar?

Yes

11. Common Issues with application submission

Counter attendant felt that experienced installers do not commonly have issues. New applicants, however, may be slightly delayed if plans are not properly prepared.

12. Construction hours

M-F 8am-5pm with an hour of silent staging allowed before and after.

13. Inspections required

Generally one inspection is required with the potential for a second once the system is operational.

14. Materials required at inspection?

Plans, permit, ladder

16. PV training of building and inspection officials?

Counter attendant noted that officials participate in continuing educations but was not specifically aware of courses completed.

17. Recommendations for applicants?

The counter attendant recommended that new applicants review guiding materials and come in for over-the-counter approval at the right time

3.2.5 Ross

Jurisdiction

Ross

Contact Spoken with

Counter Attendant

1. Permits required?

Building & Electrical

2. Materials to be submitted (including number of copies & Sizing)?

The Town of Ross requires PV project applicants to submit a plan set containing 3 copies of an architectural site plan illustrating the location and property setbacks, as well as 2 copies of project specifications including details of the panels and mounting structures, and structural calculations. Additional materials may be requested for ground-mounted systems. Plans should be no smaller than 11" x 17".

3. Fees assessed (can check Sierra report)

The Town of Ross building department counter attendant provided that the Town only requires a project permit deposit, which is collected at the time the permit is pulled and returned upon inspection of a completed project meeting the specifications of the approved plans. The permit deposit is assessed according to project valuation and increases with project value according to the following schedule:

Less than \$50,000: \$500 deposit

\$50,000 to \$500,00: Deposit set at 2% of project valuation

Greater than \$500,000: Deposit set at 3% of project valuation

4. Fee: Valuation or Flat

The Town of Ross employs a valuated permit deposit for all PV projects.

5. Difference in assessment Residential v. commercial

Ross has very limited commercial properties and so has very little experience in dealing with PV projects on nonresidential properties.

6. Review Return Period

The counter attendant reported that the Town generally requires 4-6 weeks for plan check.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

The Planning department will generally review for consistency with zoning regulations related to setbacks, height, and lot coverage (on nonresidential)

properties. The Town Planner noted that PV projects are exempt from setback requirements if placed on existing structure (continued non-conforming use). All projects are required to meet the 30 ft. height requirement or will otherwise need to apply for Town Council review.

8. Expiration period for building permit

The Town of Ross sets building permit issuance periods according to the project valuation. Permits are issued for 9 months for projects valued up to \$50,000, for one year for values between \$50,000 and \$200,000, for 15 months for projects valued at between \$200,000 and \$500,000, and for 18 months for projects valued at greater than \$500,000.

9. Expedited Solar Review?

No

10. Fee Reduction for Solar?

Yes-only deposit required

11. Common Issues with application submission

The attendant at the building counter did not feel there were any typical application submission issues. This was thought to be associated with the relative experience of contractors working in the jurisdiction.

12. Construction hours

8-5 M-F, No sat, sun, holidays

13. Inspections required

The number of required inspections is dependent on the characteristics of the projects and is decided by the building official.

14. Materials required at inspection?

Plans, permit ladder

15. PV training of building and inspection officials?

The counter attendant noted that continuing education was pursued but was unsure as to whether the officials had specifically attended courses related to PV development.

17. Recommendations for applicants?

The counter attendant recommended that plans fully disclose required information and seek consistency with town requirements.

3.2.6 San Anselmo

Jurisdiction

San Anselmo

Contact Spoken with

Building Department Counter Attendant

1. Permits required?

Building & Electrical

2. Materials to be submitted

The Town of San Anselmo requires PV project applicants to submit 3 plan sets including a site plan, roof plan, a single line drawing, elevations, and structural details for mounting systems. The Town also requires 2 sets of structural calculations. Plans should be either 11" x 17" or 24" x 36". Calculations may be on an 8.5" x 11" sheet. Additional materials may be required for ground mount projects. For further information see Town of San Anselmo Building Permit Document Submittal Requirements Guidance sheet (request from agency).

3. Fees assessed (can check Sierra report)

The Town of San Anselmo requires a plan check fee of \$130 and a building permit fee of \$200. Fees are flat for commercial and residential, but there may be an additional \$220 Fire Department plan check fee assessed for commercial projects. Applicants will also be required to pay the SMIP and Cal. BSC Green Fees.

4. Fee: Valuation or Flat (residential & commercial)

Flat

5. Difference in assessment Residential v. commercial

For most commercial projects, a fire department plan review is additionally required, which increases the permitting costs.

6. Review Return Period

The building attendant reported that plan review is often completed by the next day but may take up to a few days. Fire department review is conducted separately and prior to the issuance of a building permit.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

The planning department reviews for consistency with zoning requirements related to setbacks and height requirements. Ground-mounted projects may be

exempt from lot coverage restrictions when project does not exceed 3 ft. in height.

8. Expiration period for building permit

Building permits are issued for a standard 6 month time period

9. Expedited Solar Review?

No

10. Fee Reduction for Solar?

Yes

11. Common Issues with application submission

Common application issues include inadequate site plans, particularly those lacking details on attachment apparatuses. Projects may also be held up for inconsistency between approved plans and installation practices identified during inspections.

12. Construction hours

M-F 7am-7pm, Sat 9am-5pm, Sun 12pm-5pm

If located within Bald Hill area, M-F 8am-4:30pm, no weekends or holidays

13. Inspections required

Generally one inspection is required.

14. Materials required at inspection

Permit, plan, ladder

16. PV training of building and inspection officials?

Counter attendant was not aware as to whether officials had participated in specific trainings related to PV installations.

17. Recommendations for applicants?

Provide adequate plans and install according to plans.

Business License: Contractors located in San Anselmo

<http://ca-sananselmo.civicplus.com/DocumentView.aspx?DID=225>

Business License: Contractors located outside San Anselmo

<http://ca-sananselmo.civicplus.com/DocumentView.aspx?DID=226>

3.2.7 San Rafael

Jurisdiction

San Rafael

Contact Spoken with

Building Department Counter Attendent

1. Permits required?

Building & Electrical

2. Materials to be submitted (including number of copies & Sizing)?

The City of San Rafael requires applicants to submit 3 plan sets for most projects, 4 plan sets for major projects. For over-the-counter plan review, plans must be at least 11" x 17". Minimum plan size for larger projects is 18" x 24" with maximum plan size being 30" x 42". Plans sets shall include a site plan, elevation plans, roof plan (for roof-mounted projects), and an electrical plan displaying main service and subpanel locations, conduit sizing, conductor sizing and grounding. Two copies of structural calculations must also be included.

3. Fees assessed

Fees for PV projects differ as to whether the project is located on a residential or nonresidential property.

For residential projects a flat fee of \$282 is assessed. For nonresidential projects building fees are based upon project valuation and may include plan check fees, plan retention fees, building permit fee, electrical permit fee, and a building permit fee.

4. Fee: Valuation or Flat (residential & commercial)

Flat for residential, valued for commercial

5. Difference in assessment Residential v. commercial

Planning review typically required for commercial or ground-mounted projects.

6. Review Return Period

Residential projects are generally eligible for over-the-counter review while commercial projects may take up to 3 weeks. Over-the-counter review is available on Tuesdays and Thursdays from 9am to 12 pm.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

The City of San Rafael does not require planning review for roof-mounted projects, including those located on commercial structures. Ground-mounted projects are examined as accessory structures. If ground-mounted projects are greater than 10,000 square feet, design review is generally required to examine set back and design impact issues. Review of ground-mounted plans also examines maximum lot coverage restrictions associated with the projects zoning. Projects may also face further review if located on sites of historic designation. In such cases a historic consultation is required as an initial step forward.

8. Expiration period for building permit

Building permits are issued for six months with an automatic extension provided upon completion of an inspection.

9. Expedited Solar Review

Yes, for roof mounted residential projects over-the-counter review is provided.

10. Fee Reduction for Solar

Yes, for roof-mounted residential projects a flat fee is assessed.

11. Common Issues with application submission

The San Rafael Building Department counter attendant provided that most projects have gone smoothly through the over-the-counter review process.

12. Construction hours

M-F 7am-6pm, Sat 9am-6pm, prohibited on Sundays and holidays

13. Inspections required

Generally 1

14. Materials required at inspection?

Permit, approved plans, ladder

15. PV training of building and inspection officials?

Building and inspection officials take part in continuing education. The attendant was not aware as to whether officials had participated in courses directly related to PV installation.

17. Recommendations for applicants

The counter attendant noted that plans should clearly identify where disconnects are located.

3.2.8 Sausalito

Jurisdiction

Sausalito

Contact Spoken with

Building Department Counter Attendant

1. Permits required?

Building & Electrical

2. Materials to be submitted (including number of copies & Sizing)?

The City of Sausalito requires 4 plan sets with provided plans printed on sheets no smaller than 11" x 17". Plan sets should include the department provided project information sheet, a roof plan, a site plan, and elevation drawings. Additional materials may be required. It was noted that the City does not have any standardized guiding materials for PV projects at this time.

3. Fees assessed

The Sausalito building department counter attendant reported that the City assesses the following valuation based fees for PV projects:

Plan Check

Plan Storage

Construction Traffic Fee

Electrical Fee (Includes SMIP)

For most PV projects, it is likely that the City will wave the electrical permit fee. There is an additional charge if applicants choose the 5-day expedited review service. It may be noted that the 2011 Sierra Club survey reported that the City also assesses a zoning permit fee.

4. Fee: Valuation or Flat (residential & commercial)

Valuation

5. Difference in assessment Residential v. commercial

No difference reported

6. Review Return Period

Sausalito generally provides a 2-week plan check turnaround unless applicants opt to pay for the additional charges associated with a 5 day expedited service.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

The City of Sausalito Building Department counter attendant reported that the City does not require planning review for solar PV projects.

8. Expiration period for building permit

Building permits are issued for 6 months. Inspection or extension request may allow for the permit issuance period to be extended.

9. Expedited Solar Review

Available for additional fee

10. Fee Reduction for Solar?

Somewhat: Electrical permit fees are waived for PV projects

11. Common Issues with application submission

The building department counter attendant did not report any reoccurring issues with applications

12. Construction hours

M-F 8am-6pm

Sat 9am-5pm

No work allowed on Sundays

Work allowed from 9am-7pm on City holidays

13. Inspections required

Generally one depending on the project

15. Materials required at inspection?

Permit, approved plans, ladder

16. PV training of building and inspection officials?

The counter attendant could not confirm the attendance of officials at any solar PV related training courses.

17. Recommendations for applicants?

The counter attendant did not have any recommendations for applicants.

3.2.9 Tiburon

Jurisdiction

Tiburon

Contact Spoken with

Building Department counter attendant

1. Permits required?

Building & Electrical

2. Materials to be submitted (including number of copies & Sizing)?

The town of Tiburon requires applicants to submit 3 complete plan sets to include a building permit application (see Town building department for form), a site plan, a single line electrical diagram, cross sections and three sets of calculations.

Minimum plan size is 11" x 17"

3. Fees assessed

In 2005, the Town of Tiburon passed resolution 05-2005, which waives building permit fees for roof-mounted solar projects no more than eight inches above a sloped roof or 18 inches above a flat roof. Ground-mounted systems are subject to full building permit fees, which are valuation based and include plan check, building permit, plan storage, electrical permit fee, street impact fee, the General Plan maintenance fee, and the technology fee. All projects will be subject to the state SMIP and CA. Bldg Std. Ad Fund fee.

4. Fee: Valuation or Flat (residential & commercial)

Valuation based where applicable

5. Difference in assessment Residential v. commercial

No difference reported

6. Review Return Period

The counter attendant reported that projects are generally reviewed in three to five days but never more than two weeks.

7. Planning Review: Subject to standard setback, height, lot coverage & FAR? Additional Considerations of the Planning Department?

The town of Tiburon does not require planning review for roof mounted PV systems less than 42 inches above the roof or those located on the ground.

8. Expiration period for building permit

Building permits are issued for 18 months.

9. Expedited Solar Review?

No

10. Fee Reduction for Solar?

Yes, for roof-mounted solar systems less than 8 inches above the roof.

11. Common Issues with application submission

The counter attendant did not suggest any significant and reoccurring issues, but did note that some projects may require fire marshal review if more that 50% of a structure's walls are to be demolished for the installation.

12. Construction hours

M-f 7am-5pm

Sat. 9:30 am- 4pm

Prohibited on Sundays and holidays

13. Inspections required

Generally one inspection required

14. Materials required at inspection?

Job Card (building permit), approved plans, ladder

15. PV training of building and inspection officials?

The counter attendant was not aware of specific PV training courses attended by officials

17. Recommendations for applicants?

The building counter attendant noted that it is important for applicants to provide completed applications and adequate plans. Most contractors are repeats and are experienced thus avoiding complications.

APPENDIX B: Project Deliverables

REPORT TO THE MARIN ENERGY AUTHORITY
PERMITTING AND INTERCONNECTION BARRIERS TO FEED-IN TARRIFF
PARTICIPATION IN THE MEA SERVICE TERRITORY

by
Stephen Rogers
June 2012

TABLE OF CONTENTS

LIST OF TABLES	III
LIST OF FIGURES	IV
LIST OF ACRONYMS	V
EXECUTIVE SUMMARY	VI
1.0 INTRODUCTION	2
2.0 STUDY DESCRIPTION, OBJECTIVES, AND METHODS	3
3.0 FINDINGS	5
3.1 LIMITED INTERCONNECTION AND PERMITTING EXPERIENCE	6
3.1.1 INTERCONNECTION	6
3.1.2 PERMITTING	8
3.2 LACK OF DATA AND GUIDING INFORMATION	8
3.2.1 INTERCONNECTION	8
3.2.2 PERMITTING	11
3.3 COMMON FAST TRACK SCREENING FAILURES	14
3.4 LACK OF ADEQUATE TOOLS FOR SITE EVALUATION AND SUBMISSION	14
3.5 VARIATION IN PROCEDURAL REQUIREMENT	16
3.6 COMMON ISSUES CITED BY PROJECT STAKEHOLDERS	17
3.6. 2 INTERCONNECTION	19
3.6.3 PROJECT FINANCE	20
4.0 RECOMMENDATIONS FOR MEA ACTION AND CONCLUDING REMARKS	22
4.1 RECOMMENDATIONS	23
4.1.1 PROPERTY OWNERS AND SOLAR DEVELOPERS	23
4.1.2 LOCAL AGENCY PLANNING AND BUILDING DEPARTMENTS	26
4.1.3 PARTICIPATION IN FERC PROCEEDINGS TO REVISE SGIP PRACTICES	27
4.2 CONCLUSION	29
REFERENCES	30

LIST OF TABLES

Table		Page
1.	PG&E Executed FIT Projects	5
2.	Current PG&E WDT Fast Track Study Indicators	7
3.	Current PG&E WDT “ <i>All Queued</i> ” Interconnection Request Indicators	9
4.	Building Permit Procedural Practices in Marin Communities	15
5.	Common Issues Cited by Project Stakeholders	17

LIST OF FIGURES

Table		Page
1.	Reported Permit Review Times for the Communities of Marin	11

LIST OF ACRONYMS

EPC	Engineering, Procurement, and Construction
FIT	Feed-in Tariff
GF	Generation Facility
GIP	Generator Interconnection Process
IOU	Investor Owned Utility
MEA	Marin Energy Authority
PGC/EPIC	Public Goods Charge/Electric Program Investment Charge
PPA	Power Purchase Agreement
RAM	Renewable Auction Mechanism
ROI	Return on Investment

Executive Summary

This report has been developed for the Marin Energy Authority (MEA) in conjunction with a study of the permitting and interconnection procedures applicable to solar PV projects seeking participation in the MEA Feed-in Tariff (FIT) program. The study was conducted for the MEA on behalf of the author and in partial fulfillment of requirements for a Master's Degree in City and Regional Planning at Cal Poly, San Luis Obispo. The findings and recommendations made here seek to support participation in the MEA FIT program through the reduction of non-market barriers to the development of the solar PV generators. The study project specifically focused on the ability of property owners and solar developers to anticipate interconnection and permitting costs and timeframes in order to efficiently plan for project development and financing.

The study findings suggest that participants in MEA FIT program may face significant challenges in planning for and proceeding through regulatory compliance procedures during project development. This is because of the combined effect of the circumstantial nature of the interconnection and permitting process, as well as the relatively novel role of municipal governments and utilities in overseeing the development of consumer-sited grid-tied distributed generation. As a result, there exists limited experience in interconnecting solar PV projects of 1 megawatt (MW) or less to the PG&E distribution system under the wholesale interconnection standards set forth in the PG&E Generator Interconnection Process (GIP). Likewise, permitting practices vary greatly among communities in terms of cost and procedure, and have largely not been tested in terms of solar PV systems larger than a typical residential system.

These considerations make it difficult for FIT applicants to plan accurately for overall project costs and development timeframes. This, in turn, equates to greater difficulty in assessing the return on investment (ROI) of a given project and may dissuade investors from providing necessary development capital. As such, the permitting and interconnection procedures implemented in the MEA service territory for FIT projects have the potential to undermine the advantages in rate transparency sought through the use of standard offer contracts for power purchase agreements (PPAs).

As discussed, the MEA may assist in overcoming these challenges by working to increase access to information on permitting and interconnection practices. It is also important to work towards standardized permitting procedures that allow solar developers to more efficiently and accurately navigate municipal requirements. As a regional public entity having established relationships with the local governments in Marin, as well as with PG&E and a great number of property owners, the MEA is uniquely situated to provide guidance in working toward these goals.

The following recommendations are made to the MEA as methods for approaching the challenges FIT applicants may currently experience in navigating permitting and interconnection procedures:

- 1. Publish and Distribute the MEA Feed-in Tariff Reference Guide on Solar PV & Permitting in Marin Guide (Guide attached to this report);**
- 2. Develop Case Studies on Permitting and Interconnection of FIT Projects in Marin Communities;**
- 3. Evaluate the Return-on-Investment for 10 kW Residential Solar PV Systems under MEA FIT Contracts in Comparison to a Standard Residential Net Energy Metering (NEM) Project.**
- 4. Coordinate Approaches to Solar PV Development between the Communities of Marin;**
- 5. Increase Solar PV Education for Building and Inspection Officials and Solar Installers;**
- 6. Advocate for Revision to the PG&E Generator Interconnection Process (GIP) and the Provision of Additional Interconnection Queue Data.**

1.0 Introduction

The continued success of the Marin Clean Energy (MCE) program provides a unique opportunity for the Marin Energy Authority (MEA) to further leverage the local demand for renewable energy (RE) toward co-benefits such as workforce training and economic development. In December of 2010, the MEA took appropriate steps towards achieving these goals when the Board of Supervisors approved the implementation of a Feed-in Tariff (FIT) program. In pursuing this action, the MEA once again set precedence for community engagement in the energy system through the use of market-based mechanisms.

The FIT contract structure is thought to support investment in the development of distributed RE generation by increasing the transparency of investments in emerging energy technologies. In providing participants with standard contracts that secure compensation rates over long-periods of time, FITs allow project developers to more accurately estimate the return on capital provided for facility development. FITs are consequently viewed as efficient tools for more clearly communicating potential benefits to project financiers.

Countries across the globe have now implemented FITs. Policies providing generator access to FITs have received specific notoriety for accelerating RE capacity development in Europe (Menanteu, Finon, & Lamy, 2003). In the US, California remains a leader in implementing RE policies and has witnessed substantial demand for participation in the FIT program offered by the Pacific Gas and Electric Company (PG&E, 2012a).

Regardless of the type of market mechanism implemented to support RE generation, capacity development occurs within a complex and multijurisdictional policy environment for regulating project permitting and interconnection. Prabhu (2005) notes the potential for interconnection and permitting costs to be so great as to render small-scale DG projects infeasible. The International Panel on Climate Change (IPCC, 2011) has recognized the potential for interconnection and permitting procedures to act as non-market barriers to RE investment when resulting in a lack of procedural transparency or overly burdensome costs. Pitt (2008) agrees and provides that as interconnection and permitting costs account for a greater share of total costs in the US when compared to Japan or Europe, the underlying issues deserve greater attention from American policy makers. This report seeks to provide an initial step towards this goal by providing the MEA with an evaluation of the permitting and interconnection procedures applicable to developing a solar PV generator for participation in the MEA FIT program.

2.0 Study Description, Objectives, and Methods

During August of 2011, the MEA hosted an outreach event for public review of the organization's FIT rates. While participants were largely in agreement as to the adequacy of the rates, difficulty in anticipating the costs and timeframes associated with permitting and interconnection of generators was noted as a significant issue. Meeting attendants suggested that the MEA develop a pseudo-ombudsman capacity to facilitate the permitting and interconnection process.

While appropriate, this suggestion seemed somewhat unnecessary given the limited number of FIT applicants at that time. Nonetheless, the public participants had highlighted an important concept: financial mechanisms are only one of many considerations in developing the local capacity for RE generation. Thus, the suggestions noted at the public review were helpful in directing attention towards the transparency of permitting and interconnection procedures as having meaningful associations related to project planning, financing, and ultimately development.

In response, this author offered to produce a guide for consumers and developers on the permitting and interconnection procedures relevant to solar PV projects seeking participation in the MEA FIT program. The central objective of this project was to produce an introductory informational tool on permitting and interconnection that links disaggregated resources into a single reference source easily accessible by both the uninformed public and solar developers new to FIT development in Marin. The project also sought to examine the permitting and interconnection process in order to make recommendations for programmatic action that could be undertaken by the MEA. With the approval of the Executive Director, the project began in September of 2011 and was completed June of 2012.

In order to produce the guide, a study of interconnection and permitting procedures was conducted. The focus on solar PV stemmed from the MEA staff's anticipation that this particular technology is the generation type of greatest interest to consumers in Marin. Given the objectives of the guide, review of permitting practices was limited to those procedures implemented in the communities of Marin. The question of interconnection study was a bit more difficult as MEA FIT projects may seek interconnection under either the CAISO transmission system or the PG&E distribution system.

Discussions with a solar developer provided guidance in noting that transmission interconnections for projects of 1 MW or less were unlikely due to high costs and lengthy timelines. The developer further suggested that the sensitivity of small-scale FIT projects to the financial impact of "soft costs" like permitting and interconnection made it most likely that applicants would seek interconnection through the least expensive interconnection option for wholesale distribution. In

the case of the MEA FIT program, this is the PG&E Fast Track study procedure offered under the utility's Generator Interconnection Process (GIP).

With these parameters set, a methodology was designed that incorporated document review and stakeholder surveys. Included in the initial stages was an examination of the online materials related to community practices for solar PV permitting in the municipal jurisdictions of Marin. Documents associated with the PG&E GIP were also reviewed. Stakeholder surveys were designed to include representatives of PG&E, solar developers, and officials representing the building and planning departments in Marin.

It should be noted that identifying stakeholders and gaining their participation sometimes proved difficult. This was particularly challenging with regards to pinpointing developers experienced in interconnecting solar PV projects of 1 MW or less in the PG&E territory. As detailed in the findings, there are not any projects of this unique classification that have come online at this time. Nonetheless, the study was able to identify two organizations currently moving through the interconnection process that were willing to participate.

Additional challenges were found in survey response rates and the inadequacy of submitted responses. In most cases, the data collection process required additional information. As such, follow-up discussions were conducted over the phone, in person, and via email. The resulting findings are helpful in assessing potential barriers to FIT participation related to the regulatory compliance process.

3.0 Findings

Property owners and solar developers face significant challenges in anticipating the cost and timeframe for permitting and interconnecting solar PV facilities for participation in the MEA FIT program. The combination of survey responses and review of public data provided by PG&E suggests that there exists only limited experience with the interconnection and permitting of solar PV projects as large as 1 MW for wholesale participation within Marin County. Costs and timeframes for permitting and interconnection were found to vary according to the jurisdictional, environmental, infrastructural, and technological characteristics of the project. The complexity of these circumstantial characteristics in combination with access to limited resources for understanding the implications of siting and design decisions upon permitting and interconnection costs and timeframes reduces the ability of property owners and solar developers to accurately estimate the installed costs of solar PV development.

With regards to interconnection, variation in cost and timeframe is most influenced by the incidental characteristics of the existing utility infrastructure and the presence of previously requested or already interconnected generation projects. Applicants are generally unable to anticipate these features, as there is a lack of information and tools regarding past experiences or existing conditions. In some cases, applicants may face the potential for unlimited cost burdens and unpredictable timeframes prior to and at the time of submission. As such, integrating precise estimates of interconnection costs and timeframes into project planning is difficult task that cannot necessarily be done in an accurate manner.

The permitting process may be equally difficult to predict. The time required for permit review ranged from over-the-counter to six weeks and was noted as being dependent on the availability of staff and the size of project. Likewise, survey responses noted the fee assessment method varied both amongst and within communities. Flat fee and valuation fee assessment methods were both found to be implemented. Some communities use both these methods and rely on project zoning to determine the appropriate assessment. The numbers of plan sets required for submission were found to vary in size and number. Similarly, the procedures for scheduling inspections, as well as the time periods during which inspections are offered, were also found to vary between communities.

Responses from the planning and building staff noted that experience with permitting solar PV was largely limited to small-scale residential projects. While these project may move quickly through the permitting project, standardized information as to how project design may avoid more significant review or what the costs or timeframe associated with an in-depth review was not found.

3.1 Limited Interconnection and Permitting Experience

Table 1: PG&E Executed FIT Projects
Data Source: PG&E (2012a)

Overview of Current Information on PG&E Executed FIT Contracts for Solar PV (May 1, 2012)	
Percentage of PG&E Executed FIT Contracts that Employ Solar PV Technology (n=101)	78%
Percentage of Executed PG&E Solar PV FIT Contracts with a Capacity of 1 MW or Less (n=79)	37%
Percentage of PG&E Executed FIT Contracts Employing Solar PV that are of 10 kW or less in Capacity (n=101)	0
Number of PG&E Executed Solar PV FIT Contracts that have achieved Commercial Operation as of 1/5/12 (n=101)	0
Number of PG&E Executed FIT Contracts Employing Solar PV & Located in Marin County (n=101)	0

3.1.1 Interconnection

Review of public data on PG&E executed FIT projects and currently queued interconnection requests reveals a limited experience in interconnecting projects within the defined interest of the study. With regards to FIT contracts executed by PG&E, an overwhelming number were found to employ solar PV technologies. Less than half of these, however, are designed with a capacity of 1 MW or less. None of the executed contracts had reached commercial operation at the time of review or were located in Marin County.

There were also no projects of 10 kilowatts (kW) or less. This indicator is considered to be of importance because the PG&E GIP permits expedited interconnection with reduced costs for certain generator projects of this size. In conjunction with this, the survey and interview responses noted that the majority of solar PV projects in their

jurisdictions are located on smaller residential properties. As such there may be great potential the expedited 10 kW interconnection processes to reduce the cost and timeframes for certain potential FIT participants. However, the lack of executed FIT contracts of this size denotes that the process interconnection process set forth in the GIP has yet to be tested. The PG&E representative who responded to the survey confirmed this assumption as correct.

Table 2: Current PG&E WDT Fast Track Study Indicators
Data Source: PG&E (2012b)

Review of Projects Currently Queued in PG&E WDT Fast Track Study (Interconnection Under GIP) Reviewed 5-1-12		
Indicator	Quantification	Finding
Number of Currently Active Interconnection Requests in the Fast Track Queue	150	
Percentage of projects listed in the Fast Track Queue as active, having Initial Review complete, and having initial review issued within maximum of 19 Calendar Days (15 Business Days) of Application Completion (n=86, project active & initial review complete)	9%	Once Application status is completed, PG&E is to issue the Initial review within 15 business days (19 calendar days at most). Only a small number of projects in the queue had the initial reviews issued within this time period.
Average number of days between application completion and Initial Review Issuance for projects listed in the Fast Track Queue as active & having Initial Review complete and issued	53	On average, the time period between application completion and initial review completion is 34 days longer than stipulated by the GIP.
Percentage of projects in the Fast Track queue that are active, have completed the Initial Review and pass initial review. (n=79, project active & initial review complete)	10%	At the time of review, 90% of Fast Track applicants having completed initial reviews did not pass the initial review.
Percentage of queued projects having completed study and passed Fast Track (n= 41, queued projects having completed study)	22%	For currently queued Fast Track projects, over 75% could not be interconnected through the Fast Track study.
Technical Screens commonly failed by Fast Track applicants currently in the queue (n= 79, projects having initial review completed)	Screen: Times Cited (% of Reviews Cited In) 2: 39 (49%) 4: 20 (25%) 5: 4 (5%) 6: 2 (3%) 9: 3 (4%) 10: 37 (47%)	Fast Track applicants most commonly fail the initial review for reasons related to exceeding the 15% of Peak Line Load, contributing to more than 10% of the maximum fault current in aggregate with other generators on the line, and triggering the need for distribution or network upgrades as a result of generator impact on the grid.
*Review of queued Fast Track projects with completed applications did not include 3 projects listed as having completed the Initial Review prior to the date of application.		

3.1.2 Permitting

Planning and building officials have noted limited land use capacity for accommodating large solar PV facilities in Marin. As noted above, the participating municipal representatives also reported that most submitted projects were located on residential properties. The majority of experience in permitting solar PV projects in the communities of Marin is thus mostly restricted to projects located on residential properties of limited size. Accommodating project proposals for projects as large as one (1) MW within existing permitting structures may consequently be challenging for the planning and building departments in Marin and thus result in unanticipated review costs and timeframes.

During the survey and interview process, building department staffs were asked to comment on whether people in the department had received training specifically related to solar PV. Respondents provided that to their knowledge building officials participated in continuing education that included review of solar PV practices.. More insight into experience was provided during an opportunity to discuss review and inspection issues with the Corte Madera Building Official. During conversation, the official noted that he had attended the Bill Brooks lecture on the Solar ABC's Expedited Solar PV Permitting and Inspection process, but further asserted that review of larger systems as well as those incorporating increasingly innovative technologies provided a challenge due to lack of experience or knowledge of the included equipment. In association with this insight, the official suggested that additional training would be a welcomed help.

3.2 Lack of Data and Guiding Information

The capacity to anticipate permitting and interconnection costs and timeframes affect the ability of property owners and solar developers to efficiently plan for and finance a solar PV project. As discussed here, currently implemented permitting and interconnection procedures do not provide property owners and solar developers with the capability to fully anticipate these considerations.

3.2.1 Interconnection

The PG&E GIP Fast Track procedure involves up to seven separate stages. The costs and timeframes associated with these stages are established in the PG&E GIP. To provide potential applicants with a more in-depth understanding of the actual interconnection experience, PG&E provides the public with two interconnection queue spreadsheets denoting all current interconnection requests. These spread sheets provide the public with a bare minimum amount of data for evaluating actual interconnection experiences associated with differing project sizes, locations, and chosen study tracks.

These data sets do not readily permit users to deduce the time periods experienced for all stages of the interconnection process. The data sets also fail to provide any information associated with the incurred cost of interconnection requests. Data is, however provided to estimate the actual experienced time of review for solar PV Fast Track applicants. In conducting the examination, it was noted that for most projects, the period experienced for initial review extended beyond that provided in the PG&E GIP. This suggests that the overall time period required for completing the interconnection process may take longer than provided in the GIP, thus making it difficult to accurately plan for project development. Survey responses on this subject varied. The representative from PG&E provided that the interconnection process for Fast Track projects generally occurred within a couple of weeks before or after the 52-week estimate provided in the GIP. One solar developer was in agreement with this, while another stated that the process might take as long as 80 weeks. Unfortunately, this information cannot be verified as neither of the public data sets provides a date for the completion of the final Engineering, Procurement, and Construction (EPC) phase of the interconnection process.

The cost of interconnection is also a concern for which there is a lack of available information. While the GIP requires Fast Track requests to provide an application fee of \$500, there exist a range of additional costs of which there is no data available for. This begins with the Supplemental Review process and the cost of interconnection facilities. After an application is deemed complete, interconnection requests moved to the secondary stage of Initial Review. During this period, the project and the infrastructure existing at the proposed point of interconnection are evaluated against 10 technical screens. These screens largely focus on evaluating the impact of the generator on the grid with consideration to impacts on grid reliability and safety. If the proposed generator passes all ten screens then the project is allowed to move forward and the applicant is offered an interconnection agreement detailing the costs of installing any required interconnection facilities. If the project fails any of the 10 screens, the GIP grants PG&E the flexibility to either approve the project or require supplemental review. Review of the existing queue data provided that nearly half of all solar PV Fast Track applicants with projects of 1 MW or less required Supplemental Review. It was further found that 78% of projects having completed the Fast Track process have not been permitted to interconnect without examination under the more costly and time consuming Independent Study or Cluster Study procedures.

The GIP neither provides an estimate for the cost of Supplemental Review or the potential costs for any required interconnection facilities. Survey respondents were asked to reflect on whether it is possible to approximate these costs. The Solar developers and the representative from PG&E provided that these costs were too circumstantial to allow for cost estimations. In further discussions, the PG&E representative suggested that the average costs of supplemental review

and interconnection facilities were \$1500 and \$200,000, respectively, but additionally asserted that these costs can vary substantially. Likewise, one solar developer provided that it is impossible to accurately estimate these costs before entering Supplemental Review. The other solar developer response provided an estimated maximum of \$900,000 for the Supplemental Review and interconnection costs.

The GIP does not detail what potential interconnection facilities may be required or the costs for such facilities. This information is also not provided for those projects listed as having completed an interconnection agreement in the

Table 3: Current PG&E WDT “All Queued” Interconnection Request Indicators
Data Source: PG&E (2012c)

Review of Projects Currently in PG&E WDT Queue (Interconnection under GIP) Reviewed 5-1-12		
Indicator	Quantification	Finding
Total Projects in WDT Queue	500	
Percentage of Queued Projects Employing Solar PV (n=500)	89%	The majority of wholesale generator projects seeking interconnection in the PG&E service territory employ solar PV.
Percentage of Queued Solar PV Projects Requesting Fast Track (n=443, queued, solar)	47%	Less than half of queued wholesale solar PV projects request Fast Track
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 MW or less (n=287, queued, solar, Fast Track)	72%	Majority of queued solar projects of 1 MW or less request Fast Track
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 or less, Active Status & Interconnection Agreement Tendered or Executed (n=52, queued, solar, Fast Track, ≤1 MW, Active status)	13%	There is a limited number of solar PV projects in the Fast Track that have completed the study process
Percentage of Queued Solar PV Projects Requesting Fast Track with Capacity of 1 or less with Active Status & Interconnection Agreement Tendered or Executed that Required Supplemental Review (n=7, queued, solar, Fast Track, ≤1 MW, Active status)	43%	Almost half of the currently queued solar PV projects of 1 MW or less that have completed the study require supplemental review.
Number of Queued Solar PV Projects of 1 MW or Less Located in Marin	1	PG&E has limited experience in interconnecting wholesale solar PV projects through the GIP process in Marin.
Percentage of Queued Solar PV Projects of 1 MW or Less Requesting Cluster Study (n=80, queued, solar, ≤1 MW)	0%	No wholesale solar PV projects of 1 MW or less currently in the interconnection queue have requested Cluster Study.
Percentage of Queued Solar PV Projects of 1 MW or Less Requesting Independent Study (n=80, queued, solar, ≤1 MW)	6%	Very Few wholesale solar PV projects of 1 MW or less currently in the interconnection queue have requested Independent Study.

publically available queue data. Given that the GIP places the cost of all necessary network or reliability improvements, as well as any interconnection facilities upon the applicant, generator projects face a significant potential for unknown costs when requesting a wholesale interconnection.

FIT projects face further uncertainty with regards to the possibility of failing the Fast Track procedure. This occurs when the results of the Initial Review and Supplemental Review find that the project cannot be interconnected without further in-depth engineering studies of the project impact in aggregate with other interconnected or requested generation project. When this occurs, applicants are forced to either retire their interconnection request or move to the Cluster Study or Independent Study process.

It is important to note that these study processes incorporate timeframes and costs differing from those included in the Fast Track procedure. When having to move a project review from the Fast Track to either of these procedures, the applicant will forfeit any expenditures made during the Fast Track evaluation while additionally being required to submit an initial deposit of \$50,000 plus an additional \$1,000 per MW of project capacity. In reviewing the public data on the Fast Track queue, it was found that only 22% of currently queued Fast Track requests incorporating solar PV facilities of 1 MW or less were deemed able to be connected via the Fast Track process. Thus the overwhelming number (78%) of Fast Track applicants currently face either project cancelation or the requirement to extend the cost and timeframe for interconnection beyond that which was assumed at the time of submission.

3.2.2 Permitting

The cost and timeframe of permitting for solar PV facilities in Marin is also difficult to predict. The state has attempted to provide guidance on this issue through California Assembly Bill (AB) 2473 (2004), which limits the ability of local governments to apply discretionary review to solar PV projects unless specific and quantifiable concerns related to public health and safety are identified. While the law is generally interpreted as limiting review to building permits, actual implementation varies between communities.

In some Marin communities, planning departments do not review building permit applications for solar PV projects. In others, almost all projects must pass through design review. The case-by-case nature is typical of the development process but also complicates project planning as applicants may not be able to predict the level of review and required timeframe. Furthermore, review periods vary greatly between communities. A number of communities have established over-the-counter review processes for PV projects. Others, however, reported

that review periods depend on a number of conditions including project zoning, project size, current workload, and available staff.

The Figure 1: Reported Permit Review Times for the Communities of Marin documentation of procedures intended for solar PV project permitting is also

limited. Only two communities in Marin have passed solar ordinances or resolutions providing official guidelines on how a project will be reviewed. It was also found that only one community provides application materials specifically related to solar PV building permits.

Solar developers may be required to spend additional time identifying the process for scheduling an inspection or figuring out when construction is allowed. Though these are basic parameters influencing the completion of all permitted projects, it was found that some communities in Marin do not readily provide this information or even a building permit application online. As a result, solar developers do not have quick access to foundational information that affects the timeframe in which a solar PV project may be developed.

Mechanisms for establishing the cost of solar PV building permits also differentiate depending on project characteristics and location. In some communities a flat fee has been established. Others, however, assess permit fees through a valuation method based on the installed cost of the project. Identifying this information can be time consuming for property owners and solar developers since the information provided by municipal agencies online is often lacking clarity on this issue.

Solar PV projects also face cost uncertainty should the building official determine that further discretionary review is required. This more specifically speaks to the potential for projects to encounter environmental review under the California Environmental Quality Act (CEQA) or for community design review processes to require design alterations. Should the CEQA process result in the need for an Environmental Impact Report (EIR), the cost could potentially render the project financially infeasible. Similarly, alterations as a result of design review are likely to affect project output, thus impacting the return-on-investment (ROI) originally anticipated.

Predicting the likelihood of more in-depth review prior to submission will likely require contact with planning and building staff prior to project submission. In echoing this, the survey responses and interviews repeatedly noted that establishing early contact with municipal agencies was critical to minimizing permitting costs and timeframes. Associated with this, respondents also noted that understanding local building and zoning requirements and incorporating them into a project design is the most efficient manner for avoiding more in-depth project review when applying for building permits.

In speaking with planning and building staff, the Marin Map (<http://marinmap.org/dnn/>) was identified as a new resource for property owners and solar developers seeking information on project site constraints. This online tool incorporates the use of a Geographic Information System (GIS) user interface in order to provide users with data related to property zoning, soil

conditions, environmental hazards, and other site conditions that may affect project design and permitting. Review of this tool found that information is not available for all communities. It was also recognized that the user interface may be challenging for those inexperienced in using GIS interfaces.

3.3 Common Fast Track Screening Failures

Review of the PG&E data set on existing Fast Track interconnection requests found that only 10% of projects having completed the Initial Review screening passed. The most commonly failed screens at this time are:

2. GF (generation facility), in aggregate with other generation, shall not exceed 15% of Peak Load (49% fail).
4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current (25% fail).
10. No construction of facilities by PG&E (distribution or network upgrades) (47% fail).

With the exception of screen 10, which depends on existing infrastructure conditions, these screens refer to the distribution line Peak Load and maximum fault current limits at which PG&E automatically assumes the need for further engineering study of the impacts upon power reliability and grid safety associated with a proposed project. In addressing the use of these technical limitations as point at which further review is warranted, Keyes and Fox (2008) note that since the development of the SGIP (the precursor for the current GIP) utilities have gained significant experience in connecting small-scale distributed generation to the grid. As such, the 15% and 10% limitations used in screens 2 and 4 are suggested to be outdated and unnecessarily low (Keyes & Fox, 2008). During FERC proceedings on combining the LGIP and SGIP into the GIP, the Solar Energy Industries Association (SEIA, 2010) further asserted that, given increased application for small-scale interconnection, the levels used in these screens are unrealistic and in conflict with increased DG capacity sought through programs like the RPS, FIT, or the CSI.

3.4 Lack of Adequate Tools for Site Evaluation and Submission

Study respondents repeatedly noted that the cost and timeframe of interconnecting and permitting those projects addressed in the guide is significantly influenced by conditions at the project location. As such, the ability to anticipate environmental and infrastructure conditions of a proposed site can significantly affect the estimation of interconnections and permitting costs and timeframes. Tools for anticipating and evaluating these conditions are thus important to identifying the level of funding needed to see a solar PV project through the development process.

Information provided by the participating representative from PG&E noted that the ability to pass the Fast Track Initial Screen is greatly improved when siting a project near distribution lines having substantial capacity and away from other existing or requested generation interconnections. Tools available to the public for the interconnection process include the PG&E Renewable Auction Mechanism (RAM) map and the two public data sets on existing interconnection requests. From the data sets and map, project developers may identify existing distribution lines, substations, and interconnection requests located within the county of the proposed project. These resources do not, however, provide data regarding existing and available line capacity or the specific location of requested projects. It is appropriate to additionally note that the two publically available data sheets on exiting interconnection requests lack consistency in the indicators provided to users. For example, those viewing the Fast Track only queue will find information on the period required for the Initial Review and whether or not a given project passed or failed the Fast Track, but is not given information regarding the county in which the project is located, the nearest substation, or whether the a failed Fast Track project continued through to a Cluster Study or the Independent Study. Likewise, those viewing the “All Projects” queue are provided with information regarding location and substation name, but are not provided with information regarding the length of the Initial Review period or whether a certain project passed the Fast Track process. In effect, the lack of data access and consistency ultimately limits the conclusions that may be drawn.

For siting considerations related to project permitting, the zoning and building codes, as well as the Marin Map are provided to the public online. As users may identify the development restraints for a given property with these tools, solar developers and property owners in Marin are regarded as having access to reasonably adequate siting resources. Room for improvement does, however, exist for providing potential applicants with case study information regarding experienced permitting costs and timeframes for projects that do not readily comply with identified development constraints.

It should also be noted that the data collection process did not identify any opportunities for applicants to submit either an interconnection request or a building application online. Online submission systems were noted by Sun Run (2011) as assisting in minimizing experienced costs by reducing expenditures by solar developers associated with in-person submissions. At the time of review, the PG&E website for wholesale interconnections did provide that an electronic submission process would be forthcoming. This was, however, consistently presented on the website over the 9-month study period. None of the responding municipal stakeholders suggested that online submission systems are currently under consideration.

3.5 Variation in Procedural Requirement

Variation between community procedures may increase development timeframes and costs, as solar developers are required to become familiar with the preferences and requirements of multiple agencies when working throughout a region. The potential for this was found to exist in Marin as those building permit procedures examined varied across a number of permitting aspects. For example, the contents of plan sets, plan sizes, and the number of plan sets

Table 4: Building Permit Procedural Practices in Marin Communities

Solar PV Permitting: Procedural Variance

In conjunction with the review of online documents, survey responses and interviews helped identify the variations in procedural approaches amongst the communities of Marin. As detailed below, solar developers face varying submission requirements, fee structures, review periods and times during which construction is allowed. Likewise, property owners in some communities will encounter varying permit review periods and fees depending on the zoning of their project rather than the impact or benefit to the community.

Community	Submission	Flattened Building Permit Fees		Plan Review Return Period		Development Limitations	
	Plan Sets Required	Residential	Non Residential	Residential	Nonresidential	Expedited Permitting Process	Work allowed on Saturday
Belvedere	5	No		3 days	Up to 2 weeks	No	No
Corte Madera	4	Yes	No	3 Weeks		No	Yes
Fairfax	3	Yes-fees waived		Typically 1 day or less		Yes	Yes
Larkspur	3	Yes	No	Over-the-counter or within a week		Yes	Yes
Marin County (unincorporated)	4	Yes for projects under \$10,000		Approximately 1 week		No	No
Mill Valley	3	Flat-No Fee		Over-the-counter for 10 kW or less	3 Weeks	Yes-for Roof PV less than 10 kW	No
Novato	3	Yes		Over- the-counter or within a week		Yes	Yes
Ross	3	No		4-6 weeks		No	No
San Anselmo	3	Yes		A few days		No	Yes
San Rafael	3	Yes	No	Over-the-Counter	Up to 3 week	Yes for roof-mounted residential projects	Yes
Sausalito	4	No		5 days expedited, otherwise 2 weeks		Optional	Yes
Tiburon	3	Yes-Fees waived for projects that meet Town's Criteria		3-5 days, or less than 2 weeks		No	Yes
Summary	Requirements vary, but most jurisdictions require 3 plan sets.	Variation in approach to fee structure is common and often dependent upon property zoning.		Variation between jurisdictions is standard and often dependent on property zoning.		About half of the communities in Marin offer expedited solar PV plan review.	Most communities in Marin allow for a six day work week.

required for submitting a building permit varies amongst the building departments of Marin. Each community also uses a different building permit application and may differ according to the fee assessment structure used for solar PV projects. As noted earlier, reported review times also vary between communities and range from over-the-counter to 6 weeks long.

Table 4 indicates the need for solar developers seeking installation work throughout the MEA service territory to possess significant knowledge of up to 12 different permitting procedures. Developer Confusion over or misunderstanding of these procedures may delay the issuance of building permits or the completion of an inspection and thus increase development costs and timeframes. For solar developers, this result can limit attention and resources available for other projects and thus may affect overall profitability. Likewise, project owners and investors may be affected by delays when unexpected alterations to the commercial operation date of the solar PV project and the associated ability to begin receiving a return from project investment.

3.6 Common Issues Cited by Project Stakeholders

Table 5: Issues Cited by Stakeholders

Stakeholder Cited Issues		Potential issues affecting cost and time of solar PV FIT project development (As noted by Study Participants)	Stakeholder Raising Issue		
			Utility (PG&E)	Solar Developer	Marin Community Permitting Agencies
<p>The survey and interview process asked participating stakeholders to note potential issues or challenges that affect the cost and timeframe for permitting and interconnecting solar PV projects. Responses were provided in an open format that allowed participants to freely express how these issues affect the associated procedure and what participants may do to reduce the likelihood to encounter the noted issues.</p> <p>These issues are further described in the findings sections and were incorporated in the development of guide as assist property owners and solar developers in reducing project costs and timeframes by avoiding common mistakes.</p>	Issue	Incomplete Application			X
		Inadequate Documents			X
		Inadequate System Labeling			X
		Inadequate Equipment			X
		Limited Property Owner Oversight			X
		Inexperience with Local Process			X
		Cost & Time Frame Ambiguity (Permitting)			X
	Interconnection	Poor Project Sitting	X		
		Cost & Time Frame Ambiguity (Interconnection)		X	
	Project Finance	Inadequate Financial Security	X	X	
		Inadequate Site Control	X		
		Failure to secure FIT Agreement	X		

Study participants were asked identify common issues that increase project approval time periods and costs. These issues are presented below. A chart indicating which stakeholders cited the particular issues is also provided. These

issues are likely avoidable through increased access to procedural requirements, agency regulations, and data on infrastructure and environmental conditions. Resolving these issues through the provision of improved tools and guidance would likely reduce costs and timeframes for all stakeholders.

3.6.1 Permitting

Building and planning staff that participated in the survey and interview process, as well as those participating solar developers, cited the following issues as common mistakes made by project applicants. These issues touch on the need for applicants to be familiar with the specific procedural requirements of each Marin community in which a project is submitted. Overlooking small details may result in submission of inadequate plans or improper installations that ultimately increase those project costs born by the property owner.

Incomplete Application

Applicants may experience delays in review and approval if applications for building permits are not accurately or fully completed.

Inadequate Documents

Applicants may experience delays in review and approval for building permits if the submitted plans are inadequate. Examples of inadequacy cited by public agencies include:

- Improper scaling;
- Lack of information on mounting structures;
- Lack of notation of points of penetration;
- Inadequate identification of existing electrical system and points of connection;
- Inadequate identification of required system disconnects;
- Failure to submit labeling sheets meeting NEC requirements (See NEC Section 690);
- Out-of-date engineering calculations or failure to meet local building standards;
- Failure to adequately identify roof or site layout and system tilt;
- Inadequate identification of how the proposed system addresses the requirements of the municipal code (this may include building and zoning code, as well as any specific municipal ordinances related to solar energy systems).

Inadequate System Labeling

Applicants may fail inspection if labeling does not meet NEC standards (Section 690) or is not located and posted as provided in the approved building plans.

Inconsistent Installation

Applicants may fail inspection if system has not been installed as prescribed in the approved building plans.

Inadequate Equipment

Applicants may fail inspection if installed components are inadequate for the intended purpose. While many examples exist, agency representatives specifically noted inadequate service panels, inadequate or improper grounding methods, inadequate conduit, and improper mounting systems.

Limited Property Owner Oversight

Property owners should take an active role in developing a solar PV facility on their site. This includes understanding the legal framework, researching and selecting experienced designers/contractors/installers, and understanding the local permitting and utility interconnection process. By selecting appropriate parties to work with and developing a comprehensive understanding of the associated procedures, property owners can play an active development role and may help avoid delays likely to increase the overall project cost.

Inexperience with Local Process

In addition to issues associated with inadequate application and plans, applicants may face delays resulting from a lack of knowledge of local procedures such as the time periods during which over-the-counter plan reviews may be processed or the time periods during which construction is allowed. As a result, project costs may increase because of shifting development schedules.

Cost & Timeframe Ambiguity (Permitting)

Applicants with projects that do not initially adhere to municipal code face additional uncertainty in the cost and timeframe for project approval due to the potential need for greater planning review. This issue is likely a greater concern for larger solar PV projects in Marin as most communities are not experienced in larger or nonresidential projects. This issue may also be due to permitting structures that set maximum kilowatt (kW) limits on streamlined project review.

3.6. 2 Interconnection

Issues regarding the interconnection process were suggested by the participating representative from PG&E, as well as those participating solar developers. These challenges highlight the complexity of the interconnection process and the challenges faced in minimizing costs and timeframes through informed project siting.

Cost & Timeframe Ambiguity (Interconnection)

Solar PV FIT projects meeting the capacity limits set by the Marin Energy Authority (MEA) for the FIT program are expected to apply for interconnection under the PG&E wholesale distribution tariff (WDT) generator interconnection process (GIP) Fast Track. While the Fast Track is designed to reduce the time and cost of interconnecting relatively small distributed generation (DG) projects, the increasing number of applicants, as well as the increasing system load associated with DG FIT projects, may trigger additional costs and delays that cannot be fully anticipated prior to application for interconnection. The potential costs, as well as any associated delays in development schedules, may increase overall project costs thus affecting financial efficiency and potentially feasibility. To reduce the potential for significant cost increases or project delays as a result of the interconnection process, the utility recommends that projects be sited in areas of existing significant load (e.g. where urban development has been previously established) and where prior applications for interconnection do not previously exist. To assist in this process, applicants should take advantage of pre-application meetings with the utility as well as an examination of the “Solar PV Renewable Auction Mechanism Program Map” provided by PG&E

Inadequate Site Control

As part of the PG&E WDT GIP, applicants are required to demonstrate site control of the property where the proposed solar PV generation facility is to be located. Section 1.5 of the PG&E GIP provides applicants with a number of options for meeting this requirement. Since inability to meet property control requirements will slow the interconnection process, applicants should ensure site control is established early on in the project planning process.

3.6.3 Project Finance

The participating solar developers noted the following issues related to project finance. While project finance has not been directly studied for the development of the guide, the process initiated in relation to concerns associated with project financing. As such, these issues are included to assist property owners in taking a more holistic approach to understanding the permitting and interconnection process.

Inadequate Financial Security

Solar developers have noted the importance of securing adequate investments to finance project design, permitting, interconnection, and construction. In providing a standard contract with transparency in prices for resource compensation, FIT agreements provide investors with clear signals for evaluating the feasibility and return on developing solar PV generation facilities. Solar developers surveyed noted that project financing should be an initial consideration rather than one tackled after interconnection and permitting has been completed. Waiting to secure financing until late in the development process may result in the inability

to identify adequate funds, which may further delay or halt development, resulting in the forfeiture of any financial resources expended in project design, interconnection, and permitting. By working with developers experienced in the PG&E GIP and the permitting process implemented by the local jurisdiction, property owners may more accurately identify project costs and thus more easily develop financing plans.

Failure to Secure FIT Agreement

Though neither the utility, nor the agency with jurisdiction over project siting and development requires proof of a completed FIT agreement, project applicants should be aware that the process of completing a FIT agreement with the MEA is estimated to take approximately three to five months. Failure to begin the process in a timely manner may delay the initiation of exportation of generation resources for compensation from the MEA.

4.0 Recommendations for MEA Action and Concluding Remarks

In discussing the increasing number of applicants requesting interconnection, one PG&E representative noted that the wholesale generator interconnection program received requests for a cumulative total of 5,000 MWs last year. In addition, the PG&E website for the utility hosted FIT program reports that applications for the organization to accommodate power purchase requests from private-sector distributed generators have exceeded the program's cumulative capacity. The PG&E data provided to the public on the FIT program show that 78% of the currently executed FIT contracts are associated with solar PV facilities (PG&E, 2012a).

Taken together, this information leaves no doubt that there is increasing interest in developing solar PV generators for participation in wholesale markets. Capacity development has, however, been limited in Marin County. By implementing a FIT program that compliments that of PG&E, the MEA has taken a step forward in approaching this issue. The limited interest in the program, however, suggests that more action may be needed to increase participation.

This findings presented here highlight the complexity of the multijurisdictional policy arena implemented to provide oversight to the development of FIT projects. The regulatory environment for solar PV development relies on the interaction and approval of many stakeholders, including consumers, utility providers, local governments, investors, and in some cases, unique institutions like the MEA. The roles of these stakeholders in developing the capacity for RE generation are relatively new within the context of the American energy system. Historically, a production model where utilities worked exclusively with a limited number of power plants containing very large generation capacities has dominated the market for electricity. This structure generally relied on consumers and local governments as passive participants and resulted in only limited interconnection requests.

Today, the energy market is facing a period of rapid transformation wherein deregulated structures are increasingly accommodating technological innovations reliant on active consumer participation in energy generation (Kartseva, Gordijn, & Akkermans, 2003). As a result, local governments are emerging as influential actors in the siting of energy resources. Likewise, utilities are increasingly faced with the need to develop approaches to establishing grid access that is appropriate to economics and technical considerations relevant to small-scale generators.

Lack of coordination and consistency in permitting and interconnection costs and timeframes has been noted to effect the feasibility distributed generation projects (Kartseva, Gordijn, & Akkermans, 2003). Such assertions highlight that the policy environment in which renewable energy development occurs has a great

impact on the success of market-based mechanisms like FITs. There is thus a need to coordinate action in a manner that is supportive to achieving transparency and understanding within the diffused RE stakeholder network.

The MEA is uniquely situated to approach market and industry coordination. In developing the MCE program, the MEA has been empowered through existing mandates by the local governments in Marin to pursue increased consumption of renewable energy. The resulting MCE program places the MEA in close contact with consumers, PG&E, and regulatory agencies such as FERC and the CPUC.

There is an opportunity for the MEA to leverage these relationships in order to provide guidance on stakeholder action and policy coordination. The study presented here has examined the existing permitting and interconnection frameworks as to identify opportunities for improving the private sector planning process associated with the development of solar PV facilities for participation in FIT programs. As guided by a literature review, the research process focused on minimizing the costs and timeframe associated with the permitting and interconnection of solar PV generation facilities.

The following recommendations have been developed upon the knowledge gained throughout the research process and are recommended as actions the MEA may take to reduce non-market barriers to participation in the MEA FIT program.

4.1 Recommendations

Recommended actions have been split according to the targeted stakeholder. These include:

- Property Owners and Solar Developers;
- The community planning and building departments of the Marin Communities;
- The Federal Energy Regulatory Commission (FERC) and PG&E

4.1.1 Property Owners and Solar Developers

- 1. Seek Board Approval to publish and distribute the *MEA Feed-in Tariff Reference Guide on Solar PV Permitting and Interconnection in Marin County***

The reference guide accompanying this report provides an introductory overview of the MEA, the FIT program, and the permitting and interconnection procedures relevant to developing a solar PV facility in any of the Marin communities. Throughout the document, readers are directed

towards existing informational tools that support efficient project planning that minimizes permitting and interconnection costs and timeframes.

The guide additionally includes reference sheets on the building permit and inspection procedures implemented in each of the municipal jurisdictions in Marin. The guide also includes reference sheets for the PG&E GIP Fast Track study procedure. Included in each reference sheet is the contact information for the given organization, as well as links to any further guidance available on the Internet.

The guide thus provides readers with pertinent information that is otherwise spread across a diffuse set of organizations. In this regard, the guide is a stepping stage tool that approaches the non-market ambiguities facing potential participants in the MEA FIT program. Ultimately, the guide seeks to ensure that the MEA works towards a comprehensive approach for capacity development that recognizes that the success of financial mechanisms may be further enabled through attention to non-market barriers and process efficiencies.

2. Develop Case Studies of Permitting and Interconnection of FIT Projects in Marin Communities

The standard offer contracts provided by FIT programs assist in communicating the return-on-investment (ROI) and thus help to create transparency regarding the risks and benefits of a distributed generation projects. The regulatory environment, however, additionally affects this ROI, which can be unclear as a result of stakeholder inexperience in navigating the associated procedures for permitting and interconnection.

The findings of the study highlighted a lack of experience in interconnecting and permitting solar PV projects of 1 MW or less in the communities of Marin County. There is a lack of reliable information to assist property owners and solar developers in accurately planning for project costs and timeframes associated with regulatory compliance. Furthermore, in cases where experience does exist, project information is not necessarily readily available or formatted in a manner that supports the development of a transparent environment for solar PV development.

It is thus recommended that the MEA leverage its relationship as a FIT provider to develop case studies on the regulatory experience of successful program participants. By collecting and publishing information on the costs of permitting and interconnecting projects, the agency will

further support transparency in the project development process. In turn, consumers and solar developers interested in the FIT program will be more enabled to accurately plan for project development.

3. Evaluate the Return-on-Investment for 10 kW Residential Solar PV Systems under MEA FIT Contracts in Comparison to a Standard Residential Net Energy Metering (NEM) Project.

The lack of eligibility for state sponsored rebate incentives for solar development increases the up-front costs experienced by FIT participants. As a result, property owners seeking to develop small-scale residential systems may be deterred from participation in the FIT program should they perceive that there is little benefit to developing a facility with capacity greater than their home consumption. This notion, however, has not been well researched.

Inverter based solar PV systems of 10 kW or less are eligible for streamlined interconnection procedures under the PG&E GIP. Furthermore, such systems are more likely to fall within the limits that some jurisdictions in Marin have placed on streamlined permitting procedures. Building and planning officials in Marin have also expressed that the majority of permitting experience is associated with small-scale and often residential systems. It has been suggested that this is at least somewhat influenced by the limited availability of large lot parcels in most municipal jurisdictions located in Marin. There may thus be great potential for inverter based solar PV facilities of 10 kW or less to participate in the MEA FIT program.

It is recommended that the MEA work with the members of the solar industry to conduct a feasibility analysis and estimate the ROI for developing an inverter-based 10 kW solar PV facility on a residential property for participation in the FIT program. The assessment should examine the potential benefits in comparison to developing a similar system for participation in the NEM program. It is recommended that the MEA take further efforts to promote this type of participation in the FIT program should the study find the FIT evaluation to be economically viable and attractive.

4.1.2 Local Agency Planning and Building Departments

4. Coordinate Approaches to Solar PV Development between the Communities of Marin

The MEA is in a unique position to support cooperative progress on energy issues amongst the local governments of Marin. This is largely attributed to the formal decision of each jurisdiction to pass a resolution supportive of the agency mission to increase the consumption of RE. However, there is currently limited interaction between the MEA and the local jurisdictions with regards to developing synchronicity in approaches to distributed generation development.

The findings of the study noted that permitting procedures in Marin vary greatly among communities. In addition, the Sierra Club (2011) also found that the fees for solar PV projects vary greatly between communities. In producing the guide, the literature review process found regional discrepancies in permitting fees, procedures, and inspections to increase the installed cost of developing solar PV facilities (Pitt, 2008).

Industry participants have recommended standardization of approaches among communities as to allow developers the ability to shift expenditures related to researching community specific practices towards savings on installed costs. Local communities are also likely to benefit from standardizing procedures and submission requirements, as developers will be less likely to submit inadequate plans that require additional review time. Creating a streamlined procedure throughout the MEA service territory may also allow for innovative permitting approaches. Examples of this might be a countywide developer certification program that reduces review times for approved contractors, or a shared third-party PV plan review and inspection service.

Standardized permit review procedures are increasingly being implemented across the US with support from the solar industry. One example structure is the Expedited Permit Process by Solar America Board for Codes and Standards (Solar ABCS, 2011). Using a standardized application and single line diagram, the program is intended to reduce review periods or questions of inadequacy in submitted plans. While this program is limited to solar PV systems of 15 kW or less, it remains a useful model of a working approach implemented in number communities. The MEA may also look to neighboring Sonoma County and the City of Santa Rosa for guidance from their Solar Sonoma County organization that is currently pursuing similar goals.

5. Increase Solar PV Education for Building and Inspection Officials and Solar Installers

California continues to be a leading state in solar PV installations (Sherwood, 2010). This has put pressure on community building and inspection officials to keep up with fast-paced technological change that can be challenging to understand and efficiently integrate into the review process. Likewise, solar installers may be contractors who have migrated from other fields of the building industry and may be lacking knowledge in installation best practices.

Lack of adequate education may contribute to lengthened review periods, longer than necessary inspections, or failed inspections. All of these increase the length of time and resources expended on each project, and thus the overall cost. Facilitating training sessions would benefit market development by enhancing awareness of common solar PV mistakes and how to overcome them. It would furthermore benefit the solar PV community in Marin by bringing stakeholders together to build trust and mutual understanding. One possible funding source for this recommendation could be the MEA fair-share of the Public Goods Charge/Electric Program Investment Charge (PGC/EPIC).

4.1.3 Participation in FERC Proceedings to Revise SGIP Practices

The MEA is an active participant in CPUC proceedings related to the oversight of consumer energy services in which the CCA is involved. This action should be extended to activities that fall under the jurisdiction of FERC as related to wholesale generator interconnections. It is specifically recommended that the MEA participate in any proceedings at FERC held to revise the SGIP or the PG&E GIP. Points of advocacy should include the following:

6. Revision of SGIP/GIP Technical Screens 2, 4 of the Fast Track Study Process

Technical screens 2, and 4 of the Fast Track Study are as follows:

2. GF (generation facility), in aggregate with other generation, shall not exceed 15% of Peak Load.
4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current.

These screens are two of the top 3 screens failed by applicants to the PGE WDT Fast Track study process. The Solar Energy Industries Association (SEIA, 2010) and other advocates of DG suggest that the limits set in these screens are unnecessarily conservative and inhibit the

development of the capacity for small-scale RE generation. In light of this, it is recommended that the MEA advocate for the revision of these screens to include peak load and maximum fault current limits that do not unnecessarily direct solar PV projects of 1 MW or less towards the more costly and time consuming Cluster Study or Independent Study procedures.

7. Require PG&E to Provide Additional information on Interconnection Data and Distribution Infrastructure

PG&E currently provides the two separate spreadsheets with information on ongoing interconnection requests for public review. In addition, PG&E provides an online map denoting distribution lines and substations. While the information is helpful, it is neither coordinated nor adequate.

It is recommended that the MEA advocate on behalf of interconnection applicants to require PG&E to provide improved documentation to the public. To begin, the separate queue sheets should be coordinated as to provide the same classifications of interconnection data. Of specific note, the queue required by FERC Order No. 135 should denote the technology associated with the interconnection request, as well as the county in which the project is located, the interconnection substation name, whether or not a failed Fast Track request was moved to either the Cluster study or Independent study, and the date of execution of an interconnection agreement. Likewise, information in the WDT queue for all interconnection requests should contain that information which is provided in the Fast Track queue. This would include technical screens failed, date of issuing the initial screen findings, and date of issuing the supplemental review findings. The two queue sheets should additionally provide the public with information regarding the cost of any required upgrades and the date at which any engineering, procurement, and construction (EPC) activities begin and end.

The Solar PV and Renewable Auction Mechanism (RAM) Map should also be updated to provide users with more helpful information. This should include current line capacity (used and available), as well as the indications of the number and capacity of currently interconnected and queued generators on the line.

These improvements would significantly assist property owners and solar developers in better anticipating the cost and timeframe associated with an interconnection request. The information is furthermore largely available in disaggregated data sets. It might be anticipated that the utility would cite that such information is not

immediately useful due to the circumstantial nature impacts upon the interconnection process resulting from on-site infrastructure conditions. However, it seems rational that such information would at least provide the public with a window of measurement on actual experienced costs and timeframes.

4.2 Conclusion

The role of municipal agencies and local governments as active participants in the regional energy systems is rapidly changing. In providing opportunities for leveraging consumer demand to develop the local capacity to generate renewable energy, the MEA is a prime example of public innovation supportive of active consumer involvement in the production and procurement of clean energy.

The financial mechanisms provided through the MCE, NEM, and FIT programs are important to increasing the integration of renewable energy in energy markets. Non-market barriers may, however, impede the progress of these programs. The study presented here notes the existence of significant challenges in planning for interconnection and permitting costs and timeframes. Numerous opportunities for reducing procedural barriers and increasing process transparency have also been highlighted.

It is, of course, the responsibility of the government to ensure public health and safety. As such, local governments and utility providers must be cautious and diligent. Nonetheless, action should be coordinated at the local and regional level as to avoid conflict with state policies. Ensuring access to information and consistency in oversight procedures will assist in developing for a more unified path towards energy security, environmental prosperity, and economic development.

References

- Crawford, M., Mills, C., Newick, K., & Tryer, S. (2011). *Solar electric permit fees for commercial & residential installations in Marin County: A comparative report*. Retrieved from <http://lomapietaglobalwarming.sierraclub.org/PVSurveyMarin.php>
- International Panel on Climate Change (2011). *Special report on renewable energy sources and climate change mitigation*. Retrieved from http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#2
- Kartseva, V., Gordijn, J. & Akkermans, H. (2003). *A desisgn perspective on networked business models: A study of distributed generation in the power industry sector*. Bled, Solvenia: eTransformation.
- Menanteu, P., Finon, D., & Lamy, M. (2003). Prices versus quantities: Choosing policies for prompting development of renewable energy. *Energy Policy*, 31, 799-812.
- Pacific Gas and Electric (2012a). *Existing Executed Feed-in Tariff Contracts*. Retrieved from <http://www.pge.com/b2b/energysupply/wholesaleelectricssuppliersolicitation/standardcontractsforpurchase/>
- Pacific Gas and Electric (2012b). *PG&E WDT Queue 03.02.2012 - In compliance with FERC Order 135 FERC ¶ 61,094 (April 29, 2011), Docket No. ER11-3004-000*. Retrieved from http://www.pge.com/includes/docs/word_xls/b2b/newgenerator/wholesalegeneratorinterconnection/PGE_WDT_Queue_New_Tariff.xls
- Pacific Gas and Electric (2012c). *PG&E WDT All Projects Queue 03.02.2012*. Retrieved from http://www.pge.com/includes/docs/word_xls/b2b/newgenerator/wholesalegeneratorinterconnection/PGE_WDT_All_Projects_Queue.xls
- Pitt, D. (2008). *Taking the red tape out of green power*. Retrieved from www.newenergychoices.org/uploads/redTape-rep.pdf
- Prabhu, E., Michel, D. (2005). Interconnecting Distributed Generation: The California experience. *International Journal of Distributed Energy Resources*, 1(3), 185-195.
- Sherwood, L. (2011). *U.S. solar market trends 2010*. Retrieved from <http://www.irecusa.org/news-events/publications-reports/>
- Solar Energy Industries Association (2010). *Joint motion to intervene and comments of environmental organizations (FERC Docket No. RM12-10-000)*. San Francisco, CA: Federal Energy Regulatory Committee.

Marin Energy Authority Feed-in Tariff

Solar PV Permitting &
Interconnection Guide
Handbook and Reference Manual

Table of Contents

LIST OF ACRONYMS	4
GLOSSARY	5
Solar Energy Procurment & the MEA	10
The Marin Energy Authority	10
Net Energy Metering and Feed-in Tariffs	11
Choosing between NEM & FIT	13
The Importance of Energy Efficiency	15
Regulation of Energy Generation	17
Distributed Generation: What is it?	17
The California Energy System	18
Permitting and Interconnection Overview	25
Interconnection	25
Permitting	25
Timing Interconnection, Permitting, and the FIT Contract	26
Interconnection	29
Interconnection Standards	29
The PG&E Generator Interconnection Process (GIP)	30
Fast Track Study	32
Fast Track Stages	32
Costs of interconnection	36
Generator Interconnection Agreement (IA)	36
Engineering, Procurement, and Construction (EPC)	37
System Testing & Inspection	38
Certified 10 kW Inverter-based Interconnection Process	38
Considerations for Interconnection Siting	40
Tools for the Interconnection Process	40
Moving Forward: From Interconnection to Permitting	43
Local Agency Permitting	44
What Happens When Further Review Is Required?	46
Permitting Resources	47
Permitting Blunders: Common Errors	49
The MEA Feed-in Tariff Agreement	51
Early Contact, Continual Communication	51
Reference Information	52
Local Agency Permitting	53
Interconnection	65
MEA Feed-in Tariff Contract	69
References	70

Cover photos provided courtesey of the Marin Energy Authority.

LIST OF ACRONYMS

AB	Assembly Bill
CBC	California Building Standards Commission
CCA	Community Choice Aggregator
CEQA	California Environmental Quality Act
CHP	Combined Heat-and-Power
CPUC	California Public Utility Commission
CSI	California Solar Initiative
DG	Distributed Generation
DRS	FERC Dispute Resolution Services
EIR	Environmental Impact Report
EPC	Engineering, Procurement, and Construction
FERC	Federal Energy Regulatory Commission
FIT	Feed-in Tariff
GF	Generation Facility
GHG	Greenhouse Gas
GIS	Geographic Information System
IA	Interconnection Agreement
IOU	Investor Owned Utility
kV	kilovolts
kWh	kilowatt-hour
LGIP	Large Generator Interconnection Process
LSE	Load Serving Entity
MCE	Marin Clean Energy
MEA	Marin Energy Authority
MW	Megawatt (1,000 kilowatts)
NEC	National Electric Code
NEM	Net Energy Metering
PG&E	The Pacific Gas and Electric Company
PPA	Power Purchase Agreement
PURPA	Public Utilities Regulatory Act of 1978
PV	Photovoltaic
RE	Renewable Energy
REC	Renewable Energy Credit
ROI	Return on investment
RPS	Renewables Portfolio Standard
SB	Senate Bill
SCE	Southern California Edison
SDG&E	The San Diego Gas and Electric Company
SGIP	Small Generator Interconnection Process
UBC	Uniform Building Code
WDT	Wholesale Distribution Tariff

GLOSSARY

Cluster Study	One of the three interconnection study processes offered to wholesale distribution interconnections in the PG&E service territory. The cluster study is performed once a year and focuses on evaluating the impact of multiple generator interconnections upon grid safety and reliability.
Community Choice Aggregator (CCA)	A municipal public agency enabled by California Assembly Bill 117 to purchase electricity resources for participating consumers.
Distribution Network Upgrades	Any additions, modifications, and/or upgrades necessary to ensure congestion constraints associated with generator interconnections do not reduce the quality of power delivered to consumers.
Distributed Generation (DG)	A small-scale energy generation facility located in close proximity to the point of resource consumption. When interconnecting to the electricity grid, distributed generators typically interconnect to the low-voltage distribution system.
Facilities Study	An engineering study performed to determine a list of facilities, cost of facilities, and timeframe for development required to ensure that grid safety and reliability is maintained upon generator interconnection.
Fast Track Study	One of the three interconnection study processes offered to wholesale distribution interconnections in the PG&E service territory. The Fast Track Study process focuses on interconnecting generators with limited potential to affect grid safety and reliability as quickly as possible while incurring minimal costs
Feed-in Tariff (FIT)	A market-based financial mechanism for increasing renewable energy generation capacity. This mechanism reduce investment risk by increasing the transparency of the return on investments through the use of long-term (10 years plus) standard offer contracts with established compensation rates. Feed-in Tariffs are considered wholesale procurement programs as generators are not required to be customers of the entity hosting the program and are compensated at fixed rates other than those offered to retail customers.

**Generator
Interconnection
Process (GIP)**

The GIP is the interconnection standard approved by FERC and implemented by PG&E for wholesale generators. The GIP is an amalgamation of FERC's SGIP and LGIP and codified in the PG&E Wholesale Distribution Tariff (WDT)

Independent Study

One of the three interconnection study processes offered to wholesale distribution interconnections in the PG&E service territory. The Independent Study process is intended for generators seeking interconnection of a generator that does not meet the certification requirements established in Attachments 3 and 4 of the PG&E GIP, or is certified and passes the electrical independence screening, but does not pass the Fast Track screening process.

Initial Review

The assessment of Fast Track Study interconnection requests against the 10 technical screens established in the PG&E GIP.

Interconnection

The process of establishing an electrical connection with the existing distribution or transmission system.

**Interconnection
Agreement (IA)**

A standard offer contract included as part of the PG&E GIP that stipulates the responsibilities, costs, and timeframes for generator interconnection.

**Load Serving Entity
(LSE)**

An organization such as PG&E or the MEA that provides retail and/or wholesale energy consumers with services related to resource procurement and/or delivery.

**Marin Clean Energy
(MCE)**

The primary electricity procurement program of the MEA. This program delivers wholesale generation resources to retail customers through a partnership established with PG&E for the delivery of energy through the existing distribution system.

**Net Energy Metering
(NEM)**

A retail generation program wherein participants receive on-bill credits for energy resources exported to the grid in excess of overall on-site consumption

Permitting

For the purpose of this guide, permitting refers to the municipal agency procedure for providing entitlements to property owners to pursue the development of a solar PV facility

**Reliability Network
Upgrades**

Distribution system facility modifications or upgrades necessary to ensure safety and reliability for the electric grid as a whole.

Renewable Energy

The monetary value of the environmental attributes of renewable

Credit (REC)

energy generation resources. RECs may be purchased by LSEs for the purpose of meeting compliance requirements associated with programs like the RPS.

Renewables Portfolio Standard (RPS)

The RPS is a program enacted by the California Legislature mandating that certain a percentage of the electricity portfolio provided by investor owned utilities, electric service providers, and community choice aggregators be procured from renewable energy generators. The RPS program increases the percentage of required resources procured from RE generators over time until meeting the current goal of 33% by 2020

Supplemental Review

. The process of secondary review of a generator interconnection request. Supplemental Review is performed when a proposed generator fails the Fast Track screening process. The purpose of Supplemental Review is to determine the ability of a proposed generator to be interconnected under the Fast Track process.

Wholesale Distribution Tariff (WDT)

The WDT provides the rules and standards applicable to generators seeking interconnection to the utility controlled distribution system.

Forward

Solar energy is quickly becoming a mainstay in communities across the United States. Advancements in technology and innovative policy approaches provide much needed support for the growing renewable energy market in California. As the costs of installing a solar power system continue to decline, local generation of renewable energy is becoming a cost-effective option for homes and business across the United States.

In providing the opportunity to reduce the combustion of fossil fuels like natural gas and coal, the generation of solar energy can help curb the production of greenhouse gas (GHG) emissions while reducing reliance on diminishing fuel stocks produced from finite resources. Solar energy generation can also contribute to local workforce development, more efficient use of land, and the development of new revenue sources for property owners.

As a public agency that procures electricity on behalf of consumers across Marin County, the Marin Energy Authority (MEA) is helping develop the local market for renewable energy generation. The Net Energy Metering (NEM) and Feed-in Tariff (FIT) programs hosted by the MEA are essential in offering residents and businesses the opportunity to reduce energy bills while supplying the community with clean energy. Resources procured from these programs are integrated into the portfolio provided to MCE customers. In this manner, the MEA structure supports consumer empowerment, conservation, and local economic development.

Renewable energy (RE) generation facilities operate within a complex network of permitting and interconnection procedures. The associated expenditures are sometimes regarded as “soft costs”. This term is a comparison to the larger expenses of design, procurement, and construction. Soft costs can, however, significantly add to the overall time and cost of developing RE generation facilities. Consequently, the permitting and interconnection process can affect development financing and the ultimate feasibility of a generation project.

This guide is an informational tool for understanding the permitting and interconnection of solar PV generators seeking participation in the MEA FIT program. The material included is primarily oriented towards the solar development community. It is, however, recognized that the role of the property owner in siting small-scale solar PV installations is essential in developing the capacity for RE generation. As such, the guide highlights opportunities for property owners to stay informed and involved in the permitting and interconnection process. Establishing an educated relationship between property owners and solar developers is thus regarded as critical to achieving success in developing a FIT project.

FITs are a particular type of RE power purchase program subject to procedural requirements that, in some instances, differ from those faced by NEM customers. In offering readers an overview of the permitting and interconnection process specific to FIT projects located in the communities of Marin, and in providing reference tools to aid in the planning process for solar PV generators, this guide supports the continued adoption of renewable energy technologies.

The Purpose of this Guide

The information presented in the following pages provides an overview of the interconnection and permitting process for solar PV generators seeking participation in the Marin Energy Authority (MEA) Feed-in Tariff (FIT) program. This guide has been designed to inform readers about the services provided by the MEA, as well as how the MEA program interacts with other agencies that oversee the development of solar PV generators under wholesale FIT contracts. Underlying the development of the guide is the MEA's desire to support energy consumers in Marin by reducing informational barriers to participation in the community energy network.

Readers should note that the guide is an introductory tool rather than a supplement to direct agency contact. The permitting and interconnection of solar PV generators is a complex and often expensive process developed to ensure public health and safety, and reliable consumer access to high quality electricity. In this context, this guide should be considered a preparatory bridge towards an informed development process. In all instances, property owners and solar developers should direct questions to the appropriate agency prior to and throughout the development process.

Guide Structure

Much of the space here is designated to providing readers with an overview of the permitting and interconnection process and the associated submission requirements, costs and timeframes. Information on California laws governing solar PV development is also included to provide a broad understanding of the rights of solar property rights. Where appropriate, readers will find call-out boxes highlighting additional resources that may assist property owners and solar developers in more efficiently navigating the path towards generator development.

In the later portion of the guide, a set of reference sheets on the Pacific Gas and Electric (PG&E) interconnection process, the permitting practices of each building department in Marin County, and the MEA FIT program are provided. These sheets are designed to quickly direct property owners and solar developers to the necessary contact information, submittal requirements, and additional guiding resources relevant to the various stages of project development.

Solar Energy Procurement & the MEA

The Marin Energy Authority

The Marin Energy Authority (MEA) is the first operational community choice aggregator (CCA) in California. As authorized under California's Community Choice Aggregation Act of 2002 (AB 117), CCAs are public entities empowered to procure energy resources on behalf of participating consumers. Those energy resources purchased on behalf of MEA customers are delivered to homes and businesses through a partnership with PG&E that allows consumers continued access to the local electricity distribution network. In this regard, the MEA is a hybrid approach to meeting the demand for electricity. The core objective of this arrangement is to provide participating members of the public with greater control over the content of their electricity portfolio and increased access to renewable energy.

Formation of the MEA

The County of Marin and eight of the Marin communities formed the MEA in 2008. In light of the continued success, the remaining three Marin communities chose to join the organization in 2011. Marin Clean Energy (MCE) is the core retail program offered by the MEA. Through MCE, the MEA purchases electricity from wholesale generators for distribution to retail customers. The MCE and all other programs offered through the MEA are not-for-profit and focus on returning to the public all benefits generated through community control of the energy portfolio. Currently, the MCE program serves approximately 96,000 consumer electricity accounts within the communities of Marin County.

In providing electricity resources to MCE customers, the MEA seeks to increasingly supplement the consumption of fossil fuels with renewable energy. Currently, the MCE program provides Light Green customers with an energy portfolio that is nearly 50% renewable. MCE customers are also offered the option of Deep Green, which provides consumers with 100% renewable energy.

The MEA is unique in being a public agency that leverages market-based mechanisms to provide consumers with the opportunity to actively participate in the local energy system. In addition to increasing the renewable content of the community energy portfolio, the MEA is working to develop the local capacity for renewable energy generation. This is achieved by leveraging the MCE ratepayer demand for electricity to offer generator compensation programs such as NEM and FITs. In addition to providing Marin consumers with RE, these programs assist the community in maintaining Marin's robust economic and social environment through job creation, economic development and increased energy security.

Net Energy Metering and Feed-in Tariffs

To support local capacity for renewable energy generation, the MEA has established both Net Energy Metering (NEM) and Feed-in Tariff (FIT) programs. These programs are focused on offering participants the opportunity to be compensated for exporting generation resources into the electricity grid for consumption by MCE customers. The programs do, however, include significant differences with regards to the method of compensation for exported energy and the process by which generators are interconnected to the local distribution grid.

Net Energy Metering (NEM)

NEM programs were first established in California under California Assembly Bill (AB) 920 (2009). As a result of this bill, California's Independently Owned Utilities (IOUs), which include PG&E, SCE, and SDG&E, were directed to initiate NEM programs. Though the MEA was not required to comply with AB 920, the organization recognized the potential benefits and acted quickly to initiate a program for MCE customers.

NEM – MCE Compared to PG&E

MCE NEM Program	PG&E NEM Program
All generation credited at premium rate (base rate + \$0.01/kWh)	Surplus generation credited at ≈\$0.05/kWh
Monthly settlement	Annual settlement
Perpetual credit rollover	Credit balances settled annually (based on true-up date)
Annual cash out for credit balances >\$100	Compensation or credit rollover
Program rules set by MEA Board at public meetings; public workshops are utilized to gather input and refine program elements	Program rules set in standard regulatory process based on input from IOUs and CPUC
\$4/month bonus for net generators	No additional incentives

NEM is a procurement program offering energy consumers who generate electricity on-site the opportunity to receive credit on their energy bills for excess resources exported to the electricity grid. As the program title implies, NEM participants are only charged for the net value of exportation minus consumption. This structure consequently offers participants retail credit for exported resources and the opportunity to only be charged for energy consumption in excess of that which is generated on-site.

In comparison to that of PG&E, the MCE NEM program provides a number of additional benefits. Beyond crediting participants the base retail rate for all energy exported to the grid, MCE's NEM customers are additionally compensated an extra \$.01 per kilowatt-hour (kWh) of energy generated. Participants are also offered the opportunity to settle their accounts on a monthly basis rather than at the annual schedule provided by PG&E. Furthermore, MCE's NEM customers that are net-generators are given a \$4 monthly bonus. The MCE NEM program also allows for generation credits to be perpetually rolled into the next month's billing rather than being required to "true up" on an annual basis. A final benefit of the program is the opportunity to cash out credits when balances exceed \$100.

Feed-in Tariffs (FIT)

Feed-in Tariffs are similar to NEM programs in offering renewable energy generators the opportunity to be compensated for exporting generation resources to the grid. The program differs from NEM in that exported resources are metered separately from on-site consumption and continually compensated at the wholesale rate set forth in the FIT contract. FITs thus focus on direct wholesale payment for generation resources rather than providing retail credits for those resources generated in excess of on-site consumption.

FITs employ standard-offer contracts to reduce participant exposure to the costs of negotiating a power purchase agreement (PPA). The standard-offer contract is also believed to more clearly communicate investment benefits by establishing long-term secured compensation rates. The MEA FIT offers contract terms for periods of 10, 15, or 20 years. All generator technologies eligible for participation in the California Renewables Portfolio Standard (RPS) program qualify for participation in the MEA FIT as well. Rate of compensation offered to FIT participants varies according to the generation profile of the generator technology (e.g. solar PV, wind, etc.) and is based upon the avoided cost of procurement and delivery that would otherwise be incurred by the MEA. The capacity limit of the MEA FIT program is currently set at a cumulative total of two (2) megawatts (MWs). Individual generators participating in the program are limited to a capacity of one (1) MW.

FITs gained popularity amongst policy makers because of successful implementation in a number of European countries. For example, as much as 77% of renewable electricity contracts in Germany employ FIT agreements (Fink and Rogers, 2010). Adoption of the FIT model has proceeded more slowly in the US. The IOUs in California were first mandated to offer FIT programs by the in 2007 as a result of AB 1969. Even with the law in place, the overwhelming majority of renewable energy generation in California is contracted under arrangements like NEM or other forms of power purchase agreements (PPAs) (Couture and Cory, 2009). Nonetheless, FIT programs are a viable option for RE development and have received considerable attention in recent years. The PG&E FIT program is an example of this in having received applications exceeding the allotted capacity mandated by the State.

What about Renewable Energy Credits (RECs)?

Renewable Energy Credits (RECs) are the environmental attributes associated with generating energy from renewable resources. RECs refer to the monetization of the environmental value associated with the avoidance of carbon emissions through the generation of renewable energy. RECs may be sold or traded to meet regulatory requirements associated

with programs like the California RPS. In this regard, RECs represent an additional financial benefit that all property owners receive from the development and operation of a solar PV facility. In both the NEM and the FIT programs, the RECs associated with any exported energy are sold to the MEA. The property owner does, however, retain the RECs associated with any energy consumed on-site or not exported to the grid. These may then be sold to any party interested in the compliance value.

Choosing between NEM & FIT

There is no clear cut answer as to whether a property owner planning to develop a solar PV generator should choose to participate in the NEM or the FIT program. The choice is, however, necessary, as MCE customers are not eligible to participate in both programs simultaneously. This decision should include a detailed evaluation of project finance, project site, and project motivations. FITs are often suggested to be more appropriate for generators sited on larger commercial properties. In turn, NEM is more commonly recommended for generators located on residential properties and sized to a capacity close to the onsite consumption requirements. These recommendations are generally based on the notion that residential properties will be of limited size while commercial properties are more likely to offer the appropriate space for developing a generator sized beyond onsite consumption requirements. In such hypothetical cases, there may be a greater financial opportunity for the commercial property to benefit from a long-term wholesale arrangement for exporting resources.

As many residents and business owners in Marin are well aware, there are a wide variety of property sizes throughout the county. Many businesses in the towns and cities are located on very small parcels with even smaller building footprints. Such properties may only be able to accommodate a generator that produces slightly more (or maybe a little less) than the energy consumed on site. In such instances, the NEM program would likely make more sense.

There exist larger properties in Marin as well. These may have the potential to accommodate solar PV installations sized to substantially exceed the on-site demand for energy. Such properties may thus allow for a significant return-on-investment (ROI) through the FIT program. These are, however, only hypothetical examples. Even in terms of small residences, it may still be possible to develop a solar PV system with a capacity in excess of the on-site consumption. Depending on finance structures and the interests of the property owner, the FIT program could be an appealing long-term investment.

As a general rule, property owners should work with their solar developer to examine the relationship between site characteristics, on-site demand for energy consumption, and the circumstantial permitting and interconnection considerations that influence overall investment costs. Though the influence of local development restrictions is discussed in more depth in later sections of this guide, it is helpful to note here that solar PV installations that exceed the local development restrictions can potentially incur greater costs and the review periods as a result of design review or environmental review.

In addition, FIT projects are likely to take more time and incur greater costs with regards to the interconnection process. NEM projects are generally interconnected in approximately 30 days and without significant cost to the property owner. Projects seeking FIT arrangements are likely to take approximately a year to proceed through the interconnection process. FIT projects may also be more likely to bear the cost of any system upgrades required as a result generator impact on the stability of the electricity grid.

Property owners should also examine their financial preferences for subsidies, power pricing, and tax credits. At the moment, solar PV projects seeking interconnection for NEM participation are eligible for a number of subsidies provided by the state of California. The most well known is the California Solar Initiative (CSI). The CSI began in 2007 with an approximate budget of over two billion dollars to be expended over 10 years for consumer sited solar systems located in the service territories of the three IOUs (California Public Utilities Commission, 2007).

Unfortunately, the California Public Utilities Commission (CPUC) has ruled that FIT projects are ineligible for state subsidies afforded to other retail focused RE projects. Consequently, NEM arrangements are likely more appropriate when property owners are seeking to more quickly cover the upfront costs of facility development. It may be noted, however, that FIT participants who develop a solar PV facility may be eligible for a 30% Federal Investment Tax Credit, which is scheduled to continue till 2016 (Getsolar.com, 2012). Property owners should also note that solar PV systems are currently excluded from property tax assessments in California.

Consideration of preferences for rate of compensation is also important. As noted earlier, FITs provide fixed-rates over a standard contract period. This may be an advantage when seeking investment capital for solar projects as lenders are provided with a transparent pricing scheme that allows greater clarity on the expected return on investment (ROI). In contrast, NEM participants are subject to the standard rate schedule of the MCE program, which may change overtime. As such, the FIT program may be more appealing to generators planning to leverage their system as a long-term revenue source.

For more
information on tax
credits for investment
in solar:
[http://www.
dsireusa.org/](http://www.dsireusa.org/)

A final consideration to examine when deciding between the NEM and FIT programs is the underlying intentions of the generation project. All solar PV projects support environmental stewardship; solar power substitutes the consumption of fossil fuels and thus lessens the impact of the urban community upon the global environment. Furthermore, PV installations help contribute to workforce development as a consequence of creating a demand for skilled project designers and installers.

FIT participants usually seek to maximize the difference between on-site energy consumption and actual generation by developing larger installations. In doing so, FIT projects may increase the economic efficiency of the project and thus

FIT Rate Comparison Calculator

Not all FIT rate structures are alike. In some cases, property owners may receive greater compensation with the MEA FIT in comparison to that of PG&E. This is, however, situational and depends on a number of project characteristics including the type of generator (solar, wind, etc.) and the capacity of the system. To assist potential applicants, the MEA has developed a Microsoft Excel-based rate comparison calculator. This easy to use calculator allows users to input the estimated megawatt hours per year (MWh/year) and the type of generation technology to be used in order calculate differences in long-term returns. The calculator can be accessed at:

Placeholder-Calculator currently offline

increase the value of the land at a greater level than would be witnessed by an NEM project sized close to the onsite consumption. Thus for property owners seeking to leverage their solar PV installation as an economic tool, the FIT program may be more appealing.

FIT projects may also provide a greater level of involvement in community sustainability. This concept refers to the notion that every kilowatt-hour (kWh) of exported energy equates to less fossil fuel consumption. In this context, developing a solar PV facility that generates significantly more than what is required to meet onsite demand for electricity provides a greater contribution to the overall RE portion of the community electricity portfolio.

The Importance of Energy Efficiency

Whether choosing NEM or FIT, it is important for property owners to consider on-site energy efficiency measures prior to investing in and constructing a solar PV generator. When focusing on increasing the ROI through the exportation of excess resources, on-site energy efficiency improvements are key in maximizing the difference between property consumption and generator output. This concept is simple, but effective; investments in reducing onsite consumption allow more resources to be exported for sale to a load serving entity (LSE) such as the MEA or PG&E.

This is also beneficial from an environmental perspective as generators consume fossil fuels during the manufacturing and decommissioning stages of the system lifecycle. Of additional note, is that solar PV modules are manufactured from rare and finite materials. In light of this, reducing onsite consumption of energy provides even greater benefit than simply integrating RE into local consumption patterns without lowering the demand for electricity.

Financing Energy Efficiency Improvements

Energy Upgrade

Homeowners in Marin may receive up to \$4,000 in rebates by participating in Energy Upgrade. This whole-home assessment and improvement program is administered through partnerships between Marin County, PG&E, and local contractors, and is funded by California utility ratepayers and funds allocated by the American Recovery and Reinvestment Act (ARRA). For more information:

https://energyupgradeca.org/county/marin/about_overview

PG&E provides assistance to commercial property owners through zero-interest on-bill energy efficiency loans. There also exists a number of Federal Tax Credits for commercial retrofits. For more information:

On-bill Financing:

<http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/taxcredit/onbillfinancing/>

Commercial Energy-Efficiency Federal Tax Credits:

<http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/taxcredit/>

Moving Forward

Beyond introducing the MEA and the organization's FIT program, this guide seeks to provide readers with an understanding of the permitting and interconnection procedures required as part of the process for developing a solar PV generator for the wholesale exportation of resources. Before explaining this process, the following section provides an overview of the energy regulatory structure in California. By gaining an introductory understanding of the relationships governing consumer driven distributed generation programs, readers will be better prepared to play a more active role in the design, construction, and interconnection of the solar PV system.

Regulation of Energy Generation

Distributed Generation: What is it?

Distributed generation (DG) refers to the “integrated or stand-alone use of small, modular electric generation close to the point of consumption” (A.D. Little, 1999, p. 5). More commonly stated, DG can be understood as generation technologies like solar PV that may be developed at consumer sites for the purpose of providing energy resources for local demand.

In some ways, the term refers to the notion that when connected to the existing electricity grid, DG is most commonly linked to what is known as the distribution system. Theoretically, the distribution system is one half of the nation’s electricity network. The other half is known as the transmission system. In the most simplistic sense, these systems can be differentiated according to the role each provides in delivering electricity to retail consumers. The transmission system is primarily responsible for the movement of bulk power over high voltage lines stretching long distances from large-scale generation facilities. The high voltage is then stepped down near the point of consumption through substations linked to the distribution system, which provides end-use energy to consumers (Rynne, Flowers, Lantz, & Hellers, 2011).

Not all DG technologies focus on the conversion of renewable resources to electricity. Through increasing technological innovation, a number of combustion-based DG systems reliant on fuel sources like natural gas have been scaled down to sizes appropriate for consumer properties. There also exist DG systems termed “combined heat and power”, or CHP. These focus on cogeneration by capturing heat loss resulting from fuel combustion. The captured heat is then used to drive turbines that generate additional power. Such systems focus on increasing the efficiency of combustive fuel processes and result in decreased environmental impacts and an increased ROI.

Fueled by an increasing demand in energy and growing acceptance of locally sourced power, consumers will likely continue to witness diversification in energy generation technologies. The growth of solar power in California is only one example of this. Since the invention of the solar cell in 1954, the generation of solar electricity has come a long way in both efficiency and form. The recent proliferation of solar PV generation may be attributed to the combination of technological advancement and regulatory accommodation (US Department of Energy, n.d.a).

Increasing innovation in the solar PV industry has supported the development of installations not readily meeting the definition of distributed generation. In light of the increasing demand for renewable energy stemming from government programs like the California RPS, solar generation facilities are often found in larger scales with capacity ratings in the hundreds of megawatts (MWs). These facilities are typically located in areas of limited population like the

deserts of Southern California. Such systems are often referred to as utility-scale PV and rely on interconnecting to the transmission system to deliver resources to distant consumers across the state.

The California Energy System

The increasing presence of solar PV generation in California is not simply a matter of efficiency improvements in solar technologies. Political mandate and regulatory accommodation has played a significant role in the adoption of solar PV as a legitimate source for generating electricity. Due to the close relationship existing between economic development and reliable access to affordable power, the State and Federal governments have traditionally played active roles in providing oversight to market management and generation development.

While DG may be considered a novel concept in the modern energy system, it actually existed long before the advent of the ubiquitous electric grid (Granovetter & McGuire, 1998). With a limited ability to transport electricity, Edison's first lighting systems relied on a form of DG. As the uses of applied electric power proliferated, demand for electricity quickly outgrew the generation efficiencies offered by early DG technologies. The positive feedback loop of increasing demand amidst increasing supply thus incentivized the development of the centralized generation and transmission system that defined the concept of consumer electricity during the late 20th century (Ayres, Leslie, & Warr, 2003).

Under the centralized system, large-scale power generation facilities were often located at great distances from consumption centers. In addition to enhanced economies of scale, this model for generation and transmission benefited the urbanization of the United States by removing the environmental externalities such as air pollution or the hazard of plant malfunction from the day-to-day lives of most citizens.

One result of this was the development of a market where the public were expected to only act as passive participants. With turnkey utility providers that managed both generation and transmission, the role of the consumer was limited to turning the light on and paying the bill. Beginning with Public Utility Regulatory Act (PURPA) of 1978, the American energy system began a transformation towards what is commonly known today as "market deregulation". Through PURPA, utilities were required to purchase power generated by independent and often small-scale producers for the purpose of increasing market competition in a manner that would incentivize consumer rate efficiency (State of California, 2011a).

Deregulation of the California energy market was solidified in the late 1990's through AB 1890, which is also known as the Electric Utility Restructuring Act. AB 1890 required the separation of utility generation and transmission services as to allow greater generator access to consumer markets and the opportunity for ratepayers to choose their energy supplier while retaining access to the existing distribution infrastructure (U.S. Department of Energy, n.d. b).

Regulation of the Energy Market in California

The evolution of the deregulated energy market in California has increasingly accommodated DG technologies like solar PV. This has been achieved through a multitude of legislative and regulatory actions focused on managing the social, environmental, and economic implications of energy use in a manner that provides affordable access while ensuring public health and safety.

Development of a DG generator, as well as the exportation and sale of any energy resources, takes place within a multijurisdictional network of public oversight agencies at the federal, state, and local levels. The type of generation technology, the capacity of the generation facility, and the intentions of the facility owner with regards to the exportation and sale of energy resources all influence the jurisdictional right of agencies to oversee the development and operation of a generation facility. Property owners and their associated contractors must be aware of how the proposed project fits within the established legal framework in order to efficiently construct and operate a generator. As the oversight process can affect development timeframes and costs, it is helpful for FIT applicants to acquire an understanding of the procedural requirements prior to submitting applications for approval from the necessary organizations.

Developing this understanding can be a complex task. In some instances property owners may seek the assistance of experts who have devoted their careers to assisting consumers and businesses meeting regulatory requirements. In the case of distributed solar PV, and particularly those generators sized to the MEA FIT individual generator capacity limit of one (1) MW or less, the management of the regulatory process is typically a service undertaken by the organization managing the facility development process.

The following pages provide an overview of the laws relevant to solar PV development and participation in the MEA FIT program. In addition to this, a description of the agencies having jurisdiction over the various aspects of solar PV development and generator operation as related to the MEA FIT program is also briefly described. There is no doubt that the regulation of solar development is a bit of a soup. It is not necessary for readers to understand all the intricacies of the relationships existing amongst government agencies at the federal, state, and local levels. It is, however, helpful for property owners to recognize that the MEA and PG&E operate within a regulatory environment influenced by numerous actors often approaching the energy market from different perspectives.

Multijurisdictional Regulatory Structure of Solar PV Feed-in Tariff Projects in California

Industry Regulation

Federal		State		Local	
Agency:	Federal Energy Regulatory Committee (F.E.R.C.)	Agency:	California Public Utilities Commission (C.P.U.C.)	Agency:	Community Planning & Building Departments
Role:	Regulation of wholesale Interconnection Procedures	Role:	Regulation of electric distribution system	Role:	Regulation of facility siting & development standards
Goal:	Nondiscriminatory generator access to the electric grid	Goal:	Assurance of quality & reliable energy delivery	Goal:	Protection of Public Health & Safety

California Solar Legislative Timeline: Laws Relevant to FIT Development

California Solar Energy Laws

A B r i e f P r i m e r

The State of California, as well as the Federal government, has taken a proactive roll in supporting the development of solar energy generation capacity. Legislative action has embraced a range of approaches related to market expansion including support for consumer siting, development subsidies, and the development of procurement programs. As a result, California continues to be the leader solar PV energy generation in commanding 48% of all grid-connected solar PV capacity in the United States (Sherwood, 2010).

Market Development

Public Utility Regulatory Act of 1978 (PURPA)

Passed by the federal government, PURPA established the initial step towards developing a robust economic environment for distributed energy generation in the United States. As a precursor to much of the present legislation found in California, PURPA required utilities to purchase energy generated from independent power producers identified as “qualifying facilities” at rates associated with the avoided cost of otherwise developing large-scale power plants otherwise necessary to meet public demand (State of California, 2011).

California AB 1890 (1996)

AB 1890, also known as the Electric Utility Restructuring Act, signified the deregulation of the market for the generation and delivery of electricity in California. Prior to AB 1890, California’s utilities acted as full service provider that managed the generation, transmission, distribution, and metering of electricity. As a result of AB the Electric Utility Restructuring Act, the electricity market was reorganized as to allow consumers to choose their own electricity supplier. In effect, AB 1890 established the foundation for a distributed generation market by ensuring generator access to the utility owned transmission and distribution system. Underlying AB 1890 is the desire to create a competitive market for generation that provides consumers with high quality power at the lowest cost possible (U.S. Department of Energy, n.d.).

California Senate Bill (SB) 1078 (2002)

SB 1078 established the California Renewables Portfolio Standard (RPS), which requires IOUs like PG&E, as well as other LSEs like the MEA to provide retail consumers with an energy portfolio increasingly procured from renewable energy resources. Much like fuel standards for cars, the RPS program progressively increases the renewable energy requirements over time. In doing this, the RPS stimulates the market for renewable energy generation by creating a mandated demand for renewable resources. Beginning with the requirement of 17% renewable energy by 2017, SB 107 (2006) and SB 2 (2011) revised the RPS program to require 33% renewable energy by year 2020 (California Energy Commission, 2012).

Property Rights & Generation Siting

California Assembly Bill (AB) 3250 (1978)

AB 3250, or the Solar Rights Act, was a landmark act signifying the legislature's recognition of consumer sited solar energy as having significant potential for contributing to energy security and environmental prosperity in California. The law established protections for property owners against loss of access to sunlight as a result of development on adjacent properties. Under AB 3250, access to sunlight via preservation of adjoining property clearances may be formally recognized through the execution of a solar easement. AB 3250 additionally provided certain restrictions that limit the ability of homeowners associations to restrict solar energy development (State of California, California Energy Commission, & California Public Utilities Commission, 2011).

California AB 2321 (1978)

AB 2321, which is also known as the Solar Shade Act, compliments the Solar Rights Act in providing additional protections for consumer access to solar resources. By limiting interference with solar access resulting from tree or shrub growth on adjoining properties, AB 2321 further strengthened property rights in support of developing the market for consumer sited solar PV generation. The Act is limited in applicability to vegetation planted after the installation of the solar system (Database of State Incentives for Renewables and Efficiency, 2012).

AB 2473 (2004)

AB 2473, or the New Solar Rights Act, defined the ability of local governments to restrict solar development through the permitting process. Most significantly, the New Solar Rights Act directs local governments limit review to administrative approval by building permit or other nondiscretionary action unless the reviewing official identifies significant potential for specific adverse impacts to public health and safety. AB 2473 further directs local governments to limit restrictions for aesthetic design alterations to no more than a \$2000 increase in project cost or a 20% decrease in project efficiency, AB 2473 also established that aesthetic alterations to design required as a result of municipal review should increase project cost no more than \$2000 (Legalinfo.ca.gov, 2004).

California AB 1892 (2007)

AB 1892 voids any common interest development restrictions prohibiting solar PV development. The law essentially provided that any covenants, conditions, and restrictions (CCRs) established by homeowners associations are unenforceable (State of California, 2011).

California SB 226 (2011)

SB 226 provides an exemption from the California Environmental Quality Act (CEQA) for solar energy systems installed on existing roofs or parking lots. Though not all solar PV projects go through CEQA review, the experience can be expensive and time-consuming for those that do. The provisions of SB 226 take effect in June of 2012 (Carlin & Farabee, 2012).

Project Finance

California AB 970 (2000)

AB 970 established the creation of the Small-Generation Incentive Program (SGIP), which originally provided \$125 million per year till 2004 for consumer incentive subsidies for the development of distributed renewable generation facilities. Under AB 1150 (2011), the SGIP program has been extended till 2016 (California Center for Sustainable Energy, 2012). Building upon the SGIP, SB 1 (2006) established the California Solar Initiative (CSI), which provides consumer rebates for installed solar energy systems on a variety of public and private properties (California Public Utilities Commission, 2009). Unfortunately, FIT participants are not eligible for such rebate subsidies (California Public Utilities Commission, 2007a).

California AB 1451 (2007)

AB 1451 extended the California property tax exclusion for solar energy systems originally instituted in 199 till fiscal year 2015-2016 (State of California, 2011). As this exclusion applies to existing and newly built residential and commercial structures, and is also extended to properties in which the owner does not intend to occupy the space, it is often regarded as critical to the financial feasibility of distributed solar PV development. This notion may be particularly true within the context of FIT projects due to the exclusion from state rebate programs like the CSI.

Consumer Programs

California AB 117 (2002)

AB 117 enabled the creation of publically held Community Choice Aggregators (CCAs) in California. CCAs are empowered to procure wholesale electricity resources for distribution to participating retail customers. Though CCAs are responsible for arranging the purchase and delivery of energy resources, and for meeting procurement requirements related to resource adequacy and the RPS program, customers are ensured access to electricity their established connection to the utility distribution system.

California AB 1969 (2006)

Under AB 1969, Feed-in Tariff (FIT) programs were recognized by the California legislature as an appropriate policy for supporting renewable energy development. Originally limited to public water and wastewater facilities with generators of 1.5 MWs or less, the FIT was eventually extended to all consumers within the three IOU territories. The FIT offered by the IOUs were ordered to be uniform under a single policy by SB 380 (2008) while also being extended to projects of 3 MWs or less by SB 32 (2009) (California Public Utilities Commission, 2007a).

California AB 920 (2009)

AB 920 established the opportunity for California consumers to opt for Net Energy Metering (NEM) when installing distributed generation facilities on the site of an existing electrical connection. Under the NEM arrangement, customers may be credited for excess energy exported to the grid over a 12-month period (California Public Utilities Commission, 2007b). The NEM program offered by the MEA differs from those hosted by the IOUs in offering continual roll over of surplus generation credits, a monthly bonus for being a net generator, and the opportunity to cash out credits valued at \$100 or more.

Proposed Legislation: Interconnection

California AB 2340 (Williams)

As proposed by Representative Williams, AB 2340 would direct the CPUC to formally set rules for reimbursement to wholesale generators that fund improvements to the electricity grid through the interconnection process (Govbuddy.com, 2012). The bill is seeks to address the high cost of system improvements often born by the generator when applying for interconnection under wholesale arrangements like FITs or other power purchase agreements. In directing the CPUC to develop reimbursement rules, AB 2340 would recognize that grid improvements associated with wholesale-distributed generation interconnections benefit all ratepayers in California rather than only the generation entity.

California AB 2590 (Blumenfield)

As proposed by Representative Blumenfield, AB 2590 would assist FIT generators and other wholesale market participants seeking grid interconnection by increasing access to important interconnection information. More specifically, the act would require IOUs to make publically available on a monthly basis information regarding interconnection requests, queues, and rejections (Legalinfo.ca.gov, 2012). Much of this information is currently available as a result of orders from FERC. The law, however, would formalize these requirements, provide additional information currently not included in monthly reports, and increase the accountability of IOUs in reporting such information.

Permitting and Interconnection Overview

Permitting and interconnection are essential steps in the solar PV development process. These regulatory procedures precede project construction and finish with an inspection prior to commercial operation. Each process is initially defined below while more in-depth explanations of the associated procedures relevant to MEA FIT projects are provided in following sections.

Interconnection

The term interconnection refers to the process of establishing an electrical connection between a built structure and either the utility distribution or transmission system. All homes and business receive electricity from an electricity provider via an established interconnection. In the same context, a generator seeking to export energy resources to the grid must also be interconnected to the electricity grid.

Establishing interconnection to the grid requires the submission of an application, study of the potential impacts of the interconnection, and inspection of the interconnection. The underlying objective is to identify the potential impact of the interconnection upon the ability of the grid to provide quality and reliable electricity to all consumers. Interconnection review additionally assesses whether the interconnection poses any safety concerns to the public or the utility personnel who may need to access the grid from time to time. The procedures associated with this process are typically developed by the utility under the oversight of a specified government agency. The jurisdictional right to oversee the interconnection process is determined according to whether the generator is seeking retail or wholesale compensations, but is also dependent on the location of the interconnection with regards to placement on either the transmission or distribution system.

Permitting

The term permitting refers to the entitlement provided by the government for a property owner to construct a built structure. The permitting process seeks to manage the public health and safety concerns raised by any proposed development project. Determination of the jurisdictional right of a government entity to provide development entitlements is dependent upon a number of factors including property location, the type of development, and state and federal regulation over the environmental and technological aspects of the project.

For the majority of solar PV projects, and particularly those projects seeking participation in the MEA FIT program, the permitting process begins and ends at the local building and planning departments. For most development projects, applicants must first proceed

through the planning process. Upon approval from the planning department, the necessary permits are issued to allow the applicant to move forward in applying for building permits. In each process, the applicant will be required to submit project plans as well as any additional information deemed necessary by the local agency to evaluate the impact of the project.

In recognizing the importance of increasing the capacity for RE generation, the state legislature passed AB 2473 in 2004. Also known as the New Solar Rights Act, AB 2473 directs local governments to restrain from the use of discretionary review processes when evaluating solar PV projects. Although specific interpretation of AB 2473 varies from community to community, the law is generally interpreted as limiting the review process associated with permit issuance to that of the building department. It should be noted that in cases where the building official determines that the proposed solar PV project includes specific and significant potential impacts upon community health and safety, additional review by the planning department may be required.

AB 2473 also limits the ability of municipal governments to enact design alterations on solar PV projects based on aesthetic concerns. More specifically, restrictions founded in aesthetic concerns over solar PV developments are not to increase project costs by more than \$2000 or reduce project efficiency by more than 20% (Legalinfo.ca.gov, 2004).

Timing Interconnection, Permitting, and the FIT Contract

In addition to acquiring an interconnection agreement and the necessary local agency permits, generators developed for FIT purposes must also establish a FIT agreement with the MEA prior to participation in the program. While this is likely the least intensive aspect of FIT development, it does take time. The MEA recommends allotting for between three and five months for the completion of a FIT contract.

Generally speaking, property owners should plan for the overall project development period to take approximately one year from the initial application for utility interconnection. This approximation assumes immediate response to all communication requests from the utility, local development agency, and the MEA. To assure that these processes are conducted in the timeliest manner possible, property owners should work closely with their solar developer and be sure to stay informed periodically as to where their project stands in the review process.

Feed-in Tariff

Timeline: Interconnection, Permitting and Power Purchase Agreement

PG&E Generator Interconnection Process (GIP) Fast Track Time frame: Between 45-52 Weeks

Property owners should also note that this timeline for project development could be extended for a number of reasons related to permitting and interconnection procedures. For example, the one-year estimate does not include time required to work with the solar PV developer in assessing the project site and developing a system design. Additionally, the interconnection process may take longer depending on the existing backlog of interconnection requests, the interconnection track in which the project is reviewed, and the need for improvements to the electric grid as a result of the proposed interconnection. Similarly, the local agency permitting timeframe can vary according to available staff for project review and whether or not the agency requires additional review as a result of health and safety concerns. Finally, failure of the solar developer to install the solar PV facility according to the approved plans and the relevant building code can result in failure of inspection and the need to take more time for project revisions.

These considerations, as well as the specific requirements of the interconnection and permitting processes, are discussed in the following sections with greater depth.

Interconnection

Interconnection Standards

Generator interconnection to the transmission and distribution system is coordinated according to interconnection standards. There exist a number of interconnection standards across the United States, some of which are developed by individual utilities. Others have been developed by state and federal agencies.

The interconnection standard is a road map that sets forth the technical screens and costs associated with examining the impact of a proposed generator on grid reliability and power quality. In addition, interconnection standards usually include the interconnection agreement, which equates to the standard contract agreement for physically connecting a constructed generator to the electricity grid. Such agreements stipulate any network improvements and interconnection facilities needed, as well as the associated costs.

Federal Oversight for FIT projects

In California, interconnection standards developed by the California Public Utility Commission (CPUC) and the Federal Energy Regulatory Commission (FERC) are used. In the PG&E service territory, the determination of which interconnection standard is applied depends on whether the proposed generator is seeking participation in NEM or a wholesale program like a FIT.

Interconnections for NEM projects are processed under the authority of the CPUC. This is because NEM agreements compensate generators at retail rates, which are regulated under state authority. As result, NEM projects in California are subject to interconnection through the process defined by the CPUC in the standard known as Rule 21.

In contrast, FIT contracts provide compensation to generators at wholesale rates, which are regulated by FERC. Interconnections for FIT projects are thus subject to the FERC interconnection standards, which are commonly known as the Large Generator Interconnection Process (LGIP) and the Small Generator Interconnection Process (SGIP). Rather than developing their own interconnection standards, many states or utilities elect to adopt the LGIP and SGIP standards directly.

The PG&E standard for interconnecting wholesale generators is based upon the LGIP and SGIP models. This standard, which is known as the Generator Interconnection Process (GIP), is located in the PG&E Wholesale Distribution Tariff (WDT) and has been approved by FERC as part of the utility's compliance requirements. Though PG&E originally used separate LGIP and SGIP standards, in 2011, the utility sought and received the approval of FERC to combine the LGIP and SGIP standards into the GIP. This was done to reduce

processing delays resulting from the complexity of separately managing increasing applications in both programs.

The PG&E Generator Interconnection Process (GIP)

The PG&E GIP follows a 5-stage process that includes application processing, technical screening and engineering studies, an interconnection agreement, project implementation, and a final testing and inspection. The intent of the process is to evaluate considerations associated with establishing a new electrical connection with the grid. This is somewhat different than the utility perspective on NEM projects, which are viewed as working through established electrical connections associated with the existing onsite consumption and thus posing limited concerns related to health, safety, and reliability.

Depending on the results of the technical screening and any required supplemental review, the process could be extended to discuss the potential need for additional engineering studies. In all cases, participants will be required to provide initial processing fees and demonstrate site control. Applicants are further responsible for all costs associated with any additional studies, network and system upgrades, metering devices, and interconnection facilities.

Proceeding through the stages of the GIP requires applicants to declare a study track. The PG&E GIP offers applicants three study options, each of which have different intents, requirements, and time frames. These study tracks are described below.

Fast Track Study

Description:	The Fast Track Study process is intended for certified generators of 3 MWs or less with limited potential for significant system and network impacts. This study track offers the opportunity to interconnect relatively quickly and without the need for the more detailed engineering studies required for other interconnection tracks. Failure to secure approval in the Fast Track study process will result in the option to proceed to study under either Independent Study or Cluster Study.
Requirements:	<p>Certified generators must meet the codes and conditions set forth in Attachment 3 and Attachment 4 of the PG&E GIP. See pages 491-493 of the PG&E Wholesale Distribution Tariff (WDT).</p> <p>Permitted capacity is dependent on the voltage of the distribution line at the proposed point of interconnection. On 12 kV distribution lines, generator capacity is limited to 2 MWs. On 21 kV distribution lines, generator capacity is limited to 3 MWs.</p>
Cost of Application:	<p>\$500*</p> <p>*For inverter-based generators of 10 kW or less the application fee is \$100.</p>

Independent Study

Description:

The Independent Study process is intended for generators seeking interconnection of a generator that does not meet the certification requirements established in Attachments 3 and 4 of the PG&E GIP, or is certified and passes the electrical independence screening, but does not pass the Fast Track screening process. For further information on applicability and screening, see page 379 of the PG&E WDT.

Requirements:

Generators must pass the electrical independences test, which focuses on evaluating the ability of the generator to operate under electrical independence from the grid and any yet-to-be completed but previously queued interconnection requests. Failure to demonstrate electrical independence will result in the option to move the project to the Cluster Study process.

There is no capacity limit for this study track

Cost of Application:

\$50,000 plus \$1,000 per MW of generator capacity.

PG&E Wholesale Interconnections

Connect to the Wholesale Interconnections page for more information on Feed-in Tariff interconnections in the PG&E service territory. Links to a host of resources including the Wholesale Interconnection Tariff (WDT) Generator Interconnection Process (GIP), the Solar PV and Renewable Auction Map, and the two PG&E public queue data sets on existing interconnections.

PG&E Wholesale Generator Interconnections website:

<http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml>

Cluster Study

Description:

The annual Cluster Study is designed to evaluate the cumulative grid impact of interconnecting multiple generators. In evaluating the need for system and network improvements related to multiple generator interconnections, the Cluster study seeks to minimize expenditures on system and network upgrades and to develop an efficient path towards fair-share cost distribution.

Requirements:

There is no capacity limit for this study track.

Cost of Application:

\$50,000 plus \$1,000 per MW of generator capacity.

Fast Track Study

Discussions with solar PV developers experienced in small-scale FIT projects have suggested that in most cases the Independent Study and Cluster Study processes are likely to render a FIT project of 1 MW or less financially feasible. As a result, it is most likely that the overwhelming majority of applicants to the MEA FIT program will seek interconnection through the Fast Track option of the PG&E GIP. This option is discussed in the following section. Readers seeking more information on the Cluster Study or Independent Study options offered by the PG&E GIP should refer to the PG&E GIP. This document is located in Attachment I of the PG&E WDT. Readers may download these documents from the PG&E Wholesale Generator Interconnections website at: <http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml>.

The GIP estimates Fast Track study process to require approximately 45 to 52 weeks for completion. This timeframe is dependent upon timely responses from applicants to all communication requests made by PG&E, as well as successful inspection and testing of the generation facility upon completion of the engineering, procurement, and construction (EPC) phase. The potential for additional delays also exists due to a recent backlog of increasing interconnection requests in recent years.

Fast Track Stages

Fast Track Application & the “Energy Only” Option

PG&E relies on a single application for wholesale interconnection regardless of the applicant’s preferred study process. The application is hosted online in Microsoft Word format and may be accessed through the PG&E Wholesale Interconnections website. When requesting an interconnection, applicants must submit 2 copies of the application and all of the materials reviewed below. Submissions are received through traditional post as well as email. Please see the Fast Track reference sheets in this guide for these addresses.

Applicants should be sure to check the box for “energy only” on the delivery options listed in the application. As stated on page 467 of the PG&E WDT (Volume 4, page 367), the “energy only” deliverability renders the applicant responsible for all costs related to any necessary Reliability Network Upgrades, but not responsible for the costs of Distribution Network Upgrades.

Reliability Network Upgrades refers to distribution system facility modifications or upgrades necessary to ensure safety and reliability for the electric grid as a whole. Distribution Network Upgrades refer to all other distribution system facilities necessary to relieve grid restraints caused by issues such as congestion. Each of these terms is further defined on pages 475 and 466, respectively, of the PG&E WDT.

Application Submission Materials

In addition to the application, submissions will need to include 2 copies of: a site plan, a single-line diagram, and a demonstration of site exclusivity. Options for demonstrating site exclusivity may be found in section 1.5 of the PG&E GIP and include:

Methods for Demonstrating Site Exclusivity:

1. Ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing the Generating Facility;
2. An option to purchase or acquire a leasehold site for such purpose; or
3. Proof of exclusivity or another business relationship between the applicant and the entity holding property rights sufficient to grant the applicant the right to occupy the site for the proposed purpose (development of an energy generation facility).

Upon submission of the request for interconnection, PG&E will review the materials and provide a response as to whether the application is considered complete in 10 business days. The applicant will be contacted should PG&E determine the application to require additional documentation. An extension is given to allow the applicant to procure and submit the necessary documentation. Once notice has been given, the missing materials must arrive at PG&E within 30 business days of the original date of submission.

Tracking the Fast Track Interconnection Process

Through the PG&E Wholesale Generator Interconnections website, the public can access two Excell spread sheets containing the current wholesale generator interconnection queues. The information provided in these queues is updated on a monthly basis and thus allows interested parties the opportunity to develop a broad view of progress on interconnection requests.

Each queue provides slightly different information with one being focused exclusively on Fast Track interconnection requests. It is possible to use this data set to track progress on the timeliness of certain stages of the Fast Track, including the initial review screening. In doing so, potential FIT participants may gain greater insight into the current time period required for completing the interconnection process.

<http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml>

Initial Review

The initial review stage is to be completed within 15 business days of the date from which the application is deemed complete. During this period, PG&E will review the proposed application against the 10 technical screens established in the GIP. Projects passing all screens are eligible to move forward to the Interconnection Agreement. Failure of Fast Track screens may result in supplemental review to determine if the proposed project may be interconnected without the need to conduct more in-depth engineering studies of potential grid impacts. For further information, review section 2.2.1 of the GIP (page 372 of the PG&E WDT).

Options Meetings and Supplemental Review

Section 2.2.3 of the PG&E GIP provides that the utility may determine the generating facility eligible to be interconnected to the distribution system without significant risk to safety, reliability, or power quality regardless of failure to pass all initial screens. In such cases, PG&E will provide the applicant with an IA within 15 business days.

When a proposed project fails one or more technical screens, PG&E may instead determine the need for an Options Meeting, and possibly a Supplemental Review. These processes are outlined in Section 2.3 and 2.4 of the PG&E WDT, respectively.

The Options Meeting focuses on identifying choices that will allow the proposed generator to interconnect while maintaining grid safety and reliability. During this time, the applicant will be provided with all documentation and data that supported the determination of failure during the Initial Review. Options discussed may include alteration to the generator system design, making minor modifications to interconnection facilities or the distribution system, conducting a Supplemental Review, or moving the project to either the Independent Study or Cluster Study processes.

A Supplemental Review focuses on determining the options for allowing the proposed generator to continue seeking interconnection through the Fast Track process. When the option of the Supplemental Review is provided, the applicant will be allowed 15 business days to respond and submit a deposit to be determined by PG&E for the nonbinding estimated cost of the study. The cost of the Supplemental Review is circumstantial and varies for each project. Discussions with solar developers, however, have estimated the average cost to be about \$1,500.

Upon agreement to and deposit for the Supplemental Review, the study will be completed within 10 business days. If it remains unclear whether the proposed generator may be interconnected in a manner that maintains grid safety and reliability, the applicant will be provided the option to seek interconnection through either the Independent study or Cluster study procedures. Should the Supplemental Review determine that the proposed generator can be interconnected with minor modifications to the distribution system, the applicant will be offered the option to elect for PG&E to conduct a Facilities Study in order to provide a nonbinding estimate of the EPC costs.

Fast Track Initial Review

Technical Screens

Proposed generators seeking seeking interconnection through the PG&E GIP Fast Track are initially reviewed against the following ten technical screens. Failure of any screen may result in the need for supplemental review or movement to either the Independent Study or Cluster Study.

1. Generation Facility (GF) must be interconnected to applicable Jurisdiction, e.g. distribution if under WDT.
2. GF, in aggregate with other generation, shall not exceed 15% of Peak Load.
3. Requirements to interconnect to Spot Network.
4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current.
5. GF, in aggregate with other generation, shall not exceed 87.5% of the short circuit interrupting capability.
6. Line configuration and transformer connection required to prevent over-voltage due to a loss of ground during the operating time of any anti-island function.
7. GF, interconnecting to single-phase shared secondary, shall not exceed 20kW.
8. GF that is single-phase and is to interconnect on a central tap neutral of a 240 volt service, shall not create an imbalance between the two sides of the 240 volt service of more than 20% of the nameplate rating of the service transformer.
9. GF, in aggregate with other generation interconnected to the transmission side of a substation transformer feeding the circuit the GF is connecting to shall not exceed 10 MW in an area where there are known transient stability limitations.
10. No construction of facilities by PG&E (e.g. distribution or network upgrades).

The applicant is responsible for the cost of the Facilities Study and will be required to provide a deposit of good faith for the estimated cost of the study. The Facilities Study is to be completed within 60 days upon submission of the deposit. Further details may be found in section 3.6 of the PG&E GIP, (page 390 of the PG&E WDT).

If, prior to the Options Meeting, PG&E determines the proposed generator may be interconnected to the grid in a manner that preserves safety and reliability through minor upgrades, the applicant may opt to forgo the Supplemental Review and move directly to the IA. In such cases, the applicant will be required to agree to responsibility for all costs associated with EPC of any necessary Reliability Network Upgrades. In the same regard, applicants opting for Supplemental Review may choose to forego the Facilities Study should they agree to responsibility for all costs associated with EPC of any necessary Reliability Network Upgrades. In either of these cases, PG&E is to provide the applicant with an IA within 15 business days.

Costs of Interconnection

Discussions with representatives at PG&E have noted that the costs of interconnection are highly circumstantial and dependent upon generator size and design, as well as the state of the utility's infrastructure and any existing or requested generator interconnections within close proximity. Estimated costs for potential improvements may include the following:

Additional Meter: \$1,500 (typically required for FIT projects)

Telemetry Technology: \$100,000

Interconnection Facilities: \$50,000

There are a great number of other potential improvements as well. Average minimum cumulative costs have been estimated at \$200,000, although one solar developer suggested that costs may actually range between \$100,000 to \$900,000.

Generator Interconnection Agreement (IA)

Proposed generators may be approved for interconnection either upon passing the initial screens, determination at the Options Meeting that minor design modifications or system and network upgrades will allow continued safe and reliable operation of the grid, or upon Supplemental Review that results in the same conclusion with or without the need for modification or improvement. Within 15 business days of a positive determination, PG&E will provide the applicant with a draft Generator Interconnection Agreement (IA) stipulating each party's responsibilities related to the engineering, procurement, and construction of any necessary interconnection facilities or upgrades to the electricity grid. The IA will also stipulate the estimated costs for which the applicant is responsible.

The draft IA is prepared according to the Small Generator Interconnection Agreement (SGIA) found in attachment F (page 130) of the PG&E WDT. Upon delivery of the draft IA, the applicant and PG&E are allowed up to 90 calendar days to negotiate the appendices of the

GIA, which stipulate cost, responsibility, and timing for any required EPC actions. Applicants are entitled to pursue dispute resolution with FERC if it appears that an agreement cannot be reached between PG&E and the applicant. Applicants may contact FERC Dispute Resolution Services (DRS) at 1-877-337-2237, or online at www.ferc.gov/legal/adr/asp. For more information on execution of the IA and the dispute resolution options, readers should review sections 4 and 5 of the PG&E GIP (page 443 and page 447 of the PG&E WDT, respectively).

Applicants will execute two copies of the IA to PG&E upon successful agreement of the terms and conditions. After execution, PG&E will file the IA with FERC to ensure compliance with regulatory requirements. Execution of the IA will commence the EPC stage of the

Insurance Requirements for Wholesale Generators

Attachment F of the PG&E WDT provides the Interconnection Agreement used for generators up to 20 MWs seeking interconnection through the GIP. Article 8 (page 149 of the WDT) provides the insurance requirement for interconnecting generators. Under this article, generators are must maintain general liability insurance “sufficient” to insure against reasonably foreseeable direct liabilities given the size and nature of the generating equipment, the interconnection itself, and the characteristics of the system to which the interconnection is made. This requirement is established to ensure that ratepayers and the utility are shielded from any expenses that may be incurred as a result of generator malfunction (Keyes & Fox, 2008).

There are a couple of small peculiarities worth noting as property owners may want to investigate this issue further when considering a request for interconnection. The first is that property owners may request approval to self-insure if they are deemed to be credit-worthy. Secondly, applicants seeking interconnection under the Certified Inverter-based 10kW process are required to maintain “commercially reasonable” insurance coverage. For further information on this, see Attachment 5 to the GIP on page 504 of the PG&E WDT. Finally, property owners must be prepared to provide proof of insurance to the utility at any time while initially submitting proof of coverage no less than 10 business days prior to the commercial operation date of the generator.

Engineering, Procurement, and Construction (EPC)

In most projects, EPC is the commencement of the construction phase for a solar PV generator. With an established interconnection agreement that denotes a specific and agreed upon point of interconnection, projects can begin moving forward with the local agency permitting process. This essential step is to be conducted prior to the physical development of the solar PV generator and is discussed more fully in the next section.

It is during this time that PG&E will also be conducting EPC activities for any interconnection facilities to be located on the utility side of the meter and any minor system or network upgrades determined necessary for grid safety and reliability during the project review process. The work to be conducted by PG&E will be established in the IA with the costs being allocated to the responsibility of the interconnection applicant. This stage of the interconnection process is estimated to last up to 24 weeks.

System Testing & Inspection

The final stage of the interconnection process is facility testing and inspection. The interconnection applicant is to coordinate this process with PG&E, giving no fewer than five (5) business days prior notification to system testing. The requirements for this process are set forth in Article 2 (page 134) of the PG&E WDT. Though PG&E may choose not to witness the testing in person, applicants are to submit a report of the results to PG&E prior to commercial operation of the generator.

Certified 10 kW Inverter-based Interconnection Process

The PG&E GIP gives particular consideration to the reduced potential for negative impacts on grid safety and reliability from inverter-based generators of 10 kW or less. In light of the minimized issues associated with this classification of generators, the GIP includes a streamlined interconnection request and approval process. The ability to achieve this route is largely based on the requirement for applicants to use certified equipment that has been verified as in-compliance with UL 1741. UL 1741 is a standard developed to avoid exposing grid workers to live wires and dangerous equipment as a result of generator feed-in during grid interruptions.

The application and procedure for the 10 kW Inverter-based is located in attachment 5 of the PG&E GIP (page 494 of the WDT). It is important to note that the 10 kW process relies on the same screens as the Fast Track, but does not include Supplemental Review. As such, the project must be designed and sited as to avoid the need for any improvements beyond existing infrastructure conditions.

Another unique quality of the 10 kW Inverter-based process is the absence of a Generator Interconnection Agreement (IA). In place of the standard Fast Track Process, the following timeline and requirements apply:

Submit the 10 kW Inverter-based application found on page 496 of the PG&E WDT. PG&E will respond as to the completeness of the application in 10 business days. PG&E will then review the application against the 10 Fast Track Screens (section 2.2.1 of the PG&E GIP, page 372 of the WDT). PG&E has 15 business days to determine that the proposed generation project is not safe and reliable. After this period the generator may be installed. PG&E advises applicants to check with the company whether disconnects are required to be installed prior to beginning construction. The generation applicant is to return a Certificate of Completion, after which PG&E will schedule a witness test within 10 business days. The witness test may be waived by the utility during the application review or may not be acknowledged as desirable after submission of the Certificate of Completion. The Certificate of Completion may be found on page 500 of the PG&E WDT. A signature of the local inspection official or attached signed electrical inspection must be included with the submission of the Certificate of Completion. Whether or not the witness test is conducted, the generator may operate after the 10-business day period if the required meter has been properly installed.

Certified 10 kW Inverter-Based Generator Interconnection Process Timeline

Inverter-based generation facilities of 10 kW or less that employ equipment certified according to UL 1741 are offered an expedited interconnection process and reduced application fee. Proposed projects are screened against the Fast Track screens and no supplemental review is offered. If the submitted application is deemed complete, and the project passes all screens, construction may begin 25 days after the application is initially submitted.

Property owners should take care to coordinate with the MEA, the local permitting agency, and PG&E when establishing a development schedule. As the interconnection process is shortened for this type of generator, it may be prudent to initiate the permitting and power purchase agreement processes prior to the interconnection process. See Attachment 5 of the PG&E GIP for further information.

Considerations for Interconnection Siting

The circumstantial nature of the interconnection process and Fast Track screens increases the importance of the generator siting. Lack of adequate infrastructure necessary for ensuring grid reliability may lead to increased study requirements, grid upgrades, or the need to move the application from the Fast Track to the Cluster Study or the Independent Study.

Such outcomes might result from a history of limited load on the distribution lines and utility infrastructure to which a generator project is seeking interconnection. This is most likely to occur in rural areas where the demand for electricity has traditionally been low, thus creating limited demand for distribution upgrades that would accommodate increased power flows.

As a consequence, the overall cost and timeframe of the interconnection process would increase. In turn, increased interconnection costs and development timeframes may affect financial feasibility should the costs be substantial or if the extended development timeframe significantly affects any financing schemes associated with the originally proposed commercial operation date. Likewise, inadequate infrastructure might also be overcome by modifications to the project design in a manner that reduces the capacity of solar PV generator. This result would be similar as the opportunity to create revenue from expedited resources would be more limited than originally incorporated into the project evaluation.

Similarly, the cost and timeframe of interconnection may increase as a result of siting a generator on a distribution line where an applicant has previously been issued a queue position to await review or where other generators of significant capacity have been previously interconnected. Though other interconnection requests may be near the chosen point of interconnection, the Initial Review may determine that there are no serious potential conflicts. In such cases, each generator would be permitted to continue under the requested study process.

The initial review may otherwise determine that the combined potential of two or more interconnections in close proximity warrants deeper consideration of the cumulative effect upon safety and reliability. In such cases, both interconnection requests would require study under the Cluster Study process. This, in turn, would significantly increase the application fee and financial postings required for evaluation, as well as the interconnection timeframe.

Tools for the Interconnection Process

The considerations discussed above are particularly relevant to FIT projects. The status of FIT projects as ineligible for state-funded rebate programs like the CSI result in FIT projects facing greater upfront costs than may be experienced by similar solar PV projects that do not export resources for wholesale. As a result, upfront “soft costs” such as interconnection have an elevated long-term effect on the financial feasibility of a project by increasing the required level of investment and/or lengthening the time period required for the expected ROI.

Managing capital and soft costs continues to be a challenge for FIT projects. Applicants should carefully evaluate the proposed site prior to submitting a request for interconnection. The key is to locate a generation project where significant load previously exists while additionally avoiding distribution lines where interconnection requests are currently being evaluated.

Property owners and the solar developers working with them should make every possible effort to identify the existing conditions of the grid infrastructure and any projects previously interconnected or queued in close proximity to the proposed generator. Though this concept is rather simple, it may be difficult to achieve. This is due to restrictions placed on the utility's ability to release applicant information as a result of confidentiality provisions and national security issues associated with energy generation.

PG&E has provided a limited number of tools to assist property owners in researching potential interconnection challenges. These are addressed below.

The Renewable Auction Mechanism Program Map

This online map identifies transmission and distribution lines and the associated substation names in the PG&E service territory. Property owners and solar developers should use this map as an initial tool for identifying interconnection points and evaluating challenges related to existing infrastructures. Please note that PG&E maintains that the information provided does not guarantee the ability to accommodate interconnection requests. This is because of the circumstantial considerations related to the interaction amongst the specific characteristics of the proposed project, the conditions associated with any previously interconnected or queued generators in near proximity, and the state of the grid infrastructure at the point of interconnection.

To access this map go to:

<http://www.pge.com/b2b/energysupply/wholesaleelectricssolicitation/PVRFO/pvmap/>

Users should note that the colors are used only to distinguish between different distribution and transmission lines and are not associated with the currently available capacity of any particular line. In addition to identifying the distribution lines, the map also highlights location of existing substations, which will be helpful to know when requesting information from PG&E regarding current conditions near a proposed point of interconnection.

WDT Public Queues: Projects Awaiting Interconnection

PG&E provides two project queues for the public to view, each of which provides information on the progress of existing interconnection requests. These listings are updated monthly and are available for download from the PG&E Wholesale Generator Interconnections website: <http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml>

The first queue is titled “PG&E WDT All Project Queue (date of recent update)” and provides the following data for all queued interconnection requests:

“PG&E WDT All Project Queue (date of recent update)” Interconnection Data Indicators				
Actual On-line Date	Application Status	County	Energy Source	Facilities Study (FAS)
Feasibility Study (IFS)	Initial Study	Interconnection Agreement Status	IR Receipt (Date/Time)	Prime Mover
Queue Notes	Queue Position	Requested In-Service Date (as filed with IR)	Station Name	Study Type Request
Capacity-Summer	Supplemental Study	System Impact Study (SIS)	Updated On-line Date	Capacity-Winter

This queue should be most helpful in assisting property owners and solar developers to evaluate the size and type of projects requesting interconnection to lines in close proximity to a proposed interconnection site. In addition, the first queue can assist in better identifying the actual time period in which interconnection requests are completed. Applicants may also use this queue to identify the study track option chosen by generators of similar size and technology.

The second queue is titled “PG&E WDT Queue (date of recent update)-In compliance with FERC Order 135 ¶ 61,094 (April 29, 2011), Docket No. ER 11-3004-000”. This queue provides information on all current Fast Track Applications including the following:

“PG&E WDT Queue (date of recent update)-In compliance with FERC Order 135 ¶ 61,094 (April 29, 2011), Docket No. ER 11-3004-000” FAST TRACK QUEUE					
Queue Position	IR Status	Study Type Requested	Maximum Output (MW)	Application Complete	Initial Review Status
Initial Issued	Initial Pass / Fail	Supplemental Study Status	Supplemental Issued	Fast Track Pass / Fail	Reason(s) for Fail

This second queue is most helpful in identifying time frames for the initial review period specifically for Fast Track applicants. For example, 82 projects were listed as having completed the process at the time of developing this guide. Of these, 42 are noted as having failed interconnection through Fast Track. With further inspection, only 21 of the queued projects are one (1) MW or less. Thanks to the final column in the queue listing, it is possible to identify Fast Track screens 2, 4, and 10 (see section 2.2.1 of the GIP, page 372 of the PG&E WDT) as the most problematic for current applicants. These screens are:

2. GF, in aggregate with other generation, shall not exceed 15% of Peak Load.

4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current.

10. No construction of facilities by PG&E (e.g. distribution or network upgrades).

Each of these screens has an association with the cumulative impact of characteristics related to the proposed generator capacity, existing and queued generators, and the state of the existing infrastructure. As failure of these screens increases the cost of interconnection, the importance of diligently researching the history of the proximal distribution grid is of utmost importance.

Pre-application Interconnection Meeting

Arranging a meeting to discuss the proposed generator project with the staff in the Generation Interconnection Services department at PG&E is likely the most important step an interconnection applicant may take to reduce expenditures and delays. As addressed in section 1.2 of the PG&E GIP (page 369 of the WDT), PG&E will assist potential applicants with informal requests related to a specific site. Information that may be provided includes relevant system studies, interconnection studies, and infrastructure data so long as such information does not violate the utility's confidentiality and security restrictions.

PG&E has noted that in such instances the company provides information upon request. Due to liability issues, employees cannot direct a generator applicant as to where a project should be sited. Instead, the role of the company is to provide applicants with objective information regarding the line capacity and infrastructure at a specific project site in order to assist the applicant in making their own evaluations. To schedule a pre-application meeting contact PG&E generator Services at (415) 972-5675, or through email at: gen@pge.com.

Moving Forward: From Interconnection to Permitting

With a focus on maintaining the health and safety of the local environment, the permitting process ensures that development projects provide for and maintain a high quality of life. The following section provides an overview of the solar permitting process while noting related considerations important to system design and installation. The information provided seeks to establish a brief education on the permitting process, while additionally identifying common applicant mistakes noted by municipal staff in the communities of Marin.

Local Agency Permitting

Assembly Bill (AB) 2473 (2004) has provided substantial support for streamlining solar PV permitting at the municipal level. As a result, local community development departments manage the review of most solar PV developments through the building permit process. This arrangement often avoids increased permitting costs and delays associated with planning department procedures such as design review and environmental review.

While AB 2473 has been successful in reducing the permit cost and timeframe for the majority of solar PV projects in California, the law has been subject to varying interpretation between municipalities. Some communities interpret AB 2473 to require the most limited review possible. In such cases, solar PV projects are only reviewed for compliance with the building code. In other communities, AB 2473 has been interpreted as allowing planning department review of projects for consistency with zoning regulations like property setbacks and height limits. A third example would be a community that sets a capacity (often 10 kW), under which the project is excused from planning review. Communities may also hold different standards for projects depending on whether it is to be located on a commercial or residential property.

As illustrated above, solar development is typically handled in a unique manner that is different for every community. This increases the importance of understanding the local process and working with a solar developer experienced in the community where the project is to be sited. It is furthermore important to understand that building code requirements may vary amongst municipalities to reflect local conditions. To avoid increased costs and delays, it is imperative that proposed solar projects accommodate these conditions.

A good place to start this process is in the reference section of this guide. A reference sheet is provided for each municipal government in Marin. Besides providing an overview of the process and submission requirements for each community, links to additional preparatory materials are provided. Applicants should also take the time to contact their community's building and planning departments prior to application; allowing staff to address the project in an informal manner early in the design stage may help overcome costly delays later on.

The Building Permit and Inspection Process

Under SB 331(1978), California established the Uniform Building Code (UBC), also known as Title 24 (State of California, 2011b). Updated every three years, the UBC has assisted the State in managing the often-overwhelming growth and demand for development in a manner that maintains safety and conserves resources. AB 2693 (1993) clarified the right established in the California Constitution for local communities to enact more stringent standards than those included in the UBC if the local code is registered with and approved by California Building Standards Commission (CBC) (State of California, 2011b).

Enforcement of the UBC and any local building standards is performed through the building permit and project inspection process. The requirement to submit plans and have built projects examined is conducted under the power to police community health and safety vested in States through the Tenth Amendment of the US Constitution (US Legal, 2010). While these sound like strong words, the process is actually focused on ensuring that all residents and businesses have access to a high quality of life regardless of natural hazards like earthquakes or wind storms.

Permitting a Solar PV Project

Solar PV projects generally require both a building and an electrical permit, but may also require additional permits related to specific impacts associated with the project design. To acquire these items, applicants will need to submit a building permit application packet. Depending on the project and the community, the required documents for application vary, but generally include the following:

Common Building Permit Submission Materials

- An building or construction permit application;**
- A site diagram showing the solar PV system, existing structures, and property setbacks;**
- Engineering calculations identifying how any proposed structures meet state and local building code;**
- A single line diagram depicting the solar PV electrical system;**
- Elevation diagrams showing project height;**
- The user manual for the solar PV system.**

Every community will require duplicates of the required plans, though the size and number vary between each community. In most cases, plans will require a wet stamp signature from the certified professional who prepared them. Applicants may also be required to submit a digital copy of the application documents in CD format.

California law enables municipal agencies to recoup the costs of plan review and permit issuance. In most communities, applicants will be charged a plan review deposit upon submission of an application for a building permit. If the plans take less time to review than was charged for, the balance is typically forwarded to the cost of the building and electrical permits. If, however, the plans are inadequate or unclear, the applicant may be charged an additional sum for any extra review time required of the building official. This provides a financial incentive for property owners to ensure that the solar developer contracted for this process is experienced in both plan preparation and in working with the local officials. In some communities, interest in renewable energy development has substantially reduced the fees applied to solar PV projects.

Marin community building departments have reported that the application and approval process for solar PV building permits may generally be completed within six weeks. Depending on the project and the community, permits may be eligible for over-the-counter review, thus allowing for permits to be issued the same day. In most cases, the review process is limited to a couple weeks at most.

When plans are approved, the applicant will be notified to return to the agency and pull the project permits. The project may now proceed to the construction phase. In most communities, permits are issued for 180 days and may be extended by having a building official conduct an inspection prior to the completion of the 180-day period.

In all communities, the solar PV project will be required to undergo at least one inspection at the completion of the project. During the inspection the building official will check to ensure that the project has been built to code and according to the approved plans. If the project fails the inspection, the developer will be required to make the necessary revisions and then undergo an inspection again. Depending on the complexity of the project and the concerns of the building official, the building permit may stipulate that more than one inspection is required.

Upon approval of the inspection official, the project will be ready for operation. The right to generate and export resources to the grid, however, will require that the interconnection process has also been completed. Purchase and delivery of resources will additionally require that a FIT agreement has been reached between the property owner and the MEA.

What Happens When Further Review Is Required?

In most communities, application for a solar PV project will require a limited project review by the planning department. While specific concerns vary, the planning department typically reviews plans for consistence with zoning regulations. This is generally considered within the limits of AB 2473 as zoning regulations are accepted as legitimate means of protecting public health and safety.

Should a proposed project be found not to comply with zoning regulations, or should the building official find other specific concerns related to public health and safety, the project may be required to undergo further review. As a result, the proposed project may be moved to design review or other discretionary processes directed by the planning department. Under some circumstances, this may further lead to review under the California Environmental Quality Act (CEQA) and the need for a public hearing regarding the proposed generator.

Should the project move to discretionary review in the planning department, the process would be subject to the requirements of the Permit Streamlining Act (§65920 et. seq). Upon submission of a planning application, the planning department will first be allotted 30 days to notify the applicant of completeness. Once complete, the project will undergo a more

stringent review than encountered in the building permit process. As part of this review, the project applicants may be asked to modify the proposed project. Such requests would be made to mitigate or remove those health and safety concerns identified by the building official. Part of exploring these concerns may include the environmental review required by California Environmental Quality Act (CEQA).

AB 226 (2011) provides that solar PV projects located on rooftops of previously existing buildings, as well as those located on agriculture lands with a capacity of less than 10 MWs or an area of 100 acres are exempt from CEQA review. If the project is CEQA exempt, or if a declaration of insubstantial environmental impacts (a “negative declaration” or “neg. dec.”) is issued, then the planning department has 60 days to approve or deny the permit. Should the project be required to undergo a full environmental review, the planning department must deny or approve the project within 180 days of the certification of the Environmental Impact Report (EIR).

Property owners should be aware that, just as in the building permit process, applicants are responsible for the administrative costs of plan and environmental review. Once this process is complete, the project would return to the building department for a secondary review. Assuming the health and safety concerns have been overcome through the planning review process, the project will be issued the necessary building permits to allow construction to begin.

Permitting Resources

Communication is the foundation of the permitting process; whether researching property development restrictions or submitting project plans, the focus is on creating a dialogue that assists citizens in building the community they desire. The key to avoiding costly design alterations, development delays, and the need for secondary inspections is to work with the community from the beginning of the design process. Property owners should take the time to understand the community zoning and development regulations, as well as the process and perspective implemented by the local community development agency. They should also build working relationships with their public servants.

Information gained may then be integrated into the project design and permitting process. Property owners should take an active role in the development process and insist on creating an informed and cooperative relationship with their solar developer. The importance of selecting a solar developer experienced in both the particular type of project sought and the community in which the project is to be implemented is essential. In practice, this translates to seeking out a project developer with a working knowledge of the local building permit process. The solar developer should also have experience in the type of solar PV system desired by the property owner; whether it is a roof-mount, ground-mount, or solar parking bay, the developer should have a history of constructing the desired system type.

Permitting Tools: Community Reference Sheets and the Marin Map

MarinMap Data Viewer

2004 Urban Marin
2003 Urban Marin
Ocean Bay

Show Legend

Selection

No features are currently selected. You can select features from one or more layers using the selection tools.

Report

Zoom To All Select All

OBJECTID	2206
areasympbol	CAD41
spatialver	1
musym	202
mukey	459494
muname	URBAN LAND-XERORTHENTS COMPLEX, 0 TO 9 PERCENT SLOPES
mukind	Complex
muacres	3635
farmindci	Not prime farmland
lkey	14081
SHAPE.area	52011646.7967358

Soil Expansive (1)

Done

Projection: NAD 1983 HARN StatePlane
Scale 1: 3311
Jump to Extent:

Parcel / Address Search Street View Print

Map showing streets (e.g., 1st St, 2nd St, 3rd St, 4th St, 5th Ave, Commercial Pl, Court St, Nye St, Lincoln Ave, Tamalpais Ave, Francisco Blvd, Andersen Dr, Lindero St, Ritter St, Walter Ln) and various zoning codes (e.g., 4SRC, 5/MR/O, 2/3MUW, CSMU, R/O, C/O, R5, NC, P/O, PD(1001), P/OP, HO, NWP RR).

Scale bar: 0 79 158 316 474 632 Feet
x=0 y=0

48

Upon entering a property address, users are first presented with the parcel specific land use designation, slope, and square footage. For some communities, the zoning designation is also provided. Users may further click on the link labeled “GIS Application” to reveal the underlying mapping layers. By clicking on the layers in the legend, information related to physical hazards, soil type, and hydrology, as well as other information pertinent solar PV development, is visually displayed.

Permitting Blunders: Common Errors

In comparison to other forms of construction commonly submitted to local building department, solar PV remains relatively new. As such, the kinks in the system are still being addressed.

To put this in perspective, the 25 to 30 year lifespan, consumer-siting process, and high up-front investment characteristics of solar PV all make it rather unlikely that a property owner entering the permitting process will have experience specific to solar PV development in their community. While working with experienced developers can assist in overcoming many challenges, the local practices may also be relatively new to the contractors. Such considerations may also be true of permitting agencies; every project is different and relatively few are submitted annually.

To underscore an earlier recommendation, communication is key. In developing this guide, community building officials, planning officials and solar developers provided valuable input. One issue commonly discussed was the mistakes of the past and how to improve upon these for the future. To assist applicants in avoiding the blunders of others, a list of the most commonly cited issues is provided below. While many of these may seem obvious, taking a moment to review the list will assist property owners in effectively working with solar developers to ensure projects move through the permitting process as quickly as possible.

Common Errors and Issues Cited by Planning & Building Officials

Incomplete Application

Applicants may experience delays in review and approval if applications for building permits are not accurately or fully completed.

Inadequate Documents

Applicants may experience delays in review and approval for building permits if the submitted plans are inadequate. Examples of inadequacy cited by public agencies include:

- Improper scaling;
- Lack of information on mounting structures;
- Lack of notation of points of penetration;
- Inadequate identification of existing electrical system and points of connection;
- Inadequate identification of required system disconnects;
- Failure to submit labeling sheets meeting NEC requirements (See NEC Section 690);
- Out-of-date engineering calculations or failure to meet local building standards;
- Failure to adequately identify roof or site layout and system tilt;
- Inadequate identification of how the proposed system addresses the requirements of the municipal code (this may include building and zoning code, as well as any specific municipal ordinances related to solar energy systems).

Common Errors and Issues Cited by Planning & Building Officials

Inadequate System Labeling

Applicants may fail inspection if labeling does not meet NEC standards (NEC Section 690) or is not located and posted as provided in the approved building plans.

Inconsistent Installation

Applicants may fail inspection if the system has not been installed as prescribed in the approved building plans.

Inadequate Equipment

Applicants may fail inspection if installed components are inadequate for the intended purpose. While many examples exist, agency representatives specifically noted inadequate service panels, inadequate or improper grounding methods, inadequate conduit, and improper mounting systems.

Limited Property Owner Oversight

Property owners should take an active role in developing a solar PV facility on their site. This includes understanding the legal framework, researching and selecting experienced designers/contractors/installers, and understanding the local permitting and utility interconnection process. By selecting appropriate parties to work with and developing a comprehensive understanding of the associated procedures, property owners can play an active development role that avoids timely delays likely to increase the overall project cost.

Inexperience with Local Process

In addition to issues associated with inadequate application and plans, applicants may face delays resulting from a lack of knowledge of local procedures. Examples of this include failing to recognize the time periods during which over-the-counter plan reviews may be processed or the time periods during which construction is allowed. As a result, project costs may increase due to shifting development schedules.

Cost and Timeframe Ambiguity

Applicants with projects that do not adhere to municipal code face additional uncertainty in the cost and timeframe for project approval because of the potential need for more stringent planning review. This issue is generally a greater concern for larger solar PV projects in Marin as most communities are not experienced in systems of large capacities or projects located on commercial properties. This issue may also be triggered by system designs exceeding the maximum kW limit of the local streamlined project review process.

Moving Forward: From Permitting to the MEA FIT Application Process

While sometimes tedious, the permitting process in Marin is making strides as increasing applications, growing public attention, and local government interest helps to incentivize agency examination for opportunities to reduce barriers and unnecessary restrictions. It may be best to view this process from the perspective of project improvement; through local government oversight, projects can better achieve the goal of contributing to a vibrant, safe, and functional Marin for generations to come.

The final step in the development process will be securing the execution of an MEA FIT contract. This process is reviewed in the following and final section of this portion of the guide.

The MEA Feed-in Tariff Agreement

This section concludes the first half of this guide with a discussion of the MEA FIT application process. Establishing a FIT contract is potentially the last requirement completed in preparation for participation in the program. It should not, however, be considered as “least important”. All three procedures (interconnection, permitting, and FIT contract completion) are essential to the FIT process; failing to plan for any one in particular may interrupt the development process and potentially affect the financial efficiency of the generator project.

The MEA FIT agreement provides program participants with transparency and assurance regarding the long-term compensation for generation resources. The agreement may, in turn, assist property owners in securing financial support from lenders by providing the foundation for reliably computing the return on investment for a given project. This concept of providing clarity in the financial signals associated with renewable energy generation projects is the foundation of FIT programs.

Early Contact, Continual Communication

Property owners interested in participating in the MEA FIT program should contact the agency prior to undertaking any investments related to generator development. This is because the program is currently capped at a cumulative maximum capacity of 2 MWs. In notifying the organization of your interest, the MEA will provide clarification as to existing and expected capacity, thus ensuring property owners are not stuck with excess resources.

The process of establishing a FIT contact is relatively straightforward and generally takes three to five months for completion. In addition to the application, a copy of the interconnection request is

required as part of the MEA FIT submission process. Property owners should be aware that a FIT agreement will not be executed until an IA or Interconnection Authorization Notification (for projects applying under the 10 kW Inverter-based process) is submitted to the MEA.

With the execution of an MEA FIT contract, as well as the IA, and the approved field inspection from the local building department, the generator will be authorized for operation. Prior to the commercial delivery date, the MEA will arrange for a delivery schedule allowing for the exported resources to be integrated into the MCE resource planning process.

SMALL RENEWABLE GENERATOR POWER PURCHASE AGREEMENT BETWEEN _____ AND MARIN ENERGY AUTHORITY

MARIN ENERGY AUTHORITY, a California joint powers authority (“MEA” or “Buyer”), and (“Seller”) hereby enter into this Small Renewable Generator Power Purchase Agreement (“Agreement”). Seller and MEA are sometimes referred to in this Agreement jointly as “Parties” or individually as “Party.” In consideration of the mutual promises and obligations stated in this Agreement and its appendices, the Parties agree as follows:

1. DOCUMENTS INCLUDED; DEFINED TERMS

This Agreement includes the following appendices, which are specifically incorporated herein and made a part of this Agreement.

- Appendix A – Definitions
- Appendix B – Initial Product Delivery Date Confirmation Letter
- Appendix C – Counterparty Notification Requirements for Outage and Generation Schedule Changes
- Appendix D – Description and Location of Facility
- Appendix E – Facility Drawings

2. SELLER’S GENERATING FACILITY, PURCHASE PRICES AND PAYMENT

2.1 **Facility.** This Agreement governs MEA’s purchase of Products from the electrical generating facility as described below in this Section 2.1 (the “Facility”):

- 2.1.1 The Facility’s Energy Delivery Profile is _____ [based on the descriptions provided below in this Section 2.1.1 select one of the following designations: 1) “Peak”; 2) “Baseload”; or 3) “Intermittent”, as approved by MEA]. Seller shall be required to deliver Products consistent with the Energy Delivery Profile of the Facility.

Reference Information

The following pages provide reference information useful to property owners and solar developers preparing to navigate the permitting and interconnection process. A reference sheet noting agency contacts, building permit submission and inspection requirements, and other helpful documents has been provided for each of the communities in the Marin Energy Authority (MEA) service territory. Contact information, submission requirements, and those tools available to guide interconnection applicants in the sitting process are also provided. Finally, a reference sheet noting the contact information and submission requirements for the MEA FIT contract are provided. Wherever possible, users are provided with weblinks to assist in quickly locating necessary documents.

Readers should consider the information provided here as introductory tools to assist in planning the development of a solar PV facility for participation in the MEA FIT program. Further questions should be directed towards the appropriate organization or agency. The MEA urges potential participants to contact these organizations and agencies early in the planning process as to avoid the potential for costly misunderstandings.

Local Agency Permitting

Belvedere			
Address:	450 San Rafael Ave. Belvedere, CA 94920	Website:	http://www.cityofbelvedere.org/index.aspx?nid=105
Telephone: Fax:	(415) 435-3838 (415) 435-0430	Email:	Rachel Lang AIA, CBO, CASp Building Official/Floodplain Administrator/Code Enforcement Officer buildingofficial@cityofbelvedere.org
Building Fee Schedule:	http://www.cityofbelvedere.org/index.aspx?NID=111	Building Department Hours:	M-Th: 9am-12pm, 1pm-4:30pm
Building Code:	Belvedere Municipal Code Title 16 http://www.cityofbelvedere.org/DocumentCenter/Home/View/279	Zoning Code:	Belvedere Municipal Code Title 19 www.cityofbelvedere.org/DocumentView.aspx?DID=281
Building Permit Application:	http://www.cityofbelvedere.org/index.aspx?NID=112		
Submittal Materials:	Five Plan Sets of all necessary construction drawings Two copies of all other documents. Required documents include system specifications, engineering calculations, and a single line diagram.		
Fees Assessed:	Plan review and electrical permit. Fees based on project valuation.		
Plan Review Period:	One week or less for most projects. Larger commercial projects may take up to two weeks.		
Planning Review:	Planning officials at the City of Belvedere review all solar PV building permits for consistency with the required setbacks according to the property zoning.		
Period of Permit Issuance:	Building permits are issued according to project valuation and range from 6 to 18 months.		
Construction Hours:	M-F: 8am-5pm Work prohibited on weekends		
Inspection Hours:	M-F: 8:30am-5pm		
To schedule an Inspection:	Call (415) 435-3838. As long as the inspection request is called in before midnight, an inspection can be performed the next working day. No inspections are performed during the weekends or holidays.		
Notes:	Plans must clearly identify points of connection with existing electrical system.		
Resources:	Construction Permit Requirements www.cityofbelvedere.org/DocumentView.aspx?DID=94 Construction Project Regulations www.cityofbelvedere.org/DocumentView.aspx?DID=95 Guide to Planning & Building www.cityofbelvedere.org/DocumentView.aspx?DID=100 Staging Guidelines www.cityofbelvedere.org/DocumentView.aspx?DID=104		

Corte Madera			
Address:	300 Tamalpais Drive Corte Madera, CA 94925	Website:	http://www.ci.corte-madera.ca.us/building/index.html
Telephone: Fax:	(415) 927-5062 (415) 927-5039	Email:	building@ci.corte-madera.ca.us
Building Fee Schedule:	www.ci.corte-madera.ca.us/building/BuildingFees.pdf	Building Department Hours:	M-Th: 8am-12pm
Building Code:	Corte Madera Municipal Code Title 15 http://library.municode.com/index.aspx?clientId=16293	Zoning Code:	Corte Madera Municipal Code Title 18 http://library.municode.com/index.aspx?clientId=16293
Building Permit Application:	www.ci.corte-madera.ca.us/building/Building%20Permit%20Application.pdf		
Submittal Materials:	<p>Building official may require different materials depending on the parameters according to project parameters. Check with the Building Department prior to submission.</p> <p>4 Plan Sets including the following are required:</p> <p>Cover Sheet noting property owner; project location and address.</p> <p>Site Plan displaying set backs and project height; locations of inverters, combiner box, disconnect, main panel, points of roof penetration.</p> <p>Line Diagram displaying wiring type, conduit, and locations of disconnects</p> <p>Specifications Sheet covering all panels, rails, and feet</p> <p>Calculations sheet including up-to-date testing for A5 wind resistance</p> <p>Sticker Page completed with required notification text and the intended location</p> <p>Note: an engineering stamp is required for mounting plans</p>		
Fees Assessed:	<p>Plan Review Deposit \$160 Building Permit of \$220 If time spent reviewing plan is less than \$160 of time, excess is credited to the cost of the building permit. Additional plan check fees may be incurred if plan check extends beyond \$160 of time. This is generally a result of inadequate plans.</p> <p>For Non-residential or Multi-family: Cost based on time of review with goal of cost recovery Permit fee to be based on estimated cost of inspection</p> <p>Note: Other State fees including BSC Green and SMIP fees will also be assessed.</p>		
Plan Review Period:	Plan review generally requires 3 weeks assuming that all material is adequate and accurate		
Planning Review:	Town set-back, height, and lot coverage restrictions apply and are examined by the building official. Further examination by the Planning Department to determine the need for discretionary review may be conducted if the Building Official identifies concerns related to safety, fire protection, public rights-of-way, and drainage or flood control systems. For further information, see Town Resolution No. 3369 (2004).		
Period of Permit Issuance:	Building permits are issued for 6 months from the date of issuance. Completing an inspection commonly allows for an automatic 6-month extension.		
Construction Hours:	M-F: 7am-5pm Sat.: 10am-5pm No construction on Sundays or legal holidays		
Inspection Hours:	M-Th: 9am-12pm & 1pm-4pm F: 9am-12pm		
To schedule an Inspection:	Contact the Building Official (415) 927-5062		
Notes:	<p>The Building Department has arranged to provide Fire Department review for PV installations on single-family homes. Requirements for this review are set forth in Ordinance 922, which amends Chapter 6, Section 605.11 of the Corte Madera Municipal Code.</p> <p>Projects located on non-residential or multi-family properties are required to be reviewed by the Fire Department. This review is routed through the building department and does not require additional action by the applicant.</p>		
Resources:	<p>Links to California Building Codes and Guidelines http://www.ci.corte-madera.ca.us/building/BuildingCodes.html</p> <p>Commercial Building Construction Plan Check & Permit Process www.ci.corte-madera.ca.us/building/CommercialBuildingConstructionPlanCheck-PermitProcess.pdf</p>		

Fairfax			
Address:	142 Bolinas Rd. Fairfax, CA 94930	Website:	http://www.town-of-fairfax.org/html/dept_planbuild_overview.html
Telephone: Fax:	(415) 453-1584 (415) 453-1618	Email:	building@townoffairfax.org
Building Fee Schedule:	Fee schedule is not available online. Contact Agency to have a schedule mailed to you.	Building Department Hours:	M-Th: 8:30am-11am
Building Code:	Town of Fairfax Municipal Code Title 15 http://www.amlegal.com/nxt/gateway.dll/California/fairfax_ca/townoffairfaxcaliforniamunicipalcodeofor?f=templates\$fn=default.htm\$3.0\$vid=amlegal:fairfax_ca	Zoning Code:	Town of Fairfax Municipal Code Title 17 http://www.amlegal.com/nxt/gateway.dll/California/fairfax_ca/townoffairfaxcaliforniamunicipalcodeofor?f=templates\$fn=default.htm\$3.0\$vid=amlegal:fairfax_ca
Building Permit Application:	www.town-of-fairfax.org/pdfs/planning_dept/Building%20Permit%20Updated%202006%203.pdf		
Submittal Materials:	3 Plan Sets including: a site plan, a roof plan showing PV system layout if roof-mounted , electrical schematic (single-line diagram), all necessary structural calculations and system information (related to system size, capacity, technology, and attachment method), and a building permit application. Ground-mount systems must additionally include a structural mounting plan		
Fees Assessed:	The Town of Fairfax waives fees for PV projects. Larger commercial projects may require plan check fees. For all projects, state fees are assessed (SMIP and Cal BDC Green fees).		
Plan Review Period:	PV plans are typically reviewed in one day or less.		
Planning Review:	The planning department reviews solar PV plans for consistency with the town height restrictions. Roof-mounted PV systems may not exceed a height of 35 feet on a structure on the downhill side of the street upon which the structure has primary frontage. Roof-mounted PV systems may not exceed a height of 28.5 feet if the structure is located on the uphill side of the street or if the property is without grade.		
Period of Permit Issuance:	Building permits are initially issued for 180 days. A one-time extension for an additional 180 days may be issued upon written request to the Building Official.		
Construction Hours:	M-F 8am-8pm, Sat & Sun: 9am-7pm		
Inspection Hours:	Inspections are typically offered M-Th: 8am-9am, 11am-12pm, and 1pm-4pm		
To schedule an Inspection:	Call (415) 453-2263 M-Th: 8am-4pm		
Notes:	All projects must comply with NEC standards.		
Resources:	<p>When is a Building Permit Required? www.town-of-fairfax.org/pdfs/building_div/Handout-Exempt%20Building%20Per.pdf</p> <p>When is an Electrical Permit Required? www.town-of-fairfax.org/pdfs/building_div/Handout-Exempt%20Electrical%20P.pdf</p> <p>When is a Plumbing or Mechanical Permit Required? www.town-of-fairfax.org/pdfs/building_div/Handout-Exempt%20Plumbing%20Mec.pdf</p>		

Larkspur			
Address:	400 Magnolia Ave., Second Floor Larkspur, CA 94939	Website:	http://ca-larkspur.civicplus.com/index.aspx?nid=91
Telephone: Fax:	(415) 927-5038 (415) 927-5022	Email:	nbamatter@larkspurcityhall.org
Building Fee Schedule:	Residential Building Permit Fees www.ci.larkspur.ca.us/DocumentView.aspx?DID=187 Commercial Building Permit Fees http://ca-larkspur.civicplus.com/DocumentView.aspx?DID=186	Building Department Hours:	M-Th: 9am-12 & 1pm-5
Building Code:	Larkspur Municipal Code Title 18 http://www.codepublishing.com/CA/larkspur.html	Zoning Code:	Larkspur Municipal Code Title 18 http://www.codepublishing.com/CA/larkspur.html
Building Permit Application:	www.ci.larkspur.ca.us/DocumentView.aspx?DID=56		
Submittal Materials:	3 Plan Sets of at least ledger size (11"x 17") and the application. Contact agency for further details.		
Fees Assessed:	Residential: Flat Fee \$323 Non-residential: Standard building permit fee and electrical permit fees, and plan duplication fee. Fees based on project valuation. Plan review fees and other impact fees are not assessed.		
Plan Review Period:	The City has over-the-counter building and planning check on a first-come, first-serve basis on Tuesdays, Wednesdays, and Thursdays from 9 to 10 am. Otherwise, plan review takes 1-2 days on average.		
Planning Review:	Section 18.16.225 of the Larkspur Municipal Code (LMC) provides that roof-mounted PV projects located less than three feet above the roofline are exempt from zoning height restrictions. Ground mounted systems are subject to accessory structure setbacks and must be screened according to requirements provided in Section 18.64.020 of the LMC. Roof mounted and ground mounted projects that do not meet these requirements are subject to design review by the zoning administrator. Zoning administrator will consider maximum lot coverage requirements, setbacks, screening and height restrictions of the zoning district.		
Period of Permit Issuance:	Building permits are issued for 6 months with a one-time extension allowed upon completion of an inspection.		
Construction Hours:	M-F: 7am-6pm Sat., Sun. and holidays: 9am-5pm		
Inspection Hours:	Inspections are available M-Th in the mornings. Early afternoon inspections may also be requested. Please note that the Inspection Official holds counter hours on T,W, & TH from 9am-10am.		
To schedule an Inspection:	Call (415) 927-5033 no later than 12am on the day of the inspection.		
Notes:	Applicants seeking over-the-counter review should show up early for the first-come, first serve service. Applications and plans sets may otherwise be dropped off during regular department hours. Solar PV installations on parking structures are included in parcel FAR calculations.		
Resources:	Complete Description of the Permit Process www.ci.larkspur.ca.us/DocumentView.aspx?DID=56 Building Permit Fees Reference Spreadsheet http://ca-larkspur.civicplus.com/DocumentView.aspx?DID=188		

Marin County (Unincorporated Areas)			
Address:	3501 Civic Center Drive, # 308 San Rafael, CA 94903-4147	Website:	http://www.co.marin.ca.us/depts/CD/main/comdev/BI/index.cfm
Telephone: Fax:	(415) 499-6550 (415) 473-7432	Email:	Bridgette Choate Building Permit Technician II bchoate@marincounty.org
Building Fee Schedule:	www.co.marin.ca.us/depts/CD/main/pdf/building_safety/Building_Safety_Fee_ord1-1-10-v1-1.pdf	Building Department Hours:	M-Th: 8am-12pm F: 8am-12pm
Building Code:	Marin County Municipal Code Title 19 http://library.municode.com/index.aspx?clientId=16476	Zoning Code:	Marin County Municipal Code Title 22 http://www.co.marin.ca.us/depts/CD/Main/comdev/CURRENT/devCode.cfm
Building Permit Application:	www.co.marin.ca.us/depts/CD/Forms/Construction_Permit_Application.pdf		
Submittal Materials:	4 Plan Sets including: Local fire Authorization Letter to be acquired by applicant prior to issuance of the building permit. Plans are to be of a minimum size of 11" x 17". See Marin County Plan Review Guidelines for Photovoltaic Systems for specific scaling and informational requirements. Plan sets to include site plan, elevation plan, electrical plan, hazard signage (requirements determined by local fire prevention officer) plan, a copy of system specifications and operation manuals, and 2 sets of structural calculations.		
Fees Assessed:	For projects valued under \$10,000, the County assesses a flat permit fee of \$271.14. Projects valued greater than \$10,000 are subject to a road impact fee of 1% of project valuation. The County additionally requires a plan review fee, state fees including SMIP and BSC Green fees, and a planning surcharge. Ground mounted systems are also subject to site/encroachment review fee. Applicants may also be required to pay for Fire Department plan review.		
Plan Review Period:	Plan review is typically completed within a week.		
Planning Review:	As part of the building permit application, the planning department conducts a zoning review. The County contains over 40 zoning districts, many of which require design review for all projects. Beyond zoning requirements, projects may trigger further review if encroaching upon setback requirements or highly visible to the public. Ground mounted projects may be exempt from setback requirements at or below the grade when not exceeding a height of 18 inches in a conventional zoning district. See Chapter 22, Section 20.090 of the County of Marin Municipal Code for further information.		
Period of Permit Issuance:	Permits are initially issued for one year with the requirement for construction to finish within two years.		
Construction Hours:	M-F: 7am-6pm Silent work allowed on Sundays and holidays		
Inspection Hours:	Inspections are offered M-F, 9am-5pm and are set for 2 hour windows on the day of the requested inspection.		
To schedule an Inspection:	Inspection requests should be made on the 24-Hour Inspection Request Line at (415) 473-6560. Requests made prior to 4:00 p.m. can normally be scheduled for the following business day. Weekends, County holidays and scheduled staff training sessions will delay inspections to the next available business day. The recorder operates 24 hours a day with minimal shut downs in the morning between 7:00 and 8:00 a.m. All instructions for calling the inspection are included in the recording message. Be sure to have the permit number and project address available when calling. The recorder will not make or take specific time appointments for inspections. Callers must contact the individual inspector between 8:15 a.m. and 9:00 a.m. on the day of the inspection to confirm or request a specific time.		
Notes:	The County recommends that applicants review guiding materials and speak with staff prior to application to ensure submittals are adequate.		
Resources:	Building Fee Frequently Asked Questions (FAQs) www.co.marin.ca.us/depts/CD/main/pdf/building_safety/PermitFees_FAQ-1-1-10.pdf Building Permit General Information www.co.marin.ca.us/depts/cd/main/pdf/building_safety/General_Information.pdf Building Permit Submittal Checklist www.co.marin.ca.us/depts/CD/Forms/Building_Permit_Submittal_Checklist.pdf Simplified Site Plan Requirements Example www.co.marin.ca.us/depts/CD/Forms/Simplified_Site_Plan_Requirements.pdf		

Mill Valley			
Address:	Mill Valley City Hall 26 Corte Madera Ave. Mill Valley, CA 94941	Website:	http://www.cityofmillvalley.org/Index.aspx?page=698
Telephone: Fax:	415-388-4033 415-381-1736	Email:	http://www.cityofmillvalley.org/index.aspx?page=192&fitle=Building+
Building Fee Schedule:	www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=7838	Building Department Hours:	M, T, Th.: 8am-12pm & 1pm-5pm W: 1pm-5pm Alternate Fridays: 8am-12pm & 1pm-5pm
Building Code:	Mill Valley Municipal Code Title 14 www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=7934	Zoning Code:	Mill Valley Municipal Code Title 20 www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=7930
Building Permit Application:	Only available in-person or through the mail. Contact Agency for further information.		
Submittal Materials:	<p>Requirements are standardized for roof-mounted PV systems of 10 kW or less. Additional requirements beyond those listed here may be required of ground mounted projects or those projects larger than 10 kW.</p> <p>3 Plan Sets including a site plan, a single line diagram, and listing information for mounting, conductor type, method of grounding, and PV modules. Minimum plan size is 11" x 17". Applicants must also complete the Photovoltaic Worksheet provided by the City and should use the attached checklist to ensure plan adequacy prior to submittal. The Building Department counter attendant noted that requirements may soon change if the City decides to formally integrate fire marshal recommendations.</p>		
Fees Assessed:	Mill Valley does not collect fees on PV applications but does collect .001% of project valuation for State SMIP fee.		
Plan Review Period:	Residential projects to be located on roof tops are generally reviewed over-the-counter on Tuesdays and Thursdays if sized 10 kW or less. Nonresidential and ground-mounted projects require greater review lasting up to 3 weeks.		
Planning Review:	The Planning department will review for consistency with zoning requirements unless the system is located less than 18 inches off the ground.		
Period of Permit Issuance:	Building permits are issued for six months from the day the permit is pulled. Must complete an inspection at end of the six-month and request extension if necessary.		
Construction Hours:	M-F: 8am-5pm, an hour of silent staging is allowed before and after Work prohibited on the weekends		
Inspection Hours:	M-F: 8:30am-12pm & 1pm-4:30pm		
To schedule an Inspection:	Contact the department with the permit number and job-site address. If there are multiple permits on the job, specify which permit(s) the inspection is for. Callers are requested to be specific about the type of inspection requested. Minimum 2 days advanced notice required		
Notes:	City review requirements may change in near future if practices amended to incorporate Fire Department review. Larger projects may take up to 3 weeks to review.		
Resources:	<p>Residential Photovoltaic Submittal Requirements www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=3498</p> <p>Building Department Frequently Asked Questions (FAQs) http://www.cityofmillvalley.org/Index.aspx?page=1092</p> <p>Building Inspection FAQs www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=3829</p> <p>Building Permits Plan Submittal Requirements www.cityofmillvalley.org/Modules/ShowDocument.aspx?documentid=152</p>		

Novato			
Address:	75 Rowland Way, Room 110 Novato, CA	Website:	http://www.ci.novato.ca.us/Index.aspx?page=483
Telephone: Fax:	(415) 899-8989 (415) 899-8216	Email:	Ron Averiette Chief Building Official City of Novato raveriette@novato.org
Building Fee Schedule:	www.ci.novato.ca.us/Modules/ShowDocument.aspx?documentid=2695	Building Department Hours:	M-Th: 9am-5pm Closed for Lunch from 1pm-2pm
Building Code:	Novato Municipal Code Title 4 http://library.municode.com/index.aspx?clientId=16532	Zoning Code:	Novato Municipal Code Title 19 http://library.municode.com/index.aspx?clientId=16532
Building Permit Application:	http://www.ci.novato.ca.us/Modules/ShowDocument.aspx?documentid=465		
Submittal Materials:	Applicants are to submit 3 plan sets including a site plan, a single line diagram, structural calculations, and general information on the installation related to system size and mounting. Minimum paper size is 8.5" x 11, maximum paper size is 30" x 42". For roof-mounted systems, applicants must include a roof plan displaying the layout of the system. For Ground-mounted systems, applicants must provide a structural plan detailing the mounting system and any disturbances to the soils.		
Fees Assessed:	The City of Novato assesses a flat fee of approximately \$208 for PV building permits. State green building fee of \$1 is also assessed.		
Plan Review Period:	Either over the counter or within a week. Over-the-counter review is available M-Th, 9am-11am.		
Planning Review:	The City of Novato Planning Department reviews zoning height restrictions for roof mounted PV projects and setback restrictions for ground-mounted PV systems. If the ground-mounted system is separate from the primary structure on the property, the installation will be subject to the accessory setback restrictions of the property zoning.		
Period of Permit Issuance:	Permits are initially issued for 6 months, but may extend up to two years with an inspection every 180 days.		
Construction Hours:	M-F: 7am-6pm Sat.: 10am-5pm Work prohibited on Sundays & holidays		
Inspection Hours:	2 inspections daily: either 8am-12pm or 12pm-4:30pm		
To schedule an Inspection:	(415) 899-8240 Call by 6 am to schedule the same day. Inspections can be scheduled up to five days in advance.		
Notes:	The City of Novato commonly requires two inspections with PV projects. Ground-mount systems are likely to require design review, particularly if the systems are of significant size. Design review is automatically required when slope is 110 degrees or less.		
Resources:	Inspection Districts http://www.ci.novato.ca.us/Index.aspx?page=1237 Building Permit Information www.cityofnovato.org/Modules/ShowDocument.aspx?documentid=467 Building Permit Plan Review Checklist www.ci.novato.ca.us/Modules/ShowDocument.aspx?documentid=461 Sit Plan Checklist http://www.ci.novato.ca.us/Index.aspx?page=619 Instructions for completing permit worksheet http://ci.novato.ca.us/Modules/ShowDocument.aspx?documentid=7585 Authorized Construction & Grading Hours www.ci.novato.ca.us/Modules/ShowDocument.aspx?documentid=460 Building Division FAQs http://www.ci.novato.ca.us/Index.aspx?page=485		

Ross			
Address:	31 Sir Francis Drake Boulevard Ross, CA 94957	Website:	http://www.townofross.org/pages/town_departments/building.html
Telephone: Fax:	(415) 453-1453, Ext. 4 (415) 460-9761	Email:	Simone Jamotte Building & Public Works Secretary http://www.townofross.org/pages/contact/email_jamotte.html
Building Fee Schedule:	The Town of Ross does not host a building permit fee schedule on line. Contact the agency for the fee schedule. See the resources section of this sheet for a link to a sample fee assessment.	Building Department Hours:	M-F: 8:30am-12pm
Building Code:	Town of Ross Municipal Code Title 15 http://www.townofross.org/pages/resource_center/municipal_code.html	Zoning Code:	Town of Ross Municipal Code Title 18 http://www.townofross.org/pages/resource_center/municipal_code.html
Building Permit Application:	The Town of Ross does not host a building permit application online. Contact the agency in person or call the building department for more information.		
Submittal Materials:	The Town of Ross requires PV project applicants to submit a plan set containing 3 copies of a site plan illustrating the location and property setbacks, as well as 2 copies of project specifications including details of the panels and mounting structures, and structural calculations. Additional materials may be requested for ground-mounted systems. Plans should be no smaller than 11" x 17".		
Fees Assessed:	The Town of Ross requires a project permit deposit, which is collected at the time the permit is pulled and returned upon inspection of a completed project that meets the specifications of the approved plans. The permit deposit is assessed according to project valuation and increases with project value according to the following schedule: Less than \$50,000: \$500 deposit \$50,000 to \$500,00: Deposit set at 2% of project valuation Greater than \$500,000: Deposit set at 3% of project valuation		
Plan Review Period:	Plan check turnaround is typically completed in 4-6 weeks.		
Planning Review:	The Planning department will generally review for consistency with zoning regulations related to setbacks, height, and lot coverage (on nonresidential) properties. The Town Planner noted that PV projects are exempt from setback requirements if placed on an existing structure. All projects are required to meet the 30 ft. height requirement or will otherwise need to apply for Town Council review.		
Period of Permit Issuance:	The Town of Ross sets building permit issuance periods according to the project valuation. Permits are issued for 9 months for projects valued up to \$50,000; one year for projects valued between \$50,000 and \$200,000; 15 months for projects valued at between \$200,000 and \$500,000; and 18 months for projects valued at \$500,000 or more.		
Construction Hours:	M-F: 8am-5pm Work prohibited on Saturdays, Sundays, and holidays		
Inspection Hours:	Contact Agency		
To schedule an Inspection:	Contact agency. Request must be made at least 24 hours in advance.		
Notes:	The Town of Ross is mostly residential properties. There exists limited examples of PV projects proposed on nonresidential properties.		
Resources:	Building Department Frequently Asked Questions (FAQs) http://www.townofross.org/pages/town_departments/building_faq.html#submit_building_permits Project Cost Evaluation Worksheet www.townofross.org/pdf/town_planning/Project_Cost_Evaluation_MASTER_Rev1.pdf Sample Cost Evaluation Worksheet www.townofross.org/pdf/town_planning/Sample_Project_Cost_Evaluation.pdf		

San Anselmo			
Address:	525 San Anselmo Ave. San Anselmo, CA 94960	Website:	http://www.townofsananselmo.org/index.aspx?nid=171
Telephone: Fax:	(415) 258-4604 (415) 454-4683	Email:	Kurt Botn, Permit Services Technician kbotn@townofsananselmo.org
Building Fee Schedule:	http://www.townofsananselmo.org/index.aspx?NID=81	Building Department Hours:	M-F: 8:30am-12pm
Building Code:	San Anselmo Municipal Code Title 9 http://library.municode.com/index.aspx?clientId=16603&stateId=5&stateName=California	Zoning Code:	San Anselmo Municipal Code Title 10 http://library.municode.com/index.aspx?clientId=16603&stateId=5&stateName=California
Building Permit Application:	http://ca-sananselmo.civicplus.com/DocumentView.aspx?DID=368		
Submittal Materials:	3 Plan sets including a site plan, roof plan, a single line drawing, elevations, and structural details for mounting systems. The Town also requires 2 sets of structural calculations. Plans should be either 11" x 17" or 24" x 36". Calculations may be on an 8.5" x 11" sheet. Additional materials may be required for ground-mount projects. For further information, request and review Town of San Anselmo Building Permit Document Submittal Requirements Guidance Sheet from the Building Department.		
Fees Assessed:	The Town of San Anselmo requires a plan check fee of \$130 and a building permit fee of \$200. Fees are flat for commercial and residential, but there may be an additional \$220 Fire Department plan check fee assessed for commercial projects. Applicants will also be required to pay the SMIP and Cal. BSC Green Fees.		
Plan Review Period:	Plan review may take up to a few days, but is commonly completed overnight. Fire department review, if required, is conducted separately and must be completed prior to the issuance of the permit.		
Planning Review:	The planning department reviews PV plans for consistency with zoning requirements related to setbacks and height requirements. Ground-mounted projects may be exempt from lot coverage restrictions when project does not exceed 3 ft. in height.		
Period of Permit Issuance:	Building permits are initially issued for a 6 month period.		
Construction Hours:	M-F: 7am-7pm Sat.: 9am-5pm Sun. 12pm-5pm Bald Hill Area: M-f 8am-4:30pm; work prohibited on weekends and holidays		
Inspection Hours:	Contact Agency		
To schedule an Inspection:	Call (415) 258-4624 Provide the preferred day and AM or PM preference, the project address, the permit number, a description of the type of inspection, and a contact name and phone number. Inspections will not be scheduled unless all information is provided. Call before 4 pm for next-day accommodation.		
Notes:	For most commercial projects, Fire Department plan review is required prior to Building Department review. Applicants are responsible for fees assessed by the Fire Department for plan review.		
Resources:	Business License: Contractors located in San Anselmo http://ca-sananselmo.civicplus.com/DocumentView.aspx?DID=225 Business License: Contractors located outside San Anselmo http://ca-sananselmo.civicplus.com/DocumentView.aspx?DID=226		

San Rafael			
Address:	1400 Fifth Avenue San Rafael, CA 94915-1560	Website:	http://acm.cityofsanrafael.org/Government/Community_Development/Building.htm
Telephone: Fax:	(415) 485-3367 (415) 485-3184	Email:	Barbara Reher, Building Permit Technician barbara.reher@cityofsanrafael.org
Building Fee Schedule:	http://acm.cityofsanrafael.org/Assets/Finance/Building+Permit+Fees+-+Exhibit+A.pdf	Building Department Hours:	M-F: 8:30am to 5pm
Building Code:	San Rafael Municipal Code Title 12 http://library.municode.com/index.aspx?clientId=16610&stateId=5&stateName=California	Zoning Code:	San Rafael Municipal Code Title 14 http://library.municode.com/HTML/16610/level1/TIT14ZO.html
Building Permit Application:	http://acm.cityofsanrafael.org/Assets/CDD/Building/Building+Permit+Application.pdf		
Submittal Materials:	3 Plan Sets for most projects, 4 plan sets for major projects. For over-the-counter plan review, plans must be at least 11" x 17". Minimum plan size for larger projects is 18" x 24" with maximum plan size being 30" x 42". Plans sets shall include a site plan, elevation plans, roof plan (for roof-mounted projects), and an electrical plan displaying main service and subpanel locations, conduit sizing, conductor sizing and grounding. Two copies of structural calculations must also be included.		
Fees Assessed:	Fees for PV projects differ as to whether the project is located on property zoned single family residential or multifamily/nonresidential. For residential projects a flat fee of \$282 is assessed. For nonresidential projects, building fees are assessed according to project valuation and may include plan check fees, plan retention fees, building permit fee, electrical permit fee, and a building permit fee.		
Plan Review Period:	Single-family residential projects are generally eligible for over-the-counter review while commercial projects may take up to 3 weeks. Over-the-counter review is available on Tuesdays and Thursdays from 9am to 12 pm.		
Planning Review:	The City of San Rafael does not require planning review for roof-mounted projects, including those located on commercial structures. Ground-mounted projects are examined as accessory structures. If ground-mounted projects are greater than 10,000 square feet, design review is typically required to examine conformity with setback regulations and other design impact issues. Review of ground-mounted plans also examines maximum lot coverage restrictions associated with the property zoning. Projects may also face further review if located in a historic designation. In such cases a historic consultation is required as an initial step forward.		
Period of Permit Issuance:	Building permits are issued for six months with an automatic extension provided upon completion of an inspection.		
Construction Hours:	M-F: 7am-6pm Sat.: 9am-6pm Work prohibited on Sundays and City holidays		
Inspection Hours:	M-F: 9am-12pm, 1pm-4pm		
To schedule an Inspection:	Call (415) 485-3365		
Notes:	Design review is likely to be required for ground-mounted projects and projects zoned commercial. The City of San Rafael provides an online permit tracking system at: http://acm.cityofsanrafael.org/Government/Community_Development/Project_and_Permit_Status.htm		
Resources:	Explanation of Work Exempt & Work Requiring Permits http://acm.cityofsanrafael.org/Assets/CDD/Building/Required+permits+and+exemptions.pdf.pdf Plan Submittal Requirements http://acm.cityofsanrafael.org/Assets/CDD/Building/Plan+Submittal+Requirements.pdf		

Sausalito			
Address:	Sausalito Community Development Department Sausalito City Hall 420 Litho Street Sausalito, CA 94965	Website:	http://www.ci.sausalito.ca.us/Index.aspx?page=148
Telephone: Fax:	(415) 289-4128 (415) 339-2256	Email:	Nichole Hustone nhustone@ci.sausalito.ca.us
Building Fee Schedule:	http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=2323	Building Department Hours:	M-Th: 7:30am-5pm Friday: 7:30am-12pm
Building Code:	Sausalito Municipal Code Chapter 8 http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=53	Zoning Code:	Sausalito Municipal Code Chapter 10 http://www.ci.sausalito.ca.us/Index.aspx?page=287
Building Permit Application:	http://www.ci.sausalito.ca.us/Index.aspx?page=886		
Submittal Materials:	4 Plan Sets with on sheets no smaller than 11" x 17". Plan sets should include the department provided project information sheet, a roof plan, a site plan, and elevation drawings. Additional materials may be required, contact the Building Department for further information.		
Fees Assessed:	For PV Projects, the City of Sausalito assesses a plan check fee, a plan storage fee, a construction traffic fee, zoning permit fee, and an electrical fee. State fees for SMIP and Cal BSC are also collected. For most PV projects, it is likely that the City will waive the electrical permit fee. There is an additional charge if applicants choose the 5-day expedited review service.		
Plan Review Period:	2-week plan check turnaround unless applicants opt to pay for 5-day expedited service.		
Planning Review:	The City of Sausalito does not require planning review for solar PV projects.		
Period of Permit Issuance:	Building permits are initially issued for 6 months.		
Construction Hours:	M-F: 8am-6pm Sat.: 9am-5pm Work prohibited on Sundays but allowed from 9am-7pm on City holidays		
Inspection Hours:	M, W, Th.: 9am-12pm & 1pm- 4pm		
To schedule an Inspection:	Inspection requests should be made on the 24-hour Inspection Request Line at 289-4100 ex. 811. Reservation line is 24 hours/ 7 days a week, but call before 8:30 am for same-day service. Provide: • Building Permit Number • Site Address • Day & Date of Inspection • Preference: Morning or Afternoon • Type of Inspection • Contact Name • Contact Phone Number		
Notes:	The City of Sausalito does not have materials specifically addressing PV permitting at this time.		
Resources:	Plan Submittal Checklist http://www.ci.sausalito.ca.us/Index.aspx?page=886 Submittal Requirements http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=223 Local Ordinance Governing Construction http://www.ci.sausalito.ca.us/Index.aspx?page=151 Business License (Outside Contractor) http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=129 Inspection Request http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=8547 Project Cost Evaluation http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=10005 Special Inspection http://www.ci.sausalito.ca.us/Modules/ShowDocument.aspx?documentid=10015		

Tiburon			
Address:	Tiburon Hall 1505 Tiburon Boulevard. Tiburon, CA 94920	Website:	http://www.ci.tiburon.ca.us/services/forms/building%20division/building_permit_information.htm
Telephone: Fax:	(415) 435-7380 (415) 435-7395	Email:	Ann Heglin, Permit Clerk aheglin@ci.tiburon.ca.us
Building Fee Schedule:	www.ci.tiburon.ca.us/services/forms/building%20division/Building%20Permit%20Fee%20Summary%20for%20Residential%20Projects.pdf	Building Department Hours:	M-Th: 7am-5pm
Building Code:	Tiburon Municipal Code Title 4, Chapter 13 http://library.municode.com/index.aspx?clientId=16657	Zoning Code:	Tiburon Municipal Code Title 4, Chapter 16 http://library.municode.com/index.aspx?clientId=16657
Building Permit Application:	Application only available in-person or through post. Contact agency for further information.		
Submittal Materials:	3 Plan Sets including: a building permit application (contact agency for form), a site plan, a single line electrical diagram, cross sections and three sets of calculations wet stamped by the author. Minimum plan size is 11" x 17"		
Fees Assessed:	Building permit fees for roof-mounted PV projects no more than 8 inches above a sloped roof or 18 inches above a flat roof are waived. Ground-mounted systems are subject to full building permit fees, which are valuation based and include plan check, building permit, plan storage, electrical permit fee, street impact fee, the General Plan maintenance fee, and the technology fee. All projects will be subject to the state SMIP and CA. Bldg Std. Ad Fund fee.		
Plan Review Period:	PV plans are generally reviewed in three to five days, but may take up to two weeks		
Planning Review:	The planning department does not review building permit applications for roof mounted PV installations less than 42 inches above the roof or ground-mounted installations. Projects not meeting these criteria will be reviewed for consistency with zoning requirements.		
Period of Permit Issuance:	Permits are initially issued for 18 months		
Construction Hours:	M-F: 7am-5 pm Sat.: 9:30 am-4pm Work prohibited on Sundays and City Holidays		
Inspection Hours:	9:30am-4:30pm M-Th & every other Friday		
To schedule an Inspection:	Automated Inspection Request Line (415) 435-7380		
Notes:	Fire review of plans may be required of those projects requiring significant alterations to existing structures.		
Resources:	Building Permit Overview http://www.ci.tiburon.ca.us/services/forms/building%20division/building_permit_information.htm		

Interconnection

PG&E Generator Interconnection Process (GIP)	
General Information	
Host Agency:	<p>Pacific Gas & Electric (PG&E) PG&E Owns and manages the distribution system to which MEA Feed-in Tariff (FIT) generators are most likely interconnect through.</p> <p>Generators have the option to request interconnection through the transmission system managed by California Independent System Operator (CAISO). Interconnection through the CAISO typically pursued by larger projects or those sited in remote areas where transmissions lines with capacity limits greater than 60 kilovolts (kV). As MEA FIT projects are required to located in Marin County and of a capacity not greater than one megawatt (MW). Under these constraints generators are thought to most likely apply for interconnection through the PG&E distribution system.</p>
Compliance Agency:	<p>The Federal Energy Regulatory Committee (FERC)</p> <p>The FERC is charged with regulating the interstate transmission and wholesale of electricity. As FITs provide for the sale of generation resources at a wholesale rate rather than the retail rate paid by most customers, the FERC maintains jurisdictional oversight of FIT interconnections.</p>
Interconnection Standard:	<p>The PG&E Generator Interconnection Process (GIP)</p> <p>The GIP has been developed as part of PG&E's FERC approved Wholesale Distribution Tariff (WDT). The PG&E's GIP was recently revised (2011) from the utility's Large Generator Interconnection Procedure (LGIP, > 20 MWs) and the Small Generator Interconnection Procedure (SGIP, < or equal to 20 MWs). The LGIP and the SGIP, and now the GIP are FERC approved standards for implementing the model LGIP and SGIP originally drafted by the FERC.</p>
Generator Requirements:	<p>Generators applying for interconnection to the PG&E distribution system for the purpose of wholesale arrangements must meet the codes, standards and certification requirements established in Attachments 3 and 4 of the GIP. These attachments are found in attachment I of the PG&E Wholesale Distribution Tariff (WDT). These requirements direct adherence to applicable Institute of Electric and Electrical Engineers (IEEE) codes and standards, as well as the use and labeling of Nationally Recognized Testing Laboratory (NRTL) certified components.</p>

PG&E Generator Interconnection Process (GIP)	
Contact Information	
Utility Department:	Generator Interconnection Services
Website:	http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml
Email:	Email Generation Interconnection Services to submit application materials gen@pge.com
Phone:	(415) 972-5676

PG&E Generator Interconnection Process (GIP)	
Generation Interconnection Process Overview	
Generator Interconnection Process (GIP):	<p>The Wholesale Interconnection Process proceeds through the following 7 stages. The process is focused on determining the impact of the generator upon the distribution system and identifying any needed distribution or network upgrades.</p> <p>1. Application Processing: 10 to 30 business days PG&E will review & deem the application complete or request outstanding items within 10 business days. Project managers are then given 10 business days to provide outstanding items or to request and extension of no more than 20 business days.</p> <p>2. Initial Review: 15 business days Once the application is deemed complete, the initial review is conducted and completed within 15 business days. If review is passed then project moves to stage 5: interconnection agreement.</p> <p>The PG&E Generator Interconnection Services Department will review the project characteristics against the 10 Fast Track screens that have been set forward to determine whether the generator may be connected to the grid in a manner consistent with safety, reliability, and power quality standards. Failure to pass all screens with likely lead PG&E to offer an options meeting to define the need for supplemental review. PG&E reserves the right to allow projects to move forward to the interconnection agreement without supplemental review if it may be determined that safety, reliability, and power quality standards may be ensured regardless of failure to pass all 10 Fast Track screens.</p>
GIP Continued:	<p>3. Options Meeting: Offered within 10 business days If the initial review determines the need for a supplemental review, PG&E will make an offer to discuss the supplemental review and potential cost at an "options meeting" within 10 business days after the completion of the initial review. The options meeting is to be scheduled at the convenience of all parties.</p> <p>The options meeting will discuss the need for further supplemental review to determine continued eligibility under the Fast Track procedure. If a supplemental review is determined appropriate, PG&E will provide a "non-binding good faith estimate of the costs" of such a study (See Section 2.3 of the PG&E GIP). If the initial review determines that the impact of the generator upon the grid is beyond Fast Track eligibility, PG&E shall provide the option for the project to pursue interconnection under either the Independent Study or Cluster Study procedures.</p> <p>4. Supplemental Review: Agree to supplemental review and submission of study fee: 15 business days Completion of the supplemental review: 10 business days Failure of supplemental review may result in further delays and additional deposits as projects are consequently offered to move into the Independent or Cluster study processes.</p>
GIP Interconnection Agreement (GIA) & Project Commissioning:	<p>5. Interconnection Agreement (IA): PG&E tendering of IA: 15 business days Project Manager for generator applicant is to provide response to the PG&E draft IA: 30 calendar days IA negotiation and agreement to be completed: 90 calendar days from the provision of supplemental review results or provision of passing results from the initial study.</p> <p>Pursuant to Section 4.24.2 of the PG&E GIP, generator applicants in disagreement with PG&E over the IA terms may either initiate the Dispute Resolution procedures established in Section 5.2 of the PG&E GIP, or request submission of the unexecuted IA to the FERC.</p> <p>Section 4.24.5 of the PG&E GIP requires that all interconnection facilities be designed, constructed, operated, and maintained in accordance with the standards set forth in the PG&E Interconnection Handbook. Please see the Guidance section of this appendix for a link to the on-line location of the handbook.</p> <p>6. Project Implementation: 24 weeks Once an IA is agreed upon, the applicant and PG&E are provided 24 weeks to complete facility engineering, procurement, and construction (EPC) of the PV generator, the interconnection connection, and any necessary distribution or network upgrades.</p> <p>7. Pre-parallel inspection & generator commissioning: To be coordinated with PG&E within 15 business days of written request for inspection. Inspection of generator and interconnection construction is required prior to arrangement with PG&E for commercial operation.</p>
GIP Deposit & Cost Responsibility:	<p>Fast Track Application Fee of \$500 (nonrefundable)* • Additional Potential Costs may be required if supplemental review is necessary. The application cost for the Certified 10 kW Inverter-based review is \$100</p> <p>Cluster Study & Independent Study Application Fee** • \$50,000 + \$1,000 per MW up to a maximum of \$250,000 • Initial application deposit not to exceed \$1,000 • Further financial security postings required prior to network upgrades</p> <p>* Pursuant to Section 2.2.2 of the PG&E GIP, the party requesting generator interconnection is responsible for the cost of any interconnection facilities, distribution facilities, and network upgrades identified as in the process of the GIP as necessary for ensuring safety, reliability, and quality of distribution grid services. Applicants should read Section 2.2.2 of the PG&E GIP for further clarification regarding cost responsibility for Fast Track applicants. It may further be noted that any metering required for generator service is to be financed by the generator.</p> <p>** Some solar PV developers have noted that the potential cost of interconnection under either the Cluster or Independent Study tracks would likely be prohibitive to generators of 1 MW or less. Examination of the PG&E public queue for all WDT applicants has confirmed that all previous interconnection applicants for solar PV generators of 1 MW or less have applied under the Fast Track.</p>
Site Exclusivity Requirements:	<p>See Section 1.5 of the PG&E GIP Documentation of Site Exclusivity may be demonstrated through:</p> <p>1.5.1 Ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing the Generating Facility;</p> <p>1.5.2 An option to purchase or acquire a leasehold site for such purpose; or</p> <p>1.5.3 An exclusivity or other business relationship between the Interconnection Customer and the entity having the right to sell, lease, or grant the Interconnection Customer the right to possess or occupy a site for such purpose.</p>

PG&E Generator Interconnection Process (GIP)	
Fast Track Application Process, Technical Screens, Study Process, &Resources	
GIP Application:	<p>The application is currently only available in Microsoft Word format. It may be necessary to download and save the document and then open it afterwards.</p> <p>www.pge.com/includes/docs/word_xls/b2b/newgenerator/wholesalegeneratorinterconnection/Distribution_Interconnection_Request_Form.rtf</p> <p>Inverter based projects of 10 kW or less may apply using the application located on page 129 of the PG&E GIP.</p>
PG&E Wholesale Distribution Tariff:	www.pge.com/includes/docs/pdfs/shared/customerservice/nonpgeutility/electrictransmission/tariffs/PGE_Wholesale_Distribution_Tariff.pdf
PG&E Generator Interconnection Process (GIP):	http://www.pge.com/includes/docs/pdfs/b2b/newgenerator/wholesalegeneratorinterconnection/PGE_WDT_GIP_effective_2011Mar03.pdf
Materials Required for Submittal:	<p>Two copies completed Generator Interconnection Requests including:</p> <ol style="list-style-type: none"> 1. Requested Deliverability Status (Mark Energy Only for Fast Track) 2. The Application Fee of \$500 For Fast Track or \$100 for 10 kW Inverter Track PG&E Generation Interconnection Services (GIS) will send an invoice letter with instructions on wiring payment upon reception of the Interconnection Request 3. Site Plan Diagram Must show generator location and point of interconnection with the CAISO Controlled Grid 4. A Single Line Diagram Single-line diagram is to show applicable equipment such as generating units, step-up transformers, auxiliary transformers, switches/disconnects of the proposed interconnection, including the required protection devices and circuit breakers. Diagram should also include the distribution lines connecting the various groups of generating units, the generator capacitor banks, the step up transformers, and the substation transformers and capacitor banks at the Point of Interconnection with the CAISO Controlled Grid. 5. Demonstration of Site Exclusivity (See section 1.5 of the PG&E GIP) <p>* For both diagrams: provide 2 original prints and one reproducible copy no larger than 36" x 24"</p>
Application Submittal:	<p>Completed applications may be sent electronically to: gen@pge.com.</p> <p>Applications may also be posted to: Pacific Gas and Electric Attention: Generation Interconnection Services, Wholesale and Retail Team Mail Code N7L P.O. Box 770000 San Francisco, CA 94177</p> <p>Overnight address: Pacific Gas and Electric 245 Market Street Mail Code N7L San Francisco, CA 94177</p>
Fast Track Timeline:	<p>Depending on need for a supplemental review, PG&E currently provides that interconnection agreements may be completed in between 15 and 20 weeks after application. It is further provided that generators are to be operational and online at the conclusion of the EPC phase, which is estimated to be completed between 45 and 52 weeks after the initial interconnection request is established.</p> <p>The actual timeframe provided is dependent on immediate response from the project manager representing the generator applicant.</p> <p>See the PG&E Wholesale Distribution Tariff (WDT) for further information on timing of Independent Study or Cluster Study timeframes. Track briefings may be found: http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml</p>
Pre-application Information Request:	Pursuant to Section 1.2 of the PG&E GIP (March, 2011), project managers that present an informal project proposal for a specific interconnection point are entitled to be provided "relevant system studies, interconnection studies, and other materials useful to an understanding of interconnection" at a point on the PG&E distribution system so long as the information does not violate confidentiality and critical infrastructure requirements.
Fast Track Initial Review Screens:	<p>The following screens may be found in Section 2.2.1 of the PG&E GIP. Theses screens are evaluated during the initial review to establish whether a generator may be interconnected while maintaining safety, reliability, and quality standards.</p> <ol style="list-style-type: none"> 1. Generating Facility (GF) must be interconnected to applicable Jurisdiction, e.g. distribution if under WDT. 2. GF, in aggregate with other generation, shall not exceed 15% of Peak Load. 3. Requirements to interconnect to Spot Network. 4. GF, in aggregate with other generation, shall not contribute more than 10% to the circuit's maximum fault current. 5. GF, in aggregate with other generation, shall not exceed 87.5% of the short circuit interrupting capability. 6. Line configuration and transformer connection required to prevent over-voltage due to a loss of ground during the operating time of any anti-island function. 7. GF, interconnecting to single-phase shared secondary, shall not exceed 20kW. 8. GF that is single-phase and is to interconnect on a central tap neutral of a 240 volt service, shall not create an imbalance between the two sides of the 240 volt service of more than 20% of the nameplate rating of the service transformer. 9. GF, in aggregate with other generation interconnected to the transmission side of a substation transformer feeding the circuit the GF is connecting to shall not exceed 10 MW in an area where there are known transient stability limitation 10. No construction of facilities by PG&E (e.g. distribution or network upgrades).
Metering Standard for Interconnection under WDT:	Pursuant to Section 5.3 of the PG&E GIP, metering of the generation facility is to be installed at the expense of generator and in accordance with all FERC, state and local agency, and PG&E requirements.

PG&E Generator Interconnection Process (GIP)	
GIP Guidance Tools	
PG&E Grid Mapping Tool:	<p>Solar Photovoltaic (PV) & Renewable Auction Mechanism (RAM) Map</p> <p>This interactive online map was created by PG&E to assist in locating potential project sites. The map enables users to see the location of transmission and distribution lines, and their voltages and potential capacities, and substation locations and names. While this map does not guarantee the feasibility of a site, it can assist property owners and developers in identifying potential site opportunities and constraints related to currently developed infrastructure.</p> <p>Users are recommended to read the overview and FAQs provided on the page before proceeding to click on the map icon midway down the right side of the webpage. Users will then be prompted to create a user account before being given access to the map. Colorings indicate separate distribution lines.</p> <p>Website link: http://www.pge.com/b2b/energy_supply/wholesaleelectricssuppliersolicitation/PVRFO/pvmap/</p>
WDT Public Queue:	<p>Public WDT Queue pursuant to FERC Order 135</p> <p>Pursuant to the directives given by the FERC in the 2011 revisions to the PG&E interconnection procedures, the utility is required to maintain a listing of all projects seeking interconnection under the WDT GIP. Reviewing the queue may assist applicants in understanding current procedural timeframe potentials, as well as providing information on track choices (Fast Track, Independent Study, or Cluster Study) made by projects of similar sizes or in relative proximity.</p> <p>The spreadsheet is periodically updated and available at the following webpage under the title "PG&E maintains a public Queue for WDT applicants: file:///localhost/PG&E WDT Queue 01.06.2012 - In compliance with FERC Order 135 FERC ¶ 61,094 (April 29, 2011), Docket No. ER11-3004-000"</p> <p>http://www.pge.com/b2b/newgenerator/wholesalegeneratorinterconnection/index.shtml</p>
PG&E Executed FIT Contracts Listing:	<p>PG&E Executed FIT Contracts</p> <p>This periodically updated and sortable Excel spreadsheet provides a variety of information on distributed generation projects currently pursuing FIT arrangements through the PG&E FIT program. Interested parties may examine the spreadsheet to identify potential project to seek contact with for information on their development experience. The spreadsheet may also be used to examine the types and capacities of project commonly applying for FIT arrangements in the PG&E service territory.</p> <p>The spreadsheet is currently hosted at the following webpage under the title "Existing Executed Feed-in Tariff Contracts".</p> <p>http://www.pge.com/b2b/energysupply/wholesaleelectricssuppliersolicitation/standardcontractsforpurchase/</p>
PG&E Interconnection Handbook:	<p>Pursuant to Section 4.24.5 of the PG&E GIP, interconnection facilities are to be designed, constructed, operated, and maintained within the standards provided in the Interconnection Handbook. The complete handbook and sections individual sections are available for download at:</p> <p>http://www.pge.com/mybusiness/customerservice/nonpgeutility/electrictransmission/tariffs/handbook/</p>
GIP Procedure Overview and Track Options:	www.pge.com/includes/docs/pdfs/b2b/newgenerator/wholesalegeneratorinterconnection/Generator_Interconnection_Procedures_Overview.pdf
Fast Track Overview:	www.pge.com/includes/docs/pdfs/b2b/newgenerator/wholesalegeneratorinterconnection/Fast_Track_Roadmap.pdf
Frequently Asked Questions (FAQ):	<p>This set of FAQs includes information on how the interconnection process for wholesale generators (FIT arrangements) was revised in mid 2011, as well as introductions to the reapplication assessment process, requirements for Administrative Data Adequacy, and eligibility for the Fast Track procedure.</p> <p>http://www.pge.com/includes/docs/pdfs/b2b/newgenerator/wholesalegeneratorinterconnection/FAQ_FERC_Distribution_GIP.pdf</p>

MEA Feed-in Tariff Contract

Marin Energy Authority (MEA) Feed-in Tariff (FIT)	
Agency Website:	https://marincleanenergy.info/
Agency Address:	781 Lincoln Avenue, Suite 320 San Rafael, CA 94901
Program:	Marin Energy Authority (MEA) Feed-in Tariff (FIT)
Description:	<p>The MEA FIT programs allows eligible distributed renewable energy generators to sell power output to the Marin Energy Authority. Eligible facilities include all California Energy Commission certified renewable technologies with a capacity as large as 1 megawatt (MW).</p> <p>Launched in December of 2010, the program is currently capped at 2 MW and includes contract terms of 10, 15, or 20 years. The contract term is set by the generation applicant, which is required to be located in Marin County. Entrance into the program is on first-come, first serve basis and will continue to be open until the 2 MW cap is reached.</p> <p>Pricing for generation resources varies by delivery profile and is based on the market price of Renewables Portfolio Standard (RPS)-qualifying energy currently procured under agreement with Shell Energy North America (SENA).</p> <p>As with other MEA programs, energy under contract with the MEA is delivered through the PG&E transmission and distribution network.</p>
FIT Website:	https://marincleanenergy.info/feed-in-tariff
MEA Phone:	(888) 632-3674
Email:	_jkudo@marinenergyauthority.org
Fax:	(415) 450-8095
FIT Application:	https://marincleanenergy.info/PDF/FIT_Application.pdf
Submission Materials:	<p>FIT Application PG&E Generation Facility Interconnection Application (PG&E Form 79-974) Financial Statements, if applicable</p> <p>An Generator Interconnection Agreement or Certificate of Interconnection Authorization (for 10 kW Inverter-based interconnection applicants) will be required for execution of the FIT Contract.</p>
FIT Contract:	https://marincleanenergy.info/PDF/FIT_PPA_Contract.pdf
Resources:	<p>Marin Feed-in Tariff This document provides the general terms, conditions, and pricing for the FIT program. https://marincleanenergy.info/PDF/MCE_FIT.pdf</p> <p>MEA FIT Frequently Asked Questions (FAQs) https://marincleanenergy.info/feed-in-tariff</p>

References

- A.D. Little (1999). Distributed generation: Policy framework for regulators, An Arthur D. Little White Paper. Boston, MA: Arthur D. Little.
- Ayres, R.U., Ayres, L.W., & Warr, B. (2003). Exergy and Work in the US Economy, 1900-1998. *Energy* (28), 219-273.
- California Public Utilities Commission (2007). About the California Solar Initiative. Retrieved from <http://www.cpuc.ca.gov/puc/energy/solar/aboutsolar.htm>
- Federal Energy Regulatory Commission (April 29, 2011). Order conditionally accepting tariff revisions and denying motions. Docket No ER 11-30004-000. San Francisco, CA: Federal Energy Regulatory Commission.
- Getsolar.com (2012). Commercial solar energy grants. Retrieved from http://www.getsolar.com/commercial_federal-incentives-for-commercial-solar.php
- Granovetter, M., & Mcguire, P. (1998). The making of an industry: Electricity in the United States. In M. Callon (Eds.), *The Law of Markets* (pp.147-173). Oxford: Blackwell.
- Keyes, J.B., & Fox, K.T. (2008). Comparison of the Four Leading Small Generator Interconnection Procedures. Interstate Renewable Energy Council. Retrieved from http://www.solarabcs.org/interconnection/ABCS-07_studyreport.pdf.
- Legalinfo.ca.gov (2004). AB 2473 Chaptered. Retrieved from http://www.leginfo.ca.gov/pub/03-04/bill/asm/ab_2451-2500/ab_2473_bill_20040925_chaptered.html
- Rynne, S., Flowers, L., Lantz, E., and Hellers, E. (2011). Planning for wind energy. Chicago, IL: American Planning Association.
- State of California (2011a). History of Solar Energy in California. Retrieved from <http://www.gosolarcalifornia.org/about/gosolar/california.php>
- State of California (2011b). Building Standards Commission History. Retrieved from http://www.bsc.ca.gov/abt_bsc/history.aspx
- US Department of Energy (n.d. a). The history of solar. Washington, DC: US Department of Energy.
- U.S Department of Energy (n.d.b). Provisions of AB 1890. Retrieved from <http://www.eia.gov/cneaf/electricity/california/assemblybill.html>
- US Legal, 2010. Police Powers. Retrieved from <http://municipal.uslegal.com/police-powers/>