



James A. Baker III Institute for Public Policy

Impact of U.S. Environmental and Climate Policy on the U.S Energy Markets

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Environmental and Climate Policy And U.S. Energy Markets

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U.S. Environmental Policy

- **U.S. Environmental Policy between 2010 and 2020 will have a profound impact on three major energy sectors:**
 - 1. The power sector will see a significant shift in fuel usage from coal toward natural gas
 - 2. Natural gas demand and supply will both increase significantly in the next 10 years
 - 3. Demand for oil from mobile sources may be at a peak.
- **U.S. Climate Policy will affect the energy markets only marginally before 2020.**

U.S. Climate Law and Policy

The Current State of Play

■ Existing Laws

- Renewable fuel standard – 20% by 2023
- CAFÉ standards – 35 mpg by 2020
- *Massachusetts v. EPA* – Clean Air Act authority

■ New Legislation

- Waxman – Markey/Kerry – Boxer
 - Comprehensive climate legislation abandoned
- Bingaman – Brownback
 - Legislation to establish national renewable electricity standard gaining momentum
 - 15% (11% renewable energy = 4% energy efficiency)
 - No real “reach” beyond current state programs, but
 - National currency will add stability to REC market

U.S. Climate Policy

The Current State of Play

- **GHG Regulation by EPA**

- Mandatory Recordkeeping and Reporting Rule for all facilities with potential emissions > 25,000 tpy
- Mobile Source Rule – Section 208 of Clean Air Act (essentially and enhanced CAFÉ standard)
- Title V permitting requirements for major sources - only real impact will be on state permitting authorities
- New Source Review for “major sources” of GHG emissions
- Tailoring Rule – aimed at limiting impact on smaller sources (and state permitting authorities)

Climate Change & GHG Regulation

Limited Effects on Electric Sector

- **NSR Requirement for Major Sources (>100,000 tpy)**
 - BACT determinations & efficiency measures
 - No consensus on BACT for GHGs
 - Commercially available technology
 - Big fight over whether alternative fuels should be considered
 - Not clear that BACT would require new technology
- **Tailoring Rule Will Limit Impact On Existing EGUs**
 - 75,000 ton significance threshold for “modifications” generally should be avoidable for most major facilities
 - Will generate large amount of litigation

Existing and Expected Clean Air Act Regulations Affecting Energy Markets

- **Ozone and PM_{2.5} NAAQS**
 - Redesignation of nonattainment areas
 - SIP Calls for SO₂ and NOx reductions
- **Clean Air Transport Rule (CAIR Replacement)**
 - Aimed at addressing non-attainment caused by SO₂ and NOx emissions from upwind sources
- **Visibility/BART Requirements**
- **New Source Review – EPA enforcement initiative still underway**
- **EGU Rule for Hazardous Air Pollutants – “EGU MACT”**

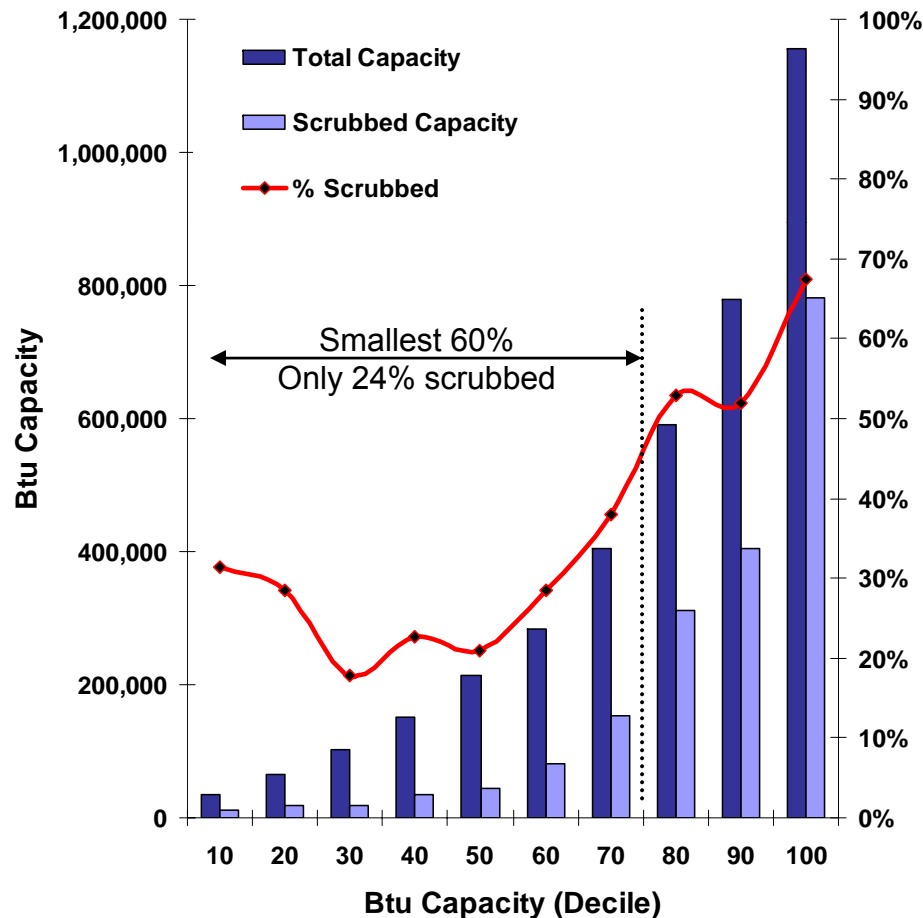
EGU MACT – Game Changer for Power Sector

- **Applies to all “major sources” of HAPs listed under Section 112 of the CAA**
- **MACT = Best performing 12% of sources**
 - Hg – sorbent injection and fabric filters or ESP, possibly SCR
 - HCl and HfI – wet gas scrubbers
- **Compliance required within 3 years with limited options for expansion: 2015 – 2018**
- **Largest impact on older and smaller coal-fired units**
 - Generally less efficient
 - Fewer have existing controls
 - Less able to absorb capital costs for controls

Demand Driver - Pending EPA Regulations

Impact on small coal-fired power plants

Coal-fired Power Plant Scrubber Penetration by Size



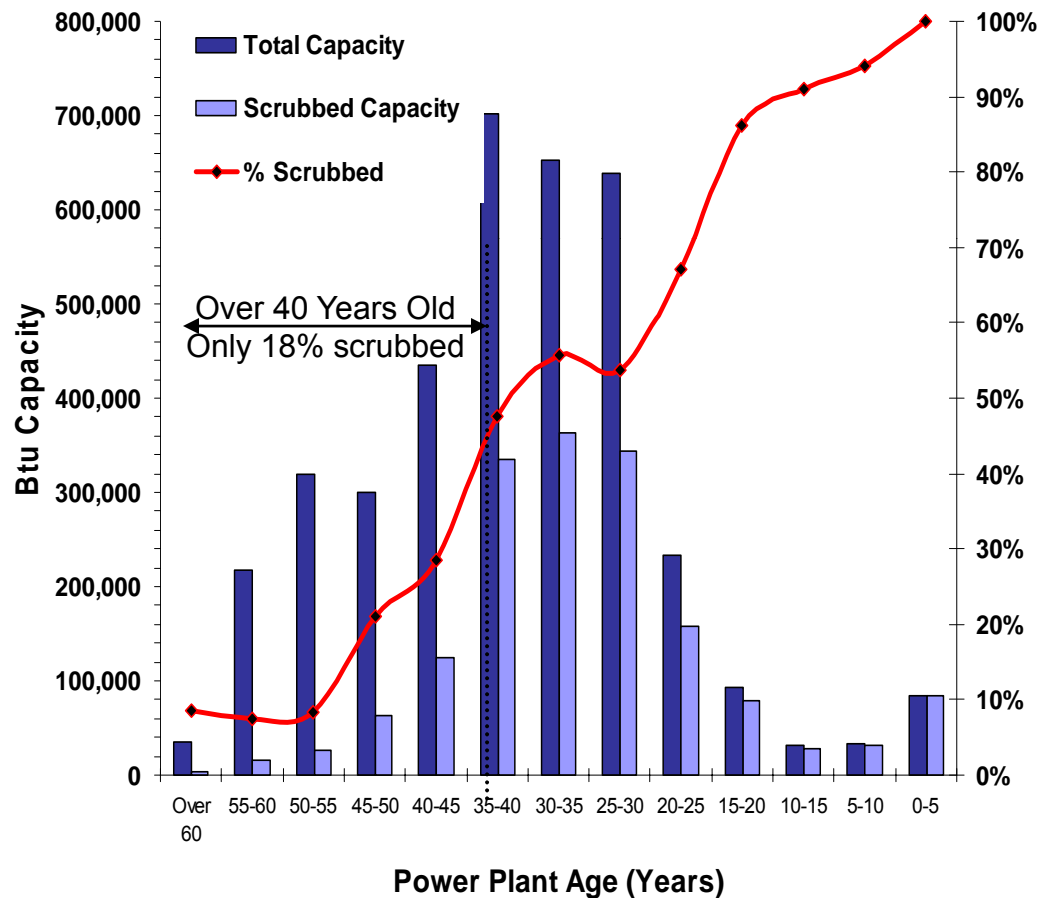
Key Observations

- Scrubber installation rate increases with plant size
- Smallest 60% of plants have low scrubber installation rates
- Only about 1/4 of all small plants are scrubbed
- Remaining un-scrubbed plants represent 17% of coal-fired capacity that may be replaced

Demand Driver - Pending EPA Regulations

Impact on older coal-fired power plants

Coal-fired Power Plant Scrubber Installations by Age



Key Observations

- Plants over 40 years old have low scrubber installation rates and high heat rates (Btu/MWh)
- Less than 1/5 are scrubbed: 28% of total capacity may be replaced
- New plants approach nearly 100% scrubber installation and are unaffected

Gas-Fired Electric Generation Infrastructure

Existing Infrastructure Under-utilized

- **U.S. has more gas-fired electric generating capacity than of any other generation type**
 - Gas-fired capacity: 397 GW - 39% of total
 - Forecast additions of 116 GW by 2035
 - 46% of total capacity increase through 2035
 - Coal-fired capacity: 313 GW - 31% of total
 - Planned additions of 31 GW by 2035
 - 12% of total capacity increase through 2035
- **Gas-fired generating capacity is under-utilized**
 - Gas-fired utilization: Combined cycle \approx 41%
Simple cycle \approx 10%
 - Coal-fired utilization \approx 73%

Renewable Electricity Standards

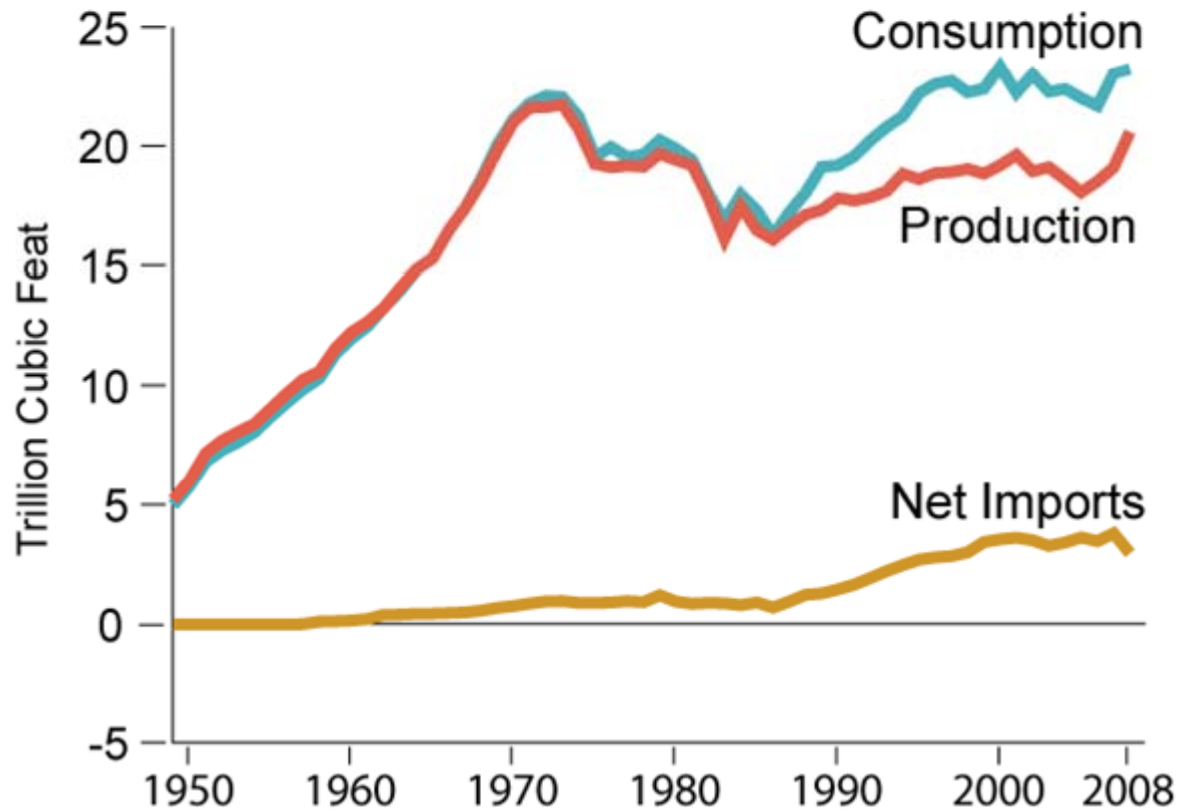
Natural gas supports renewable power

- **RES currently enacted by 31 states**
 - Require a certain percentage of electric generating capacity from renewable resources
 - 10% - 33% range depending on treatment of Hydro
 - Phase in over time, typically by 2020-25
 - Natural Gas "peaking" capacity required to fill gaps left by wind, solar, and other renewable projects
 - Uneven distribution by region and gas supply/costs
- **National RES standard**
 - Current models indicate a relatively flat natural gas consumption at a 15% national RPS
 - New California modeling shows decreased gas use at >20% RES

Implications for Gas Demand from EGUs

- **New Clean Air Act Regulations Will Push Electric Industry To Retire Older, Smaller Coal-fired Plants**
 - Approximately 75% of <200MW plants are unscrubbed = 17% of total installed electric capacity
 - Over 80% of coal-fired plants over 40 years old are unscrubbed = 28% of installed electric capacity
- **Real Potential for 10% - 20% of generation to shift to gas – possible increase in gas demand of 1.3 to 2.6 tcf/year**

Historic Natural Gas Supply & Demand



2009 Supply & Demand

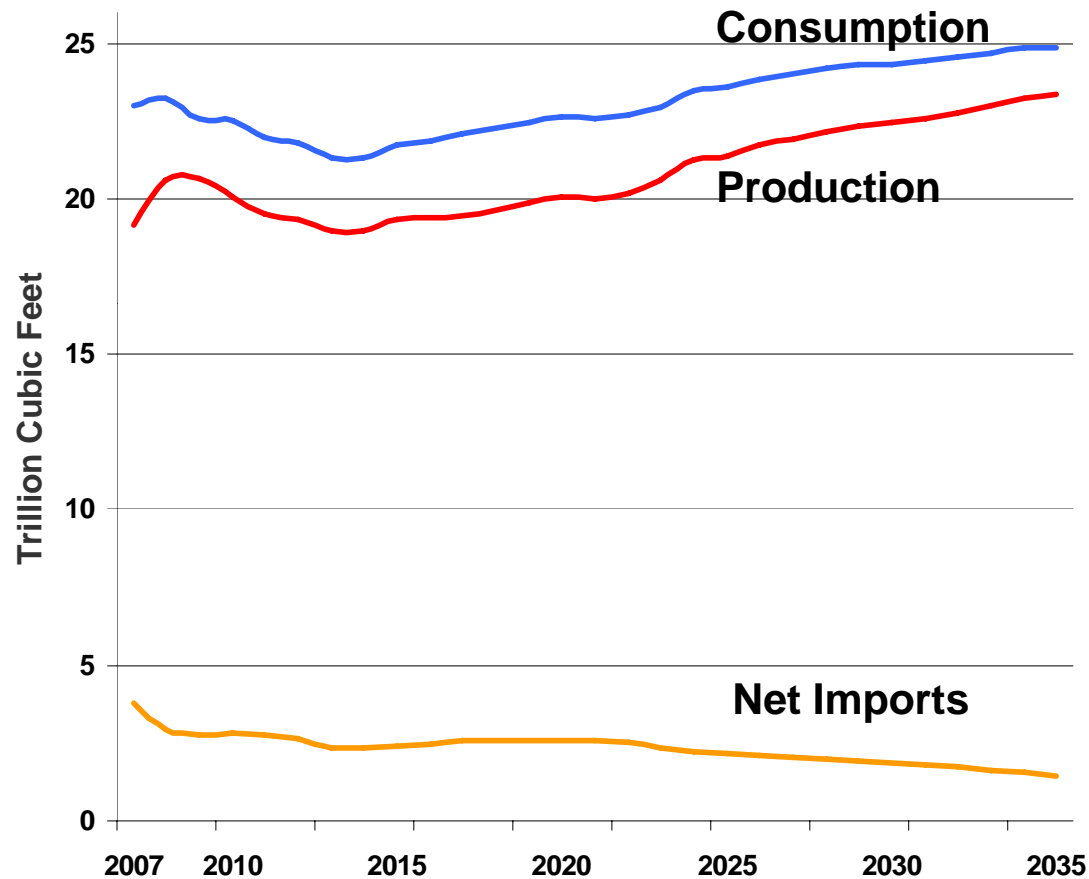
- Production: 20.76 Tcf
- Consumption: 22.59 Tcf
- Net Imports: 2.76 Tcf

U.S. Reserves

- Proved Reserves:
≈ 238 Tcf
- Technically recoverable:
≈ 1,536 Tcf

Natural Gas Forecast

2010-2035 Reference Case Scenario



Key Observations:

- Predicted decline through 2014
- Moderate upward trend after 2015
- U.S. shale development lowers prices and drives consumption
- Falling net imports:
 - Shale price pressure
 - Potential Alaskan pipeline
 - LNG delays/cancellations
- Reference case assumes no regulatory change
- New regulations are likely to alter trends

Supply - Environmental Concerns

Potential constraints on shale gas development

- **Hydraulic fracturing and groundwater concerns**
 - Potential for increased state & federal regulation
 - Increased citizen challenges under NEPA and state laws
 - Seeing process water problems under CWA
- **Pipeline infrastructure development**
 - Environmental concerns and regulatory delay/risk
- **VOC emissions from shale gas facilities**
 - Potential ozone problems may prompt state regulation
- **Potential GHG regulations**
 - Pending EPA regulations may increase costs and require CO₂ capture

U.S. Demand for Oil and Liquid Fuels

- **Existing Regulatory Drivers**

- Renewable Fuels Standards (RFS)
 - Displaces 13.6 billion gallons of petroleum-based fuels by 2023
 - Biofuels supply increases with new and existing incentives
- CAFE standards and EPA §208 Rule
 - New standards require 40% efficiency gains by 2016
 - Eliminates need for an estimated 1.8 billion barrels of oil

- **Projections - next 25 years**

- U.S. oil use remains near present level through 2035
- Growth in demand met primarily by biofuels
- Electric vehicle in-roadsceptance could significantly affect gasoline demand

Concluding Remarks

- **Clean Air Act Regulations of Traditional Pollutants are Likely to Have Greater Impact on GHG Emissions Than GHG Regulations**
- **Regulations Will Push Power Industry Toward Greater Reliance on Natural Gas By End of Decade**
- **Potential Increase in Demand From Power Industry Likely Will Exceed 1.6 tcf/year**
- **Oil & Liquid Fuels**
 - Consumption of petroleum-based liquids nearly flat
 - Biofuel consumption accounts for most growth
 - Electric Vehicle acceptance may be more important than bio-fuels



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