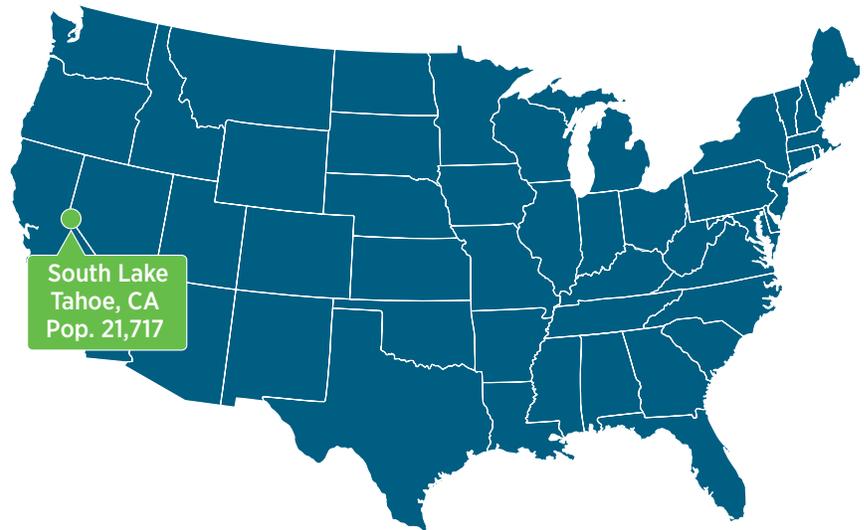


## CITY ENERGY: FROM DATA TO DECISIONS



### South Lake Tahoe, California: Using Energy Data to Partner on Building Energy Efficiency Actions

The City of South Lake Tahoe partnered with the Energy Department and the National Renewable Energy Laboratory (NREL) to demonstrate how data and analysis can inform more strategic energy decisions. NREL based its analysis in-part on the City Energy Profiles on the State and Local Energy Data (SLED) website ([eere.energy.gov/sled](http://eere.energy.gov/sled)). The profiles contain data compiled by SLED and the Cities Leading through Energy Analysis and Planning (Cities-LEAP) program. Cities across the country can follow the same approach and use data-driven analysis in their own energy planning.

#### City Energy Questions

South Lake Tahoe sought data and analysis to build on the city’s comprehensive study of local greenhouse gas (GHG) sources and move from planning to prioritized actions. To this end, the city asked:

- What is the energy savings and emissions reduction potential of building energy actions, such as local government-utility partnerships and energy efficiency incentive programs?
- How and where can energy savings and emissions reductions programs or policies be targeted most effectively?

“The Cities-LEAP analysis provided data to the City of South Lake Tahoe that would not have been available to the city as a result of limited financial resources and expertise. The Cities-LEAP analysis will be of paramount importance as the city develops its climate and sustainability plans in the future.”

— Nick Exline, 100% Renewable Committee Chairman, South Lake Tahoe

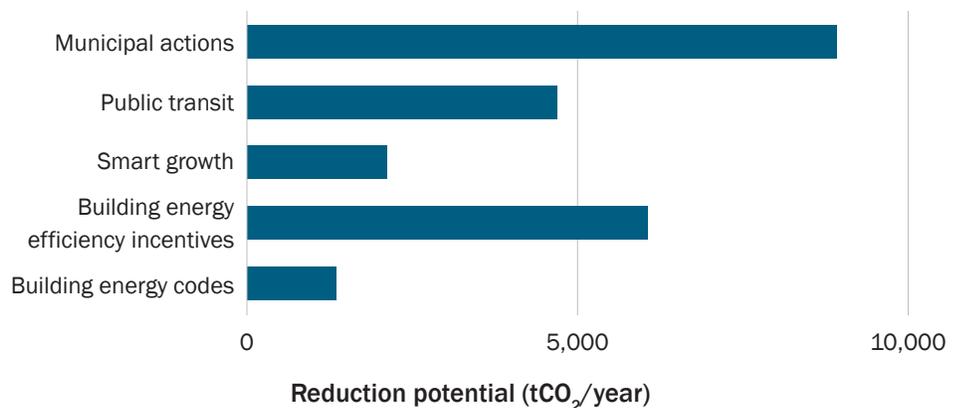
#### Data and Analysis

This analysis is based on SLED and supplemental data inputs directly from the City of South Lake Tahoe.

#### Estimating Emissions Reduction Potential of City Energy Actions

Using a Cities-LEAP study on the carbon abatement potential of city-level energy

actions,<sup>1</sup> along with data from South Lake Tahoe, NREL developed a calculator for GHG emissions reduction potential from five common city-level types of actions. For South Lake Tahoe, building energy efficiency incentives represent the second highest emissions reduction potential behind municipal actions (Figure 1). South Lake Tahoe estimated that its municipal operations share of



**Figure 1.** Estimated annual GHG reduction potential of common city actions for South Lake Tahoe, California (Source: NREL)

<sup>1</sup> O’Shaughnessy, E., et al, Estimating the National Carbon Abatement Potential of City Policies: A Data-Driven Approach, National Renewable Energy Laboratory (2016), NREL-67101, <https://nrel.gov/docs/fy17osti/67101.pdf> and <https://energy.gov/node/2104835>.

**Table 1. Estimated Annual Energy Consumption Reduction Potential from Energy Efficiency Program Participation in South Lake Tahoe, California**

Sector	Commercial	Residential
Assumed participation rates*	10%	4%–16%
Number of establishments or households†	638	16,730
Average annual electricity consumption per establishment or household (MWh)‡	229	6.3
Average natural gas consumption per establishment or household (mmBtu) ‡	1066.1	81.5
Estimated participation	64 establishments	669–2,677 households
Assumed 5% annual energy reduction per building (electric/gas)	11.5 MWh/53.3 mmBtu	0.32 MWh/4.08 mmBtu
Potential reduction in energy consumption (electric/gas), assuming 5% reduction in electricity and natural gas consumption per building	736 MWh/3,411 mmBtu	214–857 MWh/2,730–10,909 mmBtu

\* Based on research in O'Shaughnessy, et al.

† Commercial data from the SLED Building Stock Summary and residential data from 2011–2015 American Community Survey 5-Year Estimates for South Lake Tahoe, California. ‡ Based on commercial and residential electricity and natural gas consumption data provided by South Lake Tahoe.

energy use is 5%, which is significantly higher than the average value of 1.5% from the Cities-LEAP study and leads to the atypically higher Municipal Actions potential.

Municipal actions considered in this analysis focus on facilities, fleets, and solar photovoltaic (PV) energy, and include the following:

- Facilities: Energy efficiency measures in municipal buildings, waste/waste-water treatment, street lighting, and green building standards for new and renovated facilities

- Fleets: Lowering vehicle miles traveled, using cleaner fuels (e.g. E85, biofuels, fuel cells, compressed natural gas), increasing fuel efficiency, and fleet electrification

- Solar PV: Installing PV on municipal buildings or properties

Not included in this analysis are municipal PV purchasing for either municipal operations or for the entire community through programs such as community choice aggregation. Renewable energy purchasing at this scale would significantly increase the carbon abatement

potential of municipal actions above the level shown here.

#### Building Energy Efficiency Actions

Evaluating the relative energy savings potential of efficiency programs for different sectors may help target city actions. As Table 1 highlights, initial, coarse estimates based on average electricity consumption per building, average participation rate ranges for energy efficiency programs, and an assumed, conservative 5% energy use reduction per participating building suggest that commercial- and residential-sector

**Table 2. Estimated Annual Energy Consumption by Commercial Activity (2013) in South Lake Tahoe, California**

Commercial Activities - Top 5 Electricity Users	Number of Establishments	Electricity Use (MWh)	Rank	Electricity Use per Establishment	Rank
Hospitals	1	11,279	1	11,280	1
Accommodation	37	5,443	2	147	7
Food and Beverage Stores	17	4,968	3	292	5
Rental and Leasing Services	13	2,562	4	197	6
Commercial Activities - Top 5 Natural Gas Users	Number of Establishments	Natural Gas Use (Mcf)	Rank	Natural Gas Use per Establishment	Rank
Hospitals	1	45,790	1	45,791	1
Accommodation	37	9,594	2	259	10
Waste Management and Remediation Services	3	5,324	3	1,775	2
Food and Beverage Stores	17	5,079	4	299	6
Rental and Leasing Services	13	2,598	5	200	13

Source: SLED.

## Waste Management and Remediation Services Case Study

Crested Butte, a mountain town known for its outdoor recreation attractions, partnered with the Environmental Protection Agency (EPA) to increase efficiency in water and wastewater treatment and solid waste management.

NREL assessed energy consumption and efficiency at the town's water treatment sites, developed an energy baseline, and identified energy and cost savings recommendations outlined in Table 3. Working with results from energy audits, the EPA's Portfolio Manager tool (available at [energystar.gov/buildings](http://energystar.gov/buildings)) could help city staff identify and prioritize energy improvements.

**Table 3. Energy Efficiency Strategies for Municipal Water and Wastewater Treatment Facilities**

Focus Efforts for Energy Savings		
✓	Process Energy	Focus on biggest energy consumers at wastewater treatment plant (WWTP)
✓	Operational Controls	Tailor operations to meet seasonal and diurnal changes
✓	Quality vs. Energy	Balance water quality goals with energy needs
✓	Repair and Replacement	Consider equipment life and energy usage to guide repair and replacement
✓	Biosolids	Consider tradeoffs between treatment energy and improved biosolids quality
✓	Infiltration/Inflow (I&I)	Address I&I to reduce treatment energy
✓	Leaks and Breaks	Address leaks and breaks to reduce pumping energy
✓	On-Site Renewable Energy	Consider opportunities for on-site generation to reduce energy purchases
✓	Conservation	Educate the community: Less water reduces WWTP loads and energy needs

Source: J. Daw, K. Hallett, J. DeWolfe, and I. Venner, Energy Efficiency Strategies for Municipal Wastewater Treatment Facilities, NREL (2012), <http://www.nrel.gov/docs/fy12osti/53341.pdf>.

programs could achieve similar energy savings depending on participation rates.

South Lake Tahoe has a unique opportunity to address energy efficiency in the local ski industry and associated accommodations, food and beverage, and rental service industries, which collectively represent three of the top five electricity-consuming sectors in the city (see Table 2). Energy actions being undertaken at ski areas in the United States include installing LED lighting, developing on-site solar PV arrays, adding electric vehicles to fleets, and installing more energy efficient snowmaking equipment.<sup>2</sup>

Based on standardized, estimated electricity consumption by employee size class, hospitals are ranked as the highest electricity and natural gas consuming industry in South Lake Tahoe (see Table 2). Using this estimate, the hospital accounts for approximately 4% of the community's electricity consumption.

Waste management and remediation services, including wastewater treatment, also rank among South Lake Tahoe's top five energy consuming industries (see Table 2) and are among the reduction opportunities of particular interest to the city (see inset).

### Energy Efficiency Incentive Programs

In cities without a municipal utility, the city will usually need to partner with the local utility (or utilities) on energy efficiency programs. The American Council for an Energy-Efficient Economy (ACEEE) outlines approaches in Table 4 for local government and non-municipal utility partnerships, depending on the level of support from state government and utilities.

The Database of State Incentives for Renewables and Efficiency (DSIRE) summarizes state, local, and utility renewable energy and energy efficiency

**Table 4. Tactics for Local Government-Utility Partnerships**

Strategy	Level of local and utility support for energy efficiency		
	Limited	Supportive but ramping up	Robust
Program partnerships	<ol style="list-style-type: none"> <li>1. Retrofit particular municipal buildings and facilities</li> <li>2. Initiate challenge programs and competitions for households, businesses, and industries</li> </ol>	<ol style="list-style-type: none"> <li>3. Initiate market utility programs through local networks and information channels</li> <li>4. Engage in neighborhood-based targeted outreach</li> <li>5. Identify a pipeline of ready-to-go projects</li> </ol>	<ol style="list-style-type: none"> <li>6. Create a one-stop for technical services coupled with utility incentives.</li> </ol>

Source: ACEEE, "Increasing Participation in Utility Energy Efficiency Programs," [aceee.org/local-government-utility-partnerships-increasing](http://aceee.org/local-government-utility-partnerships-increasing).

<sup>2</sup> National Ski Areas Association's 2016 Sustainable Slopes Annual Report: <http://www.nsaa.org/media/276021/SSAR2016.pdf>

**Table 5. Utility Energy Efficiency Incentive Programs**

Rebate Programs	
Pacific Gas & Electric (PG&E) Residential Energy Efficiency Rebate Program	Residential customers can receive rebates ranging from \$50 to \$500 for installing energy efficient equipment, including certain appliances, water heaters, and pumps.
PG&E Multifamily Residential Energy Efficiency Rebate Program	Fixed rebate per dwelling, plus additional incentives based on the percent reduction in energy consumption (e.g., a 10%–18% improvement could yield a base incentive of \$400 per unit and an additional \$25 per unit for each additional efficiency gain between 11% and 18%).
Financing Programs	
Sacramento Municipal Utility District (SMUD) Residential Energy Efficiency Loan Program	Equipment Efficiency Loans and Home Performance Loans finance energy efficiency upgrades, including installing efficient water heaters, heat pumps, air conditioners, air/duct sealing, building insulation, windows, siding, and roofs.
SMUD Commercial Energy Efficiency Loan Program	Commercial, industrial, and multifamily residential utility customers are eligible for loan financing for energy efficiency upgrades for refrigeration equipment, lighting, processing and manufacturing equipment, and heat pumps.
PG&E Non-Residential Energy Efficiency Financing Program	Non-residential customers can receive no-interest loans to purchase and install qualifying energy efficient equipment.
SoCalGas Non-Residential On-Bill Financing	Non-residential customers can use on-bill financing to repay no-interest loans for energy efficiency upgrades.

Source: DSIRE ([dsireusa.org](http://dsireusa.org)).

policies and programs. Table 5 highlights sample utility energy efficiency incentive programs in California, some of which are similar to programs offered through Liberty, South Lake Tahoe’s utility.

## Resources

The following resources may be useful to guide further research and action steps:

### Energy Efficiency in Ski Towns

- Reaching 100% Renewable Energy: City of Aspen and the National Renewable Energy Laboratory develop and implement a strategy to cost-effectively reach a ground-breaking goal: <http://www.nrel.gov/docs/fy15osti/62490.pdf>
- Final Report: Energy Management Innovation in the U.S. Ski Industry: [https://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/display.highlight/abstract/7149/report/F](https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.highlight/abstract/7149/report/F)
- National Ski Areas Association Sustainable Slopes Initiative: <http://www.nsaa.org/environment/sustainable-slopes/>
- Small Resorts’ Guide to Energy 2006: <https://www.nsaa.org/media/21015/Small-resort-energy-guide.pdf>

### Building Energy Efficiency

- Guide for Benchmarking Residential Energy Efficiency Program Progress: <http://energy.gov/eere/better-buildings-residential-network/downloads/guide-benchmarking-residential-energy-efficiency>
- Commercial Building Energy Rating and Disclosure Policies: <http://www.imt.org/resources/detail/commercial-building-energy-rating-and-disclosure-policies>
- Commercial Buildings Advanced Energy Retrofit Guides: <http://energy.gov/eere/buildings/advanced-energy-retrofit-guides>
- EPA Portfolio Manager: <https://www.energystar.gov/buildings>

### Waste Management Energy Efficiency

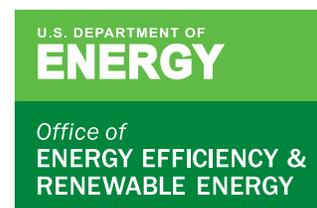
- Energy Efficiency in Water and Wastewater Facilities: <https://www.epa.gov/sites/production/files/2015-08/documents/wastewater-guide.pdf>
- Resource Conservation and Recovery: [https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/resource\\_conservation\\_and\\_recovery\\_a\\_guide\\_to\\_developing\\_and\\_implementing\\_greenhouse\\_gas\\_reduction\\_programs.pdf](https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/resource_conservation_and_recovery_a_guide_to_developing_and_implementing_greenhouse_gas_reduction_programs.pdf)

### Hospital Energy Efficiency

- Energy use indexes by building type, including hospitals: <http://cms.ashrae.biz/EUI/>
- ASHRE Advanced Energy Design Guide for Hospitals: <https://www.ashrae.org/standards-research-technology/advanced-energy-design-guides/50-percent-aedg-free-download>

Find additional resources in the SLED Local Energy Action Toolbox: <http://apps1.eere.energy.gov/sled/cleap.html>

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**For more information, visit:**  
[energy.gov/eere/cities](http://energy.gov/eere/cities)

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