NERA
ECONOMIC CONSULTING

An Economic Impact Analysis of EPA's Mercury and Air Toxics Standards Rule

Major Conclusions of NERA's Study

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Insight in Economics™

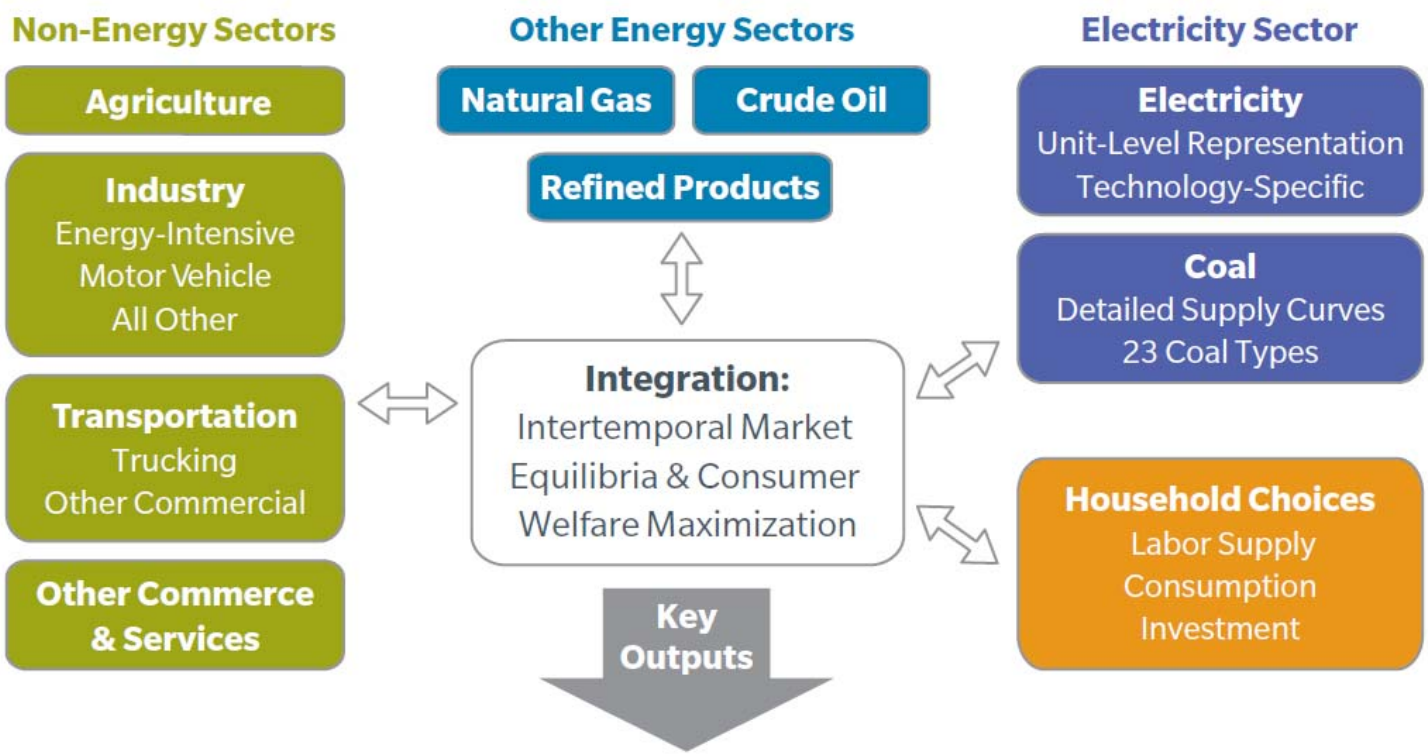
Objective of the analysis

- Costs to the U.S. electric sector under the MATS Rule
- Overall economy-wide macro-economic impacts of the MATS Rule
- Compare and contrast N$_{ew}$ERA findings with those of EPA

Methodology

- N_{ew}ERA Model
  - Computable general equilibrium model of U.S. economy with integrated bottom-up model of electric sector capacity planning and dispatch with emission control technology
  - The modeling framework allows to capture distortion costs on the rest of the economy as a result of increased capital spending on the electric sector due to the MATS Rule.
  - Evaluates changes in natural gas and coal markets and macroeconomic indicators such as GDP, consumption and welfare as well as changes in electric generation, capacity, retrofits, retirements and cost

NERA's N_{ew}ERA model



Macroeconomic (National/Regional)	**Primary Energy** (National/Regional)	**Electricity** (National/Regional/Generating Unit)
Welfare	Demand	Prices
GDP, consumption, investment	Prices	Builds, retrofits, retirements
Output by sector	Production	Load and Dispatch

Comparison of Scenarios Modeled by EPA and NERA

EPA (IPM)	N_{ew}ERA
	Baseline 1 – Includes CAIR, but not CSAPR
Baseline – Includes CSAPR	**Baseline 2 – Includes CSAPR (no CAIR)**
	MATS Only – no CSAPR (layered onto CAIR)
MATS/CSAPR – Hg, PM and Acid Gas Requirements	**MATS/CSAPR – Same as EPA**

- It is important to recognize what is in the baseline before we make any comparison of costs.
- The additional scenarios evaluated in the N_{ew}ERA model allow evaluation of MATS in the absence of CSAPR

Electric Sector Impacts

- Reproduced EPA results for electric sector
  - $95 Billion present value cost of MATS + CSAPR over CSAPR, compared to EPA $90 Billion
- Retirements
  - Baseline (CAIR) 15 GW of coal-fired capacity retiring
  - Incremental 4 GW of as a result of CSAPR
  - Incremental 19 GW as a result of MATS
  - 23 GW of retirements relative to Baseline without CSAPR.
- Capital requirements between 2012 and 2015
  - $84 billion to comply with both MATS and CSAPR.
  - 30% over capital requirements in CSAPR or CAIR baseline
  - Deducted from consumption or capital investment available for use elsewhere in the economy

Results Comparison – Retrofits in 2015 (GW)

Scenario	WFGD	DFGD	DSI	Total Scrub	SCR	ACI	FF
EPA							
Base (CSAPR)	55	6	9	70	0	0	0
CSAPR/MATS	52	26	52	130[1]	0	99	102
Delta from CSAPR	***-3***	***19***	***44***	***60***	***0***	***99***	***102***
N_{ew}ERA Primary Run (2036 Horizon)							
CSAPR	18	6	0	24	15	7	9
CSAPR/MATS	19	47	22	88	16	78	128
Delta from CSAPR	***1***	***41***	***22***	***64***	***2***	***70***	***124***
N_{ew}ERA Sensitivity Run (2050 Horizon)							
CSAPR	29	5	0	34	26	14	14
CSAPR/MATS	30	49	27	106	27	84	139
Delta from CSAPR (2050)	***1***	***44***	***26***	***72***	***2***	***70***	***125***

Fewer retirements in the N_{ew}ERA sensitivity case means more scrubber retrofits

Note: Deltas may not add up due to rounding.

[1] EPA also has 63 GW of scrubber upgrades.

Impacts on GDP

- Present value of GDP losses from 2012 - 2035
  - $84 billion relative to CSAPR
  - $112 billion relative to CAIR
- Largest loss ($22 - $25 billion) in 2015 when MATS Rule is assumed to be fully implemented
- Combination of
  - Capital diverted from productive investment in 2012 - 2015
  - Effects of higher energy costs on real income and productivity

Costs and Benefits of MATS in 2015

All values in Billions of $ per year	Benefits from HAPS	Co-Benefits from Non-HAPS	Costs	Net Benefits without Co-Benefits	Net Benefits including Co-Benefits
Mercury MACT	< $0.1	$1 to $2	**$3**	-$3	-$2 to -$1
Acid Gases MACT	$0	$32 to $87	**$5**	-$5	$27 to $82
Non-Hg Metals MACT	$0	$1 to $2	**$1**	-$1	-$1 to $0
Total	< $0.1	$33 to $90	**$10**	-$10	$23 to $80

NERA evaluated the costs for each component of the MATS rule by doing separate model runs that only included one portion of the rule at a time. Accounting for the synergies among the components of the rule (equally shared out) yields the cost figures shown in the table.

Note: Totals may not add up due to rounding.

Impacts on Labor Markets Are Clearly Negative

- Net loss in labor income even after taking into account employment in producing pollution control equipment and premature replacement of capacity

- Expressed (to contrast with direct job gains calculated by EPA and CERES/PERI) as Full-Time Job Equivalents

Change in Full-Time Job Equivalents (Thousands)

	2015	2018	2021	2024
CSAPR/MATS (relative to CSAPR)	-180	5	-60	-50
CSAPR/MATS (relative to CAIR)	-215	-15	-75	-85

Conclusions

- NERA' modeling framework captures effects of interactions between all parts of the economy. Hence, it identifies the real resource cost of the rules.
- Under MATS there is large injection of capital in the electric sector from 2012 – 2015 which must come from either investment or consumption.
- When comparing results across studies, one needs to understand what the policy is being compared against. We ensure that when we compare against EPA's results.
- Moreover, we show the cumulative cost of the rules if compared against the CAIR baseline.

Regulation and Green Jobs

- Contrary to numerous claims that EPA regulations are part of a stimulus package:

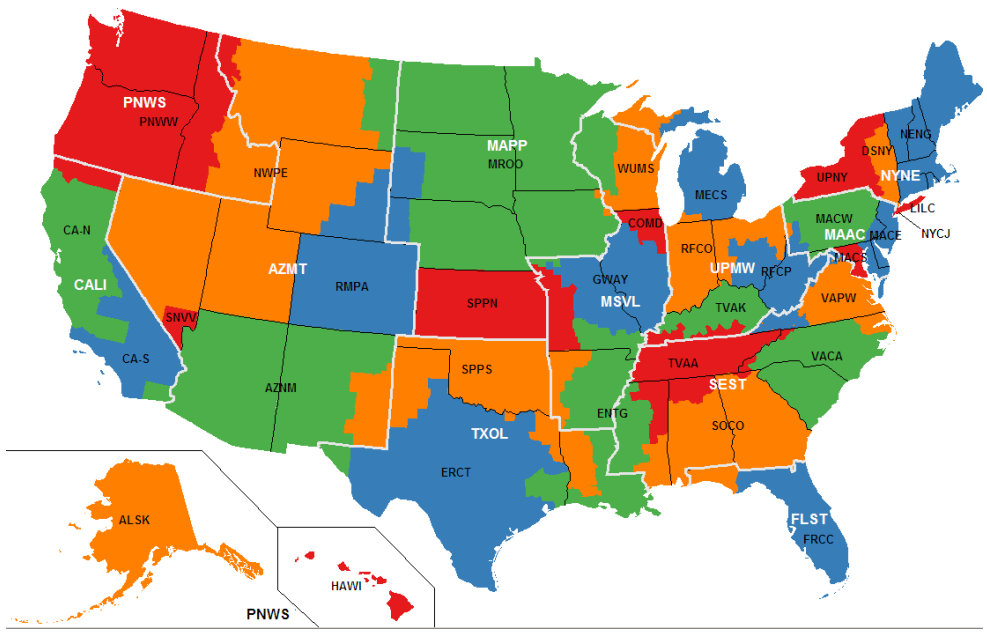
"You can't regulate your way to prosperity"

Richard Schmalensee

Additional Slides

N_{ew}ERA is national in scope, but can provide regional results

- There are 34 U.S. regions in the electric sector model and 11 regions in the macroeconomic model



Individual states can be added as stand-alone regions in the macroeconomic model

Full Range of Existing and New Generating Technologies

• Coal	• IGCC
• Natural gas combined cycle (CC)	• Geothermal
• Natural gas combustion turbine	• Hydroelectric
• Gas/oil steam	• Pumped storage hydroelectric
• Oil combustion turbine	• Landfill gas
• Nuclear	• Municipal solid waste
• Wind (on-shore)	• Solar photovoltaic
• Biomass	• Solar thermal
• Coal with carbon capture and storage	• Natural gas CC with carbon capture and storage
• Wind (off-shore)	

Other technologies can be added to the model

Detailed Coal Supply Curves and Transportation Matrices

- 3 Central Appalachian coals;
- 1 Southern Appalachian coal;
- 1 Arizona/New Mexico bituminous coal;
- 1 Wyoming bituminous coal;
- 3 Powder River Basin (PRB) coals;
- 1 Import coal; and
- 4 Northern Appalachian coals;
- 3 Illinois Basin coals;
- 1 Montana bituminous coal;
- 2 Rockies coals;
- 2 Lignite coals;
- 1 Waste coal.

Each coal has different emission characteristics (SO_2, Hg and CO_2) and heat contents. Each coal plant has plant-specific transportation costs, and an ability to change coals and blend coals.

Pollution Controls Provide Coal Units with Compliance Options

SO_2	NO_X	Hg	Other
Wet FGD	SCR	ACI	Fabric Filter
Dry FGD			Carbon Capture
Dry Sorbent Injection			Efficiency Upgrades

Existing controls and committed controls are included for each unit. Each unit can then choose among the available options to meet its respective compliance needs.