Moving to the Front of the Lines:

The Economic Impact of Independent Power Plant Development in Louisiana

David E. Dismukes
Associate Professor

With contributions from
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EXECUTIVE SUMMARY OF RESULTS

Louisiana has an energy-intensive economy. Future growth of our economy will be impacted considerably by our ability to secure a highly efficient power generation infrastructure. The purpose of our report has been to examine the economic impacts associated with new independent power generation resources. Our findings can be summarized as follows:

Economic Opportunities for Louisiana

- Louisiana has an estimated $7.8 billion potential investment in announced independent power facilities.

- There is 13,758 MWs of existing and announced independent power capacity. Some 40 percent of this capacity is from highly efficient cogeneration (combined heat and power) facilities at our industrial plants.

- The total potential economic impact associated with the construction of Louisiana's announced independent power facilities is $2.8 billion by 2005. Some 12 percent of this impact is associated with the multiplier effects associated with the potential direct economic stimulus.

- The total potential employment opportunities associated with construction of these independent power facilities is 9,382 jobs. Some 4,549 jobs are associated with the multiplier effects created by the construction of these facilities.

- Value added is a broader measure of total income created directly in an industry. The total potential value added associated with the construction of the announced independent power facilities in Louisiana is $500 million. Wages account for close to $300 million of this increased value added.

- The total potential economic impact associated with the annual operation of these facilities is $1.8 billion. Approximately $59 million of this impact is from the multiplier effects of the direct independent power generation facilities.

- The total potential employment opportunities associated with the operation of these announced independent power facilities is 1,483 jobs. Around 809 of these employment opportunities is from the multiplier effects of the annual operation expenditures.

Estimated Economic Impacts For Typical and Announced Independent Power Projects

Economic Impacts From Announced Combustion Turbine Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$247,302,219	$177,221,669	568	82
Indirect Impact	$19,415,101	$2,118,575	240	22
Induced Impact	$20,389,629	$5,103,086	300	76
Total Impact	$287,106,949	$184,443,330	1,108	180

Economic Impacts From Announced Combined Cycle Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$2,236,946,771	$1,551,873,456	4,265	592
Indirect Impact	$146,167,074	$15,332,101	1,718	158
Induced Impact	$155,119,385	$36,931,006	2,291	553
Total Impact	$2,538,233,229	$1,604,136,564	8,274	1,303

Total Potential Impacts From the Currently Announced Independent Power Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$2,484,248,990	$1,729,095,125	4,833	674
Indirect Impact	$165,582,175	$17,450,676	1,958	180
Induced Impact	$175,509,014	$42,034,093	2,591	629
Total Impact	$2,825,340,179	$1,788,579,894	9,382	1,483

Efficiency Opportunities for Louisiana

- The standard efficiency rating used in the electric power industry is referred to as a “heat rate.” The heat rate of a power plant defines how many units of energy (measured in British thermal units or BTUs) are required to produce one unit of electricity (measured in kilowatt-hours) or kWhs). Lower heat rates, which means lower use of energy to create one kWh, entails greater efficiencies. The heat rates for new independent power generation facilities vary by technology. These heat rates are:

    - As low as 5,000 Btu/kWh heat rate for a new cogeneration (combined heat and power) application;

    - As low as 6,000 BTU/kWh heat rate for a new combined cycle facility;

    - As low as 10,000 BTU/kWh heat rate for a new combustion turbine facility;

- The average efficiency rating for the currently operating fleet of power generation facilities in this region ranges from between an average of 13,000 to 17,000 BTUs per kWh;

- At certain peak times, utilities in our region are running power generation facilities with a heat rate as high as 28,500 BTUs per kWh;

- Louisiana and our regional generating facilities are old. Some 73 percent of all regional power generation facilities are over 20 years old; some 43 percent are over the age of 30.

- In our investigation, we found that the most efficient power plant used by utilities in our region runs at an efficiency rating of 8,292 BTUs per kWh during the year 1999.

- In our investigation, we found that the least efficient power plant used by utilities in our region runs at an efficiency rating of 25,499 BTUs per kWh during the year 1999.

- Some 95 percent of all regional power generation facilities currently being operated by traditional utilities run at an efficiency rating that is greater than 10,000 BTUs per kWh (1999 study period).

Taxation Implications for Louisiana

Power generation projects in Louisiana pay a considerable amount of taxes. In the past, these taxes were passed along by regulated utilities to their ratepayers. On a forward going basis, the recovery of these taxes will be determined by market conditions. Thus, the implications of tax policies will have greater importance for the developers of independent power.

- Power generation facilities pay a host of taxes including property taxes, taxes on fuel used for power generation, income taxes, sales taxes, and franchise taxes.

- We estimate that if the current number of announced independent facilities in Louisiana are realized, state and local government could collect close to $1.9 billion in taxes over the next 30 years. These figures represent the net present value of the future stream of taxes in today's dollars. The future dollar amount of these taxes is $5.5 billion.

- We estimate that if the current number of announced independent facilities are realized, local government could receive as much as $430 million in property taxes. This is the net present value of the future stream of taxes from these project based upon an assumed 30 year project life. These figures are net of the allowed 10 year exemption. The future dollar amount of these taxes is $1.2 billion.

- We estimate that if the current number of announced independent power facilities are developed, the state and local governments could receive as much as $555 million on fuel taxes associated with power generation. This is the net present value for plant operations over the next 30 years. The future dollar amount of these taxes is $1.6 billion.

- If all independent power plants are developed, the state could also realize $128 million in sales taxes. This figure is the net present value of the sales streams that could be realized over the next 30 years. The future dollar amount of these taxes is $371 million.

- If the current number of announced facilities are developed, the state could realize $793 million in income taxes. This figure is the net present value of the streams that could be realized over the next 30 years. The future dollar amount of these taxes is $2.3 billion.

Rate Implications for Louisiana Households and Businesses

The impact that energy cost increases can have on Louisiana households should not be overlooked.

- Louisiana currently pays below national average electricity rates. However, Louisiana pays considerably higher than national average electricity bills as a result of our state's energy intensity.

- In 1999, Louisiana households paid 7.1 cents per kilowatt-hour (kWh) for electricity compared to the national average of 8.1 cents per kWh.

- Louisiana households, however, pay an average of $87.26 per month in electricity bills compared to the national average of $83.26 per month.

- Louisiana pays 3.4 percent of its average household income in electricity compared to the national average of 2.4 percent. Thus, a small decrease in electricity bills can increase Louisiana household disposable income that could be used to buy other goods and services.

Our analysis also considers the impact that potential independent power could have on regional power prices and ultimately increased economic activity that could be facilitated by increasing household disposable income. Using a typical facility, our analysis finds that:

- The dispatch of a 350 MW CT project could have, holding other things constant, a total economic impact of between $24 million to $34 million; while the dispatch of a 600 MW CC project could range from $51 million to $68 million.

- If lower wholesale power costs are passed along to ratepayers, the increases in disposable income could help facilitate between 257 to 361 employment opportunities associated with the development of a 350 MW CT project and between 529 to 702 employment opportunities for a typical 600 MW CC project.

Competitive Issues Associated with Independent Power Generation in Louisiana

Louisiana has a number of unique attributes that make it attractive to independent power generation.

- Louisiana is the second largest producer of natural gas and we have significant natural gas transportation resources.
- Louisiana sits between two important regions for wholesale power trade.
- Louisiana sits in a region experiencing relatively healthy electricity growth with a considerable number of large volume industrial customers.

However, two of our neighboring states, Texas and Mississippi, also have considerable resources and can effectively compete for these new sources of power. Consider that:

- Texas is the largest producer of natural gas in the U.S.;
- Texas and Mississippi both have considerable natural gas transportation infrastructure;
- Texas is moving forward with more competitive retail markets;
- Mississippi sits between 3 important power regions and has the ability to serve as the “cross-over” region for wholesale power trade;
- Mississippi is phasing out its tax on the use of fuel for power generation which, other things being equally, will provide an opportunity for increased profitability for plants locating in that state as opposed to Louisiana;
- Mississippi offers property tax exemptions for merchant power facilities provided a fee in lieu is paid for local schools and counties;
- There will be increasing pressure, given the diffuse and rapid development of independent power, to eliminate the ERCOT bottleneck that separates a good portion of Texas from the rest of the eastern interconnection. One plant located on the ERCOT border now has the ability to toggle its power flows between the two systems within a 24 hour notice.

EXECUTIVE SUMMARY OF REPORT

The economic impacts associated with upgrading Louisiana's electric generation infrastructure are considerable. This investment represents close to $7.8 billion over the next few years. These projects create high paying jobs in both their construction and operation phases. Typical power plant employees have an average salary level of between $50,000-60,000 per year.

Independent power generation can create an opportunity for Louisiana. However, power projects on paper do not generate electricity. Serious consideration, and understanding, of the importance these facilities have on our power markets and economy are necessary if Louisiana is going to realize these power generation infrastructure investments. The limited generation capacity in California, and their ongoing energy crises, is a direct result of failing to recognize the importance of continued investment in power generation.

This report examines Louisiana's power markets and the contributions that independent power generation can have on its economy. In addition to providing background information on the state of independent power both nationally and regionally, this report quantifies the economic benefits associated with new independent power generation facilities in Louisiana. Our report is divided in six sections.

In the first section of our report, we provide an introduction and a discussion of the important relationship between energy and economic growth. This section explains the importance of new electric generation facilities, and how the new players in this industry can contribute to the regional and the national economy.

The second section of our report provides an overview of wholesale power markets. Here, we explain the major policy initiatives that have opened a formerly regulated industry. This section also provides an important explanation of independent – or "merchant" – power developers. These merchant providers are for-profit generators that are responding to competitive opportunities to construct and operate power generation facilities. The competitive market structures for these facilities was created by the Energy Policy Act of 1992 and Order 888 by the Federal Energy Regulatory Commission (FERC).

These new power generation projects are significantly different from utility projects of the past. For instance, merchant developers and their shareholders, must assume all of the risk associated with these projects. If the projects fail, the developing companies and their shareholders will be responsible for their financial miscalculations.

The second section of our report provides a discussion and overview of the existing status of independent power development in Louisiana. There are a number of announced projects in the state. The attractiveness of Louisiana as a site for independent power projects is considerable. Louisiana is the second largest producer of natural gas, it has an impressive natural gas transportation infrastructure, and has a number of power transmission lines to move electrical output within Louisiana and to its neighboring regions. One of the potential travesties of failing to capture our merchant power opportunities could be that Louisiana natural gas could be shipped to other regions, converted to electrical energy, and shipped back to our state and its customers.

The third section of our report examines the current state of electric power markets in Louisiana. This section was presented to put the current state of the industry and independent power development into perspective. Our analysis begins with an overview of past sales and usage trends in Louisiana. While Louisiana has increased its energy efficiency over the past several years, the state's households and businesses still use a significant amount of electricity. Our customers use a greater than national average amount of electricity on a per household, business, and industrial basis. Growth of electricity intensity over the past several years has been strongest among residential customers.

The third section of our report also examines past trends with power generation, non-utility generation, net imports, and reserve margin trends. This section notes that:

- Power generation in Louisiana has shifted from being heavily reliant on natural gas and oil to one that also uses coal and nuclear generation. Despite the increased fuel diversity, a significant portion of Louisiana power generation comes from natural gas fired facilities.

- Louisiana has a considerable base of non-utility generation. These non-utility generators are primarily cogeneration facilities at our industrial facilities. Cogenerators are combined heat and power applications that increase overall site energy efficiency and allow excess power to be injected into the utility power grid.

- The state imports a significant amount of its power generation from neighboring states. In recent years, between 20 to 17 percent of our power generation has been imported.

- Reserve margins, or the amount of excess power relative to system peaks, have been falling over the past several years. Maintaining these margins will be dependent upon the development of competitive independent power facilities.

The fourth section of our report presents our economic impact analysis. Our analysis examines two "typical" types of independent power generating facilities – a 350 megawatt (MW) combustion turbine (CT) and a 600 MW combined cycle (CC) facility. Methodologically, our models are developed in a manner that: (1)

controls for those "direct" expenditures that remain in the state and are associated with the development of an independent power project; and (2) to estimate the "indirect" and "induced" economic impacts that are often referred to as the "multiplier" impacts. The model results indicate that:

- The total economic impacts associated with a typical 350 MW CT project amount to approximately $52 million while the total economic impacts associated with the construction of a typical 600 MW CC project amount to $128 million;

- The total economic impacts associated with the operation of a 350 MW CT project amount to approximately $33 million annually, while the total economic impacts associated with the operation of a 600 MW CC project amount to $81 million annually; and

At this time of this analysis, some 13,758 MWs of independent power generation projects were identified as potentially locating in Louisiana. If the results of our economic impact analysis were generalized to all of these potential sources of power generation, Louisiana, by 2005, could realize:

- Close to $7.8 billion in power generation investments.

- The total economic impacts of close to $1.8 billion in the construction of the announced independent power facilities in Louisiana;

- The total number of employment opportunities could be as high as 9,382 jobs associated with the construction of these announced facilities;

- The total economic impact associated with the annual operation of these facilities would be close to $1.8 billion per year; and

- The total employment opportunities associated with the annual operation of these facilities could be close to 1,483 jobs.[1]

The impact that energy cost increases can have on Louisiana households should not be overlooked. As noted in the report, Louisiana currently pays below national average electricity rates. However, Louisiana pays considerably higher than national average electricity bills as a result of our state's energy intensity. In 1999, Louisiana paid 7.1 cents per kilowatt-hour (kWh) for electricity compared to the national average of 8.1 cents per kWh. Louisiana households, however, pay an average of $87.26 per month in electricity bills compared to the national average of $83.26 per month.

[1]These employment and operation figures do not include the net operating impacts of displaced facilities.

Taking these figures further, Louisiana pays 3.4 percent of its average household income in electricity compared to the national average of 2.4 percent. Thus, a small decrease in electricity bills can increase Louisiana household disposable income that could be used to buy other goods and services.

Our analysis also considers the impact that potential independent power could have on regional power prices and ultimately increased economic activity that could be facilitated by increasing household disposable income. Using a typical facility, our analysis finds that:

- The dispatch of a 350 MW CT project could have, holding other things constant, a total economic impact of between $24 million to $34 million; while the dispatch of a 600 MW CC project could range from $51 million to $68 million.

- If lower wholesale power costs are passed along to ratepayers, the increases in disposable income could help facilitate between 257 to 361 employment opportunities associated with the development of a 350 MW CT project and between 529 to 702 employment opportunities for a typical 600 MW CC project.

This report also highlights the fact that the development of independent power generation is a ratepayer and economic development issue. Lack of available and reliable sources of power generation can result in increased prices that will have to be recovered from households, business, and industry alike. This is particularly true for residential households who, in many instances, pay considerably more for expensive spot market power generation resources.

The impact that increased wholesale power costs can have on households was recently highlighted by a San Francisco Federal Reserve Bank report that noted increased energy costs[2] associated with the California energy crisis would set back households by $450 more per year – or one percent of the median household income. This percent could rise to as much as 1.5 percent of total household median income if business pass their increased cost along to consumers.

The fifth section of our report addresses a number of other issues associated with the development of independent power in Louisiana. This section addresses power transmission infrastructure issues, economic development and growth issues, and natural resource issues. This section notes that:

- Independent power facilities are often criticized with getting a "free ride" on the utility power transmission grid. However, as our study notes, independent power facilities have been, and continue to make

[2]Increased energy costs include retail natural gas and electricity costs to consumers.

considerable investments, as required by the FERC, on the state's power transmission grid.

- Since the California energy crises, a number of states have realized the importance of power generation as means to support their economic development and business recruiting measures. Most high technology firms require reliable, cost effective power of very high quality. It will be difficult to recruit these types of firm without having the necessary power industry infrastructure.

- The increased efficiency opportunities associated with these new power generation technologies should not be overlooked. There is a tendency in environmental impact analysis to consider these facilities on a "cumulative" rather than "net" basis. Hopefully, these facilities will displace older less efficient, and more polluting facilities. The displacement effect these facilities can have on the environment should be considered.

The last section of our report presents our conclusions. Recent policy maker resolutions promoting independent power generation are moving in a direction that could be more comprehensive than anything else in the southeast. This resolve could set the state in a regional leadership role. The goal and challenge however, will be to maintain the potential development that is now interested in Louisiana as a home. If the current initiatives are maintained and expanded upon, other states in the southeast will be trying to pass Louisiana and its enviable status at the front of the lines in regional power plant development.

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SECTION 1: INTRODUCTION

One of the pressing challenges in today's energy industry is the development of supporting infrastructure. Nowhere is this more readily apparent than in the electric power industry. Years of upheaval, uncertainty, and regulatory change have clearly had consequences that are taking their toll today. What is unique about today's energy industry revival, is the development of competitive, as opposed to regulated, forces for driving the nature and the direction of energy infrastructure investments.

The power generation sector, in particular, has seen a virtual explosion in announced construction activity over the past several years. This increase in industry activity is the result of a confluence of different factors including the following:

- *Technological:* over the years, smaller more modular and more efficient power generation technologies have emerged.
- *Economic:* the nature of wholesale[3] power markets has changed from one in which pricing and market conditions were determined by regulation to one in which the market determines the amount and prices of electricity to be offered.
- *Public Policy:* Transmission systems have been legally opened to support open access and non-discriminatory transportation of power across utility power grids.
- *Institutional:* new market mechanisms and institutions have arisen that facilitate the trade of bulk (wholesale) power as a commodity.

[3] This report will focus exclusively on the impact that merchant facilities have on wholesale power markets. Here, wholesale power markets are defined as bulk power markets where purchasers are not the ultimate end users of electricity. A wholesale power market transaction is one where a utility that is short on capacity, purchases electricity from another utility (or merchant plant), in order to supply power to its own customers. Wholesale competition allows these trades to occur outside regulation with prices being negotiated between the two utilities. Retail markets, on the other hand, are defined as markets where the customers are the ultimate end users of the energy being purchased.

An increasingly important consideration in the energy industry is the role it plays in securing economic growth opportunities. The relationship between energy and economic growth over the past 50 years has been well established by academic literature.[4] Figure 1.1 shows this relationship for the U.S. economy quite clearly.

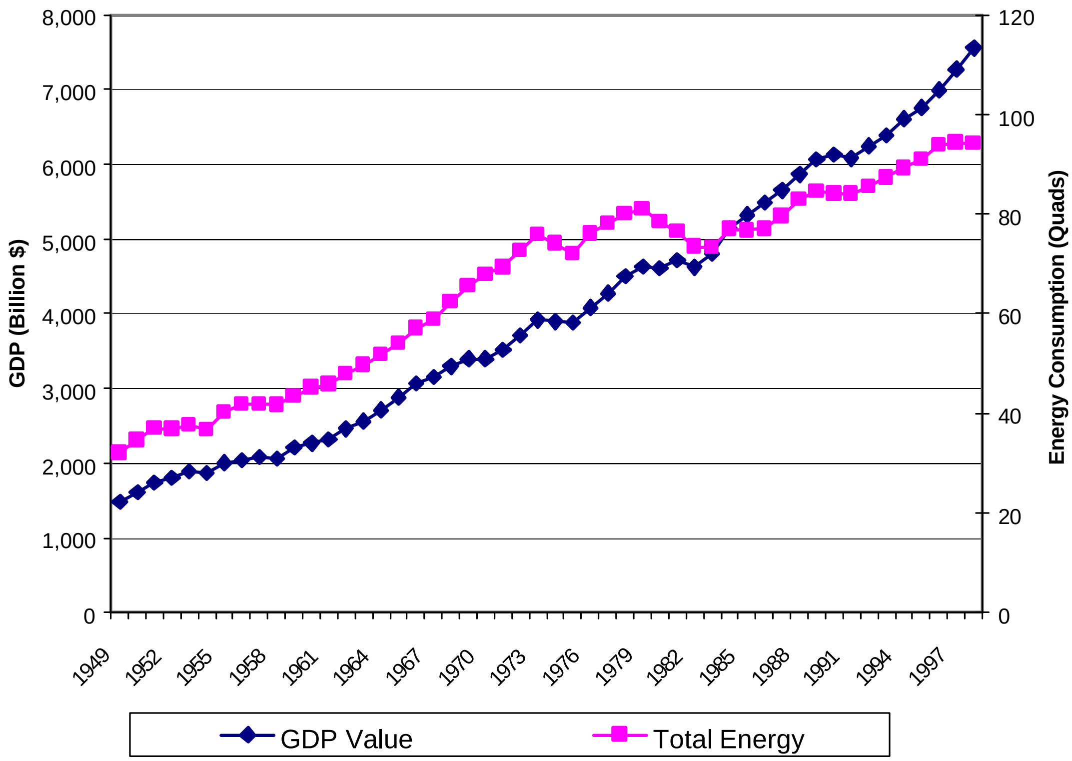


Figure 1.1: U.S. Gross Domestic Product and Total Energy Consumed

The electric power industry has transformed the relationship between energy and economic growth even further. Throughout the post-war period, the U.S. economy has undergone a dramatic transformation from one based upon primary-fuel driven, mechanical industries to one that increasingly emphasizes high technology, digital and computer applications, and increased complexity.

[4]See Dale R. Jorgenson (1984). "The Role of Energy in Productivity Growth." *American Economic Review* 74 (2): 26-30 for a seminal discussion on this relationship. A more contemporary article was prepared by John R. Moroney, (1990). "Energy Consumption, Capital and Real Output: A Comparison of Market and Planned Economics. *Journal of Comparative Economics* 14(2): 199-220.

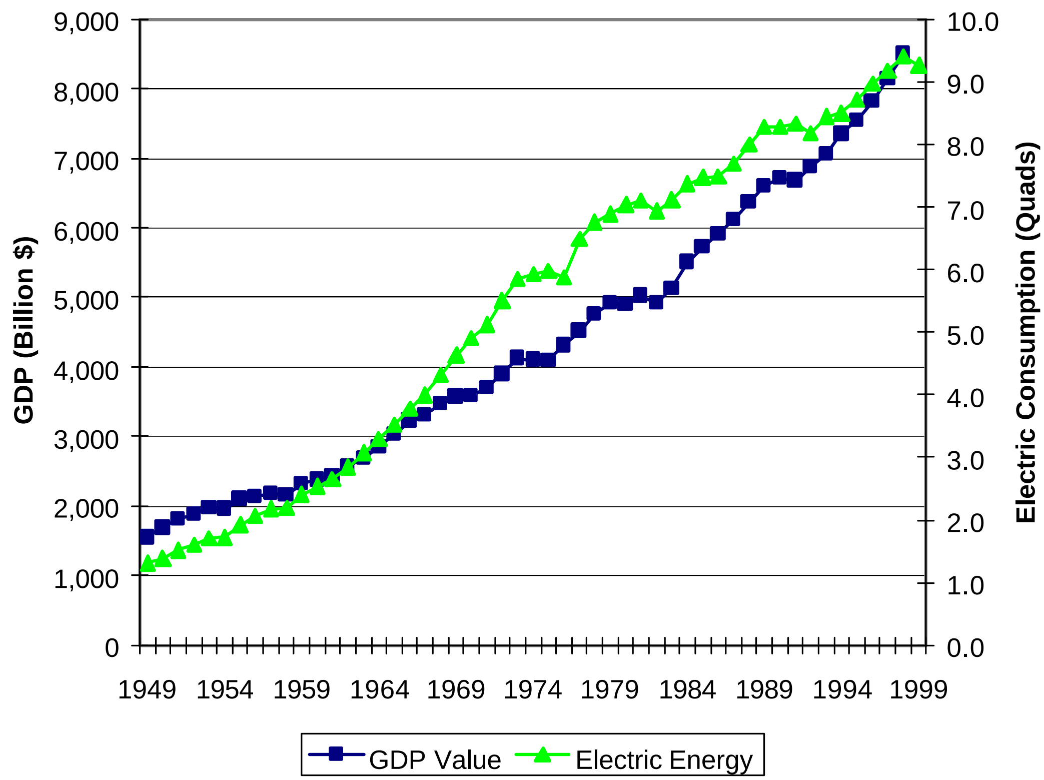


Figure 1.2: Annual Total Electric Energy Consumed and U.S. Gross Domestic Product

If economic growth is to be maintained in this increasingly more digital "new economy," additional competitive generating capacity must be developed. Businesses and households are hurt, and lose real disposable income as a result of expensive and unreliable power. A recent study by the Federal Reserve Bank of San Francisco, for instance, noted that the increased energy costs[5] associated with the California energy crisis would set households back by $450 more per year – or one percent of the median household income. This percent could rise to as much as 1.5 percent of total household median income if businesses pass their increased cost along to consumers.

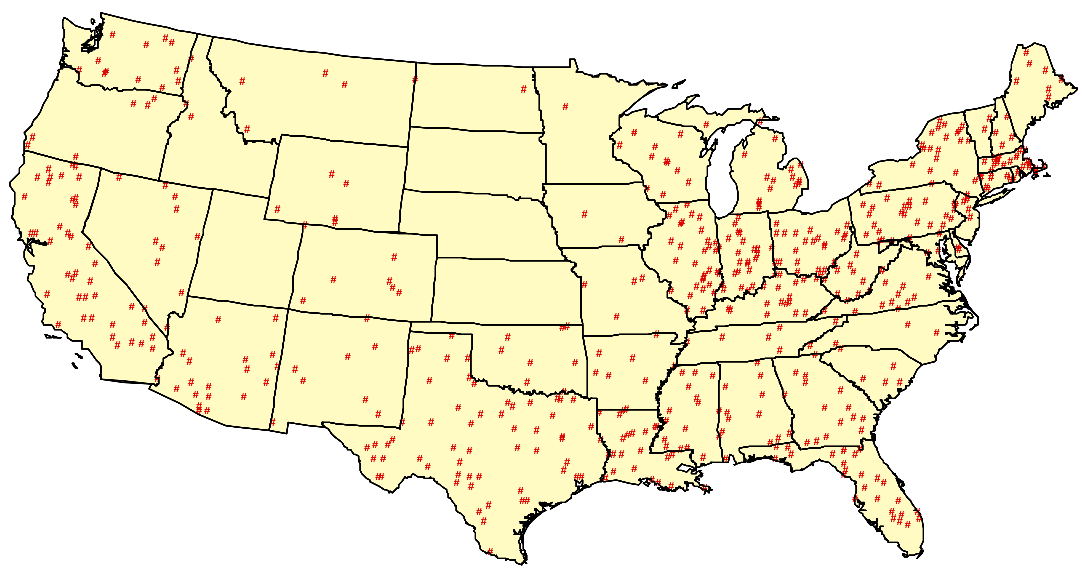
The San Francisco Fed also noted that these decreases in household income have been substantially lessened because of subsidized prices by the state of California. The recent study noted the following:

> If the full rise in wholesale electricity prices – much of which currently is being covered by the state as a result of the procurement of power by the Department of Water Resources – were taken into account, our estimate of the increase in energy-

[5]Increased energy costs include retail natural gas and electricity costs to consumers.

related expenditures by the average California household would rise substantially.[6]

Fortunately, market incentives in most regions of the U.S. seem to be working. New power plant construction activity has been stimulated by both industry changes and market forces. Today, for-profit independent power providers are constructing the next generation of power facilities; this is unlike the past when power generation facilities were built almost exclusively by regulated utilities. Figure 1.3 shows the number of independent power plant construction projects throughout the U.S.



Source: Energy Infosource and Louisiana Mid-Continent Oil & Gas Association

Figure 1.3: Announced Independent Power Projects in the U.S.

New independent power plant activity, however, has not come without a number of important policy questions being asked, including those regarding issues associated with the tax, employment, economic impact, power reliability,

[6] Mary Daly. *Federal Reserve Bank of San Francisco Economic Letter: Regional Report*. April 20, 2001.

generator availability, and environmental implications of widespread development. The purpose of this report is to address a number of these issues.

Our report is organized into five additional sections. Section 2 discusses the past and present development of wholesale markets and the relationship of independent power to this development. Section 3 presents an overview of Louisiana power markets, both past and present. Section 4 discusses the methods and results associated with our economic impact models of independent development in Louisiana. Section 5 provides an overview and discussion of a number of other issues associated with independent development in Louisiana including transmission issues, economic development issues, and natural resource issues. Section 6 presents our conclusions.

SECTION 2: PAST AND PRESENT DEVELOPMENT OF COMPETITIVE WHOLESALE MARKETS

The Origins of Competitive Wholesale Markets: One important factor changing the nature of electric power markets has been the advent of competitive opportunities for new sources of power generation. Quickly fading is the past regime of regulated prices, as well as limited opportunities for trading, profits, and energy efficiency. The origins of competition, however, are not new and can be dated to the late 1970s when the energy crises changed public policy and began challenging the notion that utilities were "natural monopolies" and should be the only regulated providers of electricity in the marketplace.

In 1978, Congress passed the National Energy Act, which comprised five different statutes: (1) the Public Utilities Regulatory Policy Act (PURPA); (2) the National Energy Tax Act; (3) the National Energy Conservation Policy Act; (4) the Power Plant and Industrial Fuels Act (PPIFA); and (5) the Natural Gas Policy Act. The general purpose of the National Energy Act was to ensure sustained economic growth during a period in which the availability and price of future energy resources were becoming increasingly uncertain. The two major themes of the legislation were as follows: (1) promote the use of conservation and renewable/alternative energy and (2) reduce the country's dependence on foreign oil.[7]

While all aspects of the National Energy Act affected the electric power industry, PURPA was probably the most significant, because it was designed to encourage more efficient use of energy through non-utility cogeneration. The statute requires utilities to interconnect and purchase power from any qualifying facility (QF) at a rate not to exceed the utility's avoided cost of generation.[8] This policy, while originally designed to promote energy efficiency, had the unintended consequence of encouraging the development of a plethora of new sources of electric generation in an industry that, as conventional wisdom held, was a natural monopoly. The emergence of these non-utility generators proved that entities other than utilities could construct and operate power plants efficiently and reliably.

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[7]Energy Information Administration (1993). *The Changing Structure of the Electric Power Industry. (*Washington: U.S. Department of Energy): 21.

[8]Avoided costs are defined as the utility's cost to produce a marginal unit of electricity. Only cogeneration facilities, and renewable energy small power production facilities, were entitled to these provisions. Cogeneration is defined as the combined production of thermal and electrical energy. Most cogeneration applications capture steam, that previously would have been vented into the environment, and use this energy resource to produce electricity: hence the term co-generation.

Since the 1980s, the power generation business continued its trek towards greater levels of competition and efficiency. By the early 1990s, Congress decided to take the unintended policy consequences of PURPA one step further by enacting the Energy Policy Act of 1992 (EPAct). The legislation is important for two reasons. First, EPAct created a whole new class of power providers called "exempt wholesale generators," or EWGs, that are essentially competitive independent power plants and not subjected to traditional ratemaking regulation. Second, the EPAct allowed the Federal Energy Regulatory Commission (FERC), to require regulated electric utilities to "wheel" (transport) power across their regulated power transmission grids.

These two developments, taken together, created a new class of generation market participants, a new market for the generation of electricity, and a new means of transporting (or wheeling) electricity to these markets across the entire U.S. The FERC promulgated the final rules outlining the terms and conditions for the open and non-discriminatory use of the electric power grid in 1996 in its industry-renowned Order 888.

Order 888 was instrumental in opening the wholesale power market to competition and facilitating independent or what is commonly referred to as "merchant" power. Without the Order, competitive power generation firms would have been able to construct and operate their facilities, but would have been required to deal directly with transmission-owning utilities for moving their power to wholesale customers. Without these rules in place, transmission-owning utilities would have been able to give preference to their own competitive (or regulated) generating facilities at the expense of their potential competitors. This new order helped create a system in which transmission lines, regardless of ownership, would serve as a common carrier to facilitate wholesale trade. From 1996 forward, competitive sources of electricity have been able to compete on a level playing field with incumbent utility generation.

The promulgation of Order 888 transformed the industry. In addition to creating a competitive power market, it also helped facilitate the growing convergence between the power business and other energy industries. New trading mechanisms and institutions that arose in the aftermath of Order 888, served to facilitate this process.

Today, independent power providers play an important role in regional power markets. The nature of these providers, however, is often misunderstood. Independent – or merchant -- power plants are those facilities that are usually constructed and operated by independent companies (i.e., non-utility companies) for a potential profit. These facilities, and their developers, differ in important ways from other utility and non-utility sources of power generation.

Utilities, for instance, are regulated monopolies that have a guaranteed retail customer base. Prices are set by state regulators to curb potential monopoly abuses. As monopolies, utilities are allowed to recover their prudently incurred costs, and to have the opportunity to earn a reasonable rate of return on prudently incurred capital investments. In return for their monopoly status, utilities are required to provide safe, reliable, and economic service to their customers.

Other non-utility power generating sources, primarily qualifying facilities or cogenerators under PURPA, are not in the primary business of producing electricity. These facilities typically produce some product, and generate electricity as a secondary endeavor. If these types of non-utility cogenerators meet thermal and other ownership and operating requirements established by the FERC, they are entitled to sell their power to utilities based upon the utilities' avoided cost. They are also entitled to emergency, stand-by, and backup power should their on-site generating facilities go down for planned or unplanned outages.

Competition in wholesale markets over the past several years has not come without its share of growing pains. Some of the more painful recent experiences of this process have included the following:

- The past several summers have seen an increase in the price volatility (variation) of wholesale power markets.

- In addition to price volatility, wholesale markets have experienced a number of incredible price increases in absolute magnitude. In some instances, wholesale power market prices have reached levels of $10,000 per MWh on certain super peak hours.

- The integrity of a number of "new players" in the market has been challenged. These players did not understand and did not anticipate the nature and volatility of the new environment and were caught short on their respective power purchases and sales.

- Outages have increased, power reliability has been challenged, and capacity margins throughout a number of regions in the U.S. are falling because of continued strong economic growth (stimulating demand) and an apparent shortfall of existing generation resources and infrastructure.

- Markets can be both integrated and segregated given varying conditions on the electric power transmission system. The operation of this system is important in determining access to alternative power supplies.

These recent experiences have highlighted a number of important lessons about electric power markets. First, and most important, are physical power generation matters. Despite all of the innovations in trading mechanisms, financial instruments, innovative transmission pricing regimes, and theories about power markets, the importance of having physical supplies of electricity (i.e., power plants) cannot be underestimated. Paper transactions are limited in their ability to keep the lights on. Eventually, these trades and transactions will have to be delivered. Recent events in California have shown that in the absence of physical power generation, strong demand for electricity can only be met in two ways: either prices must rise to lessen demand or demand must be curtailed through interruptions and rolling blackouts in instances where power is simply unavailable.

Second, the separation between wholesale and retail markets is artificial. Eventually, the ramifications of power purchased at the wholesale level will ripple down to retail customers – even if those customers are under traditional regulation. Today, many utilities in states that have not moved forward with retail choice are generation strapped, for a number of different reasons, and are having to purchase electricity on the wholesale market. When these utilities purchase electricity on behalf of their retail customers, the costs are usually directly passed on to those customers in their monthly bills. Thus, as these wholesale purchased power costs increase, so too have residential, commercial, and industrial electricity bills.

Third, the regulatory environment can strongly influence the siting decisions of competitive independent power plants. Clearly, there has been a correlation between siting decisions and a state's movement towards electric restructuring. However, this is not the only factor influencing independent power plant siting. Consider that California, for instance, was the first state in the nation to adopt electric restructuring. Over the past 17 years, the Western Systems Coordinating Council (WSCC), which encompasses the entire western portion of the U.S., has been experiencing substantial growth in peak demand. The annual average growth in peak demand for California during this period (1982-1998) was approximately 3.2 percent compared to an annual average increase in generating capacity of less than 1 percent.[9] The apparent shortfall in capacity, coupled with the new competitive retail opportunities, has thus far failed to entice a large number of independent facilities.

Equally important are other factors, such as policy stability on tax and environmental issues, that can have equally important implications for the construction and operating costs of a new multi-million dollar power plant. California, for instance, with its stringent environmental laws, rules, and standards, is not considered by many developers as being friendly towards power plant siting. While the state has recently changed these rules to allow "fast-track" approval process, many of these developments will take time- hardly a concession to ratepayers suffering from high rates and poor reliability.

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[9] *Staff Report to the Federal Energy Regulatory Commission on Western Markets and the Causes of the Summer 2000 Price Abnormalities. Part 1 of Staff Repot on U.S. Bulk Power Markets.* (Washington, DC: Federal Energy Regulatory Commission): 2-3.

Who are Independent Power Developers? Independent generators, unlike regulated utilities, do not have a guaranteed retail customer base for their electrical output. These providers must market their output and, as a result, are allowed to charge market-based rates and earn market-based returns on their investments. Independent generators differ from such other non-utility sources of power as cogeneration in two important ways. First, they are not end users of electricity and do not use their electrical output on site. Second, regulated utilities are not obligated to purchase any of the competitive independent power provider's output.

Independent providers come from a variety of corporate backgrounds. A listing of the top independent power developers has been provided in Table 2.1. A number of these developers arose to take advantage of the business opportunities offered by the restructured power business. These include companies like Calpine, Cogentrix, and Panda Energy.

Several others, however, are the unregulated affiliates of companies traditionally associated with utility operations. These include TECO Energy, Duke, and FPL Group. Other independent developers are companies that were originally started by utility holding companies, and have been, or are in the process of being spun off into successful stand alone companies. These include Mirant (formerly part of Southern), Reliant Resources (Reliant Energy) and NRG (Xcel Energy).

Lastly, there are a group of players that have been traditionally associated with various aspects of the oil and gas industry that have now diversified into power generation. These include companies such as Enron, Dynegy, Williams Energy, El Paso, and Kinder Morgan.

Table 2.1: Top 25 US Power Plant Developers

Rank	Company	Planned Capacity Minimum (MW)	Maximum (MW)	Minimum Percent of Total	Maximum Percent of Total
1	Calpine Corp.	30,186	31,283	15.9%	15.9%
2	Duke Energy	17,537	17,755	9.3%	9.0%
3	Cogentrix	12,265	13,431	6.5%	6.8%
4	Panda Energy	12,236	12,406	6.5%	6.3%
5	PG&E Corp.	12,202	12,202	6.4%	6.2%
6	Mirant Corp.	8,866	9,519	4.7%	4.8%
7	PSE&G	8,760	8,810	4.6%	4.5%
8	FPL Group	8,441	8,645	4.5%	4.4%
9	International Power	8,291	8,881	4.4%	4.5%
10	Tenaska	8,146	8,246	4.3%	4.2%
11	Constellation Energy	6,582	7,136	3.5%	3.6%
12	Southern Company	6,084	6,094	3.2%	3.1%
13	AES Corp	5,780	6,285	3.1%	3.2%
14	Reliant Energy/Resources	5,621	5,678	3.0%	2.9%
15	TECO Energy	5,473	5,758	2.9%	2.9%
16	Xcel Energy/NRG	4,923	4,930	2.6%	2.5%
17	Enron Corp.	4,025	4,134	2.1%	2.1%
18	PPL Corp.	3,938	4,060	2.1%	2.1%
19	Dynegy Inc.	3,928	4,058	2.1%	2.1%
20	Progress Energy	3,465	3,519	1.8%	1.8%
21	El Paso Corp.	3,285	3,290	1.7%	1.7%
22	Kinder Morgan	3,019	3,019	1.6%	1.5%
23	Allegheny Energy	2,338	2,338	1.2%	1.2%
24	Exelon Corp.	2,012	2,189	1.1%	1.1%
25	Orion	2,000	2,738	1.1%	1.4%
	Total	189,403	196,404		

Source: Christopher Ellinghaus (2001). *U.S. Electricity Supply & Demand Analysis: Tight Gas Supply Tells the Story*. New York: Williams Equity Research.

An important, but sometimes overlooked fact about independent power plant developers is that they, and their shareholders, incur the risks associated with their power plant investments. The rewards and penalties that are possible for incurring these risks are a double-edged sword. Investments in tight generation markets that yield high returns are clearly a benefit that is misunderstood as an exercise of market power. One need only look at the reactions to the current

California crisis as an indicator of how surrealistic the misperceptions of these market risks can be perceived.

What is often not considered is the probability that independent providers could also incur losses associated with their investments when markets become saturated with large numbers of highly efficient and low cost power plants. In cases like these, independent providers and their shareholders, will bear 100 percent of the risks associated with these failed investments. Such risks, and the participants who bear them, are in stark contrast to the stranded cost problem for traditional monopoly utilities during the retail choice process. In most instances, ratepayers were required to pay all, or most, of the costs of these uneconomic investments.

Louisiana Independent Power Development: Louisiana has not gone unnoticed by independent power developers. The state has a number of positive attributes that could support a vibrant competitive wholesale industry. One of the primary and important Louisiana attributes is its considerable supply of natural gas. Louisiana is the second largest producer of natural gas in the U.S. Approximately 90 percent of all announced independent power plant additions in the U.S. will be gas-fired. Figure 2.1 shows the relative gas production by state for 1999.

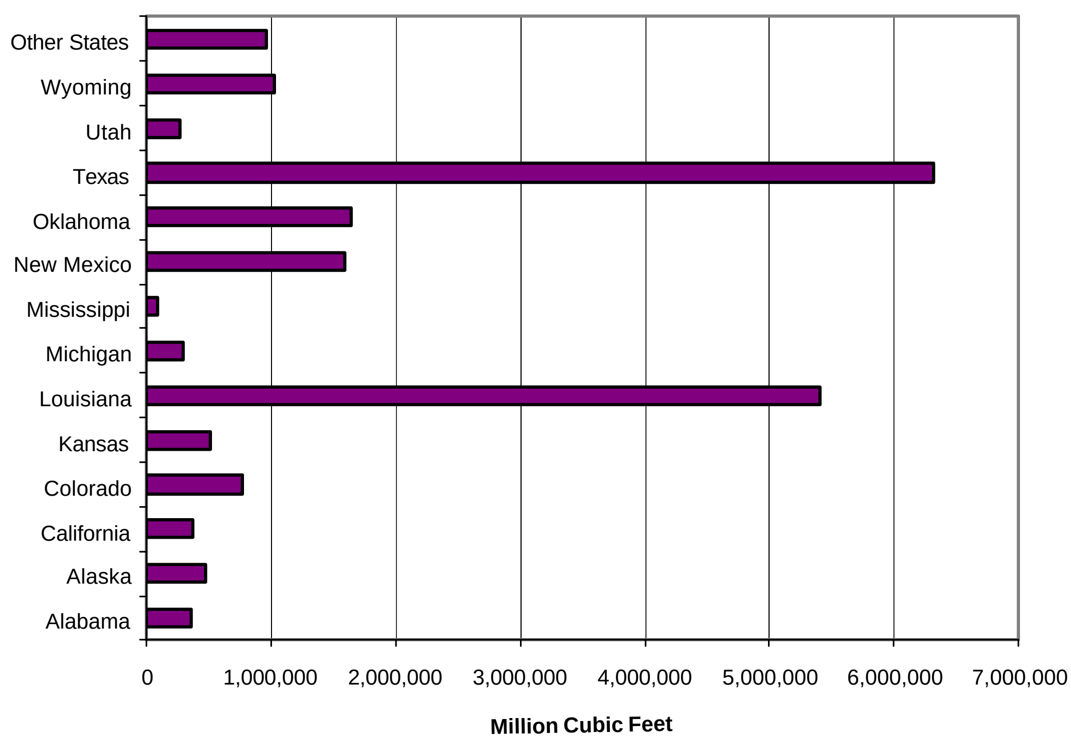


Figure 2.1: Natural Gas Production By State

Source: U.S. Department of Energy, Energy Information Administration. Natural Gas Annual.

Louisiana also has a very extensive network of pipelines to transport its large supplies of natural gas. As shown in Figure 2.2, a considerable amount of natural gas flows through Louisiana.

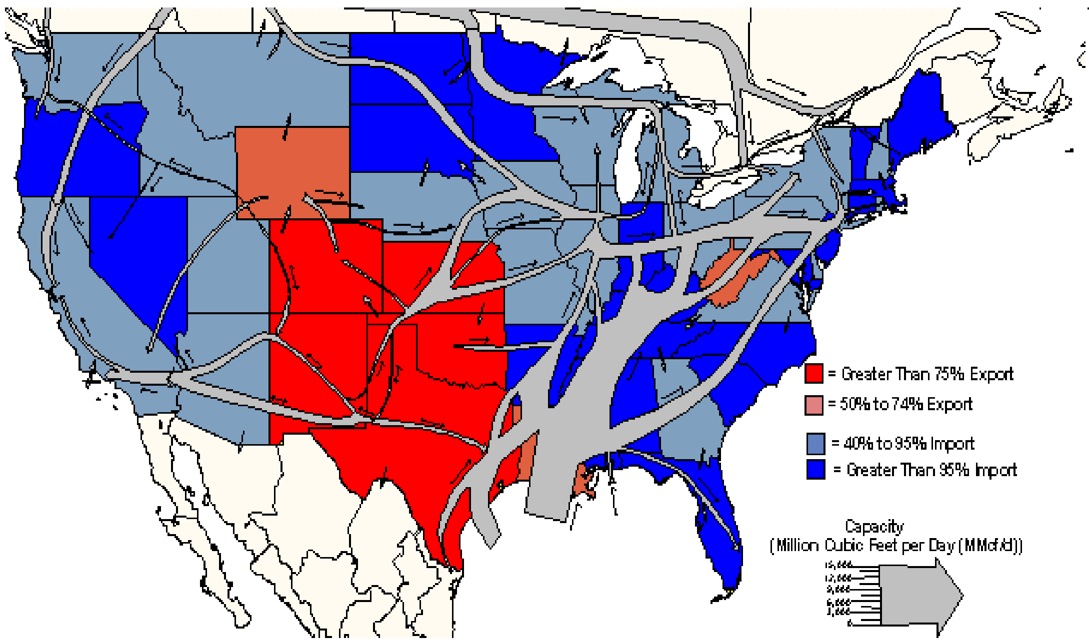
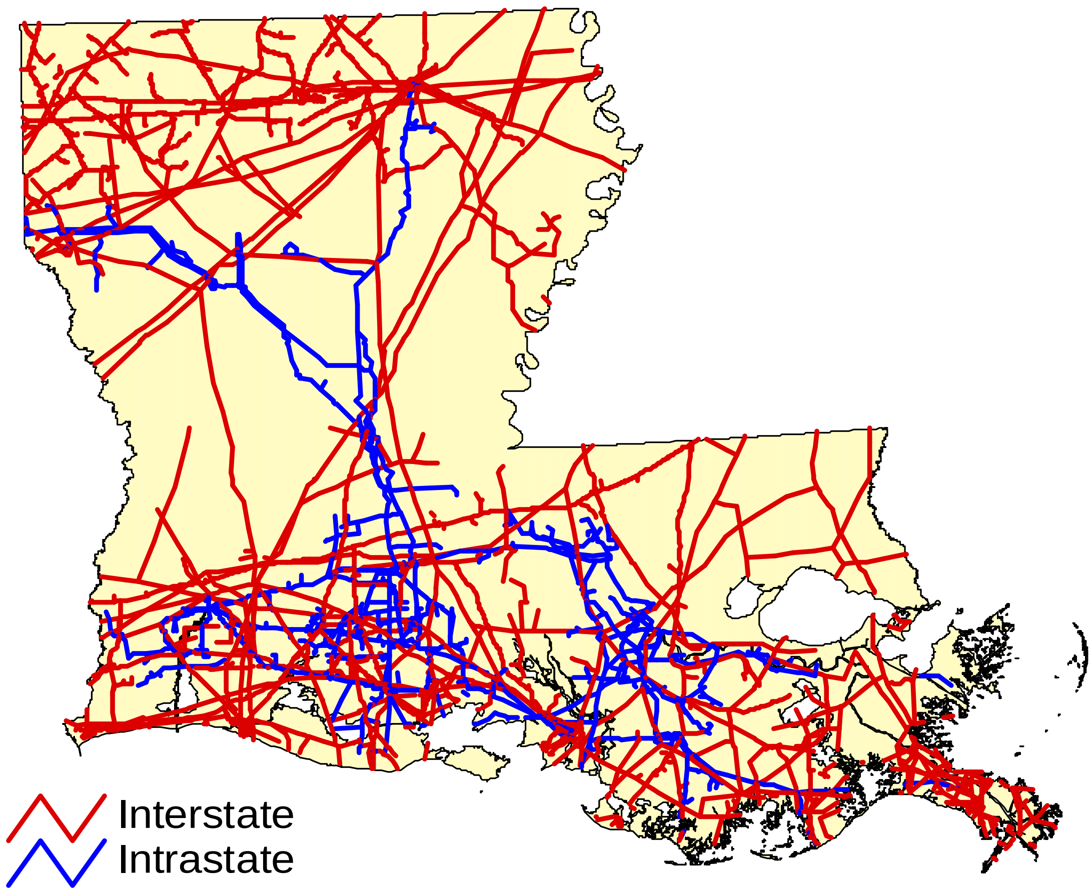


Figure 2.2: Natural Gas Flows in North America

Source: Energy Information Administration. (1999) *Natural Gas Trends and Issues, 1998.* Washington: U.S. Department of Energy.

Additionally, Louisiana's natural gas pipeline industry is marked by diversity of providers of transportation services. There are a number of inter- and intrastate natural gas pipelines in the state. Competitive forces in the industry give independent providers a number of gas transportation alternatives that are not available in other regions. Figure 2.3 shows the extensive and diverse nature of the gas pipeline business in Louisiana. Lines indicated in blue are intrastate pipelines while lines marked in red represent the location of interstate pipelines.

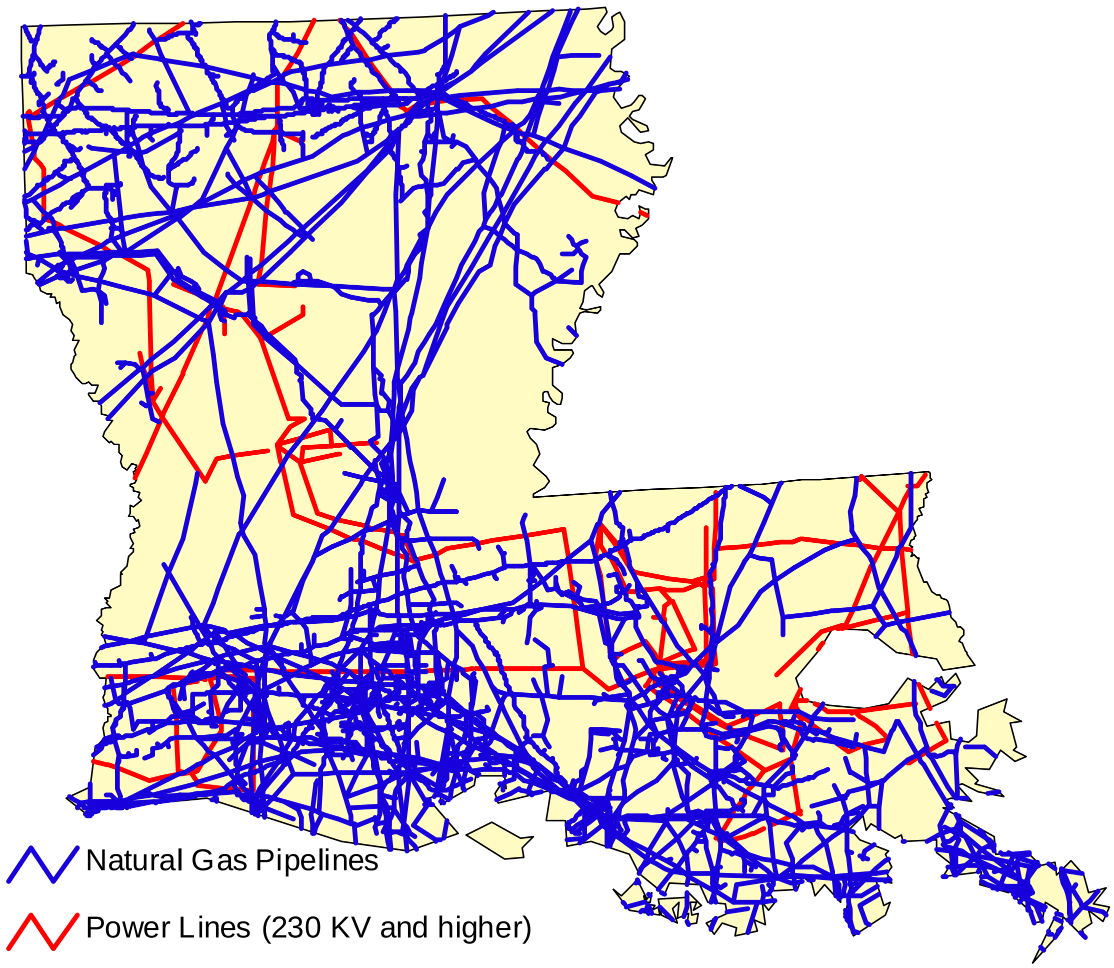


Source: DOE EIA

Figure 2.3: Disposition of Louisiana Natural Gas Pipelines by Ownership Type

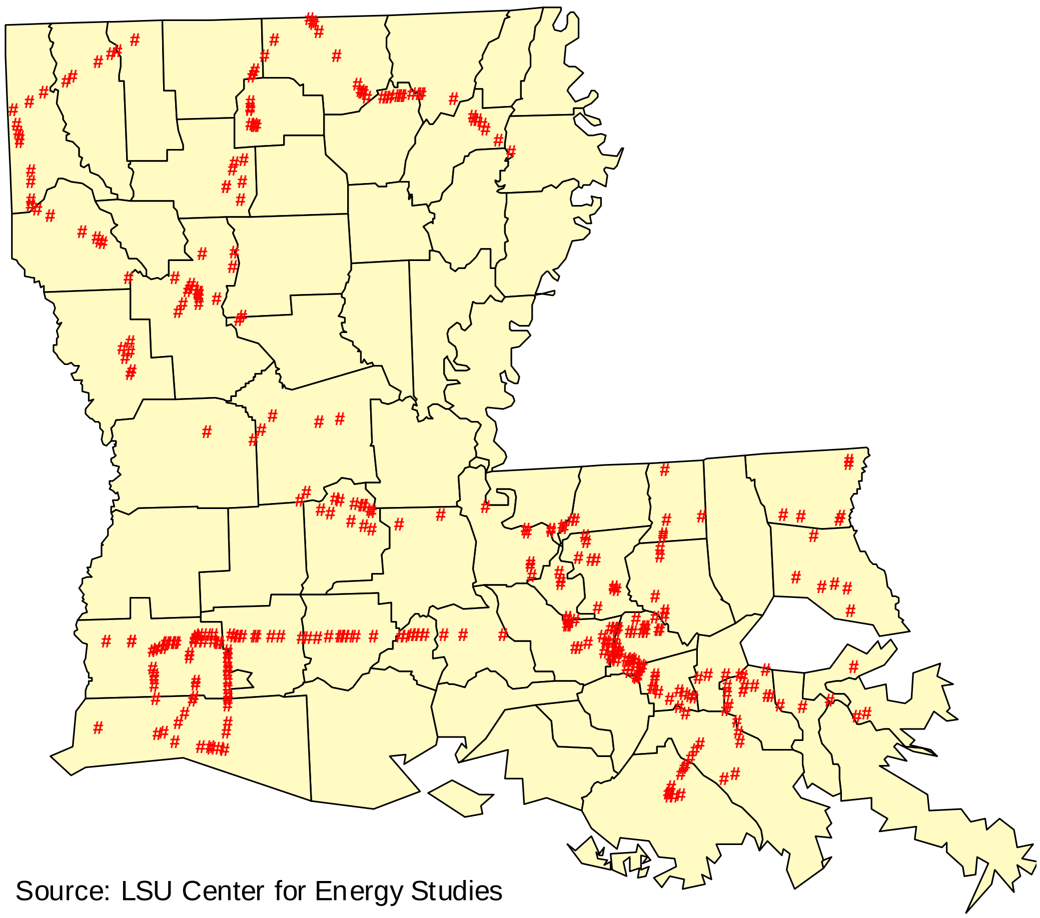
Louisiana also has a relatively extensive number of electric power transmission lines, that can support and facilitate trade in the state and the region's wholesale power markets. Louisiana has some 23,000 circuit miles of electric power transmission lines – the third highest level in the southeast. However, despite the extensive nature of the existing transmission system, most industry analysts recognize that there is not enough to facilitate the growing amount of wholesale trades on the system. One of the ongoing challenges associated with facilitating independent power, and more competitive wholesale markets, will be in providing the right incentives for appropriate transmission system planning, upgrades/construction, governance, and pricing.

Figure 2.4 overlays a map of the natural gas industry infrastructure with the electric power industry transmission infrastructure. This map is an interesting representation of the confluence between these two important energy industries. Intersections between gas and power transmission lines reveal potential opportunities for siting an independent generating facility. Figure 2.5 provides a different representation by highlighting the intersections as points within the state.



Source: LSU Center for Energy Studies

Figure 2.4: Louisiana Gas and Power Transmission Infrastructure



Source: LSU Center for Energy Studies

Figure 2.5: Louisiana Gas and Power Transmission Intersections

The attractiveness of Louisiana for independent power has resulted in a number of operating, planned, and announced facilities. Figure 2.6 shows the location of these facilities throughout the state. New cogeneration facilities are also indicated by yellow dots.

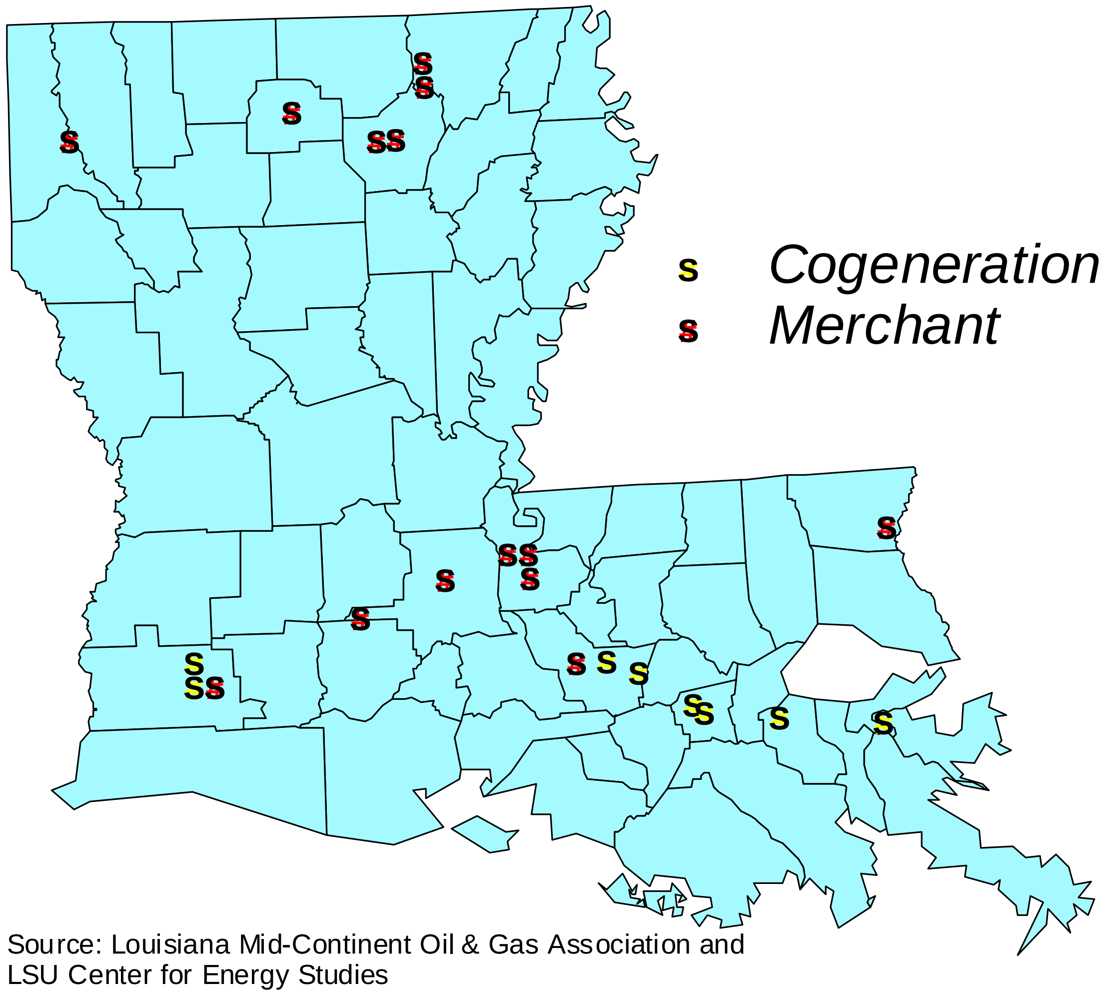
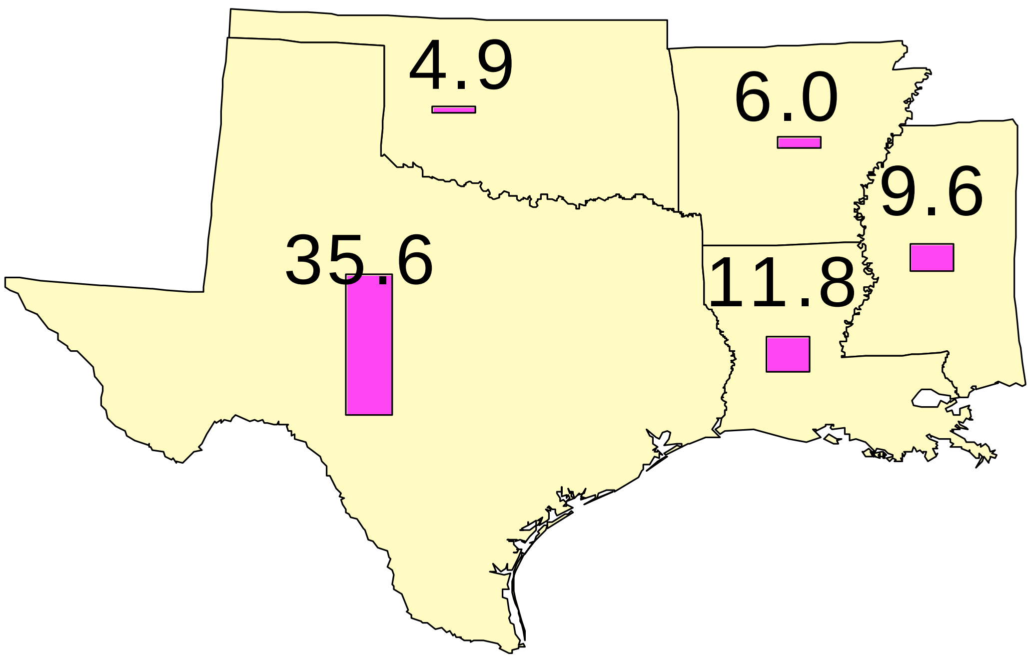


Figure 2.6: Announced Independent Power Facilities in Louisiana

Currently, Louisiana has some 11,775 MWs of announced merchant and cogeneration facilities. Approximately 4,440 MWs (or 38 percent) is associated with new cogeneration facilities at industrial plants, while the remaining 7,335 MWs (or 62 percent) is associated with pure merchant power functions. The recent surge in independent power development in the state has brought Louisiana closer to other neighboring states competing for the independent power business. Figure 2.7 shows the neighboring states' announced GWs of independent generation compared to Louisiana. Figure 2.8 puts this development into perspective by calculating the percentage share of announced independent power to total 1999 in-state generation.



Source: Energy Infosource and Louisiana Mid-Continent Oil & Gas Association

Figure 2.7 Announced IPP Capacity by Neighboring States

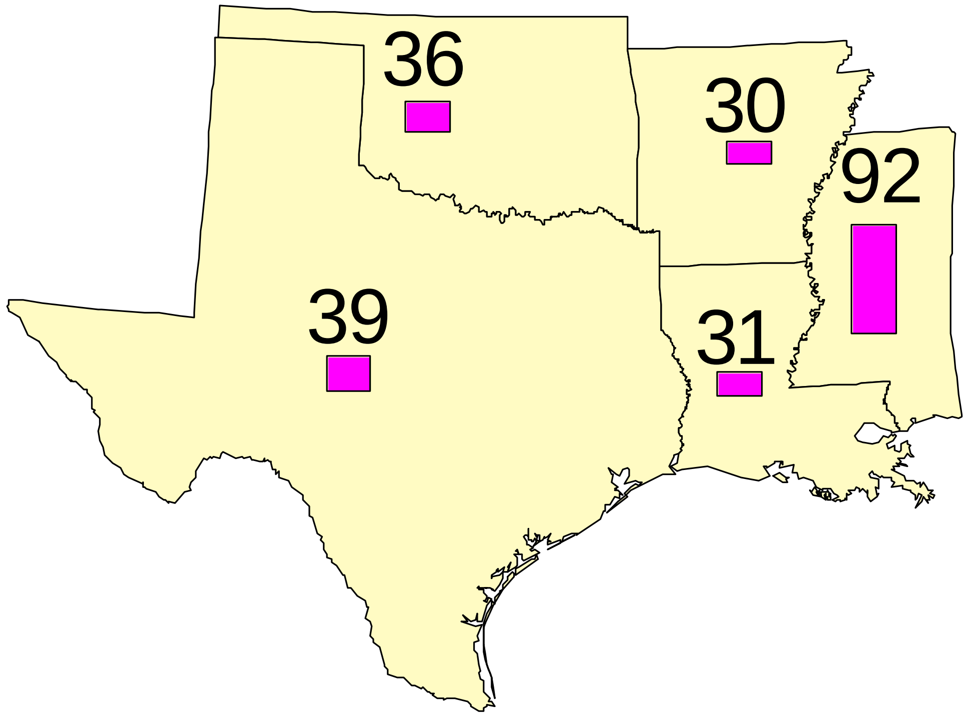
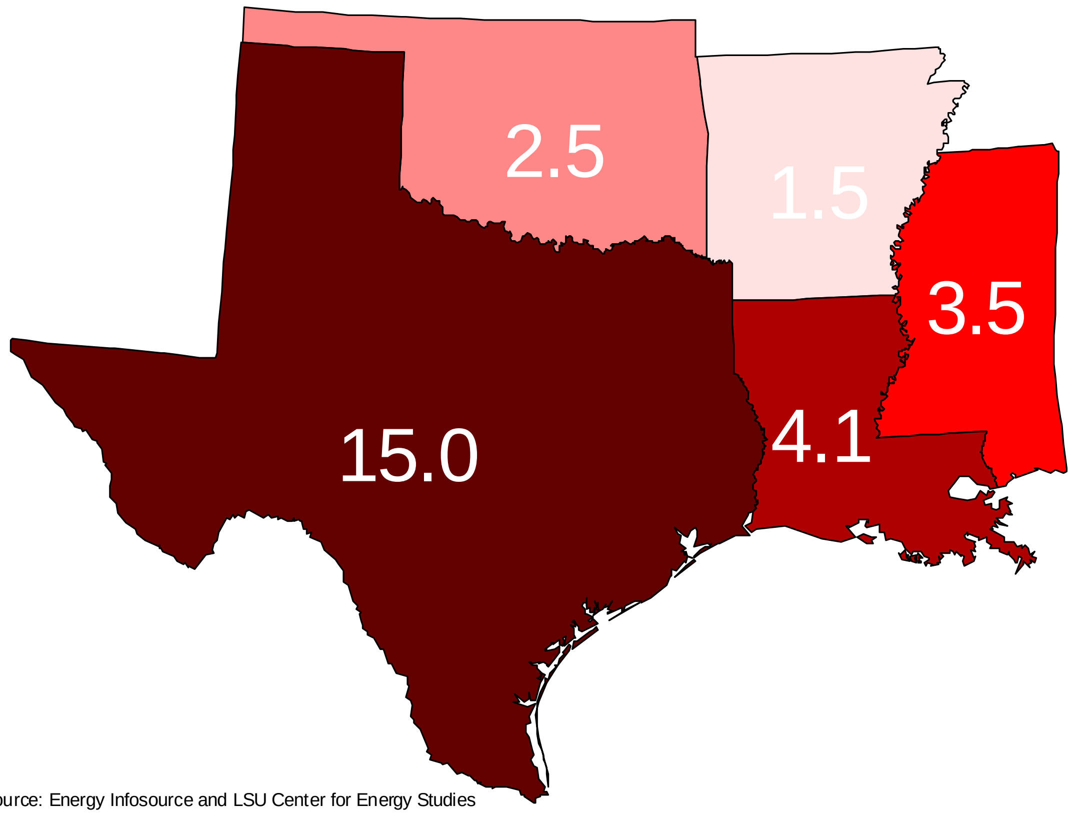


Figure 2.8 Announced IPP Capacity by Neighboring States As Percent of Total 1999 In-State Generating Capacity

Source: Energy Infosource and LSU Center for Energy Studies

Independent power generating facilities represent a considerable capital investment as well. The estimated capital additions for Louisiana, and its neighboring states, has been presented in Figure 2.9. However, it is important to keep in mind that these investments are based upon announced merchant facilities. Realization of these investments may be another issue. In order to secure these possible investments in Louisiana's future, positive incentives will need to be developed. These issues, among others, will be addressed in a later section of this report.



Source: Energy Infosource and LSU Center for Energy Studies

Figure 2.9: Total Capital Investment Associated with Announced Independent Power Facilities

SECTION 3: LOUISIANA POWER MARKETS

The purpose of this section of our report is to provide some historic context regarding the development of Louisiana electric power markets and the environment in which independent power developers are entering. This discussion will concentrate on the major areas and characteristics of Louisiana power markets examining sales growth and energy intensity, generation and generating resources, net imports of power resources, capacity margins, and the current status of independent power development.

<u>Sales and Usage Trends:</u> Retail sales in Louisiana power markets are typically made within four distinct customer classes: residential; commercial; industrial; and other. Sales can be influenced by a number of factors including weather, the economy and personal income, prices, and regulation. Historically, Louisiana has seen relatively robust periods of growth in electricity demand. Figure 3.1 shows the historic growth of electricity sales by major customer class from 1973 to 1999.

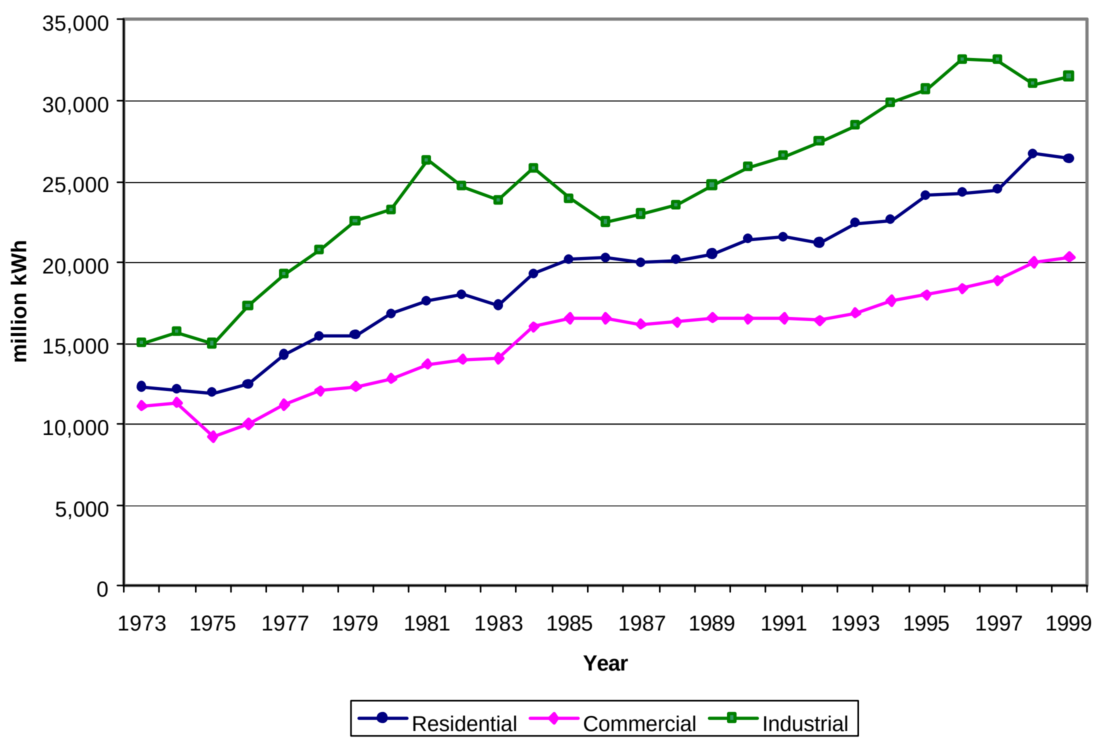


Figure 3.1: Louisiana Retail Sales by Customer Class, 1973-1999

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual

The growth of electricity sales in Louisiana can be examined from a number of different time periods. For the entire period from 1973-1999 annual average growth in total electric sales was 2.8 percent. Annual average growth rates for residential customers were 1.6 percent, 2.8 percent for commercial customers, 1.6 percent for industrial customers, and 6.1 percent for other customers. These annual averages, however, mask the strong growth during the pre-1986 period when the Louisiana economy was expanding and growth was relatively significant.

Sales growth, however, dampened significantly during the 1986-1992 period, when natural gas prices, the savings and loan crises, and other negative external factors weighed heavily on the Louisiana economy. During the 1986-1992 period, sales growth averaged one percent, much less than the average for the longer term.

Since 1992, however, the Louisiana economy has experienced a moderate degree of recovery, and as a result, sales growth for this period has started to rebound. For instance, between 1992 and 1999, annual average sales growth averaged 2.4 percent. This average is comprised of growth rates for residential customers of 2.6 percent, for commercial customers of 2.6 percent, and for industrial customers of 2.2 percent.

Louisiana has been, and continues to be, a relatively intensive user of electrical energy. During the period 1973-1999, electrical use per customer grew at an annual rate of 1.2 percent. In 1973, Louisiana used 10,460 kWh per residential customer. By 1999, this had increased to 14,753 kWh per residential customer. Louisiana businesses and industry also use a considerable amount of electricity per customer. From 1973-1999, commercial and industrial usage per customer increased at average rates of 1.8 and 2.4 percent, respectively.

In 1999, Louisiana used an average of 38,060 kWh per customer relative to Kentucky which used 38,088 kWh per customer. Louisiana electrical energy intensity is second only to Kentucky in the southeast. Table 3.1 provides a comparison of electricity use per customer in eleven southeastern states.

Table 3.1: Electrical Energy Intensity per State, 1999

State	KWh Per Customer	State	KWh Per Customer
Alabama	35,582	Mississippi	31,582
Arkansas	29,353	North Carolina	28,355
Florida	23,532	South Carolina	36,008
Georgia	29,666	Tennessee	33,388
Kentucky	38,088	Texas	33,732
Louisiana	38,060		

Source: U.S. Department of Energy, Energy Information Administration, Electric Power Annual

As noted in the introduction, the use of electricity in economic development is important. Over the past 20 years, considerable effort has been made to secure greater degrees of end-user efficiency through higher appliance and equipment standards as well as demand-side management programs. The result is that today, it takes less electrical energy to produce one dollar of output than it did in 1973 Figure 3.2 shows these trends for both the U.S. and Louisiana economies.

Two trends are noticeable from the figure. The first is that Louisiana has become increasingly more efficient in its electricity use over the past 20 years. The rate of change is dramatic, particularly in the late 1970s. The second trend is that while Louisiana has become more efficient over the years in its electricity usage, our economy still uses a great deal more electricity for every unit of output relative to the national average.

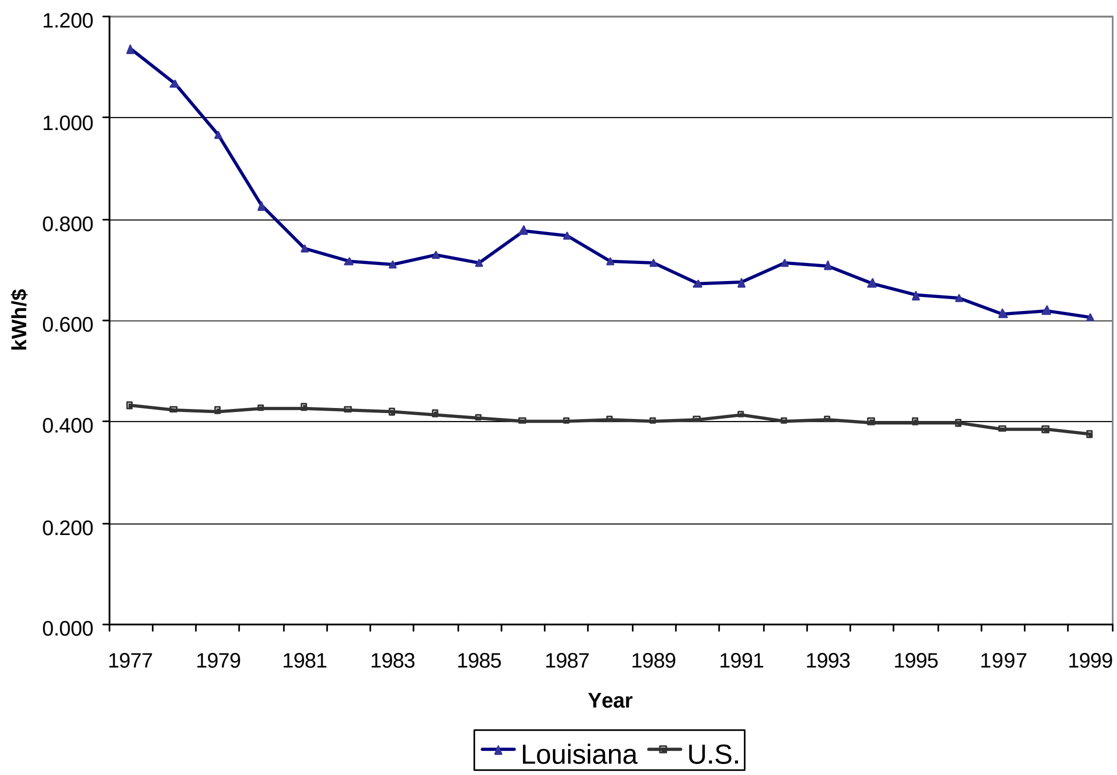


Figure 3.2: Louisiana and U.S. Electricity Intensity, 1977-1999

Source: U.S. Department of Energy, Energy Information Administration, Electric Power Annual

Power Generation Trends: Annual average growth associated with in-state generation was approximately 5.5 percent during the period 1982-1999. During the period from 1982-1986, total power generation declined at a 3.8 percent average annual rate as the Louisiana economy cooled. Much of this decrease was recovered during the period 1986-1992, as power generation grew at an 8.5 percent average annual rate. Power generation growth has been maintained, but at a slower pace in the post 1992 environment, with annual growth rates of approximately 1.7 percent . Total generation is presented in Figure 3.3.

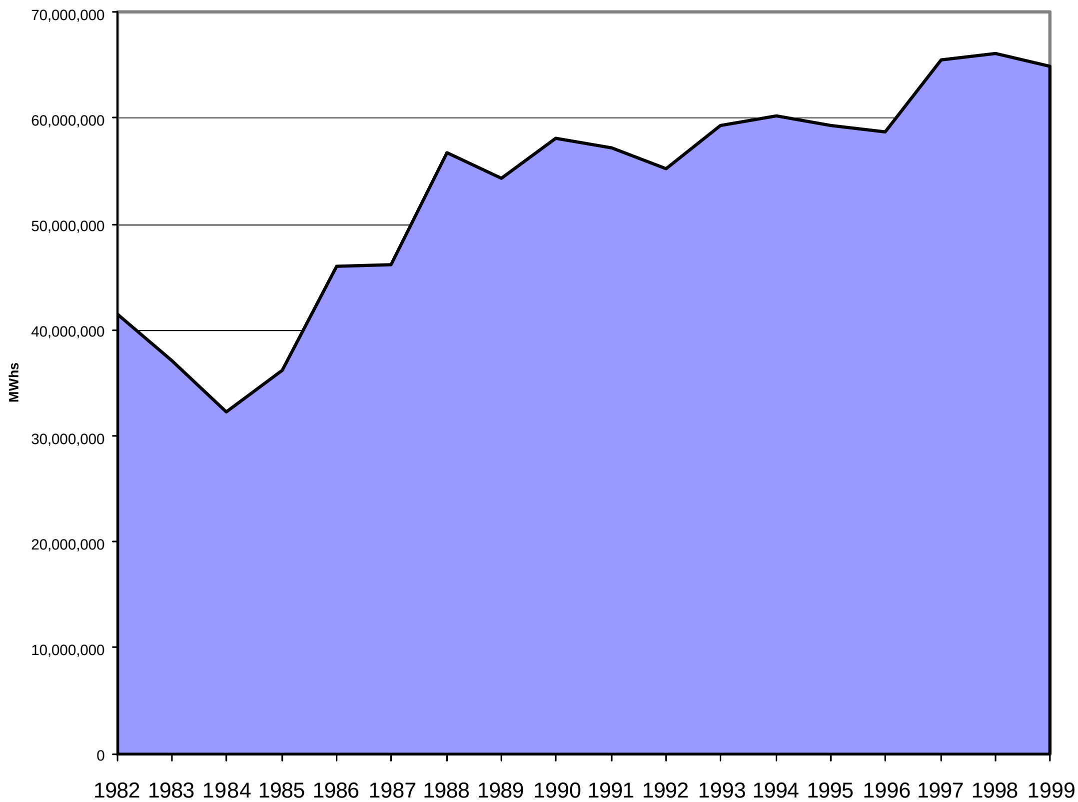


Figure 3.3: Louisiana Total Generation, 1982-1999

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

Since 1982, generation associated with gas fired generators has declined 0.03 percent and petroleum-fired generation has fallen by 58 percent. Thus, an increasing amount of the load growth during the 1980s was met by nuclear and coal generating resources. Nuclear and coal generation during this period grew at 10 and 26 percent, respectively. Total generation by fuel type is presented in Figure 3.4.

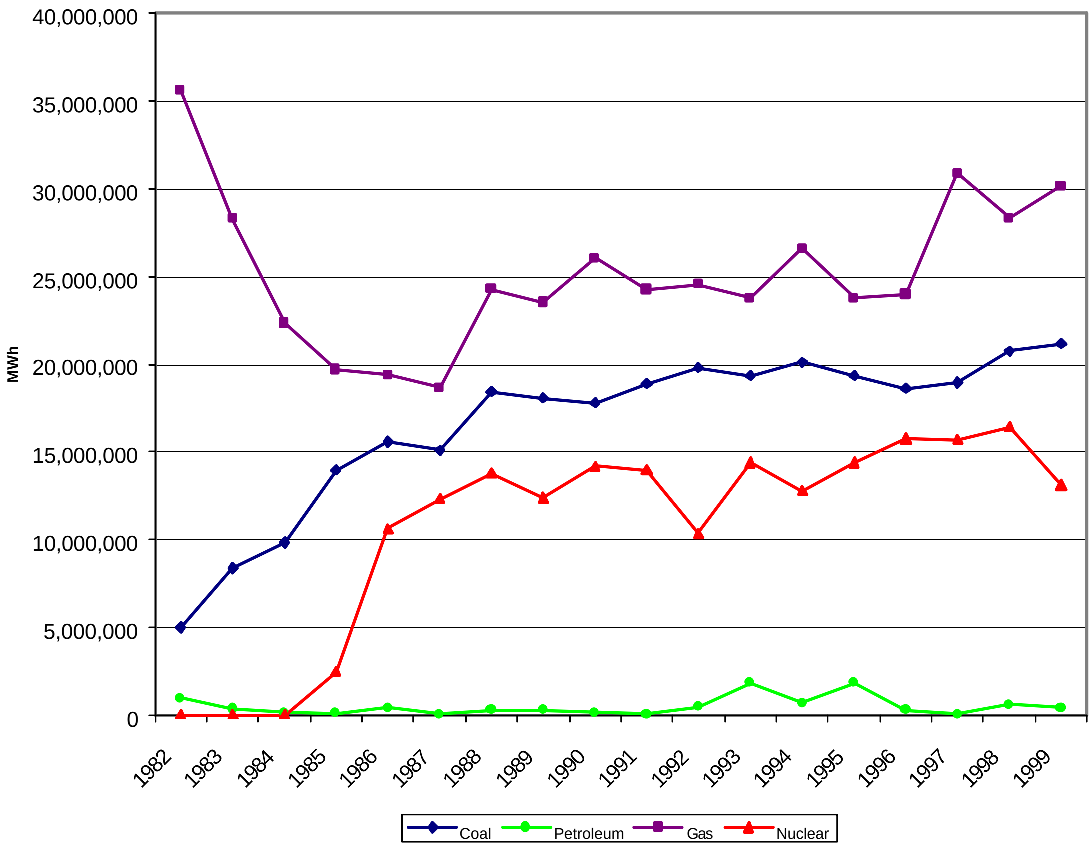


Figure 3.4: Louisiana Total Generation by Fuel Type, 1982-1999

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

Power generation since the early 1980s has shifted from gas to nuclear and coal as Louisiana's utilities have diversified their fuel mix. For instance, in 1982 (Figure 3.5) the fuel mix for Louisiana generation was 86 percent gas, 2 percent oil and 12 percent coal. By 1999, however, this fuel mix had shifted to 42 percent gas, 1 percent oil, 23 percent nuclear, and 34 percent coal. Despite this shift in fuel mix, Louisiana still relies more heavily on natural gas than do its neighboring states. With 42 percent of its generation coming from natural gas, Louisiana is above the southern average of 12 percent (Figure 3.6).

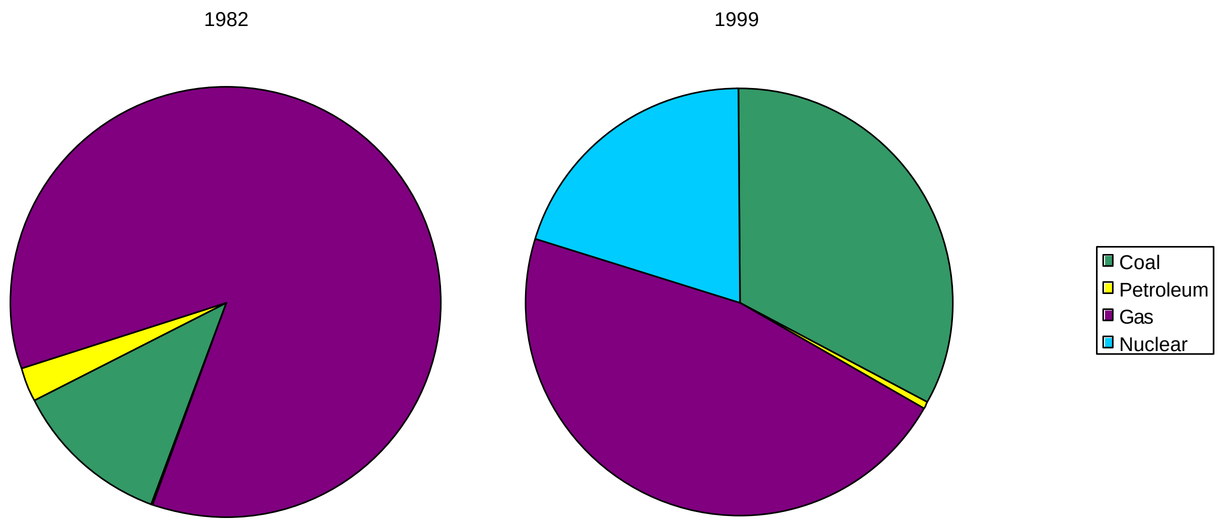


Figure 3.5: Louisiana Generation Fuel Mix, 1982 and 1999

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

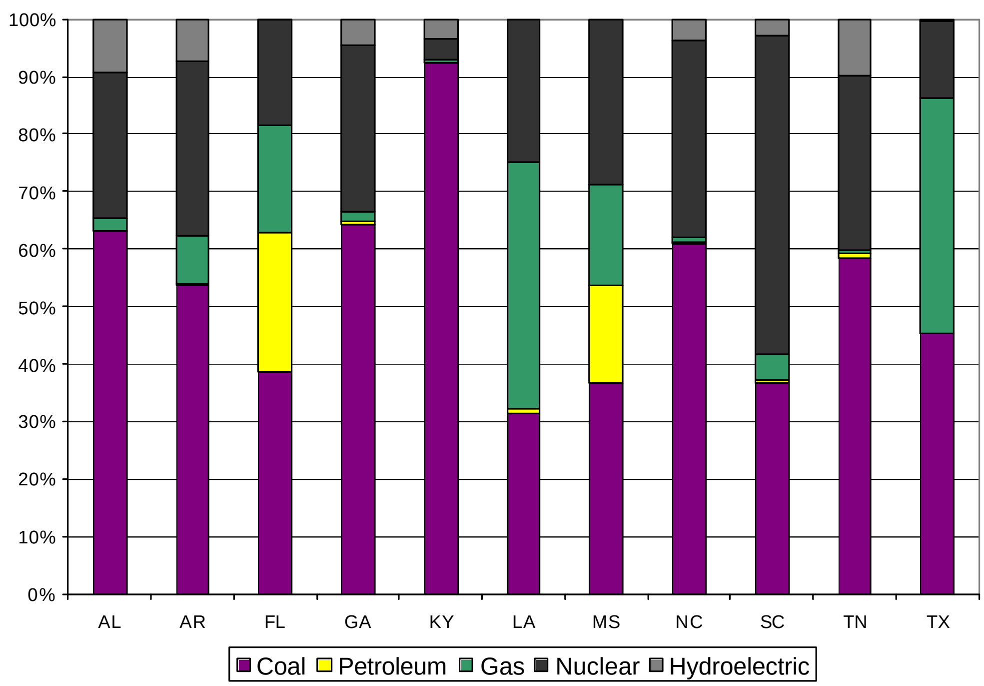


Figure 3.6: Generation Fuel Mix, Southeastern States

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

Non-Utility Generation Trends: Non-utility generation in Louisiana has historically come from industrial cogeneration facilities. Cogeneration is defined as the combined production of heat and power. Cogeneration results in greater efficiency through the use of what was traditionally thought of as waste heat or energy. In many industries (petroleum refining, steel, paper and chemical manufacturing), high-pressure/high temperature steam is used in the production process. Steam not used in the production process is usually wasted through condensation, cooling, and venting to the environment. Lost steam represents lost energy and lost opportunities. Cogeneration takes advantage of lost energy opportunities by using a combustion turbine to generate electricity, and then using the waste heat from the turbine to heat water under high temperatures and pressures to meet industrial steam needs. In short, the industrial process steam serves as a heat sink for the electricity generating system.[10] Cogeneration reduces thermal discharge and increases the combined efficiency of the production of electricity and process steam as opposed to producing both of these sources of energy separately.

These facilities were given the opportunity to interconnect and sell excess electric power to utilities beginning in the late 1970s with the passage of the Public Utilities Regulatory Policies Act of 1978 (PURPA). The three key provisions of PURPA (Section 210) were developed in large part, to address the barriers to cogeneration. The first provision required utilities to interconnect with QFs and to provide standby, emergency, and interruptible power. The second provision exempted cogenerators from traditional rate of return regulation. The third provision provided a guaranteed market for cogenerated power. Under this provision, utilities were required to purchase electricity from a QF at the utilities' avoided cost. This represented a dramatic departure from the typical pricing of electricity purchases by utilities. In the past, these purchases were based upon the providers', not the utilities' cost of production.

Given the large number of industrial customers in south Louisiana, cogeneration represents a considerable opportunity for increased generating resources as well as increased energy efficiency. Figure 3.7 shows the different types of non-utility generating facilities[11] in Louisiana.

[10]Paul L. Joskow and Donald R. Jones. "The Simple Economics of Industrial Cogeneration." *Energy Journal*. 4 (1983): 3.

[11]The information discussed here excludes the growing number of merchant power facilities in the state that are increasingly important sources of non-utility generation. This sector of the industry will be discussed in a later subsection.

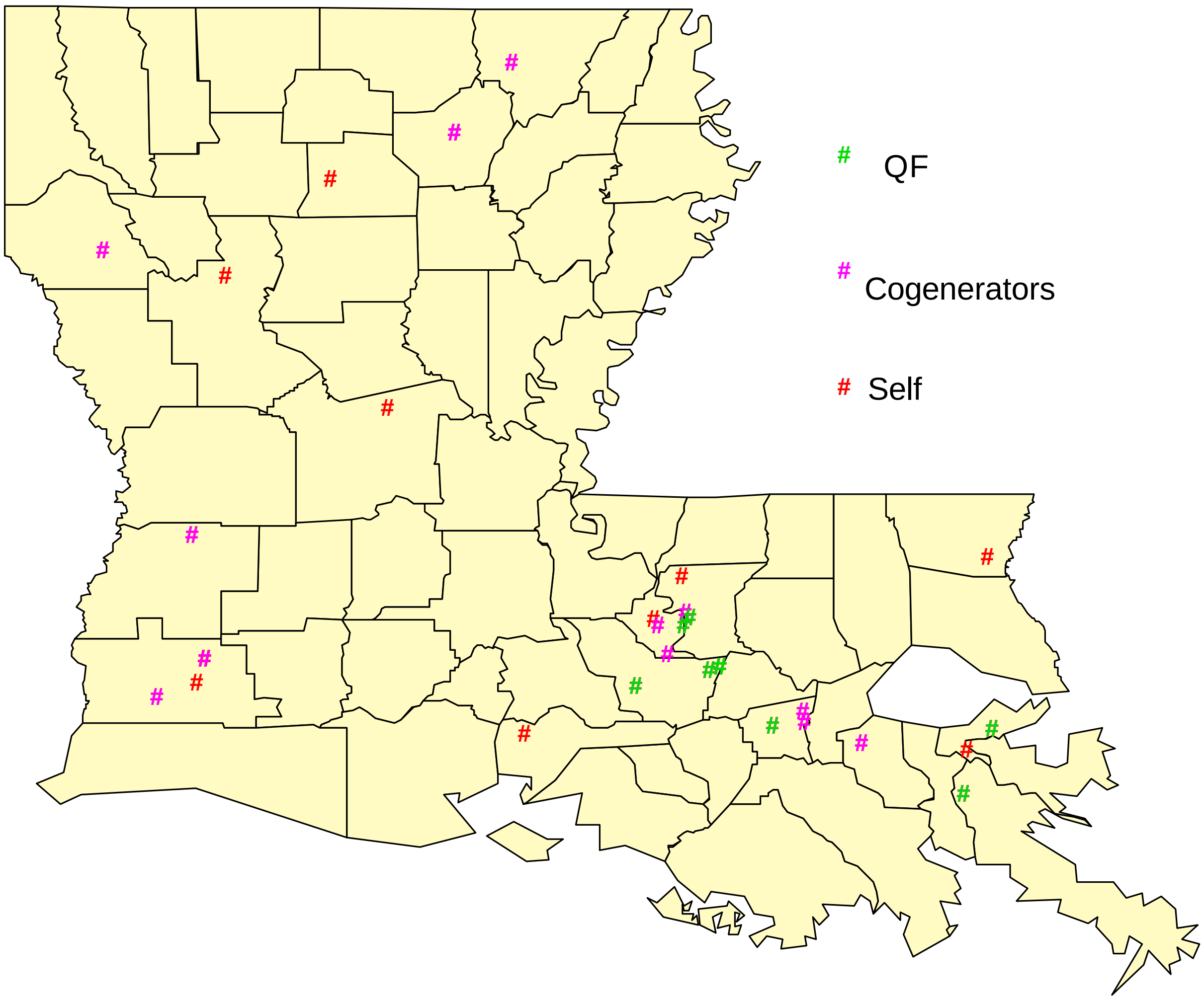


Figure 3.7: Louisiana Non-Utility Generators

Source: LSU Center for Energy Studies

Louisiana non-utility generating has been a solid source of the state's total generating resources. Over the past seven years, non-utility generation has amounted to approximately 26 percent of total Louisiana generation.

Net Imports: Louisiana is served by a number of investor-owned utilities, municipals, and rural cooperatives. Their customers are typically served by a variety of in-state and imported power generation resources. In addition, companies like Entergy-Louisiana, Entergy-Gulf States, Entergy-New Orleans, and SWEPCO-AEP/CSW are parts of larger holding company structures that dispatch resources on a system-wide basis as opposed to drawing upon in-state resources only. As a result, Louisiana imports a significant portion of its power generation resources.

Net imports[12] to Louisiana have shifted considerably over the past several decades. Prior to the development of the state's nuclear generating resources, a significant percentage of Louisiana electric supply resources was provided by net imports. Figure 3.8 shows these trends, and how dramatically net imports fell after the Riverbend and Waterford nuclear generating stations came on-line in the mid 1980s.

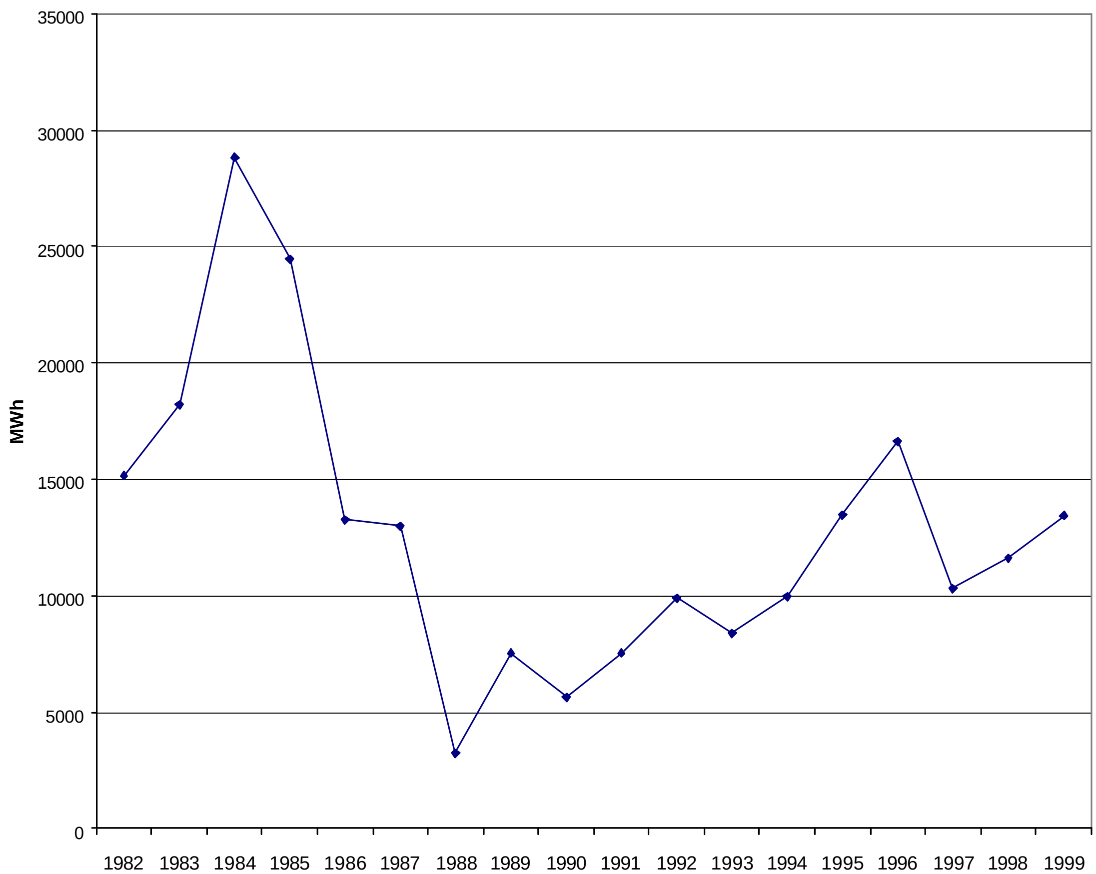


Figure 3.8: Louisiana Electricity Net Imports, 1982-1999

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

Since 1992, net imports for Louisiana have averaged about 16 percent. As noted earlier, a portion of these imports comes from the resources of large multi-state holding companies like Entergy Corporation and AEP-CSW. Currently, a large

[12]Net imports are defined as in-state retail sales less in-state power generation as reported by the US Department of Energy, Energy Information Administration.

number of southeastern states are net importers. The importing states within the southeast have net imports ranging between 4 percent of total regional generation to 24 percent of total generation. Louisiana is second to Mississippi in total net imports as a percent of total generation, and second to Florida in absolute levels of total power imported. A comparison of the net imports for neighboring states has been presented in Figure 3.9. Negative numbers entail a state is importing electricity, while positive numbers entail that a state is exporting.

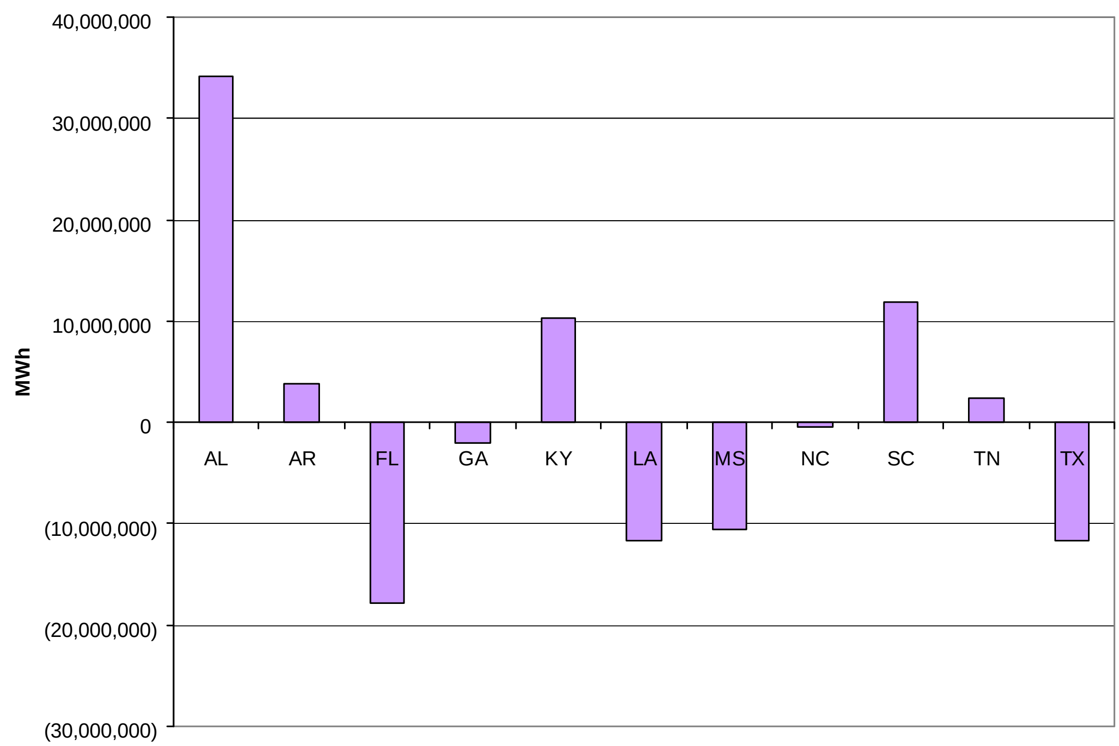


Figure 3.9: Estimated Net Exports by States in the Southeast, 1998

Source: U.S. Department of Energy, Energy Information Administration. Electric Power Annual.

<u>Reserve Margins:</u> Throughout the late 1980s and early 1990s, there were a number of disincentives for the construction of utility generating facilities. Many utilities in the late 1980s received prudence disallowances for prior investments in nuclear power plants. Demand growth during this period was uncertain, and starting in the early 1990s, the move toward electric restructuring was growing. As a result, this period saw the large degrees of excess capacity accumulated in the 1980s start to dissipate.

Figure 3.10 shows the historic trends in reserve margins for the Southwest Power Pool (SPP) region, the Southeastern Electric Reliability Council (SERC) region, and the US average. These historic trends show the decrease in excess capacity for all regions as demand increased, and generating resource capacity additions held relatively constant.

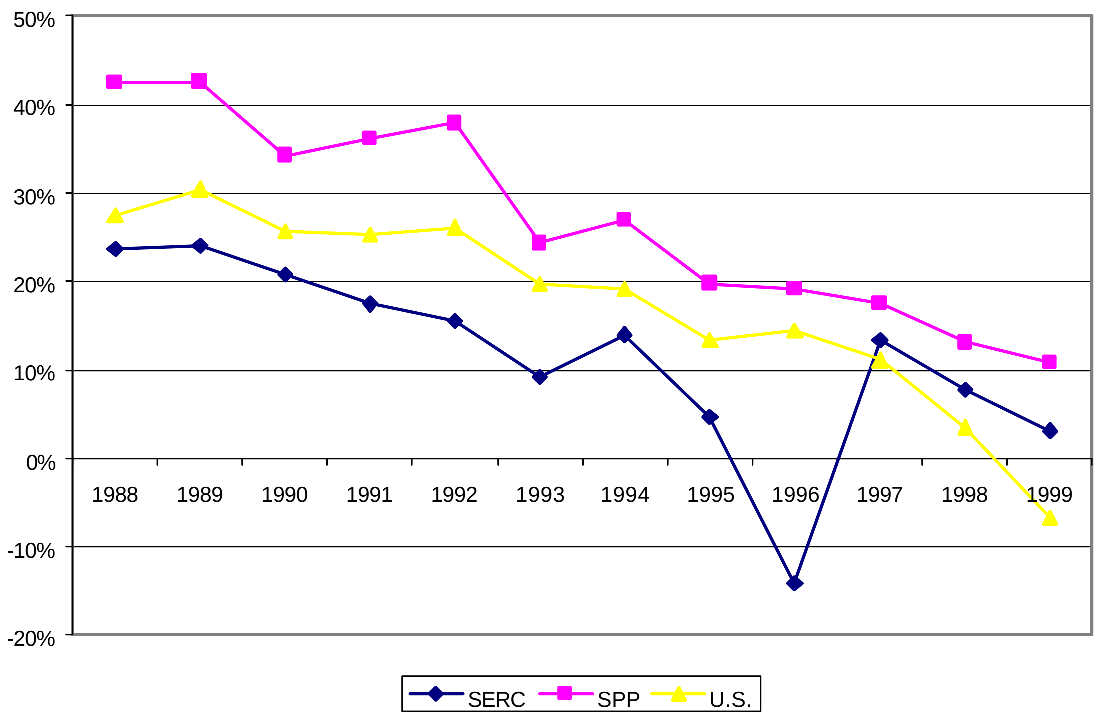


Figure 3.10 Historic Reserve Margins for SERC, SPP and US

Source: North American Electric Reliability Council

Since 1992, electricity demand growth in Louisiana, while not at historical levels, has increased consistently and steadily. During the same period, however, few new utility generating assets have come on line. Today, Louisiana's utilities draw heavily from wholesale markets to meet customer demand. Many utility generating facilities serving customers are old and less efficient than newer natural gas fired technologies. Figure 3.11, for instance, shows the age profile of the generating facilities serving Louisiana. Figure 3.12, shows the efficiency of these generating facilities (some as running as high as 25,500 BTUs/kWh). Older facilities do not compare favorably with either newer gas fired turbines, which use 10,000 BTUs of energy for every kWh generated, or with combined cycle generating facilities which use only 6,000 BTUs for every kWh generated.

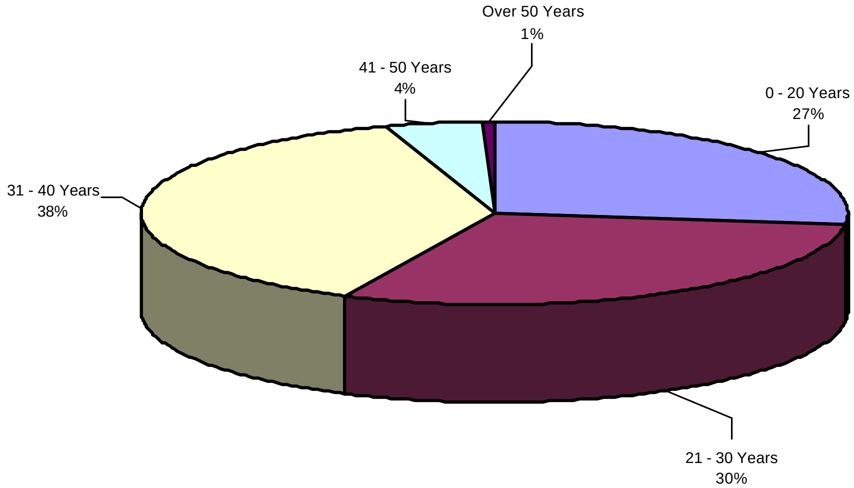


Figure 3.11: Disposition of Regional Generating Capacity by Age Category

Source: Utility Data Institute.

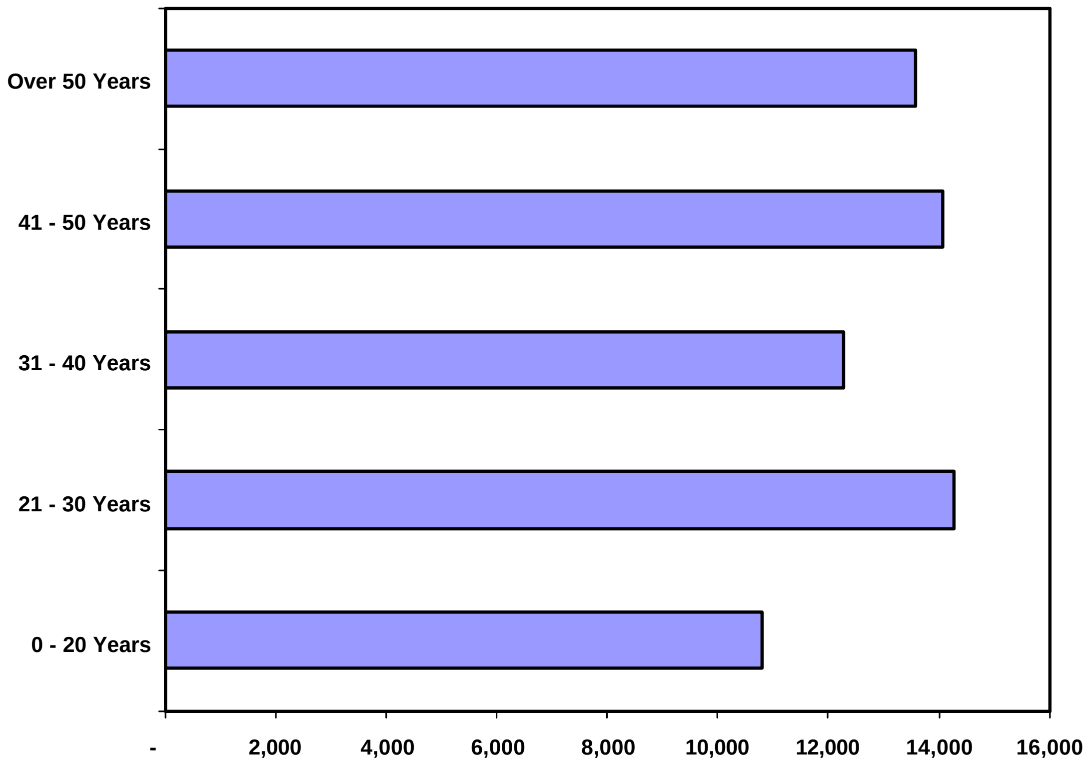


Figure 3.12: Efficiency Disposition of Regional Generating Capacity by Age Category

Source: Utility Data Institute.

The challenge for Louisiana are how future demand will be met, and whether it will be met by imports, or competitive in-state sources of capacity. Today, there is active competition among numerous states for new independent generating facilities. The next section of our report outlines a number of benefits associated with siting these facilities in Louisiana. These benefits include not only the economic impacts associated with constructing and operating these facilities, but the economic benefits resulting from lower cost, higher efficiency sources of electricity for Louisiana's households, business, and industry.

SECTION 4: THE ECONOMIC IMPACTS OF INDEPENDENT POWER FACILITIES

Methods for Estimating the Economic Impacts of Merchant Facilities: Our study facilitates an economic impact estimating methodology known as Input-Output modeling (I/O model). I/O models are powerful economic tools used to estimate sector specific impacts associated with exogenous changes in regional economic activities. The advantage of these I/O models is that they can estimate a host of economic impacts on a commodity and industry sector specific basis. These impacts include the direct, indirect, and induced economic impacts associated with regional economic changes.

Direct economic impacts are defined as those economic impacts directly associated with a change in regional economic activity. In this case, direct economic impacts are defined as the direct expenditures associated with the development and construction of independent power plants in Louisiana. Indirect economic impacts are defined as the additional economic activities stimulated by direct expenditures associated with independent plant development. These indirect expenditures would include the increased economic activities of other businesses that service those directly involved in independent power plant development. Induced economic impacts are those increases in economic activity associated with the increased disposable income created by an increase in local economic activity.

Modeling the economic impacts of independent facilities, or any ongoing dramatic industry change, can be difficult. However, for our analysis, there are two challenging issues that need to be addressed. The first issue is recognizing the fact that the energy industry, in general, and the power industry, more specifically, is in a constant state of change. Most modeling approaches, however, assume that "other things are equal." This condition is commonly referred to by economists in the Latin as the *ceteris paribus* conditions. These changes can include shocks from the national and regional economy that also influence the outcome of independent power plant development. As will be discussed below, our approach has been prepared in a "snapshot" fashion in order to isolate (or at least recognize) that these activities do not occur within a vacuum.

The second issue is recognizing that independent power activity has occurred – and is still underway – in Louisiana and the Gulf South region. Many projects have been completed, while others are under construction. While it is probable that a number of announced plants might not materialize, it is equally probable that a number of new plants could be announced in the near future. Thus, it is difficult to view the complete picture of when merchant facilities will be sited in Louisiana, and what their locations, size and installed costs will be.

In order to correct for all of the variations that can influence independent power plant development, we have chosen an approach that assumes a “typical” facility for modeling merchant economic impacts. This “typical facility” approach is premised upon the development of two types of projects based upon different technologies. We also separate our impact analysis into two broad categories: those impacts associated with the construction of the project and those associated with the operation of the project. We would characterize our approach as attempting to take a “snapshot” of each type of facility’s economic impacts as it is built and operated.

The two “typical facilities” that we examined in our analysis are as follows: (1) a simple- cycle natural gas fired combustion turbine project and (2) a natural gas-fired combined-cycle project. The input assumptions associated with these two typical facilities are provided below.

Table 4.1 Independent Power Plant Capacity and Cost Assumptions

Facility Type	Assumed (MW) Capacity	Assumed Installed Cost/kW
Combustion Turbine	350	$400
Combined Cycle	600	$600

We examined the construction and the operation phases for each type of power plant technology. We have separated these phases to recognize the different economic impacts that can occur over the life cycle of a power plant. For instance, the academic and scholarly literature has long recognized the immediate and strong economic impacts associated with the construction of power plants, but not reflected the substantially decreased impacts associated with their annual operation and maintenance.[13]

The construction cost economic impact model was developed in a relatively straightforward manner. We used publicly reported information on recent power plant construction costs and employment to develop a direct shock, or impact, to our model. The model, in turn, calculates the indirect and induced impacts associated with the construction of the different types of merchant facilities. It is important to keep in mind that while these shocks are significant, they are

[13] Many of these studies have focused on the impacts of power projects internationally. For instance see S. Yamaguchi, and E. Kuczek. 1984. “The Social and Economic Impact of Large-Scale Energy Projects on the Local Community.” *International Labour Review* 123(2): 149-165, D. Pijawka, and J. Chalmers. 1983. “Impacts of Nuclear Generating Plants on Local Areas.” *Economic Geography* 59:66-80, and W.F. Freudenburg, 1986. “Social Impact Assessment.” *Annual Review of Sociology* 12:451-478.

relatively short-lived and last only for the duration of the construction phase. Once the plant has been completed, the incremental economic and employment impacts are gone. Our model assumes that the economic impacts and construction period for each type of independent facility lasts for one year. Economic impacts associated with construction, while temporary, could last for a longer period to the extent that these construction phases last longer than one year.

In order to incorporate the impacts of independent power plant construction appropriately into our model, we developed a construction expenditure profile. This profile was developed for both technologies for two specific reasons. First, expenditures are rarely made (or allocated) to one specific commodity or industry classification. In many instances, large construction projects, like a power plant, distribute expenditures across a range of commodity and industry classifications. We have attempted to disaggregate these expenditures into a tractable profile that takes into account the diversity of economic sectors that are influenced by a major power plant construction project.

Second, many commodities and inputs come from outside Louisiana. If an adjustment is not made for the types of inputs that have higher import probabilities, then local economic impacts will be overstated. For instance, our model estimates that turbines, and their related equipment, come primarily from outside the state.[14] If we do not make an adjustment for this type of expenditure, and assume that combustion turbines are wholly produced within Louisiana, then our model will overestimate the state economic impacts.

Our analysis also included developing a separate economic impact model for independent power plant operations. We examined two different aspects associated with the operation of independent facilities: the actual plant operation impacts and the market impacts associated with the new plant output. Modeling the operational aspects of the merchant facility for each technology is relatively straightforward. Like our approach with the construction impact model, we developed an expenditure profile associated with typical plant operations.

Developing an economic model for market impacts, however, was a little more involved. The steps we employed to develop this model included the following:

(1) Estimating a simple Louisiana average wholesale market supply curve and determining an average wholesale market price.

[14]This adjustment is made through what is referred to as a regional purchasing coefficient (RPC). This RPC estimates the percent of a commodity group that is produced domestically (within the state) versus other areas. An RPC of 1.0 indicates that an area is autonomous in its production of a commodity, while an RPC of 0.0 indicates that an area is importing all of its commodity. A unique RPC is developed for each commodity/industry sector.

(2) Introducing each merchant plant technology into the average wholesale market supply curve to estimate the efficiency change in the average wholesale supply curve and estimated average wholesale price. Narrow and broad markets were defined and equilibrium conditions were assumed to hold in each of the markets (i.e., supply equals demand). No imported power from other regions outside the narrow or broad markets was assumed.

(3) Developing an unbundled retail rate for each customer class. An unbundled rate was developed to correct for the fact that only the generation portion of the bill would be impacted by the development of merchant facilities. The transmission and distribution components were assumed not to change. Our unbundled rates were determined by using the current functional plant in service to allocate rates into generation, transmission, and distribution components.

(4) Typical bills for each customer class were developed. Base case rates were then compared to new rates with higher efficiency wholesale resources. The increase in disposable income was then assumed to be translated into increased spending opportunities for households and businesses.

Admittedly, the development of an average wholesale market supply curve is a simplification of the way complex wholesale markets actually work. However, time and budget constraints dictated that an expedient and straightforward approach be developed. The purpose of the market impact analysis was to develop illustrative numbers of the types of economic impacts that could result from new merchant development, and how disposable income could be diverted to other economic activities. More sophisticated power market modeling approaches, which are virtually infinite in their assumptions and detail, could develop more specific estimates of wholesale prices particularly in more specific geographic markets, in specific time periods, and within specific seasons. Nevertheless, the basic premise that more efficient generation can lead to lower wholesale prices that are available to be transmitted to customers would remain unchanged even with an infinitely more sophisticated approach.

We believe that our generalizations are defensible and are illustrative of the types of impacts that could be generated from merchant development. These are important modeling aspects to consider for the following reasons:

(1) Most economic impact studies that have examined power plant construction have omitted the impacts that efficiency opportunities have on wholesale markets and how those impacts, in turn, are translated into lower rates for customers.

(2) These numbers are important in understanding the potential benefits (and beneficiaries) of wholesale competition. It is important to remember that the primary reason for introducing competition at the wholesale level is ultimately to increase efficiency and lower rates for retail customers.

(3) Few studies have examined the disposable income effects of any competitive power market (retail or wholesale).

Thus, our methods for estimating the economic impacts of independent power facilities can be summarized by the following matrix that maps each technology to a particular impact model, and also describes the purpose of the model for that given technology.

Table 4.2: Outline of Model Methodologies

Impact Model/ Technology	**Combustion Turbine (CT)**	**Combined Cycle (CC)**
Construction Impact Model	*Models impact of CT construction process*	*Models impact of CC construction process*
Plant Operation Impact Model	*Models impact of CT operations (annual average)*	*Models impact of CC operations (annual average)*
Market Impact Model	*Models impact of efficiency gain on rates by use of CT technology (annual average)*	*Models impact of efficiency gain on rates by use of CC technology (annual average)*

Empirical Estimates of the Economic Impacts of Independent Power Facilities: The empirical results from our analysis are presented in Table 2 through Table 17, provided after the conclusions of the report. Each of these tables is a summary of the output detail that was generated from our economic impact analysis. We have limited our presentation to the critical information provided in three major areas:

(1) ***Total Value Added:*** the estimates of the additional economic activity associated with core production including the returns to factors of production such as wages for workers, and rents paid on property and equipment.

(2) ***Output:*** this is the total economic activity, in terms of increased output, resulting from independent plant development.

(3) ***Employment:*** the estimated number of jobs that have been created as a result of the new merchant plant activity.

Each table has estimates of the direct, indirect and induced impacts associated with each type of merchant plant activity in each estimated metric (i.e., total value added, taxes, output, and employment).

Table 2 shows that there are substantial impacts associated with the construction of a 350 MW CT. Total value added to the state economy is estimated to be $9.5 million. A substantial amount (65 percent) of this value added is associated with new wages. Annual wage estimates for indirect and induced effects are somewhat lower at approximately $1.4 million, for both categories.

Output effects essentially measure the change in state economic activity created by our assumed new independent power plant. This direct output effect, in total dollars, is estimated to be $45.3 million. The output impact multiplier, which is measured as the ratio of total impacts to direct, is estimated to be 1.13. This means that for every dollar spent on constructing a independent power plant, there is another 13 cents generated in additional economic activity. The total economic output effect associated with this new construction activity is approximately $52 million.

Table 3 provides the disaggregate, per-sector output and employment impacts resulting from the construction of a typical 350 MW CT project. Seven different sectors are presented in this table. As shown in the table, there are obviously strong impacts in the construction sector of the Louisiana economy resulting from power plant development. The service sector of our economy, however, is one of the most impacted by the indirect and induced effects. There is a total of $2.6 million in service sector related output and 46 new employment opportunities created through these multiplier effects.

An important consideration in reviewing the results from our construction cost impact modeling is to recognize that these gains are temporary one-time gains associated with constructing a power plant. These impacts represent a one-time surge in economic activity associated with a major infrastructure project. We do not anticipate these employment impacts to last over a prolonged period of time. Once the plant is completed, employment opportunities associated with construction will effectively be eliminated.

In order to capture what we feel are “on-going” economic impacts of independent power facilities we generated two additional economic models. The first models the relatively small economic impacts associated with the annual operation of the typical merchant plants under investigation. The second models the disposable income affect associated with reducing electric generating costs in the wholesale market – which we assumed will be passed along directly to customers.

Table 4 shows our estimated economic impacts associated with the annual operation of our typical 350 MW CT merchant power facility. As noted earlier, the economic impacts here are not very large. This is because the unit is not very large, and more importantly, power generation (operation) is a capital and fuel intensive activity that does not employ a significant amount of labor. Thus, the economic impacts associated with increased employment, income, and spending are much smaller. The greatest expense for these power plants, especially natural gas plants, is the cost of fuel, with some smaller expenditures for operation and maintenance expense. Thus, labor induced impacts will be small.

However, unlike the economic impacts associated with plant construction, we anticipated that those associated with plant operations will be ongoing and more permanent. We estimated the total employment impact of 15 jobs associated with the operation of a typical 350 MW CT independent power project. The economic output effect associated with the facility is $32.5 million – a large portion of which is associated with fuel purchases. The estimated output impact multiplier is 1.04 indicating that every dollar associated with plant operations generates four cents of additional economic activity. Total economic impacts associated with the operation of this facility are close to $34 million.

Table 5 presents a disaggregate estimate of how various sectors of the Louisiana economy are impacted by the operation of a 350 MW CT project. We estimate that most jobs and output effects will be restricted to the utility/power generation sector. However, there are important secondary effects in construction, financial services and real estate, and service sector of the economy. These indirect effects are the spill-over effects created by new power plant operations.

Table 6 presents our estimated economic impacts associated with the potential market effects that new independent power plants can have on the Louisiana economy. In this analysis, we model the potential increases in generating efficiency that can arise as a result of the introduction of new, state-of-the-art merchant generating facilities. We assume that the gains resulting from this efficiency in regional generation supply are directly passed along to Louisiana customers. For modeling purposes, we have defined two different markets to estimate these impacts: a narrow market and a broad one.

Our broad market approach considers a simple economic dispatch of all of the regional power plants that are in the greater southeast region to determine an average cost (price) of electricity. Our analysis of this broadly defined market shows that the addition of a 350 MW CT independent power plant would have a relatively small impact on rates. We estimate a potential price decrease resulting from this new merchant plant coming on line. The small rate decreases (2.1

percent) are the result of the plant being very small relative to a large market that encompasses many competing generating units of differing fuel types.

Our narrow market approach, however, assumes that there are certain limiting constraints, like transmission congestion, that prevent a large number of regional power plants from being called upon to impact Louisiana power prices. The region we consider is essentially restricted to the Louisiana and Entergy area. We estimate that within this more narrowly defined market, a 350 MW CT would have a much smaller impact on prices resulting in a potential 1.5 percent decrease.

One of the interesting aspects of our model is associated with the counter-intuitive result that the narrow market impacts are actually smaller than the broader market impacts. This result comes from a number of interesting characteristics of the broad and narrow market. In the broad market, there are greater opportunities to displace higher cost peaking units. In the narrow market, given the relatively larger number of baseload facilities, the opportunities for displacing these inefficient peaking units, holding demand relatively steady, are not as pervasive. It should be noted however, that in both cases, the new peaking unit, given its relative efficiency, was the first gas peaking unit dispatched. It should also be noted that while this somewhat counterintuitive result held with dispatching the smaller CT peaking unit, more traditional results held for the dispatch of the larger, and more efficient, 600 MW CC unit.

The economic impacts associated with an efficiency improvement in the regional generation market for Louisiana range from very small to moderate. If broad market impacts are translated into a 2.1 percent rate reduction in the generation portion of Louisiana electric rates, then our impact model estimates that there could be 357 new jobs, $35 million in increased total economic output, and $14.9 million increase in value added. These economic impacts are associated with this shift in prices that result from increasing effective disposable income for the state's ratepayers.

The economic impacts for a more narrow or constrained market are somewhat smaller, but still important. Our model for narrow market impacts estimates 257 new jobs, $24.8 million in increased output, and $10.6 million in increased value added. The results from both assumed market structures (narrow and broad) have been presented in Table 6 for the 350 MW CT merchant facility.

Table 7 and Table 8 provide the sector-specific output and employment effects created by the electric rate decrease stimulus on the Louisiana economy. A considerable amount of the economic activities and jobs created by these efficiency opportunities are in the financial, services and retail trade sectors of the economy. These are all big consumer support sectors that see considerable stimulus from the increased household and business disposable income.

We also model the economic impacts associated with a much larger, and more efficient, 600 MW CC merchant facility. The economic impacts from our three standard models have been presented on Tables 9 and 10 (construction impacts), Tables 11 and 12 (operations impacts), and Table 13 and 14 (market impacts). These three tables show a much more substantial impact associated with this type of facility for two reasons. First, our illustrative 600 MW facility is much larger than the smaller 350 MW facility and the cost per KW associated with this facility is slightly higher. Second, because the unit has a higher efficiency; it dispatches a considerable amount of cost effective electricity, thus displacing, older, less efficient units. This creates a more significant impact on the generation market, which we assume will be passed on directly to customers.

Table 9 shows the impacts associated with the construction of a 600 MW CC merchant facility. Total employment impacts are 419 total jobs, with an estimated employment multiplier of 1.9. This entails that for every job created in the construction of a 600 CC power plant, there are an additional 0.9 jobs created. Our model estimates a total of $113 million in direct output effects with an output multiplier of 1.13. In other words, for every dollar of expenditures associated with the construction of a 600 MW CC independent generator, there is 13 cents in additional economic activity. However, like our estimated results with the 350 MW CT, these economic impacts will be of a transitory nature. Once construction activities have stopped, a good portion of these economic activities will go away. Detailed sector-specific output and employment impacts resulting from the increased construction power plant expenditures are presented in Table 10.

Table 11 shows the impacts associated with operating an illustrative 600 CC unit. As with the smaller CT unit, employment impacts associated with operations are much smaller than construction impacts. Direct employment at the facility is estimated to be 30 jobs, with indirect and induced employment estimated to create an additional 36 jobs. Our estimated output effects are $79 million in direct impacts and $81.2 million in total economic impacts. This entails an estimated output multiplier of 1.07, indicating that for every dollar in plant operations, there is an additional 7 cents in extra economic activity. Table 12 provides the sector-specific detail of both the output and employment effects.

Table 13 shows the estimated impacts associated with the efficiency-generated market impacts of a new 600 MW merchant generating facility. For the broad market, we estimate that a 600 MW CC merchant facility could reduce rates by about 3.1 percent, while for the narrow market, we estimate a potential rate impact of around 4.2 percent. The economic impacts, associated with increased disposable income from reduced rates, are presented in the table.

If broad market impacts are translated into a 3.1 percent rate reduction, then our impact model estimates 529 new jobs, $51.2 million in increased output, and a

$21.8 million increase in value added associated with this shift in prices that result in increasing effective disposable income for the state's ratepayers.

The economic impacts for a more narrow market are more pronounced. The potential 4.2 percent reduction in rates could yield 702 new jobs, $68 million in increased output, and $29 million in increased value added. The results from both assume market structures (narrow and broad) are presented in Table 13 for the 600 MW CC merchant facility. Tables 14 and 15 present the sector-specific detail associated with these impacts.

The economic impacts associated with these "typical" facilities can be extrapolated to the announced facilities that are planned for Louisiana. This extrapolation yields an interesting determination of how independent power facilities, if realized, could impact the Louisiana economy. In order to estimate these total impacts, we generalized our above results to an economic impact per MW of installed capacity for a CT and CC unit. Taking the announced plants, and their respective technologies (i.e., CC or CT) we determined the total impact that could result by 2005, from the currently announced facilities in Louisiana.

If Louisiana realized all of the development associated with announced merchant facilities in this state, there would be considerable economic impacts. These results have been summarized in Table 16. We estimate that there could be as much as $2.8 billion in direct economic effects associated with the construction of the announced facilities in Louisiana, and another $1.7 billion associated with the operation of these facilities. Some 9,400 employment opportunities could be created by the construction of these announced facilities, while another 1,500 jobs could be created. Clearly, the argument that these facilities have a small impact on the Louisiana economy is not supported. However, it is important to keep in mind that these impacts will not be realized if the announced facilities are not developed.

Table 17 presents a rough estimate of the potential tax revenues that could accrue to state and local governments from the announced facilities in Louisiana. Caution should be given to these numbers, however, since they are based upon a number of assumptions about future operating and market conditions – as well as the important assumption that all of the announced facilities in Louisiana will be developed.

We consider four major tax categories in which power plants contribute: property taxes; fuel taxes; sales taxes; and income taxes. The analysis provides estimates in both future dollars as well the streams of revenues mean in today's dollars (i.e., the net present value of these taxes that will be paid over the next 30 years). Property tax estimates have been based upon estimates of the installed costs associated with each type of project. Depreciation rates for these projects have been based upon tables provided by the Louisiana Tax Commission.

Mileage rate is assumed to be 100 mills. Ten-year exemptions are assumed in the estimation.

Fuel taxes are based upon the fuel costs associated with running each of the respective technologies. These are estimates based upon the assumed operating profile for each type of technology. Heat rates for the respective units are assumed to be 6,000 BTUs/kWh for CC units and 10,000 BTUs/kWh for CT units. Sales taxes paid by the respective units for ongoing maintenance and operation were based upon the operating profile for each type of unit. Income taxes are based upon assumed operating profiles for typical units provided by industry sources. Income taxes can be highly variable and depend upon the potential gain associated with sales from these units. While these estimates have been based upon the best available information, some caution should be given since market conditions can considerably impact these figures. The more profitable these plants are over time, the more they will pay in income taxes. The less profitable, the less they will pay in income taxes.

Figure 17 shows that a considerable amount of taxes could accrue to the state from the development of these independent power facilities. We estimate that the net present value of these potential streams are considerable. We estimate that approximately $3.1 billion could be paid in taxes over the next thirty years by these new independent facilities. This is the net present value of the future streams paid by independent generation facilities.

A considerable portion of this tax payment, some $1.7 billion, is associated with property taxes paid on these facilities. On the property tax side, these estimates are conservative since they exclude ongoing property and capital improvements that are typically made at these facilities. For instance, these estimates do not include close to $6 million made every 5 to 6 years for turbine improvements and upgrades that are typically added to the overall taxable property of these facilities.

In conclusion, we would like to note that all models are approximations of how the real world works. Our approach has attempted to use the more conservative estimates and assumptions about the potential economic impacts associated with merchant development. However, despite differing opinions about assumptions and methods, we believe our results provide relatively strong evidence that even under the more conservative of assumptions, independent power provides considerable benefits to the Louisiana economy.

SECTION 5: OTHER ISSUES ASSOCIATED WITH INDEPENDENT POWER DEVELOPMENT IN LOUSIANA

Over the past several years, a number of other important policy issues have arisen in response to increased independent power development in Louisiana. Three of the more important, and sometimes more controversial, issues will be discussed in this section: (1) what impact will independent power plants have on the state's power transmission system; (2) what impact can independent power have on economic development and growth in the state and should incentives be developed to facilitate these new power generation resources; and (3) what impact can these natural-gas fired facilities have on the state's natural resources.

Transmission Issues: The electric transmission grid is an important means by which power is moved between regions. The grid not only facilitates physical power flows, but it assures that competitive transactions between regions are possible. As a result, the grid is very important in promoting competition. Plants that cannot secure available transmission capacity to move their power will be limited in their market opportunities.

The power transmission grid facilitates competition in two important manners. When regional wholesale price differentials exist, transmission can serve as the means of equalizing these differentials as cheaper power moves to more expensive regions until prices between the two areas are close to equal. This movement assures that the "law of one price" will be closely approximated.

The second important role that the transmission system can play is in minimizing market power in a particular region. Consider for instance, an incumbent utility that, because of its past role as monopoly provider of utility services, owns a significant amount of regional generating capacity. It would be difficult for that incumbent utility to exercise market power, if power from other resources, in other regions, were able to flow into the region and under cut the potential market power pricing abuses of the incumbent.

The problem with the transmission system in the current competitive wholesale market, however, is twofold. First, the electric power transmission system has been developed over a number of decades under traditional utility regulatory practices and policies. In the past, the interrelated system of individual transmission systems was developed for reliability purposes. For instance, if one region found itself short on electrical generating capacity, it could draw upon the resources of a neighboring utility to meet that shortfall.

Over time, economic considerations entered into the picture as economy energy sales between utilities began to take place. These sales would be made when incremental generation by one neighboring utility was less than that of another. Consider two hypothetical utilities called Utility A and Utility B, if Utility A had generating capabilities that were more cost effective, at the margin, than those of

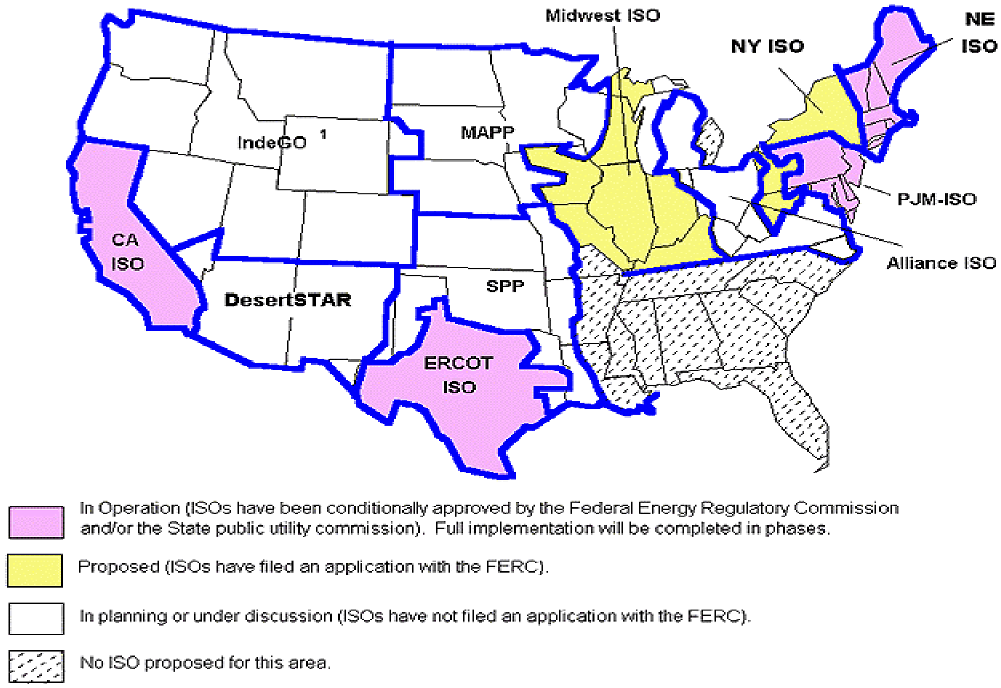
Utility B, these two utilities would have opportunities for trade. In the past, these trades were limited, and were usually made on a "split the savings" basis. For instance, if Utility A had marginal costs or $25 per megawatt hour (MWh) and Utility B had marginal costs of $30 per MWh, then Utility B would ramp down its generation and purchase the cheaper resources. The differential ($5 per MWh) would be shared between the two utilities (i.e., $2.50/MWh apiece).

However, in the past, these opportunities for trade were somewhat limited and the traditional way to meet demand over the long term was to build new generating facilities. Thus, while some trade has existed over the past several decades, it was very limited in nature, and did not place commercial and physical strain on the use of the power transmission system.

This paradigm, however, shifted with the advent of Order 888 and wholesale competition. With the Order, new and higher volumes of trade began to move between and across regions. This placed pressure on both the physical operation, pricing, planning, and organization of the utility transmission network. One means of addressing these pressures was to organize the utility transmission system under an organization referred to as an Independent System Operator or ISO. The advent of wholesale competition saw a strong preference for the idea of an ISO. However, questions about the operating incentives of ISOs have given rise to debates over independent transmission companies, or Transcos, and alternative methods for transmission system governance.

ISOs are one of the earliest proposed forms of transmission governance to be facilitated in restructured markets. FERC, in Order 888, gave a strong preference to the ISO concept and its principles. ISOs are essentially non-profit organizations that work like independent air traffic controllers for a given regional transmission system. While ownership of transmission systems stays with utilities, ISOs take over the security and operational control over all power flows and wholesale transactions. These entities, for the most part, were either in control, or directed, long term planning and pricing regimes for the regional utility transmission members.

In order to assure true independence, neither ISOs nor their employees are allowed to have any financial interest in the transmission system, its operation, or the transactions occurring over the system. An ISO has an independent governing board that includes not only utility representatives, but also representatives from other stakeholder groups including power marketers, independent power producers, small customers groups, and in some instances environmental groups. The open, objective manner of transmission operation has led ISOs as being a preferred method of transmission organization as seen in Figure 5.1.



[1]As of March 1998, continued development of IndeGO has been postponed, and its future is uncertain.
IndeGO: Independent Grid Operator; MAPP: Mid-Continent Area Power Pool; SPP: Southwest Power Pool; PJM: Pennsylvania, New Jersey, Maryland; ERCOT: Electric Reliability Council of Texas.
Note: ISO control of the transmission grid is incomplete in many of the regions shown on the map. Data are not available to show specific areas covered within regions. For example, the California ISO currently controls approximately 75 percent of the power grid in California.
Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Figure 5.1: Independent System Operators In Operation, Proposed, or Under Development (March 1998)

From the onset of the electric restructuring debate, ISOs have been plagued by their detractors. One initial criticism laid upon the formation of ISOs rested with the enormous costs associated with creating a new bureaucracy to manage regional transmission grids. The experiences and costs associated with the creation of the California ISO and its associated power exchange (PX) provided justification for this criticism. Others argued that ISOs did not go far enough in removing incentives for cross dealings and potentially preferential treatment. However, one of the most significant criticisms leveled against the ISO ideal rests with concerns about its short- and long-run incentives as a non-profit organization.

ISO critics have questioned the motivations of non-profit organizations to plan for and manage the transmission system efficiently. This system will continue to be owned by utilities that have a fiduciary responsibility to their shareholders to maximize the profits that could be earned on these assets. However, a non-profit organization will be removed from fiduciary responsibility, and may even act at cross purposes with utility motivations for maximizing shareholder returns.

For instance, ISOs, it is argued, will have little or no incentives to reduce costs, introduce new technologies, or make management and operating innovations. The inability to earn profits could make ISOs relatively indifferent to such long-run planning issues as increasing transmission capacity or making substation upgrades and additions. The lack of incentives has led many critics, primarily transmission owning utilities, to call for an alternative means to organize and govern the transmission system.

One of the more recent proposals for transmission organization rests with an institution/corporation known as a Transco, which is short for transmission company. The Transco idea attempts to merge the concepts of independence and inclusiveness of an ISO with the profit-maximizing goals of a private enterprise. Recent Transco proposals envision a private corporation that would operate and manage utility transmission assets on a for-profit basis. The owners of these assets, in turn, would serve as shareholders in this new corporation. Management of a Transco would then be accountable to their shareholders. Transcos would be for-profit entities, but could include membership and (non-voting) input from non-transmission owning stakeholders like municipal utilities, rural distribution cooperatives, power marketers, and independent power producers.

While Transcos have appeared to become the preferred approach for encouraging investment in the transmission system, securing independent governance across regions, particularly the Gulf South, has been a more challenging issue. Figure 5.1 shows that, even after Order 888, the southern part of the U.S. avoided the trends in regional transmission governance and became balkanized into a system of unorganized entities run, or in part controlled, by incumbent transmission-owning utilities.

The challenge for federal regulators has been to encourage development of independent organizations, and to do so in a manner broad enough in scope to secure independence as well as potential operating efficiencies across regions. In a recent order the FERC took its most bold stand on the issue by forcing all parties to the table for 45 days of negotiations to bring the U.S. power transmission system into five major systems: West, South, Northeast, Midwest, and Texas. These systems will be organized into large regional transmission organizations (RTOs) that will handle a variety of different transmission operation, pricing, and planning issues. While it is still too early to tell, the promise of having a number of large regional RTOs, with a number of for-profit Transcos seems likely.

Another issue associated with the nexus between merchant power and transmission is how these competitive generators of electricity facilitate the power system. A common misperception about merchant generation is that it somehow gets a free ride on the transmission system. The argument that independent power plants somehow exploit the existing transmission system ignores a number of important technical and regulatory considerations.

First, when new generation or new load is added to a transmission system, the flows on the system change. The proper siting of new generation on the system can often eliminate the need for transmission upgrades and maximize the capability of the transmission system as a whole. For example, one location on the transmission system may be experiencing line overload or congestion, while another location may be experiencing low voltage. This problem could be solved by either building additional transmission to strengthen the grid or by strategically locating additional generation on the system. This additional generation would change load flow on the transmission system, improve voltage profiles on the system, and enhance overall reliability.

Second, the Federal Energy Regulatory Commission's (FERC) current policy for assigning costs for transmission services is summarized in its *Inquiry Concerning the Commission's Pricing Policy for Transmission Services Provided by Public Utilities Under the Federal Power Act; Policy Statement*. This policy requires, among other things, that rates for transmission services must ensure that "costs incurred in providing the wholesale transmission services … are recovered from the applicant … and not from existing wholesale, retail, and transmission service customers." This policy is contained in the current pricing rules for new generator interconnections and new requests for transmission service. Therefore, existing retail customers in Louisiana can be assured they will not be negatively impacted from a rate standpoint by the entry of new generation on the transmission grid within the state.

Third, independent power providers exist to take advantage of unique cost and demand characteristics in particular regions. The profit motive serves end-users well because as more of these generators enter a particular region, they displace older less efficient generating unit and/or supplement the regions' existing generating resources. However, in order to maximize the profit opportunities for these facilities, trade between regions must be facilitated. Restricting sales of merchant providers to a particular region can change the profit dynamics of the facilities, and could discourage certain generating projects. Merchant plants are no different than other large industrial and manufacturing facilities in Louisiana. If an automobile manufacturer were to locate in Louisiana, we would not require all, or some significant portion, of its output to be sold in the state. It seems unreasonable to expect the same from a independent power facility.

On a forward going basis, transmission may play out to be the single biggest issue in securing Louisiana's share of announced merchant capacity. In order to assure that we secure the projects that have been announced in this state, continued diligence will need to be exercised. Two areas where the state can facilitate this are through the regulatory process, and through the establishment of favorable economic environment for transmission investment.

Regarding regulatory issues, the Louisiana Public Service Commission has monitored power transmission issues with vigilance and continues to do so. After the major summer rolling blackouts in 1999, the LPSC initiated a number of stakeholder meetings that included the state's utilities and independent power developers. The Commission listened carefully to the stakeholder comments in the proceedings and moved forward with a number of measures to reduce interconnection backlogs and facilitate greater development of in-state generating resources. The LPSC is also carefully monitoring and participating in transmission policy issues at the FERC.

On economic incentive issues, state policymakers are recognizing the importance of merchant power and the important role that transmission plays in the process. At a recent meeting of the Louisiana Commerce and Industry Board's Rules Committee, including the representative from the Governor's office, encouraged independent power development. At the meeting, the committee recognized the importance that transmission plays in continued in-state resources and directed the Louisiana Department of Economic Development and other stakeholder groups to begin developing a set of incentives that will facilitate both power generation and transmission in Louisiana. The recommendations to promote merchant incentives was later supported by the entire Commerce and Industry Board.

<u>Economic Development and Growth:</u> As noted at the onset of this report, energy, and particularly electrical energy, plays an important role in the development and growth of our economy. The importance of electrical energy to our digital "new economy" is significant. These technologies are dependent on power quality and reliability to function properly. One need only think about the frustrations of coming home and seeing blinking VCRs and microwave clocks, as a reminder of the sensitivity of these technologies. Even more serious is the wake-up call this region experienced during the rolling blackouts in the summer of 1999. More recently, the power outages, high costs, and political frustrations of California serve as a constant reminder to the rest of the country of how inattention to basic power market fundamentals can cost households, business, and industries.

The earlier section of our report outlined the economic impact that typical generating facilities can have on a regional economy. These impacts are associated with the construction, operation, and dispatch of competitive power generating facilities. A number of states are beginning to recognize all, or part of these benefits, and are either actively encouraging merchant development, or actively encouraging industry relocation from high cost, unreliable regions of the country (i.e., California).

El Dorado, Arkansas, for instance, based a local economic development strategy upon the location of merchant power, and in particular, a large power generation facility proposed by Panda Energy. According to an 8 March, 2000 story on the "El Dorado: Arkansas' Original Boomtown" website, the Panda Energy facility amounts to a $1.1 billion investment for the 2,720 MW natural gas fired facility and will create 1,000 construction jobs with an $85 million payroll and 65 full-time operation jobs resulting in a $3.25 million annual payroll.[15] The project is estimated to purchase between $10 million and $15 million of materials locally during construction and an additional $5 million to $8 million a year after completion, and will provide $3 million annually in tax revenues[16]. In April, 2000, Panda signed a contract with Dynegy Inc. for the provision of 500 MW of capacity off-take from the plant for resale to investor-owned utilities, cooperatives, and municipalities throughout the southeast.[17]

Michigan is another example of a state vying for merchant plants to be built within its borders. According to a Detroit News story from March 1, 2001, Greg Kitts told the Michigan House Energy and Technology Committee that new deregulation laws make Michigan a "friendly place to build a generating plant." Kitts as well as John Stauffcher of Dynegy claim that it takes less time, about seven years, to build a power plant in Michigan.[18]

Elko, Nevada sees the building of a new 480 MW power plant along with a 290 mile natural gas pipeline as a way to attract new kinds of industry. Ursula Powers, former director of economic development for the city looks for manufacturing operations that require natural gas to see Elko as an attractive place to operate.[19]

Finally, Mississippi's government has attempted to attract power plants through SEC. 57-1-255 of the Mississippi Code also known as the Major Energy Project Development Fund. The law authorizes the Department of Economic and Community Development to act on behalf of the state in developing, financing,

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[15] El Dorado: Arkansas' Original Boomtown 2000 (1). "First Merchant Power Plant to Give $1.1 Billion Economic Boost to Union County." (http://www.boomtown.org/plant/money.html).

[16] El Dorado: Arkansas' Original Boomtown 2000 (2). "Project Facts." (http://www.boomtown.org/plant/facts.html).

[17] El Dorado: Arkansas' Original Boomtown 2000 (3). "Panda Signs Power Supply Contract with Dynegy." (http://www.boomtown.org/plant/dynegy.html).

[18] Franklin, A. March 1, 2001. "Michigan Right Place for Power Plants." (Detroit, The Detroit News/detnews.com).

[19] Edwards, J. February 14, 2001. "Energy Deal Could Boost Elko." (Las Vegas, Las Vegas Review Journal/lvrj.com).

and operating major energy projects and related facilities. It also authorizes the issuance of bonds to defray the costs of such projects.[20]

Because of the California power crisis, many states are also attempting to attract Silicon Valley firms with the promise of reliable and inexpensive power. Minnesota has placed a billboard with the phrase "White Outs – Occasional. Black Outs – Never." in San Jose, California. The billboard invites onlookers to the UpgradetoMinnesota.com website, which lists economic factors important to businesses, business assistance programs, and quality of life and demographic information. Of particular emphasis is the availability of low cost, reliable power.

Minnesota governor Jesse Ventura followed up the billboard campaign with personal letters to the presidents and CEOs of about 500 targeted high growth companies.[21] A press release from Ventura's office touts a 1999 commercial electricity price 37 percent lower than California's and an industrial electricity price 36 percent lower than California's.

Other marketing efforts made by states to woo high-tech California companies include the following:

- The Michigan Economic Development Corporation sent 4,500 glow-in-the-dark mouse pads to high-tech companies and aired ads of San Jose and San Francisco radio stations.[22]

- The Tennessee Department of Economic and Community Development has held business receptions in California and distributed "the lights are always on in Tennessee" flashlights to 1,000 executives at large automotive, technical, and steel fabrication companies.[23]

  The East Tennessee Economic Development Agency has services in place to assist companies who want to relocate to that section of the state. These services include information on labor and training,

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[20] McCann, N. March 31, 1996. "Legislation Aimed at Helping Local Areas Attract Energy Production Plants." (Jackson, Mississippi Business Journal Online/msbusiness.com).

[21] Press Office March 19, 2001. "Billboard Campaign Launched in Silicon Valley." (Minneapolis, Office of Governor Jesse Ventura) and CNEWS March 20, 2001. "Minnesota Humor Coming to Silicon Valley." (Toronto, canoe.ca).

[22] Associated Press Report (1) March 12, 2001. "States Looking to Cash in on California Power Woes." (Reno, Reno Gazette-Journal/RGJ.com).

[23] Streisand, B. May 28, 2001. "Like a Moth to a Flame: Luring California Firms Out of State by Promising Cheap Power." (Washington D.C., U.S. News and World Report/usnews.com).

economic and demographic data, transportation contacts, and utility cost, availability, reliability, and capacity.[24]

- The Greater Raleigh Chamber of Commerce sent 9-volt batteries and letters to 89 Silicon Valley companies.[25]

- The Spokane Area Economic Development Council sent a letter to about 8,000 California companies with which it maintains regular contact.[26]

The strategies pursued by other states are certainly ones that can be implemented in Louisiana if similar "big welcome mat" philosophies are pursued. Given the public resolutions offered by the Louisiana Legislature, the Louisiana Public Service Commission, and the Rules Committee of the Louisiana Commerce and Industry Board, Louisiana seems well positioned to move forward in this direction.

Natural Resource Issues: One of the additional issues addressed in recent months, is that of the relationship between natural resource issues and independent power generation. One independent power project near Eunice, Louisiana raised a firestorm that pitted the state's agricultural interests against independent power developers. This debate resulted in a number of proposals that would have provided a number of disincentives for continued merchant development in Louisiana. However, through the Governor's intervention, a multi-stakeholder task force has been commissioned to deal with these water-related issues. The charge of the task force has been to develop a comprehensive water use policy that provides comparability across all of the state's industrial and agricultural users.

Another important natural resource issue is air quality and the emissions associated with power generation facilities. Most of the regulated power generating facilitates in Louisiana and its surrounding region are older and use less efficient technologies than those facilitated by independent developers, and even the unregulated projects of the state's investor-owned utilities. Efficiency gains from these new technologies can be translated into lower emissions for the same number of kWhs generated in the state. Improved air quality could be one of the important consequences of these new generation technologies.

A particular opportunity for reducing air emissions is associated with industrial cogeneration. These facilities, as defined and identified earlier in the report,

[24] ETEDA. "Economic Development Services." (Knoxville, East Tennessee Economic Development Agency/eteda.org).

[25] Associated Press Report (1).

[26] Associated Press Report (2) January 27, 2001. "Business Recruiters Target California." (Honolulu, Honolulu Advertiser/honoluluadvertiser.com).

have the ability to improve air quality in two important ways. First, more efficient power generating technologies should, other things being equal, produce lower air emissions per kWh than the older power generation technologies. Second, there are opportunities to reduce certain air emissions at the state's petrochemical facilities if on-site reliability is improved. Today, every time a major petrochemical facility experiences outages or reliability related "hiccups," there are increased emissions associated with increased flares that result from these electrical-related problems. Cogeneration at these facilities will help minimize these hiccups and lower plant emissions associated with needless power outages and reliability problems.

In addition to water and air issues, many observers in the state, as well as other regions in the southeast, are concerned about our natural gas resources and whether they are abundant enough to facilitate the considerable number of merchant facilities that have been announced in Louisiana and the Gulf South region as a whole. There are a number of considerations, however, that need to be kept in mind during the course of this debate.

First, Louisiana is the second largest producer of natural gas in the U.S. The state is well positioned to provide the needed natural gas to run these facilities. However, an increasing amount of natural gas is coming from the offshore, and particularly the deep waters of the Gulf of Mexico. If Louisiana were to promote policies that restricted natural gas use for power generation, newer facilities, even those possibly constructed by the state's utilities, would find other states, like Mississippi, in which to operate. Thus, while natural gas issues are an important consideration that the nation should examine in regards to our national energy policies, there is little that Louisiana can do to encourage greater demand-side conservation.

Second, fuel use policies should be considered at the national level and not the state level. To date, most policies have facilitated open markets for making incremental fuel choice decisions and not regulation. The Power Plants and Industrial Fuels Use Act of 1978 is an excellent example of the unintended consequences of well-intentioned fuel use policies. This policy helped facilitate, in part, the power industry's costly experiment with nuclear power, the prudence disallowances resulting from those nuclear investments, and the stranded cost problem of recent times.

Lastly, the efficiency of new power generation facilities cannot be emphasized enough. Like air emissions, the amount of natural gas used to make one kWh is less for newer merchant technologies and cogeneration, than for older steam-fired power generation stations. What needs to be considered in this debate is the impact of net, and not cumulative, natural gas usage. Newer facilities will more than likely displace existing ones, other things being equal. The displacement of natural gas from these older facilities needs to be subtracted from the use of natural gas at new facilities to get a more appropriate understanding of how these fossil-fuel resources will be used. At the margin, it seems that allowing markets, rather than regulation, to make these considerations, is more fruitful. In the worst case scenario, increased natural gas prices will send the market strong incentives to develop alternative fuels such as clean-coal, renewables, and possibly even nuclear.

SECTION 6: CONCLUSIONS

The purpose of our report has been to describe, quantify, and analyze the economic opportunities for independent power generation in Louisiana. A large portion of the work in this report, has been to quantify these benefits from customized models of power generation in the Louisiana economy. While some may disagree with the magnitude of our results, it is clear that experience, intuition, and current policy recognizes that there are meaningful economic benefits from merchant development. One need only look across the Sabine or Pearl Rivers to see how positively our neighboring states perceive these investment opportunities. If Louisiana is going to maintain its position as having a strong and diversified energy industry and infrastructure, continued diligence will be needed.

As our study has noted, the promotion of independent power resources in Louisiana will help foster the state's future economic development and growth. In the short-run, these facilities use a considerable amount of highly-skilled contract and construction employees. These jobs can provide a needed shot in the arm for economic activity, and provider longer run benefits by maintaining our human capital stock and keeping jobs in the state. Over the longer run, these resources provide efficient low-cost power to a region in need of updating its aging power generation capital stock.

An abundant number of efficient, diversified sources of power generation will also help facilitate competitive regional power markets and result in the promised benefits to ratepayers from competition. In the end, it is important to keep in mind that the development of these competitive markets, whether wholesale or retail, is important to all of the state's electricity customers – households, business, and industry alike.

Recent policy maker resolutions promoting merchant generation are moving in a direction that could be more comprehensive than anything else in the southeast. This resolve could set the state in a regional leadership role. The goal and challenge however, will be to maintain the potential development that is now interested in Louisiana as a home. If the current initiatives are maintained and expanded upon, other states in the southeast will be trying to catch-up with Louisiana and its enviable status of being at the front of the lines in regional power plant development.

Table 1: Operating & Announced Independent Power Projects in Louisiana
September 2001

Company	Gross MW	City/ Parish	Type	Prime Mover	Fuel	Estimated Cost (000)	Status	Projected COD
AEP/Dow	900	Plaquemine	Cogeneration	CC	Gas	540,000	Planned	2003
Calpine Corporation	530	Carville	Cogeneration	CC	Gas	318,000	Under Construction	2001
Calpine Corporation	500	Bogalusa	Merchant	CC	Gas	300,000	Under Construction	2001
Calpine/Triad Nitrogen	530	Donaldsonville	Cogeneration	CC	Gas	318,000	Unknown	Unknown
CLECO/Calpine	1,000	Eunice	Merchant	CC	Gas	600,000	Planned	2002
CLECO/Mirant	150	Perryville	Merchant	CT	Gas	60,000	Under Construction	2001
CLECO/Mirant	550	Perryville	Merchant	CT	Gas	220,000	Planned	2002
CLECO/Williams	750	St. Landry	Merchant	CC	Gas	450,000	Operational	Operational
Cogentrix	800	Ouachita	Merchant	CC	Gas	480,000	Planned	2002
Duke Energy	550	Lincoln	Merchant	CT	Gas	220,000	Planned	2002
Dynegy	320	Lake Charles	Merchant	CT	Gas	128,000	Operational	Operational
EDG	750	Pointe Coupee	Merchant	CC	Gas	450,000	Planned	2004
EDG	600	Iberville	Merchant	CC	Gas	360,000	Unknown	Unknown
Entergy/PPG	425	Lake Charles	Cogeneration	CC	Gas	255,000	Planned	2002
LGC/NRG	600	Pointe Coupee	Merchant	CC	Gas	360,000	Planned	2005
LGC/NRG	200	Ouachita	Merchant	CC	Gas	120,000	Unknown	Unknown
LGC/NRG	230	Pointe Coupee	Merchant	CT	Gas	92,000	Under Construction	2001
Motiva-Convent	530	St. James	Cogeneration	CC	Gas	318,000	Planned	2003
Motiva-Norco	Unknown	St. Charles	Cogeneration	CC	Gas	NA	Unknown	Unknown
Nations Energy	110	Chalmette	Cogeneration	CT	Gas	44,000	Unknown	Unknown
Occidential Energy	775	Taft	Cogeneration	CC	Gas	465,000	Under Construction	2001
Occidential/Entergy	588	Convent	Cogeneration	CC	Gas	352,800	Planned	2003
Sempra Energy	1,200	La Place	Merchant	CC	Gas	720,000	Under Construction	Unknown
Shreveport/FPL	500	Shreveport	Merchant	CC	Gas	300,000	Planned	2005
TECO/Citgo/Texaco	670	Lake Charles	Cogeneration	CC	Gas	402,000	Planned	2005

Disposition of Capacity by Status

Status	Gross MW	Percent of Total
Operational	1,070	7.8%
Under Construction	3,385	24.6%
Planned	7,863	57.2%
Unknown	1,440	10.5%
Total	13,758	100.0%

Table 2: Louisiana Power Plant Construction Impacts: Typical Combustion Turbine Project (350 MW)

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**5,263,250**	**2,006,611**	**2,282,891**	**9,552,751**
	a. Labor Income	3,564,539	1,383,664	1,341,619	6,289,822
	b. Other Property Income	1,444,757	452,289	699,394	2,596,440
II.	**Output ($)**	**45,317,161**	**3,557,741**	**3,736,319**	**52,611,221**
III.	**Employment[1] (Temporary Jobs)**	**104**	**44**	**55**	**203**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 3: Louisiana Power Plant Construction Impacts
Detailed Summary of Typical Combustion Turbine Project Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$0	$1,205	$29,104
Construction	$5,350,211	$174,097	$85,956
Finance, Insurance, Real Estate	$1,506,431	$312,290	$787,094
Home Furniture/Appliances	$0	$2,992	$3,142
Services and Recreation	$0	$1,426,164	$1,298,530
Utilities/Power Generation	$0	$428,288	$367,279
Wholesale/Retail Trade	$0	$637,335	$848,217
Total Output Impacts	***$6,856,642***	***$2,982,370***	***$3,419,322***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	0	0	0
Construction	60	3	1
Finance, Insurance, Real Estate	8	2	4
Home Furniture/Appliances	0	0	0
Services and Recreation	0	21	25
Utilities/Power Generation	0	3	2
Wholesale/Retail Trade	0	10	21
Total Employment Impacts	***68***	***40***	***54***

Table 4: Louisiana Power Plant Operations Impacts: Typical Combustion Turbine Project (350 MW)

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**4,784,081**	**199,665**	**571,358**	**5,555,105**
	a. Labor Income	1,097,519	140,910	335,778	1,574,207
	b. Other Property Income	3,013,214	45,301	175,043	3,233,559
II.	**Output ($)**	**32,475,175**	**388,221**	**935,121**	**33,798,516**
III.	**Employment[1] (Permanent)**	**15**	**4**	**14**	**33**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 5: Louisiana Power Plant Operation Impacts
Detailed Summary of Typical Combustion Turbine Project Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$0	$61	$7,284
Construction	$0	$118,359	$21,513
Finance, Insurance, Real Estate	$0	$34,843	$196,993
Home Furniture/Appliances	$0	$44	$786
Services and Recreation	$0	$65,272	$324,994
Utilities/Power Generation	$5,393,220	$89,240	$91,922
Wholesale/Retail Trade	$0	$18,134	$212,290
Total Output Impacts	***$5,393,220***	***$325,954***	***$855,782***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	0	0	0
Construction	0	2	0
Finance, Insurance, Real Estate	0	0	1
Home Furniture/Appliances	0	0	0
Services and Recreation	0	1	6
Utilities/Power Generation	15	0	1
Wholesale/Retail Trade	0	0	5
Total Employment Impacts	***15***	***4***	***13***

Table 6: Louisiana Power Plant Market Impacts: Typical Combustion Turbine Project (350 MW)

Broad Market Impact

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**9,480,802**	**2,228,220**	**3,205,400**	**14,914,422**
	a. Labor Income	5,554,788	1,392,969	1,883,761	8,831,518
	b. Other Property Income	2,880,307	658,292	982,017	4,520,616
II.	**Output ($)**	**25,739,136**	**3,989,528**	**5,246,153**	**34,974,816**
III.	**Employment[1] (Permanent)**	**236**	**48**	**77**	**361**

Narrow Market Impact

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**6,746,105**	**1,585,499**	**2,280,815**	**10,612,419**
	a. Labor Income	3,952,533	991,173	1,340,398	6,284,104
	b. Other Property Income	2,049,494	468,411	698,758	3,216,663
II.	**Output ($)**	**18,314,789**	**2,830,194**	**3,732,922**	**24,877,905**
III.	**Employment[1] (Permanent)**	**168**	**34**	**55**	**257**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 7: Louisiana Power Plant Market Impacts
Detailed Summary of Typical Combustion Turbine Project Impacts

Broad Market Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$37,085	$119,305	$40,864
Construction	$0	$438,291	$120,691
Finance, Insurance, Real Estate	$3,209,160	$707,779	$1,105,156
Home Furniture/Appliances	$14,225	$1,146	$4,411
Services and Recreation	$5,634,305	$1,169,796	$1,823,261
Utilities/Power Generation	$1,286,564	$668,790	$515,695
Wholesale/Retail Trade	$3,976,013	$277,327	$1,190,979
Total Output Impacts	***$14,157,352***	***$3,382,434***	***$4,801,057***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	1	2	1
Construction	0	7	2
Finance, Insurance, Real Estate	12	6	5
Home Furniture/Appliances	0	0	0
Services and Recreation	109	22	35
Utilities/Power Generation	7	4	3
Wholesale/Retail Trade	103	4	30
Total Employment Impacts	***231***	***45***	***75***

Table 8: Louisiana Power Plant Market Impacts
Detailed Summary of Typical Combustion Turbine Project Impacts

Narrow Market Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$26,388	$84,892	$29,077
Construction	$0	$311,868	$85,878
Finance, Insurance, Real Estate	$2,283,491	$503,623	$786,379
Home Furniture/Appliances	$10,122	$816	$3,139
Services and Recreation	$4,009,113	$832,373	$1,297,349
Utilities/Power Generation	$915,460	$475,880	$366,945
Wholesale/Retail Trade	$2,829,148	$197,333	$847,446
Total Output Impacts	***$10,073,723***	***$2,406,785***	***$3,416,212***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	0	1	0
Construction	0	5	1
Finance, Insurance, Real Estate	8	4	4
Home Furniture/Appliances	0	0	0
Services and Recreation	77	16	25
Utilities/Power Generation	5	3	2
Wholesale/Retail Trade	73	3	21
Total Employment Impacts	***164***	***32***	***54***

Table 9: Louisiana Power Plant Construction Impacts:
Typical Combine Cycle Project (600 MW)

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**11,150,490**	**4,156,339**	**4,799,693**	**20,106,522**
	a. Labor Income	7,576,048	2,827,361	2,820,702	13,224,111
	b. Other Property Income	3,093,296	959,030	1,470,449	5,522,776
II.	**Output ($)**	**113,282,247**	**7,402,114**	**7,855,472**	**128,539,833**
III.	**Employment[1] (Temporary Jobs)**	**216**	**87**	**116**	**419**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 10: Louisiana Power Plant Construction Impacts
Detailed Summary of Typical Combined Cycle Project Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$0	$2,419	$61,189
Construction	$9,452,040	$356,445	$180,720
Finance, Insurance, Real Estate	$2,640,210	$636,798	$1,654,836
Home Furniture/Appliances	$0	$5,872	$6,606
Services and Recreation	$0	$2,745,774	$2,730,110
Utilities/Power Generation	$0	$953,243	$772,189
Wholesale/Retail Trade	$0	$1,416,204	$1,783,345
Total Output Impacts	***$12,092,250***	***$6,116,754***	***$7,188,994***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	0	0	1
Construction	106	6	3
Finance, Insurance, Real Estate	14	5	7
Home Furniture/Appliances	0	0	0
Services and Recreation	0	42	52
Utilities/Power Generation	0	7	4
Wholesale/Retail Trade	0	22	45
Total Employment Impacts	***120***	***82***	***113***

Table 11: Louisiana Power Plant Operations Impacts: Typical Combine Cycle Project (600 MW)

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**9,568,164**	**399,332**	**1,142,717**	**11,110,213**
	a. Labor Income	2,195,040	281,820	671,556	3,148,415
	b. Other Property Income	6,026,430	90,603	350,087	6,467,120
II.	**Output ($)**	**78,589,135**	**776,440**	**1,870,240**	**81,235,815**
III.	**Employment[1] (Permanent)**	**30**	**8**	**28**	**66**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 12: Louisiana Power Plant Operation Impacts
Detailed Summary of Typical Combined Cycle Project Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$0	$122	$14,568
Construction	$0	$236,719	$43,026
Finance, Insurance, Real Estate	$0	$69,686	$393,985
Home Furniture/Appliances	$0	$88	$1,573
Services and Recreation	$0	$130,545	$649,988
Utilities/Power Generation	$10,786,441	$178,480	$183,844
Wholesale/Retail Trade	$0	$36,267	$424,581
Total Output Impacts	***$10,786,441***	***$651,907***	***$1,711,565***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	0	0	0
Construction	0	4	1
Finance, Insurance, Real Estate	0	1	2
Home Furniture/Appliances	0	0	0
Services and Recreation	0	2	12
Utilities/Power Generation	30	1	1
Wholesale/Retail Trade	0	1	11
Total Employment Impacts	***30***	***8***	***27***

Table 13: Louisiana Power Plant Market Impacts: Typical Combine Cycle Project (600 MW)

Broad Market Impact

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**13,895,629**	**3,265,811**	**4,698,024**	**21,859,464**
	a. Labor Income	8,141,428	2,041,618	2,760,953	12,944,000
	b. Other Property Income	4,221,549	964,832	1,439,302	6,625,683
II.	**Output ($)**	**37,724,809**	**5,847,290**	**7,689,074**	**51,261,174**
III.	**Employment[1] (Permanent)**	**345**	**71**	**113**	**529**

Narrow Market Impact

	Impact Item	Direct	Indirect	Induced	Total
I.	**Value Added ($)**	**18,445,747**	**4,335,200**	**6,236,390**	**29,017,338**
	a. Labor Income	10,807,337	2,710,145	3,665,026	17,182,508
	b. Other Property Income	5,603,894	1,280,766	1,910,601	8,795,261
II.	**Output ($)**	**50,077,787**	**7,761,984**	**10,206,859**	**68,046,630**
III.	**Employment[1] (Permanent)**	**458**	**94**	**150**	**702**

Notes: (1) Employment is "number of jobs"
(2) All values, except employment, are in 2000 dollars

Table 14: Louisiana Power Plant Market Impacts
Detailed Summary of Typical Combined Cycle Project Impacts

Broad Market Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$54,355	$174,861	$59,893
Construction	$0	$642,386	$176,892
Finance, Insurance, Real Estate	$4,703,535	$1,037,363	$1,619,783
Home Furniture/Appliances	$20,849	$1,680	$6,466
Services and Recreation	$8,257,973	$1,714,523	$2,672,280
Utilities/Power Generation	$1,885,665	$980,218	$755,833
Wholesale/Retail Trade	$5,827,481	$406,467	$1,745,570
Total Output Impacts	***$20,749,858***	***$4,957,497***	***$7,036,715***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	1	2	1
Construction	0	10	3
Finance, Insurance, Real Estate	17	9	7
Home Furniture/Appliances	0	0	0
Services and Recreation	160	32	51
Utilities/Power Generation	10	6	4
Wholesale/Retail Trade	150	7	44
Total Employment Impacts	***339***	***66***	***110***

Table 15: Louisiana Power Plant Market Impacts
Detailed Summary of Typical Combined Cycle Project Impacts

Detailed Per Sector Output Impacts

Sector Description	Direct Impact ($)	Indirect Impact ($)	Induced Impact ($)
Agriculture and Natural Resources	$72,153	$232,119	$79,505
Construction	$0	$852,735	$234,815
Finance, Insurance, Real Estate	$6,243,706	$1,377,047	$2,150,180
Home Furniture/Appliances	$27,676	$2,230	$8,583
Services and Recreation	$10,962,043	$2,275,943	$3,547,317
Utilities/Power Generation	$2,503,125	$1,301,191	$1,003,330
Wholesale/Retail Trade	$7,735,688	$539,564	$2,317,156
Total Output Impacts	***$27,544,392***	***$6,580,828***	***$9,340,886***

Detailed Per Sector Employment Impacts

Sector Description	Direct Impact (Jobs)	Indirect Impact (Jobs)	Induced Impact (Jobs)
Agriculture and Natural Resources	1	3	1
Construction	0	13	4
Finance, Insurance, Real Estate	23	12	10
Home Furniture/Appliances	0	0	0
Services and Recreation	212	43	68
Utilities/Power Generation	14	8	6
Wholesale/Retail Trade	199	9	58
Total Employment Impacts	***450***	***88***	***146***

Table 16: Louisiana Power Plant Market Impacts: Economic Impacts from Typical and Announced Facilites

Economic Impacts From Announced Combustion Turbine Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$247,302,219	$177,221,669	568	82
Indirect Impact	$19,415,101	$2,118,575	240	22
Induced Impact	$20,389,629	$5,103,086	300	76
Total Impact	$287,106,949	$184,443,330	1,108	180

Economic Impacts From Announced Combined Cycle Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$2,236,946,771	$1,551,873,456	4,265	592
Indirect Impact	$146,167,074	$15,332,101	1,718	158
Induced Impact	$155,119,385	$36,931,006	2,291	553
Total Impact	$2,538,233,229	$1,604,136,564	8,274	1,303

Total Potential Impacts From the Currently Announced Independent Power Projects

Impact Type	Construction	O&M	Construction Jobs	O&M Jobs
Direct Impact	$2,484,248,990	$1,729,095,125	4,833	674
Indirect Impact	$165,582,175	$17,450,676	1,958	180
Induced Impact	$175,509,014	$42,034,093	2,591	629
Total Impact	$2,825,340,179	$1,788,579,894	9,382	1,483

Table 17: Louisiana Power Plant Tax Impacts
Current Dollar and Net Present Value of the
Estimated Taxes Paid By Announced Facilities Over the Next 30 Years

Tax Category	Future Dollars	NPV Dollars
Property Taxes	$1,242,717,270	$429,549,612
Fuel Taxes	$1,604,532,904	$554,612,463
Sales Taxes	$370,757,276	$128,153,561
Income Taxes	$2,293,564,870	$792,778,795
Total Taxes:	$5,511,572,319	$1,905,094,431