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February 11, 2008

Chairman John Mengacci and Members
Connecticut Energy Advisory Board
C/o CERC
805 Brook Street, Building 4
Rocky Hill, CT 06067-3405

Re: **Comments on the Integrated Resource Plan for Connecticut dated January 1, 2008.**

Dear Chairman Mengacci and Members:

A. Introduction

The undersigned hereby submits his comments concerning the Integrated Resource Plan ("IRP") for Connecticut submitted to the Connecticut Energy Advisory Board ("CEAB") on January 1, 2008 by the Brattle Group ("Group") in a collaborative effort with the Connecticut Light and Power Company ("CL&P") and the United Illuminating Company (`UI"). The Group designed the IRP to fulfill the requirements of Section 51 of Connecticut Public Act 07-242 (the "Act"), which required the state's electric distribution companies to engage in a comprehensive evaluation process designed to produce a comprehensive plan for the procurement of energy resources for the next three, five and ten years based on additions to current planned generation, recent and planned transmission projects, and demand-side measures that are planned or underway. In another words a "roadwork" to guide the procurement of energy resources for up to ten years. [Executive Summary, Findings, ES-1].

According to the Executive Summary, the Group conducted a regional electricity market analysis that examined how well selected resource options fared in meeting the performance criteria outlined in PA 07-242 and the CEAB Preferential Criteria for Evaluation of Energy Projects under a broad range of potential future scenarios. The results of that analysis underlie its findings and recommendations. [Executive Summary, ES-1]

After taking into account additions to planned generation, recent and planned transmission projects, demand-side measures that are planned or underway, and assuming no retirements, the IRP found that Connecticut and New England would not need new electricity resources to attain reliability targets for several years.

Section 51(a)- (d) of the Act defines the elements of the procurement "plan" in terms of assessments, specifications and considerations. In addition to the work proposed in the Group's

response to the CEAB's Request for Proposal dated July 23, 2007 and pursuant to the Act, it developed the IRP according to 25 deliverable elements in the Scope of Services. [(IRP, Appendix J].

Section 51(a) of the Act required the Group to develop a comprehensive plan after reviewing the state's energy and capacity resource assessment that minimizes the cost of such resources to customers over time and maximizes consumer benefits consistent with the state's environmental goals and standards. Additionally, Section 51(b) required the Group to assess energy and capacity requirements of customers, the best manner of eliminating electric-demand growth, the achievement and impact of current and projected environmental standards and goals, energy security and economic risks of potential energy resources, and the estimated lifetime cost and availability of potential energy resources. Further, Section 51(c) required the procurement plan to specify: (1) energy and capacity resource needs for customer demand; (2) the extent to which demand-side measures meet customer needs; (3) needs for generating capacity and transmission and distribution improvements; (4) whether development of such resources will reduce and stabilize the costs of electricity; and (5) the manner in which each of the proposed resources should be procured, including the optimal contract periods for various resources. And, Section 51(d) required the procurement plan to consider: (1) Approaches to maximizing the effectiveness of demand-side measures; (2) the extent to which generation needs can be met by renewable and combined heat and power facilities; (3) the optimization of the use of generation sites; (4) fuel types, diversity, availability, firmness of supply and security and environmental impacts; (5) reliability, peak load and energy forecasts, system contingencies and existing resource availabilities; (6) import limitations and the appropriate reliance on such imports; and (7) the impact of the procurement plan on the costs of electric customers.

Generally, in determining appropriate and relevant comments to statutorily mandated studies, the commentator must first answer three fundamental questions before proceeding with remarks on a study's details. Firstly, what factors does the statute mandate for consideration? Secondly, did the study consider part or all of the mandated factors? And, thirdly, if the study comprehensively considered all the factors, did the document fully provide all the required information supporting the findings of facts, conclusions, and recommendations?

Dictionaries provided the following definitions for a plan: (1) A scheme, program, or method worked out beforehand for the accomplishment of an objective: *a plan of attack;* (2) a proposed or tentative project or course of action; (3) a method for achieving an end; (4) a detailed formulation of a program of action; and (5) a scheme devised; a method of action or procedure expressed or described in language as, the plan of an expedition.

The IRP provided the following on the issue of energy security:

> **Define metrics for evaluating resource solutions** along the policy objectives addressed in Section 51, included customer costs, emissions, and

> reliability/security. Many of these objectives are also reflected in the CEAB Preferential Criteria for Evaluation of Energy Projects. [IRP, p.5]
>
> After resource solutions are tested in DAYZER and other offline analyses, they are compared to each other using multiple evaluation metrics that correspond to the objectives outlined in PA 07- 242 and also reflect the CEAB Preferential Criteria for the Evaluation of Energy Proposals. These metrics measure economic impacts such as resource costs and customer costs under various assumed pricing regimes; and also include reliability indices, environmental impacts, fuel diversity and energy security considerations. [IRP, Evaluation Metrics, p. 23]
>
> **Fuel Diversity and Security** – measures of the contribution of power generation to overall gas demand and particularly wintertime peak gas demands. [IRP, Evaluation Metrics, p. 24]
>
> This study investigates the resource solutions and procurement strategies that would achieve the best combination of reliability, customer costs, and other policy objectives, including environmental, energy security across a range of potential future scenarios. [IRP, Electricity Market Analysis, p. A-7]
>
> We report the fuel consumption metrics that are most relevant to the objectives of fuel diversity and security: the quantity of natural gas burned in Connecticut and New England all year and during the peak heating season . . . . [IRP, Evaluation Metrics, p. H-5]

B. Findings

Based on the above, the IRP provided recommendations but not a plan for procurement of energy resources for the next three, five and ten years. Additionally, conclusions based on assumptions do not constitute fact but often merely support presumptive conclusions; however, many of the assumptions neglected to paint both the best and worst case scenarios.

Section 51(b) and item 6 of the Scope of Services required the Group to assess energy security, and Section 51(d)(4) and item 11 of the Scope of Services required the procurement plan to consider the firmness of energy supply and security. The IRP failed to substantively address energy security based on potential threat scenarios. Attachments 1 and 2 provide a realistic perspective on energy security issues, which should have been addressed by the report. Perhaps, the failure to adequately address the security issue lies with the Legislature's failure to specifically request such analyses and planning.

C. Conclusion

The IRP does not constitute a procurement plan even though the Group concluded that the state does not need one followed by recommendations, which form an element of a plan.

D. Recommendation

Advise the Energy and Technology Committee that the Group failed to submit the requisite plan.

Cordially,

Robert Fromer

Attachments: (1) Sebastian Mallaby, *What 'Energy Security' Really Means*
(2) Wikipedia, *Energy Security*

What 'Energy Security' Really Means
Washington Post
By Sebastian Mallaby
Monday, July 3, 2006; Page A21

At their annual gathering each summer, the leaders of the rich world promise to fix some pressing global problem -- and usually fail to deliver. This month's Group of Eight summit in Russia takes statecraft to a whole new level. Global leaders have "energy security" on the agenda. But judging by what they say and do, they don't always understand the subject.

For many American leaders, energy security means producing energy at home and relying less on foreigners. But the United States imports three-fifths of its oil, and the share is heading up. For the foreseeable future, alternative fuel is unlikely to change that.

For China, which isn't part of the G-8 but participates in some of its meetings, energy security means buying stakes in foreign oil fields -- in Sudan, Nigeria, Angola and so on. But this doesn't make China any more secure. If a geopolitical crisis broke out, China's tankers might be blocked on the high seas; owning chunks of Africa's oil wouldn't make much difference. In the absence of a crisis, African investments make little more sense: China can buy oil on the world market.

For Russia, which pushed energy onto the G-8 agenda, energy security has yet a third meaning: restrictions on foreign investment in domestic oil and gas fields. But this is the mirror image of the Chinese mistake. Just as China's security isn't boosted by owning African resources, Russia's security isn't reduced by allowing foreigners to own Russian ones. In a crisis, Russia would control its oil fields by military force. Short of a crisis it can extract taxes and royalties from foreign energy firms just as it can from Russian ones.

So there's no sense in these nationalistic conceptions of energy security. As Daniel Yergin has written recently in Foreign Affairs, real energy security requires setting aside the pipe dream of energy independence and embracing interdependence.

Energy interdependence can actually be good for energy security: Just look at natural gas markets. Right now nearly all the natural gas that Americans consume comes from U.S. and Canadian fields; only 3 percent comes into the country by tanker in the form of liquefied natural gas. This renders the United States highly vulnerable to disruptions on its home continent. If terrorists or a hurricane took out a key pipeline, it would be hard to bring in alternative supplies from outside North America, and prices would spike upward. By buying more liquefied natural gas from a diverse range of foreigners, the United States would reduce its energy independence but enhance its energy security.

For different reasons, the oil market also shows why leaders should embrace interdependence. Because oil is traded globally, a supply disruption anywhere will affect gas prices in the United States; there's no use thinking nationalistically. If there's an explosion in a Chinese oil field that serves Chinese consumers, it will force the Chinese to buy more oil on the world market and so drive up the global price: American motorists will suffer. So China's energy security is not in competition

with U.S. energy security, as the resource-scramble model would suggest. China's energy security is part of U.S. energy security.

Equally, there's a lot of breast-beating about the U.S. strategic oil reserve. The idea of vast bunkers full of crude conjures pleasing feelings of national self-sufficiency: The heck with those foreigners, we can take care of ourselves! But this is mostly a delusion. If the United States releases oil from its reserve, the benefit is dissipated around the world since the global oil price is affected. To have a serious impact on that price, the United States needs Europe and the advanced Asian countries to release oil from their stockpiles in a concerted way: Far from being a tool of national self-sufficiency, strategic oil reserves are a classic *multilateral* instrument. There's an urgent need to bring the big emerging economies into the International Energy Agency, which coordinates the reserves held by the rich countries.

What about U.S. relations with energy *suppliers* ; surely here the model of nationalistic competition is relevant? The Arab oil embargo of 1973 demonstrated the danger of a conflict between suppliers and consumers, and Russia's withholding of natural gas from Ukraine last winter shows that embargoes remain possible. But suppliers know that strong-arm tactics are the surest way to accelerate the search for alternative fuels, which is why Russia plays politics with energy more by giving out subsidized supplies than by refusing to sell any. The threat of an embargo by oil states is therefore smaller than the threat of violence by non-states -- rebel attacks in Nigeria's oil delta, an al-Qaeda strike in Saudi Arabia. In this sense the energy security of producers is not in competition with that of consumers. They are interdependent.

If the G-8 summit can spread the word about this interdependence, it will do some good. But the nationalistic conception of energy security is worse than useless. By encouraging a competitive scramble for resources that could spiral into conflict, this sort of security talk only creates insecurity.

Wikipedia

Energy Security

Access to cheap energy has become essential to the functioning of modern economies. However, the uneven distribution of energy supplies among countries and the critical need for energy has led to significant vulnerabilities. Threats to global energy security include the political instability of several energy producing countries, the manipulation of energy supplies, the competition over energy sources, attacks on supply infrastructure, as well as accidents and natural disasters. It is also the limited supplies of the most common forms of primary energy, i.e. Oil and Gas that changes perceptions on this topic. Although plenty of coal, up to 155 years worth, is readily available , coal is not the fossil fuel of choice for many more advanced countries because of its highly polluting nature. The potential need to change our primary energy sources in the foreseeable future is the crux of the energy security question, leading to higher prices, more limited access to sources of energy, competitions and political troubles, which in turn make the threat even larger.

Security threats

One of the leading threats to energy security is the significant increase in energy prices, either on the world markets – as has occurred in a number of energy crises over the years – or by the imposition of price increases by an oligopoly or monopoly supplier, cartel or country. In some cases the threat might come from a single energy superpower – those states able to significantly influence world markets by their action alone. Rather than just manipulating prices, such suppliers might go beyond this by suspending or terminating supplies. This has been done to apply pressure during economic negotiations - such as during the Russia-Belarus energy dispute - or to apply political pressure, for example by OPEC in response to Western support for Israel in the Yom Kippur War. Suspension of supplies may also come about as a result of world-wide international sanctions against a country.

Energy plays an important role in the national security of any given country as a fuel to power the economic engine. Hence, threats to energy security can also result from physical damage to the energy infrastructure either of the supplier, or of the importer as a result of natural events, misfortune, terrorism, or warfare. The political and economic instability caused by war or other factors such as strike action can also prevent the proper functioning of the energy industry in a supplier country.

In recent years, new threats to energy security have emerged in the form of the increased world competition for energy resources due to the increased pace of industrialization in countries such as India and China. Although still a minority concern, the possibility of price rises resulting from the peaking of world oil production is also starting to attract the attention of at least the French government.

In the future it is possible to envisage threats to energy security emerging not as a result of energy prices, but as a result of increases in the price of carbon emissions within carbon emissions trading schemes, or from international political pressure to reduce emissions.

Increased competition over energy resources may also lead to the formation of security compacts to enable an equitable distribution of oil and gas between major powers. However, this may happen at the expense of less developed economies. The Group of Five, precursors to the G8, first met in 1975

to coordinate economic and energy policies in the wake of the 1973 Arab oil embargo, a rise in inflation and a global economic slowdown.

Long term security

Long term measures to increase energy security center on reducing dependence on any one source of imported energy, increasing the number of suppliers, exploiting native fossil fuel or renewable energy resources, and reducing overall demand through energy conservation measures. It can also involve entering into international agreements to underpin international energy trading relationships, such as the Energy Charter Treaty in Europe.

The impact of the 1973 oil crisis and the emergence of the OPEC cartel was a particular milestone that prompted some countries to increase their energy security. Japan, almost totally dependent on imported oil, steadily introduced the use of natural gas, nuclear power, high-speed mass transit systems, and implemented energy conservation measures, It has become one of the world leaders in the use of renewable energy. The United Kingdom began exploiting North Sea oil and gas reserves, and became a net exporter of energy into the 2000s.

In other countries energy security has historically been a lower priority. The United States, for example, has continued to increase its dependency on imported oil although, following the oil price increases of 2004-2006, the development of biofuels has been suggested as a means of addressing this.

Increasing energy security is also one of the reasons behind plans for an oil phase-out in Sweden, together with a block on the development of natural gas imports. Greater investment in native renewable energy technologies and energy conservation is envisaged instead. India is carrying out a major hunt for domestic oil to decrease its dependency on OPEC, while Iceland is well advanced in its plans to become energy-independent by 2050 through deploying 100% renewable energy.

Short term security

Petroleum

Many countries hold strategic petroleum reserves as a buffer against the economic and political impacts of an energy crisis. All 26 members of the International Energy Agency hold a minimum of 90 days of their oil imports, for example.

The value of such reserves was demonstrated by the relative lack of disruption caused by the 2007 Russia-Belarus energy dispute, when Russia indirectly cut exports to several countries in the European Union.

Natural gas

Compared to petroleum, reliance on imported natural gas creates significant short term vulnerabilities. Many European countries saw an immediate drop in supply when Russian gas supplies were halted during the Russia-Ukraine gas dispute in 2006.

Improving Energy Security Via Decentralization

One possible way of simultaneously contributing to international energy and climate security is by investing in decentralized energy. By building electricity generating capacity close to the source of demand one can improve combustion efficiency (by capturing waste heat) and reduce imports of natural gas and other fuels. Using on-site renewable powered energy can go even further in reducing fuel imports and emissions responsible for climate change and air pollution.

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The information that follows from www.naturalgas.org concerns future availability of natural gas for Connecticut and the Group should have addressed this in its IRP:

NATURAL GAS. ORG
Natural gas is a vitally important source of energy for all sectors of the economy in the United States. Maintaining an adequate supply of this important resource is thus extremely important to preserving and improving our quality of life.

Meeting Natural Gas Demand
The United States has vast resources of natural gas available for extraction. The Energy Information Administration (EIA) estimates that there are 1,279.5 Trillion cubic feet (Tcf) of technically recoverable natural gas resources in the United States. The National Petroleum Council estimates U.S. recoverable natural gas resources to be 1,451 Tcf, while the Potential Gas Committee estimates a level of 1,127 Tcf.

Given U.S. production levels in 2002 and the National Petroleum Council's estimate for available domestic resources, there is enough natural gas in the United States to meet over 75years of domestic production. This estimate, although not taking into account expected increasing levels of domestic production, or the potential opening up of access to currently restricted land, offers a good idea of how much domestic natural gas to which the United States currently has access.

The United States is a large consumer of natural gas. In 2002, the United States used about 22.8 Tcf of natural gas, making it one of the worldwide leaders in natural gas consumption. According to the Energy Information Administration's (EIA's) International Energy Outlook 2003, the United States accounted for over 25 percent of total worldwide consumption in 1999.

To review the demand for natural gas in the United States, including factors that are expected to shape future demand, click here.

In order to meet the demand for natural gas, the United States relies on domestic production, imports of dry gas, and imports of Liquefied Natural Gas (LNG). Most of the natural gas that is consumed in the United States is produced domestically, with the balance of dry natural gas being imported mainly from Canada. Imports of LNG also serve to meet the growing demand for natural gas in the United States. In addition to domestic production and imports, natural gas in storage is also used to ensure that demand for natural gas in the United States is satisfied throughout the year.

Domestic Natural Gas Production
According to the EIA, 19.05 Trillion cubic feet (Tcf) of dry natural gas was produced in the United States in 2002. This represents over 84 percent of total domestic consumption. This compares to crude oil, where only about 39 percent of consumption is met by domestic production. The United States is much less reliant on other countries for its natural gas supply than it is for its supplies of crude oil. Many believe that natural gas is a much more reliable source of energy, considering such a high proportion of domestic demand is met by domestic production.

Dry Natural Gas Imports and Exports
According to the Energy Information Administration (EIA), net imports of natural gas accounted for 15 percent of natural gas use in the United States in 2002. About 95 percent of U.S. natural gas imports are from Canada. According to the EIA, net imports from Canada equaled 3.49 Tcf, and this level is expected to decrease at an annual rate of 1.4 percent to a level of 2.56 Tcf per year in 2025.

Liquefied Natural Gas
Liquefied natural gas (LNG) imports represent an increasingly important part of the natural gas supply picture in the United States. According to the EIA, the U.S. imported 0.17 Tcf of natural gas in the form of LNG in 2002. LNG imports are expected to increase at an average annual rate of 15.8 percent, to levels of 4.80 Tcf of natural gas by 2025.

Factors Affecting the Supply of Natural Gas

The production of natural gas in the United States is based on competitive market forces: inadequate supply at any one time leads to price increases, which signal to production companies the need to increase the supply of natural gas to the market. Supplying natural gas in the United States in order to meet this demand, however, is dependent on a number of factors. These factors may be broken down into two segments: general barriers to increasing supply, and those factors that affect the short term supply scenario.

Short Term Supply Barriers

In a perfect world, price signals would be recognized and acted upon immediately, and there would be little lag time between increased demand for natural gas, and an increase in supplies reaching the market. However, in reality, this lag time does exist. There are several barriers to immediate supply increases which affect the short term availability of natural gas supply. They include:

- **Availability of Skilled Workers** - The need to train and hire skilled workers results in lag times between times of increased demand and an increase in production. For example, from 1991 to 1999, a prolonged period of relatively low prices indicated adequate supplies of natural gas existed, and the exploration and production industry contracted in response. During this period, the U.S. Bureau of Labor Statistics recorded a 26 percent average decrease in employment in the oil and gas extraction industry. Some of these workers left the industry altogether rather than remain unemployed. When production companies began to react to higher prices in late 1999, the need to find and train skilled workers contributed to a slower increase in activity than would have been the case if skilled workers were plentiful. To counter this problem, many production companies offer increasingly high wages, as well as scholarships and educational contributions to attract professionals to the industry.

- **Availability of Equipment** - Drilling rigs are very expensive pieces of equipment. Price volatility in the industry makes it very difficult for producers, as well as production equipment suppliers, to plan the construction and placement of drilling rigs far in advance. Prolonged periods of low prices results in reduction of the number of available rigs. When prices respond to increase demand, and drilling activity increases, time is required to build and place an adequate number of drilling rigs. For this reason, drilling rig counts are a good indication of the status of the oil and natural gas production industry.

- **Permitting and Well Development** - Before a natural gas well actually begins producing, there are several time consuming procedures and development activities that must take place. In order to begin drilling, exploration activities must take place to pinpoint the location of natural gas reserves. Once a suitable field has been located, production companies must receive the required approval from the landowner (which in many cases is the government) to install drilling equipment and begin to drill the well. The Bureau of Land Management is responsible for issuing permits for onshore development, and the Minerals Management Service is responsible for offshore development areas. Once drilling is completed, extraction

and field processing equipment must be set up, as well as gathering systems. In all, the time between the location of natural gas deposits and the beginning of production can range from as little as a few months to as much as ten years.

- **Weather and Delivery Disruptions** - Although unrelated to natural gas prices or demand increases and decreases, weather patterns and anomalies can have a significant impact on natural gas production. For example, hurricanes can have an impact on the offshore production of natural gas, as safety measures require the temporary shut down of offshore drilling and production platforms. In addition, while the safety record of the natural gas industry is extremely good, malfunctions and accidents may occur from time to time that disrupt the delivery of natural gas. For example, a compressor malfunction in a large pipeline serving a major hub could temporarily disrupt the flow of natural gas through that important market center. While the effects of weather and delivery disruptions are most often of short duration, they can still have an effect on the expeditious production of natural gas.

General Barriers to Increasing Supply

In addition to the short term impediments to increasing natural gas supply, there exist other more general barriers to the increased supply of natural gas in the United States. These include:

- **Land Access** - The U.S. government owns more than 29 percent of all the land in the country, and an estimated 40 percent of undiscovered natural gas exists on this land. In several areas, the government has restricted access to federal lands. 59 percent of undiscovered gas resources are on federal lands and offshore waters. Outside of the western Gulf of Mexico, production companies are prohibited access to virtually all federal lands offshore the Lower 48 states. About 9 percent of resource-bearing land in the Rockies is also off limits, and access to another 32 percent is significantly restricted. The National Petroleum Council in 1999 estimated that 213 Tcf of natural gas exists in areas under federal access restrictions. This restriction is the result of presidential and congressional leasing moratoria, and affects the amount of natural gas resources that may be extracted to increase supply.

- **Pipeline Infrastructure** - The ability to transport natural gas from producing regions to consumption regions also affects the availability of supplies to the marketplace. The interstate and intrastate pipeline infrastructure can only transport so much natural gas at any one time, and in essence provides a 'ceiling' for the amount of natural gas that can reach the market. Although the current pipeline infrastructure is significant, with the EIA estimating daily delivery capacity of the pipeline grid to be 119 Bcf. However, natural gas pipeline companies must continue to continually expand the pipeline infrastructure in order to meet growing demand.

- **The Financial Environment** - Exploring for and producing natural gas is a very capital intensive endeavor. In fact, the National Petroleum Council estimated in 1999 that production companies will have to invest $1.44 trillion in capital between 1999 and 2015 in order to keep

pace with demand growth. This puts significant pressures on production companies, particularly small, privately owned firms, to raise the capital necessary to increase production. While efficient and transparent financial markets in the U.S. do offer options for raising capital effectively, the rate at which production companies may do so can serve as a limiting factor in the increasing availability of supplies reaching the market.

Cordially,

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Robert Fromer