

Market Solutions and Restoring the Chesapeake

The Economics of Nutrient Trading

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Chesapeake Bay Commission



Tri-State Legislative Commission

- PA, MD, VA

Legislative Partner of Chesapeake Bay Program

7 Members Each (21 total)

- 2 Senate
- 3 House
- Governor or Designee
- Citizen At-Large

32 years of *Policy for the Bay*

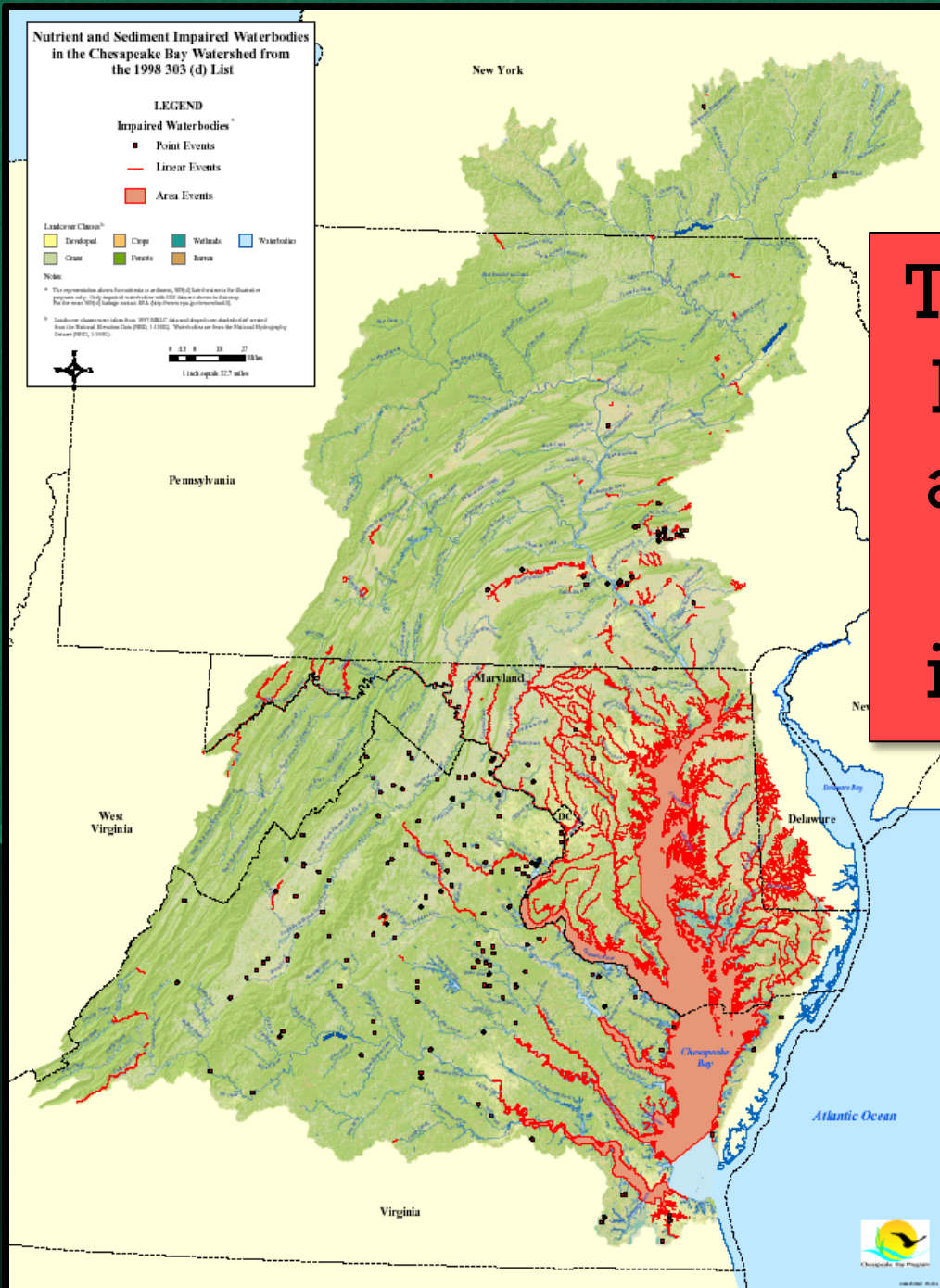
**Nutrient and Sediment Impaired Waterbodies
in the Chesapeake Bay Watershed from
the 1998 303 (d) List**

- LEGEND**
Impaired Waterbodies*
- Point Events
 - Linear Events
 - Area Events

- Landcover Class[†]
- | | | | |
|-----------|----------|----------|-------------|
| Developed | Cropland | Wetlands | Waterbodies |
| Grass | Forest | Barren | |

* The representation shown for waterbodies on this map is based on the National Water Inventory Data (NWID) for the Chesapeake Bay watershed. Only segments on the NWID that are listed as impaired are shown. The NWID is a point-in-time snapshot of the Chesapeake Bay watershed. It is not a dynamic system.

† Landcover data were derived from 2001 USDA National Resources Inventory (NRI) data. The NRI is a point-in-time snapshot of the Chesapeake Bay watershed. It is not a dynamic system. The NRI is a point-in-time snapshot of the Chesapeake Bay watershed. It is not a dynamic system.



The Chesapeake Bay is impaired and subject to a federally imposed TMDL.



Nutrient Trading is One Possible Solution

In our region, 4 states have nutrient trading programs

- ✓ Pennsylvania
- ✓ Maryland
- ✓ Virginia
- ✓ *West Virginia*



Our Approach to the Task

- Project Development & Funding



- Economics Analysis, Modeling and Report Preparation



- Project Management, Policy & Technical Expertise



- Transparency, Accuracy & Applicability

Purpose of the Study

Is:

- ✓ To investigate the *POTENTIAL* cost savings
- ✓ To estimate how potential savings are affected by differing sources and scope

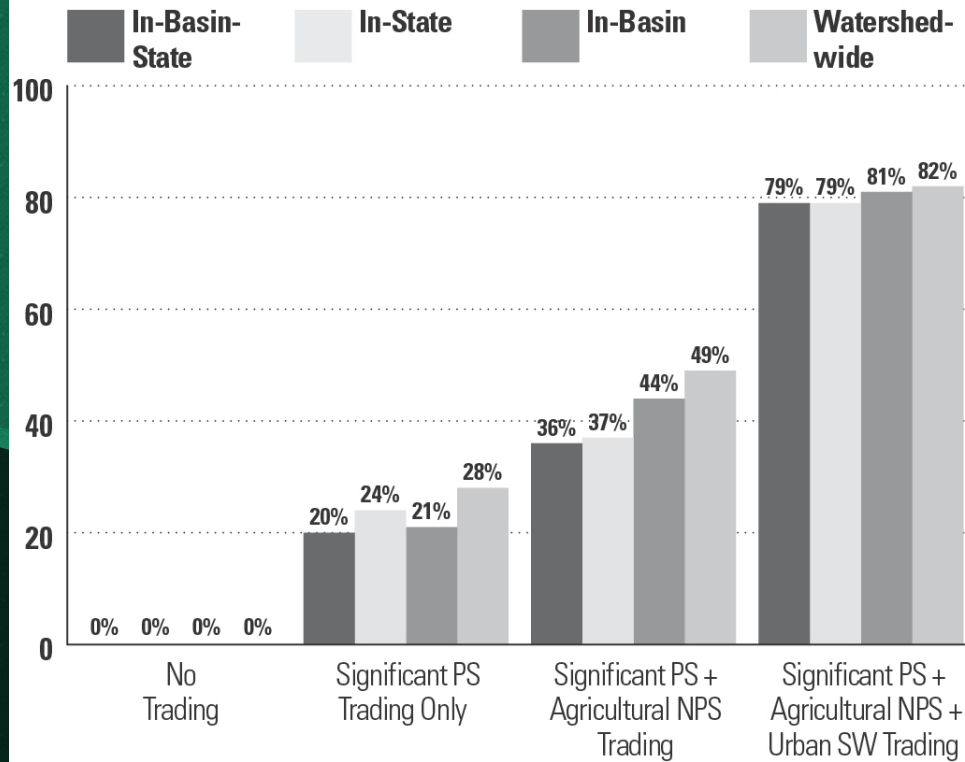
Is *NOT*:

- ✗ To model specific state programs
- ✗ To predict future trading levels

Summary of Findings

Potential Cost Savings (%) from Nutrient Credit Trading

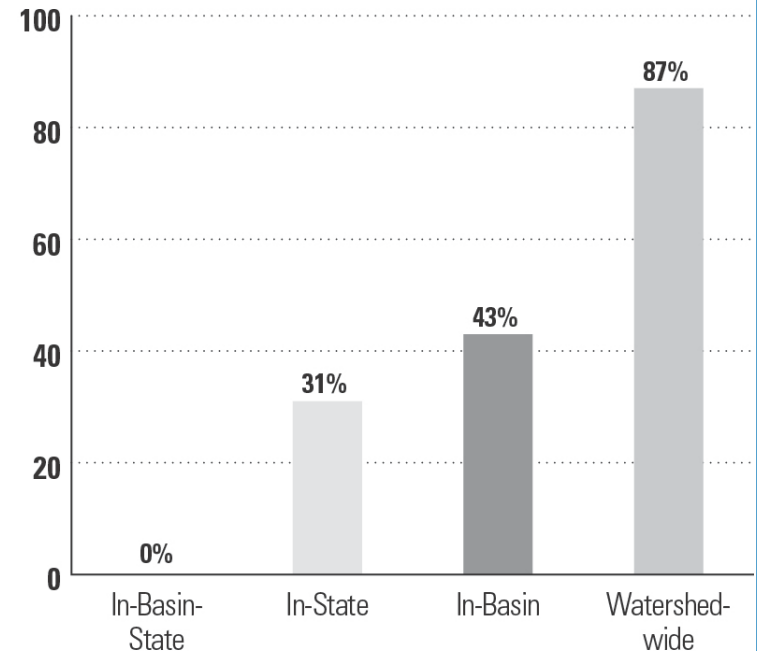
Savings expressed as a percent of TMDL compliance costs for significant point sources with no trading, except for the last column, where the savings are expressed as the percent of TMDL compliance costs for significant point sources and urban stormwater sources *combined*.



Increasing Trading Sources →

Potential Cost Savings (%) from Trading to Offset New Loads

Savings expressed as a percent of costs due to additional treatment capacity at wastewater treatment plants. Does not include costs from land use changes.



Increasing Geographic Scope →

Why *POTENTIAL*
Cost Savings?



A MARKET Requires

- ✓ Defined Product
- ✓ Buyer
- ✓ Seller
- ✓ Voluntary Entry

A MARKETPLACE Requires

- ✓ Rules and Boundaries
- ✓ Information
- ✓ Access

In Reality . . .

MARKETS DO NOT WORK PERFECTLY

Policymakers must consider factors other than cost

Market Restrictions

- ✓ **Baseline for Agriculture**

TMDL implementation

- ✓ **Baseline for Significant Point Sources**

TMDL WLA or 2010 load

- ✓ **Protection of Local Water Quality**

Trades limited to 9M lbs.. N; 200,000 lbs.. P

- ✓ **Trading Ratio**

2:1

- ✓ **Transaction Costs**

38%

- ✓ **Maintain Productive Farmland**

maximum 25% retirement



Nutrient Trading Scenarios

Geography

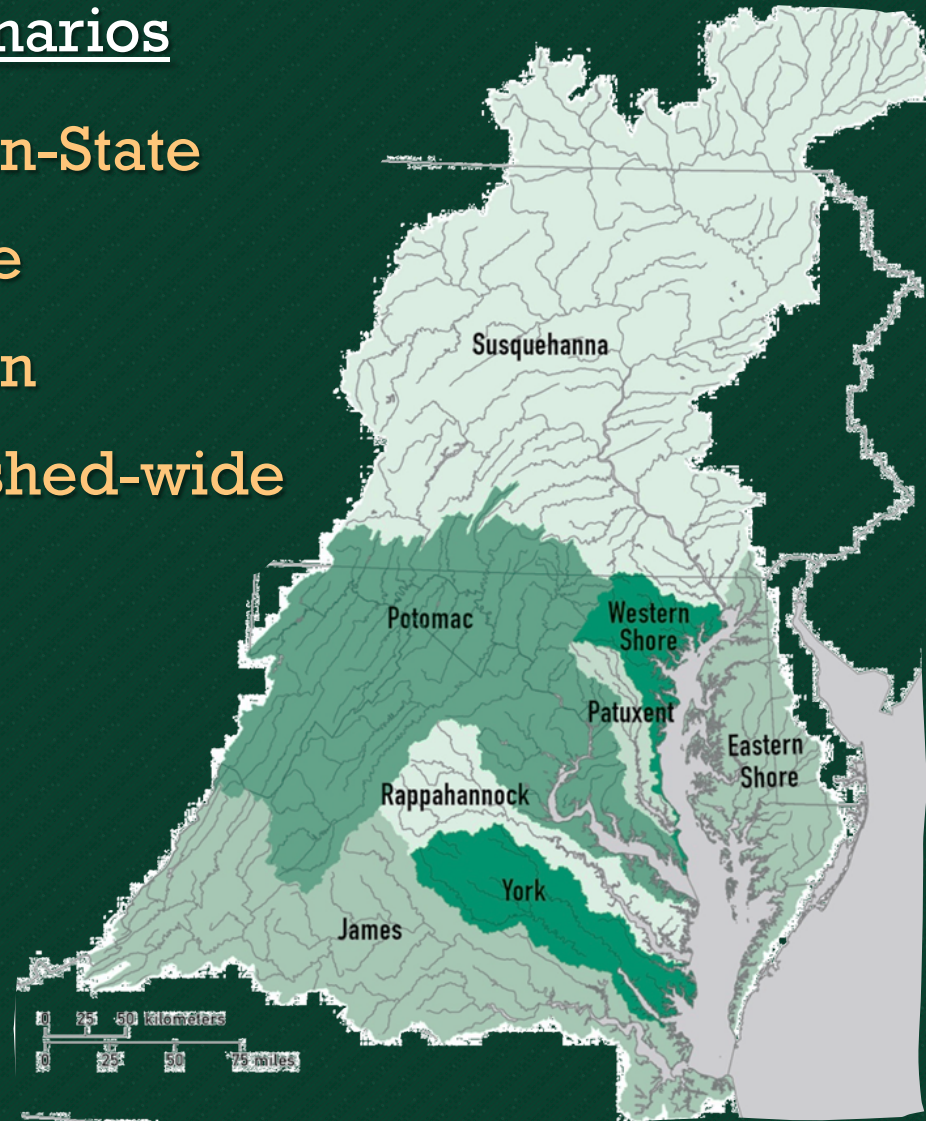
4 scenarios

In-Basin-State

In-State

In-Basin

Watershed-wide



Nutrient Trading Scenarios

Sources

3 short term scenarios

SigPS-Only

SigPS-AgrNPS

SigPS-AgrNPS-Urban

1 long term scenario

Offset-Only

Significant Point Sources (SigPS)

475 municipal and industrial facilities

- 16 tiers of treatment based on:
 - 8, 5 or 3 mg/L N
 - 1, 0.5 or 0.1 mg/L P
- Annualized costs (capital and O&M) based on EPA's ongoing cost analysis

Control Projects,
Load Reductions
and Annual Costs



Agricultural and Urban Stormwater BMPs

- Annualized unit costs (\$/ac/yr)
- Includes land, installation and O&M

Control Projects,
Load Reductions
and Annual Costs



Aligning Our Work

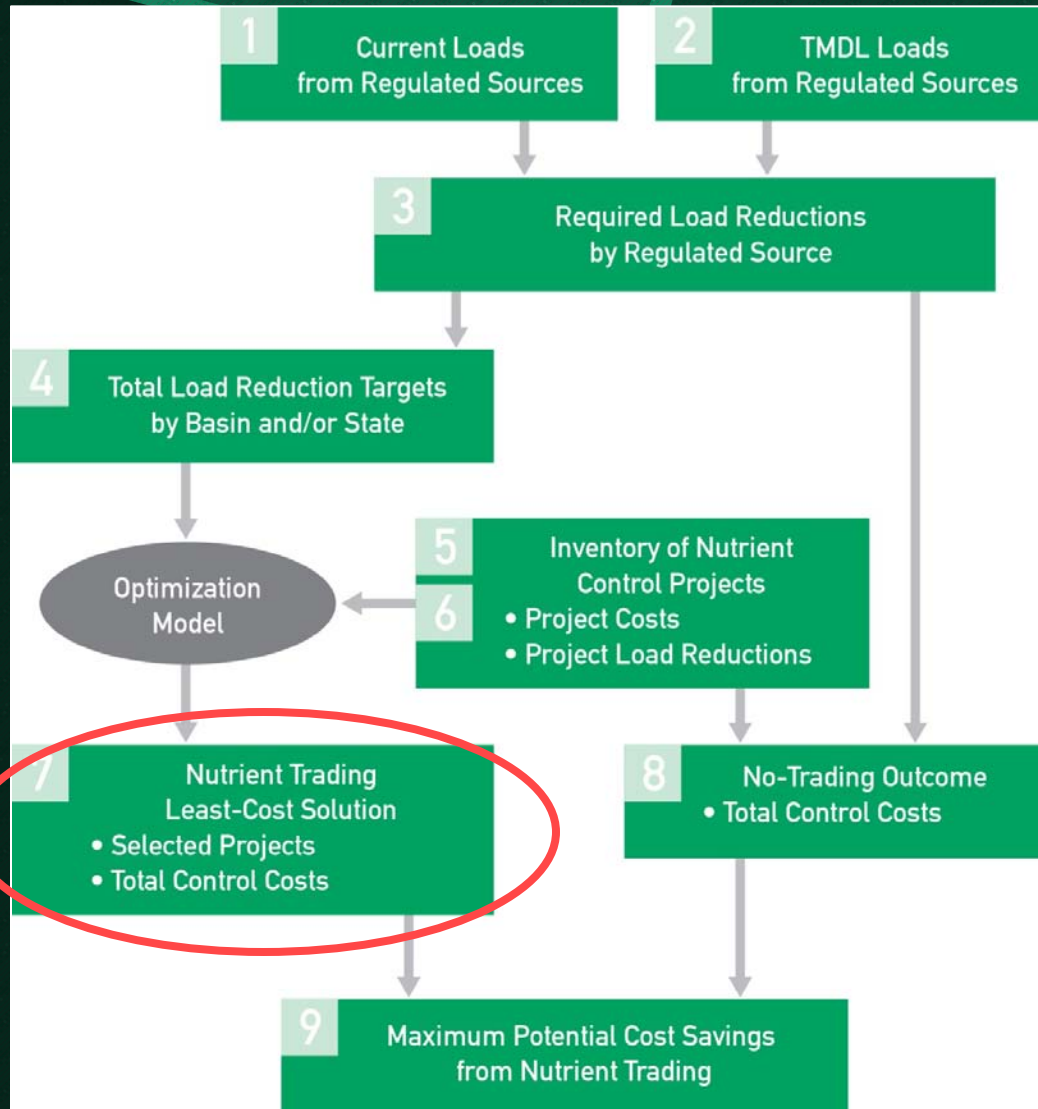
The Chesapeake Bay Program's *Watershed Model Phase 5.3.2* Provided Key Inputs

- Watershed network and segmentation
- Land use/land cover
- Delivered loads
- BMP nutrient removal rates
- Acres of BMP implementation

Analytical Framework

9 step process to identify the least-cost solution (representing the trading outcome)

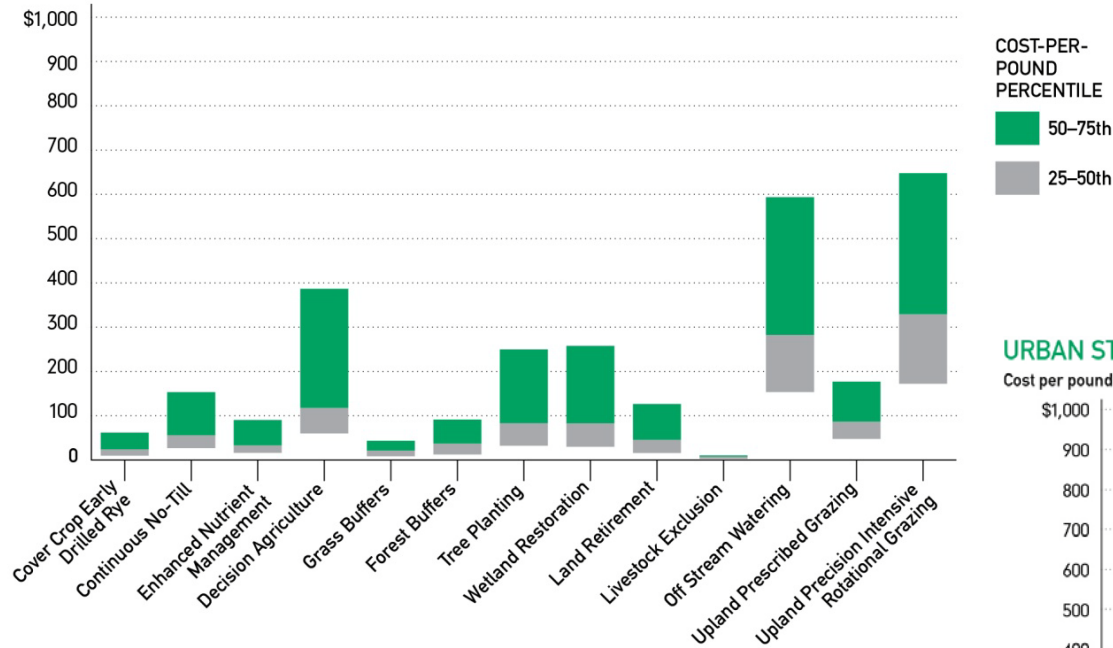
Optimization model used always seeks least cost BMPs first as available within other constraints (basin, state, local water quality, etc.)



Cost-Effectiveness of Ag BMPs and Stormwater for N Removal Vary Widely

AGRICULTURAL BMPs

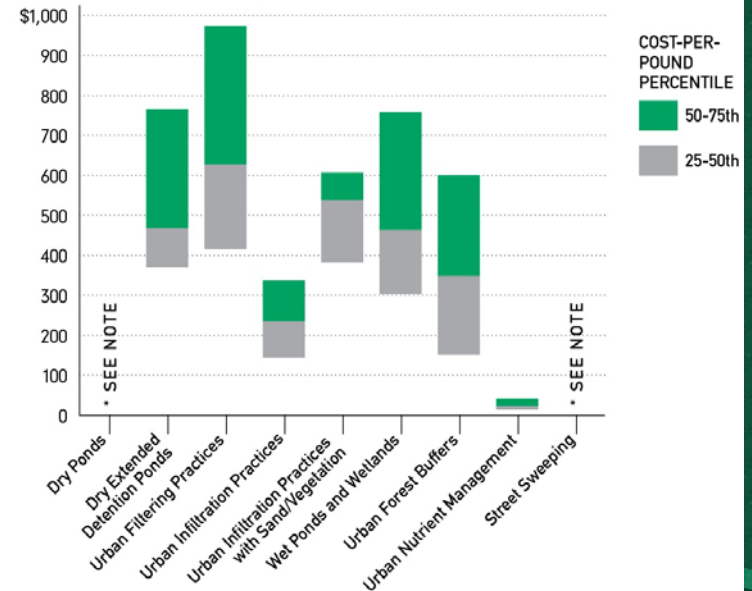
Cost per pound of NITROGEN reduced per year



Using N as an example

URBAN STORMWATER BMPs

Cost per pound of NITROGEN reduced per year



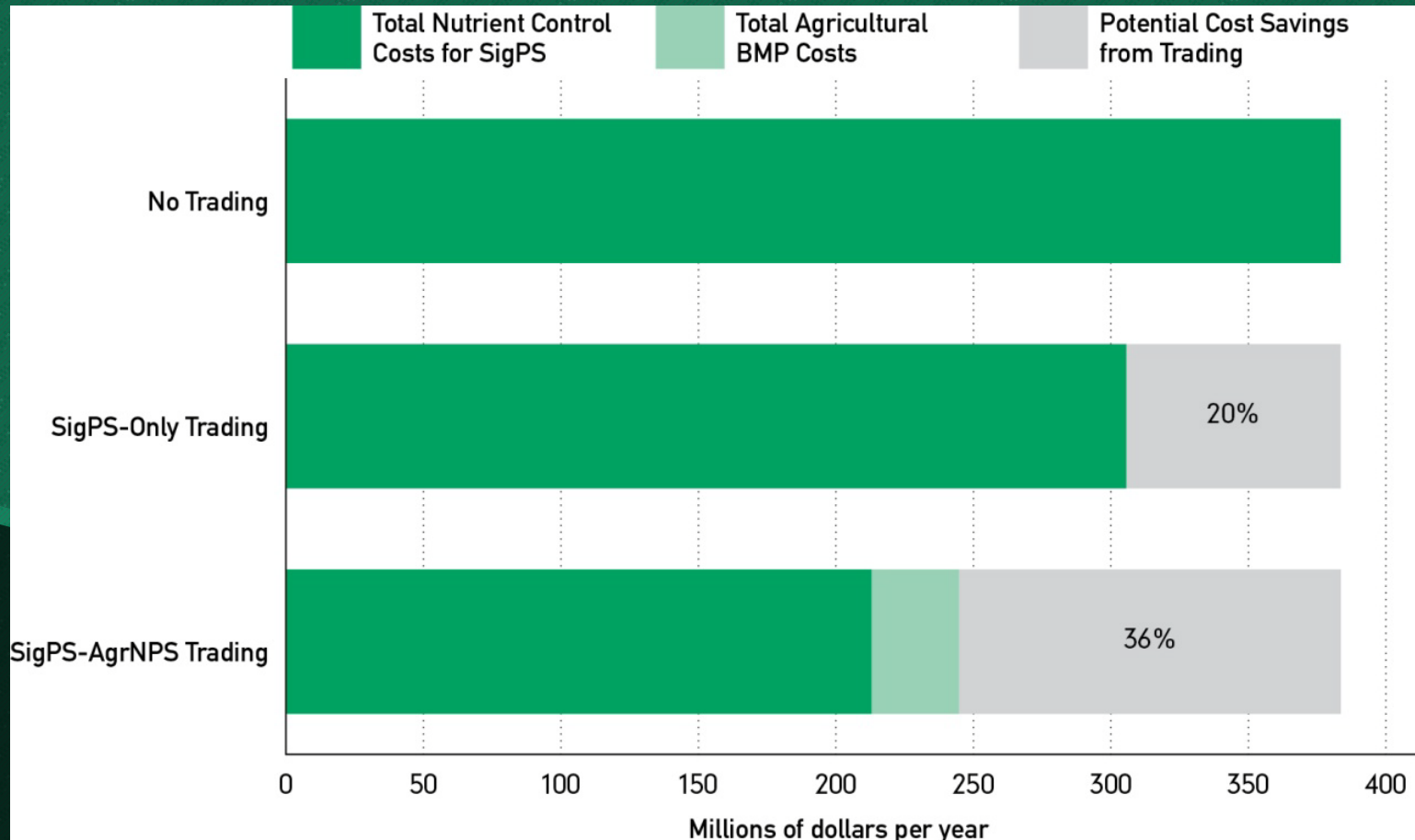
***Value ranges for dry ponds and street sweeping are above \$1,000/lb**



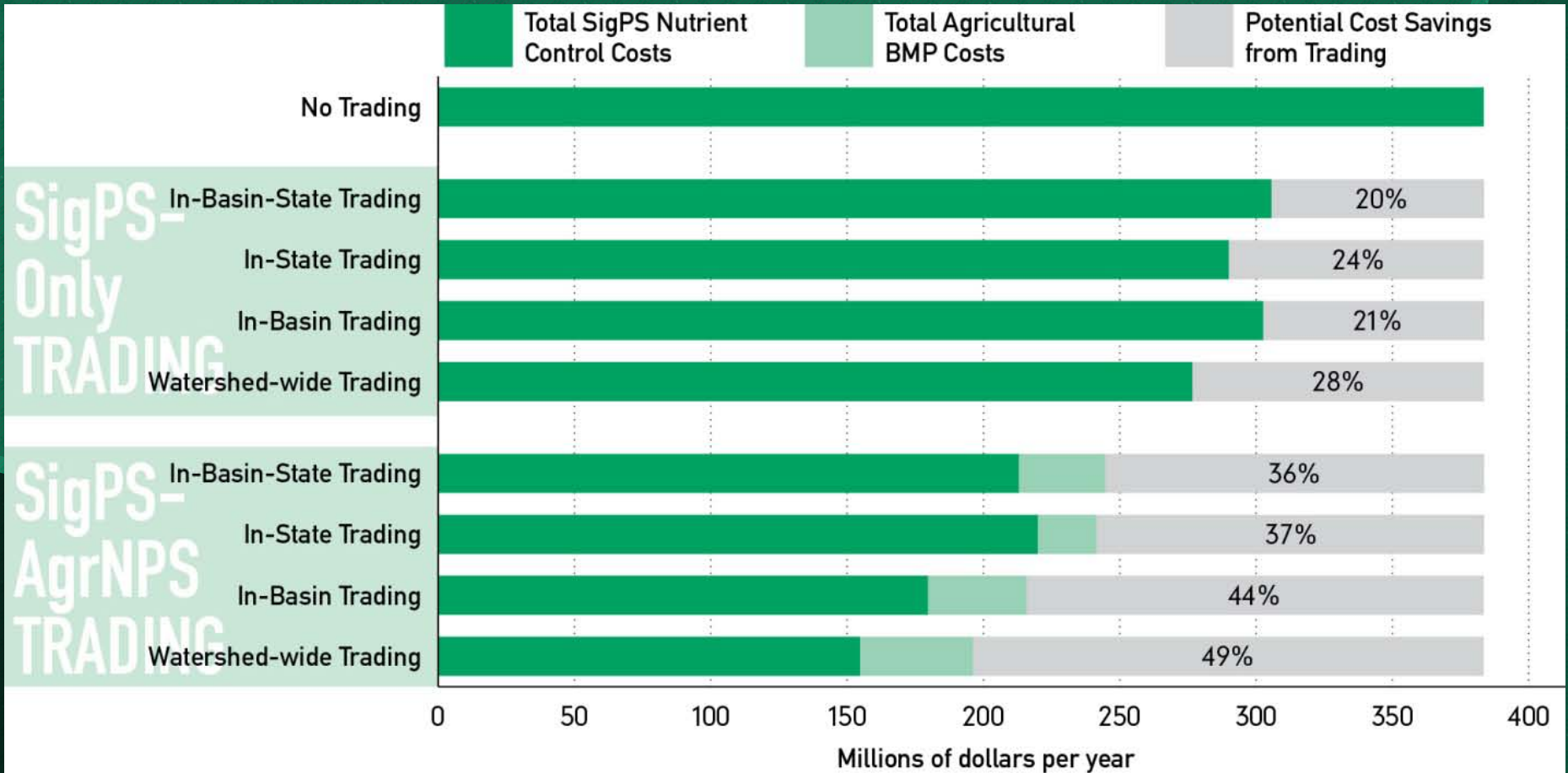
The Findings

Cost of Meeting SigPS Load Reduction Targets

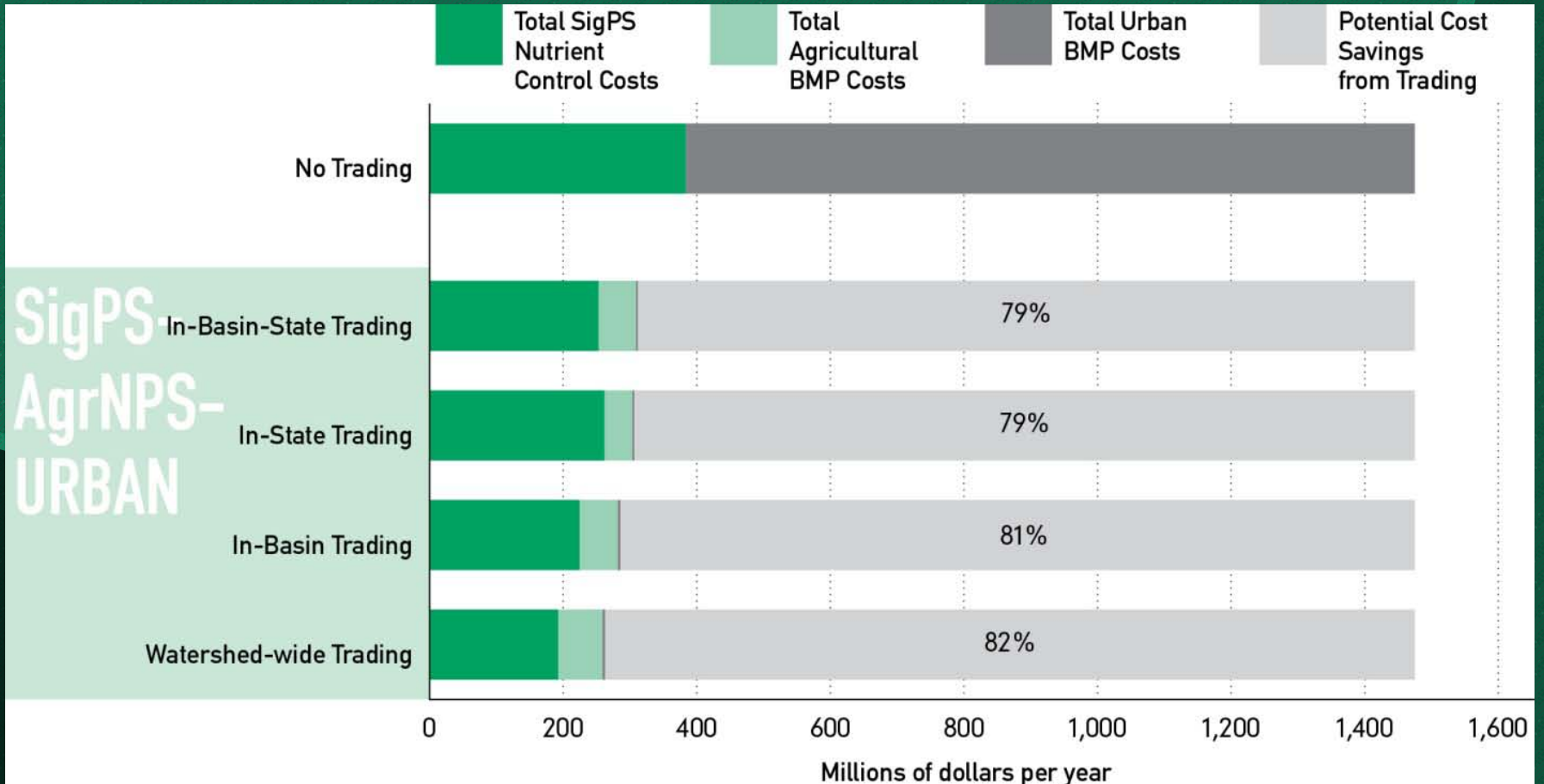
No-Trading v. In-Basin-State Trading



Cost of Meeting SigPS Load Reduction Targets

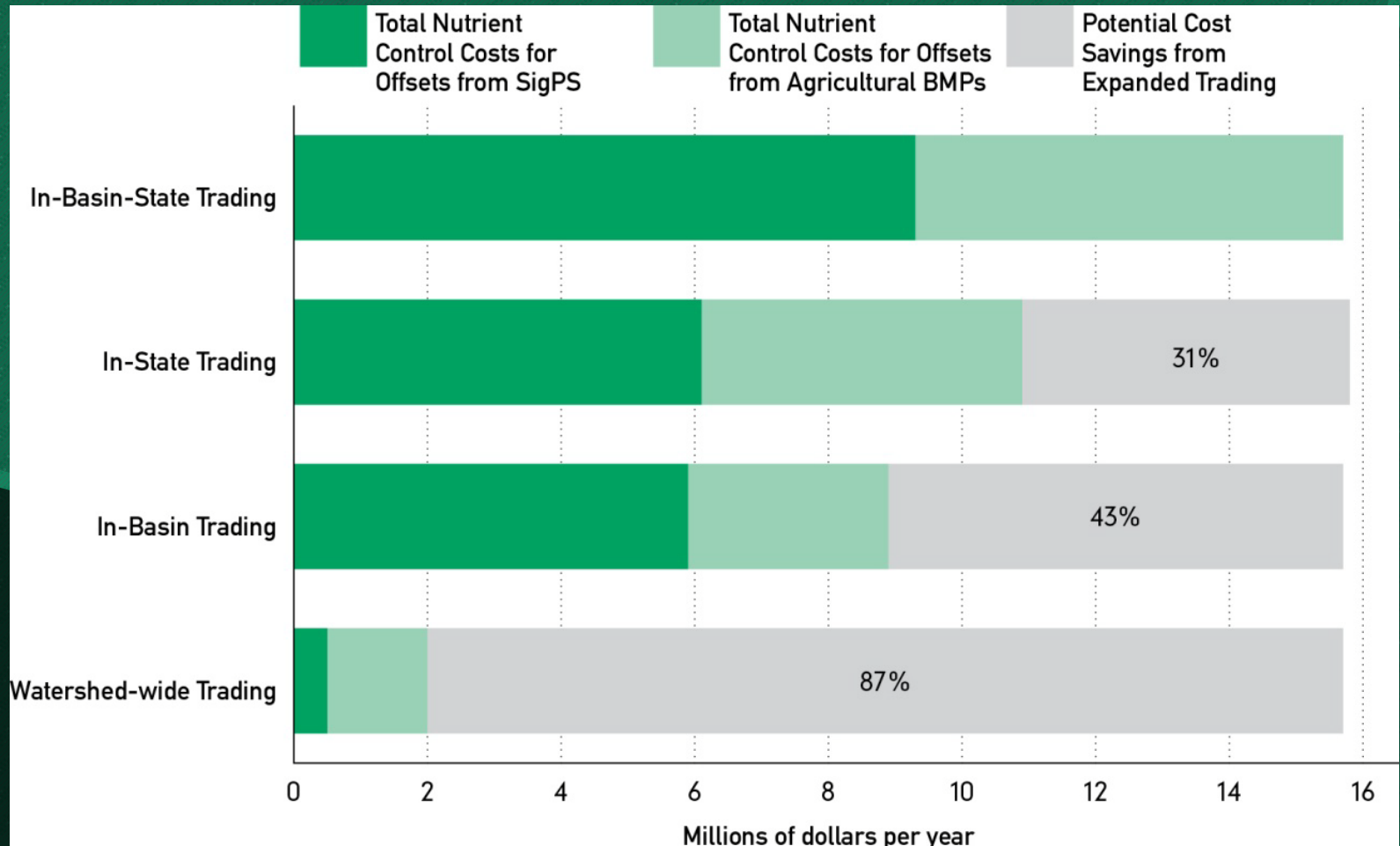


Cost of Meeting SigPS AND Regulated Urban Stormwater Load Reduction Targets



Cost of Offsets for Added Capacity at Municipal SigPS

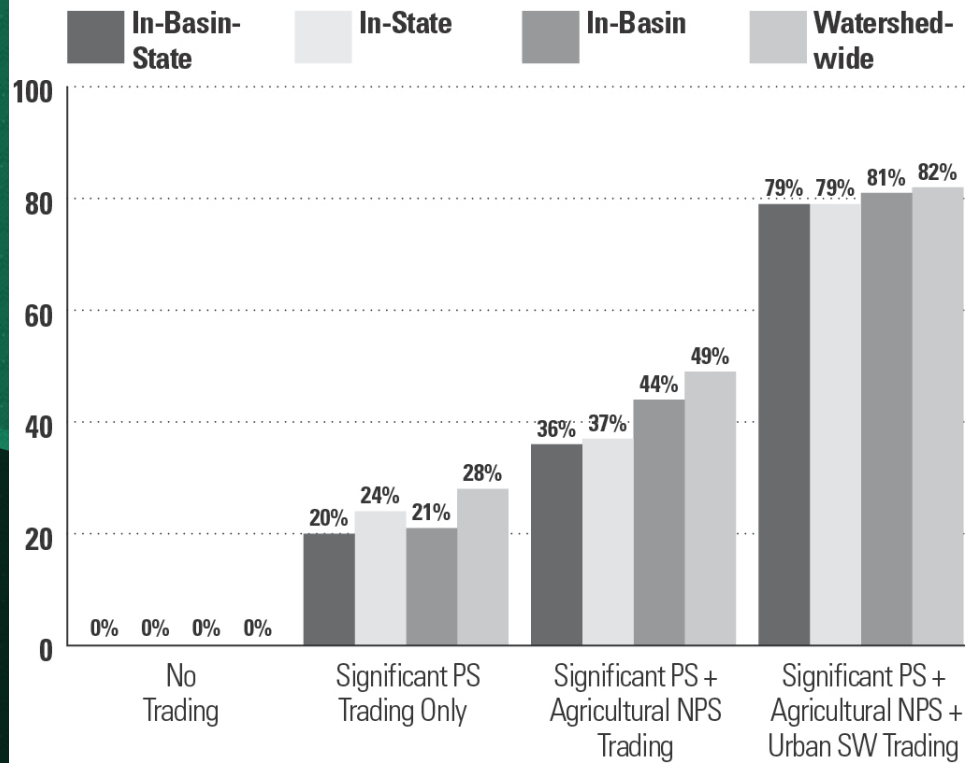
Long Term Offset-Only Trading Scenarios



Summary of Findings

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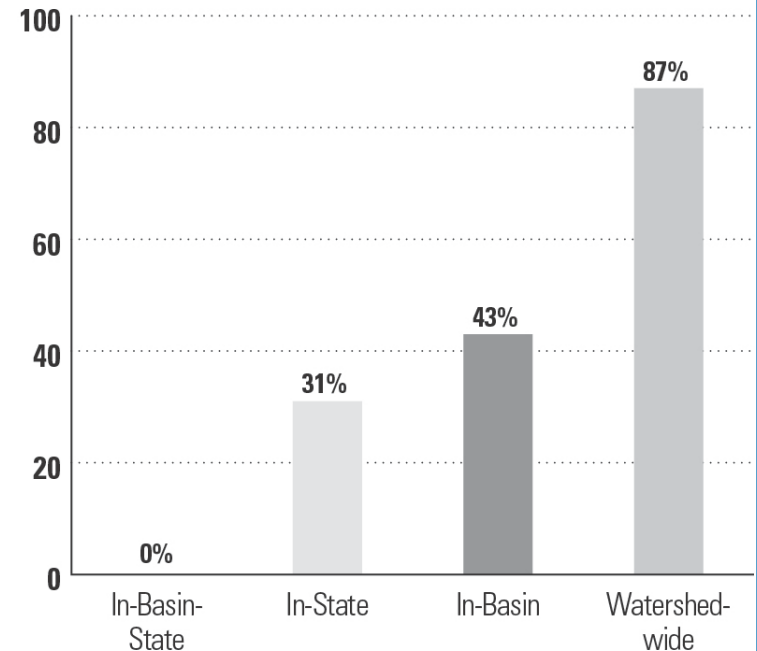


Increasing Trading Sources



Potential Cost Savings (%) from Trading to Offset New Loads

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Increasing Geographic Scope



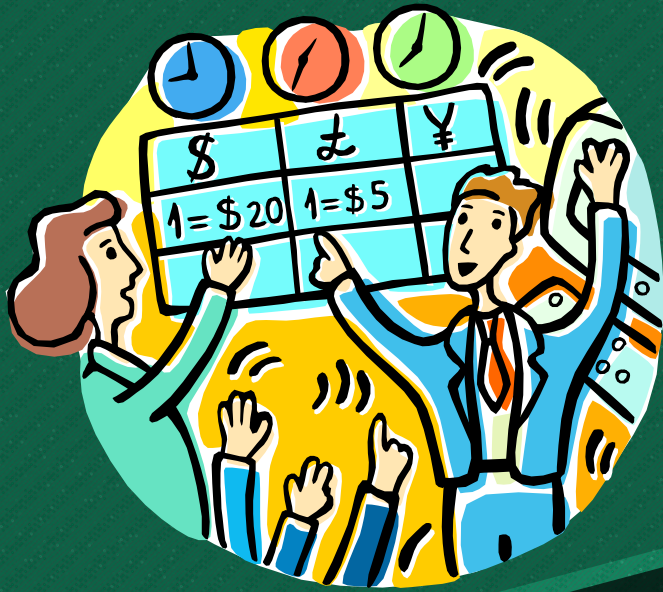
 Verification

 Local Water
Quality Protection

 Measurable and
Enforceable Cap

Keys to a Successful Trading Program





Current Trading Programs

Virginia, Maryland and
Pennsylvania

Current Trading Programs: VA, MD & PA

Authority

VA & PA – direct Code authority and regulations

MD – general Code authority & policy

Who can trade?

VA – Point sources: buy & sell, buy from NPS; New development (SW)
buy from approved sources; Voluntary

MD & PA- Point sources, nonpoint sources, third parties; Voluntary

What can be traded?

VA- Point sources N for N, P for P; PS-PS ratio 1:1, PS-NPS ratio 2:1
New development P for P ratio 1:1, retires N, permanent

MD- N for N, P for P, require net load decrease, 5% retirement ratio for
PS credits and 10% for NPS credits

PA- N for N, P for P, 10% required credit reserve

Current Trading Programs: VA, MD & PA

Where can trades occur?

VA- within major river basins; Eastern Shore with Potomac

MD- within major river basins; Eastern & Western Shore with
Susquehanna

PA- within major river basins; pilot program between basin approved
and Potomac basin with West VA considered

Eligibility (CANNOT degrade local water quality)

VA- PS below TMDL WLA can sell, buy to comply; NPS generate if
baseline met, land conversion; credits already generated

MD- PS and NPS that go beyond baseline can sell; limit Ag land
conversion

PA- PS and NPS baseline is any legal requirements plus Ag has
threshold performance level; limit Ag land conversion

Current Trading Programs: VA, MD & PA

Certification

VA- PS permit compliance, NPS specific activity approval

MD- DE P permit compliance & certification, MDA farm visit certification

PA- DEP “proposed” activity approval; valid 5 years, renewal

Verification

VA – DEQ inspections and compliance audits

MD- DEP PS compliance; DA verifies Ag credits

PA- Self-verification or 3rd party; DEP can inspect & audit

Registration

VA- PS credits generated/used annually; NPS Credit Registry tracks

MD- Credits are “numbered”, posted to MD Trading Registry

PA- Credits are numbered and tracked

Questions?

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