

# Economic Impacts of the proposed Buccaneer Natural Gas Pipeline

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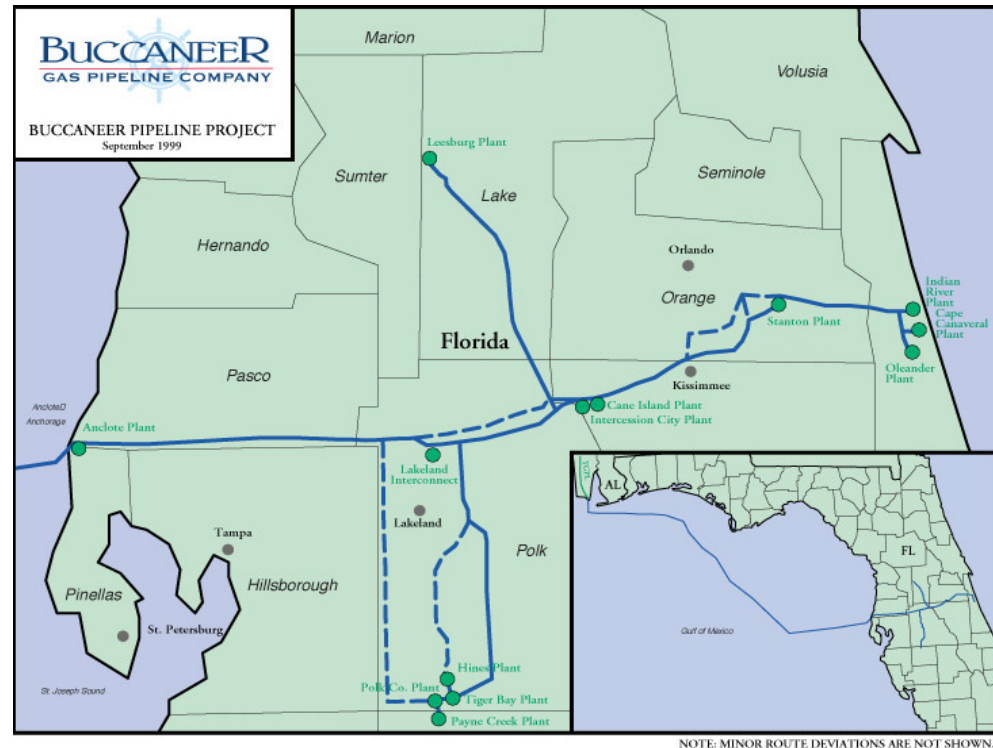
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## INTRODUCTION

To keep up with one of the nation's fastest growing populations, The Florida Reliability Coordinating Council has projected Florida will need an additional 10,000 megawatts of electricity by the year 2007. More stringent air quality standards and a decline in available nuclear capacity have left clean burning natural gas as the best viable fuel source to meet the needs of Florida's new and existing electric power generation plants. The Williams Companies and Duke Energy have proposed to construct and operate Buccaneer Natural Gas Pipeline, almost 700 miles of pipe, to deliver natural gas to growing markets in Florida. Tampa Bay Regional Planning Council (TBRPC) has been commissioned to prepare an economic impact analysis on the proposed pipeline construction phase, operation, maintenance, and other potential benefits of the Florida portion of the Buccaneer Natural Gas pipeline.



Data related to the construction, operation and maintenance of the project were obtained from the project estimates provided by the Buccaneer Gas Pipeline Company ("Buccaneer") as well as other sources. The majority of the data supplied by Buccaneer was submitted by Buccaneer to the Federal Energy Regulatory Commission (FERC), Docket No. CP00-14-00, October 1999, and, where possible, TBRPC verified the data against other sources. Other data sources included federal agencies, Regional Economic Models, Inc. and TBRPC Files.. TBRPC was compensated for the preparation of this report.

### What was measured?

This study measures the economic impacts of the construction, maintenance, and operation of the Florida segments of Buccaneer Natural Gas Pipeline; the economic benefits associated with reduced pollution from a cleaner energy source (natural gas); and economic benefits associated with reduced energy costs to business and residents within the State.

### What was not measured?

This study does not estimate the economic impacts on individual counties. It is possible to evaluate the economic impacts based on County level data. However, the purpose of this study is to evaluate the impacts of the pipeline on the State. Individual county data may be supplied as requested.

### Methodology

The methodology used to prepare this analysis included the evaluation of the estimates of all the expenditures associated with the pipeline's construction and expected operation and maintenance costs. The expenditures were input into the Tampa Bay Regional Planning Council's version of the Policy Insight® econometric model. Policy Insight is a sophisticated computer model considered the best available tool to measure economic impacts. Additional details on methodology and model variable inputs is presented in separate parts of the report.

**Economic Impacts of the Buccaneer Natural Gas Pipeline  
State of Florida (2001 - 2020)  
SUMMARY TABLE**

	Construction		Operation & Maintenance		<i><b>SubTotal</b></i>	Other Benefits		<i><b>Total</b></i>
	Labor	Sales & Svcs.	Employment	Taxes		Pollution Reduction	Energy Savings	
<b>Employment</b>	781	719	22	398	<b>1,920</b>	1,834	3,430	<b>7,184</b>
<b>Personel Income</b>	\$39.40	\$34.60	\$27.90	\$374.30	<b>\$476.20</b>	\$2,753.10	\$2,648.30	<b>\$5,877.60</b>
<b>GRP</b>	\$35.00	\$40.78	\$29.00	\$422.60	<b>\$527.38</b>	\$2,367.00	\$4,349.20	<b>\$7,243.58</b>
<b>Output</b>	\$68.80	\$84.57	\$50.70	\$531.00	<b>\$735.07</b>	\$2,803.50	\$7,043.50	<b>\$10,582.07</b>

\$ are in Millions adjusted for inflation

During the construction phase of the project over 1,500 jobs will be generated. 420 permanent jobs will be created by the operation and maintenance (including tax payments) of the Buccaneer Pipeline. The project will generate over \$476 million in personal income for the State's residents and contribute in excess of \$527 Million to Florida's Gross Regional Product (GRP). Gross Regional Product as a value added concept is analogous to the national concept of Gross Domestic Product. It is equal to output excluding the intermediate inputs. It represents compensation and profits. Total output for the project from construction and operation and maintenance is estimated at \$735 Million.

Other benefits from the Buccaneer Natural Gas Pipeline include improvements to air quality and reduced energy prices due to competitive energy prices. Employment gains associated with the air quality improvements are estimated at 1800 jobs and total economic output at \$2.8 Billion. Economic impacts associated with reduced energy costs are dramatic. Energy is one of the three main factors of economic production. Labor and capital are the other two. Even a moderate reduction in energy costs, like 1% as modeled for this report, can produce job gains exceeding 3,400 and add over \$7 Billion in economic output.

Total economic output benefits for the project are anticipated to exceed \$10.5 Billion from 2001 to 2020.

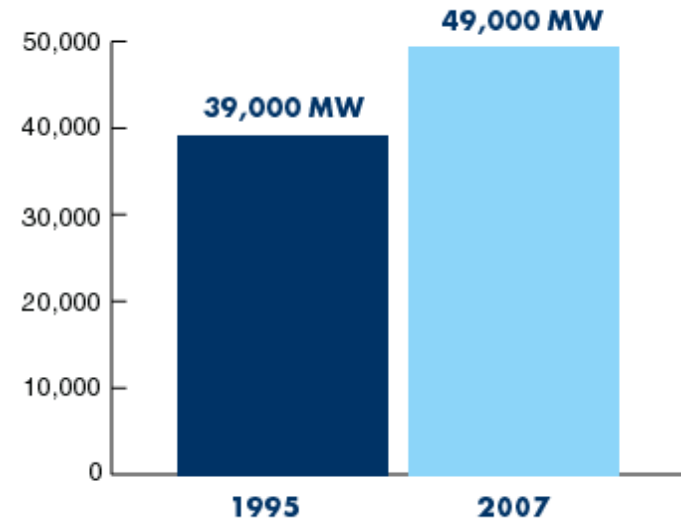
## OVERVIEW OF PIPELINE PROJECT

As one of the fastest-growing states in the country, the Florida Reliability coordinating Council has identified a need for an additional 10,000 megawatts of electricity in the State by the year 2007. Additional power generation capacity is important to avoid the electric curtailments that Florida experienced during the summer of 1998.

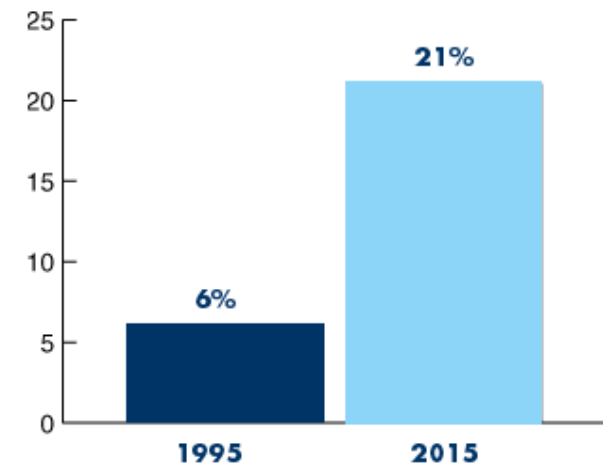
With the decline in available nuclear capacity and limits placed on the potential increases to coal use, natural gas is projected to play a growing role in fueling new and existing power generation plants in the southeastern United States, growing from an average 6 percent in 1995 to 21 percent by 2015, according to the Gas Research Institute. By that time, natural gas is projected to account for over 70 percent of the energy consumed for electric power generation, increasing from 43 gigawatts in 1995 to almost 80 gigawatts by 2015.

In addition, Florida's commitment to compliance with the Clean Air Act means that existing industrial and commercial plants that are now coal- or oil-fueled will be encouraged/required to switch to natural gas as their primary fuel source.

Florida is projected to require an additional 1.5 billion cubic feet of natural gas per day to meet the electric power generation needs identified by filings with the Florida Public Service Commission. Peninsular Florida's only interstate pipeline currently does not have the capacity to meet this demand.



Florida's electricity demand (in megawatts)



Natural gas fired power generation in Florida

### The Pipeline

The 36-inch, 139.24-mile Florida Mainline begins in Pasco County at Florida Power Corporation's Anclote Power Plant and traverses Pasco, Polk, Osceola, Orange, Brevard Counties. In Orange County, the mainline reduces to 30 inches.

There are three major lateral systems and five smaller laterals, which branch from the Florida Mainline. The Tiger Bay Plant Lateral begins at the Polk County Mainline and extends to the south in Polk County. The Hines, Polk and Payne Creek Plant Laterals are extensions of the Tiger Bay Plant Lateral at its southern end.

The Leesburg Plant Lateral extends from the Polk County Mainline to the north into Lake County. The 34 mile, 30-inch, Oleander Plant Lateral extends from the Orange County Mainline to the east into Brevard County. The Indian River and Cape Canaveral Plant Laterals are extensions of the Oleander Plant Lateral at its eastern end. Additional laterals extend from various portions of the Florida Mainline to deliver gas to the Anclote, Intercession City, Cane Island and Stanton Plants and to the City of Lakeland, Florida.

### Liquids Separation Facility

A Liquids Separation Facility will be located at Anclote in Pasco County to collect liquids that may condense in the pipeline due to pressure and temperature drop. The Liquids Separation Facility will be sited on a 68-acre tract, immediately north of Florida Power Corporation's Anclote Plant. Installed equipment will include an above ground section of pipeline to collect the liquids into a low pressure state, flash-gas and vapor recovery systems, and two 10,000-gallon liquids storage tanks with secondary containment. A 290-foot, single-span bridge will be constructed across the Anclote Power Plant cooling water outflow channel to access the site.

## ECONOMIC IMPACTS

### Direct Construction Expenditures and Taxes

The following table depicts the estimates of the direct construction payroll, materials, contractor, purchases, and other spending which should occur in the project area (including payroll and income taxes paid by workers; and sales, social security taxes) during the construction. Total costs for the project are estimated to approach \$1.5 Billion. Year one sales and property taxes and contributions to Social Security, Medicare, and Unemployment are expected to exceed \$131 Million statewide.

**Construction Expenditures and Taxes - 2000 - 2002**

<b>Payroll:</b>	<b>Construction</b>	<b>Taxes</b>
	Labor	\$511,472,742
	Social Security	\$63,422,620
	Medicare	\$14,832,710
	Federal Unemployment Tax	\$31,711,310
<b>Contractors:</b>	Survey	\$11,375,618
	Engineering & Inspection	\$55,269,682
<b>Materials:</b>	Line Pipe	\$263,404,487
	Coating	\$56,548,651
	Concrete Coating	\$67,104,953
	Fabrication	\$5,166,447
	Freight (Pipe & Materials)	\$40,725,630
	Cathodic Protection	\$7,461,270
	Miscellaneous Materials	\$7,959,907
	Other Material Costs	\$72,706,818
	Sale Tax	\$9,499,622
<b>Yearly Property Tax:</b>		\$12,097,394
<b>Right of Way:</b>	\$10,926,280	
<b>Non-easement Comp</b>	\$94,774,160	
<b>Natural Gas Line Pack:</b>	\$8,449,370	
<b>Overhead</b>	\$91,744,908	
<b>Money costs</b>	\$73,244,793	
<b>Contingencies:</b>	\$61,537,610	
<b>Total:</b>	<b>\$1,439,873,326</b>	<b>\$131,563,655</b>

## Economic Impact of Expenditures, Taxes, Operation and Maintenance

### Florida Totals (all dollars adjusted for inflation)

During the construction phase of the project over 1,500 jobs will be generated. Additionally, 250 to 420 (direct and indirect) permanent jobs will be created by the operation and maintenance (including tax payments) of the pipeline. The project will generate over \$476 million in personal income for the State's residents and contribute in excess of \$527 Million to Florida's Gross Regional Product (GRP). Gross Regional Product as a value added concept is analogous to the national concept of Gross Domestic Product. It is equal to output excluding the intermediate inputs. It represents compensation and profits.

<b>Florida Totals</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	1727	252	255	233	242	309	373	421	
Personal Income (Millions)	\$58.93	\$14.07	\$12.21	\$12.27	\$12.58	\$19.23	\$27.95	\$35.21	\$476.20
GRP (Millions)	\$87.66	\$11.64	\$11.65	\$12.40	\$13.26	\$20.31	\$28.98	\$39.19	\$527.50
Output (Millions)	\$168.15	\$17.47	\$17.68	\$18.13	\$18.93	\$25.68	\$36.58	\$49.31	\$735.00

### Florida Construction Employment and Construction Sales/Professional Services

Below is a break-out of the economic impacts associated with construction employment, professional services, and sales of construction materials during the construction period.. The methodology takes into account the importation of labor and materials into Florida.

<b>Florida Construction Employment</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	781								
Personal Income (Millions)	\$25.94	\$2.38	\$1.07	\$0.61	\$0.31	\$0.61	\$0.85	\$0.61	\$39.40
GRP (Millions)	\$36.40								\$35.00
Output (Millions)	\$68.80								

<b>Florida Construction Sales/Services</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	719								
Personal Income (Millions)	\$26.00	\$2.47	\$0.92	\$0.49	\$0.24	\$0.31	\$0.49	\$0.37	\$34.60
GRP (Millions)	\$40.78								
Output (Millions)	\$84.57								



### Florida Operation and Maintenance

The operation and maintenance analysis takes into consideration that Buccaneer Natural Gas will operate several small offices in Florida to handle business activity and coordinate the maintenance of the pipeline. These offices will directly employ 8 to 12 persons. The study considers that most maintenance workers will be specialized in pipeline operations and will be hired from out-of-state. The impacts of these workers include expenditures on transportation, lodging, and eating drinking, etc.

<b>Florida Operation &amp; Maintenance</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)		22	22	22	22	22	22	22	
Personal Income (Millions)	\$0.00	\$0.92	\$1.04	\$1.10	\$1.10	\$1.40	\$1.71	\$2.14	\$27.90
GRP (Millions)	\$0.00	\$1.28	\$1.27	\$1.26	\$1.21	\$1.42	\$1.60	\$2.18	\$29.00
Output (Millions)	\$0.00	\$2.32	\$2.22	\$2.28	\$2.25	\$2.55	\$2.89	\$3.63	\$50.70

### Florida Property Tax Impacts

The property tax impacts are the amount of employment and economic output associated with the payment of ad valorem taxes by Buccaneer Natural Gas Pipeline. The \$12 Million plus in property taxes paid will be multiplied throughout the economy via tax savings passed along by local governments to citizens and additional government spending. The property tax payments are significant contributors to the project's economic impact. The property tax impacts account for over 200 to 400 permanent jobs between 2001 and 2020. The property tax collections are estimated to contribute over \$422 Million to Florida's GRP by 2020. Total economic output is forecasted to exceed \$531 Million during the study period.

<b>Florida Property Tax Impacts</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	227	229	231	233	239	287	350	398	
Personal Income (Millions)	\$6.99	\$8.30	\$9.19	\$10.07	\$10.93	\$16.91	\$24.90	\$32.10	\$374.30
GRP (Millions)	\$10.49	\$11.29	\$11.81	\$12.44	\$13.21	\$18.80	\$26.95	\$36.29	\$422.60
Output (Millions)	\$14.78	\$15.15	\$15.46	\$15.85	\$16.68	\$23.13	\$33.69	\$45.67	\$531.00

## **Environmental Benefits**

Energy produced from natural gas generates less pollutants. Three major pollutants are reduced with the use of natural gas as an energy source as compared to other fossil fuels. They are sulfur dioxide, nitrogen oxide, and particulate matter. Reduced pollutants produce savings for individuals and business.

### **Sulfur Dioxide (SO<sub>2</sub>)**

Sulfur dioxide belongs to the family of sulfur oxide gases. These gases are formed when fuel containing sulfur (mainly, coal and oil) is burned and during metal smelting and other industrial processes. The highest monitored concentrations of SO<sub>2</sub> are recorded in the vicinity of large industrial facilities.

High concentrations of SO<sub>2</sub> can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated SO<sub>2</sub> levels while at moderate exertion may result in reduced lung function that may be accompanied by such symptoms as wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer-term exposures to high concentrations of SO<sub>2</sub>, in conjunction with high levels of PM, include respiratory illness, alterations in the lungs' defenses, and aggravation of existing cardiovascular disease.

Together, SO<sub>2</sub> and NO<sub>x</sub> are the major precursors to acidic deposition (acid rain), which is associated with the acidification of soils, lakes, and streams, accelerated corrosion of buildings and monuments, and reduced visibility. Sulfur dioxide also is a major precursor to PM, which is a significant health concern as well as a main pollutant that impairs visibility.

### **Nitrogen Oxides (NO<sub>x</sub>)**

Nitrogen dioxide (NO<sub>2</sub>) is a reddish brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide (NO). Nitrogen oxides (NO<sub>x</sub>), the term used to describe the sum of NO, NO<sub>2</sub> and other oxides of nitrogen, play a major role in the formation of ozone. The major sources of man-made NO<sub>x</sub> emissions are high-temperature combustion processes, such as those occurring in automobiles and power plants. Home heaters and gas stoves also produce substantial amounts of NO<sub>2</sub> in indoor settings.

Short-term exposures (e.g., less than 3 hours) to current nitrogen dioxide (NO<sub>2</sub>) concentrations may lead to changes in airway responsiveness and lung function in individuals with pre-existing respiratory illnesses and increases in respiratory illnesses in children (5-12 years old). Long-term exposures to NO<sub>2</sub> may lead to increased susceptibility to respiratory infection and may cause alterations in the lung. Atmospheric transformation of NO<sub>x</sub> can lead to the formation of ozone and nitrogen-bearing particles which are both associated with adverse health effects.

Nitrogen oxides also contribute to the formation of acid rain. Nitrogen oxides contribute to a wide range of environmental effects, including potential changes in the composition and competition of some species of vegetation in wetland and terrestrial systems, visibility impairment, acidification of freshwater bodies, eutrophication (i.e., explosive algae growth leading to a depletion of oxygen in the water) of estuarine and coastal waters, and increases in levels of toxins harmful to fish and other aquatic life.

#### Particulate Matter (PM)

Particulate matter (PM) is the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. These particles originate from many different stationary and mobile sources as well as from natural sources. Fine particles result from fuel combustion from motor vehicles, power generation, and industrial facilities, as well as from residential fireplaces and wood stoves. Coarse particles are generally emitted from sources, such as vehicles traveling on unpaved roads, materials handling, and crushing and grinding operations, as well as windblown dust. Some particles are emitted directly from their sources, such as smokestacks and cars. In other cases, gases such as sulfur oxide and SO<sub>2</sub>, NO<sub>x</sub>, and VOC interact with other compounds in the air to form fine particles. Their chemical and physical compositions vary depending on location, time of year, and weather.

Inhalable PM includes both fine and coarse particles. These particles can accumulate in the respiratory system and are associated with numerous health effects. Exposure to coarse particles is primarily associated with the aggravation of respiratory conditions, such as asthma. Fine particles are most closely associated with such health effects as increased hospital admissions and emergency room visits for heart and lung disease, increased respiratory symptoms and disease, decreased lung function, and even premature death. In addition to health problems, PM is the major cause of reduced visibility in many parts of the United States. Airborne particles also can cause damage to paints and building materials.

Source: EPA Office of Air and Radiation, National air Quality: Status and Trends Report

## Savings

Reducing the three main pollutants associated with burning coal and fuel oil can significantly improve the health of the population and economy. Savings are accrued by improved quality of life, reduced health care costs, reduced worker absenteeism, improved worker productivity, reduced maintenance requirements for buildings due to less corrosion, better visibility, etcetera. Research conducted by the EPA has estimated that the savings per ton are:

### **Savings per Ton Reduced** (in dollars)

<u>Pollutant</u>	<u>Low Estimate</u>	<u>High Estimate</u>
Sulfur Dioxide (SO <sub>2</sub> )	\$3,768	\$11,539
Nitrogen Oxide (NOx)	\$519	\$2,360
Particulate Matter (PM)	\$11,539	

Source: Federal Register, August 17, 1998

### **Annual Savings from Reduced Pollutants by Use of Natural Gas Provided by the Pipeline**

	<b>Tons saved</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>NOx</b>	23000	\$11,937,000	\$33,120,000	\$54,280,000
<b>SO<sub>2</sub></b>	128000	\$482,304,000	\$979,584,000	\$1,476,992,000
<b>PM</b>	7,300	\$84,234,700	\$84,234,700	\$84,234,700
		\$578,475,700	\$1,096,938,700	\$1,615,506,700

Source: EPA as published in Federal Register, August 17, 1998

### **Economic Impacts From Reduced Pollutants**

<b>Florida Air Quality</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	0	0	312	915	1834	1834	1834	1834	
Personal Income (Millions)	\$0.00	\$0.00	\$21.89	\$66.25	\$137.28	\$155.47	\$176.08	\$199.49	<b>\$2,753.10</b>
GRP (Millions)	\$0.00	\$0.00	\$19.63	\$58.13	\$117.93	\$133.55	\$151.25	\$171.37	<b>\$2,367.00</b>
Output (Millions)	\$0.00	\$0.00	\$22.84	\$67.97	\$139.74	\$158.26	\$179.23	\$203.07	<b>\$2,803.50</b>

Results represent the impacts from the low range savings estimates.

## **Benefits from Energy Cost Savings**

Competition is good. That simple sentence when translated to the increased presence of natural gas in Florida means increased savings to business and residents in energy costs. A study prepared in 1997 by the Energy Information Administration (EIA) indicates that by 2015, electricity production and delivery costs could be reduced by 10% or more. These savings include reduced fuel costs and higher efficiencies in electricity production such as the increased use of combined cycle technology. For our study, savings of one percent to each of the industrial, commercial, and residential sectors were modeled. One percent was chosen as a conservative estimate for modeling and reporting purposes. As documented by the EIA, One could argue that substantially greater savings might occur.. Savings are shown beginning in the projected first full year of pipeline capacity.

### **Economic Impacts of One Percent (1%) Reduction in Energy Costs to the Buccaneer Natural Gas Pipeline Service Area (2005 -2020)**

<b>Florida Totals</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	2357	2866	3189	3430	
Personal Income (Millions)	\$84	\$138	\$194	\$249	\$2,648
GRP (Millions)	\$148	\$230	\$311	\$402	\$4,349
Output (Millions)	\$256	\$375	\$498	\$638	\$7,044

<b>Florida Industrial</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	101	222	245	251	
Personal Income (Millions)	\$3.91	\$12.33	\$16.97	\$20.51	\$223.20
GRP (Millions)	\$7.84	\$25.06	\$35.99	\$46.29	\$472.80
Output (Millions)	\$14.67	\$47.77	\$68.43	\$87.84	\$900.10

<b>Florida Commercial</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	907	1197	1313	1376	
Personal Income (Millions)	\$32.10	\$58.53	\$81.67	\$102.80	\$1,105.90
GRP (Millions)	\$52.03	\$93.01	\$129.44	\$168.65	\$1,776.30
Output (Millions)	\$89.38	\$149.94	\$204.63	\$265.00	\$2,839.10

<b>Florida Residential</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>Total</b>
Employment (FTEs)	1349	1447	1631	1803	
Personal Income (Millions)	\$48.22	\$67.02	\$95.21	\$125.90	\$1,319.30
GRP (Millions)	\$87.83	\$111.65	\$145.49	\$186.83	\$2,100.10
Output (Millions)	\$151.90	\$177.44	\$224.96	\$285.64	\$3,304.30

## METHODOLOGY

The table below depicts the variables that were input into the Policy Insight econometric model. Construction phase variables were only input for the construction period. Operation and maintenance, tax, reduced pollution, and energy savings variables were input for the 2001 to 2020 period.

### Summary of Inputs

<i><b>Construction Phase</b></i>	
<b>Construction Employment</b> local labor pool-30% of project average	224.5 annual equivalent
<b>Spending by out-of-state Pipeline Construction Workers</b>	lodging, food, nondurable goods and travel (\$65 per day) 189,189 worker days
<b>Construction Material Sales</b> pipe, coating, professional services and other miscellaneous	Florida Supplied \$45,730,590
<i><b>Operation &amp; Maintenance</b></i>	
<b>Employment</b>	Local: 10 jobs / \$470,000 annual salary Non Local:180 worker day equivalent (\$65 day)
<b>Property Taxes</b>	\$10,942,889
<i><b>Other Benefits</b></i>	
<b>Savings from Air Quality Improvements</b>	EPA estimates of the benefits per ton of emission reduction
<b>Energy Savings</b>	1% reduction in energy cost to industry, commerce and residents

Source: TBRPC, Buccaneer and EPA

## AN OVERVIEW OF REMI POLICY INSIGHT®

### What Is REMI Policy Insight®?

Founded in 1980, Regional Economic Models, Inc. (REMI) constructs models that reveal the economic and demographic effects that policy initiatives or external events may cause on a local economy. REMI model users include national, regional, state and city governments, as well as universities, nonprofit organizations, public utilities and private consulting firms.

REMI Policy Insight®, the newest version of REMI's software, combines years of economic experience with an easy-to-use software interface. A major feature of REMI is that it is a dynamic model which forecasts how changes in the economy and adjustments to those changes will occur on a year-by-year basis. The model is sensitive to a very wide range of policy and project alternatives and to interactions between the regional and national economies. By pointing and clicking, you can answer the toughest "What if...?" questions about federal, state, local or regional economies. REMI is dedicated to continuing economic research combined with quality customer service and support.

### Model Introduction

TBRPC's version of REMI Policy Insight® includes a REMI model that has been built especially for the Tampa Bay Region. The model-building system uses hundreds of programs developed over the past two decades to build customized models for each area using data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Census Bureau and other public sources.

The REMI model is a structural model, meaning that it clearly includes cause-and-effect relationships. The model shares two key underlying assumptions with mainstream economic theory: *households maximize utility* and *producers maximize profits*. Since these assumptions make sense to most people, the model can be understood by intelligent lay people as well as trained economists.

In the model, businesses produce goods to sell to other firms, consumers, investors, governments and purchasers outside the region. The output is produced using labor, capital, fuel and intermediate inputs. The demand for labor, capital and fuel per unit of output depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. More people will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor in the model determine the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in price or a cut in profits, depending on the market for the product. In either case, an increase in cost would decrease the share of the local and U.S. market supplied by local firms. This market share combined with the demand described above determines the amount of local output. Of course, the model has many other feedbacks. For example, changes in wages and employment impact income and consumption, while economic expansion changes investment and population growth impacts government spending.

## **Model Overview**

Below is a pictorial representation of the model. The Output block shows a factory that sells to all the sectors of final demand as well as to other industries. The Labor and Capital Demand block shows how labor and capital requirements depend both on output and their relative costs. Population and Labor Supply are shown as contributing to demand and to wage determination in the product and labor market. The feedback from this market shows that economic migrants respond to labor market conditions. Demand and supply interact in the Wage, Price and Profit block. Once prices and profits are established, they determine market shares, which along with components of demand, determine output.

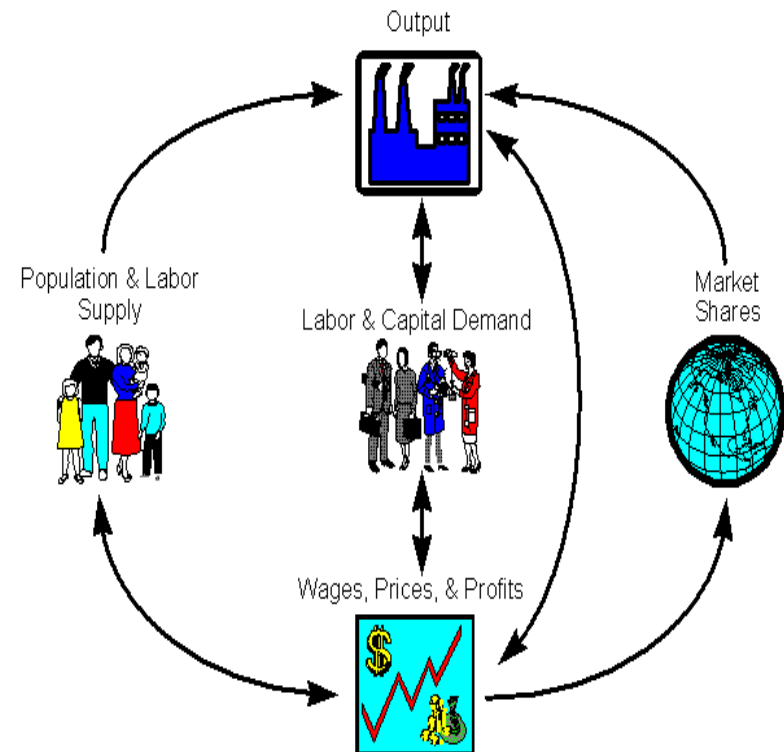
The REMI model brings together all of the above elements to determine the value of each of the variables in the model for each year in the baseline forecasts. The model includes all the inter-industry relationships that are in an input-output model in the Output block, but goes well beyond the input-output model by including the relationships in all of the other blocks shown in the figure.

In order to broaden the model in this way, it was necessary to estimate key relationships. This was accomplished by using extensive data sets covering all areas in the country. These large data sets and two decades of research effort have enabled REMI to simultaneously maintain a theoretically sound model structure and build a model based on all the relevant data available.

The model has strong dynamic properties, which means that it forecasts not only what will happen but when it will happen. This results in long-term predictions that have general equilibrium properties. This means that the long-term properties of general equilibrium models are preserved without sacrificing the accuracy of event timing predictions and without simply taking elasticity estimates from secondary sources.

## **What Sets REMI Apart?**

The widespread use of the REMI methodology throughout the U.S. has led to extensive documentation of the value of the REMI model in socioeconomic analysis. A \$200,000 study was commissioned by the South Coast Air Quality Management District (SCAQMD) for the Massachusetts Institute of Technology to evaluate the REMI methodology and the entire socioeconomic analysis system that SCAQMD used to forecast the impacts of air pollution controls in the Los Angeles Basin.





This study evaluated REMI and other socioeconomic analysis models for SCAQMD, and came to the conclusion:

“REMI has the following seven features often unavailable in many other microcomputer-based regional forecasting models:

1. It is calibrated to local conditions using a relatively large amount of local data, which is likely to improve its performance, especially under conditions of structural economic change.
2. It has an exceptionally strong theoretical foundation.
3. It actually combines several different kinds of analytical tools (including economic-base, input-output, and econometric models), allowing it to take advantage of each specific method's strengths and compensate for its weaknesses.
4. It allows users to manipulate an unusually large number of input variables and gives forecasts for an unusually large number of output variables.
5. It allows the user to generate forecasts for any combination of future years, allowing the user special flexibility in analyzing the timing of economic impacts.
6. It accounts for business cycles.
7. It has been used by a large number of users under diverse conditions and has been proven to perform.”

#### **TBRPC's use of the REMI Policy Insight model**

TBRPC staff has been using the REMI Policy Insight model since January, 1999. Staff has attended various training sessions including an intensive three day seminar in Amherst, Massachusetts. In February, 2000, TBRPC co-hosted the REMI Florida Policy Issues Conference. A sampling of the projects/clients in which the Council has conducted or contributed includes:

- |  |  |
|--|--|
| • Tampa Bay Water Desal Facility economic impacts      | • Buccaneer Natural Gas Pipeline       |
| • Clearwater Mall redevelopment fiscal impacts         | • Sarasota County EDC project analyses |
| • Pasco County Economic Committee                      | • High Tech Corridor Task Force        |
| • Tampa Bay Estuary Program (bay benefits)             | • Florida 2012 Preliminary Events      |
| • USF laser optics study <sup>†</sup>                  |  |
| • Tropicana headquarters impacts                       |  |
| • Spring Training impact study                         |  |
| • USF solar energy study <sup>†</sup>                  |  |
| • TBP Workforce grant application                      |  |
| • Pinellas County business retention/expansion studies |  |

<sup>†</sup> Contributor

## GLOSSARY

Demand - The amount of goods and services demanded by the local region; demand equals imports plus self supply.

Employment - Bureau of Economic Analysis (BEA) concept based on place of work; includes full-time and part-time employees; includes the self-employed. Expressed as a full time equivalent concept (FTE).

Exports - The amount of local production exported out of the local region, i.e. to the rest of the US and the rest of the world.

Gross Regional Product - Gross Regional Product as a value added concept is analogous to the national concept of Gross Domestic Product. It is equal to output excluding the intermediate inputs. It represents compensation and profits.

Imports - The amount of goods and services produced outside the area and consumed locally; a component of demand.

Induced Effects - Economic effects resulting from the re-spending of wages, i.e., new employees have money to spend. Explains why the demand is higher than the direct expenditures.

Output - The amount of production in dollars, including all intermediate goods purchased as well as value-added (compensation and profit). Can also be thought of as sales.  $\text{Output} = \text{Self-Supply} + \text{Exports} + \text{Intraregional Trade} + \text{Exogenous Production}$ .

Self Supply - The amount of local demand supplied locally; equals the Regional Purchase Coefficient multiplied by Demand.

Personal Income - This is a concept based on place of residence; the sum of wage and salary disbursements, other labor income, proprietors' income, rental income, personal dividend income, personal interest income, and transfer payments, less personal contributions for social insurance. Reported as a nominal dollar concept.

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