



COMBINED ENERGY AND WATER CONSERVATION STRATEGIES PROVIDE BENEFITS TO BUSINESSES, UTILITIES, AND THE ENVIRONMENT

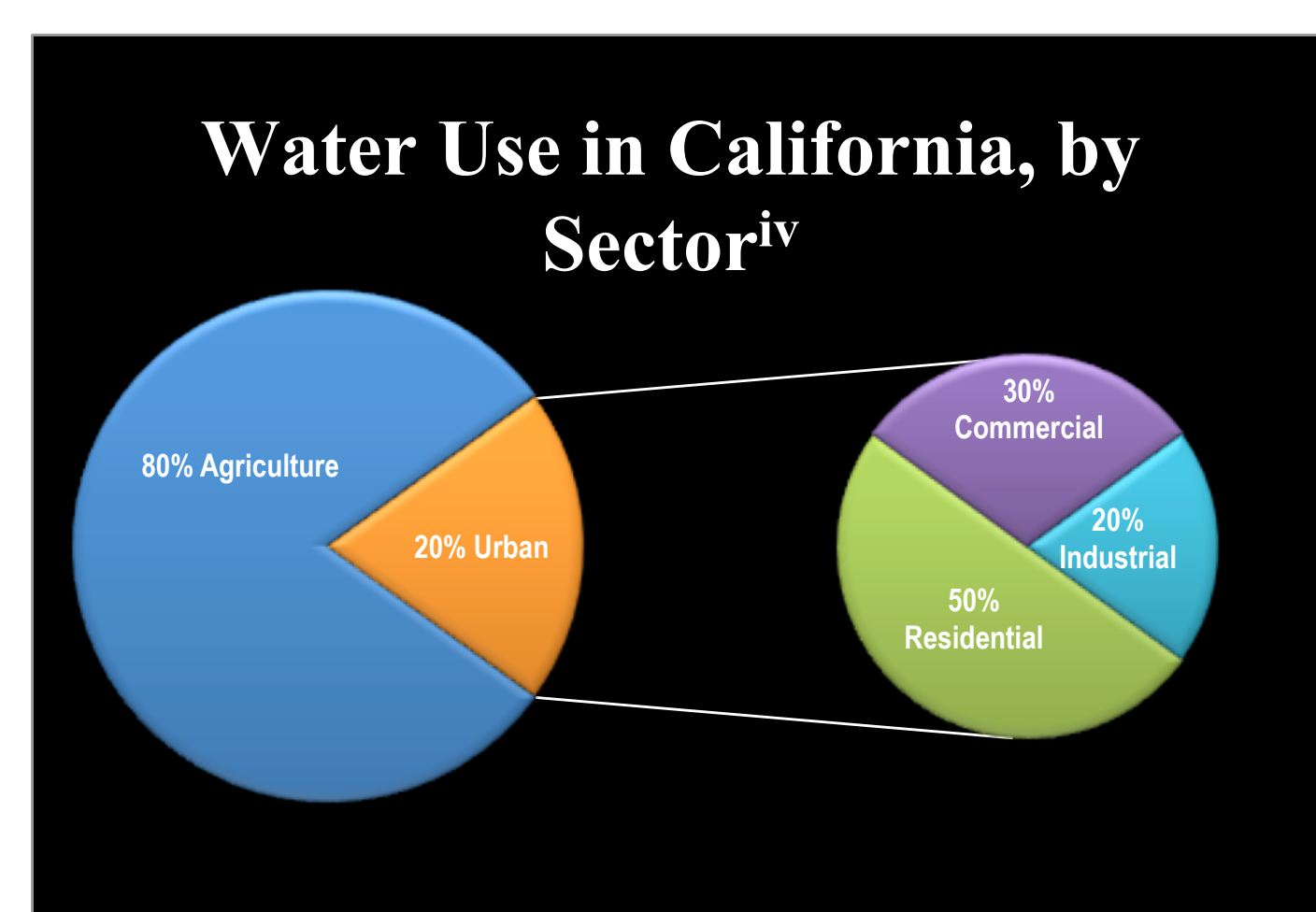
SYNERGY PROJECT OVERVIEW

Many technologies use a combination of natural gas, electricity or water, but traditionally utilities only focus on their own managed resource. Our Synergy audits quantitatively captured electricity and natural gas savings opportunities associated with water conservation at three case study hotels.

Category	Type of Resource Used by Targeted Each End Use		
	Water	Gas	Electricity
Ice Machines	X	-	X
Dish Washers	X	X	X
Pools	X	X	X
Washing Machines	X	X	X
Faucets	X	X	-
Shower Heads	X	X	-
Landscaping	X	-	-

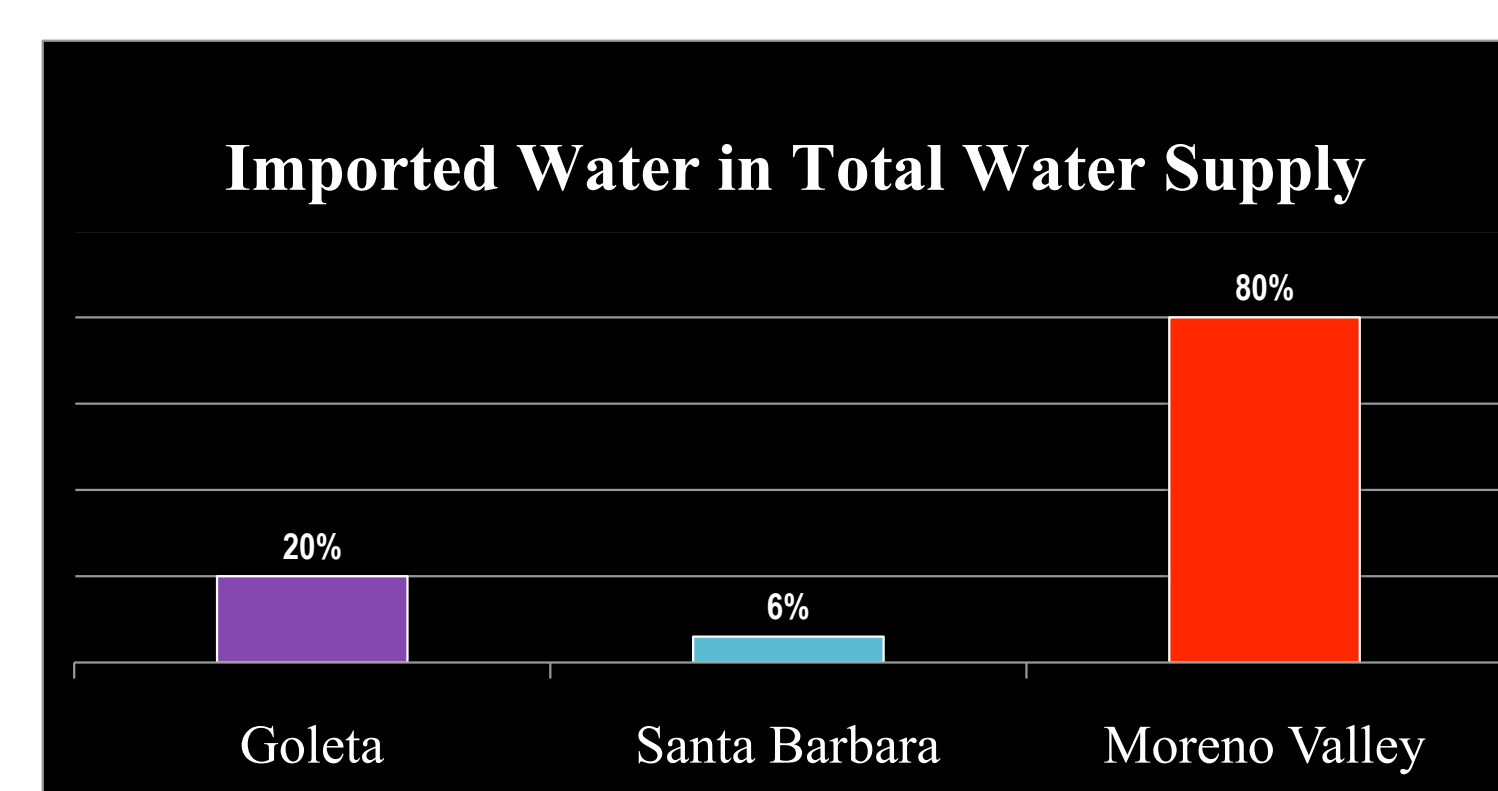
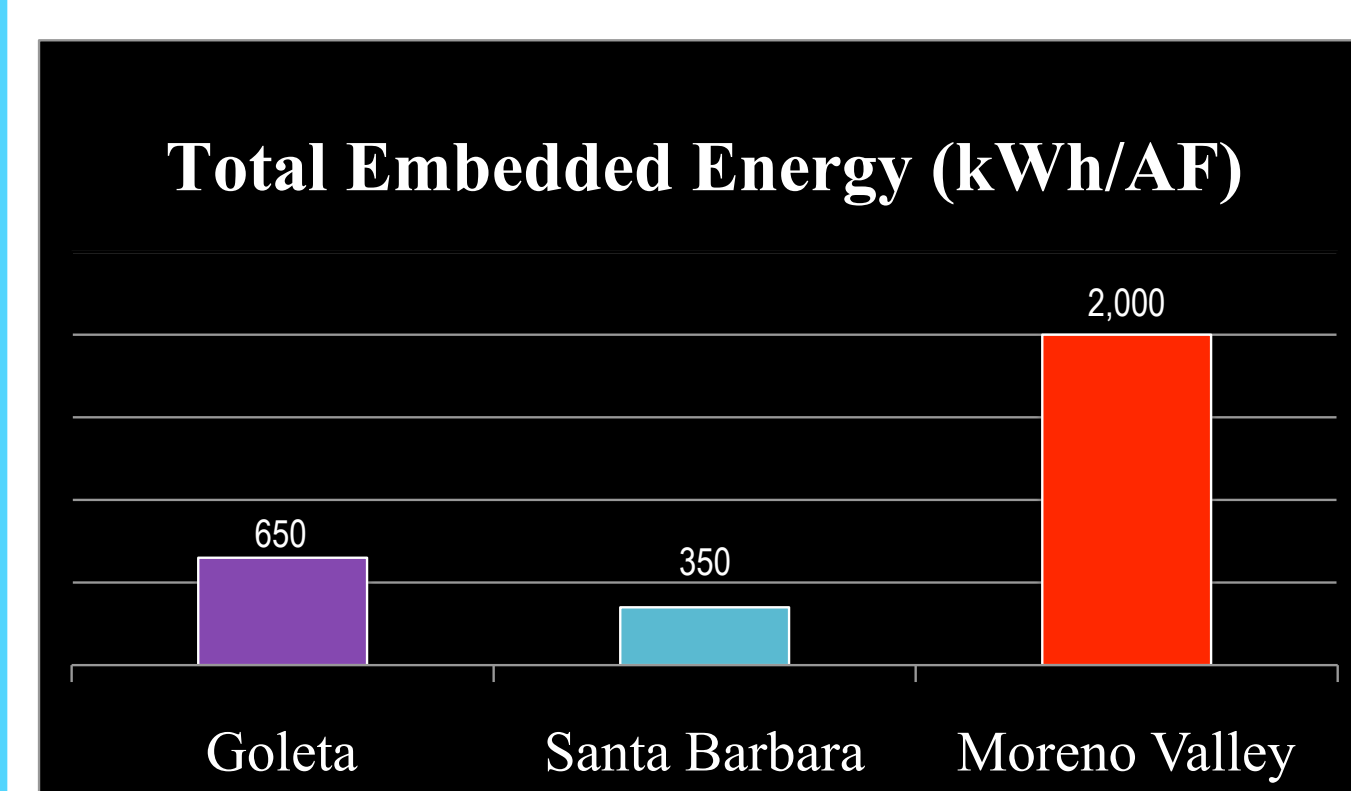
WATER, ELECTRICITY AND NATURAL GAS IN CALIFORNIA

- Water-related energy demand accounts for 19% of all electricity consumed in California.ⁱ
- Natural gas demand for the heating of water is 32% of all non-thermal power generation use.ⁱⁱ
- The California Energy Commission estimates that urban water use efficiency may prove to be the largest single supply available for meeting growth in both water and energy demand over time.ⁱⁱⁱ

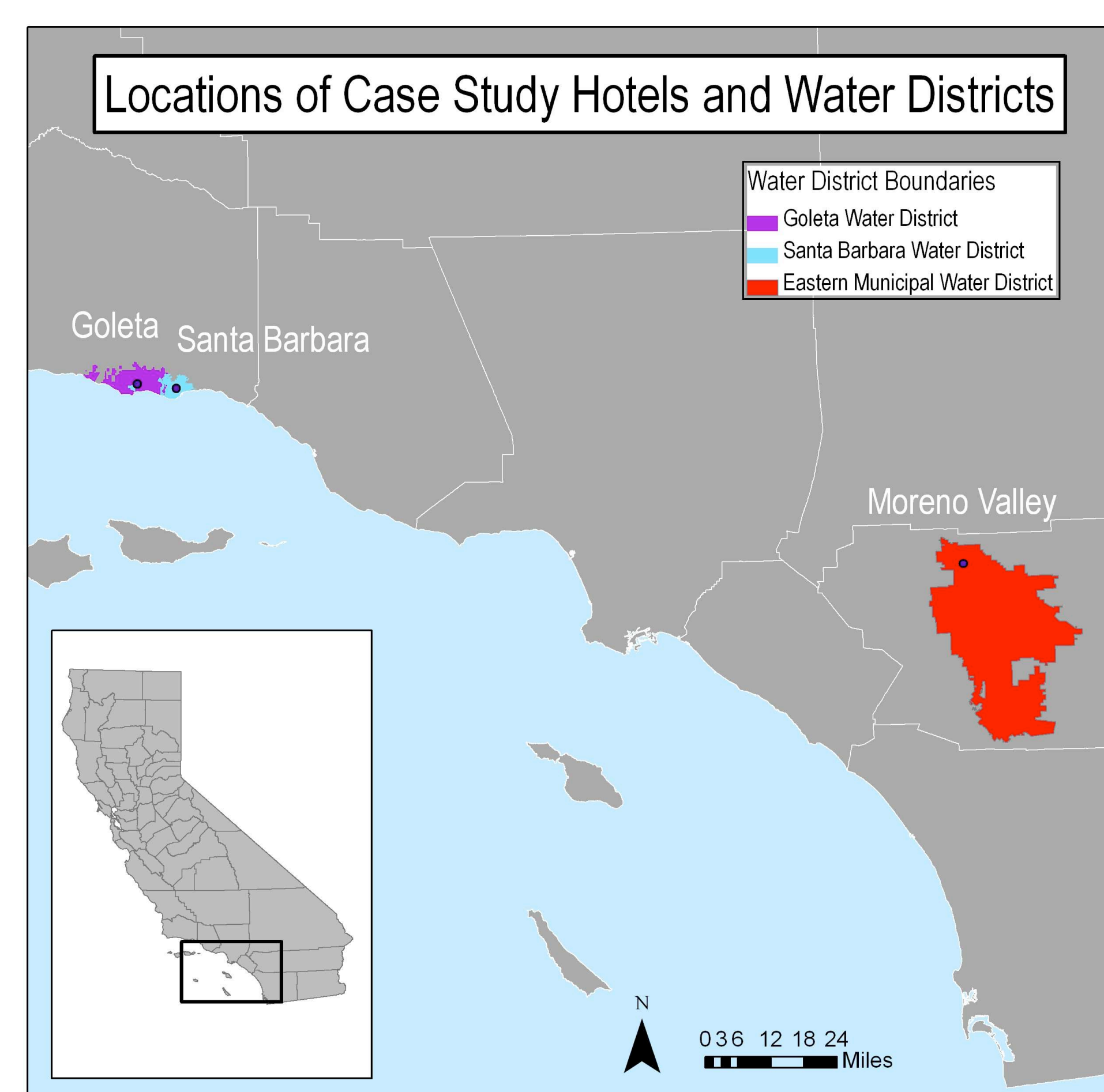


REGIONAL DIFFERENCES IN WATER SUPPLY SOURCES

Moreno Valley is in a region that predominately relies on energy intensive imported water from northern California and the Colorado River. Goleta and Santa Barbara are regions that mainly draw from local gravity fed surface water or groundwater.



Under the current regulatory structure, utilities are not able to receive credits for embedded energy saved through water conservation.

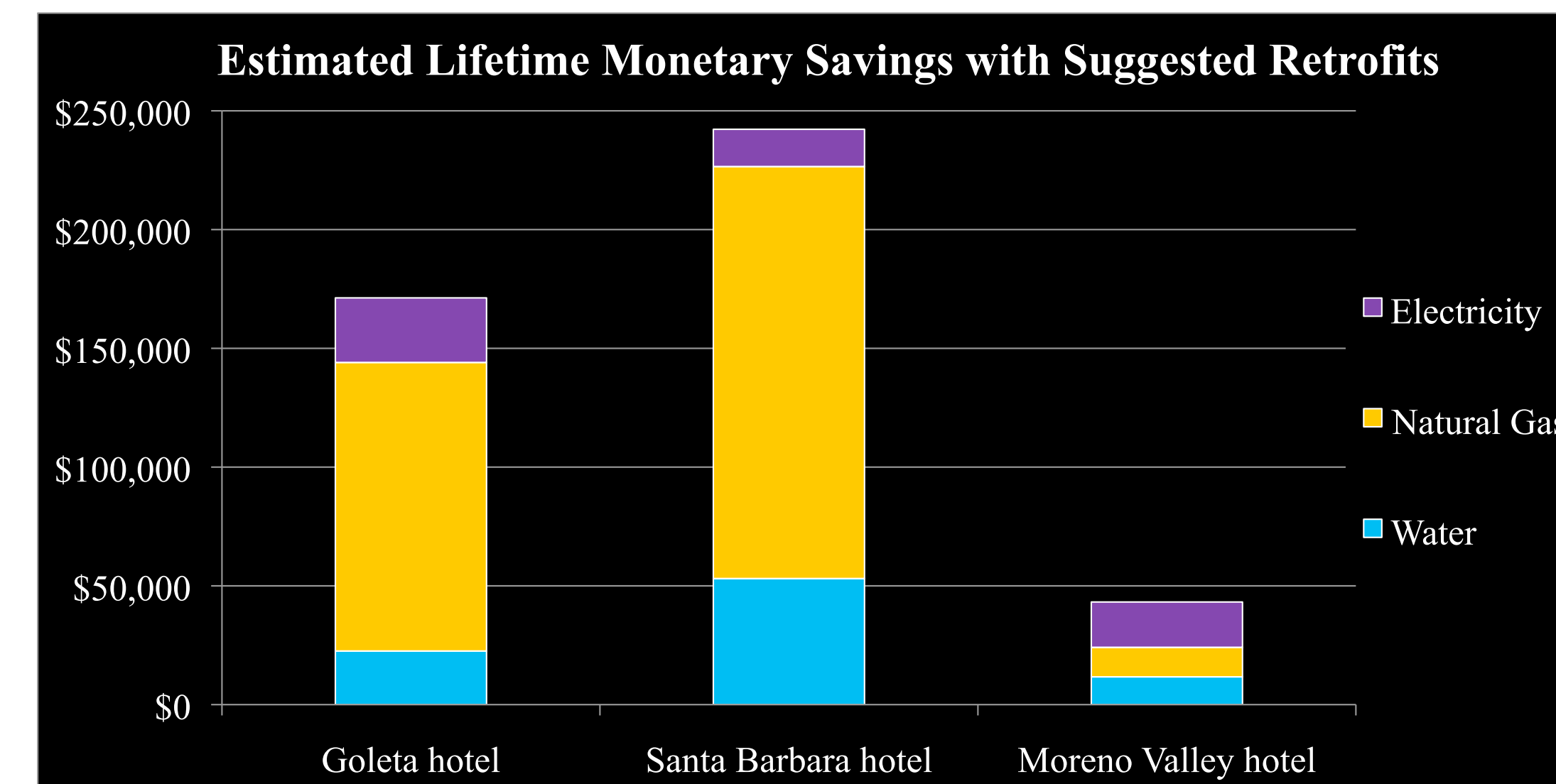


Data Source: National Atlas, 2009.

BUSINESSES SAVE MONEY

We recommended only the retrofits that are cost effective over the lifetime of the technology under current utility rates.

Type of Recommended Retrofits		
Goleta	Santa Barbara	Moreno Valley
Faucets	Faucets	Faucets
Pool	Pool	Pool
Irrigation	Irrigation	Irrigation
Showerheads	Showerheads	
	Toilets	
	Laundry	



The greatest potential savings were found at the Santa Barbara hotel since it is an older facility with less efficient existing technologies.

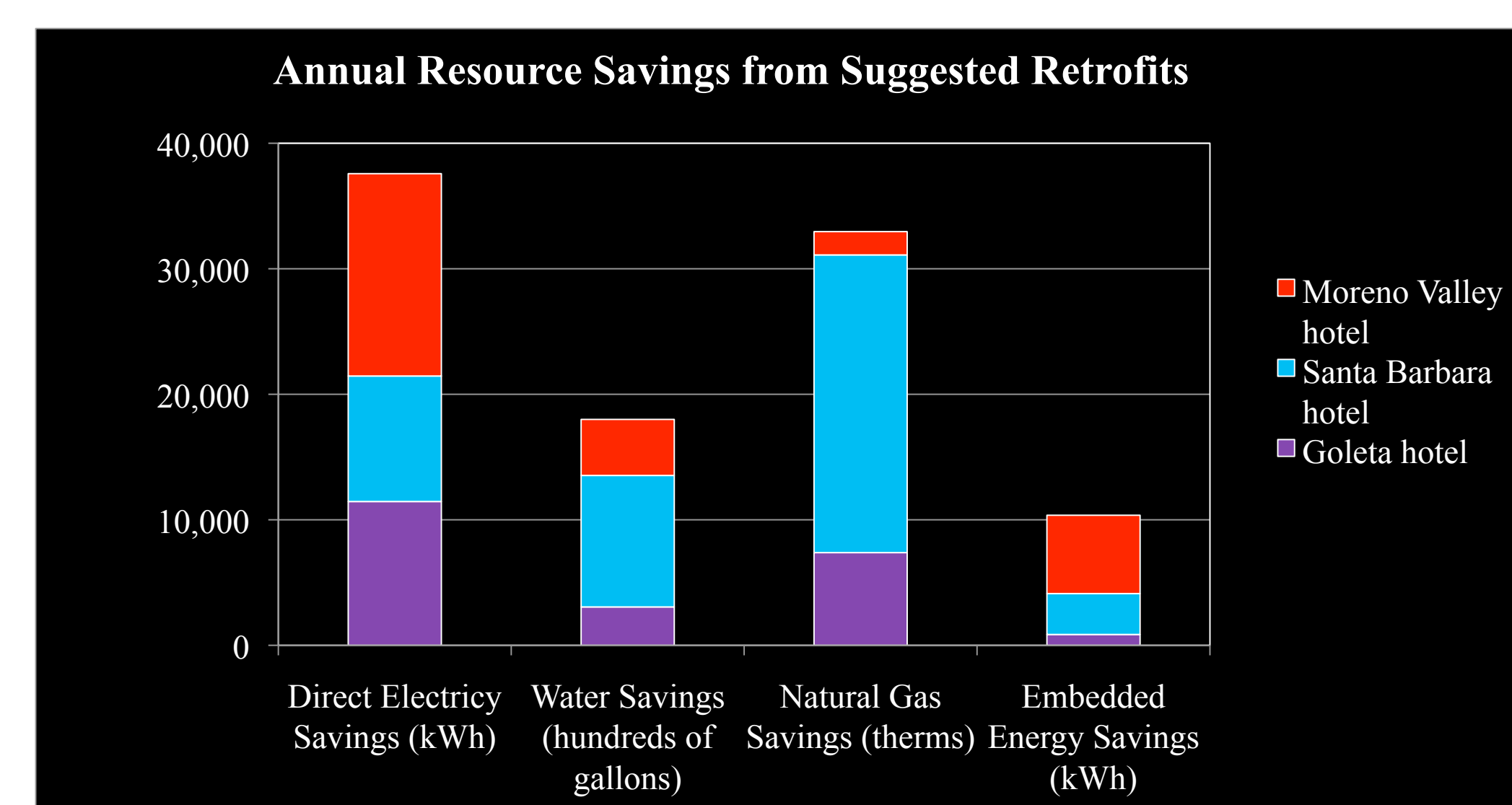
UTILITIES MORE EFFICIENTLY MEET CONSERVATION GOALS

GHG Emissions from Recommended Retrofits (annual metric tons CO2 equivalents)			
	Goleta	Santa Barbara	Moreno Valley
Before Retrofits	90	230	30
After Retrofits	45	100	10
GHG Savings	45	130	20

California has ambitious energy and water efficiency goals and greenhouse gas (GHG) reduction targets. Our recommended retrofits saved GHG emission from the reductions in natural gas, energy embedded in water, and direct electricity use.

CONSERVING RESOURCES FOR FUTURE GENERATIONS.

Coordinated efforts by businesses, utilities and the state to implement energy and water conservation strategies will lead to important reductions in resource consumption throughout California.



ACKNOWLEDGMENTS

We would like to extend sincere gratitude to the following people and organizations for their guidance and support during this project: Arturo Keller, Robert Wilkison, Misty Williams, Jack Sahl, Paul Thomas, Matt Garcia, the staff at each water district, and the staff at each case study hotel.

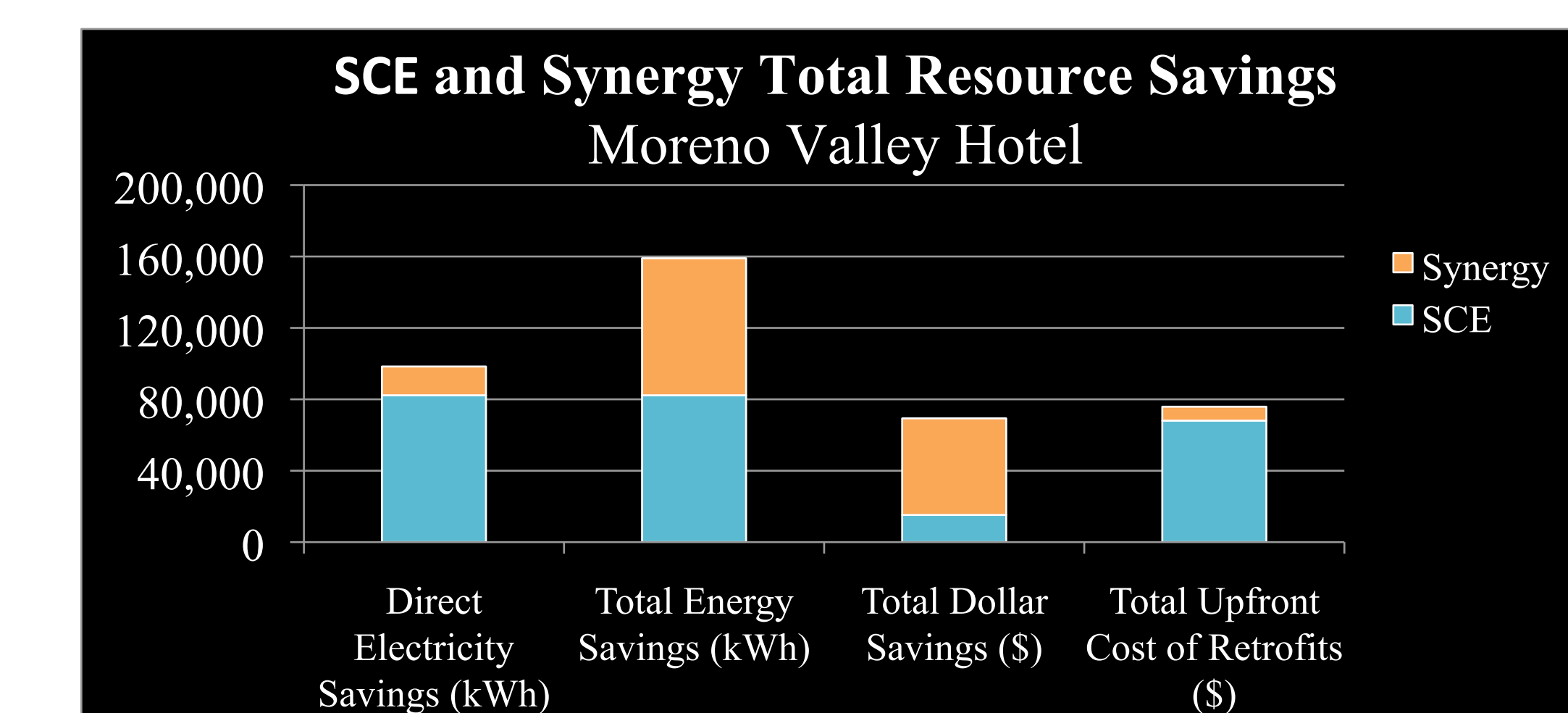
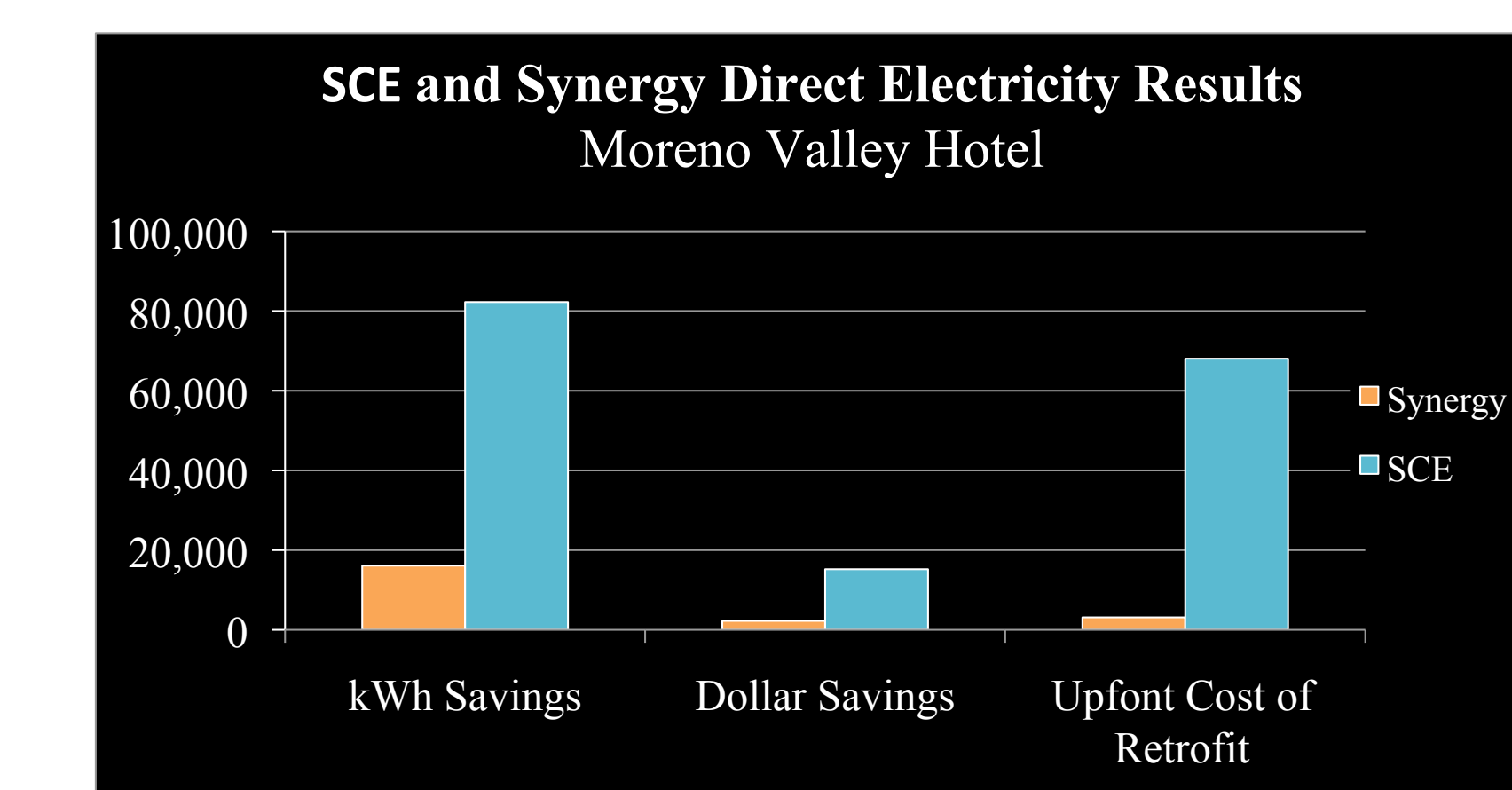
GROUP MEMBERS: SARAH NICHOLS, ISAAC PEARLMAN, GABRIEL SAMPSON, JASMINE SHOWERS, & RANDY TURNER; FACULTY ADVISOR: ARTURO KELLER

MANY OPPORTUNITIES TO INCREASE ENERGY AND WATER EFFICIENCY HAVE YET TO BE CAPTURED

Despite the inherent connection between the energy required at every part of the water cycle, and the water needed to produce energy, there is a lack of coordinated management between electricity, water and gas utilities.

OUR CLIENT, SOUTHERN CALIFORNIA EDISON (SCE)

We compared our resource savings to those found with SCE's existing electricity audit at each case study hotel.



The estimated savings from our retrofit recommendations suggest some electricity conservation measures that SCE can incorporate into their efficiency efforts to realize more energy and GHG savings.

PROJECT IMPLICATIONS

- Extrapolating our most conservative estimated resource savings for the 8,100 hotels in Southern California represents a 27% decrease in natural gas, 9% decrease in water, and 4% decrease in electricity consumption.^v
- Our results show that coordinated resource management should be considered as part of a successful conservation strategy to reach California's utility efficiency goals.
- Of the retrofits we considered, we found cost effective energy and water savings through installation of faucet aerators, low flow shower heads and toilets, efficient irrigation systems, ozone laundry systems, pool covers, and pool LED lights. Also, there are multiple no cost behavioral adjustments hotels can make to conserve resources.

SOURCES

- ⁱ California Department of Water Resources. (2009). California Water Plan Highlights.
- ⁱⁱ Krebs, M. (2007). Water-related energy use in California. Public Interest Energy Research Program.
- ⁱⁱⁱ California Energy Commission. (2009). California Energy Demand 2010-2020 Staff Draft Forecast.
- ^{iv} Rosenblum, J. (2009). Reducing Greenhouse Gas Impacts in California's Urban Water Cycle. Rosenblum Environmental Engineering.
- ^v Bureau of Reclamation. (2009). Water Energy Efficiency Program for Commercial, Industrial, and Institutional Customer Classes in Southern California.