DEC's Water Intake Proposal: Bad Policy for New York State

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In March 2010, the New York State Department of Environmental Conservation (DEC) released a policy proposal aimed at lowering fish mortality in New York State's water bodies.[1] The proposal defines new, strict standards for power plants and other industrial facilities that require the intake of water from a river or lake as part of their operations. As written, the policy would cause unprecedented harm to a variety of New York State businesses and, in particular, the state's electric power industry. This policy would force significant and unnecessary costs onto the owners of power plants and to ratepayers, at great consequence to the state's economy and electric reliability.

Power Plants and Cooling

The bulk of worldwide electricity is generated in thermal power plants which use steam cycle heat transfer and require water for steam generation and cooling. For this reason, readily available and plentiful water for cooling is a major consideration in siting power plants. The cooling system is also an integral part of power generation and has a major influence on the power plant's overall performance and reliability.

Currently, three main types of cooling exist for power plants: wet cooling (once-through or closed-cycle); dry cooling, and a hybrid of wet/dry cooling. Wet cooling systems use water to absorb heat through indirect contact with steam in a condenser. The heated water is then either discharged back into the body of water from which it was taken (once-through) or is passed through a cooling tower and recycled back to the condenser (closed-cycle).

Prior to 1990, virtually all steam electric generators used one version of wet cooling, with the majority utilizing once-through cooling. After decades of experience and refinement, wet systems were the standard for cost-effective, reliable cooling of turbine generators in thermal power plants.

Clean Water Act and State Environmental Regulations

The Clean Water Act is the principal federal law in the U.S. governing water pollution. It has, in fact, dramatically improved New York's and the nation's rivers, lakes, and streams.

The Hudson River notably has improved, and a May 16, 2009 *New York Times* editorial states that, "Once little more than a sewer for the towns and industries along its banks, the Hudson staged a remarkable comeback after the enactment of the clean water laws of the 1970s." Robert F. Kennedy of Riverkeeper also noted that, "Today, the Hudson River is one of the richest bodies of water in the North Atlantic.

[1] March 4, 2010 DEC Policy: Best Technology Available (BTA) for Cooling Water Intake Structures: http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf

There is more biomass per gallon and more fish per acre than in any body of water in the North Atlantic."

The main body of law currently in effect is based on the Clean Water Act's Federal Water Pollution Control Amendments of 1972. Section 316(a) regulates cooling system thermal discharges, and Section 316(b) requires the use of "best technology available" for minimizing environmental impact in location, design, construction and capacity of cooling water intake.[2] As a direct response to Sections 316(a) and 316(b), the majority of newly constructed power plants have selected wet closed-cycle, dry or hybrid cooling systems.

Beyond federal regulations on water pollution, the DEC has its own water quality standards and State Pollution Discharge Elimination System (SPDES) program.[3] Pursuant to federal and state regulations, the DEC released a policy proposal in March 2010 outlining what they defined as "best technology available" for cooling intake structures. Through the proposed policy the DEC establishes closed-cycle cooling or its equivalent as the design standard for "best technology available." [4] For a facility where it is determined that closed cycle cooling is unavailable, the policy establishes a performance goal of 90 percent or greater reduction in both entrainment and impingement mortality.[5]

Impingement and Entrainment

In the cooling water intake process, water must be drawn from a body of water with some force. Facilities with cooling water intake structures typically have screens over intake pipes to prevent organisms and garbage from entering with the water. Through this intake, fish can be pinned against these screens, in what is known as impingement. The screens on intake structures block fish from entering but are often not small enough to block free floating fish eggs and larvae. The suction of fish eggs and larvae is known as entrainment. Due to impingement and entrainment concerns, many original cooling water intake structures have been retrofitted with fish return systems and other mechanisms to reduce entrainment and impingement.

The Impact on New York State's Energy Industry

The majority of New York's power plants were built prior to the Clean Water Act, and as such, use once-through cooling systems. According to the DEC's own figures, the proposed policy will impact **approximately 54 percent of New York State's electric generation or 20,846 megawatts (MW)**[6] (26 steam electric facilities and 4 non-steam electric), including all but one of the state's nuclear plants and many of the large power plants that supply the downstate region's current electric demand. (*See chart on page 5 for plant listing*). One thousand MW is enough to power up to one million average homes.

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[2] U.S. Environmental Protection Agency, Cooling Water Intake Structures: http://www.epa.gov/waterscience/316b/basic.htm

[3] NYS Department of Environmental Conservation, SPDES: http://www.dec.ny.gov/permits/6054.html

[4] NYS Department of Environmental Conservation, Environment DEC: http://www.dec.ny.gov/environmentdec/63606.html

[5] March 4, 2010 DEC Policy: Best Technology Available (BTA) for Cooling Water Intake Structures: http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf

[6] Statewide capacity is listed by the U.S. Energy Information Administration as 38,700 MW. The DEC has calculated that 20,845 MW will be impacted by the policy. One thousand MW is enough to power up to one million average homes.

The DEC has estimated that the costs of retrofitting these power plants to meet the proposed policy standard in 20 years to be over $8.5 billion[7], yet energy industry officials believe the costs will greatly exceed this estimate. Closed-cycle cooling systems require electricity from the plant to operate and reduce plant efficiency, yet the DEC's estimate does not take into account the efficiency losses or reductions in generation when calculating costs or revenues. Some facilities may not be able to meet the DEC's performance goal with feasible alternative technologies, and would likely be forced to reduce overall generating capacity to reduce cooling water use, or could close altogether.

In the downstate region, both the Indian Point and Ravenswood generating facilities will be affected by the proposed policy. **Together the two plants provide over 4,000 MW of electricity and over 35 percent of New York City's peak load power**. Indian Point operates two nuclear reactors, while Ravenswood operates 21 units fueled by natural gas, fuel oil, or kerosene. Both plants are located in densely populated areas with limited space, and importantly, little popular support for the installation of cooling towers.

The DEC estimates that the costs of building closed cycle cooling and operating it for 20 years are approximately $1.4 billion for Indian Point and $707 million for Ravenswood.[8] However, neither estimate accounts for efficiency losses, parasitic losses, outage time, or the impact on New York City's electric reliability with either plant offline for long periods during cooling tower construction.

Costs and Consequences

Even as a low estimate, the $8.5 billion dollar cost of the DEC's policy will have significant consequences on New York State's energy providers and ratepayers. The construction and costs will reduce system reliability, increase electric costs, and harm New York State's fragile economy.

Residential, industrial and commercial ratepayers inevitably will feel the impact in increased electric rates and other bills. Beyond increased consumer, commercial, and industrial costs, New York may face an immediate shortage of power, should any facility in the downstate region be forced to close or should several facilities go off line simultaneously for retrofits.

The New York Independent System Operator (NYISO) noted in the 2009 Comprehensive Reliability Plan that current generation capacity will meet demand but that the loss of 500 MW in the lower Hudson Valley and New York City regions would violate reliability standards.[9] Should the proposed DEC policy force the extended unavailability of facilities, due to retrofits or the retirement of facilities, downstate New York would face an immediate shortage of power.

Indeed, with the costs of the new proposal, the owners of some plants will likely find that it no longer makes economic sense to continue operating and simply close down. Given this potential outcome, as well as the continued absence of a power plant siting law in New York State to encourage and facilitate the development of new facilities, the DEC's proposal could significantly harm New York's economy.

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[7] Appendix A: BTA Policy Technical Document (page 14):
http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf
[8] Appendix A: BTA Policy Technical Document (page 14):
http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf
[9] New York Independent System Operator:
http://www.nyiso.com/public/webdocs/newsroom/planning_reports/CRP__FINAL_5-19-09.pdf

Many good paying jobs would be lost, electricity prices would increase because of further constrained supply, and New York would lack the electricity to maintain and fuel economic growth.

Conclusion

By prescribing a specific design standard or fixed performance standard, the DEC will force power plants to increase costs or even go out of business. Both the proposed design and performance standard of the DEC's policy are too rigid and fail to account for the costs of compliance beyond some estimate of the direct costs for the power plant owner. Alternatives to the DEC's policy threshold can serve the same goals and minimize the impact of power plants on aquatic life, without over-reaching, causing harm to the state's economy and costing jobs upon which New Yorkers depend.

The proposed policy must be reworked to ensure New York's electric rates remain competitive and that electric system reliability is maintained.

About the Author:

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Facilities impacted by the DEC's Best Technology Available Policy Proposal

The following chart lists the plants impacted by the DEC's proposed policy including the source they draw water from, plant owner and Megawatt capacity if applicable. [10]

Water Body	Facility	Owner	Megawatts (MW)
	Steam Electric		
Arthur Kill	Arthur Kill	NRG Energy	842
Barnum's Cove	Barrett	National Grid	384
Black River	Black River Power	Black River Power	50
Cayuga Lake	AES Cayuga	AES	306
East River	Astoria Generating	Astoria Generating	1290
East River	Brooklyn Navy Yard	Brooklyn Navy Yard	286
East River	East River Generating	ConEd	317
East River	Poletti	NYPA	875
East River	Ravenswood	Trans Canada	2410
Hempstead Harbor	Glenwood	National Grid	210
Hudson River	Bowline 1 & 2	Mirant	1139
Hudson River	Danskammer	Dynegy Northeast	491
Hudson River	Indian Point	Entergy	1910
Hudson River	Roseton	Dynegy Northeast	1200
Jamaica Bay	Far Rockaway	National Grid	109
Lake Erie	Dunkirk Steam Station	NRG Energy	600
Lake Ontario	AES Somerset	AES	675
Lake Ontario	Fitzpatrick	Entergy	825
Lake Ontario	Ginna	Rochester Gas & Electric	496
Lake Ontario	Nine Mile Point 1 &2	Constellation	1757
Lake Ontario	Oswego Steam Station	Oswego Harbor Power	1700
Long Island Sound	Northport	National Grid	1522
Niagara River	Huntley	NRG Energy	760
Port Jefferson Harbor	Port Jefferson	National Grid	385
Seneca Lake	AES Greenridge	AES	161
Susquehana River	AES Westover	AES	145
	Non-steam Electric		
Hudson River	Holcim Cement	Holcim Cement	NA
Hudson River	LaFarge Cement	LaFarge Cement	NA
Hudson River	Empire State Plaza	OGS	NA
Hudson River	World Trade Center	NY/NJ Port Authority	NA
		Total Megawatts Impacted:	**20,845**

[10] March 4, 2010 DEC Policy: Best Technology Available (BTA) for Cooling Water Intake Structures: http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf

Source Documents and Resources:

Micheletti & Burns
Emerging Issues and Needs in Power Plant Cooling Systems
http://www.netl.doe.gov/publications/proceedings/02/EUW/Micheletti_JMB.PDF

World Nuclear Association – Cooling power plants
http://www.world-nuclear.org/info/cooling_power_plants_inf121.html

National Energy Lab (NETL) – Cooling Water Intake Structures
http://www.netl.doe.gov/technologies/coalpower/ewr/water/policy/cwis.html

California's Coastal Power Plants: Alternative Cooling System Analysis
http://www.swrcb.ca.gov/water_issues/programs/npdes/docs/cooling/ch4.pdf

Cooling Technology Institute
http://www.cti.org/

Energy & Environmental Analysts, Inc. (EEA) – "Entrainment and Impingement What's That? Power Plants and Cooling Water Intake Structures (CWIS)
http://www.eeaconsultants.com/news/winter2004/winter2004.pdf

Synapse Energy Economics – "Power Plant Repowering as a Strategy for Reducing Cooling Water Consumption at Existing Electric Generating Facilities"
http://www.epa.gov/waterscience/316b/meetings/symposium/pdf/schlissel.pdf

New York State Department of Conservation – "Best Technology Available (BTA) for Cooling Water Intake Structures"
http://www.dec.ny.gov/docs/fish_marine_pdf/drbtapolicy1.pdf

Reuters – "NY water plan could cost power generators billions"
http://www.reuters.com/article/idUSTRE62B4N320100312

The New York Times – "Reclaiming a River" May 16, 2009
http://www.nytimes.com/2009/05/16/opinion/16sat1.html