

## Natural Gas Use in L.A. County: Analysis from the *L.A. Energy Atlas*

### Key Points

- **Promote natural gas conservation in residences**, which comprise the largest percentage of gas consumption in L.A. County. In particular, single-family homes are the highest users, measured both in total and per square-foot consumption.
- **Winter natural gas consumption is significantly higher** in buildings throughout L.A. County. In particular, areas with lower average winter temperatures in northern L.A. County are high winter users.
- **Lower-income areas rank highly for consumption per square-foot.** Areas of L.A. such as Willowbrook, Vermont Vista, and Compton south of downtown use as much or more therms per square-foot as northern and coastal areas, likely due to the predominance of older buildings. These areas are ideal for targeting Energy Savings Assistance (ESA) program and other funds that can improve conservation in lower-income households.
- **Focus energy efficiency efforts on key sectors and ages of buildings.** Older residential buildings and newer commercial buildings are the most intensive users of natural gas and prime candidates for targeting energy efficiency measures.
- **Target natural gas efficiency in smaller buildings.** Across buildings types, smaller buildings consume more natural gas per square-foot than larger buildings.

### Analysis

The shutdown of the Aliso Canyon natural gas storage facility has threatened the reliability of energy supplies in Southern California. Reducing natural gas demands, especially during peak periods of summer and winter use, is critically important to preserve uninterrupted electricity and natural gas services throughout the Los Angeles metropolitan region. In winter, natural gas consumption in buildings goes to heat homes and hot water, while in summer, natural gas importantly supplies small power plants brought online to meet peak demands during the hottest hours of a day. A technical assessment group comprised of utility and government experts assessed that without use of the Aliso Canyon storage facility, Los Angeles could face up to 14 days of service interruptions during the summer corresponding with peak loads.<sup>1</sup> Moreover, if remaining natural gas reserves in Aliso Canyon are used to meet summer peak demands but service is not restored, winter shortages are projected to still occur.

Promoting conservation in natural gas end-uses throughout the region can help preserve supplies for peak times. To this end, California Public Utilities Commission (CPUC) director Catherine Sandoval directed the agency to address energy reliability associated with the Aliso Canyon leak. As one measure, the CPUC ordered regional utilities, the Southern California Edison (SCE) and Southern California Gas (SoCalGas) companies, to “enhance their Energy Savings Assistance Program efforts in low-income communities affected by the Aliso Canyon Storage Facility Gas Leak,” enacting measures to promote greater uptake of efficiency in willing households, including those that have previously participated (CPUC Decision 16-04-040). As a result, SCE can allocate \$250 million in unspent funds to reduce energy and gas consumption for low-income households through the Energy Savings Assistance Program (ESA).

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<sup>1</sup> *Aliso Canyon Action Plan to Preserve Gas and Electric Reliability for the Los Angeles Region*. CPUC, CEC, CalISO, and LADWP. April 4, 2016.

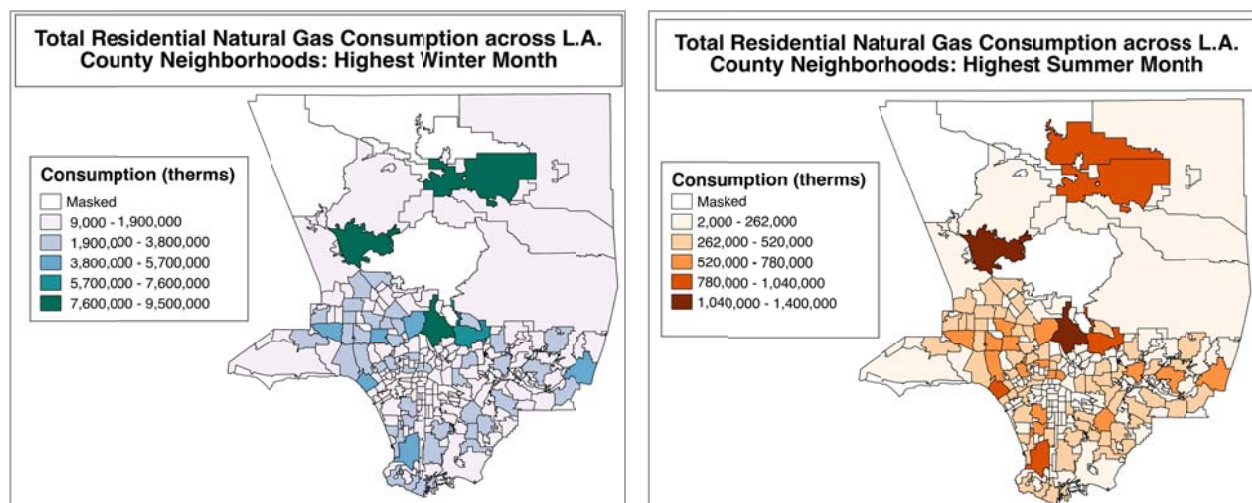
Most comments and recommendations from the ruling focused on measures using existing statewide programs, implemented through regional utilities. Aggregated parcel consumption data allows a different approach. When energy billing data is tied with building characteristics, geography, and socio-demographic statistics, it informs more effective policy making for the ESA and other energy efficiency programs. This necessarily requires merging datasets from across government, utility, and private sector sources.

Analyzing data from the *L.A. Energy Atlas* reveals important trends that can help implement energy efficiency measures aimed at reducing natural gas consumption in metropolitan L.A. more effectively. We provide findings and recommendations below.

**Residences dominate overall consumption of natural gas.** Across L.A. County, in 2010, over 42% of the total natural gas consumed occurred in single- and multi-family residences. Single-family homes in particular comprised 30% of consumption alone. In comparison, the next largest category (commercial buildings) made up only 13% of natural gas consumption. By 2014, natural gas consumption in L.A. County residences had increased 23% percent to 1.394 billion therms, comprising an even larger percentage of total countywide use (48%).

**Winter consumption is significantly higher** due to natural gas use for heating, with December and January being peak months for total consumption. During winter months (October – March) in 2014, median monthly consumption across all of L.A. County (1.6 million therms) was nearly triple that of summer months (.589 million therms), as reported by through the *L.A. Energy Atlas*.<sup>2</sup> In summer months, a more critical issue for natural gas consumption is meeting increased demand as natural gas peak-use plants come online during periods of high electricity use.

Figure 1: Total natural gas consumption (2014) across L.A. County neighborhoods, mapped as highest winter month (left) and highest summer month (right)

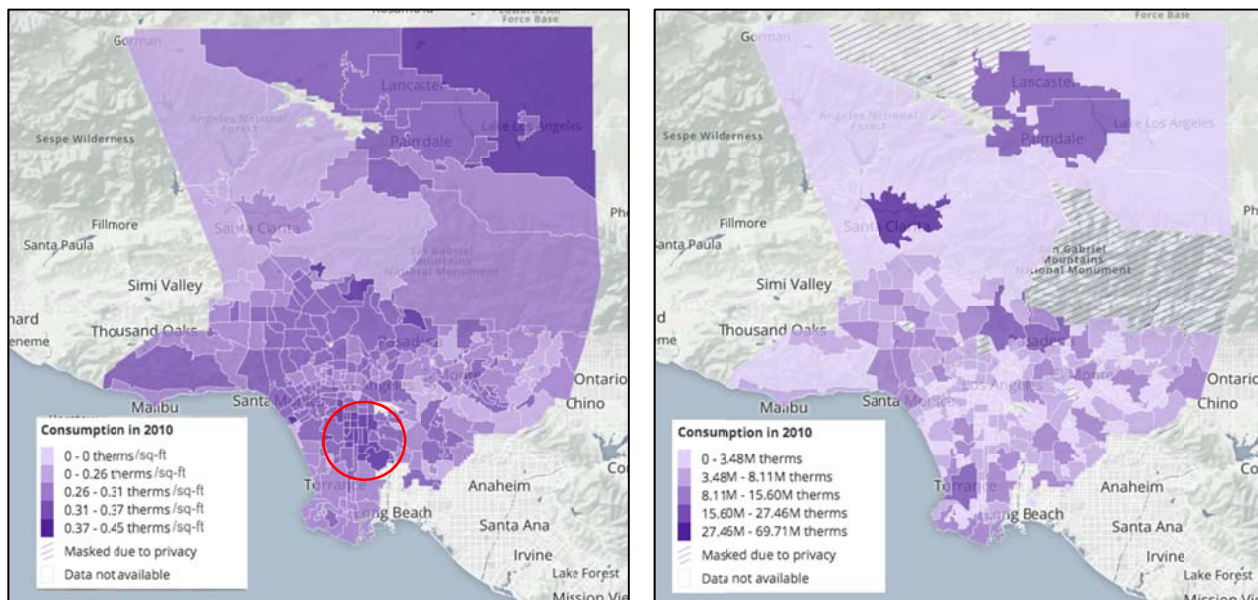


<sup>2</sup> The *L.A. Energy Atlas* reports consumption as total and per square-foot based on privacy protection guidelines, which mask data for some communities. Thus, total and sector-specific consumption may be underestimated.

Notably, the relative size and population of areas explains high consumption (residential) in the maps above. Many of the largest users are classified as both neighborhoods and cities, including Glendale, Santa Clarita, Pasadena, Torrance, and Long Beach. With larger contiguous areas than other neighborhoods at the sub-city level, natural gas consumption is higher in these areas.

**Moderate and lower-income areas rank high for annual natural gas consumption per square-foot.** For instance, Compton, Willowbrook, and Vermont Vista all have average annual natural gas use per square-foot equal to or exceeding northern and coastal areas such as Lancaster and Palmdale (see area highlighted in red in Figure 2). Lower-income neighborhoods have predominantly older, less-efficient buildings.

*Figure 2: Natural gas consumption (2010) across L.A. County neighborhoods by: 1) median consumption per square-foot in a building (left); and 2) total consumption in a neighborhood (right). Some moderate- and lower-income inland areas (highlighted in red) are intense consumers of natural gas (per sq-ft)*



**Older residential buildings and newer commercial buildings are least efficient.** Across all cities in L.A. County, older residential buildings are the least efficient for natural gas use (measured as therms per square-foot). Single-family homes are more intensive users of natural gas. Yet, for commercial properties, newer buildings are less efficient than older ones. Seasonal patterns, with consumption highest in December and January, are also evident (Figure 3).

**Smaller buildings consume natural gas more intensively.** Across building types, smaller buildings have higher natural gas consumption per square-foot than larger buildings. Residences, especially single-family homes, have the greatest use per square-foot, nearly double that of commercial buildings. In addition, single-family homes have the smallest disparity in consumption across building sizes. Larger multi-family, commercial, and industrial buildings have the lowest values of consumption per square-foot (Figure 4).

Figure 3: Building age and natural gas consumption (2010) in cities of L.A. County by: 1) median consumption per square-foot in residential buildings (left); and 2) median consumption per square-foot in commercial buildings (right)

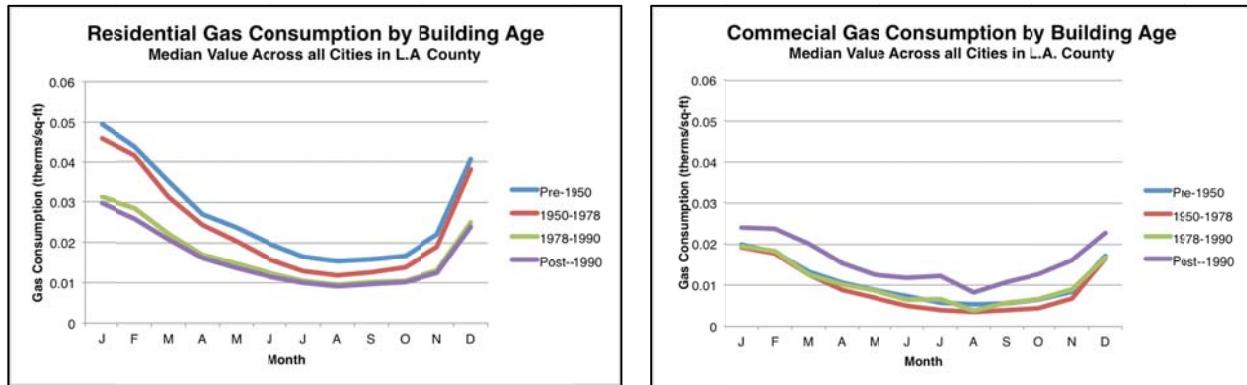
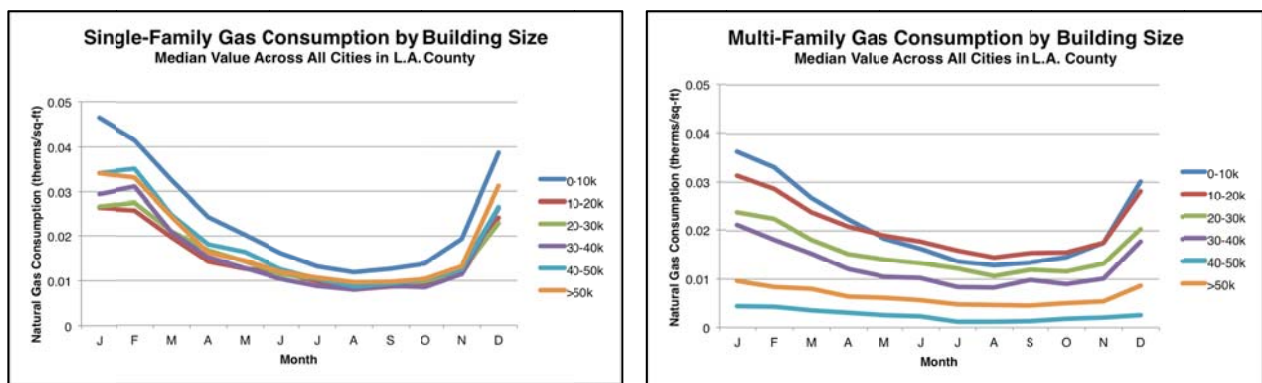


Figure 4: Building size and natural gas consumption (2010) in cities of L.A. County by: 1) median consumption per square-foot in single-family residential buildings (left); and 2) median consumption per square-foot in multi-family residential buildings (right)



## Recommendations

Based on the analysis, we recommend several actions for maximizing public investments to reduce the risk of service interruptions from the Aliso Canyon storage facility leak:

- 1) *Promote natural gas conservation in residences.* The percentage of total natural gas used by residential properties increased from 42% to 48% between 2010 and 2014. Additionally, single-family residences are the largest users of natural gas in Los Angeles. Smart efficiency investments would target natural gas reductions in single-family, and then multi-family, households.
- 2) *Promote conservation by targeting geographic areas of high-use.* Most energy efficiency programs are statewide and implemented by local utilities. Emergency measures should focus on maximizing potential returns on investment. Given the need for residential conservation, implemented through existing programs that emphasize voluntary



participation, program managers should focus on promoting uptake in areas (neighborhoods) of high consumption (both total and per square-foot), using aggregated parcel-level data.

- 3) *Pursue reductions of natural gas consumption in higher-income areas.* While actions through the ESA and other programs help improve equity of public investments, empirical analysis reveals that some wealthy areas of L.A. County use disproportionately more gas per capita. In particular, areas near the Santa Monica Mountains are high users. Emergency measures should importantly focus not just on promoting conservation in lower-income households, but also achieving energy savings in moderate- and high-income homes.
- 4) *Target energy efficiency in older residential buildings and newer commercial buildings.* Analysis shows that older residential buildings and newer commercial buildings are intensive users. Energy efficiency programs should maximize participation of these buildings.
- 5) *Target energy efficiency in smaller buildings, with priority for single- and multi-family residences.* Across building types, consumption efficiency (therms/sq-ft) increases with building size. Focusing energy efficiency retrofits on smaller buildings can help maximize investments. In addition, with the residential sector comprising the largest percentage of consumption, efficiency investments can address both total and per square-foot use.
- 6) *Promote long-term electricity supply resiliency in L.A. County* through data-driven energy efficiency that maximizes public investments in conservation, combined with distributed renewable generation that reduces peak loads and preserves natural gas supplies. In particular, account-level data, aggregated to protect personal privacy, is an important component of measuring and verifying energy savings.

### **About the *L.A. Energy Atlas***

The California Center for Sustainable Communities within UCLA's Institute of the Environment and Sustainability developed the *LA Energy Atlas*, an interactive tool for mapping and exploring account-level energy consumption throughout L.A. County. The *L.A. Energy Atlas* was funded by the County of Los Angeles and uses electricity and natural gas consumption data obtained from the California Public Utilities Commission (CPUC), Los Angeles Department of Water and Power (LADWP), Burbank Water and Power, Glendale Water and Power, the City of Downey, and Long Beach Gas and Oil. L.A. County GIS exports also provided technical support.

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