

Executive Summary

This report examines the sustainability of Trane's EarthWise™ climate control systems in the Salt Lake Valley (and the United States Mountain West in general). A simulation is performed to determine the best climate control system for a LEED Silver, 5-story tenant office building. This new building is a duplication of a pre-existing building. The climate control system installed at the preexisting building is used as a baseline against which three (3) alternative systems are compared. The social, ecological, and economic impact of each alternative is examined to determine which is the most sustainable. Since the baseline system is a proven option for LEED, and therefore ecologically sustainable, emphasis is given to the economic viability of the alternatives.

The first alternative reduces temperature of the air supplied to the conditioned space. The theory is that by supply cooler air, less of it can be delivered, which should result in smaller equipment with lower installation and operation costs. This system would save approximately \$8,000 per year in utility costs. The second alternative adds thermal storage to the baseline. With this system, ice can be produced at nighttime, when electricity is cheap and plentiful, and then melted during the day to offset some of the cooling requirements for the building. By shifting the time the energy is consumed to off-peak hours, this alternative saves over \$18,000 a year in electricity costs. The final alternative combines the first two alternatives with a new high efficiency chiller running a more efficient refrigerant. In the end, despite the increased installation cost of the fourth alternative, it is selected as the favored system because of its low cost of operation (saving over \$26,000 a year) which results in a payback period of less than 3 years. These savings result in a 44.5% return on investment, which makes this particular alternative a highly attractive climate control system for the given building, and one that is worth considering for other buildings in similar climates.