Overview for Purchasing / Selling Nutrient Credits in PENNVEST’s Nutrient Credit Clearinghouse

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Pennsylvania is addressing its commitment to the Chesapeake Bay in three ways:

- Both DEP and PENNVEST fund nutrient (nitrogen and phosphorous) reduction projects using both Commonwealth financial resources and the CWSRF.

- The Department of Environmental Protection’s Nutrient Credit Trading Program, embodied in its trading platform NutrientNet, provides a mechanism for creating and trading nutrient credits.

- PENNVEST’s market based nutrient credit clearinghouse, which is being implemented with Markit Inc., encourages credit trading by spreading and shifting market risk.
PENNVEST has funded 48 projects ($272 million total funding) in the Chesapeake Bay watershed that reduce nutrient discharges to the Bay. This funding comes from the following sources:

**Commonwealth:**
- 3 projects
- $54 million in funding, all loans

**CWSRF:**
- 45 projects
- $218 million in total funding; $136 million loans, $82 million principal forgiveness
PENNVEST wants to own credits to serve as a buffer in our credit auction market in case of failure on the part of sellers.

For all credit-generating projects that we fund, we own credits up to the value of our subsidy. This takes two forms:

- Grants (principal forgiveness) - we own a dollar value of credits up to the amount of the grant
- Loans – we own a dollar value of credits up to the present value of the interest rate subsidy on our loan

At the moment, PENNVEST owns approximately $44 million worth of credits from 34 NPS credit-generating projects that we have funded.
One Example – BION Inc.

- Project: construction of a manure management system on a dairy and egg farm in Lancaster County
- Projected annual nutrient reductions when project is fully operational at the end of 2011:
  - Nitrogen: 2 million pounds
  - Phosphorous: 14.5 thousand pounds
- PENNVEST funding: $7.8 million loan for a ten year term
- Collateral: PENNEST will be repaid entirely by nutrient credit sales. In addition, PENNVEST will share in credit sales in excess of the amount needed to repay the loan, as compensation for risk.
PENNVEST could only use Commonwealth funds for this project because:

- the project is ineligible for Section 319 funding since Kreider Farms (the dairy and egg farm) is a CAFO and therefore a point source
- Since Kreider Farms is a CAFO, it is ineligible for CWSRF funding
- The project is also ineligible for Section 320 funding since the Chesapeake Bay does not fall under the 320 program
NutrientNet was created by DEP, in consultation with World Resources Institute, to provide a market-based program that would provide incentives for entities to create nutrient reduction credits. They would do this by going beyond statutory, regulatory or voluntary obligations and goals to remove nutrients from a watershed. The credits can be traded to help others more cost effectively meet their obligations or goals. The primary purpose of the Nutrient Credit Trading Program is to provide for more efficient ways for National Pollutant Discharge Elimination System (NPDES) permittees to meet their effluent limits for nutrients. Currently, the focus of the program is on the Chesapeake Bay Watershed.
Nutrient Trading Program Website and NutrientNet

Nutrient trading is a market-based program that provides incentives for entities to create nutrient reduction credits by going beyond regulatory or voluntary obligations and goals to reduce nutrients in a watershed. The credits can be sold to help others meet their obligations or goals. The primary purpose of the Nutrient Credit Trading Program is to provide a more efficient way to reduce nutrient discharges into surface waters.

Pennsylvania Water Quality Trading

Making a Difference in the Chesapeake Bay Watershed

NutrientNet, Online Trading Marketplace

Pennsylvania’s Nutrient Trading Program is a voluntary program that can be used by point and non-point sources that exceed their environmental obligation to generate credits that may be traded to those seeking nutrient reduction credits.

NutrientNet has two components:

- Trading Marketplace: For trading nutrient credits.
- Calculation Tools: For calculating credits generated by agricultural management practices and activities.

Interested in trying NutrientNet?

Try Demo  View Screencast

Screencast presented at the trading workshop meeting (6/15/07).

Please feel free to Contact Us for more information.

Disclaimer: NutrientNet is a service provided by the Department to promote a market for exchange of nutrient credits to achieve environmental improvements in the Chesapeake Bay more effectively. The Department does not guarantee that any credits for sale on the NutrientNet marketplace are viable.
NutrientNet

**Administrative:**
- Approve, Modify, Deny accounts
- Add Credits
- Approve Trades
- Modify emails

**User’s Account (Generator and Purchaser):**
- Update Account Information
- Calculate credits (calculation summary can be submitted with certification request)
- Post Credits for sale
- Post a need for Credits
- Bid on Credits
- Review and Accept Bids
PENNVEST developed the clearinghouse in order to mitigate some of the market risk perceived by potential credit buyers and sellers and which was inhibiting development of the credit market.

PENNVEST implemented the clearinghouse by instituting a dual auction process. Both credit buyers and sellers participate simultaneously to determine a market clearing price and quantity. PENNVEST then enters into contracts on both sides of the market. If everyone performs as planned, PENNVEST breaks even.

Initial auction conducted by the Chicago Climate Exchange (CCX) in 2010. PENNVEST has since contracted with Markit Inc. to conduct future auctions and provide registry services.
PENNVEST’s Clearinghouse Benefits

- Benefits of purchasing credits through PENNVEST nutrient credit clearinghouse – absolves regulated point sources of:
  - Adhering to regulatory procurement requirements
  - Search costs
  - Negotiation costs
  - Evaluating counterparty credit-worthiness
  - Contract enforcement
- Benefits to credit sellers: can facilitate an increase in demand that makes undertaking credit-generating projects more viable
- Market risk is reduced for both buyers and sellers since PENNVEST is responsible for contract enforcement
Types of Market Events

- Forward auctions for multiyear delivery for certified credits that are not yet verified. Currently anticipate holding these quarterly.
- Spot auctions for verified and issued credits. Currently anticipate holding one spot auction annually during “true-up” period (October- November)
Auction Structure Used Initially

• Structure:
  • sealed-bid, single-round, uniform price

• Procedure:
  • Participants submit bids & offers
  • Administrator aggregates bids / offers and calculates market-clearing credit price & credit quantity
  • Administrator may solicit non-binding letters-of-intent to participate to indicate to participants the quantity of credits available on the auction

• Benefits of structure: simplicity, have worked well in practice
  • Unsuccessful participants may participate in an auction in the future
Proposed Auction Structure to be Implemented in the Near Future

- Revised structure:
  - Auction open for specified period of time
  - Participants submit bids & offers
  - Administrator posts market information on website, available for viewing by participants
  - **Participants can revise bids/offers based on prevailing market information** – administrator updates new bids/offers as they are received on ongoing basis
  - Administrator settles auction at close based on existing bids / offers -- calculates market-clearing credit price & credit quantity
  - Auctions have uniform-price format

- Benefits of structure:
  - Can adjust bids/offers based on prevailing market information
  - Mechanism to provide price signal to both point source buyers and credit sellers
  - Enhances the ability of the auction process to yield buy and sell “matches”
Procedure for Competitive Auction

- PENNVEST auction announcement
- Participants establish eligibility to participate
- Participants submit bids & offers
- PENNVEST closes auction, announces auction results (market-clearing price and quantity)
- Execution:
  - Buyers makes payments to PENNVEST on agreed schedule
  - Sellers deliver verification reports to PENNVEST at agreed schedule
  - PENNVEST pays sellers contingent on receiving verified credits
PS notifies PENNVEST of interest in buying credits

PENNVEST receives statement-of-intent to offer supply from credit producers

If supply exists, PS establishes eligibility; PENNVEST announces auction and distributes auction bid and offer documents & contractual requirements

Auction window open; binding bids and offers submitted

Auction closes; PENNVEST informs participants of results & announces market-clearing price and quantity exchanged

Credit producers submit verification reports to DEP on specified schedule; Payment transfers from PS to PENNVEST to credit producers occur on specified schedule
Auction Procedural Issues

• Auction Settlement Price Options:
  • Average between lowest winning bid & highest winning offer
  • Highest winning offer price

• Tie-breaking Options:
  • Pro-rata amongst winning participants that indicated “partial fill”
  • Time stamp
  • Another specified process
Evidence of financial guarantee

- Letter of credit from qualified bank for payment in event point source defaults without sufficient escrow
- Performance funds / escrow
- Audited financial statements
- Other acceptable evidence
Sell-Side Eligibility Requirements for Forward Auctions

- Evidence of legal title / credit ownership
  - Copy of contract between aggregator & farmer in which farmer attests to owning credits
- Evidence that credits will be generated
  - Copy of DEP certification approval letter & verification schedule
  - Evidence of intent to implement for “contingent-on-sale” or “planned” projects
  - Evidence of permanence
    - Contract length between aggregator & farmer
    - Funds / personnel available to support verification
- Financial guarantee in event of nonperformance if PENNVEST forced to buy credits at higher price than contracted (optional)
  - To be evaluated on case-by-case basis – may depend on quantity offered relative to overall quantity certified
Force majeure provisions:

- All parties absolved of contractual commitments if Tributary Strategy invalidated / overturned
- Guarantee for credit sellers that their crediting & eligibility conditions established in certification letter will be valid for length of forward contract with PENNVEST if the Tributary Strategy is not invalidated / overturned
Hold harmless provisions:

- Successful point source bidders will be held harmless from legal or regulatory action by DEP if:
  - They enter into a forward contract agreement to purchase credits for NDPES compliance obligations
  - They submit payment at the contracted price at agreed upon schedule for the quantity of credits that their NDPES permit requires
- It is PENNVEST’s responsibility to supply the credits contracted for by the point source. However, if for some reason PENNVEST is unable to fulfill its obligation, the point source will still be held to its regulatory requirements for nutrient emissions.
Bid / Offer Forms

- Price: in increments of $0.01/USD
- Quantity:
  - 100 lb increments for nitrogen credits
  - 50 lb increments for phosphorous credits
- Tranche:
  - Pollutant type
  - Watershed
  - Compliance Year
    - May indicate a series of consecutive years for delivery (i.e., “strip”)
- Credit Increment (optional) – if price varies depending on quantity bid / offered
- “Partial Fill” or “All-or-None”
**Insurance Credit Mechanisms Available to PENNVEST**

- Likely to be an excess supply of credits
- Sources of credits available for purchase as reserve:
  - reserve pool from projects funded by PENNVEST through its normal loan/grant program
  - DEP’s 10% reserve pool from verified projects that have not sold through PENNVEST
  - Un-contracted non-point source projects
  - Credits from point sources that become verified at close of compliance year
- Ability of suppliers to raise prices beyond contracted price – in the event PENNVEST needs to buy more -- are constrained if:
  - Excess supply
  - Hold harmless provisions imply that PENNVEST is not required to purchase credits at a higher price than the contracted price
Auction Example 1 – Structure A

<table>
<thead>
<tr>
<th>Bidder #</th>
<th>Price (per lb)</th>
<th>Quantity</th>
<th>&quot;All or None&quot; or &quot;Partial&quot;</th>
<th>Cum. Quantity</th>
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<td>10,000</td>
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<tr>
<td>2</td>
<td>$9.00</td>
<td>25,000</td>
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<td>35,000</td>
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<td>3</td>
<td>$6.00</td>
<td>125,000</td>
<td>all/none</td>
<td>160,000</td>
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<tr>
<td>4</td>
<td>$5.00</td>
<td>250,000</td>
<td>all/none</td>
<td>410,000</td>
</tr>
<tr>
<td>5</td>
<td>$4.50</td>
<td>200,000</td>
<td>all/none</td>
<td>610,000</td>
</tr>
<tr>
<td>6</td>
<td>$4.00</td>
<td>75,000</td>
<td>all/none</td>
<td>685,000</td>
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<table>
<thead>
<tr>
<th>Offer #</th>
<th>Price (per lb)</th>
<th>Quantity</th>
<th>&quot;All or None&quot; or &quot;Partial&quot;</th>
<th>Cum. Quantity</th>
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</thead>
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<td>$2.50</td>
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<td>25,000</td>
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<tr>
<td>2</td>
<td>$3.75</td>
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<td>100,000</td>
<td>partial</td>
<td>500,000</td>
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<tr>
<td>5</td>
<td>$8.00</td>
<td>80,000</td>
<td>partial</td>
<td>580,000</td>
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Auction Results: 160,000 credits purchased and sold.
Buyers 4, 5, and 6 have bids completely filled.
Offer 1 sells 25,000 credits and offer 2 sells 135,000 credits.
Market-clearing price is $4.88 – average of lowing winning bid ($6.00) and highest winning offer ($3.75).
Results from Past Auctions

- PENNVEST and CCX conducted two auctions in the fall of 2010:
  - forward auction for three water years (2011 – 2013)
  - forward auction for one water year (2011)
- Both nitrogen and phosphorous credits were eligible to be traded
- Separate auctions were conducted for the Susquehanna and Potomac watersheds
<table>
<thead>
<tr>
<th>Contract</th>
<th>Number of Bids to Buy Credits</th>
<th>Total Credit Bid Quantity (credits per year)</th>
<th>Number of Offers to Sell Credits</th>
<th>Total Credit Offer Quantity (credits per year)</th>
<th>Quantity of Credits Exchanged (credits/credit/year)</th>
<th>Market Price (USD/credit/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Year Susquehanna Nitrogen</td>
<td>7</td>
<td>27,000</td>
<td>9</td>
<td>323,149</td>
<td>21,000</td>
<td>$3.04</td>
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<td>3 Year Susquehanna Phosphorous</td>
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<td>0</td>
<td>4</td>
<td>25,599</td>
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<td>(no match)</td>
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<td>3 Year Potomac Nitrogen</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(no bids or offers)</td>
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<tr>
<td>3 Year Potomac Phosphorous</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>(no bids or offers)</td>
</tr>
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</table>
# Results for the One Year Auction

<table>
<thead>
<tr>
<th>Contract</th>
<th>Number of Bids to Buy Credits</th>
<th>Total Credit Bid Quantity (credits)</th>
<th>Number of Offers to Sell Credits</th>
<th>Total Credit Offer Quantity (credits)</th>
<th>Quantity of Credits Exchanged (credits)</th>
<th>Market Price (USD/credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year Susquehanna Nitrogen</td>
<td>8</td>
<td>42,000</td>
<td>12</td>
<td>375,826</td>
<td>41,000</td>
<td>$2.75</td>
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<tr>
<td>1 Year Susquehanna Phosphorous</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>27,314</td>
<td>0 (no match)</td>
<td>None (no match)</td>
</tr>
<tr>
<td>1 Year Potomac Nitrogen</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>None (no bids or offers)</td>
</tr>
<tr>
<td>1 Year Potomac Phosphorous</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>None (no bids or offers)</td>
</tr>
</tbody>
</table>
Future PENNVEST Auctions

PENNVEST has announced that it, in conjunction with Markit, Inc., will be conducting two spot auctions during the 2010-2011 water year true-up period:

- November 2, 2011
- November 9, 2011

We will soon be announcing a complete schedule of both forward and spot auctions to begin in early 2012.
Where to go from here?

In order to enhance the effectiveness of the clearinghouse mechanism to facilitate nutrient credit generation and trading as a means to help restore the Chesapeake Bay, we suggest the following:

- Cross-basin credit trading and a multistate clearinghouse structure
- Expansion of pool of eligible credit buyers beyond permit holders to include beneficiaries of Bay remediation
Cross-basin Trading and Multistate Clearinghouse

- Cross-basin trading:
  Presently, we have to segregate Susquehanna and Potomac basin credits into separate “sub-auctions”. From the broader Bay perspective (ignoring local basin and “hot spot” issues) this is an artificial distinction. The credit trading market would work much more efficiently if these distinctions were removed to allow trading among credit buyers and sellers who are in different basins. It is our understanding that there is an effort underway with WRI to examine this issue.

- Multistate clearinghouse:
  If the clearinghouse mechanism that we have initiated proves to work in Pennsylvania, it would work even better if it were applied Bay-wide on a multistate level. This would obviously require solving the cross-basin trading issue first.
Expansion of Pool of Eligible Credit Buyers

Those who have an interest, financial or otherwise, in restoration of the Chesapeake Bay should be allowed and encouraged to buy credits, which they would simply “retire”.

- This could greatly expand the financial resources available to finance Bay cleanup through the credit trading mechanism.
- This approach also circumvents the problem of cross-basin trading since no regulatory concerns are involved. Beneficiaries of Bay restoration could immediately bring their financial resources to bear by buying credits that would result from nutrient reduction activities.
Examples of Payments for Environmental Services

- Government sponsored and funded programs:
  - Conservation Reserve Program (USDA) – pays farmers for instituting practices that reduce soil erosion - $1,855 million in assistance in 2009
  - Wetlands Reserve Program (USDA) – pays landowners for instituting practices that protect wetlands - $592 million in assistance in 2010
  - Costa Rica, Payments for Environmental Service (PES), pays landowners to institute sustainable forestry practices to preserve water quality and ecosystem diversity.
  - There are similar PES programs, both publicly and privately funded, in Colombia, Ecuador, Brazil, Guatemala, El Salvador, Nicaragua and Bolivia
Examples of Payments for Environmental Services (cont.)

- Privately financed PES program:
  - Vitell program in France – best known:
  - initiated by Nestle Waters (owners of the Vitell brand) to protect the watershed from which Vitell derives its bottled water.
  - The program pays local farmers in the watershed to compensate them for following land management plans developed by Nestle’s consultant to protect water quality.
Potential Expansion of PES’s to Chesapeake Bay Watershed Through Nutrient Credit Trading

There is significant financial interest in Bay clean-up:

- “The Economic Argument for Cleaning Up the Bay and its Rivers”, Chesapeake Bay Foundation, 2010:
  - “The economic losses associated with the decline in fisheries resources in the Bay are substantial”. Between 1994 and 2004 the decline was about 30%.
  - “The damage and destruction borne by our coasts and estuaries has ... diminished the economic productivity of the nation and the economic wellbeing of millions of Americans who...depend on the coast and the goods and services it provides”
Connection between PES’s and Nutrient Credit Trading

- Nutrient credit trading creates a mechanism whereby those who benefit financially from Bay cleanup (e.g. the fishing industry) can pay those whose actions can cleanup the Bay (e.g. farmers) for their cleanup services.

- To effect these transactions, nutrient credit trading programs should not limit potential credit buyers to regulated entities only. Rather, they should allow, and in fact encourage, the purchase of credits by beneficiaries of Bay cleanup.

- By expanding the population of credit buyers to include beneficiaries, this could potentially greatly increase the financial resources brought to bear for Bay cleanup.
Questions or comments:

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