

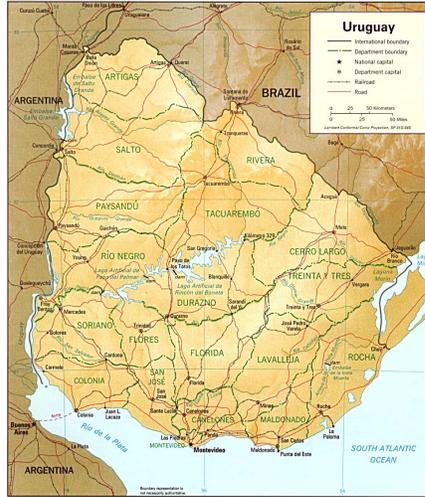
ARGONNE NATIONAL LABORATORY

Center for Energy, Environmental & Economic Systems Analysis (CEEESA)

Analyzing the Potential for Natural Gas Imports to Uruguay

Opportunity: Uruguay's energy supply system is rapidly changing because of ongoing energy market reforms, continued regional integration in the MERCOSUR free trade zone, and on-going upgrades and modifications to existing energy supply facilities. The Government of Uruguay (GOU) needed to analyze the effects of importing natural gas on its energy supply system as part of a broader fuel diversification strategy.

and developing a new natural gas infrastructure. CEEESA collaborated with several Uruguayan institutions, including the presidential planning office and oil, gas, and electric companies.



Scope of Work: CEEESA developed energy demand projections based on a local analysis of past patterns, determined the market penetration of natural gas by sector, evaluated the effects of increased electricity

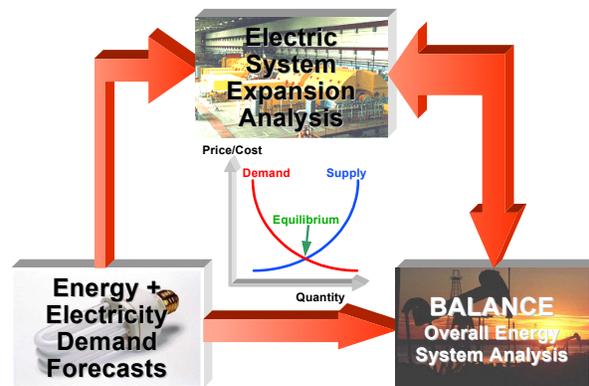
exchanges, and estimated the potential level of natural gas imports under different scenarios. CEEESA also installed ENPEP on local computers, provided training, and transferred all model runs to local PCs. Uruguay's Energy Office and Ministry of Environment continue to use the model for energy and climate change studies, demonstrating the success of the project.

Argonne Approach: GOU contracted CEEESA to conduct a detailed energy supply and demand analysis using the Energy and Power Evaluation Program (ENPEP). Specifically, CEEESA was asked to analyze the potential for expanding electricity ties with Argentina and Brazil

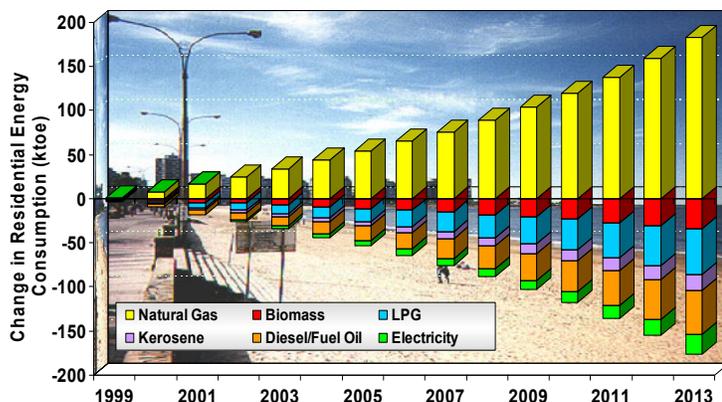
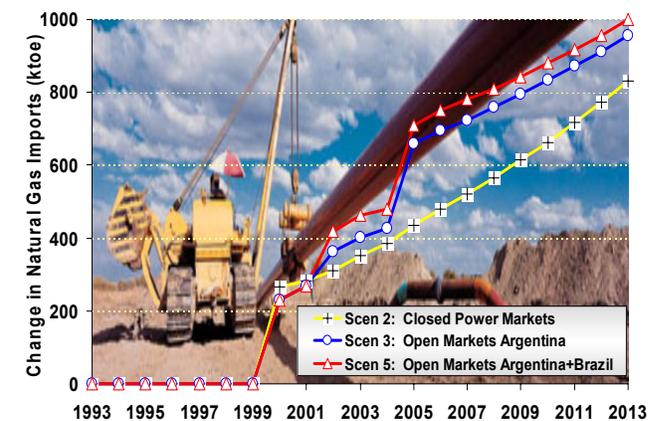
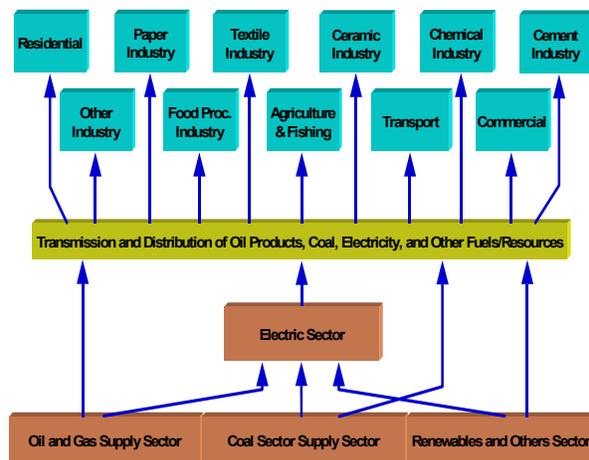
Routing of New Natural Gas Pipeline



CEEESA staff projected future fossil and non-fossil energy flows for Uruguay using the BALANCE module of ENPEP. BALANCE is a generalized equilibrium model that consists of a system of simultaneous nonlinear relationships that specify the transformation of energy quantities and energy prices through the various stages of energy production, processing, and use. The basic assumptions in the equilibrium approach are that the energy sector consists of autonomous energy producers and consumers that carry out production and consumption activities while pursuing individual objectives. BALANCE is not an optimization model; rather, it simulates and describes energy market choices that are made by producers and consumers. For this study, BALANCE used an energy network (see figure) designed to simulate the interactions among all energy supply and demand sectors. Local experts developed a forecast for useful energy demand, such as residential space heat, industrial steam demand, and passenger transportation demand. CEEESA staff obtained the projected expansion of the electricity generation system from Uruguay's electricity company (UTE). Uruguay's oil company, ANCAP, provided oil-sector-specific information. Because one of the outputs of BALANCE was the demand for electricity, we had to perform several iterations between the UTE expansion model and BALANCE.



Results: CEEESA's study revealed that natural gas imports will be strongly affected by the projected electric sector capacity expansion plan. The level of electric system integration with Argentina and Brazil will also play a significant role in natural gas demand. With electric integration, electricity exports are expected to increase substantially, driving up the demand for natural gas in the power sector. Natural gas imports in 2013 are forecast to be 25-28% of primary energy. Results for the residential sector show that the overall market share of natural gas will reach around 24% by 2013 with a range of 0-83%, depending on gas availability by region. Although natural gas will displace some residential electricity demand in areas where it is available, overall electricity demand is not expected to change significantly. Similar results are available for other sectors.



For further information, contact:

Guenter Conzelmann
 Center for Energy, Environmental & Economic Systems Analysis
 Argonne National Laboratory
 9700 S. Cass Avenue, Bldg. 900
 Argonne, IL 60439, USA

phone: 630-252-7173
 fax: 630-252-6073
 email: guenter@anl.gov
 internet: energycenter.anl.gov