

Manure Treatment Technologies and Nutrient Credit Trading The Forgotten Core Element of Pennsylvania's Chesapeake Strategy

*Patrick Thompson, EnergyWorks Group
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PENNSYLVANIA'S TECHNOLOGY AND NUTRIENT TRADING STRATEGY

By 2025 Pennsylvania must reduce its current annual nitrogen load to the Chesapeake Bay by 33.9 million pounds. This is three times the total reduction achieved by Pennsylvania during the preceding thirty year period beginning in 1985. What's more, 80% or 27.2 million pounds of this remaining reduction must be provided by Pennsylvania's agricultural sector ⁽¹⁾.

Adding to the challenge is the fact that agricultural activities deposit nutrients on or near the surface of cropland soils. Nutrients that are unused by plants are susceptible to displacement over the surface of land by rainfall, resulting in uncontrolled, nonpoint discharges to both surface waters and groundwater. Landscape best management practices (BMPs) can help mitigate agricultural nonpoint discharges but their actual performance is highly uncertain because, at no point in the process are agricultural nutrient loads observed or measured directly. Instead, they are estimated by imperfect models ⁽²⁾.

The authors of the Pennsylvania's original Watershed Implementation Plan (WIP) understood the complexity and magnitude of the task. To meet the 2025 TMDL goal, the WIP approach was based on three core elements: 1) milestone implementation and tracking; 2) supporting the implementation of advanced technologies and nutrient trading; and 3) enhancing common sense compliance efforts ⁽³⁾.

Unfortunately, Pennsylvania made little progress during the first five years following the EPA issuance of the Chesapeake Bay TMDL in 2010. In fact, during this period, nitrogen loads from the agricultural sector actually *increased*. Under mounting pressures from EPA, the Bay Partnership and other regional stakeholders, in July of 2015, the state publically recognized that Pennsylvania would not meet its 2017 mid-point milestone target and announced a plan to "reboot" efforts to meet the 2025 load reduction goal. Since the announcement, there have been numerous conferences, studies and surveys to better quantify the actual status of farm conservation measures and accelerate implementation of additional measures by farms and communities. The Chesapeake Bay Foundation recently outlined a plan to prioritize implementation of these measures in five south-central Pennsylvania counties. At the October 2016 meeting of the Chesapeake Partnership Executive Council, Pennsylvania, EPA and USDA announced commitments to provide \$28 million to support these efforts.

These developments are significant and will ensure the long overdue beginning of real progress. However, they are also recognized as insufficient to meet the 2025 goals and, except for non-specific references to "legislative, programmatic or regulatory changes to provide additional tools and resources", the second core element of Pennsylvania's WIP strategy has received little attention. Pennsylvania's Chesapeake Bay reboot will be incomplete and unlikely to meet the demanding agricultural sector goals without renewed commitment to supporting advanced technologies and nutrient trading.

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GAME CHANGING ADVANCED TECHNOLOGY

Although each of the Bay jurisdictions has endorsed nutrient trading as a future water quality maintenance strategy, the Pennsylvania WIP is unique in its reliance on advanced technologies (primarily manure treatment technologies or MTT) and nutrient trading as a systemic approach to reaching its TMDL targets. Therefore, to a large extent, Pennsylvania had to go it alone in its early certification of MTT nutrient credit generators and simultaneous implementation of a nutrient trading program to allow competitive market forces to drive innovation and development of cost effective nonpoint source solutions.

Tepid support for MTT nutrient credit generators has been a major obstacle to increased adoption. While the general public has limited knowledge of treatment technologies, influential interest groups with a preference for traditional land management approaches have questioned the legitimacy of certified MTT credits due to their omission from the Chesapeake Bay Model.

Even though Pennsylvania's 2010 WIP highlighted the need for cooperative efforts to adequately reflect the nutrient reduction capability of MTT in model results, EPA and the Bay Partnership began addressing this issue in early 2013 ⁽⁴⁾. It has taken nearly four additional years to develop consensus on methodologies for certification of MTT nutrient credit generators. They will finally be included in the Phase 6.0 Bay Model in June 2017. This will eliminate a barrier to increased adoption and will encourage greater public and private investment for continued development. As the early adaptor and major beneficiary, Pennsylvania should maintain a leadership role in this development.

According to a 2013 report ⁽⁵⁾, manure from animal operations produce about 16% of the nitrogen from Pennsylvania agriculture. However, deployment of cost effective MTT solutions can yield nitrogen load reductions that are on the order of 25% of the TMDL target. Since MTT solutions are ideally suited to processing manure from large scale operations they can allow continued growth of Pennsylvania's animal agriculture industry without compromising long term water quality objectives. Game changing characteristics of MTT solutions include the following:

- Load reductions by data driven MTT systems can be measured and verified in real-time, throughout the year, with little negative performance impact from meteorological conditions. Because of their predictable performance and transaction efficiency, data driven MTT generators offer low risk for public and private investment. As climate change amplifies uncertainties associated with landscape BMPs, performance reliability will become an overarching consideration for future water quality investments.
- Data driven MTT systems meet the definition of a point source, resulting in a 1:1 trading ratio for purpose of offsetting excess discharges from NPDES permitted point sources.
- Data driven MTT systems have the potential to *eliminate* (not simply manage) significant nonpoint pollution sources. Reducing the quantity and scale of nonpoint pollution sources constitutes a basic strategy for performance reliability and efficient use of public and private resources.

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Because water quality is a public good, Pennsylvania should support public-private partnerships for the development of MTT infrastructure projects. Such projects should be developed in coordination with conservation and landscape BMP measures as part of county-wide nutrient management strategies.

NUTRIENT CREDIT TRADING – ROLE OF THE STATE

Pennsylvania's nutrient credit trading program has suffered from un-sustained management commitment, poorly defined goals, ill-advised certification of "phantom credits" and lack of accountability for market performance. The result has been a loss of stakeholder confidence, massive public expenditures on high cost alternatives and collapse of credit demand. Nutrient trading is not a stand-alone collection of technical and administrative processes; it is integral to a market system that must be nurtured and managed by the state. As observed by the University of Maryland regional Economic Finance Center (EFC), "...markets will not magically appear in support of Bay restoration; rather, the state must intentionally establish the appropriate property rights, market infrastructure, and rules of engagement for water quality markets to function effectively" ⁽⁶⁾.

As previously noted, the Pennsylvania WIP was unique in its reliance on advanced technologies and nutrient trading. As each state focused on its own priorities, Pennsylvania received limited external assistance in the simultaneous development of its two-part strategy. Many critical activities were underfunded through periods of declining public resources. The result was a partially developed market, administered by understaffed state agencies. Several legislative initiatives attempted to revive the market but were overshadowed by other matters.

In spite of obvious shortcomings in its Nutrient Trading Program, Pennsylvania has completed more water quality credit trading transactions than any other state in the region. This experience and the administrative infrastructure currently in place provide a foundation for restructuring, expansion and improvement of the program. As suggested by the referenced EFC report, Pennsylvania should reconsider the role of the Commonwealth in establishing, managing and administering the water quality marketplace and market system. As supported by EPA and other states, the current program must be expanded to include offsets for urban stormwater and interstate transactions. The wide area ecosystem balancing capacity of large scale MTT solutions should be coordinated with landscape BMPs to achieve cost effective local and far field water quality results.

Unlike earlier phases of development, Pennsylvania can now rely upon support and a growing body of knowledge from the EPA, USDA, the Bay Partnership, the EFC and many other entities to create a market system that will play an important role in achieving its 2025 water quality objectives. Creation of this new and better nutrient credit market must be a priority for Pennsylvania's Chesapeake reboot.

CONCLUSION: MTT AND NUTRIENT TRADING ARE A REBOOT PRIORITY

Pennsylvania's original WIP strategy was correctly focused on nonpoint sources for achieving its target reductions in Chesapeake Bay nutrient loading. Six years later, cooperative efforts with

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EPA and other Bay Partnership jurisdictions have validated the nutrient reduction capability of manure treatment technologies, leading to their inclusion in Chesapeake Bay watershed model results.

By renewing and expanding its support for MTT and nutrient trading in close coordination with the other key elements of its strategy, Pennsylvania can resume its position of environmental leadership and meet its Chesapeake Bay TMDL commitments.

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