

## Theses and Professional Projects Abstracts

### Master of City and Regional Planning

#### City and Regional Planning Department, Cal Poly San Luis Obispo

For fulfillment of the MCRP degree, the CRP department offers the student a choice between a final comprehensive planning studio, a thesis, or a professional project. The following abstracts represent master's theses and projects approved during the 2015/2016 academic year. They are all available from Cal Poly's Kennedy Library at <http://digitalcommons.calpoly.edu/theses>.

#### **Automated Vehicles: A Guide for Planners and Policymakers.**

*Charlie Coles*

Automated vehicles are those which are capable of sensing their environments in order to perform at least some aspects of the safety-critical control (like steering, throttling, or braking) without direct human input. As a guide for planners and policymakers, the objective of this thesis is to develop a strong foundation for anticipating the potential impacts resulting from advancements in vehicle automation. To establish the foundation, this thesis uses a robust qualitative methodology, coupling a review of literature on the potential advantages and disadvantages of vehicle automation and lessons from past innovations in transportation, with recent trends of the Millennial Generation, carsharing services, and a series of interviews with thought-leaders in automation, planning, policymaking, transportation, and aviation. Five significant findings emerged: (1) the impacts of vehicle automation differ depending on one's visions of what automation means, how it is implemented, what the automation does, and where it operates; (2) current limitations of vehicle automation to perform all aspects of the dynamic driving task in all driving conditions make it difficult to move from level-4 to level-5 automation; (3) level-5 automation is required to have any effect on carsharing, mobility, and quality of life; (4) assuming effective planning and policymaking techniques, housing preferences, urban growth, and increases in total VMT will likely not be significantly impacted by vehicle automation; (5) human drivers may never be allowed to disengage their attention from a partially-automated vehicle, specifically in applications where drivers are expected to reengage their attention in safety-critical situations. This thesis developed a proposed future scenario of vehicle automation in the next five to ten years that is used to suggest guiding principles for policymakers, and key recommendations for planners, engineers, and researchers.

<http://digitalcommons.calpoly.edu/theses/1534/>

#### **Sea Level Rise Preliminary Vulnerability Assessment and Local Coastal Program Guidance Report for the County of San Luis Obispo.**

*Jonathan Stanley DiSalvo*

As a result of climate change, sea level rise is expected to cause changes to local coastal conditions, increasing potential impacts to coastal communities. Given the coastal location of San Luis Obispo County, it is a priority of the County to prepare for sea level rise; however, existing County plans have not been amended to include strategies for sea level rise. This Report assesses regionally-relevant sea level rise projections, performs a preliminary vulnerability assessment of California Coastal Act Resources, as a basis of adaptation planning strategy development for the Local Coastal Program. This Report serves as an administrative draft for the County, and follows the California Coastal Commission Draft Sea-Level Rise Policy Guidance Public Review Draft (2013) and the California Climate Adaptation Planning Guide (2012).

*(not available from Digital Commons at the time of publication)*

#### **Bainbridge Island Metropolitan Parks & Recreation District Landscape Ecology Adaptive-Management Framework Plan.**

*Craig Addison Houston*

The mission of the Bainbridge Island Metropolitan Parks and Recreation District (BIMPRD) is to build a healthy community through effective, sustainable stewardship of parks and open space, through the development and delivery of innovative cultural and recreational opportunities. The purpose of the Landscape Ecology Adaptive-Management Framework (LEAF) Plan is to serve as a living document to supplement the Parks and Recreation Master Plan by providing a framework for the implementation of ecosystem management practices. The plan focuses on the stewardship and management of the Island's ecological resources and responds to the challenge of managing environmental landscapes that integrate biological, geographic,

and socioeconomic processes. As a living document, LEAF serves as a tool to determine the evolutionary character of Bainbridge Island and to identify obstacles to sustainable stewardship of its environmental resources. Over time, through continual monitoring, analysis, and updating, LEAF will continue to grow with refined detail leading to the development of new management approaches better suited to the future needs of BIMPRD and the Island's community.

*(not available from Digital Commons at the time of publication)*

### **Policy & Privilege in Photovoltaics: a Community Level Analysis In San Diego County.**

*Rose M. Kelly*

This thesis is an investigation into the demographic and local government permit characteristics of communities with high levels of solar adoption in the San Diego Region. Utilizing a statistical model, this research illustrates which communities have been able to benefit from the current solar incentive programs in a robust market with an abundant solar resource. In San Diego, zip codes with large proportions of people over 65 have the highest correlation with high levels of residential solar adoption. This potentially illustrates that the life changes associated with retiring, including accumulated wealth, stable homeownership, and a fixed income, make residential solar systems accessible and appealing. Moving forward solar policy should expand to better facilitate installations for renters, sharing between neighbors, and clear pathways to retrofit older homes.

<http://digitalcommons.calpoly.edu/theses/1630/>

### **Does GRID Alternatives Impact Greenhouse Gas Emissions Reduction Targets in Central Coast Climate Action Plans?**

*Sandra V. Knapp*

As of March 2016, GRID Alternatives' 179 solar electric system installations on low-income housing contributed 103 metric tons of carbon (MT CO<sub>2</sub>e) emissions reduction for the climate action plans' Energy or Renewable Energy climate action measures that pertain to solar electric installations in the cities of: Arroyo Grande, Atascadero, Paso Robles, and San Luis Obispo and San Luis Obispo County. In 2007, the San Luis Obispo County Air Pollution Control District (APCD) created a team of government agencies to design climate action plans (CAP) that met the emission reduction goals set out by AB 32 and the 2008 Climate Change Scoping Plan. Each CAP outlines its greenhouse gas (GHG) baseline emissions and GHG emissions reduction targets in metric tons of carbon (MT CO<sub>2</sub>e) and identifies climate action measures to reach GHG emissions reduction targets. The climate action measure that pertains to Energy or Renewable Energy, specifically solar electric system installations, is examined in this study.

GRID Alternatives, a non-profit solar installer that implements its Solar Affordable Housing Program, was selected by the

California Public Utilities Commission (CPUC) in 2008, to serve as the statewide program manager for the California Solar Initiative's \$108 million incentive program called the Single-family Affordable Solar Homes (SASH) program, which is the country's first dedicated solar rebate program for low-income families (GRID, 2016a, p. 2). In 2010, GRID Alternatives opened its Central Coast office in Atascadero to serve five central coast counties and tracks CO<sub>2</sub> emission reductions for each installation.

The thesis' objective is to determine the impact that GRID Alternatives' solar electric installations in the cities of Arroyo Grande, Atascadero, Paso Robles and San Luis Obispo, and in San Luis Obispo County have on their respective CAPs' GHG emissions reduction targets for the Energy or Renewable Energy climate action measure that pertains to solar electric installations.

<http://digitalcommons.calpoly.edu/theses/1613/>

### **After the Paris Agreement: How India Can Use Climate Financing to Implement a Sustainable Clean Cookstove Program.**

*Hannah Kornfeld*

The burning of biomass for cooking purposes without proper ventilation and filters poses a massive health and climate risk. Health implications from exposure to household air pollution from this type of fuel impacts women and children in many developing countries, who spend many hours a day cooking and gathering fuel. Climate implications from burning solid biomass results in increased carbon dioxide and black carbon emissions, which contribute to global climate change. This thesis aims to explore the issues associated with biomass cookstoves in terms of both health and climate, and seeks to understand how a new national clean cookstove program could be funded in India. This includes potential partnerships with United States agencies, nonprofit organizations, and other international funding sources. The topic of clean cookstoves has gained traction as a strategy to mitigate emissions and adapt to a changing climate, and with the recent passing of the United Nations Paris Agreement, funding is increasing to support programs that address climate impacts.

<http://digitalcommons.calpoly.edu/theses/1590/>

### **Exploring Transit Ridership Using Census, Routing & Scheduling, and Stop Characteristic Data.**

*Douglas Harvey Moody*

This study develops, analyzes, and applies transit-system-specific regression tree models that identify and prioritize transit system improvements through analysis and application of ridership, Census, routing and scheduling, and transit stop characteristic data. Regression trees identify and rank independent variables that split dependent variable datasets into meaningful subsets according to significant relationships with independent variable datasets, and regression tree

models can be used to identify and prioritize transit system improvements. In this study, ridership datatypes are the dependent variables (i.e., boardings and alightings) and Census, routing and scheduling, and transit stop characteristic datatypes are the independent variables. Data associated with the San Luis Obispo Regional Transit Authority (RTA) is the basis of this study.

The literature review identified no other studies using regression trees to identify and/or prioritize transit system improvements. The analysis method helps identify and prioritize improvements to any transit system. The findings of this study may be applicable to other transit systems if assumptions can be made about the similarity of other systems to the San Luis Obispo Regional Transit Authority system.

Relationships between transit ridership and independent variables that may be effective predictors of transit ridership are evaluated in this study. Traditional independent variables used to forecast transit ridership include population and employment densities, land use types, income distributions, service frequencies, and transit stop accessibility; other independent variables that may be significant predictors of transit ridership include transit stop amenities, characteristics, and connecting and nearby infrastructure.

Ridership data needed for the analysis presented in this study can be obtained from transit agencies. Census data needed for the analysis presented in this study is available through the United States Census Bureau. Routing and scheduling data needed for the analysis presented in this study can be extracted from local transit system schedules. Transit stop characteristic data needed for the analysis presented in this study can be gathered by using a survey instrument during field-visits.

The regression tree models developed in this study show a positive relationship in the RTA system between transit ridership and population density (specifically Asian and twenty to twenty-four years old residential population densities), the number of trips serving transit stops, and transit stop characteristics (specifically the presence of a trash can). According to these findings, this study offers recommendations for improvements to RTA's transit system and marketing and planning strategies. More general conclusions that could be applicable to more transit systems could be drawn if the analysis method used in this study were performed with more and/or larger datasets (e.g., other transit agency, regional, statewide, national, and/or global datasets) comprised of more robust, accurate, and precise datatypes, and this concept is the basis for the future work recommended by this study.

<http://digitalcommons.calpoly.edu/theses/1535/>

### **The Impact of Cargo Bikes on Travel Patterns of Women.**

*Jana E. Schwartz*

There are a number of issues preventing the rollout of cargo bikes as a transportation mode in the United States. One

concern that has been raised is whether cargo bikes can function as a gender equitable transportation solution in the United States, given documented gender gaps in national bike riding statistics and ongoing inequities in childcare in 2-parent heterosexual households. The research is aimed at reviewing the practicality, enjoyment, and outcome of cargo bike use as a gender equitable transportation solution. This research contributes to new knowledge in gender equitable transportation in two ways: a) gender-focused analysis of survey data regarding cargo bikes use; b) extended open-ended interviews with mothers with cargo bikes.

Qualitative and quantitative data from surveys and interviews explore the influence of cargo bikes on transportation patterns and follow how behavior, attitude, spatial context, and perception varies between riders. Specific attention is given to the use of cargo bikes by women with children, as this demographic represents a minority group in the bicycle community and a group who could benefit most from the capabilities of a cargo bike design. Research shows, mothers spend more hours a day around their children and take part in more child-related activities. Therefore, the comfort and feasibility of the cargo bike for women with children becomes the topic of exploration to determine whether this mode type is a functional substitution for trips usually made by an automobile.

Through the collection of a nation-wide survey of cargo bike riders and in-person interviews with mothers in San Luis Obispo, CA who currently use a cargo bike to transport their children and goods, the research assesses the travel patterns of women and the emotional and physical benefits cargo bikes can provide to this specific demographic. Results show that benefits of cargo bike use include boding opportunities with children and a more enjoyable commute, while barriers to use include ill-performing bicycle infrastructure and time allocation for trips made by the cargo bike, in comparison to the automobile. Mode substitution behavior from the automobile to the cargo bike is geographically and culturally specific, but as results from both parts of the study show, women are receptive to cargo bike use and demonstrate a powerful demographic that has the potential to influence the travel patterns of current and future commuters to shift away from automobile dependency.

<http://digitalcommons.calpoly.edu/theses/1584/>