

State Laws Based on Obsolete Technologies Restrict Cogeneration

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Power entrepreneurs are often prevented from installing energy efficient technology because of state laws that are based on obsolete technology or other unrelated factors. These rules may have been passed originally to ensure public safety or may have been proposed by labor unions to preserve existing jobs. Many of these rules have been made obsolete by new technologies and need to be repealed or severely modified. Here are some examples drawn from a much longer list.

Example #1. State Law Blocking Efficiency

In 1899, Massachusetts passed a law that required every steam turbine fed by a 1 3/4-inch or larger steam pipe to have a licensed operator present in the same room 24 hours per day. The technology was in its infancy, and thought to be potentially dangerous. There were no computer controls nor even any computers to shut down the machine in the event of a problem, and there was little experience. Ninety-nine years have passed. Today, mass produced back-pressure turbine generators can be installed in buildings to reduce the pressure of district steam. They convert 97% of the energy in the heat they remove to electricity.

Counting boiler efficiency to make the extra steam, these units have a fossil fuel efficiency of 80-82% fuel to electricity—2.5 times the national average efficiency of generating electricity. They could save a lot of carbon dioxide and money. A 100-kilowatt turbine that could save \$20,000 per year, and that is allowed to run without operators in 49 other states, is required by Massachusetts law to have a full time opera-

tor. Obviously no efficient small back-pressure turbines are installed in Massachusetts.

In late 1997, when the Massachusetts legislature passed new laws to deregulate electricity, they slightly modified the 1899 law to allow the licensed operator to be out of the room as long as he or she was on the premises. This small change of law will change nothing else as the cost of that operator exceeds the savings from installing these efficient devices. There are no remaining safety reasons to mandate operators on small steam turbines. If unattended operation is so dangerous, where is the smoking gun of personal injury in the other 49 states? There is no history of safety problems.

Example #2. Making an Example of MIT

When some organization or institution does try to improve its energy efficiency by combining the generation of their heat and power, and they stop purchasing all of their electricity from the local monopolist, the barriers to efficiency come into play with awesome force. The Massachusetts Institute of Technology increased its efficiency by installing a highly efficient 22-megawatt cogeneration plant. However their ensuing experience put a chill on efficient combined heat and power everywhere. The entire story is reprinted below from the NE-MW Economic Review of March/April 1998.

The Massachusetts Institute of Technology (MIT) in 1985 began to consider generating its own electricity for a variety of reasons. With its students now using PCs, stereos, hair dryers, and toaster ovens, the university faced soaring electricity cost from the local utility, Cambridge Electric Company (CelCo). Many of MIT's world class research projects also could be ruined by power quality problems or service interruption. Also, MIT's steam-powered heating and cooling system, which included 1950's-vintage boilers that burned fuel oil, was a major source of local air pollution.

The university selected a 22-megawatt combustion-turbine-based, natural gas-fired, CHP system. The system was to be 18 percent more efficient than generating electricity and steam independently. It was expected to meet 94 percent of MIT's power, heating, and cooling needs, and to cut annual energy bills by 40 percent. MIT expected to recoup its investment in less than seven years.

MIT's first major hurdle was in obtaining the environmental permit needed before construction could begin. Because it retired two 1950's-vintage boilers and relegated the remaining boilers to backup and winter peaking duty, the CHP system would reduce annual pollutant emissions by 45 percent, an amount equal to cutting auto traffic in Cambridge by 13,000 round trips per day. Despite these substantial emissions savings, plant designers had problems meeting the state's NO_x (nitrogen oxides—a smog precursor) standard. The state's approved technology for meeting that standard—which was designed for power stations more than ten times larger than MIT's generator—was expensive and posed a potential health risk because of the need to house large amounts of ammonia in the middle of the campus. MIT appealed and won by performing a sophisticated life-cycle assessment that showed its innovative system had lower net emissions than the state-approved technology that vented ammonia.

Although MIT overcame the environmental hurdle and completed construction in September 1995, the story wasn't over. MIT had the misfortune to leave the grid just when Massachusetts was restructuring its electric utility industry. The Massachusetts Department of Public Utilities (DPU) approved CelCo's request for a "customer transition charge" of \$3,500 a day (\$51.3 million of year) for power MIT would not receive. MIT appealed the ruling in federal court—arguing that it already was paying \$1 million per year to CelCo for backup power, and that for ten years CelCo had been informed of the university's plans and could have taken actions to compensate for MIT's self generation, and that the utility's projected revenue loss was inflated. But the judges ruled they did not have jurisdiction. MIT then appealed to the Massachusetts Supreme Judicial Court, which in September 1997 reversed DPU's approval of the customer transition charge, remanded the case for further proceedings, and stated that no other CelCo ratepayers contemplating self-generation should have to pay similar stranded costs.

In the meantime, the state's proposed restructuring legislation could have raised the amount that MIT would have had to pay for leaving the system to as much as \$6.5 million. Fortunately for the university, the Massachusetts law exempted CHP generators from

an “exit charge,” or non-bypassable transition charge paid by anyone who leaves the system.

Although MIT now has a CHP system—which is saving money and reducing pollution—the university’s experience demonstrates the substantial efforts that have been needed to overcome regulatory barriers to efficient combined heat and power plants. MIT was a major research institution ready to fight, but most heat and power users would have had neither the financial resources nor technical expertise to surmount these barriers.

Example #3. State Law Blocking Efficiency

Many states still have laws requiring licensed operators for any power plant with steam pressures above 15 pounds per square inch, based on the safety technology of the 1930’s. New computerized control technology makes these laws obsolete. For the past 20 years, France has allowed power plants without operators, providing they have redundant safety controls. France has not experienced safety problems. The state laws requiring full time operators discourage combined heat and power plants from using small scale combined cycle technology, since the needed steam pressure forces the owner to add needless operators around the clock. Numbers illustrate the point. If the total cost of a licensed operator, including social security, insurance, vacations and pension, is \$50,000 per year, the rule forces adding costs of \$250,000 per year. Taking account of vacations and sick leave, one must employ 5 people working 40-hour shifts to cover a facility 24 hours per day, 7 days per week.

Example #4. State Law Blocking Efficiency

Some states require siting approval by the Public Service Commission for any new power plant, regardless of size. For example, Trigen currently seeks to build a relatively small 4-megawatt power plant inside its downtown Baltimore steam production plant, which would dramatically improve efficiency and reduce carbon dioxide. There is, however, a legally required siting review by the Maryland PSC that could take up to 18 months. It is quite likely that the commission will approve, but a goodly amount of fuel will be needlessly wasted during the 18-month review period.

This law was clearly intended for regulation of the typical mo-

nopoly utility plants that range from 200 to 1000 megawatts but it is applied equally to small on-site plants. If any consumer chooses to install a heat-only boiler plant of any size that is inherently inefficient, no siting review is required. If that same consumer chooses to install an inherently efficient combined heat and power plant, many states will require a siting review. How do these rules protect the public? There is no logic to this—it is yet another barrier to efficiency, based on the central generation paradigm.

[This is an excerpt from the paper: Barriers to Deploying More Efficient Electrical Generation and Combined Heat and Power Plants—Analysis of benefits from removing or improving rules that hinder efficiency. It is also part of a new book published by Prometheus Press entitled Turning off the Heat—Why America Must Double Energy Efficiency to Save Money, and Reduce Global Warming. ISBN 1-57392-269-2

ABOUT THE AUTHOR

Thomas R. Casten has served as president and CEO of Trigen Energy Corporation, White Plains, NY, since 1986. Trigen is a NYSE-listed firm whose mission is to produce electricity, heat and power with one-half the fossil fuel and one-half the pollution of conventional generation.

Trigen, the leading thermal sciences company in North America, develops, owns and operates commercial energy systems. Trigen uses its expertise in thermal engineering and proprietary cogeneration processes to convert fuel to various forms of thermal energy and electricity at more efficient conversion rates than conventional processes. Trigen combines heat and power generation, producing electricity as a by-product, for use in its facilities and for sale to customers. The company serves more than 1,500 customers with energy produced at 34 plants in 24 locations, including industrial plants, electric utilities, commercial and office buildings, government buildings, colleges and universities, hospitals, residential complexes and hotels. Cities served include Baltimore, Philadelphia, St. Louis, and London, Ontario.

From 1964 to 1986, Mr. Casten was an officer in the U.S. Marine Corps., Force Engineers, and spent one year in Vietnam. Eleven years at Cummins Engine Company included efforts to develop more efficient power. Tom has served on the board of directors and as president of the

International District Energy Association. He has authored numerous reports and articles on cogeneration and district heating, and has been called upon to give testimony before public service commissions, state assembly committees, U.S. Congressional committees, as well as state and federal agencies. He has recently published his first book, *Turning Off the Heat: Why America Must Double Energy Efficiency to Save Money and Reduce Global Warming*.

Mark Hall is director of government affairs at Trigen Energy Corporation. He has more than 7 years of experience in the areas of regulatory and legislative advocacy, environmental, health and safety program development and implementation and regulatory planning and permitting. His experience includes work with the White House, U.S. Department of Energy, U.S. Environmental Protection Agency, Congress, state legislatures and regulatory agencies to address global, national and regional energy and environmental issues.

As director of government affairs, Mark Hall's responsibilities include the strategic development and implementation of advocacy positions for Trigen, routine interface with federal and state legislators and regulators. He represents Trigen in a number of key coalitions and advocacy organizations that focus on national energy and environmental policy.

Mr. Hall is Trigen's lead on electric market restructuring, climate change, ozone and NO_x control policy and numerous other related issues. He works closely with Trigen's management, stockholders and customers. Mr. Hall was previously Trigen's manager of environmental health and safety programs. Prior to joining Trigen he worked as an environmental consultant to the energy industry.