Maryland
Department of the Environment

Crediting Reductions in Atmospheric Nitrogen Deposition Toward Chesapeake Bay Restoration

Greg Busch & Dinorah Dalmasy
MDE Water and Science Administration

Water Quality Goal Implementation Team
November 30, 2020

Project statement

Formulate a Partnership approach to permanently credit states' WIPs for exemplary air quality or greenhouse gas reduction programs that decrease atmospheric deposition of nitrogen in the bay watershed

Can we get credit now?

- Under some circumstances, yes
  - For example, Volkswagen settlement reductions
  - Maryland's Phase I WIP credited the state's Healthy Air Act
- But credit is temporary and limited to few activities
- Qualifying conditions:
  - Chesapeake Bay TMDL (Appendix L)
    - "Determine whether the emission source for which the state is seeking credit already assessed credit for reductions in the state's State Implementation Plan (SIP) for achieving the state's air quality standards"
  - Summary:

➔ **An action can get either SIP credit or WIP credit for a state, not both**

What is a SIP?

- State Implementation Plan
  - Plan for attaining and maintaining air standards
    - National Ambient Air Quality Standards (NAAQS)
      - Criteria air pollutants: CO, lead, NOx, Ozone, Particulates, SO2
  - SIPs include:
    - State-adopted control measures
      - Regulations and requirements (for example, consent decrees)
      - Current and proposed
    - State emission inventories
      - State SIPs are aggregated into a national model for assessing air quality standard attainment
  - SIP revisions occur periodically:
    - Updated standards
    - Nonattainment on a planned timeline
    - Performance of control technology does not match planned performance

https://www.epa.gov/sips/basic-information-air-quality-sips#:~:text=A%20State%20Implementation%20Plan%20(SIP,Air%20Quality%20Standards%2C%20or%20NAAQS.

How are actions included in SIP?

- Explicit inclusions (inputs):
  - List of current and future state air regulations and requirements
  - Concern
    - Federal ozone standards (8-hour 70 ppb) is ambitious

    ➔ **No WIP credit for most future actions that impact NOx**

- Implicit inclusions (calibration):
  - Any action picked up in air baseline monitoring and modeling
  - Concern
    - Every time baseline modeling is updated, all existing programs are implicitly incorporated into SIP

    ➔ **Any WIP air credits expire after a few years**

- CMAQ Modeling
  - Domain: North America
  - Inputs from national data sets: NEI, etc
  - Calibrated with nationwide monitoring data: NADP AIRMoN, etc

WIP credit vs. SIP credit

- WIP credit (Bay TMDL Section 6.3)
  - Allocations based on:
    - "Equitable distribution of loads"
    - Protect living resources
    - Basins contributing most, do most
    - Tracked and reported reductions are credited to WIP
    - Controllable load
    - Geography and relative effectiveness
  - Responsibility is assigned to all contributors

- SIP Credit in WIP
  - 2025 WIP Scenario includes fully-implemented SIPs
    - Captures nationwide actions (all states)
    - New CMAQ scenario for 70 ppb ozone standard by 2025
  - Actions from other states are included in modeling
    - But each state is responsible for meeting its own standards
  - Is a state meeting NOx and ozone standards?
    - If not, programs are applied to SIP, not WIP

Challenges with SIP Accounting in WIP

- Inconsistency in WIP crediting between:
  - Atmospheric deposition reductions
    - Based on meeting air quality standards in state (Yes/No)
  - All other reductions (ag, stormwater, wastewater …)
    - Based on equity

  ➔ Can atmospheric deposition credits adopt an equity (level-of-effort) approach to better align with the WIP?

- Permanence of credits
  - Credits are eliminated each time the SIP model is updated

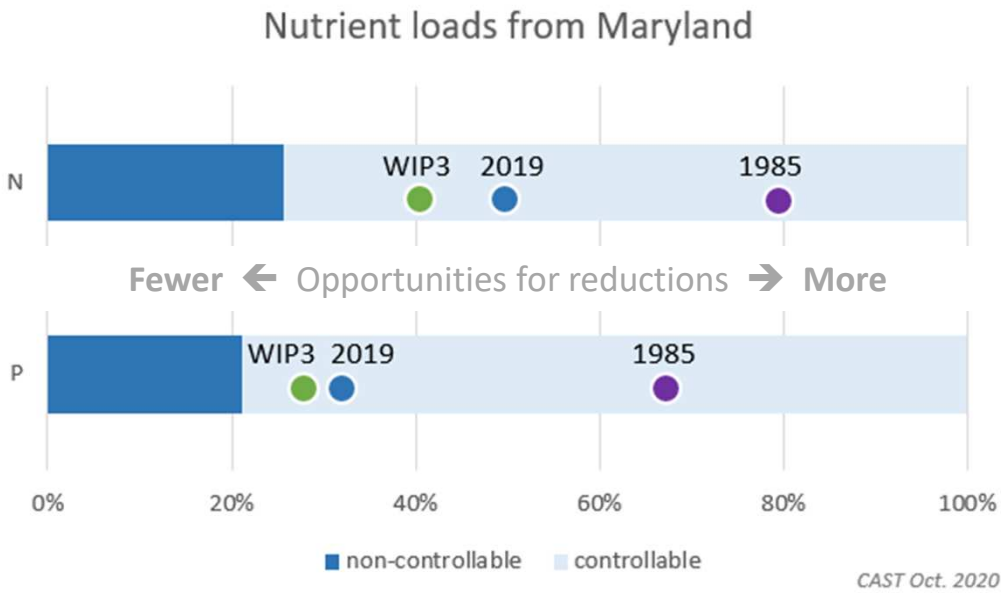
  ➔ Can the Partnership create a framework for permanent atmospheric deposition credit for state WIPs?

Atm. deposition credits are important

- States will need more reduction opportunities for 2026 and beyond
- These offer high potential co-benefits
- They are potentially cost-effective

Reduction opportunities are decreasing

- States' Phase III WIPs are pushing the bounds of feasibility
  - More required reductions in future
  - Opportunities will be scarce



What are the potential reductions?

Rough estimate of potential NOx reductions

	2014 Mobile and Stationary Emissions		Delivery to Bay	Load to Bay
	(tons NOx)	(lbs N)		(lbs/yr)
Maryland	138,492	84,299,725	4.13%	3,481,579
Pennsylvania	492,751	299,935,391	2.43%	7,288,430
Virginia	273,700	166,600,000	3.36%	5,597,760
TOTAL	**904,943**	**550,835,117**		**16,367,769**

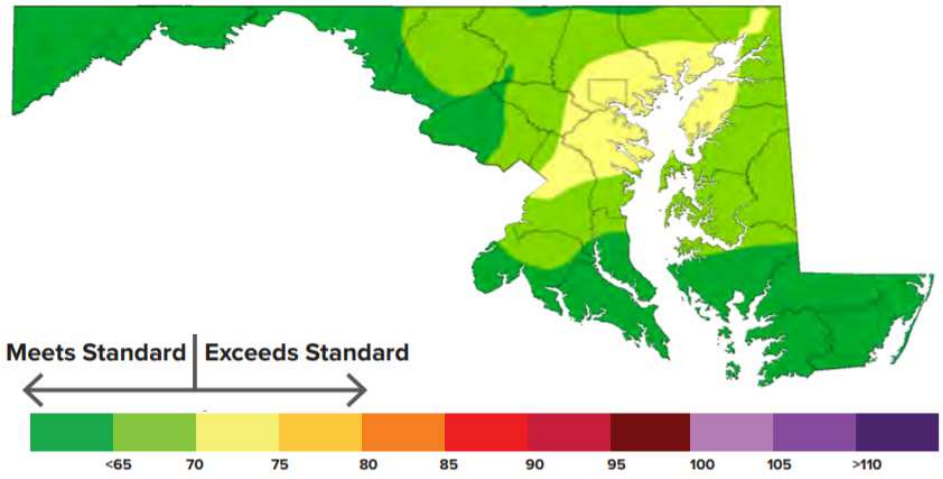
https://www.chesapeakebay.net/channel_files/28679/influence_of_volkswagen_settlement_agreements_on_chesapeake_water_quality_final_8-20-18.pdf
https://edap.epa.gov/public/extensions/nei_report_2014/dashboard.html#sector-db

- Atmospheric deposition reductions could offer over 16M pounds of nitrogen reductions, roughly 8% of Phase III WIP loads
  - Many of these potential reductions are already credited to the 2025 WIP3 scenario, but many are not
  - This table only considers oxidized nitrogen, not reduced

Atm. deposition reductions & co-benefits

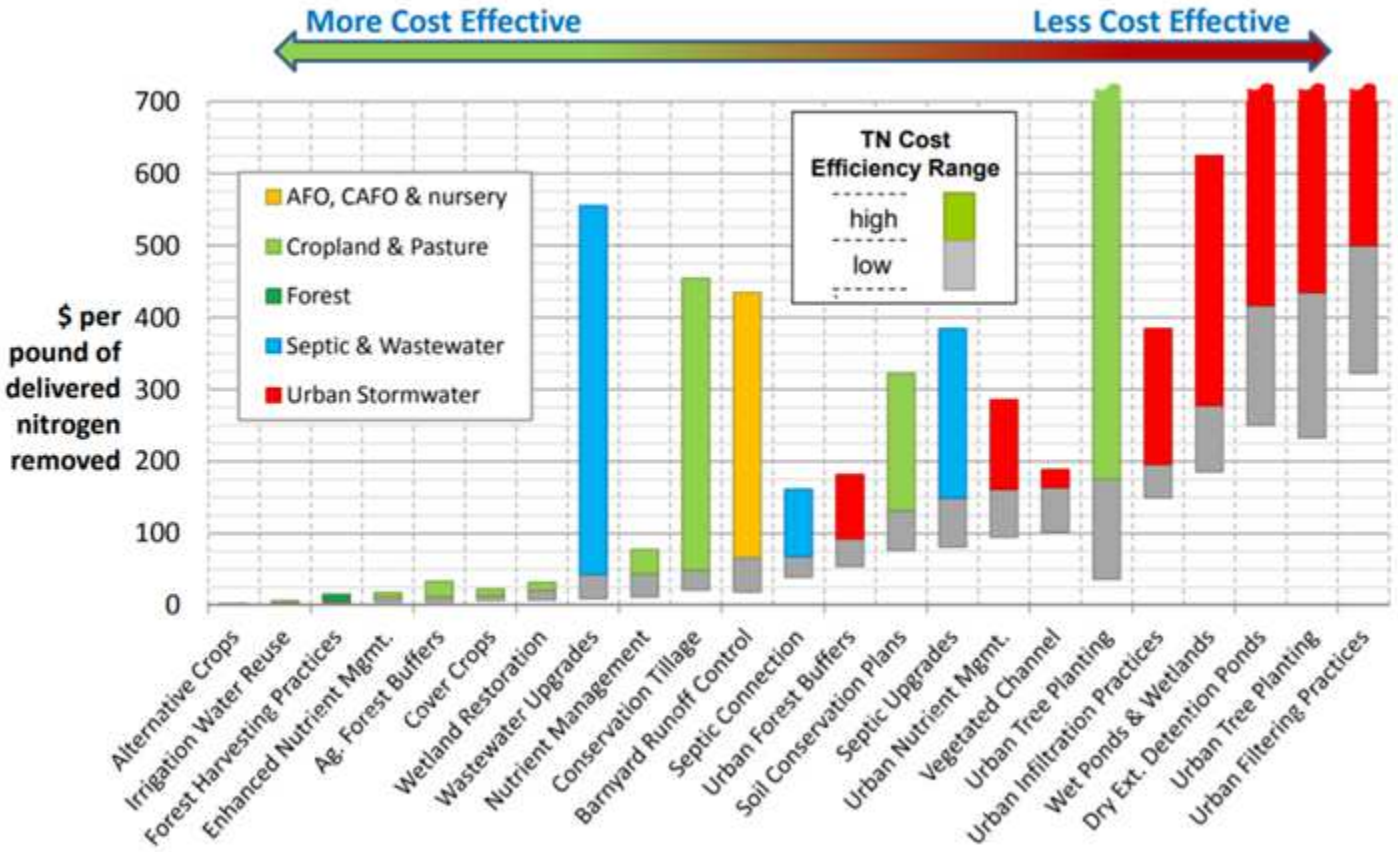
- Green house gas emissions reductions
  - States will aggressively decarbonize in coming decades
- Air quality in urban areas

2019 Ozone Concentrations in Maryland



https://mde.state.md.us/programs/Air/Documents/GoodNewsReport/GoodNews2020.pdf

Cost effectiveness of N reductions



Cost effectiveness of the most efficient 5% of VW settlement projects

➔ **For nitrogen reductions, the most cost-effective VW projects are competitive with other practices**

https://mde.state.md.us/programs/Water/TMDL/TMDLImplementation/Documents/Regional_Meetings/Fall2013/presentations/Cost_Efficiency_WIP_Fall_Workshops_10312013.pdf

Summary

- Current WIP atmospheric deposition crediting
  - Severely limits which actions can be credited
  - Limited to temporary credit
  - Is inconsistent with other WIP crediting procedures
    - Based on individual state attainment rather than equity
- A more robust framework would yield many benefits
  - Expand opportunities for reductions in 2026 and beyond
  - Co-benefits like GHG reductions and urban air quality
  - Potentially cost-effective when considering value of all benefits

Proposal

- Form a Partnership Action Team to consider:
  - Framework for permanent nitrogen credits from atmospheric deposition
  - Focus on credits for 2026 and beyond
    - Assembling team, project statement, technical work & policy work will take several years, at minimum
  - Significant programs rather than one off projects
    - Impacts of GHG reduction programs on nitrogen
    - Consider sources of oxidized and reduced nitrogen
  - Equitable crediting based on level-of-effort

➔ This is a substantial challenge in terms of both policy and technical analysis