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# The Connecticut Nitrogen Exchange Program

Ann Powers\*

## Introduction

Long Island Sound is a cherished national natural resource, surrounded by some of the most densely populated land in the country. It has long provided sustenance, economic opportunities and comfort to the spirit for those who inhabit or visit its shores and waters. Like many of our Nation's water bodies, it drains a substantial and diverse watershed, and suffers a broad range of environmental insults. The problem of most concern is the severe shortage of oxygen in the deep waters of the western part of the Sound during summer months. This hypoxia is attributable to excess nitrogen that fuels the growth of algae in which, when decomposing, draw oxygen from the water, denying it to other aquatic life. While a considerable amount of nitrogen derives from surface runoff and atmospheric deposition, the main contributors are the many sewage treatment plants that pour thousands of pounds of nitrogen into the Sound and its tributaries each day.

To address this problem, the two states primarily encompassing the Sound, New York and Connecticut, have taken measures to upgrade their sewage plants with nitrogen removal technologies. Connecticut has gone further, devising a program under which sewage plants may create, sell and purchase credits in order to meet their nitrogen effluent limitations.<sup>1</sup>

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1. This article briefly describes the Connecticut program. For more details on the program, see Ann Powers, *The Current Controversy Regarding TMDLs: Contemporary Perspectives "TMDLs And Pollutant Trading,"* 4 VT. J. ENVTL. L. 1 (2003), available at <http://www.vjel.org/articles/articles/powers.html>. For further background on the Connecticut program, Long Island Sound, and water pollutant trading in general, see Ann Powers, *Reducing Nitrogen Pollution on Long Island Sound: Is There a Place for Pollutant Trading?*, 23 COLUM. J. ENVTL. L. 137 (1998).

### The Connecticut Nitrogen Credit Exchange Program

The Connecticut Nitrogen Credit Exchange Program is a pollutant trading program based on the State's wastewater regulatory program. The pollutant to be traded is, of course, nitrogen, and the participants are seventy-nine Connecticut sewage treatment plants, although in the future other point sources and perhaps even nonpoint sources could potentially be included. The State establishes the market, and the economic driver is a cap on the total nitrogen that may be discharged each year by the sewage plants. That cap declines each year until 2014, when it reaches a level that will achieve, in conjunction with other source reductions, the Total Maximum Daily Load (TMDL) established for nitrogen in the Sound.

Each plant is subject to an individual discharge permit, but in the past few permits have included limitations on nitrogen discharges. In order to meet the mandate of the Clean Water Act and to establish the cap for trading, the Connecticut Department of Environmental Protection promulgated a State Nitrogen General Permit covering the seventy-nine plants. So long as their combined discharges are within the overall limit of the permit, the Clean Water Act is deemed satisfied.<sup>2</sup> The State limits the pounds of nitrogen each plant may discharge; the plant may meet its individual limit either by controlling its discharge, or, if that is insufficient, by purchasing credits created by plants that achieve stricter controls than mandated. The State will not allow a plant to trade if it would cause local water quality problems. The State Department of Environmental Protection directs the program with the input of a legislatively established Nitrogen Credit Advisory Board. State and municipal officials primarily comprise the board, which assists and advises the Department in carrying out its functions.<sup>3</sup>

Because the impact of a plant's nitrogen discharge on the most hypoxic areas of the western Sound generally becomes increasingly attenuated the further the plant is from those areas, trading ratios or "equivalency factors" were established to reflect actual impact.

The State creates the market for the credits and serves as a clearinghouse for purchases and sales. It also sets the price of credits, based on the cost of nitrogen upgrades funded by the State, and of operation and maintenance (O&M) of nitrogen removal controls during

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2. CONN. DEPT. OF ENVTL. PROT., GENERAL PERMIT FOR NITROGEN DISCHARGES (Jan. 2, 2002), *available at* <http://www.dep.state.ct.us/wtr/lis/nitrogengp/gpindex.htm>. The permit was updated and reissued in 2005. *See* CONN. DEPT. OF ENVTL. PROT., GENERAL PERMIT FOR NITROGEN DISCHARGES PROGRAM FACT SHEET 1 (Oct. 2005), *available at* <http://www.dep.state.ct.us/wtr/lis/nitrogengp/ncpfs.pdf>.

3. CONN. GEN. STAT. § 22a-523(a) (2001).

the year. At the close of the year, the Department of Environmental Protection determines how much nitrogen each plant discharged and whether the plant will be paid for excess credits or whether it must purchase them from the State. If there are more credits created than purchasers need, the State must buy them. Credits do not carry over from year to year.

#### Trading Under the Program

In 2002, the first full year of operation, the price was established at \$1.65 per pound, and because more credits were created than needed, the State absorbed the cost of the rest, at \$1.4 million.<sup>4</sup> In December 2004, the Nitrogen Credit Advisory Board submitted to the Connecticut General Assembly its report on the program for the calendar year 2003, its second year of trading.<sup>5</sup> On the recommendation of the Advisory Board, the Department of Environmental Protection established a price per pound of \$2.14 for 2003. At the conclusion of 2003, thirty-seven facilities created roughly \$2.43 million in credits. Forty facilities had to purchase credits, roughly \$2.12 million worth, in order to comply with the Nitrogen General Permit. Accordingly, the State spent approximately \$312,000 to purchase excess credits, substantially less than the \$1.4 million that it expended in 2002.

For 2004, the third full year of trading, the credit was set at \$1.90 per pound, and thirty-five plants, two fewer than the previous year, sold \$2.66 million in credits to the State. There were forty-four buyers, but their purchases totaled only \$1.79 million, so the State expended roughly \$872,000 to buy the remaining credits.<sup>6</sup> The data for calendar 2005 is not complete, but it is estimated that there will be a modest increase in the credit price to \$2.12 per pound, and that for the first time the state may have a surplus from the sale of credits.<sup>7</sup>

During the first three years of the program, the plants' combined

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4. Information regarding the 2002 program may be found in CONN. DEPT. OF ENVTL. PROT., REPORT OF THE NITROGEN CREDIT ADVISORY BOARD TO THE JOINT STANDING ENVIRONMENTAL COMMITTEE OF THE GENERAL ASSEMBLY CONCERNING THE NITROGEN CREDIT EXCHANGE PROGRAM (2003), *available at* <http://www.dep.state.ct.us/wtr/lis/nitrocntr/annrpt.pdf>.

5. CONN. DEPT. OF ENVTL. PROT., REPORT OF THE NITROGEN CREDIT ADVISORY BOARD FOR THE CALENDAR YEAR 2003 TO THE JOINT STANDING ENVIRONMENTAL COMMITTEE OF THE GENERAL ASSEMBLY CONCERNING THE NITROGEN CREDIT EXCHANGE PROGRAM (2004) [hereinafter YEAR 2003 REPORT], *available at* <http://www.dep.State.ct.us/wtr/lis/nitrocntr/2004annrpt.pdf>.

6. CONN. DEPT. OF ENVTL. PROT., REPORT OF THE NITROGEN CREDIT ADVISORY BOARD FOR THE CALENDAR YEAR 2005 TO THE JOINT STANDING ENVIRONMENTAL COMMITTEE OF THE GENERAL ASSEMBLY CONCERNING THE NITROGEN CREDIT EXCHANGE PROGRAM 2 (2005) [hereinafter YEAR 2005 REPORT].

7. *Id.* at 8-9.

discharges have been in compliance with the Nitrogen General Permit and met the interim TMDL, although in 2004 they were close to the permit limit. However, the data for the first ten months of calendar year 2005 indicates that the permit limit for the year will be exceeded.<sup>8</sup> This will occur not only because of weather conditions, but also because targets for plant nitrogen removal upgrades have not been achieved due to lack of funding.<sup>9</sup> However, compliance with the TMDL by 2014 requires continued reductions in nitrogen loadings, which can only be achieved by further plant upgrades.

The matter of funding is a difficult one because, like most states, Connecticut has substantial resource demands, and the general obligation bonds issued to finance the water program must support a range of activities. Although a number of plants are prepared to proceed with upgrades, the reduced funding available from Connecticut's Clean Water Fund has delayed the start of construction of a number of the projects.<sup>10</sup> The Nitrogen Credit Advisory Board estimates that if the current budget situation continues, in 2006 only one in five of the projects will receive the funding necessary to proceed.

In addition to funding difficulties, the price of credits may affect the program. If credits remain inexpensive, a plant has less of an incentive to upgrade.

The price of credits has remained at a modest level because to date the cost of upgrades and O&M for nitrogen has been relatively low. Although some large projects are underway or nearing completion, the full costs associated with the upgrades have not yet accrued and been factored into setting credit prices. Moreover, some plant operators were able to achieve efficiencies in O&M. The efficiencies in O&M reduced both the costs factored into setting the credit price and gave individual plants with reduced O&M costs less reason to trade. As a consequence of the inexpensive credits, plants have had less incentive to invest in costly upgrades. However, in the next several years, the price of credits should increase to a more realistic level as the costs of various major upgrades become part of the equation. In addition, the negative impact of weather on nitrogen removal capability at the plants, combined with decreasing permit ceilings should encourage plants to upgrade, if funding is available.

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8. *Id.* at 5. There is some leeway in the program, since the permit and the waste load allocations to the plants are slightly stricter than required by the TMDL.

9. *Id.* at 5, 6-7.

10. *Id.* at 9, 10-11.

### Observations About the Program

The Connecticut Nitrogen Trading Program is essentially a bubble nitrogen permit for the Connecticut sewage treatment plants, with the flexibility for individual plants to meet their discharge limits either by reducing discharges or paying, indirectly, another plant to do so. The State sets each plant's discharge limit, administers the credit exchange, buys excess credits and determines which plants qualify for loans and grants. It is a complex program, with trading ratios, complicated cost calculations, and numerous factors that may potentially affect it. In that regard, it is very far from the classic market model. Nonetheless, most of those involved with the program consider it to be a successful and useful undertaking that is helping achieve water quality improvements in Long Island Sound.

The Connecticut Department of the Environment has been pleased with the program since it has focused the attention of plant operators and municipal authorities on the nitrogen problem and encouraged efforts to reduce discharges in order to avoid having to purchase credits or undertake upgrades. Some plants have upgraded even when they might have met their discharge obligations by purchasing credits. This might be attributable to a sense that purchasing credits would in some fashion "stigmatize" the community as unable to meet its wastewater obligations, but is more likely the result of a desire to benefit from generous grants and priority funding available for nitrogen upgrades. The plant operators and municipal officials appreciate the flexibility the program affords in meeting discharge limits and the opportunity to gain additional revenue if their controls exceed required levels.

State officials also note that they have avoided having to include nitrogen limits in seventy-nine separate facility permits, a process that would no doubt have engendered substantial administrative expense, resistance and appeals. Additionally, the clearinghouse role the state plays has avoided public perception problems that might have arisen if poorer communities were to buy credits directly from wealthier ones.

Lastly, the program is popular with state legislators, who have been supportive. It assists localities in upgrading their wastewater facilities, providing environmental benefits to local areas as well as restoring Long Island Sound. Also, the construction projects bring jobs to the community.

In spite of the complexity of the program, over the four years of its operation the administrative costs have been reasonable, involving primarily staff time and other resources related to managing the credit exchange. It should be noted, however, that the State has been required to make substantial outlays to purchase unsold credits each year.

Notwithstanding its initial success, there are concerns about the future of the program since a number of issues affect it, including physical factors, such as weather conditions, and economic factors, such as the availability of grant and loan funds from the State. Weather can have a substantial impact on vulnerable nitrogen reduction processes and thus the ability of plants to achieve the nitrogen reductions required under the program. As the Nitrogen Credit Advisory Board pointed out in its 2003 report,<sup>11</sup> higher than usual rainfall and a colder winter and spring led to higher nitrogen discharges than in the same period in 2002. In 2005, a wetter than usual spring had a similar impact. In the future, unfavorable weather conditions could decrease the efficiency of plants, making fewer credits available, and potentially causing the plants as a whole to exceed the general permit limit, a situation that would leave the State subject to Clean Water Act sanctions. This is an especially critical point. As the TMDL interim limits become more stringent and the plants approach the limits of technology, weather could have an increasingly adverse effect each succeeding year.

Finally, the success of the program has to be judged by whether it improves water quality in the Sound, and that means additional plant upgrades. However, the funds for these upgrades must be authorized from the State's Clean Water Fund, which has competing demands and must obtain additional funding from the legislature over time. Because upgrades have not been completed at the rate originally contemplated, due in part to limited funding, the Advisory Board projected that nitrogen loadings in 2005 and 2006 would exceed the limit established in the Nitrogen General Permit.<sup>12</sup> This does indeed appear to be the case in 2005. The Board noted pointedly that "[t]he single most critical factor relative to the continued success of the program is the availability of Clean Water Fund financing to support nitrogen removal projects."<sup>13</sup>

#### The Connecticut Nitrogen Trading Program as a Model

The perceived success of the Connecticut program has led water quality officials from other areas to look to it as a potential model. In this context several points should be kept in mind. The Connecticut program is part of a long-term effort to restore Long Island Sound. To support this effort, extensive monitoring, modeling and information gathering has taken place. The Connecticut program involves a single pollutant, for which a TMDL has been established, and, while individual plants may have dissimilar impacts on the areas of hypoxia, the level of

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11. YEAR 2003 REPORT, *supra* note 5, at 4.

12. *Id.* at 5.

13. *Id.* at 1.

impact of each plant is reasonably certain. Thus, trading ratios or equivalency factors can be reliably established.

Further, Connecticut is a relatively small state, and the Sound is very important for its economy. Essentially all of the state drains to the Sound, providing a focus and unity of interest to the municipal officials, plant operators and others concerned with water quality. The state has a well-developed regulatory water quality program, which includes plans to provide funds over time for facility improvements. Finally, it has the financial resources to absorb substantial expenses so far accrued with unsold credits. Even with these positive factors, the state must grapple with the need for increased funding for nitrogen upgrades.

The Connecticut Nitrogen Trading Program, while far from a classic market program, is an interesting collaborative effort on the part of state and local officials that shows promise for accomplishing reductions in nitrogen loadings to Long Island Sound in an organized manner. And it may well do so more quickly than the regulatory program alone. But its future success is closely tied to the availability of funds for wastewater facility construction and upgrades, a matter of serious uncertainty in the current economic and political climate.<sup>14</sup>

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14. For a thorough explanation of the factors to be considered in establishing a water pollutant trading program, *see* OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, WATER QUALITY TRADING ASSESSMENT HANDBOOK 69-71, 80-81 (2004), *available at* [http://www.epa.gov/owow/watershed/trading/handbook/docs/NationalWQTHandbook\\_FINAL.pdf](http://www.epa.gov/owow/watershed/trading/handbook/docs/NationalWQTHandbook_FINAL.pdf). The Handbook also includes a concise description of the Connecticut nitrogen trading program.



