



# LakeLinks

Fall/Winter 2001

*A multi-disciplinary forum for dialogue and expression of diverse viewpoints  
on issues of importance to the Great Lakes region*

## **Special points of interest:**

- National Water Crisis: A Great Lakes Response Conference Nov. 1, 2001.
- Spring 2002 conference - Legal Impediments to Brownfield Redevelopment. April 18 & 19, 2002.



## **Energy: The Balancing Act Between Price, Production and Pollution**

by Gary Overmier, Assistant Director LIGL

Energy, mention the word and most people respond, "I wish I had more of it!" Whether personal energy or the energy we use to power our vehicles, machinery and appliances, we need more of it. The Great Lakes region, for better or worse, encompasses large populations and industrial centers both using large quantities of

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## **Centralized Power Plants: On the Brink of Extinction?**

Eric T. Truelove, P.E. IBC Engineering Services, Inc.

Eric Truelove has been an engineer in the energy industry since 1980. During the first nine years of his career, he served as a Power Plant Engineer, Research Engineer, and

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## **State of Power Generation in the Great Lakes Basin**

by Susan Freedman and Suzanne Watson, Northeast-Midwest Institute

The Great Lakes Basin relies primarily on coal for its power generation needs. But many of the coal plants in the region are extremely old and less efficient than

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## **Energy Policy: Four Bills Moving Through Congress**

by Olwen F. M. Huxley, Legislative Director

On August 2, the House of Representatives passed H.R. 4, the Secure America's Future Energy (SAFE) Act of 2001. This bill was an amalgam of four bills that had been passed out of the committees with jurisdiction over various aspects of energy policy: Resources, Ways and

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## **Drilling under the Great Lakes- I SAY NO!**

By Michigan Congressman Bart Stupak ( D-Menominee)

The residents of the Great Lakes states have an awesome responsibility – the protection and stewardship of the Great Lakes. The Great Lakes – our great treasures – are the world's

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energy. We, as much as any other area of the country, struggle to obtain (and pay for) an adequate low polluting energy supply. It is a tremendous balancing act between price, production and pollution.

What do we as a society do to solve this problem? Do we increase the CAFE requirements and raise the price of automobiles? Do we require everyone's home to be more energy efficient, but by how much and when? Do we spend money on research to develop more efficient electric motors<sup>1</sup> or on pollution control devices for the power plants? Do we build more coal-fired base generating plants with sophisticated and expensive pollution controls (in the hundreds of millions of dollars) or do we build more nuclear plants that do not emit greenhouse gases but have long-term storage problems? Do we build new oil refineries and, if so, where? Do we build them in remote areas that require more pipelines or do we build them in city brownfields that are usually located in poor neighborhoods? Do we drill more oil and gas wells or declare every place off-limits to drilling? Do we let the market place solve the problem or do we have the government "do something?"<sup>2</sup> There will be, at least in the short run<sup>3</sup>, no single magic solution.

My stand on the use of energy, I don't want to be without it! I love driving my car. I want to keep warm in the winter and cool in the summer. I want to watch television and get on the Internet. I hate doing the dishes by hand and I do not even have an outdoor clothesline. So electricity, natural gas and LP and gasoline are very important to me. No brown outs or black outs or long lines for gasoline for me please. I want the prices low and no pollution. I want my cake and eat it too. Most people do.

To illustrate the conundrum we have with energy, the balancing of price, production and pollution, the electrical production industry provides a good case study. The ideal balance of sources would result in low prices,<sup>4</sup> low pollution<sup>5</sup> and high (reliable) production. But how do we judge the cost versus the benefits of each source? On what basis do we measure the effects of one source over another? Is the long-term future storage of nuclear waste worse than the current and continuous emissions of greenhouse gases from a coal fired plant? Is the destruction of the landscape by strip-mining coal worse than the destruction of birds caught in the turbine blades of a windmill farm? We are trying to compare apples to rutabagas or perhaps even apples to aardvarks. Without a standard method to compare the different sources we are vulnerable to hyperbole

from all sides. It causes us to rely more on emotion than on the evidence.

A brief examination of each current source will hopefully provide a background for further discussion. Plus I will provide my prediction for the short-term future of each source.

**King Coal.** Coal-fired plants are very reliable and produce adequate electricity at reasonable consumer prices but produce large amounts of pollutants. We have been building coal-fired plants for over a hundred years. However, they are noisy and "dirty" and no one would prefer to live next door to one. They also emit millions of pounds of gases, particulates and waste heat even with pollution controls. The coal itself has to be mined and transported which requires additional energy use and increased environmental damage. Coal-fired plants would have to be built that are more efficient in the production of electricity with essentially zero pollution<sup>6</sup> and still sell electricity at reasonable prices. Certainly with advancements in the building trades, pollution control technology and computer assisted management, a state of the art facility could be built that meets these goals. However, given the enormous amount of capital required to erect these facilities, the government regulations and the NIMBY<sup>7</sup> factor it would be a challenge.

Predictions: Price - moderately to substantially higher; Production Potential - high; Pollution - moderately lower to even; Chances of occurring - high.

**Nuclear.** When I was a child, nuclear power production was held up as the magic solution to our energy problem. Houses would not even have meters; you would just pay a flat rate for electricity each month. Nuclear plants could still provide an almost unlimited supply of electricity. They produce no greenhouse gases or particulates but generate waste heat. Certain mistakes at the facility can be devastating. They can be built almost anywhere because you do not need a rail line or storage area for coal, but no one wants them in their backyard. The leftover nuclear material is highly dangerous for centuries and requires secure long-term storage.<sup>8</sup> Uranium needs to be mined, transported and processed, but the quantities per BTU produced are substantially smaller than coal. Although the technology is over 50 years old, our ability to build reliable, reasonably priced plants has escaped us. The facility design needs to be standardized as in Europe. The political uproar over nuclear plants doomed them before standardized plant designs could be implemented.

If standardization occurs my predictions are: Price - moderately high;<sup>9</sup> Production Potential - higher; Pollution -

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moderate to substantially lower; Chances of occurring – low to medium.

**Hydroelectric** production is a reliable source of production as long as there is no long-term drought. Consumer prices are among the lowest of all the alternatives. There is no air pollution because nothing is being burned. However, there is environmental damage to the area in which the dam is built and in the flooded area behind the dam. The habitat of local native species is replaced with different habitats. Costs to build these large facilities are substantial. Perhaps the single largest factor limiting hydroelectric production is the limited number of sites available to build additional dams. Also, these sites are not evenly distributed across the country so the problem of distribution arises. Existing sites may be reworked to install more turbines.

Predictions: Price - low; Production Potential - low, Pollution - low to medium; Chances of occurring - low.

**Other Sources.** Most of the other sources such as fuel cells, solar cells, and wind power cannot currently produce the quantity of electricity needed to maintain our current demands. Unless solar cells and windmill generator efficiency is dramatically improved, huge areas of the landscape would be required to produce existing needs. They produce low emissions but what happens when the sun doesn't shine and the wind doesn't blow? Another problem is the sites where the sun shines or the wind blows consistently are limited. Fuel Cells may hold the most promising source in the short term but the most reliable units require some outside fossil fuel and will be most appropriate where the electrical infrastructure does not exist. For a more in depth discussion of these issues read the report "Repowering the Midwest: The Clean Energy Development Plan for The Heartland" produced by a consortium of environmental organizations. Even with their most optimistic scenario, these alternatives appear to have limited short-term applicability.

My predictions: Price - high; Production Potential - low; Pollution - low; Chances of occurring - low.

**Conserving.** We are not going to conserve our way out of this predicament. That does not mean we do not need to conserve. Conservation will reduce the need to build some base generating plants. The conservation of electricity should be a function of the marketplace with some incentive from the government. The other day I was shopping for a refrigerator. The most energy

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Means, Energy and Commerce, and Science. Up to the moment of consolidation of the four bills into H.R. 4 for introduction on the House floor, little in the way of coordination had taken place between the four committees, and participation in the crafting of this legislation had been largely limited to committee members and staff. taken as a whole, the matter of crafting the bills was hurried and muddled at best, and a perfect example of non-transparent governmental process at worst.

Two days before the bill was brought to the House floor, the Northeast-Midwest Congressional Coalition organized an open meeting at which staff from the four committees were invited to talk about their bills to those staff who would soon be advising their bosses on how to vote on the energy bill. It was the only occasion that staff would have to learn about the bill in the form it would be moved on the House floor. More than a hundred and fifty congressional staff came to the meeting, so many that the room had to be changed. Almost immediately, based on the questions asked and the rate at which the few handouts were snatched up, it became clear that the level of understanding among non-committee staff was extremely low. Two days later the bill passed the House of Representatives. Now it awaits Senate action, which will produce a bill that will be extremely different from its companion, based on the philosophical and political differences between majorities in the two legislative bodies.

Energy policy as guided by the federal government has not experienced a significant overhaul since the days of President Jimmy Carter, and the legislative action both then and today was prompted by crises which were largely beyond the immediate control of the Federal Government. This is not to say that it was beyond the reach or responsibility of the Federal Government to solve these crises, or prevent them from happening again. But it is important to bear in mind that their solution is in the hands of non-governmental players as well, and may develop independently of government action in unexpected ways.

The House Committee on Resources passed H.R. 2436, "The Energy Security Act" by a partisan vote of 26-17 on July 10. The House Science Committee passed H.R. 2460 "The Comprehensive Energy Research and Technology Act" by voice vote July 11. The Committee on Ways and Means passed H.R. 2511 "The Energy Tax Policy Act" July 17 in a partisan vote of 24-17, and the Energy and Commerce Committee passed H.R. 2587, by a vote of 50-

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## **Background**

In May of 2001, the National Energy Policy Development Group (NEPDG) issued the National Energy Policy. The policy emphasizes the need to develop a stronger energy infrastructure including the construction of 1,300 to 1,900 new power plants, 38,000 miles of new natural gas pipelines, and 255,000 miles of new electric distribution lines, all by the year 2021.<sup>1</sup> To fulfill the NEPDG plan, electric utilities will need to construct one new power plant a week, every week, for the next 20 years. This would be an overwhelming undertaking, even compared to the 1960's and 1970's when large power plants were springing up all over the country. However, this new policy fails to account for changes in the electric utility industry; changes that may make this energy policy totally ineffective for dealing with our current energy shortages. These changes include increased competition for funding, greater time constraints, and lack of public support.

## **Increased Competition for Funding**

A 1,000-megawatt, coal-fired power plant, built today, would cost about 1.3-billion dollars; a comparable nuclear plant would cost closer to 2-billion dollars. This is a tremendous amount of money, even for a large electric utility. Nevertheless, utilities constructed many plants like this in the past. The vehicle to fund these plants was cheap financing.

Thirty years ago, utilities were considered solid investments, a firm bedrock for anyone's retirement portfolio. As far as long-term investing was concerned,

the stability of the electric utility industry made their financial security second only to that of the U.S. Government. During the 1960's and 1970's, utilities acquired billions of dollars by selling low-interest bonds.

That was then, but what about now? During the 1980's, several large utilities had to walk away from hundreds of millions of dollars invested in unfinished power plants, most of them nuclear. In some cases, these utilities even did the unthinkable and defaulted on their bond payments. To make matters worse, deregulation is the current theme in the electric generation industry. Most electric utilities realize that they will probably be forced to sell off or divest themselves of their generating plants, similar to what happened in California.

This air of uncertainty, combined with the past defaults, has moved electric utilities out of the sure investment category. How many investors want to purchase low-interest bonds from an electric utility, to build a power plant that the utility probably won't even own when the power plant is ready to generate its first kilowatt-hour? Investors may be inclined to hold back when they are considering putting their money into a company that is about to change management, particularly when they can take the same money and invest it in the stock market where long-term annual returns are 12 to 15%. Unfortunately, to meet an aggressive goal of 1,300 to 1,900 new power plants in 20 years, this hesitancy alone could cripple the current energy plan.

## **Greater Time Constraints**

Under the best of circumstances, from the point that an electric utility commits to the time that a plant can produce its first kilowatt-hour, a large coal plant requires seven years to build and a large nuclear plant requires ten years to build. Best of circumstances assumes a firm commitment from the utility, a firm commitment from sufficient investors, all legal and environmental hurdles have been cleared, and the permitting process must be smooth. If this is not enough of a barrier, which utility is ready to commit to a coal or nuclear plant today? To get 1,300 to 1,900 new plants on line over the next 20 years, hundreds of electric utilities need to commit now.

It has been at least 15 years since any electric utility in the United States has seriously considered building a coal or nuclear power plant, and none of them have shown any inclination to step up and be the first. NEPDG has forgotten that utilities are still trying to grapple with their role in the new deregulated market. The time has never been worse for getting their attention focused on the enormous task of building new coal or nuclear power plants, particularly when the utilities realize they probably

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5 July 23. The final, 500-plus page bill passed the House August 2 by 240-189, hard on the heels of several other contentious issues - campaign finance reform, faith-based initiatives, a number of appropriations bills, and the bitter debate over the tax cut. Congress was scheduled to go out of session the next day, August 3.

The point of the chronology is this: in the midst of crisis, perceived or otherwise, is never a good time to craft long-range policy. Even the most sensibly-paced process is prone to exploitation by interest groups on all sides. This is what the democratic process is all about and it is not inherently ill-advised. But charge the legislative climate with a do-or-die sense of urgency, and one immediately renders it vulnerable to bad information and legislative ignorance. The deficit of knowledge, the amount of contradictory information, the lack of even a definition of what “energy security” was, the partisanship, and the pressure to pass an energy bill – any energy bill – on Capitol Hill was overwhelming, and the policy suffered as a result.

- The Resources bill dealt primarily with supply issues, namely offshore and federal lands oil and gas leases, geothermal resources development, hydroelectric power, and the Arctic National Wildlife Refuge. Most of the specifics included orders for studies and inventories of various resources, and royalty relief and other breaks for lessees on federal property. Attempts were made in committee to reduce the royalty relief for drilling language and strike the clause opening ANWR to drilling, which failed in committee and on the House floor.
- The House Science Committee’s bill authorized a range of programs within the Department of Energy for research on alternative fuels and renewable sources, clean coal technology, nuclear research, energy efficient technologies, and other measures to increase fuel efficiency in industry, household use, and transportation. The Science Committee enjoys strong bi-partisanship and the contentious issues were resolved amicably.
- Ways and Means passed a range of tax provisions totaling \$33.5 billion, extending breaks to oil and gas producers in the form of shortened depreciation schedules on equipment and production credits on oil and gas. Additional tax credits were included for solar and fuel cell technology, clean coal technology, and tax credits to appliance manufacturers and companies offering products that make homes or business more energy efficient.
- The Energy and Commerce Committee re-authorized a number of federal and state energy programs, including the Weatherization program and the Low Income Home Energy Assistance Program (LIHEAP). The divisive issue of Corporate Average Fuel Efficiency (CAFE) standards was left as language requiring the Secretary of Energy to plan a way to ensure that cars manufactured between 2004 and 2010 save 5 billion gallons of fuel, and an attempt to enforce this in the final bill as a CAFÉ standard was defeated. Funding was

approved for nuclear research, various nuclear programs, and the storage of spent nuclear fuel and other radioactive waste, and tax credits for clean coal. Language was included requiring a number of studies: of “boutique fuels,” renewable energy assets, increased vehicle fuel economy, and energy conservation in federal buildings, among others.

The stated goals of the energy policy were to meet the nation’s energy needs and establish a long-term program for national energy security. The fundamental question is, when all is said and done, did this happen? Were the goals really served by this legislation? Were the goals even achievable? It still remains to pass an energy bill out of the Senate, and then reconcile the differences between the two bills, which will be substantial. But consider this: energy use in the U.S. is roughly divided between transportation, and everything else. Energy consumption in the transportation sector is mostly fuel from petroleum products. Energy consumption in the “everything else” category is mostly electricity from power plants

The spike in gasoline prices, which led to the declaration of crisis, was due to, the price of oil as dictated by OPEC - over which we have very little control, U.S. sanctions on certain Middle Eastern countries - which are determined by Administration policy, interruption of refinery operations in several parts of the country, regional fuel requirements, and this year’s weather. U.S. oil consumption is such that the production from ANWR will have no impact on prices at the pump, since there is no incentive for domestic producers to undercut the international market price regardless of how cheaply they produce. Drilling was forbidden in the Great Lakes. Such production would have had little impact on oil prices, but natural gas prices may have been affected. The oil and gas industry itself is robust and has been posting healthy profits, largely thanks to OPEC pricing decisions, and will not want to change their behavior much. The tax breaks offered the industry will, therefore, not be passed on to the consumer in the form of lower fuel costs. Prices at the pump itself are more responsive to taxes, output from refineries, and state regulations on fuel emissions which create localized “boutique fuel” markets. Although some attempts have been made in the legislation to help small business oil refiners, the refineries that will have an impact are the larger ones. The number of new refineries built will be independent of energy policy and more tied to environmental regulations and

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won't own these plants by the time they are ready to produce electricity.

Can we ask the people in California to bear with 10 to 20 years of rolling blackouts while we get these new power plants built? What about areas in the Midwest and along the East Coast that are likely to see rolling blackouts in the next few years? It would be easier to ask people to get rid of their fax machines, email, and pagers, and return to a time, not so long ago, when we all thought it was okay to wait several days to receive information on urgent matters. Patience is not a virtue in the new economy, particularly when it comes to our needs for reliable energy.

### **Lack of Public Support**

During the 1980's many electric utility CEO's didn't even mention the possibility of building a large nuclear power plant without risking a severe plunge in their company's stock value. Although we can argue about what the actual public health effects were from the accident at Three Mile Island, we do know one thing, it led to a complete halt in the construction of new nuclear power plants. NEPDG seems to gloss over the public support issue. They even call for an executive order granting authority to obtain rights of way for electricity transmission lines.<sup>1</sup> This type of nostalgic thinking brings back memories of the days when you did what government told you for your own good. However, in our current day, just suggesting such a facility brings the power of Not-In-My-Backyard (NIMBY) to light. Consider the following official response to the NEPDG suggestion to expand drilling operations off the Florida Keys:

“As a result, there will be no new drilling in the Lease Sale 181 Area off the coast of Florida under my watch. Due to our efforts, any lease sales that do occur in the 181 area will occur off the coast of Alabama, not Florida...No lease sale will occur within 100 miles of Florida, no matter how you draw the line.”<sup>2</sup>

This response is published on the Governor's Web Page, State of Florida, and was made by Jeb Bush, Governor of Florida and brother of President George W. Bush.

If government forces this issue, an enlightened public can easily hamper their effort by suggesting something like building a new 3,000-megawatt, coal-fired power plant in Kennebunkport, Maine. Kennebunkport is a well-known tourist center located on Maine's scenic coast. It is also the home of President Bush's mother, former First Lady Barbara Bush.

From a technical standpoint, siting a plant in Kennebunkport makes a lot of sense. The plant would have an almost unlimited supply of cold water from the ocean, critical to maintaining maximum plant efficiency. In addition, the plant could be fed a continuous stream of coal from ocean-going barges arriving day and night; therefore, no new railways would be needed. Best of all, the prevailing winds would send stack emissions out to sea and away from any inhabited areas. As NEPDG suggests, this new plant would use the latest in air pollution control technology including 700-foot high stacks topped with strobes to warn-off low-flying aircraft. These strobes would be visible day and night and provide a landmark that would be visible for miles in all directions. Whenever tourists in Kennebunkport felt they had gotten away from it all, this landmark power plant would assure them otherwise. In addition to losing tourist dollars, residents in Kennebunkport would not rest easy knowing this new plant, and a few new transmission lines running down the coast, would provide abundant electric energy to people as far away as Boston and New York.

The technology to build better, cleaner, more efficient power plants has always been here, but public support fell away during the 1980's. Without public support, the thriving power industry turned away from building new power plants for 15 years. Even the utility industry, which is conservative by nature, learned the hard way that you can't fight the power of NIMBY.

### **Is Natural Gas the Silver Bullet?**

According to the NEPDG, most of these problems can be easily managed by turning to one energy resource: natural gas. Power plants fired with natural gas are cleaner, don't require extensive permitting, and can be built in just a few years. Natural gas is a clean fuel that is relatively easy to pipe from one location to another and has been used as a primary fuel source for decades. For these reasons, electric utilities that are building new power plants, are fueling them with natural gas. One went on line in California last month, the first new power plant in that state in over a decade, and several combined-cycle, gas-fired power plants will be built by other western utilities over the next few years. It almost makes us wonder why there is a problem in the first place. With such a clean, cheap, and proven technology readily available, does an energy crisis exist at all?

Unfortunately, you don't have to go any further than the NEPDG report to see what the next crisis will be. According to their report, natural gas consumption will increase by well over 50% while demand for electricity will rise by 45% over the next 20 years<sup>1</sup>. This increase

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the health of the economy.

Attempts to address the price of gasoline from the demand-side (i.e., the consumer) are limited in their extent in the House Bill and, as a group, unlikely to create incentives to bring new cars to the market that will save the average car-driver money anytime soon. Is this fuel security? Will this benefit the general population? The Great Lakes region is very much beholden to the auto industry, and that industry lobbied heavily against more stringent CAFÉ standards because foreign automakers already have a head start on fuel-efficient vehicles. It remains to be seen whether the jobs saved by this measure offset the billions of dollars that could be saved in fuel costs, and the forced modernization of the industry which would render its products more attractive to budget-conscious customers both at home and overseas.

The problems confronting the generation and distribution of electricity will be similarly difficult to solve and were not fully addressed in the House Bill. Many of the problems and solutions have and still are being developed at the state level, the example of California springing irresistibly to mind. The “deregulation” or “restructuring” of state electricity markets has provided many fascinating and instructive lessons in what is possible and what is dangerous. Even Texas had price spikes in its deregulation pilot project, despite being a net electricity exporter. As always, the federal government has a role to play in policy by opening markets and paying for the capital costs of improving transmission and distribution networks. Part of this has been addressed in the House Bill from the production side, with the active promotion of nuclear, coal, and some alternative production means. The transmission and distribution side of the equation will manifest itself in a separate bill which will be introduced later this year, probably in September, by the House Energy and Commerce Committee. The issues of who will pay for the repair and construction of aging electricity infrastructure, federal domain and rights-of-way issues, and broader access to the grid will be addressed. Although these are contentious points and it is not clear how the bill will fare in Congress, there will probably be more time for congressional staff to become acquainted with these highly technical issues before passage of a better bill. It is certain that they will have a lot of unfamiliar material to absorb and understand in the meantime.

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in natural gas assumes much of the new electric generating capacity comes from coal and nuclear. If we rely on 1,300 to 1,900 new power plants that burn natural gas to produce electricity, could we be rapidly heading toward a crisis consisting of natural gas shortages? Didn't we just go through a winter where natural gas prices doubled and tripled in value while stockpiles ran dangerously low?

### **The Next Generation of Power Plants**

Although NEPDG may be optimistic about the opportunity to build new power plants, like the old days, they did recognize the enormous improvements that we have made in energy efficiency since those days. In their report, they state that our economy has grown by 126 percent since 1973 while our energy use has increased by only 30 percent.<sup>1</sup> This is an outstanding accomplishment. Imagine what would have happened if our energy consumption had remained constant while the economy tried to grow by 126 percent. Clearly, our economy would have reached a watershed where growth would have slowed or stopped in response to inadequate energy supplies and excessive energy cost. Fortunately, until recently, this watershed did not occur, thanks to our ability to use energy more efficiently.

One approach that can substantially increase energy efficiency, without relying on expensive technologies, is distributed cogeneration. Small cogeneration plants can meet both electric energy and heating demands with typical overall energy efficiency between 65 and 75%. A properly sized cogeneration plant, located in a facility with year-round heating demand, can operate at 80% efficiency. Compare this to an electric power plant fired by natural gas that can achieve, at best, 49% overall efficiency. With line and transformer losses, this ends up being only 45%, substantially less than the overall efficiency of a typical cogeneration plant.

Cogeneration systems are readily available in a number of technologies including reciprocating engines, steam generators, combustion turbines, and fuel cells. Other than fuel cells, which are still expensive, the other technologies can be purchased and installed for less than \$1,000 per kilowatt of electric output which is certainly less than a coal or nuclear plant. Central combined cycle power plants can be built for about one-half of this cost; however, when you add in the cost of distribution, de-centralized cogeneration is cost competitive to build. In addition, these systems can be on-line within months of being ordered, not requiring years to build.

Another advantage of cogeneration is the smaller profile of these facilities. In most cases, they can be built

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inside existing commercial and industrial facilities without public review: Out of site and out of mind. With the higher fuel efficiency, these plants are environmentally friendly since they will allow us to decrease our dependence on fossil fuel along with the resulting air pollution. Furthermore, since they operate close to industrial processes, they can frequently burn hydrocarbon emissions and combustible toxins, effectively turning a source of pollution into fuel. These distributed facilities can also provide greater stability since electric power is being generated at the source and does not require the construction of additional power lines.

### **A New Role for the Electric Industry**

For the past 30 years, cogeneration has been shunned by the electric utility industry. Regulated electric utilities must provide reliable electric energy to everyone in their service territory. These utilities can recoup the cost of this service if they have a captive market. However, once a customer in their service territory builds a cogeneration plant, the electric utility has to cope with a wild card. When the cogeneration plant runs, the customer takes some or all of their electric energy from the cogeneration plant, robbing a utility of its ability to recoup the cost of building and maintaining their own plants and lines. However, when the customer's cogeneration plant is off-line for maintenance, the customer falls back on the utility, expecting them to deliver whatever electric power the customer needs.

Electric utilities have developed special electric rates for customers with their own cogeneration. These rates allow the utility to charge higher fees for any electric power taken from the utility, usually in the form of a demand ratchet, and to assess ongoing standby charges whether electric power is taken or not. While this structure does allow utilities to recoup their costs for acting as a standby source of energy, it typically leads to an excessively long payback for building a cogeneration plant. Therefore, even though cogeneration is cheaper and faster to build than comparable central plant capacity and runs at a better fuel efficiency, the life-cycle cost of cogeneration is made unattractive by a built-in electric utility penalty.

The answer may be to let electric utilities do what they do best: Build and operate electric generating facilities. However, instead of building them as expensive, centralized plants located far from population centers, build and operate them as small cogeneration plants located at their points of use. Most of the commercial and industrial clients I have worked with are enthusiastic about this idea. With cogeneration, they

are assured of a firm, local power source that is largely immune from regional disruptions. This is particularly attractive in an age where firm computer power is always a first priority. Nevertheless, most of these clients are not interested in going into the power business, but prefer their local utility take the lead.

Advantages for the electric utilities are obvious. They won't need to raise large amounts of capital, go through long and painful permitting processes, be bothered by NIMBY, build new transmission lines, or lose large customers to deregulation and can charge for electric energy and waste heat.

Advantages to the environment are an increase in overall energy efficiency, a reduction in air emissions and thermal pollution, saving valuable land that would have been needed for new plants and distribution lines, and a reduction in oil and gas drilling. Another untapped opportunity is the ability to combine cogeneration with renewable energy. As new technologies develop, cogeneration plants can be combined with small renewable energy systems. These systems may extend the life of the cogeneration plant by reducing its operation when adequate solar or wind energy is available or offsetting natural gas consumption by harvesting landfill gas or other biomass as a fuel source. Eventually, when the cogeneration plant is beyond its useful life, it can be replaced by an energy storage system, making all site power generated through renewable resources.

In summary, a heavy reliance on new cogeneration, not new centralized power plants, is the answer to numerous dilemmas that have plagued the electric utility industry for decades. We need to evolve the industry from one of me against you, as typified by the following quote from Governor Jeb Bush:

"In deference to states' rights, the Administration does plan to allow a more remote portion of the 181 sale to proceed, thereby diminishing the potential for retaliatory actions by neighboring oil and gas producing states against Florida."<sup>2</sup>

In contrast, the industry standard must become one of extensive cooperation with consumers. Energy is something we all need, it is vital to our prosperity and security. And, we all have to take responsibility for its production, generation, and distribution. It is time to bring electric utilities back into the fold as true partners in the energy industry as well as find ways to do more with less energy.

### **References**

1. National Energy Policy Development Group, National Energy Policy, May 2001, Superintendent of Documents, U.S. Government Printing Office, Washington D.C.
2. Statement by Governor Jeb Bush Regarding Lease Sale 181, July 2, 2001. Governor's web page, State of Florida.
3. Arthur D. Little, Inc., Distributed Generation: Understanding the Economics, 1999 White Paper.



*(Generation—Continued from page 1)*

commercially available power generating technologies today. The average level of efficiency for conventional electrical generation technologies is 33 percent. The most efficient electricity-only generation is 55 percent efficient at best. However, new and innovative technologies exist today that can reach efficiency levels in excess of 80 percent. Before looking to future prospects for power generation, let us review the current state of power generation in the Great Lakes Basin. Table 1 (see page 12) provides an overview of the electric power industry for the states of the Great Lakes Basin. Coal is the primary fuel source for all of the states with the exception of New York, where natural gas is the dominant fuel source.

The Energy Information Administration (EIA) documents electricity generation, capacity, fuel source, and other information at the state, national and international levels. In addition to documenting the total generating capacity of electric power utilities, the EIA provides public information based on fuel sources and on the largest individual electric power plants in each state. This offers a glimpse into the energy infrastructure of the utility sector by providing the ages of the largest power plants and the average age of the plants by fuel source. Apparent in the figures from Table 1 is that the energy infrastructure that comprises the Great Lakes Basin is aged. As the infrastructure becomes older and older, opportunities abound for the introduction of new and innovative technologies to replace or augment the power needs of the region.

One very clean, environmentally friendly and energy efficient method is by employing combined heat and power (CHP) technologies and applications. Combined heat and power (CHP) technologies produce both electricity and steam from a single fuel source in a facility located near the consumer. These efficient systems recover and utilize waste heat and save fuel that would otherwise be needed to produce heat or steam in a separate unit.

CHP systems can reach energy efficiency levels in excess of 80%, well above the 33% average for conventional electrical generation technologies. Even the newest and most efficient electricity-only generation is 55% efficient at best. CHP systems achieve greater efficiency because they:

- Recover heat that would normally be wasted in separate power production.
- Save the fuel that would otherwise be used to produce heat in a separate appliance.
- Locate the electric generation near the load, thus avoiding energy losses from electricity transmission (which can exceed 10% of the energy produced).

CHP units reduce the need for costly pollution control equipment that would otherwise be needed for conventional power generation. The local nature of CHP reduces:

- Demands on overburdened electric transmission and distribution systems.
- Environmental impacts of siting new transmission and distribution wires.
- Interruptions in critical power needs that can result from incidents on the grid.

CHP is utilized internationally to supply countries like Sweden and Denmark with the majority of their power needs. Although CHP use is lower across the U.S., growing power constraints and regulatory restructuring are opening the door to more highly-efficient energy technologies and systems. CHP has been in existence since Thomas Edison's day, but it is underutilized today, due in part to regulatory and financial barriers.

The National Energy Policy Development Group has highlighted the need to capture and reuse the waste heat produced from the generation of electricity, which is what CHP systems do. Efficiency ratings from large central power plants have been stagnant for decades at 30 and 35 percent. Transmission and distribution line losses add an additional 5 to 10 percent reduction in efficiency. The reality is that the U.S. wastes more than 2/3 of its electricity production and the Basin is no different. Air pollution levels are much higher as a direct result of this failure to productively recycle waste heat.

Fortunately, that wasteful way of thinking about energy production and use is changing. Today, both climate change concerns and greater efficiency demands are driving the implementation of more on-site energy generation. By using the recycled thermal load to produce electricity, heat, and cooling, efficiency levels reach in excess of 80%, and provide the parallel benefit of reducing harmful emissions.

With increased on-site energy production, there also is less need to build transmission and distribution (T&D) lines across populated areas, and stress on the existing T&D system is reduced. In fact, where appropriate, CHP systems can return energy to the T&D grid, bolstering its reliability. Where CHP is utilized, it can replace or supplement energy sources realized from fossil fuels, further reducing greenhouse gas emissions to the atmosphere. Moreover, in emission-constrained areas of the region, CHP systems, which have significantly lower emissions, can make redevelopment

*(Generation: Continued on page 10)*

*(Energy: the Balance: Continued from page 3)*

efficient refrigerators are found in the top of the line models. However, not all top of the line models were energy efficient. For almost the same money, you could buy a refrigerator that was almost twenty-five percent more efficient. You would be foolish to pay the same money for a refrigerator that uses more electricity. However, most people either do not pay attention or cannot afford to pay for the efficiency “up front.” Should there be a mandated level of efficiency for appliances similar to the requirements automobile manufacturers have for mileage requirements? Should the government give you a tax break if you buy more energy efficient appliances? Should we sell only florescent or other highly efficient but more expensive light bulbs? Should there be a tiered rate level? Instead of getting a price break for using larger amounts of electricity (in the commercial/industrial sector, large users of electricity can negotiate price breaks with the electric companies) the price break would be given if less electricity were used.

My predictions: Price - medium; Production Potential - low to medium; Pollution - low; Chances of occurring - medium to high.

What mix do you choose? I pick coal-fired plants with a mix of nuclear facilities combined with conservation. I would also encourage the continued research of other sources. You shouldn't put all your eggs in one basket.

1. Most of our machinery and appliances are driven by electric motors. Even a slight increase in efficiency would save substantial amounts of electricity.
2. Such as initiating an energy tax to lower demand.
3. The next fifty years.
4. I consider price as the net cost of production including off-site costs such as pollution and ecological destruction. For example, the consumer price of electricity from a particular source may be high but it is off-set by the reduction of other costs to the consumer such as a reduction in medical costs. A low consumer price may be the result of high pollution and environmental damage, so the net price is high.
5. The term pollution covers a wide variety of items from direct air and water pollution by the production facility itself to pollution caused by mining coal, storing wastes, building the facilities and the transmission facilities themselves.
6. While improved “scrubber” technology may reduce stack emissions to essentially zero, you still have the problem of disposal of the scrubbed products and the ash from the coal mixtures. If this is not recycled into the manufacturing stream, it has to be landfilled.
7. NIMBY – Not In My Back Yard.
8. This time period may, and probably will, be substantially reduced with advancements in technology over the next one hundred years.
9. The price of electricity with a standard design and efficient regulatory process would result in lower prices but the storage and decommission cost would raise these prices.

*(Generation: Continued from page 9)*

more attractive.

As additional electrical generation capacity is needed and aging infrastructure must be replaced, energy-efficient onsite generation is a positive answer to the energy, environmental needs and power transmission constraints for the Great Lakes Basin.

Sources:

Northeast-Midwest Institute, [The Clean Air-Innovative Technology Link: Enhancing Efficiency in the Electricity Industry](#), 1999.

U.S. Combined Heat and Power Association, Fact Sheets and Reports, [www.nemw.org/uschpa](http://www.nemw.org/uschpa).

Energy Information Administration, US DOE.

Office of Power Technologies, Energy Efficiency and Renewable Energy, US DOE.



## **National Water Crisis: A Great Lakes Response**

November 1 & 2, 2001  
The University of Toledo  
College of Law Auditorium

Thursday, November 1

### **Reception & Dinner**

Keynote Speaker

Friday, November 2

### **Welcome and Introduction**

*Dean Phil Closius* University of Toledo College of Law

**Kick—Off Speech – Hon Robert Taft, Governor, Ohio**

#### **Panel 1:**

### ***Federal Power and the Growing Influence of the Sun Belt in Congress***

Moderator: *Prof. Robert Abrams*, Wayne State Univ. School of Law  
Speakers:

*Hon. Marcy Kaptur*, Member Congress Ohio

*James S. Lochhead*, Esq.

Brownstein, Hyatt, Farber & Strickland — Denver, Colorado

#### **Panel 2:**

### ***The Economics of, and the Demand for, Clean Water***

Moderator: *Prof. Daniel Tarlock*, Chicago Kent School of Law

Speakers:

*Patricia Mulroy*, General Mgr., Las Vegas Valley Water District

*Jack Lindsey*, CEO, Sunbelt International Inc

### **Lunch & Keynote Speech**

*Senator George Voinovich*, Ohio

#### **Panel 3:**

### ***Existing Interstate Compacts: The Law and The Lessons***

Moderator: *Prof. Mark Squillace*, University of Wyoming

Speakers:

*Richard Cairo*, General Counsel, Susquehanna River Basin

*Jeffrey Featherstone*, Immediate Past Deputy Director, Delaware River Basin

*Gerald E. Galloway, Jr.*, Secretary U.S. Section, International Joint Commission

#### **Panel 4:**

### ***Regulating Diversions – Negotiating an Interstate Compact and the Issue of Sustainability***

Moderator: *Prof. Sandra Zellmer*, University of Toledo College of Law

Speakers:

*Russell Van Herik*, Exec. Director, Great Lakes Protection Fund

*Samuel W. Speck*, Director, Ohio Dept. of Natural Resources

*Michael J. Donahue*, CEO, The Great Lakes Commission

### **Closing Speech**

*Senator Mike DeWine*, Ohio

# Brownfields: A Great Lakes View

April 18 & 19, 2002

LIGL's Spring Environmental Conference will explore the use and reuse of brownfields in the Great Lakes Basin. Please join us at the SeaGate Centre in Toledo, Ohio for an indepth discussion of the issues.



**ELECTRICITY PROFILES OF THE STATES FROM THE GREAT LAKES BASIN**

	Primary Fuel	5 Largest Plants	Age of Plants	Average Age	Generating Capacity MW	% Coal and Nuclear	CO2 Emissions 1000 short tons
IL	Coal	1 gas 3 nuclear 1 coal	21 13/10/14 28	31	30,367	44% coal 32% nuclear	87361
IN	Coal	All Coal	23/14/22 3/1/43	25	20,337	86% coal	121,905
MI	Coal	1 coal 1 nuclear 1 hydro 2 multi-fuels	29 23 25 39/45	30	21,943	48% coal 16% nuclear	80,164
MN	Coal	3 coal 2 nuclear	22/40/40 24/2	27	9,089	56% coal 16% nuclear	37,773
NY	Gas	3 coal 1 hydro 1 nuclear	35/40/31 37 29	36	29,585	11% coal 14% nuclear 15% hydro	64,048
OH	Coal	All Coal	24/29/39 4/1/31	29	26,768	86% coal	133,274
PA	Coal	2 coal 3 nuclear	22/29 12/24/15	31	33,781	48% coal 25% nuclear	129,324
WI	Coal	4 coal  1 nuclear	18/39/23/ 4 7	28	11,863	56% coal 12% nuclear	49,092

Source: State Electricity Profiles 2000, Energy Information Administration, US DOE 1998 data.



**Acid mine drainage**



**Longwall coal mining**



**Yucca Flats: site of proposed nuclear storage facility.**



(Drilling: Continued from page 1)

largest body of freshwater outside of the polar ice caps. They contain eighteen percent of the world's freshwater supply and their basin is home to more than 34 million people. The future of the Great Lakes lies in our hands, so I ask you: is drilling beneath the Great Lakes for oil and gas worth the risk?

I say, NO.

Michigan began directional drilling for oil and gas deposits beneath the Great Lakes from onshore wellheads in 1979. Thirteen wells have been drilled and seven are currently active. Five wells are located under Lake Michigan in Manistee County and two wells under Lake Huron in Bay County.

Over the past 22 years, these seven wells beneath Michigan's Great Lakes bottomlands have produced 17.7 billion cubic feet of natural gas and 438,000 barrels of crude oil. After 22 years worth of oil and gas extraction, these wells have not produced enough energy to fuel our needs for even one day in the U.S. In fact it accounts for only 28.5% of natural gas and 2.2% of crude oil consumed in a single day in the U.S. This small amount is only a drop in the energy bucket – and shows that drilling beneath the Lakes is not the solution to the U.S. energy crisis.

There are inherent risks and problems with directional drilling, these risks are:

- *Hydrogen sulfide release.* Hydrogen sulfide or “sour gas” has effects similar to cyanide; high concentrations can kill a person within a matter of seconds. In 1996 and 1997, residents of Manistee were hospitalized after releases of hydrogen sulfide gas. A few residents were totally and permanently disabled with a decrease in life expectancy.
- *Oil spill.* It only takes one quart of motor oil to contaminate 250,000 gallons of water and to create a 2-acre oil slick.
- *Water pollution.* Pollution by oil and gas can have far-reaching effects on local tourism, agriculture, fishing, recreation activities, and drinking water sources.
- *Groundwater contamination.* An accidental spill at a well-head on a sandy shoreline can contaminate groundwater quickly, because sand acts as a good conduit of fluid.
- *Fragmentation of the shoreline.* Oil and gas infrastructure (i.e., roads, pipelines, and transmission lines) disturb the shoreline and alter the normal patterns of the local wildlife population.
- *Aesthetic impacts.* The smell, noise, and interference of views created by the well-heads can be just as

undesirable as a hydrogen sulfide release.

- *Lack of state regulation.* Citizen complaints take an average of 580 days to receive an initial response from the Michigan Department of Environmental Quality.

As a matter of law, the states hold Great Lakes bottomlands and water in trust for the public good. (*Illinois Central Railroad v Illinois*, 146 US 387 (1892); *Obrecht v National Gypsum*, 361 Mich 399 (1960); *People v Broedell*, 365 Mich 201, 204-205 (1961); *People v Babcock*, 38 Mich App 336 (1972).) There are very few exceptions to the public trust doctrine which would allow the states to exploit, dispose of, or allocate our Great Lakes bottomlands and water. (*Illinois Central* and *Obrecht*, supra.)

Even Michigan statutory and case law do not allow small incremental “trifles” in our bottomlands and water. (*Obrecht*, supra.) In fact, Michigan law provides for even greater restrictions when the “trifles” are for financial gain such as oil and gas exploitation. This is true even when leasing our bottomlands is for a valid public interest. Still, the Courts have ruled that the compensation received by the state should be in addition to and not as replacement of the public trust doctrine. (*The Great Lakes Submerged Lands Act*, MCL 324.32501, *et seq.*; *Illinois Central*, supra.)

So when the State of Michigan chooses to drill beneath the Great Lakes in return for 1/6th of the royalties at each well site, the State cannot justify its violation of the public trust doctrine by placing the royalty money into the Michigan Natural Resources Trust Fund.

The State of Michigan is proposing to lease up to 30 additional well sites for drilling under the Great Lakes. The 30 new wells could bring in \$50-100 million dollars in new revenue for the Natural Resources Trust Fund, but at what expense? Assuming production levels consistent with the seven active wells, the total lifetime production from these new wells would only be able to fuel the U.S. for less than a day and a half. Is it worth the risk? Is it worth breaching the public trust?

In the Great Lakes region, the public has been outspoken in opposing new drilling. Public polls show that opposition by Michigan voters ranges from 59% to 74%. Elected officials like myself have spoken out about drilling to ensure that the people's voices are heard. The list of public officials who oppose drilling continues to grow. It includes Governor Taft of Ohio, all six candidates for Governor of Michigan, the International Association of Great Lakes and St. Lawrence Mayors, the Great Lakes Resources Committee of the Chippewa-

(Drilling: Continued on page 14)

(Drilling: Continued from page 13)

Ottawa Resource Authority, and the U.S. Congress. The U.S. Senate and House of Representatives each passed amendments to halt Great Lakes drilling this year.

Is the federal government overstepping its role? No.

First, the Great Lakes are defined as a navigable waterway and fall under the jurisdiction of the Commerce Clause, found in Article 1, Section 8 of the U.S. Constitution. The Commerce Clause reserves to the federal government authority to regulate interstate commerce.

The Great Lakes also border eight U.S. states and two Canadian provinces. The Compact Clause of the U.S. Constitution, in Article 1, Section 10, clearly states that “No State shall, without the Consent of Congress...enter into any Agreement or Compact with another State, or with a Foreign Power...” The federal government, through the Congress, must approve any interstate or international compact, and therefore, the federal government plays the role of arbiter internationally and domestically between the states and provinces.

Finally, federal legislation beginning with the 1899 *Rivers and Harbors Act* (33 USC 403), the 1972 *Clean Water Act* (33 USC 1342), and the 1990 *Oil Pollution Act* (33 USC 2701) clearly demonstrate a long history of the federal government asserting its regulatory responsibilities over the states regarding interstate waters, interstate commerce and navigable waterways.

The federal and state roles are each subject to the public trust doctrine. The land belongs to the people, and must be used in the best interests of all the people, not just the producers and extractors of natural resources. The people of Michigan have explicitly told the state that they are against drilling beneath the Great Lakes.

It does not make sense or serve the public interest to put



Canadian Hydroelectric Facility in the Great Lakes Basin



**A natural gas powered bus runs cleaner, and reduces pollution in urban areas.**

the Great Lakes at risk and then to try to justify the decision by dedicating a small portion of drilling royalties to protect other natural resources.

We are blessed with an abundance of fresh water and some are willing to jeopardize it for a drop of energy. The trade off is not worth the environmental risk and the breach of the public trust.



**Can we grow our own fuel? Modified soybean oil can be blended with refined petroleum diesel fuel to extend the supply of the fuel used to transport most of our manufactured goods. Diesel powered engines are used in trucks, trains, farm equipment, construction equipment and ships.**

# Websites of Interest

**Congressman Bart Stupak's website:** <http://www.house.gov/stupak/>

**CENTER FOR ENERGY AND ENVIRONMENTAL POLICY** <http://www.udel.edu/ceep>

**Great Lakes Alternative Energy:** <http://www.greatlakes-energy.com/>

**Touchstone Energy:** [http://www.touchstoneenergy.com/content\\_partners.html](http://www.touchstoneenergy.com/content_partners.html)

## **Electricity**

Shopping for Electricity? All of you have heard of restructuring or deregulation in the electric industry. Some of you may have already been approached with "Are you tired of high electric bills?"

<http://www.uwsa.edu/capbud/nrg1.htm>

**New U.S. Electric Generating Units by Operating Company, Plant, and Month.** <http://www.eia.doe.gov/electricity/epm/epmt01p5.htm>

## **American Coal Foundation**

Sells educational materials and videos about the coal industry for students and teachers. Find science fair ideas, a coal quiz and links.

<http://www.acf-coal.org/>

## **Electricity Journal**

Industry news and policy analysis for subscribers. With free access to a request-for proposals database.

<http://www.electricity-online.com/>

## **US Department of Energy**

Govt agency promotes efficiency and alternative energy sources. Search the database, or find technical, scientific, and policy information.

<http://www.doe.gov/>

## **Energy in the Great Lakes Region**

<http://www.great-lakes.net/econ/busenvt/energy.html>

## **Nuclear Energy Institute**

Access nuclear facts and quotes, environmental preservation information and details about careers and education in nuclear energy.

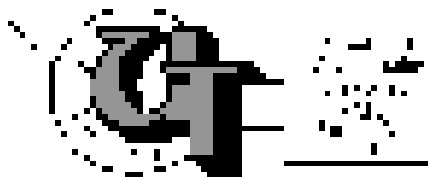
<http://www.nei.org/>

## **Natural Gas Information and Education Resources**

An overview and introduction to natural gas, and look through the Glossary of Terms. Includes a bibliography and guide to associations.

<http://www.naturalgas.org/>

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