New Orleans' Efficient Path to 2030: Leadership to Save Energy, Lower Bills, and Create Jobs

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Executive Summary

The homes, buildings, and other facilities in New Orleans hold great potential for improved efficiency, which together can reduce energy demand and can save consumers money by avoiding the need for new traditional energy investments. Energy efficiency investments are proven, cost-effective methods to reduce energy expenses at both the utility and customer scale while helping to improve the local economies. Energy efficiency is the cheapest, cleanest, and least-risk solution to meet rising energy demand—while also bringing economic development, addressing the volatility of fuel prices, and hedging against uncertainty in environmental regulations.

KEY FINDINGS

Several of the key findings of our analysis include:

- A comprehensive portfolio of energy efficiency policies, such as building energy codes and customer efficiency programs, has the potential to cost-effectively meet a cumulative 8% of the city's electricity needs in 2020, increasing to 20% in 2030; and a cumulative 4.5% of natural gas needs by 2020, increasing to 14.5% by 2030.
- Energy efficiency programs are typically the lowest cost option to meet New Orleans' future electricity demand compared to supply-side alternatives. Efficiency program portfolios cost about 2–4 cents per kWh saved, compared to the avoided cost of energy in New Orleans of about 4–8 cents per kWh through 2030. Efficiency also has avoided peak demand and avoided transmission and distribution (T&D) benefits. Thus, energy efficiency rate impacts can be lower than rate impacts from building new energy supply or transmission infrastructure.
- The set of recommended efficiency policies and programs in this report can reduce energy costs in New Orleans by $443 million over the life of the energy-savings measures, which is the total resource cost (TRC) test net cost reduction for all customers (including both program participants and nonparticipants).
- New Orleans businesses that take advantage of energy efficiency programs can lower their energy bills as a way to improve their bottom line and remain competitive in the global market place. Avoided local energy consumption also creates additional opportunities to export energy to other regions.
- Our macroeconomic assessment finds that by 2030, the portfolio of residential and commercial efficiency policies and programs would result in net annual benefits of $169 million in economic output, including $62 million in wages and $41 million in business income to small business owners, 1,500 person-years of employment, and increased state and local tax revenues of $6 million.
- There has been growing momentum toward energy efficiency in New Orleans, and the city remains a leader in Louisiana, but the existing policies in place are not capturing the full economic benefits available from the significant additional efficiency opportunities. Regulatory and policy changes will be needed to continue to reduce the major market barriers to energy efficiency. Our report offers several program and policy options.

BACKGROUND

New Orleans is already a leader on energy efficiency in the Gulf Coast region. While Louisiana as a whole has been weak in its implementation of energy efficiency opportunities—the state ranked 43rd out of 51 states in ACEEE's *2012 State Energy Efficiency Scorecard* (Foster et al. 2012)—New Orleans is a bright spot in the state. Strong stakeholder interest and the New Orleans City Council's direct regulation of Entergy New Orleans, Inc., has made the city a venue for introducing effective programs and providing an example to the rest of region. New Orleans has successfully introduced an integrated resource planning (IRP) process to its electric utility planning. The city is two years into running its successful Energy Smart customer efficiency programs, which are implemented by Entergy New Orleans through CLEAResult, a third-party administrator, and is planning to continue them in the next program cycle. Additionally, the city has promoted the adoption of comprehensive efficiency actions and the development of a skilled energy efficiency workforce through both the Energy Smart and the NOLA Wise programs. Finally, the city has begun to take actions in several areas to improve energy efficiency in its own operations.

The successes on energy efficiency in New Orleans still leave much opportunity for further improvement, such as those identified in this report. Significant opportunities include:

- The development of new efficiency programs for natural gas and water end uses.
- The adoption of specific energy savings targets and a strengthened utility business case to help meet them.
- Improvements to the designs of and additional funding for existing programs; new programs to serve new markets and a broader array of energy end uses.
- Expansion of comprehensive, performance based programs.
- Improved implementation of building energy codes and utility program support for code implementation.
- Expanded lead by example actions for energy savings in government operations.
- Support for energy efficiency financing programs to provide access to capital.
- The adoption of policies, such as benchmarking and disclosure requirements, to drive demand for efficiency services through improved building energy information.

METHODOLOGY

This report provides a detailed, quantitative analysis of cost-effective energy efficiency potential in New Orleans' residential and commercial buildings, focusing on end-use electricity and natural gas usage. The analysis covers the period 2011–2030, and we organized our research effort into five overall parts:

1. *Stakeholder Engagement*. Meet with and learn from energy stakeholders to understand the policy context, unique needs, and energy characteristics of the city.
2. *Reference Case*. Develop a baseline reference case scenario of citywide forecasted electricity and natural gas consumption data and prices by customer class.
3. *Cost-Effective Energy Efficiency Potential*. Estimate the cost-effective resources potential in each sector using a bottom-up assessment of individual measures within each customer class (completed at the state level).
4. *Program and Policy Potential*. Analyze a comprehensive set of programs and policies that New Orleans can adopt or expand to develop its energy efficiency potential.
5. *Macroeconomic Assessment*. Analyze the macroeconomic (jobs, gross state product, tax revenues) impacts from the program and policy scenario.

Overview of Results

The cost-effective energy savings potential in Louisiana and New Orleans is significant, around 27% for electricity and 19% for natural gas statewide by 2030, and even higher when considered for residential and commercial buildings exclusively. These numbers are an estimate of the overall energy efficiency resource available, but many market barriers and program infrastructure requirements exist that prevent all of the cost-effective resource potential savings identified from immediately being captured. Toward this end, our program and policy analysis is an estimate of the portion of the cost-effective resource potential that can be captured through energy efficiency policies and programs, given customer acceptance, i.e., program participation rates, and the time it takes to ramp up program infrastructure.

Policy and Program Potential

The policy and program analysis considers the portion of the cost-effective potential that could be achieved through the adoption of several city policy options (Table ES-1) and widespread adoption of tailored customer energy efficiency programs (Table ES-2).

Table ES-1. City Energy Efficiency Policy and Program Options for New Orleans

City Policies, Programs, and Initiatives	Summary of Analysis Recommendation
Integrate Energy Efficiency into Resource Planning	Fully incorporate energy efficiency into electric and natural gas integrated resource planning processes as an equally considered resource option, and select efficiency resources when they are the least-cost or lowest-risk options.
Energy Savings Targets for Utilities and Customer Efficiency Programs	Set incremental annual electricity savings targets ramping up to 1%/year by 2016 and natural gas savings targets of 0.75%/year by 2020, and expand implementation of cost-effective customer programs to achieve targets (see program options in Table ES-2 that our analysis finds can together reach these target levels).
Utility Performance Incentives and Cost Recovery	Address the utility business model to align utility financial motivations with energy efficiency.
Enforce Building Energy Codes for Residential and Commercial Buildings	Improve compliance with building energy codes. Implement utility code support programs that count as credit toward energy efficiency savings targets.
Lead by Example in Government Facilities and Operations	Benchmark energy usage in public buildings and other infrastructure, streamline ESCO options and rules, set energy savings targets, improve energy management in municipal water systems, and implement street lighting improvements.
Low-Income Weatherization	Coordinate utility program offerings with state weatherization programs.
Customer Financing Options	Provide financing options for customers such as streamlined loan programs combined with on-bill repayment.
Benchmarking and Disclosure of Building Energy Use	Take steps toward benchmarking and disclosure of all commercial and residential building energy usage.
Combined Heat & Power (CHP) and District Energy	Use regulatory mechanisms to encourage development of new CHP systems; implement customer incentives to encourage connections to high-efficiency district energy systems.

Table ES-2. Energy Efficiency Program Options by Customer Segment

Residential	Commercial
New Construction and Building Energy Code Support	New Construction and Code Support
Multifamily Buildings	Retrocommissioning and Monitoring-Based Commissioning
Home Energy Retrofits	Small Business Direct-Install
Upstream Retail Appliances and Electronics	Custom Incentives for Retrofits
Lighting	Prescriptive Equipment Rebates
Air Conditioning	Computer and Plug-Load Efficiency
Water Heating	
Low-Income Weatherization (in coordination with state and nonprofit programs)	
Information Feedback	

Our analysis finds that this combined set of energy efficiency policies and programs for the residential and commercial buildings sectors in New Orleans alone could reach a cumulative electricity savings of 7.7% in 2020, increasing to 19.9% in 2030, and a cumulative natural gas savings of 4.5% in 2020, increasing to 14.5% in 2030 (Table ES-3 and Figures ES-1 and ES-2). In addition, the electricity efficiency gains will also reduce peak demand. Because New Orleans already has significant experience with energy efficiency programs, ramping up to these saving levels is achievable within this time period. However, our review of best-practice program deployment elsewhere in the country demonstrates that significant additional investment will be needed to develop programmatic infrastructure and expand customer education and marketing efforts.

Table ES-3. Program and Policy Energy Savings Type and Customer Class in 2020 and 2030

	2020		2030	
Electricity End-Use Efficiency Savings	GWh	Percent of Reference Case*	GWh	Percent of Reference Case*
Residential	176	9.1%	467	23.0%
Commercial	270	8.4%	740	22.0%
Electricity Total	446	7.7%	1,207	19.9%
Natural Gas End-Use Efficiency Savings	MMCF	Percent of Reference Case*	MMCF	Percent of Reference Case*
Residential	277	6.6%	856	19.8%
Commercial	206	4.1%	733	14.0%
Natural Gas Total	483	4.5%	1,589	14.5%

*Savings are shown as a percentage of sales by each customer class in the reference case scenario. Total savings are shown as a percentage of all sales, including sales to industrial customers.

Figure ES-1. Electric Energy Efficiency Program and Policy Potential by 2030

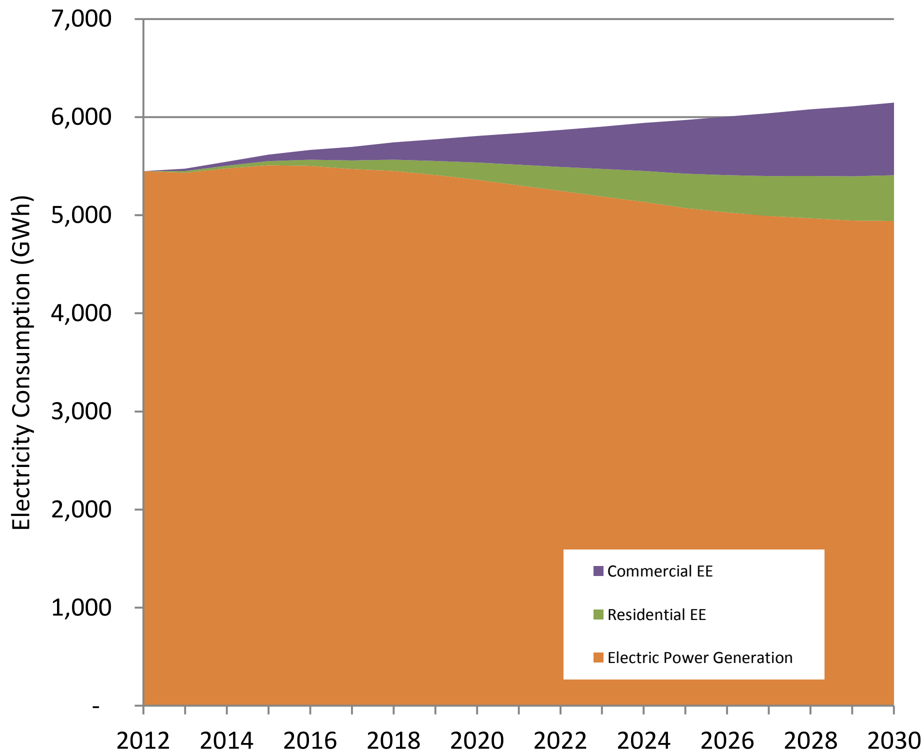
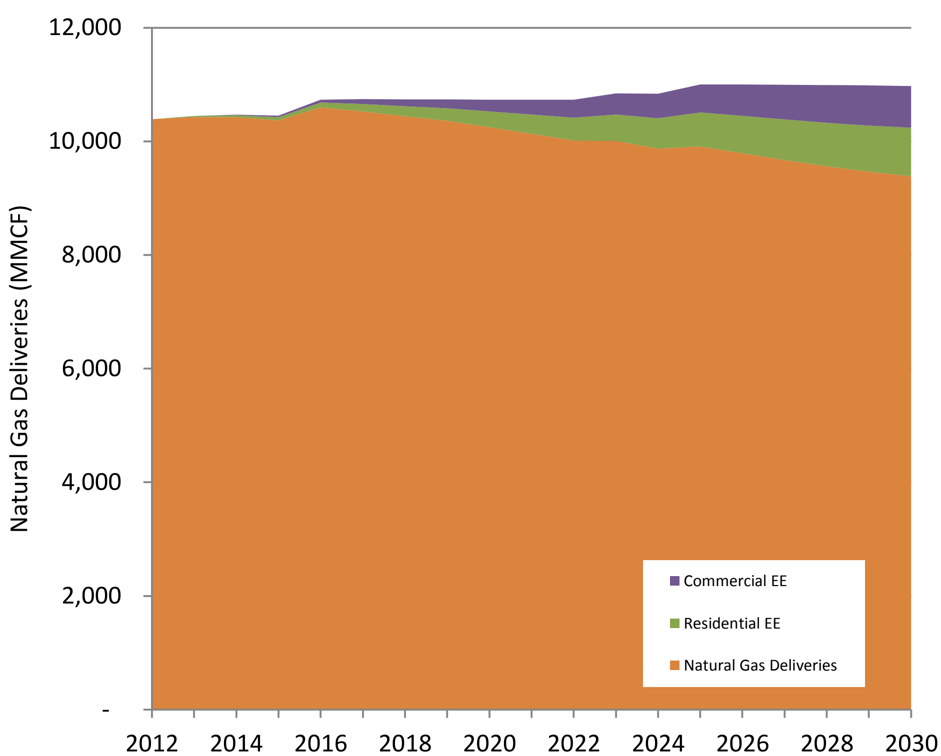


Figure ES-2. Natural Gas Energy Efficiency Program and Policy Potential by 2030



Costs and Benefits

Efficiency measures continue saving energy over the lifetime of the upgrades, which can add up to significant savings over the long term and can delay or avoid the need to build new power generation facilities. Investments in new power plants or power purchase contracts can be costly and risky long-term investments, which means that the benefits of efficiency to the utility system, and ultimately to all New Orleans ratepayers, can be significant. A recent analysis finds that energy efficiency is the least-risk resource compared to other energy resource options (see Binz et al. 2012).

Our analysis finds the set of recommended policies and programs in this report can reduce New Orleans' energy costs by $443 million over the life of the energy-saving measures. These investments have an estimated benefit-cost ratio of 2.0 under the total resource cost (TRC) test. Another way of stating this economic benefit is that for every $1 invested in energy efficiency, the economy benefits from $2 in avoided energy costs. Cost-effectiveness is even better under the other benefit-cost tests we consider. These impacts would benefit all ratepayers, because utilities could delay or avoid costlier investments in energy supply and transmission and distribution.

Efficiency programs cost about 2–4 cents per kWh saved,[1] which is lower than the avoided cost of energy in Louisiana of about 4–8 cents per kWh through 2030. Efficiency also contributes avoided peak demand and avoided transmission and distribution (T&D) benefits. Thus, energy efficiency rate impacts are far lower than rate impacts from building new energy supply or transmission infrastructure. An energy efficiency program portfolio could cost a residential customer about $0.47 per monthly bill and a commercial customer about $5.41 per month.[2] Rate increases from fuel price volatility or new supply or transmission facilities can be far higher. Stakeholders should be careful not to let the short-term rate impacts of energy efficiency measures detract from the medium- and long-term benefits of energy efficiency that accrue from delaying or avoiding supply investments.

Macroeconomic Analysis

The final component of our study is a macroeconomic assessment of the impacts of the set of programs and policies, which was conducted by Evergreen Economics. This analysis finds that the portfolio of efficiency programs and policies would result in net annual benefits of $169 million in economic output, including $62 million in wages and $41 million in business income to small business owners, 1,500 person-years of employment, and increased state and local tax revenues of $6 million by the year 2030.

Conclusion

Our analysis finds that energy efficiency can play a critical role in New Orleans' energy future as a least-cost resource that benefits all customers and as an economic development

[1] While some programs and measures are more cost-effective than others, efficiency program portfolios on average across the U.S. cost in this range, based on a forthcoming ACEEE review of efficiency program costs in about twenty states, which is an update of a previous study (Friedrich et al. 2009).

[2] This assumes an efficiency program portfolio budget equivalent to 0.5% of revenues, an average residential customer who uses 1,000 kWh per month, and an average commercial customer that uses 12,500 kWh per month.

tool. Our review of the policies in place in New Orleans finds that it has made significant strides to improve efficiency through policies and programs, but that there is much work to be done to realize the full benefits that efficiency investments can offer the city. The suite of program and policy options presented in this report can together help the city expand its efforts to improve energy efficiency and foster economic growth.

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Introduction

New Orleans is one of the cultural treasures of the United States and a major economic hub of Louisiana and the Gulf Coast. These rich and varied activities—from world-class universities, championship sports teams, and multinational corporations to Mardi Gras, one-of-a-kind restaurants, hotels, conventions, and musical traditions that attract visitors from around the world—are made possible by energy in one form or another. But the less energy wasted by businesses and households in New Orleans, the more money is available to invest in growing a business or supporting a family. Whether a small shop in the Marigny or a large hotel in the Central Business District, whether living in a historic home in the Garden District, a recently rebuilt house in New Orleans East, or a rented apartment in Algiers, savings on utility bills mean new freedoms in monthly budgets and new choices available to businesses and households.

The homes, commercial buildings, and other facilities in New Orleans hold great potential for improved efficiency, which together can reduce energy demand and can save consumers money by avoiding the need for new traditional energy investments. Energy efficiency investments are proven, cost-effective methods to reduce energy expenses at both the utility and customer scale while helping to improve the local economies. The energy sector itself, primarily oil and gas and related business activities, are a major component of the New Orleans economy. This has an additional implication for the role of energy efficiency in the economy: the less energy used in New Orleans, the more that is available to export out of state, helping to further improve the local economy. Additionally, energy efficiency, especially in the form of distributed combined heat and power systems, can be a tool to help improve the resilience of energy service delivery, an important benefit for a community like New Orleans, which has seen its share of natural disasters. All of these factors add up to mean that energy efficiency is usually the cheapest, cleanest, and least-risk solution to meeting rising energy demand. Efficiency also brings economic development, addresses the volatility of fuel prices, and acts as a hedge against uncertainty in environmental regulations.

New Orleans is already a leader on energy efficiency in the Gulf Coast region. While Louisiana as a whole has been weak in its implementation of energy efficiency opportunities—the state ranked 43rd out of 51 states in ACEEE's *2012 State Energy Efficiency Scorecard* (Foster et al. 2012)—New Orleans is a bright spot in the state. Strong stakeholder interest and the New Orleans City Council's direct regulation of Entergy New Orleans, Inc., has made the city a center for introducing effective programs and providing a successful example to the rest of region. New Orleans has successfully introduced an integrated resource planning (IRP) process to its electric utility planning. The city is two years into running its successful Energy Smart customer efficiency programs, which are implemented by Entergy New Orleans, through CLEAResult, a third-party administrator, and is planning to continue them in the next program cycle. Additionally, the city has promoted the adoption of comprehensive efficiency actions and the development of a skilled energy efficiency workforce through the Energy Smart and NOLA Wise programs.

The successes on energy efficiency in New Orleans still leave many opportunities for further improvement, such as those identified in this report. Continued progress will require continued leadership, willingness to build on successes, stakeholder support, and effective implementation. But these efforts will have a significant payoff. Continuing the positive momentum New Orleans has developed on energy efficiency will not only provide additional benefits to the bottom line for both families and businesses, but also a stronger and more resilient the economy for the city as a whole.

Methodology

This report provides a detailed, quantitative assessment of a comprehensive set of cost-effective energy efficiency options for New Orleans buildings. It also includes analysis of program costs and benefits and a macroeconomic assessment of the impact of these potential investments on the city's employment and economic situation. In this section we describe our overall project approach and methodology.

Over the past several years, ACEEE has worked increasingly at the state and city level as a growing number of state legislatures, governors, city councils, mayors, and other public entities are showing interest and leadership in energy efficiency. As states and localities engage in improving energy efficiency, they identify a need for analysis and technical assistance. ACEEE's State Clean Energy Resource Project (SCERP) has created series of state assessments of efficiency resources and other clean-energy strategies, and the project aims to serve as a center of information and expertise to support relevant policy strategies at the state and, in some states, local, level. This assessment of New Orleans is an extension of that work through providing analysis to assist decision makers and stakeholders in the city. It has been prepared simultaneously with a companion report for the state of Louisiana (Molina 2013).

STAKEHOLDER ENGAGEMENT

Part of our project methodology is to engage with stakeholders in New Orleans and Louisiana more broadly to understand the policy context and unique needs and energy characteristics of the city. We talked to a broad range of stakeholders over several months. Engaging the many New Orleans stakeholders groups was a significant undertaking, and we tried to meet in person or via telephone with as many different stakeholders as possible; we later shared a draft of this report widely in order to get their feedback.

ANALYSIS APPROACH

The following describes each of the steps in our analysis:

1. **Reference Case Forecast**

The first step in conducting the analysis was to collect data to characterize the city's current and expected patterns of electricity and natural gas consumption over the study time period (2011–2030), as well as population and buildings data. We consulted several data sources to develop reference case projections for electricity and natural gas consumption, avoided energy costs, and retail electricity and natural gas prices.

2. **Cost-Effective Energy Efficiency Resource Assessment**

The next task in estimating energy efficiency potential is to assess the cost-effective resources that are available, given the mix of residential, commercial, and industrial energy consumers. This component is comparable to the "economic potential," as it is termed in many energy efficiency potential studies. We examine dozens of energy efficiency measures by customer class and by end-use for electricity and natural gas potential savings. This analysis was undertaken at the state level and was used to inform both the state and city reports.

3. **Energy Efficiency Policy and Program Analysis**

While cost-effective resource assessments provide an important basis for understanding the general magnitude and types of energy efficiency potential in a given location, their limitation is that they provide theoretical estimates but do not provide solutions for capturing the efficiency resource through specific policies and programs. Toward this end, our study analyzes a specific suite of energy efficiency policies and programs that could be adopted and ramped up over time. This suite of policies, including measures like building codes and utility programs, would enable homeowners and businesses in the city to take advantage of the energy efficiency resource. This component is comparable to the "achievable potential" discussed in many energy efficiency potential studies. This analysis for New Orleans was developed based on apportioning savings from the statewide analysis, which included a differentiated schedule for ramp up of programs. This study also differs from the statewide analysis in that it does not include an analysis of savings potential from industrial programs or combined heat and power.

4. **Macroeconomic and Emissions Impacts**

Using the energy efficiency policy analysis results on energy savings, program costs, and investments, we worked with Evergreen Economics to estimate the policy impacts on jobs, wages, and economic output in New Orleans. Evergreen Economics uses an input-output model that evaluates macroeconomic impacts of energy efficiency investments. Finally, we assess the impacts of energy efficiency policies to reduce air emissions, including carbon dioxide, sulfur dioxide, and nitrogen oxides.

CAVEATS

Readers should note the inherent uncertainty, or ranges of possible futures, in any forecasts of energy consumption. Our analysis relies on several long-term (through 2030) projections developed by other entities, including Moody's Analytics for housing and population forecasts; utility integrated resource plans (IRPs) for electricity demand and avoided costs forecasts; and the U.S. Energy Information Administration (EIA) for natural gas demand forecasts. Likewise, there is uncertainty in energy efficiency potential forecasts, such as uncertainty in technological changes and customer participation rates. Uncertainty in the projections should not mean that the analyses are flawed—rather, it is an inherent characteristic of resource planning. The goal of these analyses is not to predict the future, but rather to present comprehensive and transparent information to policy makers.

Background and Policy Context

A broad and diverse set of public and private stakeholders are impacted by energy efficiency in New Orleans, and many are actively involved in policy and business aspects of delivering efficiency services. While efficiency is only one of many issues of interest to these players, it can be a useful tool to accomplish their multiple and varied economic, energy, social welfare, and environmental goals. These stakeholders include (but are not limited to):

- The New Orleans City Council, which in addition to being the legislative body, also acts as the regulator of Entergy New Orleans, Inc., and the portion of Entergy Louisiana, Inc., that serves New Orleans (in Algiers) through its Utility Committee.
- The City of New Orleans Mayor's Office and the city departments under its purview implement many programs and policies that directly influence energy efficiency, including energy code implementation, administration of some programs for the community such as NOLA Wise, and improvement of energy efficiency in government operations.
- Entergy New Orleans, Inc., is the investor-owned electric and natural gas utility that serves that vast majority of the city and that is also charged with administering the Energy Smart efficiency programs.
- Sewerage and Water Board of New Orleans (SWBNO) is the municipally owned water and sewer utility serving the city, a major energy consumer, and a potential partner in delivering water and energy efficiency services in the city.
- State policy bodies and agencies are also important stakeholders, since many policy authorities and resources rest at the state level. Most notably, the state legislature, the State Fire Marshal, and the Louisiana State Uniform Construction Code Council are responsible for building energy code adoption. The Louisiana Department of Natural Resources hosts the state's energy office.
- Private-sector businesses, especially energy-intensive businesses, are interested in keeping their energy costs low, and the services provided by efficiency programs can be attractive to them. Based on New Orleans's economy, owners of large commercial and multifamily residential buildings, hotels, restaurants, and institutions such as universities and hospitals are particularly important stakeholders. New Orleans is also home to a growing number of businesses directly related to efficiency, including suppliers and contractors specially trained in building performance.
- Nonprofit organizations with varied missions are very active on energy issues in New Orleans, including those focused on consumer advocacy, community development, green economic development, community service provision, and housing. Some nonprofits also act as efficiency program implementers, such as those involved with NOLA Wise and low-income weatherization programs.

ENERGY EFFICIENCY IN NEW ORLEANS

New Orleans is unique in Louisiana and in the country in that the city government regulates an inventor-owned utility. Entergy New Orleans, Inc., and the portion of Entergy Louisiana, Inc., that serves New Orleans are regulated by the New Orleans City Council, while all other all electricity and natural gas investor-owned utilities (IOUs) in the state are regulated by the Louisiana Public Service Commission. The City Council has taken important leadership steps toward greater energy efficiency for residents and businesses in New Orleans. The council has established an integrated resources planning process (IRP) to systematically consider the costs and benefits of different energy resource choices, including energy efficiency, and it has launched a three-year Energy Smart customer energy efficiency program (with a planned $11 million investment from 2011 to 2014). The council is now considering a revised and updated IRP that will move efficiency programs out of the three-year quick-start stage and formally integrate them into the city's overall long-term energy resource portfolio.

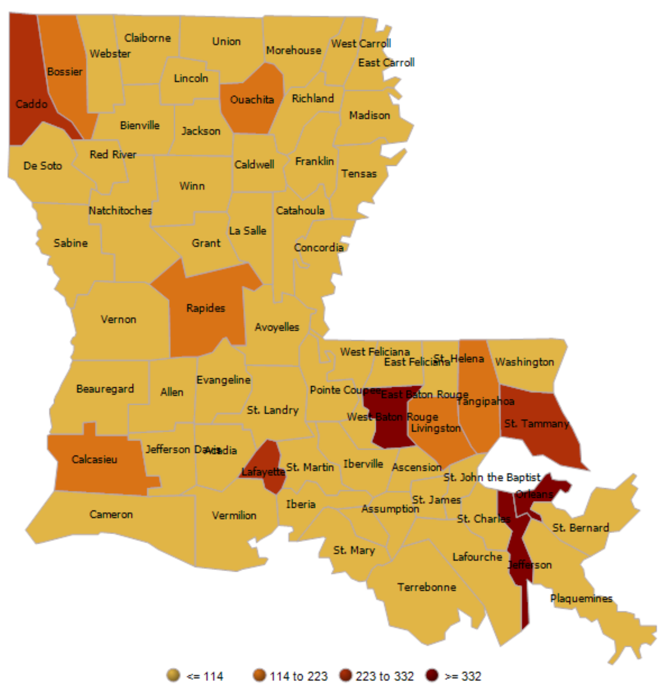
Beyond the City Council, the Mayor's Office and executive branch have highlighted the importance of energy efficiency to the community as whole through the inclusion of efficiency among the Sustainable Communities priorities of Mayor Landrieu's Strategic Framework (New Orleans 2012a). City departments have taken action on efficiency through investments in improving the energy performance of public infrastructure such as schools and streetlights. They have also supported expanding the home performance services available in the city through the establishment of NOLA Wise.

Members of the private for-profit and nonprofit sectors have likewise taken a leadership role in integrating energy-efficient practices into their building construction and rehabilitation work and through improving public awareness of energy efficiency, especially in rebuilding efforts in the aftermath of Hurricane Katrina.

DEMOGRAPHICS AND ENERGY CONSUMPTION

Figure 1 shows the current population of Louisiana by parish, which demonstrates that the population is concentrated primarily in the southeast portion of the state around New Orleans and Baton Rouge. The total population of Louisiana in 2012 is about 4.6 million, and by 2030 that figure is projected to reach about 5 million (Moody's Analytics 2012).

Figure 1. Louisiana Population by Parish in 2011 (Thousands)



Source: Moody's Analytics and American Community Survey

While Orleans Parish and the City of New Orleans are a small part of Louisiana geographically, its population was over 362,000 in 2012, or around 7.9% of the state's population. The city is projected to grow more quickly than the state as a whole over the next two decades to 394,000 by 2030, becoming 8.4% of the state's population (Moody's Analytics 2012).

Compared to the state as a whole, New Orleans has a different mix of energy-consuming sectors, fuels used, and energy prices. As a percentage of overall energy use, commercial sector consumption is much higher (55% of electricity as of 2011) and industrial consumption much lower (11% of electricity) in New Orleans than the state. This is a result of New Orleans' economic base in services and tourism, with little presence of large-scale industry within the city itself. New Orleans also has much larger number of natural gas customers per resident than the state average. The city also has lower natural gas prices than the state, particularly for residential customers.

As in many other areas of daily life, energy use in New Orleans was impacted significantly by the widespread flooding resulting from Hurricane Katrina in 2005. Most obviously, the hurricane resulted in significant population decline and a related community-wide decline in energy use, both of which have now partially rebounded. Perhaps most significant for this study, the hurricane also altered energy usage characteristics at the building level. A 2008 study found that the average New Orleans household was using around 9% less energy after the hurricane compared to before (GCR 2008). Energy savings were even higher in heavily flooded areas. These savings were primarily the result of purchases of new, more efficient appliances and improved building practices and codes, primarily in rebuilt or renovated homes. Additionally, residents were found to have heightened awareness of energy efficiency. Such a significant recent experience with rebuilding has already demonstrated to residents the value of efficiency and may help to improve the implementation of additional future energy savings.

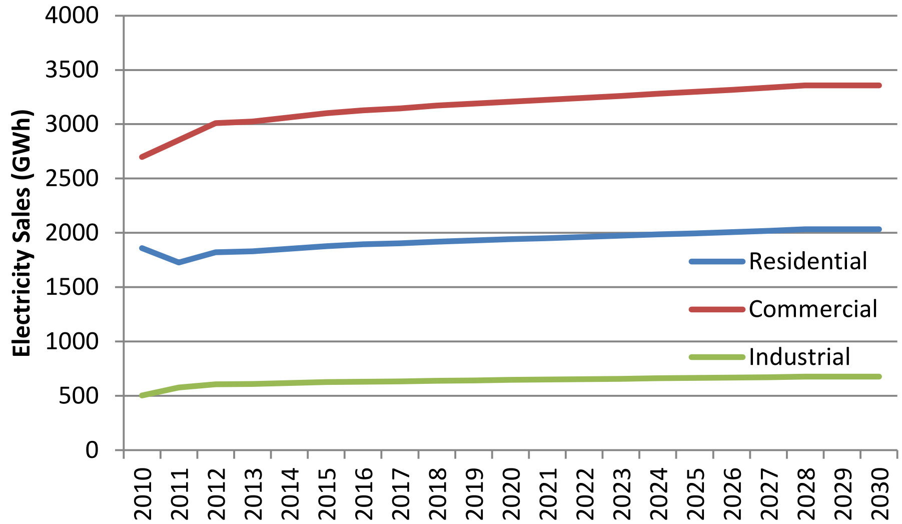
Entergy New Orleans Reference Case

Entergy New Orleans (ENO) serves customers in all of Orleans Parish for natural gas and the East Bank of Orleans Parish only for electricity. Electricity is provided to the West Bank (Algiers) by Entergy Louisiana. Despite this split in service areas, as of October 2012, the Energy Smart programs implemented by Entergy New Orleans are available to all customers in New Orleans, including Algiers (New Orleans 2012b). ENO is unique among investor-owned utilities in the state in that it is regulated by the New Orleans City Council Utility Committee, rather than the Louisiana Public Service Commission.

ELECTRICITY

To develop the New Orleans reference case we used electricity sales data from Entergy New Orleans by customer class that was collected from the EIA's *Electric Power Annual* 2010 report. We then applied the forecasted annualized growth rate for Entergy New Orleans from the 2012 Entergy IRP to each consumer sector, extended out to 2030. Actual electricity consumption in the Entergy New Orleans service territory in 2010 was 5,072 GWh, about 6% of the total state consumption. In the reference case, consumption is projected to grow to 5,807 GWh in 2020 and 6,147 GWh by 2030, an average annual increase of 1.0% between 2010 and 2030. The following graph (Figure 2) shows our projection for electricity demand in New Orleans for the time period of the study.

Figure 2. Entergy New Orleans Electricity Sales Forecast by Sector

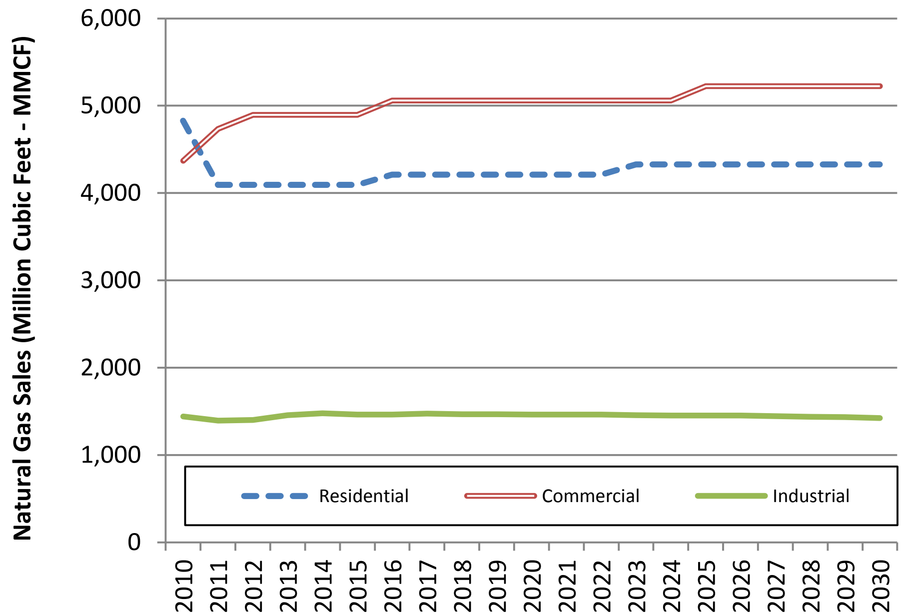


Our assumptions for electricity peak demand growth are based on Entergy New Orleans' 2012 IRP. Peak demand is estimated to grow at an average annual rate of 0.65%, from 940 MW in 2011 to 1,022 MW in 2020 and 1,066 in 2030.

NATURAL GAS

Our forecast of natural gas consumption in New Orleans uses a method similar to that used on the state level. First we took historic data on Entergy New Orleans gas sales volume by customer class from the EIA Form 176 for the years 2010 and 2011. Next we applied the AEO 2012 growth rates for the West South Central region to each sector to create a forecast out to 2030. Total customer sales in 2011 were 10.2 billion cubic feet, or only about 1.1% of total Louisiana consumption; however, ENO serves 10.4% of residential and 18.6% of commercial consumption in the state. Commercial and residential customers made up the majority of ENO sales in that year at 46% and 40%, respectively, with industry accounting for around 14%. After a decrease in residential and industrial consumption in 2011, consumption is forecasted to grow modestly in each sector to 2030. We project an annual growth rate of 0.3% for residential, 0.5% for commercial, and 0.1% for industrial consumption between 2011 and 2030. Figure 3 below shows the complete results.

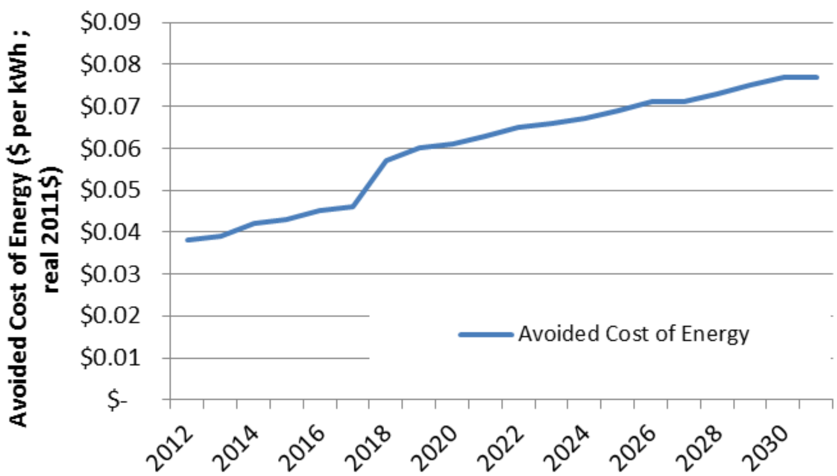
Figure 3. Entergy New Orleans Natural Gas Sales Volume Forecast by Sector



RETAIL PRICES AND AVOIDED COSTS FORECAST

Energy efficiency improvements have the effect of reducing energy consumption, which in turn can avoid the need for new investments in energy supply or transmission. The benefits to the utility system from energy efficiency are therefore quantified in terms of "avoided costs." Avoided costs typically include avoided purchases or investments in energy, generation capacity, and transmission and distribution infrastructure. For this analysis, the avoided costs estimates for electricity are based on the Entergy New Orleans IRP (Entergy 2012a). Avoided costs of energy are shown in Figure 4. We use these values, along with the avoided cost of capacity values, to evaluate the benefits of energy efficiency resources. The avoided cost of capacity ranged from about $160/kW to $170/kW.

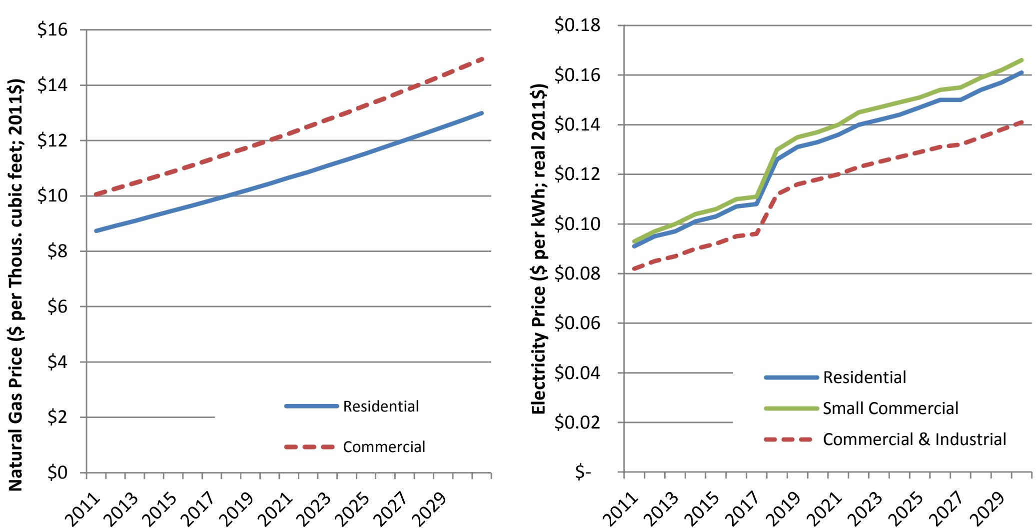
Figure 4. Avoided Cost of Energy Projections Through 2030 (2011$)



Source: Entergy 2012a

Figure 5 shows projections for retail electricity and natural prices for 2011–2030, which are based on the Entergy New Orleans IRP (Entergy 2012a). Electric rates for commercial and industrial customers in New Orleans are the same, although small commercial customers do have a different rate. There is no published industrial rate for natural gas service.

Figure 5. Entergy New Orleans Retail Price Forecast by Sector for Natural Gas (left) and Electricity (right)



Energy Efficiency Resource Potential

Significant energy efficiency opportunities have been identified in New Orleans through studies including our companion Louisiana state analysis (Molina 2013), the high level results of which are shown in Table 1, and the ICF International potential study for Entergy New Orleans (ICF 2012). Whereas the ICF potential assessment includes electricity-saving measures alone, Molina 2013 also considers the potential for cost-effective natural gas savings. Another difference is that Molina 2013 examines statewide potential, whereas the ICF analysis examines only the New Orleans service area.

Table 1. Summary of the Louisiana Economic Energy Efficiency Resource Potential Results for 2030

Customer Class	Electricity		Natural Gas	
	GWh	Percentage of Reference Case*	MMCF	Percentage of Reference Case*
Residential**	8,253	29%	8,168	34%
Commercial	9,362	33%	9,879	35%
Industrial	6,892	20%	19,855	16%
Total	24,507	27%	37,902	19%

Source: Molina 2013. *Percentages for each customer class are expressed as a portion of the reference case for that customer class in 2030. **Residential analysis includes single-family homes only due to the scope of the building modeling software we used; multifamily homes also have significant potential as modeled in our policy analysis.

These other reports have both developed assessments of the *economic* energy potential available—the energy efficiency resources available from full implementation of specific, cost-effective end-use measures in buildings and industrial facilities. We therefore focus in the remainder of this report on determining the amount of this cost-effective efficiency that is realistically *achievable* through policies and programs. Toward this end, our study analyzes a specific suite of energy efficiency policies and programs that could be adopted and ramped up over time. This suite of policies, including measures like building codes and utility programs, would enable homeowners and businesses in the city to take advantage of the energy efficiency resource. This component is comparable to the "achievable potential" discussed in many energy efficiency potential studies.

Energy Efficiency Policy and Program Analysis

This section provides a quantitative analysis and roadmap of specific policy and program options to improve energy efficiency in New Orleans and achieve the identified savings opportunities. We categorize these broadly as: 1) city policies and programs; and 2) tailored utility program offerings, while recognizing that coordination between these two types (e.g., through program and planning coordination, shared workforce training, etc.) is essential to maximize the impacts of both. The city policies we discuss are listed in Table 2, whereas the program offerings we analyze later in the report are included in Table 3.

The first category of city policy and program mechanisms, as shown in Table 2, describes efforts that could be established either through action by the City Council, the Mayor's Office, or city departments. We quantify the energy savings benefits for some of these policy options in the analysis that follows. However, many of the initiatives enable policies that break down market barriers to greater efficiency, yet it is not easy to quantify their potential energy savings or the costs to implement them. For example, establishing regulatory guidelines that better align utility financial motivations with energy efficiency helps to reduce market barriers, but these benefits cannot be quantified.

Table 2. City Energy Efficiency Policy and Program Options for New Orleans

City Policies, Programs, and Initiatives	Summary of Analysis Recommendation
Integrate Energy Efficiency into Resource Planning	Fully incorporate energy efficiency into electric and natural gas integrated resource planning processes as an equally considered resource option, and select efficiency resources when they are the least-cost or lowest-risk options.
Energy Savings Targets for Utilities and Customer Efficiency Programs	Set incremental annual electricity savings targets ramping up to 1%/year by 2016 and natural gas savings targets of 0.75%/year by 2020, and expand implementation of cost-effective customer programs to achieve targets (see program options in Table 3 that together can reach these target levels).
Utility Performance Incentives and Cost Recovery	Address the utility business model to align utility financial motivations with energy efficiency.
Enforce Building Energy Codes for Residential and Commercial Buildings	Improve compliance with building energy codes. Implement utility code support programs that count as credit toward energy efficiency savings targets.
Lead by Example in Government Facilities and Operations	Benchmark energy usage in public buildings and other infrastructure, streamline ESCO options and rules, set energy savings targets, improve energy management in municipal water systems, and implement street lighting improvements.
Low-Income Weatherization	Coordinate utility program offerings with state weatherization programs.
Customer Financing Options	Provide financing options for customers such as streamlined loan programs combined with on-bill repayment.
Benchmarking and Disclosure of Building Energy Use	Take steps toward benchmarking and disclosure of all commercial and residential building energy usage.
Combined Heat & Power (CHP) and District Energy	Use regulatory mechanisms to encourage development of new CHP systems; implement customer incentives to encourage connections to high-efficiency district energy systems.

The second category of tailored energy efficiency programs, as shown in Table 3, lists several tailored program offerings for residential and commercial customers in New Orleans. Our program list represents a comprehensive (though not exhaustive) list of energy efficiency program options for New Orleans customers. We analyze potential energy savings, costs, and benefits for each of the programs. We do not include an analysis of potential savings for the industrial sector because it accounts for a relatively small portion of customers in the city. However other research, including ICF 2012, suggests that there is significant achievable efficiency opportunity in this sector.

Table 3. Energy Efficiency Program Options by Customer Segment

Residential	Commercial
New Construction and Building Energy Code Support	New Construction and Code Support
Multifamily Buildings	Retrocommissioning and Monitoring-Based Commissioning
Home Energy Retrofits	Small Business Direct-Install
Upstream Retail Appliances and Electronics	Custom Incentives for Retrofits
Lighting	Prescriptive Equipment Rebates
Air Conditioning	Computer and Plug-Load Efficiency
Water Heating	
Low-Income Weatherization (in coordination with state and nonprofit programs)	
Information Feedback	

Next we present overall findings of the policy and program analysis, including estimated total annual electricity and natural gas savings impacts from the recommended efficiency policies and programs through 2030. Our analysis finds that a comprehensive set of policies and programs can cumulatively and cost-effectively meet 7.7% of electricity needs in the city by 2020 and 19.9% by 2030. Efficiency upgrades can also cumulatively save 4.5% of natural gas needs by 2020 and 14.5% by 2030. Table 4 and Figures 6 and 7 show a further breakdown of savings potential by customer class. A discussion of the specific policies and programs for each customer class in our analysis is included in the following sections. Details for each of the policies and programs analyzed are presented in the statewide Louisiana companion report (Molina 2013).

Table 4. Program and Policy Energy Savings Type and Customer Class in 2020 and 2030

	2020		2030	
Electricity End-Use Efficiency Savings	**GWh**	**Percentage of Reference Case***	**GWh**	**Percentage of Reference Case***
Residential	176	9.1%	467	23.0%
Commercial	270	8.4%	740	22.0%
Electricity Total	446	7.7%	1,207	19.9%
Natural Gas End-Use Efficiency Savings	**MMCF**	**Percentage of Reference Case***	**MMCF**	**Percentage of Reference Case***
Residential	277	6.6%	856	19.8%
Commercial	206	4.1%	733	14.0%
Natural Gas Total	483	4.5%	1,589	14.5%

* Savings are shown as a percentage of sales by customer class in the reference case scenario. Total savings are shown as a percentage of all sales, including sales to industrial customers.

Figure 6. Electric Energy Efficiency Program and Policy Potential by 2030

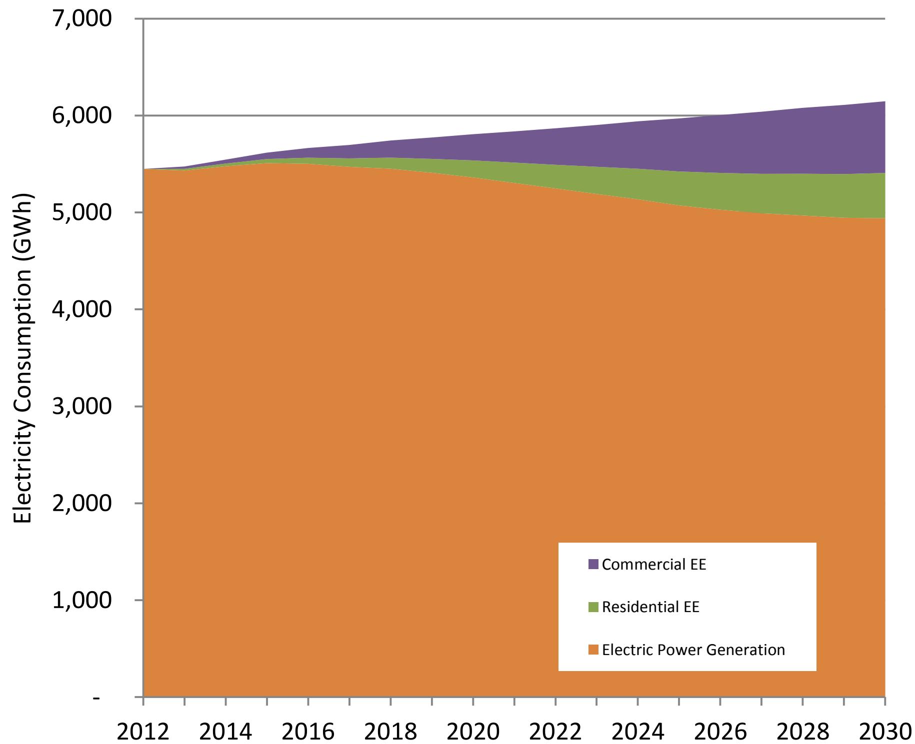
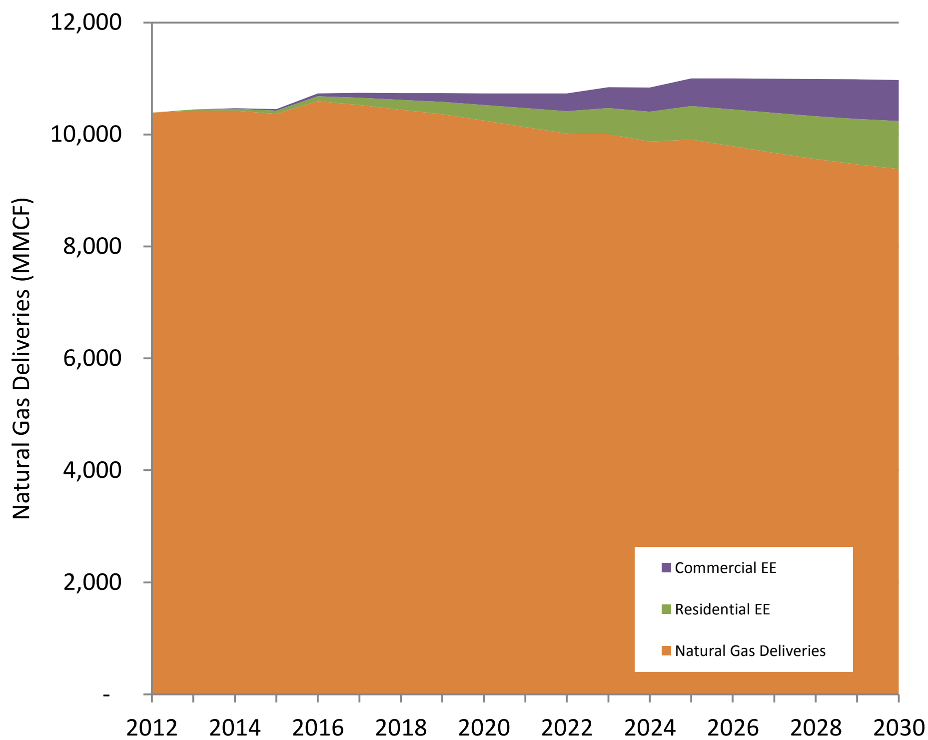


Figure 7. Natural Gas Energy Efficiency Program and Policy Potential by 2030



CITY POLICIES AND PROGRAMS

The policies and program options discussed in the following sections are either recommended expansions or updates of existing efforts in New Orleans, or are new opportunities for energy savings.

Utility Regulatory Policies

The responsibilities of the New Orleans City Council as the regulator of Entergy New Orleans and its electricity and natural gas utilities provide the city with opportunities to ensure that energy efficiency services are available to utility customers in the city. The city has already taken significant steps in this direction through the establishment of an integrated resource planning process and the development of the Energy Smart efficiency programs. The following policies are mechanisms that can further encourage utility investment in efficiency resources and continue New Orleans' leadership on energy efficiency policy.

INTEGRATED RESOURCE PLANNING

Simply ensuring that energy efficiency is considered as an option alongside traditional supply-side resources when planning for the future needs of the energy system makes it easier to identify and capture energy efficiency opportunities. The most common mechanism to enable this is an integrated resource planning (IRP) process. According to the State and Local Energy Efficiency Action Network, an IRP is "a long-range utility plan for meeting the forecasted demand for energy within a defined geographic area through a combination of supply side resources and demand side resources. Generally speaking, the goal of an IRP is to identify the mix of resources that will minimize future energy system costs while ensuring safe and reliable operation of the system" (SEE Action 2011). As of 2011, 34 states and many local jurisdictions had undertaken electricity resource planning through an IRP. Thirteen states also use an IRP for natural gas planning.

The New Orleans City Council first adopted an electricity IRP process for Entergy New Orleans in 2008 under Docket UD-08-02. As a result, Entergy New Orleans developed a plan for the years 2009–2028 (Entergy 2009). A demand-side management (DSM) potential study was included as a part of this process to evaluate available efficiency resources (ICF 2009). The IRP process was renewed in 2011, this time with input from stakeholders through consultation at a series of quarterly technical conferences at the request of the City Council (New Orleans 2010a; 2011). Entergy New Orleans submitted a new proposed IRP for years 2012 through 2031 in October 2012 (Entergy 2012a). This IRP was accompanied by a new DSM potential study that included an expanded set of programs based on the existing Energy Smart program portfolio (ICF 2012). The City Council has developed a procedural schedule to review the proposed IRP and its intention to make a complete consideration of the IRP in July 2013 (New Orleans 2013). The state of Louisiana has similarly adopted an IRP process, with the Louisiana Public Service Commission in 2012 implementing an IRP process for investor-owned utilities under its purview (LA PSC 2012).

New Orleans has been the leader in Louisiana on integrated resource planning, but as the city begins its next IRP cycle there is still room for improvement. Several resources based on best practices developed through experiences with energy efficiency in integrated resource planning around the country have been developed in recent years such as Kushler & York

2010; SEE Action 2011; Binz et al. 2012; and resources by the Regulatory Assistance Project (RAP), e.g., Neme & Sedano 2012 and Lamont & Gerhard 2013. Based on these best practices, opportunities to improve the process in New Orleans include these options:

- *Inclusion of natural gas*. Because natural gas represents a significant portion of energy expenses for New Orleanians, an IRP process for the fuel may contribute to improved service and lower costs for customers through, in part, providing efficiency programs and greater energy savings for gas end-uses, adding to the current electricity-focused programs.
- *Stakeholder engagement*. While the move toward a technical conference format has considerably improved stakeholder engagement in the most recent IRP process, there are additional opportunities for engagement and transparency, including development of a formal advisory body undertaking a collaborative planning process wherein stakeholders can participate in the development of modeling and a preferred resource portfolio, such as has been done in Massachusetts with the Energy Efficiency Advisory Council (Massachusetts 2013).
- *An all cost-effective energy efficiency requirement*. While the IRP planning process is already focused around least-cost energy planning, some jurisdictions have found it valuable to codify that this includes a requirement that all cost-effective energy efficiency options be used before investments in more expensive or risky resources.
- *Discontinue use of the Ratepayer Impact Measure (RIM) as a primary measure of cost-effectiveness*. While RIM can provide important information to program administrators, it is biased toward supply-side resources, has become widely recognized as inappropriate for screening energy efficiency programs, and has fallen out of use (Woolf et al. 2012). Only one state continues to use RIM as its primary cost-effectiveness test (Kushler et al. 2012).
- *Consideration of efficiency programs as discrete, deployable resources*. While a diversified portfolio of resources on the demand side is as important for a resilient energy system as on the supply side, IRP analysis should avoid the use of program bundles in modeling and instead allow the model to choose an optimum level of investment based on the levelized cost of each individual resource or program.

ENERGY SAVINGS TARGETS FOR UTILITIES

The City Council's 2009 adoption of the Energy Smart programs for the three-year period April 2011—March 2014 has proven successful in cost-effectively saving customers money on their energy bills (Entergy 2012c). But without integrating energy efficiency programs and related energy savings targets into long-term system planning, Entergy New Orleans will not have certainty as to what its regulators will expect. Explicitly including energy efficiency as a resource in ENO's 2012 Integrated Resource Plan is a step in the right direction.

As the next step toward enabling ENO to consistently achieve the cost-effective energy savings that are possible through efficiency programs, we recommend that the City Council sets specific, multiyear energy savings targets. Programs developed to meet these targets should be subject to cost-effectiveness criteria to ensure that they provide cost savings to participants and ratepayers as a whole, and they should not be limited by a prescriptive cap on spending. Rather, Entergy should be empowered to achieve as aggressive cost-effective savings as possible.

As of September 2012, energy efficiency targets have been established by 24 states (ACEEE 2012) and by numerous public and cooperative utilities (APPA 2011; CMUA 2012). These state annual savings targets range from less than 0.5% to more than 2% of retail sales. States that have set targets have on the whole been effective in meeting them, independent of the specific savings level of the target (Sciortino et al. 2011). Local governments engaged in administering utility energy efficiency programs, mostly cities with municipal utilities, have likewise succeeded in regularly achieving significant levels of savings through efficiency, with leading utilities saving between 1% and 2% of retail sales annually (EIA 2012; Mackres et al. 2013 forthcoming).

An IRP process and the development of efficiency targets are closely related, although the details of the interrelationship and how targets are established varies from jurisdiction to jurisdiction. The tools and analysis used in IRPs are almost always used to inform energy efficiency goals. But in the end, how rapidly the available efficiency resources are pursued is a policy decision. In some cases these decisions are made through legislation, in others through the actions of regulators, and in still other cases through efficiency objectives developed and justified by utilities themselves (Lamont & Gerhard 2013).

We suggest that the City Council consider adoption of energy savings targets that reflect the achievable, cost-effective savings available in New Orleans and the city's experience with implementing efficiency programs. Our analysis of potential cost-effective savings from energy efficiency programs, as described in the following sections of this report, suggests that New Orleans could achieve incremental annual electricity savings of 1% by 2016 and higher savings in following years. We suggest that the city consider an electricity savings target that builds on the existing Energy Smart programs to ramp up to 1% over the first three years of the next program cycle, e.g., 0.5% in 2014, 0.75% in 2015, and 1% in 2016.[3] This quick ramp up in savings targets is feasible in New Orleans because of the existing program implementation experience and savings achieved from the Energy Smart programs, which are already achieving savings of over 0.3% annually.

Over the long term, our analysis finds that New Orleans could then ramp up to annual savings targets of between 1.5% and 2% for the years after 2020, in keeping with the achievable best practices established by leading program portfolios around the country (Sciortino et al. 2011). Targets for the years 2025–2030 could then be determined based on the results and lessons learned from previous years. We suggest that the City Council periodically evaluate the success of programs, e.g., every three to six years, as is the standard practice in many states, and set new targets based on updated analysis of energy

[3] Note that our analysis includes only efficiency opportunities available in the residential and commercial customer classes. For the sake of consistency our suggested targets are described as a percentage of sales to commercial and residential customers only (i.e., exclusive of sales to industrial customers). Other analyses, such as ICF 2012, suggest that there is considerable efficiency opportunity in the industrial sector. We recommend that any targets adopted by the council also incorporate savings from programs targeting the industrial sector.

efficiency potential and best practices in program design. We also recommend that the council establish robust cost-effectiveness criteria with appropriate consideration of the full benefits of efficiency to guide energy efficiency investments, rather than limit efficiency investments through a prescriptive spending cap.

Our analysis also suggests significant cost-effective opportunity for natural gas savings through efficiency programs. To capture these savings we suggest that the city adopt programs targeting natural gas end-uses and establish savings targets for natural gas. We suggest that the city consider a natural gas savings target that gradually increases to 0.75% over seven years, e.g., 0.25% in 2014, 0.4% in 2016, 0.55% in 2018, and 0.75% in 2020. Targets for the years 2021–2030 could then be determined based on the results and lessons learned from previous years, but our analysis finds that saving of around 1% annually could be achievable in the later years of the analysis.

ALIGNING UTILITY FINANCIAL INCENTIVES WITH ENERGY EFFICIENCY

The third policy need is to better align utility financial models with energy efficiency. Utilities across the country have identified the significant disincentive they face to invest in energy efficiency. By reducing customer energy usage and therefore energy bills, energy efficiency can reduce electricity and/or natural gas sales for utilities, which in turn means lower utility revenues. Utilities and their shareholders have natural concerns that, over time, reduced revenues without timely adjustments for cost recovery could impede the utilities' ability to provide energy services due to decreased earnings or financial margins. To make efficiency a part of their long-term business model, utilities should be able to earn a return on investments in efficiency just as they do on investments in supply-side resources.

Utility spending on energy efficiency programs can impact the financial position of a utility in three ways: 1) through the direct costs of the programs; 2) through reduced revenues due to falling sales; and 3) through reduced opportunities for a return on investment on supply-side resources guaranteed by traditional utility regulation, which may not be comparably regulated for energy efficiency investments. To encourage utilities to invest in energy efficiency, all three of these issues should be addressed. Neglecting to do so puts utilities in a relatively weaker financial position, dissuading them from pursuing energy efficiency further.

A strong foundation for utility investments in energy efficiency is a "three-legged stool" approach to a new utility business model (York & Kushler 2011):

1. Allow timely cost recovery of direct energy efficiency program costs.
2. Address the throughput disincentive by allowing utilities to recover income from reduced sales to pay their fixed costs.
3. Provide financial incentives for utilities that meet or exceed energy efficiency performance targets (and allow utilities the flexibility needed to maximize energy efficiency program savings).

Combined, these three legs form the strong regulatory framework that is needed to fully support and enable the utilities to capture the higher levels of cost-effective energy efficiency our analysis suggests are achievable. In addition to recovery of efficiency program costs, the city of New Orleans has a rate rider that provides for recovery of lost contribution to fixed costs for Entergy New Orleans. The lost-contribution estimate is the product of the adjusted gross margin per kWh and total annual projected savings. The city also has financial incentives in place for Entergy New Orleans for energy savings that range from 75% to 125% of the annual targets under Energy Smart (New Orleans 2009; Entergy 2010). As a result, the city currently has some version of each of the three legs of the efficiency business model in place for its regulation of Entergy New Orleans. However, the council should consider options for improving the mechanisms already in place and expanding their use. These improvements to the utility business case for efficiency should be coupled with renewed and expanded energy efficiency targets and increased levels of investment in efficiency under the new IRP.

Combined Heat and Power and District Energy Systems

Combined heat and power (CHP) is the generation of electricity and thermal energy in a single, integrated system. CHP systems are much more efficient than electricity-only generation because they make use of thermal energy that is normally wasted during the separate generation of electricity. CHP systems range in size from tens of kilowatts for single buildings up to hundreds of megawatts for large industrial or commercial facilities. Several barriers impede cost-effective CHP applications, including a lack of common and fair interconnection and net metering standards for systems over 300 kW; unfavorable utility standby rates that do not reflect the full costs and benefits of CHP to the system; and emissions regulations that do not recognize the improved efficiency and pollution benefits of CHP systems.

CHP technology can help manufacturers and other large facilities such as hospitals and universities lower their energy costs, which improves their bottom line and competitiveness, or in the case of government institutions, saves taxpayer dollars. Facilities that use CHP consequently reduce their dependence on grid-supplied electricity, which can mitigate transmission and distribution congestion and increase reserve margins while improving the grid's reliability and stability, benefiting all electricity users. An additional significant benefit of CHP is that it allows for increased energy assurance—meaning a more stable, local electricity supply—all the more important in view of past disruptions from natural disasters. CHP facilities improve customer reliability in the case of power outages, and can therefore be highly beneficial in critical infrastructure facilities such as hospitals and wastewater treatment plants, as was seen recently during Superstorm Sandy (Chittum 2012). The value of CHP in disaster situations was recognized in 2012 state-level legislation (Louisiana House Resolution 167), which requests the Louisiana Department of Natural Resources and the Public Service Commission to establish guidelines to evaluate CHP feasibility in critical government facilities, such as hospitals, prisons, police and fire stations, data centers, and waste and wastewater facilities.

District energy systems aggregate thermal loads using pipes that connect buildings together, which allows for more efficient use of heating and cooling plants. The aggregated load also increase the attractiveness for CHP, since the district energy loads are larger than those for individual buildings and the distribution pipes provide some load leveling, which can improve the efficiency of the CHP system. New Orleans is no stranger to district energy, with the Tulane University and Loyola University campuses linked together with a district energy system that includes CHP, and Entergy Thermal LLC, which has developed district energy in the New Orleans Regional Medical Center (NORMC) district. The NORMC District Energy Center will have the capability to produce 33,000 tons of chilled water and provide air conditioning to over 12 million square feet of commercial property in the NORMC district and downtown New Orleans (Entergy 2013a).

New Orleans represents a unique opportunity to build upon the existing district energy system to serve the city's extensive commercial and hospitality space and create opportunities for CHP. Because of the density of Canal Street and Central Business District, district energy is an ideal solution that can be complemented with CHP generation. In particular, the Entergy Thermal system can provide more chilled water than its current customers require and could provide cooling services to additional customers at potentially lower rates than peak electricity costs. Connecting new buildings to the system to make use of this efficient, affordable and underutilized resource should be a priority for the city.

The city should consider adopting incentives for buildings to connect with the city's district energy systems. Such incentives could increase the adoption of nonelectric space cooling, decrease related energy costs, improve the efficiency of overall energy use in the city, and reduce electricity consumption. In addition, encouraging new buildings to be built in such a way to be able to take district energy (e.g., hydronic systems integrated into buildings) can help increase future demand for district energy. For large buildings that cannot easily connect with the city's district energy systems, smaller CHP systems may provide benefits.

We do not include an energy savings analysis of district energy or CHP potential for New Orleans in this report. However, the companion report for Louisiana (Molina 2013) includes a statewide analysis of CHP potential.

Building Energy Codes and Enforcement

Strong building energy codes that are adequately enforced are a critical foundation for greater energy efficiency. Up-to-date codes and proper training and enforcement ensure lower energy bills and greater comfort for those consumers who purchase or rent new homes or buildings. Buildings are much more difficult and costly to retrofit for energy savings after they are built, i.e., they become "lost opportunities" for energy savings. This makes statewide building energy codes and their proper implementation a critical foundation for energy efficiency progress in New Orleans and the state as a whole.

Authority for energy code adoption rests exclusively at the state level in Louisiana. Louisiana's statewide building energy codes have been updated fairly recently, but they still have room for improvement. The state's mandatory residential energy code, the Louisiana State Uniform Construction Code (LSUCC) is based on the 2006 International Residential Code (IRC), which became effective in January 2011 (BCAP 2012). The mandatory Louisiana Commercial Building Energy is the ASHRAE Standard 90.1-2007, which became effective in August 2012. The code adoption cycle is every three years, which means that the next round of codes will likely become effective in 2014 and 2015 for residential and commercial construction, respectively. Codes are adopted through state legislation. However, the Office of the State Fire Marshal has authority to promulgate amendments or revisions to the code. The role of the Louisiana State Uniform Construction Code Council, which consists of 19 members appointed by the governor, is to review and adopt the state uniform codes, provide training and education of code officials, and consider amendments to the codes.

Although New Orleans has no direct authority over code adoption, it can support the adoption of stronger codes through actively participating in the process at the state level. Moreover, while code adoption occurs at the state level, code *enforcement* in Louisiana occurs through local governments, providing significant opportunities for New Orleans to find additional energy savings through codes. Stakeholders in New Orleans and throughout Louisiana have identified the need for improved training of local code officials and contractors to improve compliance with buildings codes. Cost-effective code compliance strategies that could be considered for adoption in New Orleans include performance testing, third-party plan review, design professional accountability, and streamlining of regulatory processes (IMT 2011).

There has been growing interest in energy-efficient rebuilding among citizens, businesses, and policymakers in the city since Hurricane Katrina (USGBC 2005; Baker 2008; McKee 2009; DOE 2010; Doris 2011). This period has also seen the proliferation and growth of nongovernmental organizations focused on green community development and energy-efficient buildings (Davey & Sherry 2007). This activity provides a means by which to improve code awareness and compliance. Utility efficiency programs could also have a role to play in encouraging adoption of strong codes and supporting efforts to ensure compliance. Both of these activities could allow options for utilities to earn credit toward their energy savings targets. Code-related programs could be evaluated with a proper baseline and annual surveys to measure changes in compliance rates, and the Department of Energy's new Building Energy Codes Program (BECP) method could be used toward this goal (Misuriello et al. 2012). A handful of states have developed methodologies to attribute savings from compliance with building energy codes to the efforts of code support programs (Wagner & Lin 2012; Misuriello et al. 2012).

Energy code enforcement authority and compliance activities in New Orleans fall primarily under the purview of the Department of Safety and Permits, which provides a "one-stop shop" service for all permits and licenses, including for construction. Although funding to the department has been relatively steady over the past half-decade, the number of staff in the department has declined from 112 in 2008 to 77 in 2012. Also, the proposed 2013 budget for the department is down more than 25% from the previous year. Perhaps most notable in the proposed 2013 budget are unfunded energy-related line items, including "Continuing Education–Inspections and Plan Review" and "Increased Building Inspections & Enforcement" activities, which can be critical to achieving energy savings through codes (New Orleans 2012a).

Even now, after the post-Katrina rebuilding boom has ebbed, new construction remains an important efficiency opportunity for New Orleans if the city is to avoid lost savings opportunities. While new housing starts, one indicator of construction activity, are down from the peak rebuilding years of 2007–2009, they remain consistently higher than the state on average. Similarly, employment has also been growing at a faster rate (Moody's 2012) in the city, and as a result commercial building square footage is likely also increasing at a quicker pace.

PATH TO 2030 ANALYSIS

For our analysis of energy and cost impacts of building codes, we use state policy adoption assumptions identical to those used in our Louisiana companion report (Molina 2013). For the residential sector, the state could immediately jump to the 2012 IECC, which is the most advanced building energy code. However, we assume that the state will take an incremental approach and will first adopt the 2009 IECC for residential construction, effective January 2014, followed by the 2012 IECC, which would become effective three year later. Incremental cost data are from various sources (Lucas et al. 2012; EPA 2012a). For the commercial sector, we assume adoption of ASHRAE 90.1-2010, effective in 2015. Estimates for incremental costs to meet code are from the New Buildings Institute (NBI 2012). We base projected new construction activity in Orleans Parish on forecasts from Moody's Analytics (Moody's 2012).

Lead by Example in Government Facilities and Operations

The city of New Orleans not only has the authority to help its residents through efficiency programs, but also the bully pulpit to demonstrate the value of energy savings through actions to improve its own facilities and operations.

Some of the current and past energy efficiency actions in city operations include the following:

- *Schools.* New Orleans Public Schools District has adopted commitments to energy savings in new buildings as well as for major renovations. It has completed audits on many buildings and has begun monitoring energy use (DOE 2011; DOE 2012a).
- *Streetlights.* As of January 2013 the city's Department of Public Works had converted over 2,500 of its nearly 51,000 streetlights to energy-efficient light-emitting diodes (LEDs) (New Orleans 2013).
- *Procurement.* The city's Office of Coastal and Environmental Affairs is working with the Chief Administrative Office and City Purchasing to develop a policy for environmentally friendly procurement, including energy-efficient appliances (New Orleans 2010b).

The city last completed a comprehensive look at its energy use and resulting greenhouse gas emissions using data from 2007 (Moore & Stone 2009). The report shows that emissions and energy use from city operations were approximately 4% of the community's total consumption. Of this government energy use the largest energy uses were water/sewage, which accounted for 64%; streetlights, accounting for 15%; and public buildings, with 13%. We will briefly discuss energy saving opportunities for each of the government uses.

While the city has already taken many actions to improve efficiency there is still much more to be done. Developing an energy savings goal and a comprehensive strategy for energy efficiency in government operations can result in significant benefits, including cost savings, community engagement through demonstrated leadership, improved productivity, decreased pollution, improved indoor air quality, and local job creation (EPA 2011a). We recommend that the city set a goal to reduce the energy used in its operations by at least 20% by 2020.

WATER AND WASTEWATER

Energy use for drinking water and wastewater systems typically can account for up to one-third of a municipality's energy bill (EPA 2009). At nearly two-thirds of the government's greenhouse gas emissions, water-related energy use in New Orleans is well above the average. This is in no small part due to New Orleans' geography and hydrology. Much of the city is below sea level, which requires a system of pumps running constantly to ensure that the city remains dry. Water and sewer services in the city are the responsibility of Sewerage and Water Board of New Orleans (SWBNO). In 1996, the Southeast Louisiana Urban Flood Control Program, administered by SWBNO and U.S. Army Corps of Engineers, was authorized to construct new pumping stations and drainage canals throughout New Orleans to reduce flooding damages (SELA 2013). With regard to wastewater, SWBNO signed an agreement with the U.S. Environmental Protection Agency in 1998 to improve the city's wastewater system to decrease pollution and increase water quality. Sewer System Evaluation and Rehabilitation Program has been developed to improve the wastewater collection system. The project is estimated to cost nearly $500 million over a ten-year period. Two sewer rate increases have been adopted to pay for these improvements (SWBNO 2013).

Considering New Orleans' unique hydrologic environment and resulting challenges, additional energy efficiency improvements may make it easier and a more affordable to achieve the city's objectives for water-related services. As a part of its ongoing efforts to improve drainage, drinking water, and wastewater systems in the city, high-efficiency pumps, leak management, and automated controls and monitoring systems should be considered. Energy benchmarking and monitoring using tools such as ENERGY STAR® Portfolio Manager and SCADA systems can improve energy performance through improved energy-use information and active management of systems (EPA 2009). Significant energy savings are often available through simple improvements in operations that can be found through improved energy-use monitoring alone.

Optimization of pumping can also often result in significant cost-effective energy savings. In typical drinking water systems over 90% of energy is consumed by pumping (Focus on Energy 2006). A similarly large portion of energy usage from pumps is likely in New Orleans' drainage system. High-efficiency and variable speed pumps should be considered for both new and existing components of the drinking water and drainage systems. These improvements can often pay for themselves within a few years through reduced energy costs (Focus on Energy 2006). Leak management is a cost-effective maintenance approach to reducing energy costs through reduced need for pumping (Young & Mackres 2013). Reducing system leakage before major capital improvements may also reduce the number and power of pumps required and the energy needed to run them. It was estimated that 63% of New Orleans' drinking water was lost to leaks in 2006 (Krupa 2006). Even after some post-Katrina repairs, leakage was still at 50% as of 2011 (NOLA 2011). While leakage is common in municipal water systems, New Orleans' leaks are considerably above average, leaving significant room for cost-effective improvements (Kenter 2011).

Opportunities for drinking water savings are also significant at the point of customer use. Additionally, many of these water savings measures also save energy, particularly with regard to heated water but also to a lesser extent for cold water. There may be opportunities for programs jointly funded and administered by SWBNO and Entergy to save both energy and water simultaneously, since water and energy utility collaboration on efficiency programs is a growing practice elsewhere in the country (Young & Mackres 2013).

For wastewater plants, harnessing waste energy in wastewater treatment plants through methane capture can improve reliability and efficiency of the wastewater system. Some wastewater treatment plants have become energy self-sufficient through a combination of waste energy capture and efficiency improvements in aerators and motors (Sciortino 2011; Young & Mackres 2013).

Another opportunity for water-related energy savings include green stormwater infrastructure, which uses natural landscape elements to reduce the load on stormwater systems. These systems reduce energy use needed for water treatment and also can reduce energy use in buildings because of greater shade from tree planting. Beyond energy savings, green infrastructure can also improve water quality, reduce flooding, help with environmental compliance through decreased runoff, improve air quality, reduce heat islands, and improve livability (CNT 2010).

STREETLIGHTS

There are nearly 51,000 streetlights owned by the city of New Orleans (New Orleans 2013). These streetlights account for 15% of the city government's greenhouse gas emissions and a significant portion of its energy consumption and costs—55,441 MWh and $2.7 million in 2007 (Moore & Stone 2009).

The city has taken action to improve the efficiency of street lighting, mostly through the installation of light-emitting diode (LED) fixtures, and has additional actions planned. As of January 2013 over 2,500 (around 5%) of fixtures had already been converted to LEDs. Streetlight maintenance is a major expense for the city. In 2007 this responsibility was shifted from Entergy New Orleans to the city, which contracts out the implementation. From 2008 to 2013 the spending or budgets on streetlight maintenance averaged $6.7 million annually. Since May 2010, 23,000 specific outages have been fixed, averaging between 12,000 and 15,000 annually; the number of repairs had previously averaged 15,000 to 20,000 annually. As a result, the backlog of uncompleted repairs is increasing (New Orleans 2013).

The New Orleans Department of Public Works is proposing a franchise fee to be paid by Entergy New Orleans to fund ongoing streetlight maintenance and repair. With a new funding source in place the department expects to install 10,000 total LEDs by end of 2013 and convert 15–20% to LED each year going forward, with an eventual goal of 100% LED fixtures combined with remote monitoring and controls (New Orleans 2013).

Although the Department of Public Works is still analyzing expected energy savings from LED installations, it expects to be able to reduce streetlight energy use by around 30% (New Orleans 2013). This is in keeping with national estimates that 100% adoption of LEDs for street and highway lighting applications would reduce energy consumption by around 38% (Navigant 2011). Cost savings to the city are a different matter. Currently Entergy charges a flat fee based on fixture type, not usage. The city is currently negotiating with Entergy to ensure that the pricing structure will enable the city to achieve cost savings from improved efficiency (New Orleans 2013), an issue that has arisen for other municipalities around the country (Cleveland 2011).

Beyond energy savings, the advantages of LED fixtures are numerous. They have a 5- to 7-year lifespan, longer than the current average 1.5- to 3-year bulb lifetimes for existing city fixtures (New Orleans 2013). This longer bulb life will help reduce maintenance and replacement costs. LEDs provide additional public safety benefits by reducing the length of outages and by improving the quality of light and visibility, making it easier for first responders to quickly diagnose a situation.

In addition to the franchise fee the city is currently pursuing, other financing options for a LED street lighting conversion include an internal revolving loan fund, as has been used for streetlight improvements in Asheville, NC (Cleveland 2011); energy service performance contracts, which have been used by numerous local governments (ESC 2013); and improved rate tariffs designed to allow financing of LEDs through rates while still reducing municipal energy bills, as have been adopted in Vermont (Arnold et al. 2012).

PUBLIC BUILDINGS

Public buildings are major users of energy, resulting in considerable expense for both the city of New Orleans and other public entities in the city. As of 2007, buildings accounted for 13% of the city government's greenhouse gas emissions, resulting from consumption of 45,059 GWh of electricity (at a cost of over $5 million) and 21,928 MCF of natural gas (Moore & Stone 2009). In addition to local government and school buildings, New Orleans is also home to several state and federal government buildings.

A variety of strategies are available to improve energy performance and increase the energy efficiency of public buildings. These strategies vary from those that can be integrated into existing operations with little or no cost to those that require identifying capital resources. The simplest interventions include those related to improving information on energy use in city's building portfolio, such as benchmarking. Benchmarking refers to the systematic tracking of energy usage and costs over time. Tools like the publicly available ENERGY STAR Portfolio Manager and most sophisticated applications allow users to see how their building energy and water use compare to other similar buildings and identify and prioritize opportunities for improvement (EPA 2013a).

A benchmarking plan can provide a data-driven foundation for further energy efficiency actions (DOE 2013a). Benchmarking often helps to identify small changes in building operations that result in large energy savings at very little cost. Benchmarking also allows a local government to prioritize the poorest-performing buildings for more comprehensive evaluation and improvements, through a combination of energy audits, building retrocommissioning ("tune-ups") and more capital-intensive building retrofits.

One of the most effective mechanisms available for financing energy efficiency retrofits in government buildings is an energy service performance contract (ESPC) through an energy service companies (ESCOs), a method that has been used extensively by municipalities, states, and the federal government. Under the ESPC model, agencies hire prequalified ESCOs to implement projects that improve a building's energy efficiency and lower maintenance costs. The ESCO guarantees the performance of its services, and the energy savings are used to repay the project costs. This model has proven to be highly effective for institutional energy customers, both in terms of delivering energy savings and in terms of cost-effectiveness (LBNL 2008). In addition to the ESPC approach, there are a variety of other models available to finance energy improvements to local government buildings and schools (Borgeson & Zimring 2013).

Other buildings-related strategies available include integrating energy efficiency into procurement and asset management. Local governments have begun integrating energy efficiency into their product procurement processes (EPA 2011b) and adopting efficiency criteria for construction of new buildings, such as ENERGY STAR certification or other above-code green buildings criteria (Doris 2011). Some are also developing policies for property leases that include provisions related to energy performance (DOE 2012b).

As noted previously, New Orleans has already begun some of these activities, including benchmarking, building energy-efficient schools, and integrating energy efficiency into procurement. Adopting government energy-saving goals, taking the next steps building off these existing activities, and further integrating energy management across government operations will yield lasting energy savings for the city.

PATH TO 2030 ANALYSIS

Our analysis of energy use and efficiency opportunities in the public sector uses the same methodology as the Lead By Example program in Molina 2013, but its subsector reference case differs and is based on a combination of New Orleans–specific data, national datasets, and program experiences elsewhere in the country. To develop a baseline of government energy use, we use data on electricity consumption from the Entergy New Orleans DSM potential study, which reports that sales to government customers accounted for 16% of all sales in 2010, or approximately 811 GWh to 1,707 government customers (ICF 2012). For natural gas, we apply information from CBECS to estimate that around 20% of natural gas consumption in commercial buildings occurs in public buildings each year and develop a forecast by applying the annual rate of change in natural gas sales from the commercial reference case to government sales.

These estimates include all government energy consumption, not just the consumption by city of New Orleans government entities. Based on 2007 data, around a quarter of government electricity consumption is by the city government, in buildings, water/wastewater, and streetlights (Moore & Stone 2009). However, this does not include energy use by New Orleans Public Schools. Other government energy users likely include state and federal government and independent public authorities.

ENABLING POLICIES AND PROGRAMS

The program options described in the following section serve as enabling tools. We do not directly include them in the quantitative analysis, but they are critical components in driving customer participation in efficiency programs.

Benchmarking and Disclosure of Building Energy Information

Improved access to actionable information on building energy use has been shown to increase demand for energy efficiency improvements. There are a variety of methods to improve customer access to information on their building's energy performance, but two of the most promising are benchmarking and disclosure. As with public buildings, commercial and residential buildings can also systematically monitor their energy use over time through benchmarking. A study of over 35,000 buildings has demonstrated that the improved building energy information available from benchmarking can save energy—an average of 2.4% annually—including through improved operations and occupant behaviors, even absent capital investments (EPA 2012a). Benchmarking also enables public recognition for high-performing buildings, further motivating improvement. Currently New Orleans is home to 18 ENERGY STAR labeled buildings, 17 office buildings, and one hotel (EPA 2013b). These buildings have benchmarked their energy use and demonstrated that their energy performance is better than at least 75% of similar buildings around the country.

Governments and utilities have a number of options to promote benchmarking. These include providing technical assistance or incentives for adoption, supporting automated benchmarking, sponsoring benchmarking competitions, using benchmarking as a platform for energy management and continuous improvement programs, and using benchmarking as prerequisite to participation in other efficiency incentive programs (EPA 2013c; EPA 2013d).

Increasingly, jurisdictions are recognizing building energy information as a missing ingredient in the real estate market and are developing mechanisms to include it. Louisiana has taken as step in this direction with Act 504, which was passed in 2010 and requires property appraisers to incorporate energy efficiency measures into the assessment of a property's value. The law went into effect in 2011; however, no guidelines were provided for implementation of the new requirement.

Another method of improving access to energy information is through a benchmarking requirement that includes provisions for disclosure. At least 15 states and cities in the United States have adopted some form of a requirement for benchmarking or rating of private buildings (IMT 2013; EPA 2013d). Additionally, disclosure of building energy usage, either publicly or as a part of real estate transactions, has also been included in a growing number of benchmarking requirements. This is because of recognition that the value of benchmarking, and other building energy-use information such as audits or ratings, can be amplified through their disclosure to potential buyers or renters, which allows them to incorporate energy costs into their decisions (Burr et al. 2011).

We recommend that New Orleans consider adopting benchmarking and disclosure requirements for commercial and residential buildings. Even applying these policies only to large commercial buildings and multifamily residential buildings could have a significant impact on efficiency because of the significant number of these large, high-energy-use buildings in the city. An energy disclosure policy designed specifically for rental housing would also make sense for New Orleans, based on its high proportion of renters. Renters are at an additional disadvantage when it comes to energy information because not only are they unaware of the potential monthly energy costs until they get their first bill, but unlike owners once they move into their home they cannot choose to make improvements to reduce costs without participation by the owners, who may be uninterested if they don't pay the energy bill. This "split incentive" between owner and renter can be addressed in part through providing information on energy costs in advance of finalizing a rental agreement, such as with the Austin, Texas, Energy Conservation Audit and Disclosure ordinance (Haines & Mackres 2011), or requiring that rental properties meet a minimum level of efficiency as with the Boulder, Colorado, SmartRegs ordinance (LBNL 2012).

Customer Financing for Energy Efficiency

The up-front costs of cost-effective energy efficiency improvements can often deter property owners from pursuing efficiency projects, especially during periods of economic uncertainty when consumer confidence is low. An important goal of policies and programs is to help minimize the initial costs of energy efficiency projects or upgrades through financing or other tools, encouraging owners to invest in efficiency. One important aspect of financing mechanisms is that the debt can be spread out over the course of several years, if not decades, which decreases annual costs and substantially increases the annual net cost savings from efficiency improvements. Energy efficiency improvements to a property also help to increase the overall property value and improve the cash flow of property owners (from reduced liability relative to the upfront costs), thus improving resale value.

New Orleans has already developed a financing product designed for energy efficiency improvements through the NOLA Wise program. NOLA Wise Energy Efficiency Loans are available through Fidelity Homestead Savings Bank as either an unsecured loan or as a secured home equity product ranging from $3,000 to $25,000 in principal, for terms from one to ten years, and at interest rates from 3.75% to 10.24% (Fidelity 2013). The availability of these products is a large step in the right direction of making the customer costs of efficiency investments affordable. However, there are a variety of options available to make these lending options easier to use and to encourage their broader adoption in New Orleans.

There are two major financing mechanisms that New Orleans could consider adopting to better allow property owners to make energy efficiency retrofits by reducing up-front costs:

- *On-Bill Repayment (OBR).* This loan mechanism allows property owners to repay their debt through a fee on their electric bill or in some cases on other utility bills such as water or sewer. The loan can be financed either by the utility or by a third-party financer, although the fee would be collected by the utility. The loan may be attached to the property. On-bill repayment programs are increasingly being adopted by states, municipalities, and cooperative utilities around the country (Bell et al. 2011). While OBR can provide benefits to customers, there are some challenges with this model, since the role of lender is often outside a utility's business model and expertise, and utility bills and billing systems may need to be redesigned.[4] This option may be a valuable avenue for the city to explore because it provides an opportunity to combine the financing relationships already built through establishing the *NOLA Wise* loan program with a new, simplified repayment process through existing customer bills from Entergy or the Sewerage and Water Board.

[4] See http://aceee.org/files/pdf/toolkit/OBF_toolkit.pdf for a discussion of the successes and challenges of on-bill financing programs

Under such an arrangement the utilities would not act as lenders, but rather would only provide the mechanism for repayment.

- *Property Tax Financing, or Property Assessed Clean Energy (PACE).* This model has some similarities with on-bill repayment, except that instead of using utility bills as the collection mechanism, the local government issues a surcharge on the annual property tax bill. The financing entity in this case would be the local government, which again could work with a third-party financer. Currently this option is most appropriate for commercial properties because Federal Housing Finance Agency regulations limit its use for residential properties.

Financing options can also encourage consumers to purchase more efficient homes. One strategy to influence home buyers is making sure that energy-efficient mortgages are available to purchasers of energy-efficient homes. Energy-efficient mortgages should be attractive to lenders by reducing the risk of the loan because energy bills are a major household expense, particularly for moderate-income households, and lowering energy bills frees more income to make mortgage payments. With the increased prevalence of home ratings such as ENERGY STAR, both for new and existing homes, identification of qualifying properties should not be a barrier. Recent research has demonstrated that mortgage default rates are lower for energy-efficient homes, making them safer investments for lenders. One study of ENERGY STAR rated homes found that they had a 32% lower default rate compared to nonrated homes while controlling for other factors (Kaza et al. 2013). The city is in a position to encourage lending practices that take efficiency into consideration through integrating energy efficiency characteristics into real estate listings, working with lenders to integrate efficiency into their underwriting, and promoting energy-efficient mortgages. Such products would be natural complements to the growing number of energy-efficient homes in the New Orleans market.

The city of New Orleans should continue to implement and improve a range of financing opportunities to reduce first-cost barriers to energy efficiency investments, such as through developing finance options that tie loan repayment to energy meters and utility bills, or through financing that ties repayment to a property tax bill. Energy efficiency should also be further integrated into the lending criteria for home mortgages. All of these financing options would help achieve energy and cost savings while creating the jobs necessary to meet the demand for energy retrofits spurred by lower up-front costs.

UTILITY PROGRAM OPTIONS

This section provides an analysis of the benefits and costs of several energy efficiency program options, categorized by customer class, which could be offered to utility customers in New Orleans.

Existing Program Context

The only energy efficiency programs of significant impact currently offered in Louisiana are those available exclusively to residents of New Orleans. Entergy New Orleans, through the Energy Smart program established by the New Orleans City Council, has been offering residential and business electric efficiency programs since April 2011. On the whole, these programs have been highly successful in reaching their goals. In the first program year the Energy Smart programs achieved 111% of the energy savings goal at only 93% of the expected cost (Entergy 2012c). Results presented to the City Council from the first nine months of the second program year showed similar success, with 80% of a higher annual energy savings goal achieved with three months remaining (New Orleans 2013c). The energy savings goals, in gross kWh, for the three-year Energy Smart program and the savings results as of December 2012 are included in Table 5.

Table 5. Energy Smart Energy Savings Goals and Results by Program Year

	Year 1 *(April 2011–March 2012)*		*Year 2* *(April 2012–March 2013)*		*Year 3* *(April 2013–March 2014)*
Program	Savings Goal (gross kWh)	Actual Savings (gross kWh)	Savings Goal (gross kWh)	Actual Savings (gross kWh)*	Savings Goal (gross kWh)**
Residential Solutions	651,656	3,080,830	868,874	2,204,875	3,359,323
ENERGY STAR Air Conditioning	651,656	134,655	1,178,169	186,063	296,543
Air Conditioning Tune-up	882,739	429,291	1,176,985	341,507	695,479
Energy-Efficient New Homes	1,266,391	207,067	2,308,671	545,045	160,130
CFL Direct Install	3,424,013	3,726,006	4,565,349	1,582,068	2,881,722
Weatherization Ready (Low Income)	81,699	419,857	122,250	663,929	382,723
Solar Water Heater Pilot	259,785	5,438	0	0	27,190
Total Residential	7,449,910	8,003,144	10,220,298	5,523,487	7,803,110
Small Commercial Solutions	2,230,328	2,231,265	2,230,328	1,775,580	2,207,088
Large Commercial and Industrial Solutions	4,130,464	5,578,546	4,130,464	6,074,342	5,578,532
Total Commercial & Industrial	6,360,792	7,809,811	6,360,792	7,849,922	7,785,620
***Total* Energy Efficiency Programs**	13,810,702	15,812,955	*16,581,090*	*13,373,409*	*15,588,730*
Total as percentage *of previous-year sales*	0.27%	0.31%	0.32%	0.26%	0.29%

Sources: Entergy 2012c; New Orleans 2013c; and Entergy 2013b. * Year 2 results presented here include only the results from the first three quarters of the program year, April through December 2012. ** In late 2012, programs were also approved for Algiers to be implemented by Entergy Louisiana, however the year 3 goals presented here include only those programs implemented by Entergy New Orleans.

In addition to the programs administered by Entergy New Orleans, Global Green USA in partnership with the Mayor's Office and the Southeast Energy Efficiency Alliance administers the NOLA Wise program, which provides whole-home energy assessments, access to qualified home performance contractors, incentives for energy improvements, and a quality control process coupled with the option of financing from Fidelity Homestead Savings Bank (NOLA Wise 2011; DOE 2013b). As of January 2013 the program has completed 287 home energy audits and 72 retrofits, which have resulted in 241 MWh in electricity savings and an average household energy cost savings of $637 annually (SEEA 2013). While the program's current funding through by the U.S. Department of Energy's Better Buildings Neighborhood Program will expire in the next year, it has developed an important professional infrastructure in New Orleans for delivering comprehensive building energy improvements that, with sustained funding, can continue to provide value in the form of energy savings and community economic development.

Program Analysis

We use these existing programs as the starting point of our analysis of the energy savings potential from utility-sector programs for the residential and commercial markets over the time period to 2030. We also analyze the potential savings from a number of additional programs that are not yet provided in the New Orleans market. The programs included in our analysis are listed in the final column of Table 6. This list represents a comprehensive but not exhaustive set of programs and is based on ACEEE's research on best-practice efficiency programs. We do not include an assessment of program potential for the industrial sector, in part because it represents a small portion of energy consumption in the city. Despite this, significant savings are available from industrial customers, as indicated by other analyses such as ICF 2012. Several other program types could be considered. Overall, it is important to maintain flexibility in designing program portfolios, allowing for adjustments to programs as needed to improve participation rates and overall effectiveness. For more information on program options from a national "best practices" perspective, see *Frontiers of Energy Efficiency* (York et al. 2013).

We recognize that, in addition to recent program experience in New Orleans, forward-looking analyses of efficiency program potential and new program proposals have recently been completed for the city. These include the ICF International demand-side management potential study (ICF 2012) and the energy savings from efficiency programs resulting from the "Preferred Portfolio" scenario in Entergy New Orleans proposed IRP (Entergy 2012a). With an eye toward placing our analysis in the context of the existing programs and other reports, a comparison of which programs are included in each is provided in Table 6. Although the details of programs are not perfectly equivalent, this comparison matches each program with its rough analogies across the table's rows. Since ACEEE did not include any distributed generation (solar) or demand-response programs in our analysis, we have not included such programs in the table. In addition, our analysis includes savings potentials for both electricity and natural gas, whereas existing Energy Smart programs and the other analyses consider only electricity savings.

Table 6. Comparison of Energy Efficiency Program Options Analyzed with Existing Programs and Other Reports

Existing Energy Smart Programs (Electricity)	ICF 2012 DSM Study (Electricity)	Entergy 2012 IRP Preferred Portfolio (Electricity)*	ACEEE Analysis (Electricity & Natural Gas)
Residential			
Residential Solutions Program	Residential Energy Solutions		Home Retrofit
ENERGY STAR Air Conditioning Program	ENERGY STAR Air Conditioning	ENERGY STAR Air Conditioning	Cooling and Heating
A/C Tune-up Program	AC Tune-up		Cooling and Heating
Energy-Efficient New Homes Program	Energy Smart New Homes	Energy Smart New Homes	New Construction & Code Support
CFL Direct Install Program	Residential Lighting and Appliances	Residential Lighting and Appliances	a) Lighting b) Retail Products
Weatherization Ready Program (Low Income)	Low-Income Weatherization		Low-Income Weatherization
Solar Water Heater Program (pilot)	Solar Water Heater Pilot		
	Multifamily		Multifamily
	Home Energy Use Benchmarking		Enhanced Billing & Information Feedback
			Water Heating
Commercial and Industrial			
Small Commercial Program	Small Commercial Energy Solutions	Small Commercial Energy Solutions	Small Commercial
Large Commercial and Industrial Program	Large Commercial Energy Solutions	Large Commercial Energy Solutions	a) Large Commercial Custom b) Prescriptive Rebates & Upstream Incentives
	Commercial Building Energy Management	Commercial Building Energy Management	Retrocommissioning
	Commercial New Construction	Commercial New Construction	New Construction and Code Support
	Industrial	Industrial	
			Computer Efficiency & Plug Loads

Sources: Entergy 2012c; ICF 2012; Entergy 2012a. *The programs included here have since by supplemented in the IRP DSM Plan (Entergy 2013b) with additional programs, including low-income weatherization, multifamily, and home retrofits (Home Performance with Energy Star).

Our program analysis is based on a program-by-program scaling of the statewide program analysis to the New Orleans context. For more detailed descriptions of each of the programs included and the methodology used to model each, see *Louisiana Energy Efficiency Roadmap 2030* (Molina 2013). For information on the methodology used to scale each program to New Orleans, see Appendix A.

RESIDENTIAL

Our analysis of efficiency options for the residential customer class includes ten policies/programs, including nine utility program options. Together, these programs, combined with improved statewide building energy codes, can save over 5% of electricity use by 2020 and 23% by 2030 relative to sector reference case electricity sales (Table 7). Many of the programs save both electricity and natural gas, such as home retrofit and new construction, in which case we analyze dual-fuel savings opportunities while apportioning the program costs across both energy savings types. Additionally, programs targeting natural gas end uses can save over 6.5% of natural gas consumption in 2020 and nearly 20% by 2030 (Table 8).

Table 7. Total Annual Residential Electricity Savings (GWh)

	2020		2030	
Residential Programs	GWh	Percentage of Reference Case	GWh	Percentage of Reference Case
Building Energy Codes	12	0.6%	46	2.3%
New Construction and Code Support	16	0.8%	55	2.7%
Low-Income Weatherization	13	0.7%	31	1.5%
Multifamily	9	0.5%	29	1.4%
Home Retrofit	38	2.0%	78	3.9%
Retail Products	9	0.5%	38	1.8%
Lighting	40	2.0%	72	3.6%
Cooling and Heating	12	0.6%	47	2.3%
Water Heating	6	0.3%	26	1.3%
Enhanced Billing & Information Feedback	22	1.1%	45	2.2%
Residential Subtotal	176	5.2%	467	23.0%

Table 8. Total Annual Residential Natural Gas Savings (MMCF)

	2020		2030	
Residential Programs	MMCF	Percentage of Reference Case	MMCF	Percentage of Reference Case
Building Energy Codes	37	0.9%	127	2.9%
New Construction and Code Support	26	0.6%	85	2.0%
Low-Income Weatherization	81	1.9%	152	3.5%
Multifamily	13	0.3%	51	1.2%
Home Retrofit	51	1.2%	138	3.2%
Retail Products	n/a	0.0%	n/a	0.0%
Lighting	n/a	0.0%	n/a	0.0%
Cooling and Heating	24	0.6%	150	3.5%
Water Heating	28	0.7%	122	2.8%
Enhanced Billing & Information Feedback	16	0.4%	32	0.7%
Residential Subtotal	277	6.6%	856	19.8%

COMMERCIAL

Our analysis of efficiency options for commercial customers covers eight policies/programs, including six utility program options. Our analysis finds that these programs, combined with improved statewide building energy codes and lead-by-example policies for government facilities, can save 8.4% electricity savings by 2020 and 22% savings by 2030 (Table 9). Many of the programs can be designed to save both electricity and natural gas. Programs targeting natural gas end-uses can save over 4% of natural gas consumption in 2020 and nearly 14% by 2030 (Table 10).

Table 9. Total Annual Commercial Electricity Savings (GWh)

	2020		2030	
Commercial Programs	GWh	Percentage of Reference Case	GWh	Percentage of Reference Case
Building Energy Codes	38	1.2%	140	4.2%
Lead by Example in Government Facilities	52	1.6%	185	5.5%
New Construction and Code Support	6	0.2%	39	1.2%
Small Commercial	48	1.5%	62	1.9%
Large Commercial Custom	87	2.7%	118	3.5%
Computer Efficiency & Plug Loads	14	0.4%	24	0.7%
Prescriptive Rebates & Upstream Incentives	18	0.6%	79	2.3%
Retrocommissioning	8	0.3%	92	2.7%
Commercial Subtotal	**270**	**8.4%**	**740**	**22.0%**

Table 10. Total Annual Commercial Natural Gas Savings (MMCF)

	2020		2030	
Commercial Programs	**MMCF**	**Percentage of Reference Case**	**MMCF**	**Percentage of Reference Case**
Building Energy Codes	66	1.3%	242	4.6%
Lead by Example in Government Facilities	18	0.4%	67	1.3%
New Construction and Code Support	6	0.1%	36	0.7%
Small Commercial	n/a	n/a	n/a	n/a
Large Commercial Custom	61	1.2%	130	2.5%
Computer Efficiency & Plug Loads	n/a	n/a	n/a	n/a
Prescriptive Rebates & Upstream Incentives	46	0.9%	165	3.2%
Retrocommissioning	8	0.2%	92	1.8%
Commercial Subtotal	**206**	**4.1%**	**733**	**14.0%**

UTILITY PROGRAM PORTFOLIO

Our analysis, as shown in Table 11, finds that utility programs alone (i.e., excluding building energy codes) can achieve cumulative electricity savings of 6.8% in 2020, increasing to 16.8% by 2030, and cumulative natural gas savings of 3.5% in 2020, increasing to 11.1% by 2030.

Table 11. Energy Savings from Utility Programs by Fuel and Customer Class in 2020 and 2030

	2020		2030	
Electricity End-Use Efficiency Savings	**GWh**	**Percentage of Reference Case ***	**GWh**	**Percentage of Reference Case ***
Residential	165	8.5%	422	20.7%
Commercial	180	5.6%	414	12.3%
Electricity Total	345	5.9%	836	13.8%
Natural Gas End-Use Efficiency Savings	**MMCF**	**Percentage of Reference Case ***	**MMCF**	**Percentage of Reference Case ***
Residential	240	5.7%	729	16.9%
Commercial	122	2.4%	423	8.1%
Natural Gas Total	362	3.4%	1,153	10.5%

*Savings are shown as a percentage of sales by customer class in the reference case scenario. Total savings are shown as a percentage of all sales, including sales to industrial customers.

The utility program energy savings are equivalent to displacing the need for a new 100 MW combined-cycle gas turbine (CCGT) in 2020, and by 2030 displacing 250 MW of CCGT generation.[5] This 2020 savings would remove the need for more than half of the planned 171 MW CCGT generation resource noted in Entergy's proposed IRP as being in operation starting in 2020.

Finally, as previously noted, our New Orleans analysis does not include industrial programs. We made this choice to simplify our analysis and because industrial customers make up a relatively small portion of energy consumption in the city, approximately 11% of Entergy New Orleans electricity sales. That said, considerable cost-effective, achievable savings have been identified by other studies (ICF 2012; Molina 2013). Based on these analyses we estimate that industrial-sector programs can contribute at least another 1 percent savings for both electricity and gas by 2020 and savings of several additional percent for each fuel by 2030.

Costs and Benefits of the Programs and Policies Analyzed

The following sections put the energy saving results of our analysis in context. First, we discuss the costs and benefits associated with the policies and programs analyzed. Second, we discuss the results in the context of other analyses of the efficiency potential in New Orleans.

COST AND BENEFIT TESTS

Stakeholders use multiple cost-effectiveness tests to evaluate energy efficiency investments, and each test provides different information about the impacts of efficiency programs from the different vantage points in the energy system. The total resource cost (TRC) test indicates whether the program will produce a net reduction in energy costs in the utility service area over the lifetime of the program impacts. Other tests are used as distributional assessments, i.e., they indicate the vantage point of different stakeholders. These tests are the program administrators cost (PAC) test (also known as the utility cost test [UCT]), the participant cost test (PCT), and the rate impact measure (RIM) test. The first three tests are defined as follows:

- The total resource cost test measures the benefits of energy efficiency programs for the region as a whole. Costs are the incremental costs to purchase and install energy efficiency improvements, incurred by both the program administrators and the participants, as well as the overhead to administer the programs. The benefits are the avoided costs of energy (in dollars per kWh) and capacity (in dollars per kW), which reflect infrastructure costs, such as building power plants, that accrue from the program impacts.
- The program administrator cost test (or utility cost test) measures benefits and costs from the perspective of considering energy efficiency as a resource to the utility on par with supply-side resources. The costs are those incurred by the utility/program

[5] Assuming a capacity factor for the combined cycle gas turbine of 42.2% (based on EIA 2011 data) and 7% line loss.

administrator, which includes financial incentives such as rebates or technical expertise, as well as program overhead such as marketing and administration. The benefits are the avoided costs of energy and capacity that accrue from the program impacts (the same as the TRC benefits).

- The participant cost test (PCT) measures the benefits and costs from the perspective of a program participant. Costs are the incremental costs to purchase and install energy efficiency improvements, incurred by both the program administrators and the participants, while the benefits are the avoided retail customer costs plus the rebates/incentives paid to the participant.

While the RIM test can provide important information to program administrators, it has become widely recognized as inappropriate for screening energy efficiency programs and has fallen out of use (Woolf et al. 2012). Only one state continues to use RIM as its primary cost-effectiveness test (Kushler et al. 2012). The societal test, a variation on the TRC, includes other non-energy benefits that accrue from energy efficiency, including reductions in air emissions, reduced risk, etc. In practice policymakers decide which specific benefits should be included in the cost-benefit analyses for programs under their jurisdictions.

While some states designate a primary test to use, others require all tests and others require no specific tests. According to a 2008 national review, the TRC is the most common primary measurement of efficiency cost-effectiveness (EPA 2008). There has been increasing criticism of how the TRC is applied, however, and calls for improving the comprehensiveness of the benefits side of the test (Neme & Kushler 2010). And with many states and regions increasingly using energy efficiency as a resource to the utility system, the PAC/UCT has become increasingly important. The PAC/UCT is recommended for jurisdictions seeking to emphasize efficiency as a resource to the utility system on par with other resources.

We present the benefit-cost results of the programs we analyzed in Table 12. We use a 5% real discount rate,[6] and we have presented the results using three tests: TRC, PCT, and PAC. Under all tests these investments have a cost-benefit ratio of greater than 1, meaning that the investments meet the test's criteria for cost-effectiveness. Under the total resource cost test, our analysis shows a direct net benefit to the New Orleans economy of $443 million over the course of the study period.

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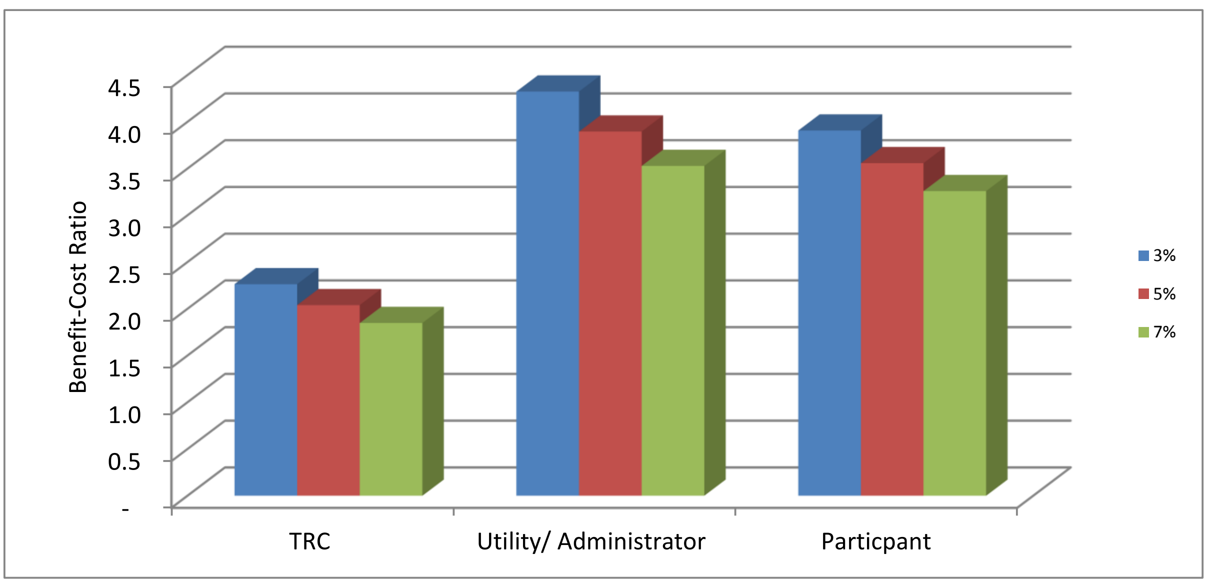
[6] We use a real discount rate because our analysis is in real (2011) dollar terms. This is not equivalent to a discount rate based on the weighted average cost of capital (WACC). The real cost of capital (as opposed to nominal cost often used in WACC) for electric utilities is currently about 3.5%, according to one comprehensive analysis on the cost of capital among various economic sectors (Damodaran 2013).

Table 12. Costs and Benefits by Cost Test
(Millions of 2011 Dollars; 5% Real Discount Rate)

	NPV Costs	NPV Benefits	Net Benefit	Benefit/Cost Ratio
Total Resource Cost Test				
Residential	$ 208	$ 385	$ 177	1.9
Commercial	$ 219	$ 485	$ 266	2.2
Total	$ 427	$ 870	$ 443	2.0
Participant Test				
Residential	$ 172	$ 567	$ 395	3.3
Commercial	$ 188	$ 712	$ 525	3.8
Total	$ 360	$ 1,280	$ 920	3.6
Utility/Administrator Cost Test				
Residential	$ 119	$ 385	$ 266	3.2
Commercial	$ 104	$ 485	$ 381	4.7
Total	$ 223	$ 870	$ 647	3.9

Benefits from energy efficiency accrue over the lifetime of the energy-saving measures, and therefore the stream of monetized benefits is discounted to compare those benefits to the implementation costs in the same time frame. Toward this end, net present value (NPV) analysis is used, and assumes a discount rate to represent future cash flow in present dollar terms. The specific discount rate assumptions are a significant driver of the results of cost/benefit tests. To better understand the implications of the choice of discount rate on the results of the benefit-cost tests, we ran a sensitivity analysis, as displayed in Figure 8. These results show that under real discount rates ranging from 3% to 7% all of the cost tests continued to provide a large net benefit, in all cases resulting in a benefit-cost ratio of 1.8 or greater.

Figure 8. Costs and Benefits by Cost Tests and Discount Rates sensitivities



COMPARISON OF RESULTS TO OTHER ANALYSES

Our analysis provides an additional perspective on the policy and program potential for efficiency in New Orleans. Our approach and results share many similarities with, but also differ in important ways from, other recent New Orleans–focused efficiency-related analyses. These include the ICF demand-side management potential study (ICF 2012) and the Entergy New Orleans proposed IRP (Entergy 2012a) and subsequent updates in the related Supplemental IRP Filing (Entergy 2013b). We compare the electricity savings results of these three analyses in Table 13.

Table 13. Potential Electricity Savings in 2030 as Identified in Recent Analyses

Savings in 2030 by Analysis	***ACEEE 2013***		***ICF 2012—High Case***		***ENO 2012—Preferred Portfolio*****	
Residential Programs	**GWh**	**Percentage of Reference Case**	**GWh**	**Percentage of Reference Case**	**GWh**	**Percentage of Reference Case**
Building Energy Codes	46	2.3%	0	0%	0	0%
New Construction and Code Support	55	2.7%	1	0%	0	0%
Low-Income Weatherization	31	1.5%	14	1%	0	0%
Multi-Family	29	1.4%	27	1%	0	0%
Home Retrofit	78	3.9%	69	3%	0	0%
Retail Products	38	1.8%	47	2%	33	2%
Lighting	72	3.6%	0*	0%	0*	0%
Cooling and Heating	47	2.3%	62	3%	31	2%
Water Heating	26	1.3%	0	0%	0	0%
Enhanced Billing & Information Feedback	45	2.2%	4	0%	0	0%
Residential Subtotal	467	23.0%	224	11%	64	3%
Commercial Programs						
Building Energy Codes	140	4.2%	0	0%	0	0%
Lead by Example in Government Facilities	185	5.5%	0	0%	0	0%
New Construction and Code Support	39	1.2%	71	2%	29	1%
Small Commercial	62	1.9%	85	3%	37	1%
Large Commercial Custom	118	3.5%	362	11%	205	6%
Computer Efficiency & Plug Loads	24	0.7%	0	0%	0	0%
Prescriptive Rebates & Upstream Incentives	79	2.3%	0	0%	0	0%
Retrocommissioning	92	2.7%	24	1%	10	0%
Commercial Subtotal	740	22.0%	542	16%	280	8%
Industrial	0	0.0%	53	8%	36	5%
Total All Programs	1,207	19.9%	818	13%	380	6%

* Lighting is included with Retail Products in this table since the ICF and ENO program analyses combine them within the Residential Lighting and Appliances program. **The programs included here have since by supplemented in the IRP DSM Plan (Entergy 2013b) with additional programs, including low-income weatherization, multifamily, and home retrofits (Home Performance with Energy Star). These additional programs are expected to result in considerable additional cost-effective energy savings. However, we do not include these programs in this table because the plan covers only a three-year period (2014–17) and is not comparable to the 2030 savings presented here.

The three program portfolios consist largely of the same types of programs. The exceptions are that 1) the ENO Preferred Portfolio drops several residential programs that were included in the ICF analysis; 2) the ACEEE analysis does not include any industrial programs; 3) ACEEE does evaluate the impacts of nonutility policies (energy codes and government lead-by-example programs) that are not included in the other analyses; and 4) ACEEE also includes a few additional utility programs not explicitly included by ICF or ENO (residential water heating, computer efficiency and plug loads, and commercial prescriptive rebates and upstream incentives).

Although not as easily seen in the table, there are also variations in program design assumptions that influence program cost assumptions and the resulting programs included in the portfolios. For example, ACEEE's analysis includes only energy efficiency programs, while the other analyses included solar and demand-response programs. Solar programs will tend to make the overall portfolio more expensive, while demand-response programs will typically make it less expensive. However, in most cases it does not make sense for these programs to compete for resources with efficiency programs because they provide different benefits. Finally, the portion of costs associated with program administration in the ICF and ENO analyses appears to be high compared to national averages. It is possible that these cost assumptions are the result of early implementation experience and implementation in a small service territory, which may to come down as experience with program implementation grows and economies of scale are achieved.

Macroeconomic Analysis: Jobs, Revenues

Authored by Evergreen Economics

In support of ACEEE's efforts to prepare a study of the economic and achievable potential for energy efficiency resources in New Orleans, Evergreen Economics estimated the economic and fiscal impacts of the proposed portfolio of programs over a 20-year study period (2010–2030).

Economic and fiscal impacts were measured using an input-output modeling framework and IMPLAN economic impact modeling software. The IMPLAN model is constructed with historical government data from 2010 on industries and households in Orleans Parish, the most recent data available. The inputs utilized by the city-level model include program implementation costs, net incremental measure spending, net energy savings to households and businesses, changes in utility revenues, and changes in household spending on nonutility goods and services. Economic impacts are measured as changes in output, wages, business income, and employment. Fiscal impacts include changes in tax and fee revenues for state and local taxing jurisdictions.

For this analysis, gross impacts are calculated and then compared against a base case spending scenario that assumes that the funds used to support energy efficiency program activities and incentives are returned to and spent by New Orleans ratepayers. The difference in economic impacts attributed to the programs and the base case scenario are referred to as *net impacts*.

In addition to the economic benefits from initial equipment expenditures, the energy efficiency programs generate energy bill savings that continue to benefit program participants beyond the first year of measure implementation. Consequently, Evergreen Economics also analyzed the economic and fiscal impacts attributed to energy savings that continue in the future over the expected lifespan of the installed energy efficiency equipment.

KEY FINDINGS

Summary of Findings

Investments in energy efficiency in New Orleans are expected to result in energy savings, increased economic output, business income, jobs, and state and local taxes in the twenty-year program period and beyond. As shown in Table 14, between 2010 and 2030 it is estimated that the portfolio of efficiency programs will result in the following net *cumulative* impacts:

- Over $1.4 billion in economic output, including $510 million in wages, and $352 million in business income to small business owners, and 11,900 person-years of employment over the twenty-year period.
- Increased state and local tax revenue by $40 million.
- Additional energy savings in future out-years after the programs end in 2030 will sustain a total of $1.02 billion in output, including $391 million in wages, $240 million in business income, over 10,000 person years of employment, and an increase of $41 million in state and local tax revenue.

Table 14. Summary of Energy Savings and Net Economic Impacts in New Orleans

Impact Measure	Impacts During Program Years 2010–2030	Impacts in Future Out-Years 2031–2040
Electricity Savings (GWh)	10,320	8,030
Natural Gas Savings (MMCF)	12,090	10,820
Output ($MM)	$1,438	$1,020
Wages ($MM)	$510	$391
Jobs (person-years)	11,900	10,050
Business Income ($MM)	$352	$240
State and Local Taxes ($MM)	$40	$41

Presented another way, these programs would result in the following *annual* impacts in 2030:

- $169 million in economic output, including $62 million in wages and $41 million in business income to small business owners, and 1,500 person-years of employment in 2030.
- Increased state and local tax revenue of $6 million.
- Additional energy and cost savings in the years after the programs ends sustaining economic benefits.

The remainder of this report documents the analysis that was completed to develop these economic impact estimates beginning with a summary of model inputs, methodology, and, finally, detailed results.

PROGRAM ACTIVITIES

Expenditures

For this analysis, spending and energy savings data relating to the proposed efficiency programs were provided by ACEEE and aggregated into several general categories to facilitate economic impact modeling. Table shows the spending for residential and commercial programs in selected years. Although additional program expenditures occur on an annual basis for most programs, the table omits many of these years for ease of presentation.

Table 15. Expected Energy Efficiency Program Spending in New Orleans
(Selected Years, 2010–2030; Millions of Dollars)

Impact Measure	2015	2020	2025	2030	Total Program (2010–2030)
Total Residential	$6.1	$12.1	$16.7	$15.9	$221.1
Total Commercial	$6.0	$10.1	$13.9	$13.1	$189.8
Total All Programs	**$12.1**	**$22.2**	**$30.6**	**$29.0**	**$410.9**

Energy Efficiency Equipment Spending

Next, our analysis considers incremental equipment spending by program. Net incremental spending represents additional spending on energy efficiency equipment in homes and businesses beyond what would have been spent on standard efficiency equipment in the absence of energy efficiency programs. While equipment spending and program spending generally exhibit an increasing trend from 2010 to 2025, as new codes and standards come into effect and base efficiency levels increase, incremental equipment spending begins to decrease. By 2030, we find that the total amount of equipment spending attributed to energy efficiency programs is less than the amount of spending that occurs in 2025.

ECONOMIC IMPACT ANALYSIS METHODS

Measuring the economic impacts attributable to efficiency programs is a complex process, since spending by the city of New Orleans and local utilities—and subsequent changes in spending by program participants—unfolds over a lengthy period of time. From this perspective, the most appropriate analytical framework for estimating the economic impacts is to classify them into the following categories:

- *Short-term* impacts are associated with changes in business activity as a direct result of changes in spending (or final demand) by program implementers; energy efficiency program participants; and ratepayers, who provide funding for energy efficiency programs.
- *Long-term* impacts associated with the potential changes in relative prices, factor costs (e.g., changes in wage rates, cost-of-capital, and fuel prices), and the optimal use of resources among program participants, as well as industries and households linked by competitive, supply-chain, or other factors.

This analysis measures the short-term economic impacts associated with efficiency programs in New Orleans. These impacts are driven by changes (both positive and negative) in final demand, and are measured within a static input-output modeling framework that relies on data for an economy at a point in time and assumes that program spending does not affect the evolution of the city's economy. Energy efficiency programs may have longer lasting effects, and this is clearly the case for continued energy savings beyond the end of the programs in 2030. However, these long-term, dynamic effects are not measured in this analysis.

The IMPLAN input-output model has several features that make it particularly well suited for estimating these short-term impacts.

- The IMPLAN model is widely used and well respected. The IMPLAN model is constructed with data assembled for national income accounting purposes, thereby providing a tool that has a robust link to widely accepted data development efforts. The United States Department of Agriculture (USDA) recognized the IMPLAN modeling framework as "one of the most credible regional impact models used for regional economic impact analysis" and, following a review by experts from seven USDA agencies, selected IMPLAN as its analysis framework for monitoring job creation associated with the American Recovery and Reinvestment Act (ARRA) of 2009.[7]
- The IMPLAN model's input-output framework and descriptive capabilities allow for the construction of economic models with region-specific data for 440 different industry sectors, as well as for households and government institutions. These details permit accurate mapping of program spending and energy savings to industry and household sectors in the IMPLAN model.
- Finally, the IMPLAN model is based on historical economic data for New Orleans and, therefore, reflects the unique nature of New Orleans' economy.

Input-output analysis employs specific terminology to identify the different types of economic impacts. Energy efficiency programs affect the city directly, through the purchases of goods and services within the region. Specific direct impacts include spending by staff administering the energy efficiency programs and manufacturers and contractors that produce and install the energy-efficient equipment. Direct impacts also include changes in spending or output attributed to energy bill savings for households and businesses participating in efficiency programs.

These direct changes in economic activity will indirectly generate purchases of intermediate goods and services from related sectors of the economy. In addition, the direct and indirect increases in employment and income enhance overall economy purchasing power, thereby inducing further economic impacts as households increase spending and businesses increase investment. This cycle continues until the spending eventually leaks out of the local

[7] See excerpts from an April 9, 2009, letter to MIG, Inc., from John Kort, acting administrator of the USDA Economic Research Service, on behalf of Secretary of Agriculture Vilsack, at http://www.implan.com.

economy as a result of taxes, savings, or purchases of non-locally produced goods and services.

Within this framework, the IMPLAN model reports the following impact measures:

- Output is the value of production for a specified period of time. Output is the broadest measure of economic activity, and includes intermediate goods and services and the components of value added (personal income, other income, and indirect business taxes).
- Wages include workers' wages and salaries, as well as other benefits such as health and life insurance, retirement payments, and noncash compensation.
- Business income is also called proprietary income (or small business income) and represents the payments received by small business owners and self-employed workers.
- Job impacts include both full- and part-time employment. Over time, these job impacts are expressed as person-years of employment, since they represent the number of jobs sustained over a single year.

Given the static nature of the input-output model used in this analysis, it is important to note that the cumulative impacts presented do not take into account changes in production and business processes that businesses make in anticipation of future increased energy prices and/or competition to increase production efficiency. To the extent that New Orleans businesses are already making adjustments in anticipation of these factors, the cumulative impacts presented here may be overstated, as the overall market would become more efficient due to factors outside program influence.

The cumulative numbers also rely on the assumption that each dollar saved will translate into a dollar of increased economic output for those businesses installing efficiency measures. This assumption conforms to findings in previous research conducted by Evergreen staff,[8] and it is reasonable in the short run. In the long run, however, it is possible that a dollar of energy savings will translate to less than a dollar of increased economic output if businesses adopt more efficient production practices. Despite these caveats, the ongoing and cumulative effect of conservation due to energy efficiency program activities is nevertheless a significant net benefit to New Orleans' economy.

Gross and Net Economic Impacts

For this analysis, *gross impacts* refer to *economic* impacts that do not include a counterfactual base case scenario that compares alternative uses of program funding. The gross impacts are calculated based on the annual program spending and energy savings for New Orleans discussed below. These input parameters are then compared against a base case spending scenario that assumes that New Orleans program funding is returned to New Orleans ratepayers and spent following historical purchase patterns. The difference between the

[8] For more information please see the following documentation: http://www.ecy.wa.gov/climatechange/docs/20100707_wci_econanalysis.pdf.

gross economic impacts attributed to the proposed New Orleans programs and the base case scenario is referred to as *net impacts.*

For the proposed New Orleans energy efficiency programs and policies, specific gross spending impacts include the following:

- Program administration as program implementers incur administrative costs and purchase labor and materials to carry out energy efficiency programs.
- Incremental measure spending represents additional spending on energy efficiency beyond what would have been spent on standard less-efficient measures in the base case.
- Reductions in energy consumption and the associated increase in household disposable income and lower operating costs for businesses.
- For residential program participants, lower energy costs will increase household disposable income, which is assumed to be spent following historical purchase patterns.
- For businesses, energy savings reduce production costs, which, in the short run, leads to changes in productivity. To estimate the economic impacts associated with these lower energy costs, Evergreen Economics used an elasticity-based approach to measure the direct change in output and associated changes in direct employment and income.
- Energy savings begin to accrue after energy efficiency measures have been installed. Thus, energy savings in the program year must take into account the timing of these installations. In this analysis, we have assumed that installations occur evenly throughout the year and have used a fifty percent implementation adjustment factor for energy savings in the first program year.
- The efficiency gains result in some loss of utility revenues due to lower power sales. We assume that the utilities are able to recover from ratepayers the costs of implementing the efficiency programs plus some recovery of lost revenues. The mechanisms typically used for revenue recovery are complicated and vary from state to state. To simplify this process for the IMPLAN model, we assume that the utilities are able to recover fifty percent of their lost retail revenues to simulate the revenue recovery process. Our fifty percent estimate assumes that half of utility revenues cover fixed costs, which then need to be recovered from ratepayers, while the other fifty percent represents variable costs that the utility can save as the need for power declines.[9]. To reflect the ratepayer perspective, the energy savings of households and businesses are also reduced by fifty percent as part of the revenue recovery mechanism (e.g., half of the energy savings value is transferred from ratepayers to the utility sector through the revenue recovery process). The fifty percent assumption is likely higher than utilities would actually be able to recover (e.g., fixed costs are likely less than fifty percent of revenues), which results in a conservative estimate of impacts for our model.

[9] A quick review of the energy cost data provided for Louisiana shows that about fifty percent of the retail power costs are avoided costs, indicating that the remaining fifty percent are likely fixed costs, which helps support the assumption used in our model.

ECONOMIC IMPACT RESULTS

The economic impacts associated with New Orleans' efficiency programs are reported in this section. Results are arranged as follows:

- Total gross and net economic impacts. This section also reports the distribution of net impacts by residential and commercial programs.
- Economic impacts attributed to energy savings continuing in future years after the programs have ended in 2030.

Total Gross and Net Impacts

The following sections present the gross and net economic impacts of the residential sector and commercial sector programs included in the analysis.

RESIDENTIAL SECTOR

Table 16 shows total cumulative gross and net economic impacts in New Orleans from residential efficiency programs from 2010 to 2030. Over this 20-year program period, we expect to see a total increase in the city's economic output of nearly $501 million relative to the base case scenario. Stated another way, the efficiency programs will increase economic output in New Orleans by $501 million over what they would have been had the programs not existed, the energy efficiency savings had not been achieved, and the program spending funds were returned to ratepayers and spent following historical purchase patterns. This estimate (and all the ones discussed below) also takes into account the costs of the programs and higher equipment costs to consumers and assumes a revenue mechanism where ratepayers compensate utilities for lost revenues. This increase in economic output corresponds to an increase of $167 million in increased wage income and over $137 million in business income. Over this period, the net gains associated with the efficiency scenario are able to sustain 4,000 jobs (measured in person-years of employment). Finally, the net gain in economic activity also results in an increase in tax revenue generated for state and local governments. As shown at the bottom of the table, state, and local governments will see an increase of $15 million in tax revenue over the base case scenario.

Table 16. Total Gross and Net Economic Impacts for Residential Efficiency Programs (2010–2030)

Impact Measure	Gross Impacts	Net Impacts
Residential		
Electricity Savings (GWh)	4,107	4,107
Natural Gas Savings (MMCF)	6,676	6,676
Output ($ MM)	$831	$501
Wages ($ MM)	$300	$167
Jobs (person-years)	7,200	4,000
Business Income ($ MM)	$229	$137
State and Local Taxes ($ MM)	$30	$15

COMMERCIAL SECTOR

Table 17 shows the analogous gross and net economic impacts for the commercial efficiency programs. These impacts are in addition to those estimated for the residential sector. In general, energy savings are expected to be slightly higher for the commercial sector, and as a consequence the resulting economic impacts are also higher relative to the residential programs. All of the same assumptions discussed for the residential sector are also used in the commercial sector, including the assumptions regarding utility revenue recovery. In total from 2010 to 2030, we expect to see an increase in state economic activity equal to $937 million relative to the base scenario where the efficiency programs do not exist. We also find that energy efficiency programs will help sustain 7,900 person-years of employment over the same time period, in addition to the job gains that occur due to the residential sector efficiency programs. The net increase in economic benefits also increases expected tax revenue, with the state and local governments estimated to receive an additional $26 million in tax revenue relative to what would occur in the base scenario.

Table 17. Total Gross and Net Economic Impacts for Commercial Efficiency Programs (2010–2030)

Impact Measure	Gross Impacts	Net Impacts
Commercial		
Electricity Savings (GWh)	6,207	6,207
Natural Gas Savings (MMCF)	5,414	5,414
Output ($ MM)	$1,231	$937
Wages ($ MM)	$451	$344
Jobs (person-years)	10,800	7,900
Business Income ($ MM)	$281	$215
State and Local Taxes ($ MM)	$37	$26

Overall, the portfolio of residential and commercial energy efficiency programs is expected to achieve significant gains in the regional economic activity beyond the base case scenario. The primary driving force behind these net economic gains is the energy bill savings enjoyed by households and businesses that result from the increase in energy efficiency. These energy savings continue after the initial installation year, resulting in a substantial amount of economic benefits accruing throughout the study period and beyond.

Conclusion

In this analysis we explored the questions of how much energy efficiency potential is available in New Orleans and what specific steps stakeholders can take to harness this potential through policies and programs. The suite of program and policy options presented in this report can together help the city expand its efforts to improve energy efficiency and foster economic growth. We found that the set of policies and programs recommended can meet 20% of the city's electricity needs by 2030 and 14.5% of natural gas needs. We also examined the financial and macroeconomic impacts of improved energy efficiency on New Orleans' economy.

Our review of the policies in place in New Orleans finds that while it has made significant strides to improve efficiency through policies and programs there is much work to be done to realize the full benefits that efficiency investments can offer the city. Energy efficiency can play a critical role in New Orleans' energy future, as a least-cost resource that benefits all customers, and as an economic development tool.

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Appendix A. Program Analysis Methodology

The program and policy analysis for New Orleans is based on a similar statewide analysis undertaken by ACEEE for Louisiana that is included in *Louisiana's 2030 Energy Efficiency Roadmap* (Molina 2013). The statewide analysis was then scaled to New Orleans in a year-by-year, program-by-program fashion as described in this appendix.

Annual values for electricity savings (GWh), natural gas savings (MMCF), program costs (2011 dollars), and participant costs (2011 dollars) were determined in three different ways, depending on when they occur in the program analysis:

1. For years 2011 and 2012, actual Energy Smart program costs and savings are included.
2. Manual multipliers were determined as described below to allow for a reasonable ramp-up period between the years in our analysis when a program is active in New Orleans to only the years where the program is in place statewide.
3. In the later years of the analysis, through 2030, when programs are active in both New Orleans and the remainder of the state, the values for each year are scaled from the Louisiana analysis using a consistent normalization formula as described for each program below. Sources for the data points cited below are the same sources as those used for the equivalent statewide values as cited in Molina 2013.

RESIDENTIAL

Building Energy Codes

For years 2016 to 2030, annual energy savings and cost values are normalized using the formulas below. No additional savings from buildings codes are included before 2016 because we assume no code changes are implemented until that year.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [annual kWh (or MCF) of average new New Orleans home using fuel / annual kWh (or MCF) of average new Louisiana home using fuel] * [annual New Orleans housing starts in year / annual Louisiana housing starts in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

We include no incremental program costs associated with this measure, since code compliance is required by law.

Incremental participant costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [annual New Orleans housing starts in year / annual Louisiana housing starts in year].

New Construction and Code Support

For years 2011 through 2013 all savings in Louisiana are attributed to the New Orleans efforts. Programs are assumed to spread to the rest of the state in 2014–16, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (25% in 2014, 15% in 2015, and 10% in 2016). For years 2017 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [annual kWh (or MCF) of average new New Orleans home using fuel / annual kWh (or MCF) of average new Louisiana home using fuel] * [annual New Orleans housing starts in year / annual Louisiana housing starts in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental program (or participant) costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [annual New Orleans housing starts in year / annual Louisiana housing starts in year].

Low-Income Weatherization

For years 2011 and 2012 savings are based on statewide reported projects and savings through Energy Smart and Louisiana Community Action Partnership. Of documented statewide participants, 445 of 524 in 2011 and 568 of 696 in 2012 were from Energy Smart. Programs are assumed to ramp-up in the rest of the state in 2013–16, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (20% in 2013, 15% in 2014, 12% in 2015, and 10% in 2016). For years 2017 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [annual kWh (or MCF) average of New Orleans single-family and mobile homes using fuel / annual kWh (or MCF) average of Louisiana single-family and mobile homes using fuel] * [households eligible for low-income weatherization in New Orleans in year / households eligible for low-income weatherization in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [households eligible for low-income weatherization in New Orleans in year / households eligible for low-income weatherization in Louisiana in year].

There are no participant costs associated with this program.

Multifamily Homes

Program begins in 2014. Natural gas annual savings and related cost values are normalized using the formulas below for all years through 2030. Electricity annual savings and related cost values are normalized using the formulas below for years 2019 through 2030. For 2014 through 2018, savings and costs for electricity are normalized using the values below and multiplied by 1.5 to represent at higher participation rate in electricity measures in New Orleans as compared to the rest of the state in those years.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [annual kWh (or MCF) average of New Orleans multifamily unit using fuel / annual kWh (or MCF) average of Louisiana multifamily unit using fuel] * [multifamily units in New Orleans in year / multifamily units in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [multifamily units in New Orleans in year / multifamily units in Louisiana in year].

Home Retrofit

For years 2011 through 2013 all savings in Louisiana are attributed to the New Orleans efforts. Savings values for 2011 and 2012 are based on Energy Smart program results. Program is assumed to ramp-up in the rest of the state in 2014–19, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (75% in 2014, 50% in 2015, 45% in 2016, 20% in 2017, 16% in 2018, and 12% in 2019). For years 2020 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * 2 * [annual kWh (or MCF) average of New Orleans single-family and mobile homes using fuel / annual kWh (or MCF) average of Louisiana single-family and mobile homes using fuel] * [single family and mobile homes in New Orleans in year / single-family and mobile homes in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * 2 * [single-family and mobile homes in New Orleans in year / single-family and mobile homes in Louisiana in year].

Retail Products

Program starts in 2014 and is focused on electricity end-uses only. For all years, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual electricity savings, in GWh, in New Orleans = annual Louisiana savings * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

Lighting

For years 2011 through 2013 all savings in Louisiana are attributed to the New Orleans efforts. Savings values for 2011 and 2012 are based on Energy Smart program results. Program is assumed to ramp-up in the rest of the state in 2014, with New Orleans slowly representing 10% of statewide savings and costs that year. For years 2015 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual electricity savings, in GWh, in New Orleans = annual Louisiana savings * 2 (for 2015–2017) or 1.5 (for 2018–2030) * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * 2 (for 2015–2017) or 1.5 (for 2018–2030) * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

Cooling and Heating

For years 2011 through 2013 all savings in Louisiana are attributed to the New Orleans efforts. Program is assumed to ramp-up in the rest of the state in 2014–19, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (15% in 2014, 10% in 2015, 9% in 2016, and 7% in 2017). For years 2018 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual electricity savings, in GWh, in New Orleans = annual Louisiana savings * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

INCREMENTAL ANNUAL NATURAL GAS SAVINGS

Incremental annual savings, in MMCF, in New Orleans = annual Louisiana savings * [residential natural gas customers in New Orleans in year / residential natural gas customers in Louisiana in year] * [average natural gas consumption (MCF) per natural gas customer in New Orleans in year / average natural gas consumption (MCF) per natural gas customer in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year] + annual Louisiana natural gas–related costs * [residential natural gas customers in New Orleans in year / residential natural gas customers in Louisiana in year].

Water Heating

Program begins in 2014. Program is assumed to ramp-up in 2014–16, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (20% in 2014, 15% in 2015, and 10% in 2016). For natural gas these percentages are also normalized by annual average MCF of all New Orleans single-family and mobile homes. For years 2017 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual electricity savings, in GWh, in New Orleans = annual Louisiana savings * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year].

INCREMENTAL ANNUAL NATURAL GAS SAVINGS

Incremental annual savings, in MMCF, in New Orleans = annual Louisiana savings * [total natural gas consumption (MCF) in New Orleans in year / total natural gas consumption (MCF) in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [annual residential sector electricity sales (GWh) in New Orleans in year / annual residential sector electricity sales (GWh) in Louisiana in year] + annual Louisiana natural gas related costs * [(residential natural gas customers in New Orleans in year / residential electric customers in New Orleans in year) / (residential natural gas customers in Louisiana in year / residential electric customers in Louisiana in year)] * [total natural gas consumption (MCF) in New Orleans in year / total natural gas consumption (MCF) in Louisiana in year].

Enhanced Billing and Information Feedback

Program begins in 2014. For years 2014 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual electricity savings, in GWh, in New Orleans = annual Louisiana savings * [residential electric customers in New Orleans in year / residential electric customers in Louisiana in year] * [average electric consumption (MCF) per electric customer in New Orleans in year / average electric consumption (MCF) per electric customer in Louisiana in year].

INCREMENTAL ANNUAL NATURAL GAS SAVINGS

Incremental annual savings, in MMCF, in New Orleans = annual Louisiana savings * [residential natural gas customers in New Orleans in year / residential natural gas customers in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana costs * [residential electric customers in New Orleans in year / residential electric customers in Louisiana in year].

COMMERCIAL

Building Energy Codes

For years 2015 to 2030, annual energy savings and cost values are normalized using the formulas below. No additional savings from buildings codes are included before 2015 because we assume no code changes are implemented until that year.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [new commercial floor area (square feet) using fuel in New Orleans in year / new commercial floor area (square feet) using fuel in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

We include no incremental program costs associated with this measure, since code compliance is required by law.

Incremental participant costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [new commercial floor area (square feet) in New Orleans in year / new commercial floor area (square feet) in Louisiana in year] + annual Louisiana natural gas related costs * [new commercial floor area (square feet) using natural gas in New Orleans in year / new commercial floor area (square feet) using natural gas in Louisiana in year].

Lead by Example in Government Facilities

Program begins in 2014. For years 2014 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [sales (kWh or MCF) to government customers in New Orleans in year / sales (kWh or MCF) to government customers in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [sales (kWh) to government customers in New Orleans in year / sales (kWh) to government customers in Louisiana in year] + annual Louisiana natural gas related costs * [sales (MCF) to government customers in New Orleans in year / sales (MCF) to government customers in Louisiana in year].

New Construction and Code Support

Program begins in 2014. Program is assumed to ramp-up in 2014–16, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (25% in 2014, 20% in 2015, and 15% in 2016). For years 2017 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [new commercial floor area (square feet) using fuel in New Orleans in year / new commercial floor area (square feet) using fuel in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [new commercial floor area (square feet) in New Orleans in year / new commercial floor area (square feet) in Louisiana in year] + annual Louisiana natural gas related costs * [new commercial floor area (square feet) using natural gas in New Orleans in year / new commercial floor area (square feet) using natural gas in Louisiana in year].

Small Commercial

For years 2011 through 2012 all savings in Louisiana are attributed to the New Orleans efforts and are based on Energy Smart results. Program is assumed to ramp-up in the rest of the state in 2013–17, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (70% in 2013, 40% in 2014, 30% in 2015, 25% in 2016, and 20% in 2017). For years 2018 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual savings, in GWh, in New Orleans = annual Louisiana savings * 2 * [commercial electric customers in New Orleans in year / commercial electric customers in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * 2 * [commercial electric customers in New Orleans in year / commercial electric customers in Louisiana in year].

Large Commercial Custom

For years 2011 through 2013 all costs and savings in Louisiana are attributed to the New Orleans efforts. The 2011 and 2012 costs and savings and are based on Energy Smart results. Program is assumed to ramp-up in the rest of the state in 2014–19, with New Orleans slowly representing a smaller portion of statewide savings and costs each year (18% in 2014, 17% in 2015, 16% in 2016, 14% in 2017, 13% in 2018, and 12% in 2019). For years 2020 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual savings, in GWh, in New Orleans = annual Louisiana savings * 2 * [commercial electricity customers in New Orleans in year / commercial electricity customers in Louisiana in year].

INCREMENTAL ANNUAL NATURAL GAS SAVINGS

Incremental annual savings, in MMCF, in New Orleans = annual Louisiana savings * [commercial consumption of natural gas in New Orleans in year / commercial consumption of natural gas in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * 2 * [commercial customers using electricity in New Orleans in year / commercial customers using electricity in Louisiana in year] + annual Louisiana natural gas–related costs * [commercial consumption of natural gas in New Orleans in year / commercial consumption of natural gas in Louisiana in year].

Computer Efficiency and Plug Loads

Program begins in 2014. For years 2014 and 2015 all savings in Louisiana are attributed to the New Orleans efforts. Program is assumed to ramp-up statewide in 2016 with New Orleans representing 15% of statewide savings that year. For 2017 and 2018, savings and costs for electricity are normalized using the values below and multiplied by 2 to represent at higher participation rate in New Orleans as compared to the rest of the state in those years. For years 2019 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY SAVINGS

Incremental annual savings, in GWh, in New Orleans = annual Louisiana savings * [commercial electric customers in New Orleans in year / commercial electric customers in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [commercial electric customers in New Orleans in year / commercial electric customers in Louisiana in year].

Prescriptive Rebates and Upstream Incentives

Program begins in 2014. Program is assumed to ramp-up in the rest of the state more slowly in 2014–19 and as a result New Orleans represents a smaller portion of statewide savings and costs each year (50% in 2014, 50% in 2015, 35% in 2016, 15% in 2017, 8% in 2018, and 6% in 2019). For years 2020 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [commercial customers using fuel in New Orleans in year / commercial customers using fuel in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [commercial customers using electricity in New Orleans in year / commercial customers using electricity in Louisiana in year] + annual Louisiana natural gas related costs * [commercial customers using natural gas in New Orleans in year / commercial customers using natural gas in Louisiana in year].

Retrocommissioning

Program begins in 2014. Program is assumed to ramp-up in 2014–16, with New Orleans representing a smaller portion of statewide savings and costs each year (50% in 2014, 50% in 2015, and 20% in 2016). For years 2017 to 2030, annual energy savings and cost values are normalized using the formulas below.

INCREMENTAL ANNUAL ELECTRICITY AND NATURAL GAS SAVINGS

Incremental annual savings, in GWh (or MMCF), in New Orleans = annual Louisiana savings * [total commercial floor area (square feet) using fuel in New Orleans in year / total commercial floor area (square feet) using fuel in Louisiana in year].

INCREMENTAL ANNUAL PROGRAM AND PARTICIPANT COSTS

Incremental costs (in 2011 dollars) in New Orleans = annual Louisiana electric related costs * [total commercial floor area (square feet) in New Orleans in year / total commercial floor area (square feet) in Louisiana in year] + annual Louisiana natural gas–related costs * [total commercial floor area (square feet) using natural gas in New Orleans in year / total commercial floor area (square feet) using natural gas in Louisiana in year].