Linking Air Pollution Mitigation and Energy Strategies

Air Quality and Climate Change Policies: Separate or Joint Challenges?

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Presentation Overview

1. Introductory Framing
2. Illustrations of Co-Benefits
3. IMPEAQ Multi-pollutant Planning Process
4. Initial US Experience with Integrated Multi-Pollutant Planning
5. Conclusions

1. Introductory Framing (1)

- We *breathe* on an integrated basis, so we should *plan* and *regulate* on an integrated basis
- Little progress will be made if AQ, energy, and climate regulators:
  - Do not talk to each other
  - Choose to remain ignorant of important aspects of each other's area of responsibility
  - Are prohibited from considering each other's goals by legal, institutional, or political boundaries

1. Introductory Framing (2)

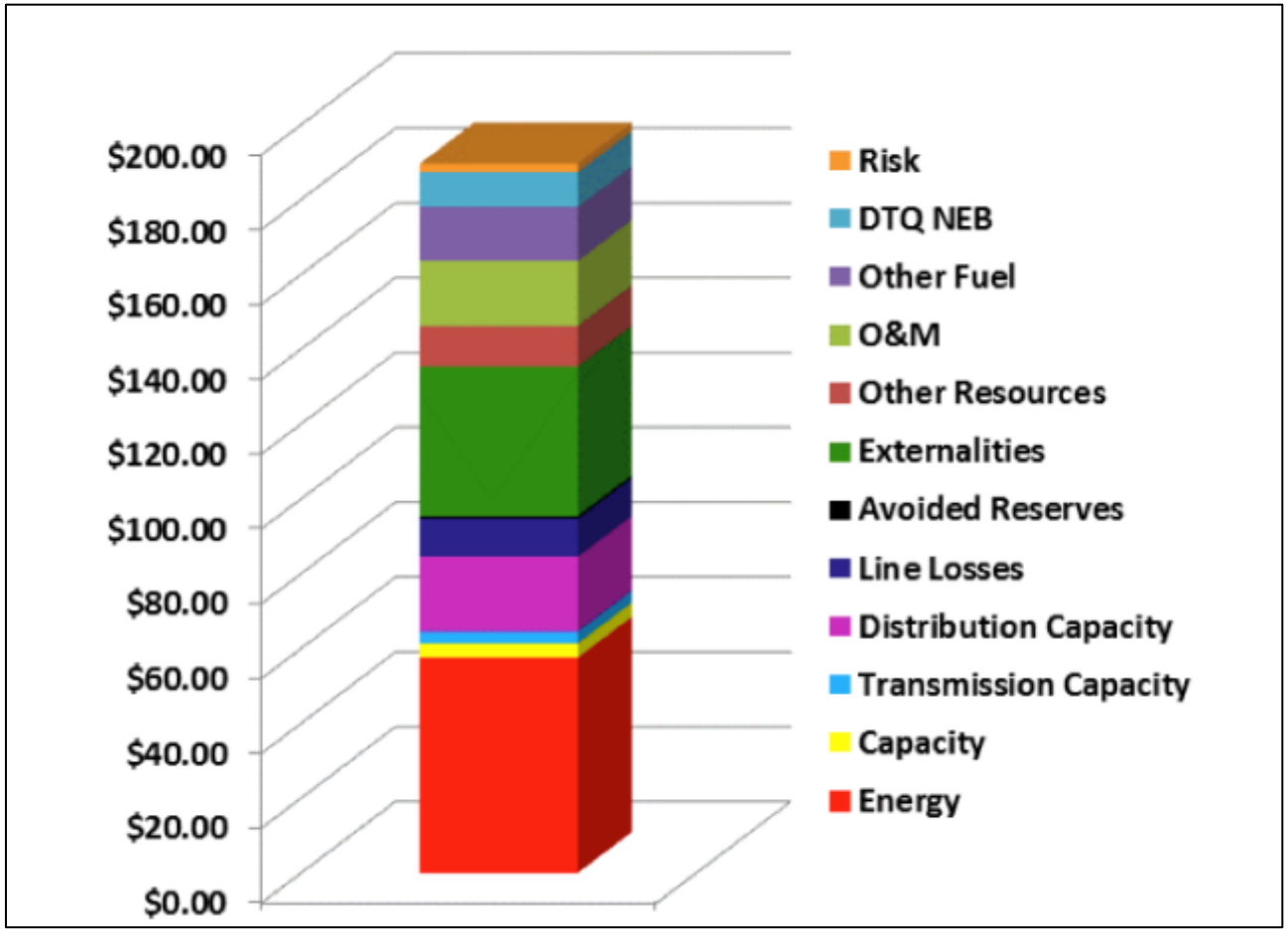
At least 3 advantages to integrating Air Quality (AQ), Energy, and Climate Change policy:

1. Lower costs
2. Fewer trade-offs
3. More co-benefits

Degree of Integration	Resulting Interactions	Financial Character
3 Separate Policy Areas	Conflicts and Trade-Offs	Costs & Countermeasures
1 Integrated Policy	Synergies & Co-Benefits	Investments

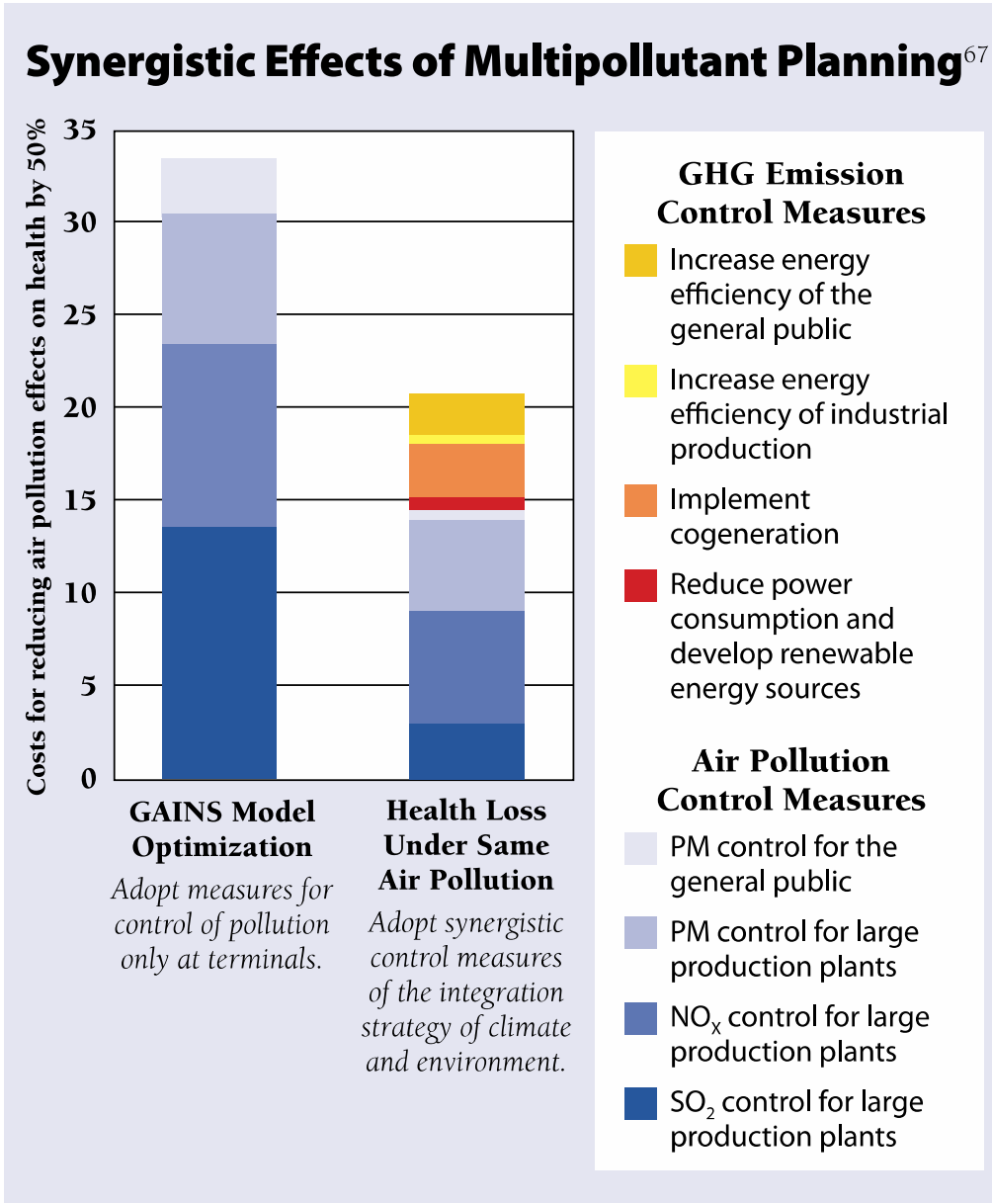
2. Illustrations of Co-Benefits

Multi-Pollutant Measures (e.g., EE) Offer Extraordinary Co-Benefits



US$ / MWh

(Source: RAP, 2012, Vermont Data)

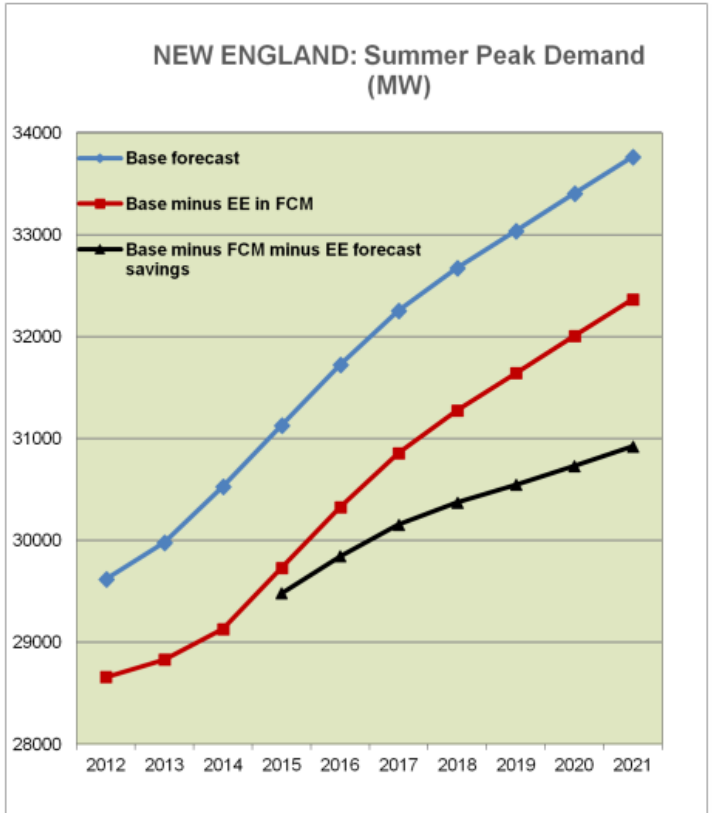


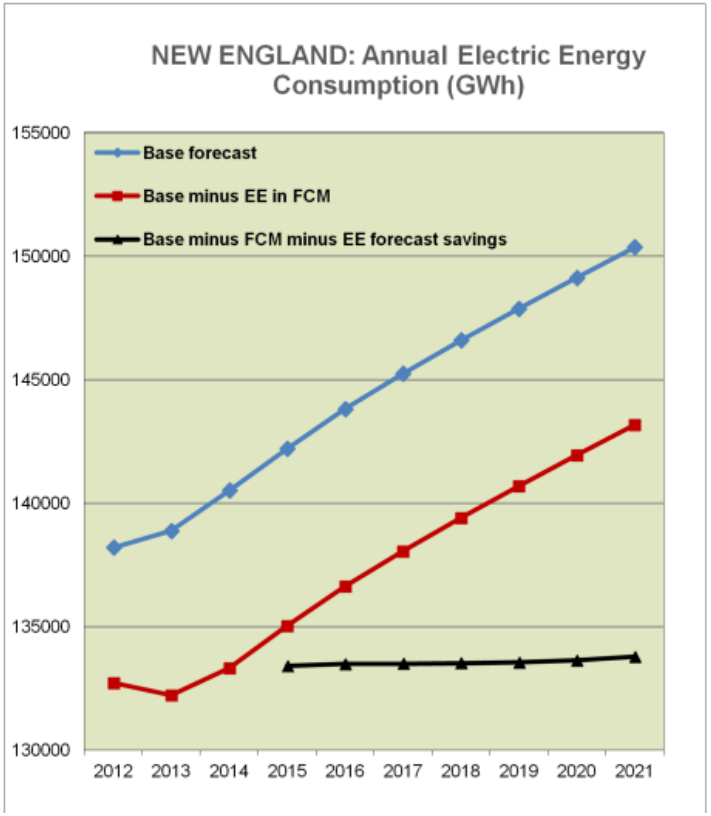
Synergistic Effects of a Multi-Pollutant Approach Offer Economic Benefits

Design Task: Reduce air pollution health impacts by 50%.

(Source: Based upon Bollen et al, 2009 cited in RAP 2012, Integrating Energy and Environmental Policy)

EE Impacts in ISO-NE Forecasts





These results have already led to the cancellation of 10 planned transmission upgrades in New Hampshire and Vermont, saving $260 million.

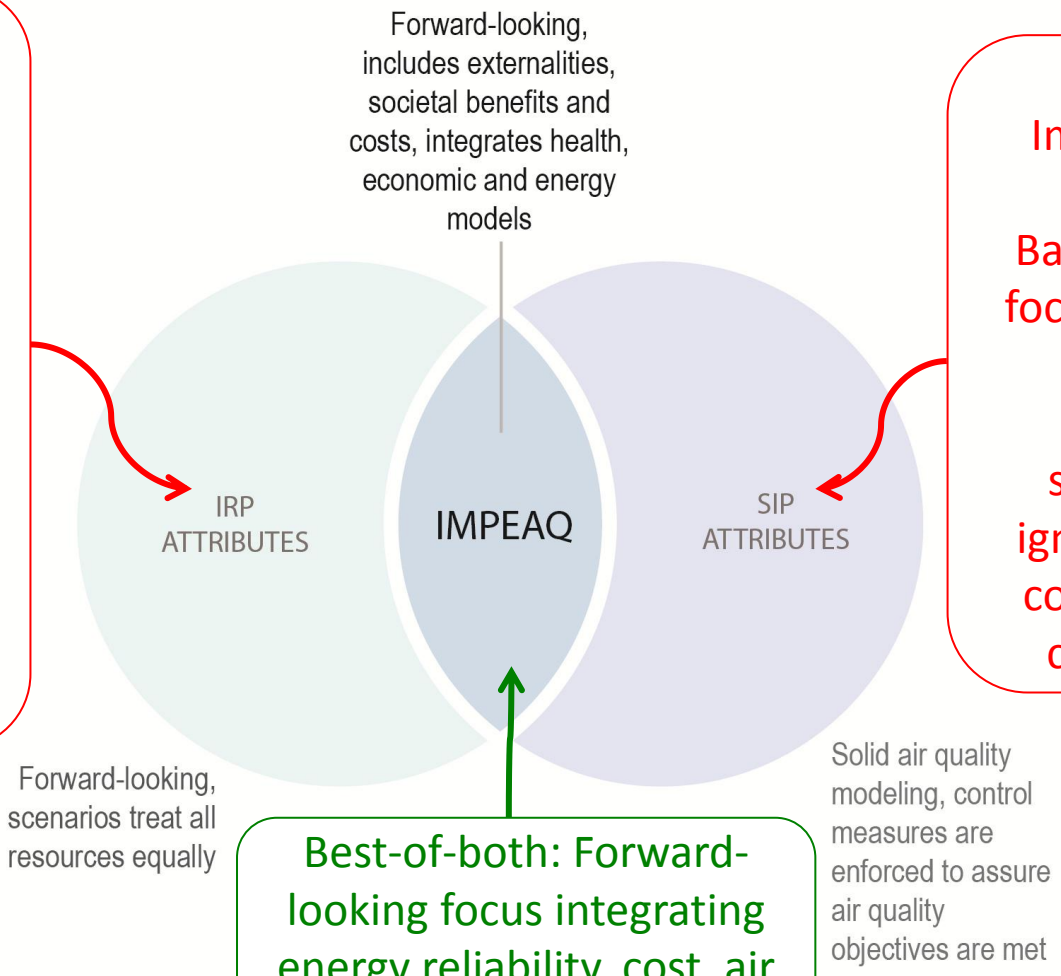
IIASA's GAINS Modeling Shows Similar Results

- For 2005 TSAP strategy
  - Estimated co-control could reduce costs of GHG mitigation by 40%
- For EU 2020 GHG Target (20% → 30%)
  - Estimated costs of 2005 TSAP would be ~3 billion less in 2020 and provide health benefits of 3.5-8 billion
- For 2012-2013 AQ Review
  - An illustrative 80% decarbonization scenario would offer similar reductions in SO_2, NO_x and PM emissions by 2050 compared to fully implementing remaining end-of-pipe air pollution measures

3. IMPEAQ Integrated Multi-Pollutant Planning Process

Integrated, Multi-pollutant Planning for Energy and Air Quality (IMPEAQ)

Integrated Resource Planning (IRP): Forward-looking focus by energy regulators on ways to meet electric system reliability needs at least-cost, but ignores public health and environmental "externalities."



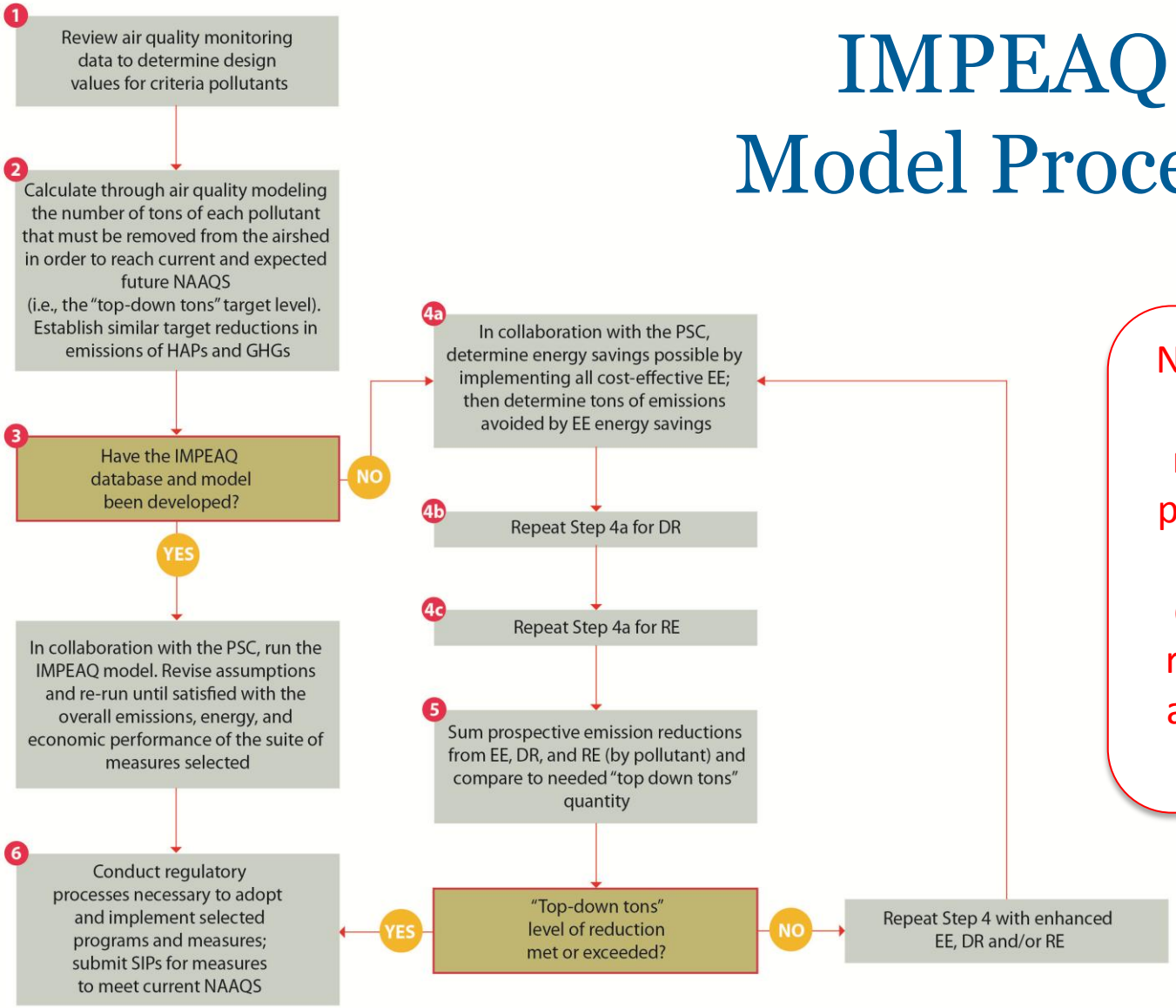
State Implementation Plans (SIPs): Backward-looking focus by air quality regulators on achieving AQ standards, but ignores reliability, cost, and (as yet) climate issues.

Best-of-both: Forward-looking focus integrating energy reliability, cost, air quality, climate, etc.

IMPEAQ Echoes Workshop's Rationale

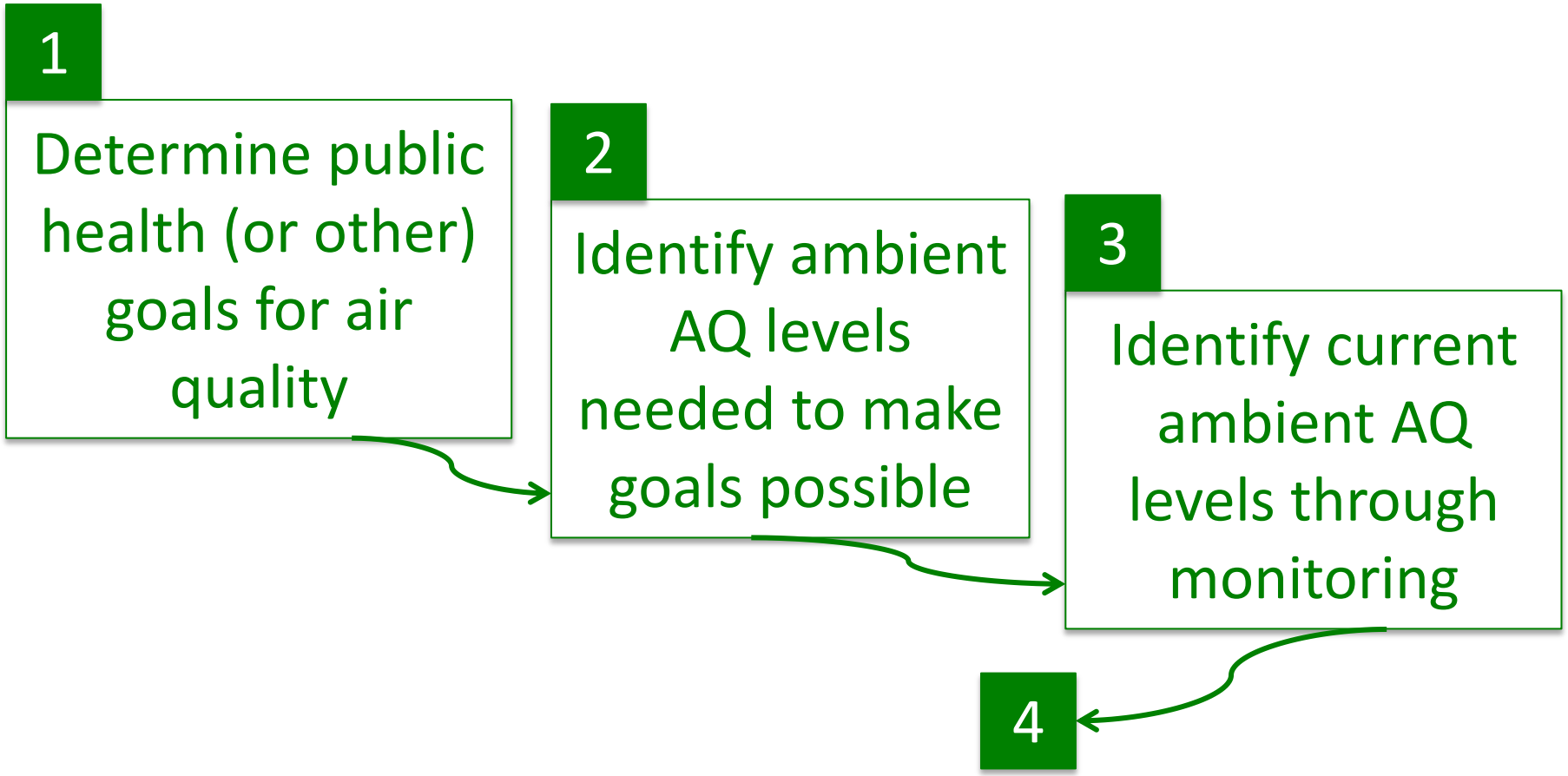
- "… an integrated approach that compares the impact on climate and on air quality [*and on energy*] for every measure before action is taken can be effective."
- "An integrated approach… will help reach Europe's climate goals and air quality standards [*and energy reliability*] at the same time while avoiding inefficient loops of measures and countermeasures."

IMPEAQ Model Process



Note: IMPEAQ is an integrated, multi-pollutant planning process now being developed and refined. It is ***not*** an air quality or energy model.

Steps of the IMPEAQ Process (1)



Steps of the IMPEAQ Process (2)

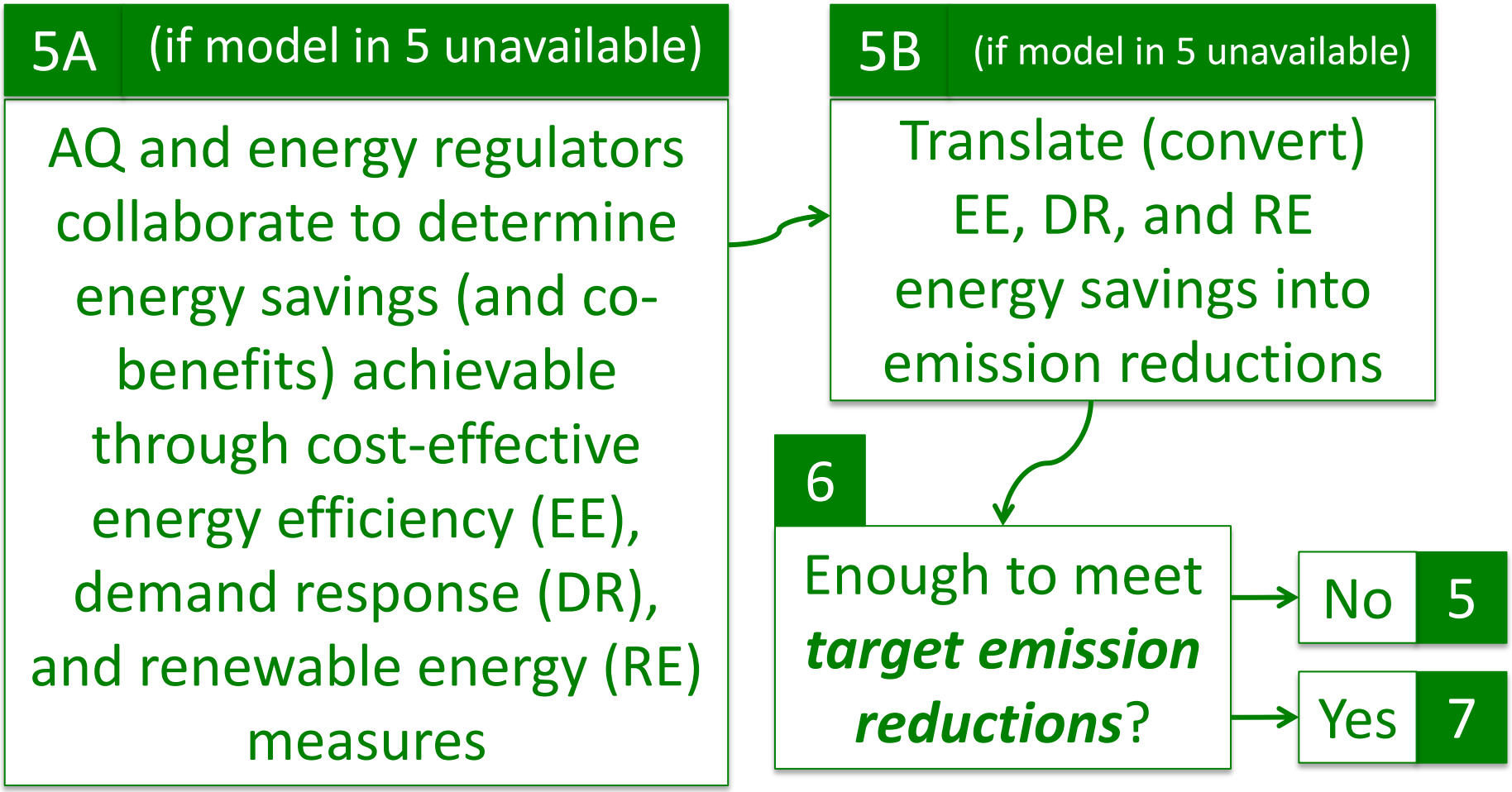
4

Determine (through AQ modeling) the ***target emission reductions*** needed to achieve satisfactory ambient pollution levels

5

Run optimization model against database of potential emission reduction measures until ***target emission reductions*** are reached

Steps of the IMPEAQ Process (3)



Steps of the IMPEAQ Process (4)

7

Conduct regulatory processes necessary to adopt and implement the measures identified in Steps 5-6

Conceptual Database of Co-Control Measures for IMPEAQ Optimization

ID #	Description	Sources	Cost	Units	SO2 Impact	NOx Impact	CO2 Impact	HAPs Impact	Penetration Limit	Interactions with Other Measures	Feasibility (1-10)	Etc …
1	RPS	EGUs	$50	MWh	Y	Y	Y	Y	x	#2, #3	9	x
2	SCR	EGUs	$5000	Ton	N	Y	Y(-)	N	x	n/a	9	x
3	EE	EGUs	-$5	MWh	Y	Y	Y	Y	x	#1, #2	8	x
4	I/M	Cars	$30	Ton	N	Y	Y	Y	x	n/a	2	x

Note: All data is purely hypothetical for illustrative purposes.

RAP's draft IMPEAQ paper is available at
http://www.raponline.org/document/download/id/6440

4. Initial US Experience with Integrated Multi-Pollutant Planning

Note: Multi-pollutant planning is a key component of IMPEAQ, but it is not equivalent to IMPEAQ, which includes several other important elements (e.g., target setting, optimization, etc.)

Bay Area AQ Management District (California, 2010)

- First comprehensive, multi-pollutant clean air plan in the US; and the first to start with explicit public health goals
- Developed "Multi-Pollutant Estimation Method" tool (MPEM) to achieve public health goals by developing a value – including co-benefits – for each ton of pollution reduced
- Includes 55 control measures; many of which simultaneously reduce air pollutants and GHGs

New York State (~2010-2013)

- Working with NESCAUM and EPA to identify an integrated set of policies to jointly reduce air pollutants (including mercury) and GHGs
- Proposed measures are modeled for:
  - Costs and benefits
  - Impacts on energy sector
  - Local economic effects
  - Reductions in ambient $PM_{2.5}$ and ozone levels
- EPA's participation will help future states meet required AQ plans in an integrated fashion

Maryland (~2009-2013) (1)

- Doing multi-pollutant approach by evaluating co-benefits of measures (to work around single-pollutant laws)
- Is depending on EE/RE to help address:
  - $PM_{2.5}$
  - Ozone
  - New SO_2, NO_2, and Pb standards
  - State-required GHG reduction plan
  - Deposition to Chesapeake Bay
  - Environmental justice concerns

Maryland (~2009-2013) (2)

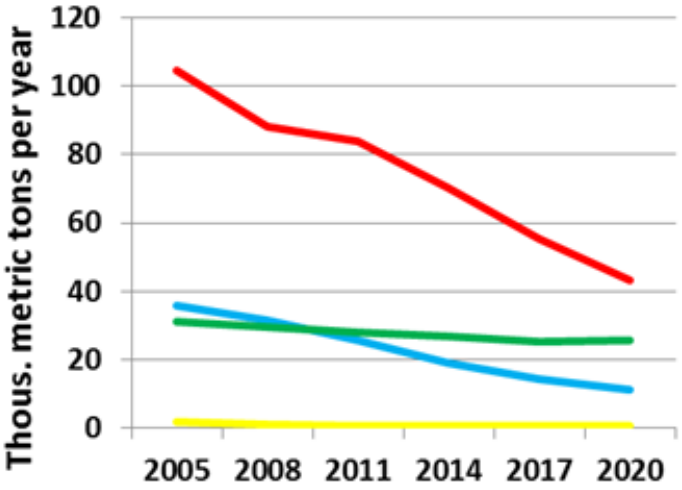
- Multi-pollutant framework being applied:
  1. Quantify the emission reductions of multiple pollutants for a broad suite of EE/RE measures
  2. Model the reductions in ambient ozone, $PM_{2.5}$, and other pollutants from those emission reductions (CMAQ)
  3. Estimate the public health benefits associated with improved ambient pollution levels, and
  4. Quantify the economic benefits and costs (REMI, BenMAP)

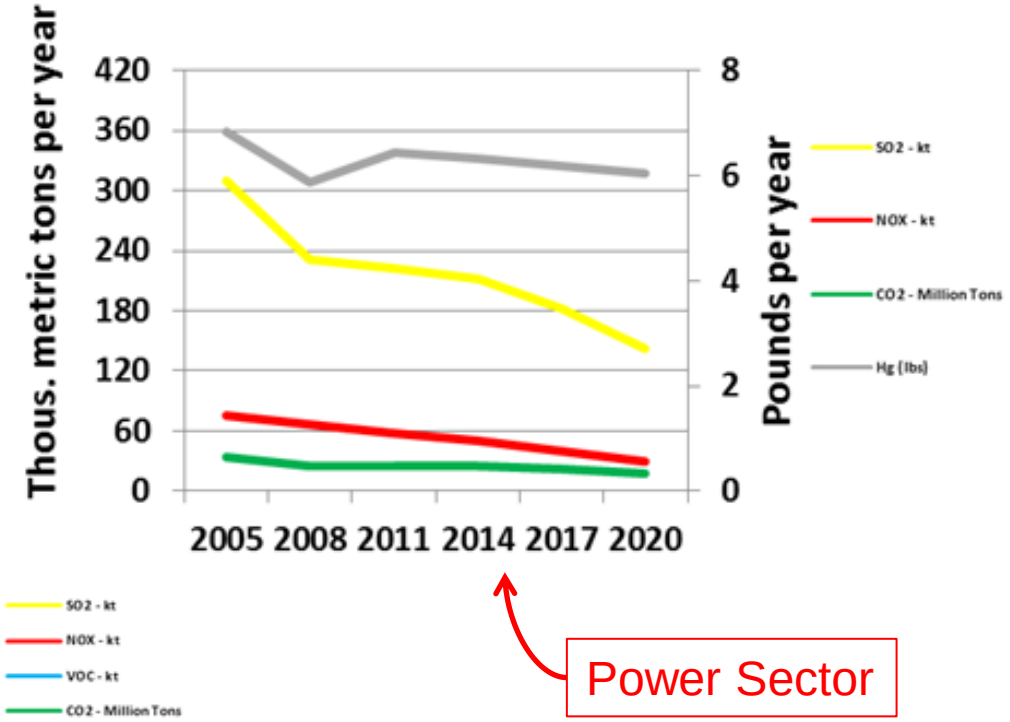
Maryland (~2009-2013) (3)

- Measures analyzed:
  - Regional Greenhouse Gas Initiative (RGGI)
  - "EmPOWER Maryland" (state program to reduce energy consumption 15% by 2015)
  - Renewable Portfolio Standards (RPS)
  - Clean Cars program
  - Electric vehicle initiatives
  - "Smart Growth" initiatives
  - "Green Building" initiatives

Maryland (~2009-2013) (4)

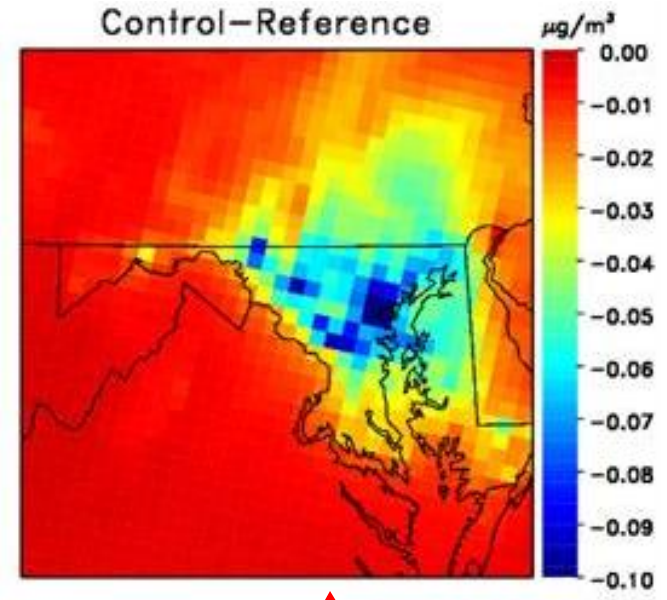
- Results: Projected emission reductions from EE/RE efforts to 2020



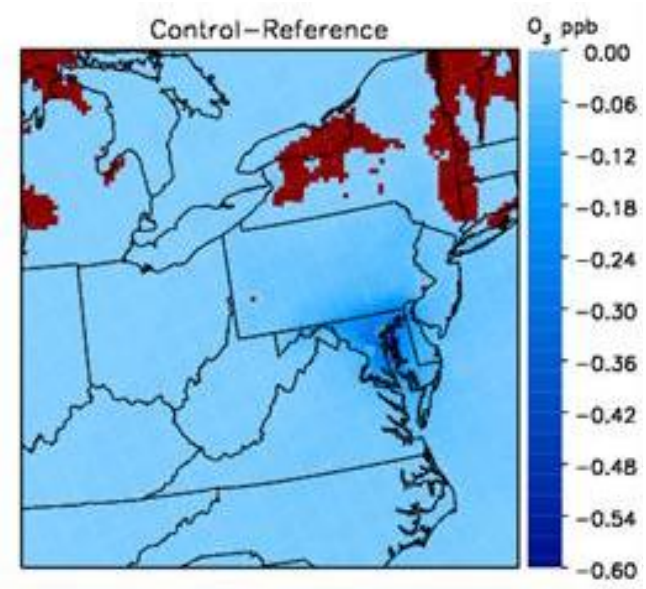


Maryland (~2009-2013) (5)

- Results: Modeled ambient AQ benefits from EE/RE efforts



PM2.5



Ozone

Maryland (~2009-2013) (6)

- Public Health Benefits (morbidity + mortality):
  - $PM_{2.5}$: $170-$573 million/year
  - Ozone: $25-$36 million/year
- Economic Benefits:
  - **Jobs**: Average net gain of 4,300 jobs/year through 2020
  - **Wages**: Average increase in direct wages of $131 million/year
  - **Household Income**: Average savings of $80/year

5. Conclusions

1. It's foolish *not* to pursue integrated measures that provide multiple economic, resource, and public health benefits

2. Politicians are unlikely to pursue integration until regulators do, and regulators can often be prescriptive about the objectives, coordination, processes, and methods for programs and plans.

3. Jurisdictions in the US are beginning to undertake integrated planning approaches (despite little help from the federal government)

4. Expertise with, and outcomes of, integrated approaches are improving with experience; sharing of best practices soon possible

5. Jurisdictions that don't pursue integrated approaches will be at an economic disadvantage, public health disadvantage, or both

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at **www.raponline.org**

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Additional Slides

Key Prerequisites & Principles for Integration

Category	Key Prerequisites/Principles
Institutional	· Coordinate regularly between climate, air quality, and energy regulators and their activities/programs on all levels: EU, MS, regional, local. · Identify, record and share best practice: identify champions; create and coordinate centralized data and assumptions; keep updated.
Policy	· Conduct air quality planning within a multi-pollutant framework targeting long-term objectives and integration of climate and energy. · Maintain a policy measures database that includes effectiveness of measures in reducing multiple pollutant emissions and cost/benefits. · Prioritize measures that simultaneously reduce legislated air pollutants and GHGs at least cost and offer greatest net benefit.
Technical	· Develop models to evaluate energy, health/environmental, and economic impacts of suites of policy measures to reduce pollution. · Sequence implementation of emissions control measures and measure results (emissions, reliability, economic impacts, health, etc.).