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The Vermont Legislative Research Shop

Issues Involving Electricity Production in the State of Vermont

Due to the increasing demand for electricity in Vermont, a transmission line project was proposed to meet the demand of consumers. The Northwest Reliability Project proposed by VELCO was recently given the go ahead by the Vermont Public Service Board. This ruling has brought about concerns. Is it the most cost effective means for acquiring energy? How will the proposal effect the environment? Have all other options been explored? These concerns raise questions over the level of control the Federal Energy Regulatory Commission (FERC) holds. Can they tell the New England ISO what to do?

The North West Reliability Project

Vermont Electric Power Company (VELCO) has proposed a project, which would allow the company to bring a greater and much needed supply of energy to Vermont. Vermont reached a peak of approximately 1000MW in 2003 pressing the issue that the existing lines were no longer sufficient.[1] The Vermont Public Service Board has approved the Northwest Reliability Project proposed by VELCO. The project, however, was approved with added conditions. In Shelburne, 1.4 miles of the lines will be underground. This change will cost a few million dollars on top of the already estimated 130 million dollars.[2] VELCO estimates that Vermont customers will pay 12 million dollars, which will be about 5% of the cost of the project. The Vermont Public Service Board also called for low noise equipment to be used at certain construction sites and an increase in vegetation along certain parts of the route. The board also implemented relocation of proposed lines along with lower lines in order to enhance scenery.

A date to begin construction has not yet been decided since VELCO must still obtain additional permits. The entire project should be completed by 2007.[3] There are currently 534 miles of

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[1] Michael H. Dworkin, "Introduction to the Vermont Public Service Board," prepared for The Energy Regulatory Commission of the Republic of Macedonia and Vermont Public Service Board, March 2004, www.narucpartnerships.org/Presentations/VPSB/Mar04/Dworkin_Introduction_eng.pdf site visited on 3/7/05.

[2] Sutkoski, Matt, "VELCO project likely to see increase in costs, public debate" Burlington Free Press 2/1/05, site visited 2/3/05.

[3] Gram, David, "VELCO project approved with conditions," Associated Press, 1/28/05.

transmission lines in Vermont, 483 of those miles belonging to VELCO. The approved project would service the greater Burlington area with lines stretching from West Rutland to New Haven and the Western edge of the state. The new lines would be 36 miles of 345 kV and 27 miles of smaller lines to follow the path of the already existing lines carrying electricity from Southern New England. Thirteen substations will also need to be upgraded.

Transmission Lines

According to a review of the extant research conducted by the Minnesota Department of Health, transmission lines do not cause a public health risk. "While some researchers have different views on EMF (electric and magnetic fields), scientists agree that EMF associated with power frequencies is extremely low (60 hertz) relative to other types of fields commonly found in our environment (i.e., AM/FM radio, television, cellular phone frequencies). They also know that low frequency EMF is not capable of causing heating or direct DNA damage (e.g., mutations) caused by higher frequency fields (e.g., ultraviolet light from the sun, cosmic rays).[4] Due to the fact that there have been no scientific correlations between transmission lines and health risks there are no current federal standards for an accepted level of EMF.

According to the California Energy Commission the cost of maintaining and operating transmission lines are also extremely low compared to alternatives. Transmission lines can last between 30 and 50 years. Much of the cost of transmission lines occurs during construction.[5] "New and more efficient power plants should be able to use a strong transmission network to deliver power throughout their regional market, thus reducing the cost of power through out the market."[6] Transmission systems secure stable prices and an efficient energy supply. "…the transmission system helps to insulate electricity consumers from the effects of natural gas spikes, low hydro electric years and catastrophic events."[7]

Transmission lines are also stable in service. The stability of hydroelectric plants and wind farms are reliant on environmental standards and wind and water flow. All types of electric facilities will occasionally shut down due to maintenance however transmission systems allows for energy to be drawn from various places adding to the efficiency of the lines.[8] When a system has interconnected power plants fewer power plants are needed to meet the demands of consumers since the plants can share power.[9]

Customers may feel one problem with the Northwest Reliability Projects is its economic impact on local transmission owners. When dealing with cross state transmission lines, customers in one state can be hurt by costs while customers in other states may be benefiting. Also transmission

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[4] Minnesota Department of Health, http://www.health.state.mn.us/divs/eh/radiation/emf/#risks, site visited on 3/7/05
[5] California Energy Commission http://www.energy.ca.gov visited on 1/20/05
[6] National Council of Electricity, *Electricity Transmission a Primer*, http://www.ncouncil.org/primer.pdf, site visited on 2/24/05
[7] National Council of Electricity, *Electricity Transmission a Primer*
[8] National Council of Electricity, *Electricity Transmission a Primer*
[9] National Council of Electricity, *Electricity Transmission a Primer*

lines could endanger tourism, a complaint that the town of Shelburne has voiced. The lines may be perceived by many to be environmentally unfriendly, unhealthy, and property values may decrease due to massive power lines blocking once beautiful scenery. Since transmission lines have the ability to both economically and physically last between 30 and 50 years it is necessary to forecast energy use over the next 40 years.[10]

Facts on Natural Gas

As opposed to oil, the United States produces 87% of its own natural gas.[11] According to the U.S Department of Energy, 9 out of 10 new power plants built in the U.S will be natural gas plants.[12] On a similar note, "in 2000, 23,453 MW (megawatts) of new electric capacity was added in the U.S, of this, almost 95 percent, or 22,238 MW were products of natural gas additions."[13]

The feasibility of running the nation's natural gas generation units continuously and without major price increases has been an issue that has garnered much attention since the California energy crisis. At first glance natural gas is among the most expensive forms of energy production in the U.S when compared per kilowatt-hour. (A kilowatt-hour measures the amount of electricity needed to burn a 100-watt bulb for 10 hours.)[14] However, the specific cost per kilowatt-hour for the various fuels can vary widely depending on what variables are taken into account when calculating their cost, such as the overall cost of operating the plant—including fuel, labor, materials, and services and maintenance and decommission costs of coal and especially nuclear power plants.[15]

A report drafted by the Energy Information Administration in 2005 noted that, "projections put the cost of nuclear electricity at about 6.8 cents per kWh, when estimated capital costs are included with operations, maintenance, and fuel expenses. By comparison, the total cost for coal is projected at 4.3 cents per kWh, and combined-cycle natural gas at 4.1 cents per kWh."[16]

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[10] California Energy Commission http://www.energy.ca.gov visited on 1/20/05
[11] Natural Gas http://www.naturalgas.org/business/analysis.asp visited on 2/1/05
[12] U.S. Department of Energy http://www.doe.gov/engine/content.do?BT_CODE=NATURALGAS visited on 1/20/05
[13] Natural Gas http://www.naturalgas.org/overview/uses_eletrical.asp visited on 2/1/05
[14] Betty Joyce Nash, "Mature Nuclear Plants Power the District," *Region Focus,* Volume 5, No. 4, Fall 2001, published by the Federal Reserve Bank of Richmond http://www.rich.frb.org/pubs/regionfocus/fall01/nuclear.html, visited on 2/8/05
[15] Nuclear Energy Institute http://www.nei.org/index.asp?catnum=2&catid=262%20 visited on 1/20/05
[16] Nash, "Mature Nuclear Plants Power the District," *Region Focus*

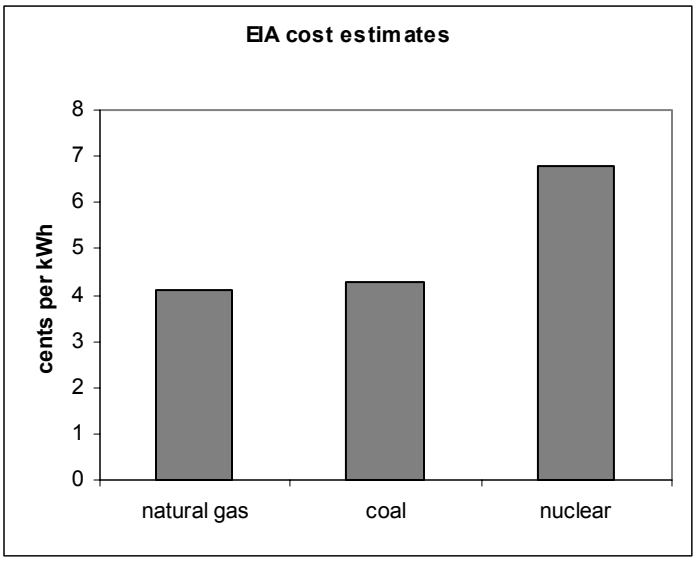

Figure 1: Energy Information Administration's cost estimates for producing electricity from natural gas, coal and nuclear facilities, 2005.

The primary problem with comparing prices is that there are often large variances and fluctuations in fuel prices especially that of natural gas due to the relative uncertainty of future supplies and demand. The Energy Information Administration (EIA) estimates that natural gas costs will be 7 percent higher in the winter of 2004-2005 than it was during the previous year. Although cold spells and other anomalies can affect the price of natural gas temporarily, there are other variables, which have a more prolonged effect on the price of natural gas. Although the U.S gets most of its natural gas from domestic production the remainder is mostly brought in via pipe from Canada. In 2003 net imports of natural gas fell 7 percent and forced the price of natural gas to increase. Finally varying cost of other fuel commodities can affect the cost of natural gas, most notably the increased cost of petroleum oil. The EIA notes that "some large-volume customers (primarily industrial consumers and electricity generators) can switch between natural gas and other fuels, such as petroleum products, depending on the prices of each. As a result of this interrelation between fuel markets, when oil prices rise, the competitive pressure to maintain low gas prices diminishes, and the shift in demand to natural gas drives prices upward."[17]

Institutions with own generating capabilities

Two examples of places that produce electricity with natural gas are Stanford University and Massachusetts Institute of Technology. Stanford's program has been in use for over a decade and has reaped the benefits. MIT is still in the early testing stages and will soon be using the technology to power the campus and provide steam heat to it buildings.

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[17] Nash, "Mature Nuclear Plants Power the District," *Region Focus*

Stanford's facility was built in 1987 and is operated by Cardinal Gogen, a subsidiary of General Electric. The plant consists of a natural gas powered turbine driving a 39.2 MW generator. Stanford incorporates a waste Heat Recovery Steam Generator (HRSG), and also a steam powered turbine driving a 10.7 MW generator. Leftover heat from the gas turbine combustion process is then used in a steam turbine to generate additional electricity. Stanford only uses half of the electricity produced from the Cardinal plant, the other half is then sold the PG&E.[18]

The MIT Project was a ten year, forty million dollar initiative by the Massachusetts Institute of Technology to generate its own electrical power. According to MIT, its new plant is projected to save the Institute millions of dollars over the life of the plant.[19]

What is FERC?

The Federal Energy Regulatory Commission (FERC) consists of a governing board of five members (at one time no more than three members may be from the same political party). These members, selected by the President of the United States oversee the regulation of the country's hydroelectric projects, oil pipelines, natural gas industry and wholesale rates for electricity.[20] FERC does not regulate local generation because the electricity does not cross state lines. By creating local generation a city does not have to answer to FERC and can handle conservation issues as it sees fit. When a system crosses state lines, FERC gains authority. FERC does not have jurisdiction over maintaining or constructing transmission lines; the agencies purpose is to regulate energy on an interstate level. "Once Electricity projects become operational, safety is regulated, monitored and enforced by the state."[21] FERC took the place of the Federal Power Commission which was founded due to the Federal Powers Act of 1935. This act was to ensure reasonable electricity prices. Critics of the agency claim that free market principles are a higher priority than the concerns of the consumers to FERC.[22] Congress controls funding for the Federal Energy Regulatory Commission. FERC has power over ISO's; if an ISO does not want to comply a complaint must be filed and reviewed by the commission. Vermont is part of the New England ISO, a non-profit corporation that is responsible for the region's wholesale electricity market place.[23]

Compiled in response to requests of Senators Vincent Illuzi and Claire Ayers by Katie Sheeran and Jonathan Wheatley on March 8, 2005 under the supervision of Professor Anthony Gierzynski.

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[18] Central Energy Facility http://www.stanford.edu/group/EMG/html/cef.html visited on 2/8/05
[19] MIT Cogeneration Project http://cogen.mit.edu/ visited on 3/3/05
[20] PBS *What is FERC?* www.pbs.org/wgbh/pages/frontline/shows/blackout/regulation visited on 2/15/05
[21] PBS *What is FERC?*
[22] Federal Energy Regulatory Commission, http://www.ferc.gov/press-room/pr-current/02-09-05-nerc.asp 2/17/05.
[23] Federal Energy Regulatory Commission, http://www.ferc.gov/press-room/pr-current/02-09-05-nerc.asp visited on 2/17/05

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