Emissions Baseline Projections

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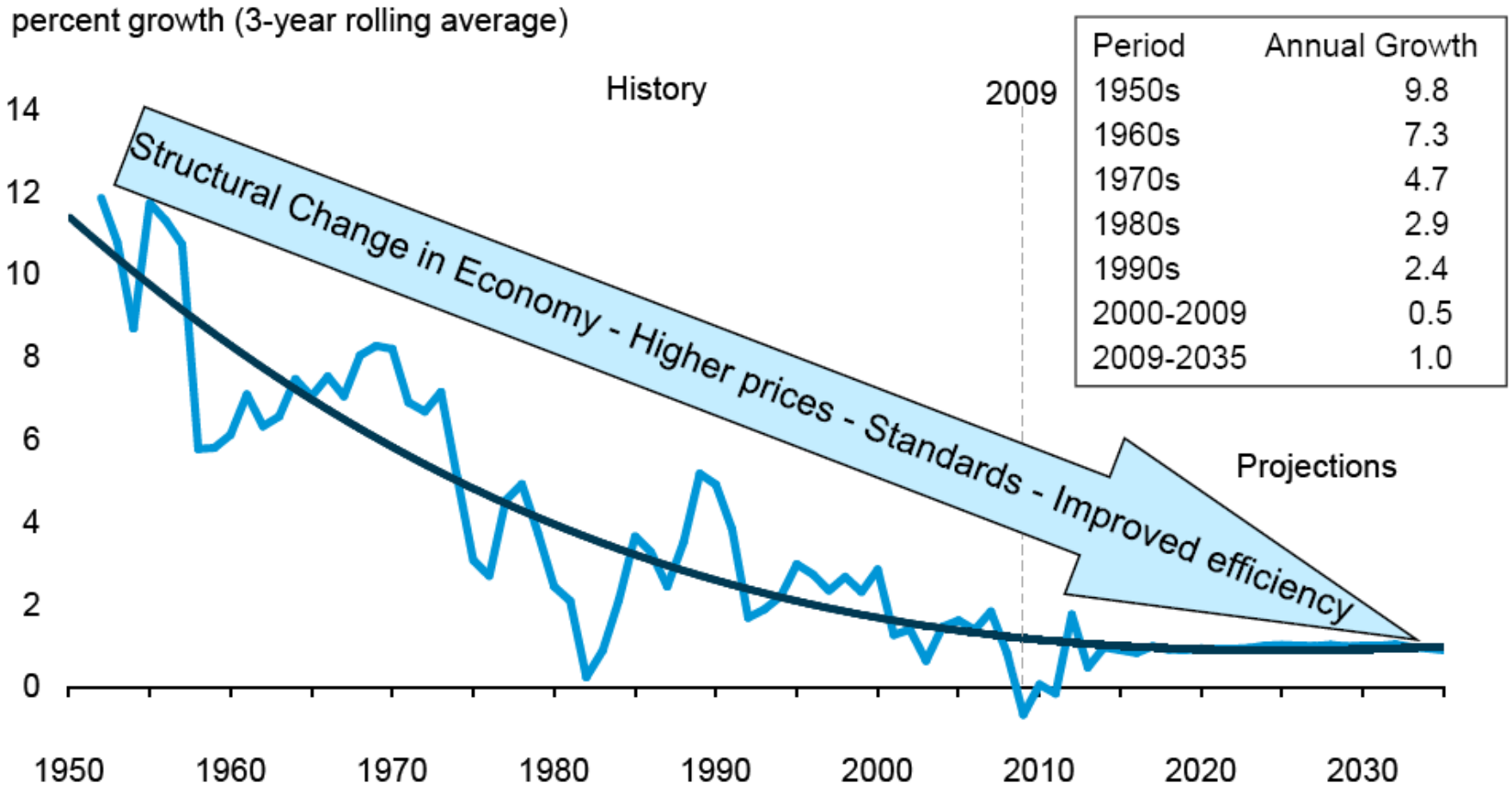
Background on power sector projections

- Need an emissions baseline projection to develop a SIP
- Analytical tools & products for power sector projections:
  - National Energy Modeling System (NEMS) & the Annual Energy Outlook (AEO) developed by the Energy Information Administration (EIA)
  - Integrated Planning Model (IPM) developed by ICF and used by U.S. EPA for U.S. electric power sector modeling
  - Many others
- Key assumptions & variables for power sector projections:
  - Economic growth
  - Electricity demand growth
  - Fuel prices (e.g., natural gas)
  - Technological change
  - Energy & Environmental Policy
- It's important to know what's included in the baseline to avoid double counting policy impacts

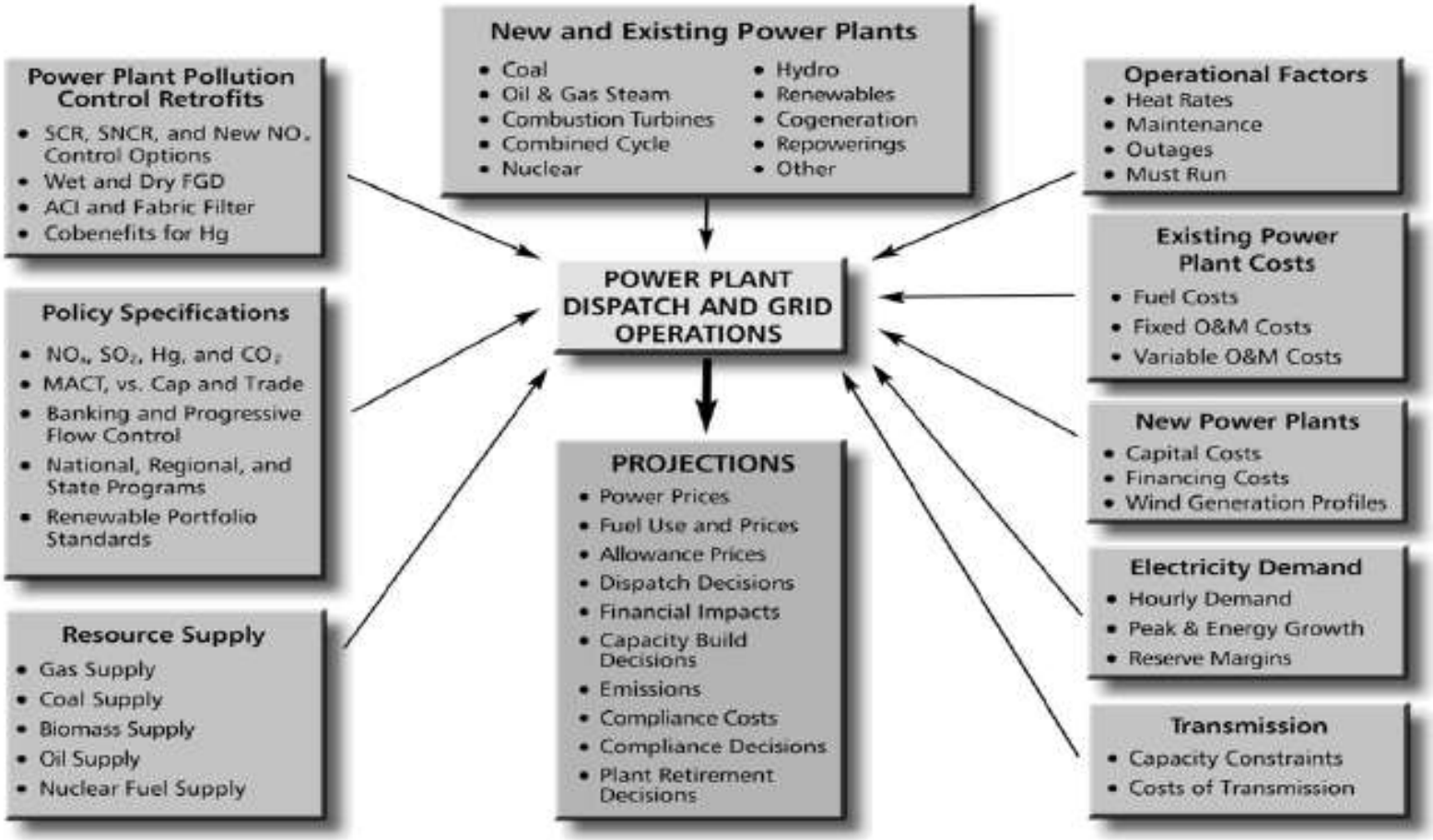
While projected electricity consumption grows by 30%, the rate of growth has slowed



Period	Annual Growth
1950s	9.8
1960s	7.3
1970s	4.7
1980s	2.9
1990s	2.4
2000-2009	0.5
2009-2035	1.0

Source: EIA, Annual Energy Outlook 2011

EPA uses IPM to project the impact of environmental policies on the U.S. electric power sector



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Selected IPM 4.10 Baseline Inputs & Sources

- Electricity demand from AEO 2010
- State Environmental Regulations & NSR settlements
- Finalized State GHG Cap & Trade Programs (e.g., RGGI)
- Existing state RPS and ARRA incentives for renewables from AEO 2010
- Higher cost imposed for new coal plants to reflect uncertainty while there is no national CO2 policy

Incorporating state EE/RE Policies in electric power sector projections

- Goal:
  - Help states incorporate the impacts of key "on the books" EE/RE policies into State Implementation Plan (SIP) baseline emission projections.
- Investigated:
  - What EE/RE policies are currently accounted for in the Annual Energy Outlook (AEO) 2010 forecast
- Found that:
  - Some EE/RE policies are already accounted for
  - Some state EE/RE policies are not reflected, but could be added.
- For SIP purposes, decided to:
  - Develop methods to estimate the energy impacts of existing EE/RE policies not explicitly reflected in AEO 2010.
  - Develop projection of electricity sector emissions in IPM that reflects a revised demand forecast that accounts for State EE/RE policy.

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Note: "on the books" refers to existing policies

Applicable EE/RE Policy Assumptions Explicitly Included and Not Included in AEO 2010

EE/RE Policies Explicitly Accounted for in AEO 2010

- American Recovery and Reinvestment Act (ARRA) funded EE programs
- Federal appliance standards
- State building codes
- Renewable portfolio standards for 30 states and DC as of Sep. 2009

Existing State EE/RE Policies NOT Explicitly Accounted for in AEO 2010

- Energy Efficiency Resource Standards (25 states)
- Other Ratepayer funded EE programs (3 states*)
- EE/RE programs funded through RGGI (3 states*)
- Newly adopted State RPS after Sep. 2009 (6 states)

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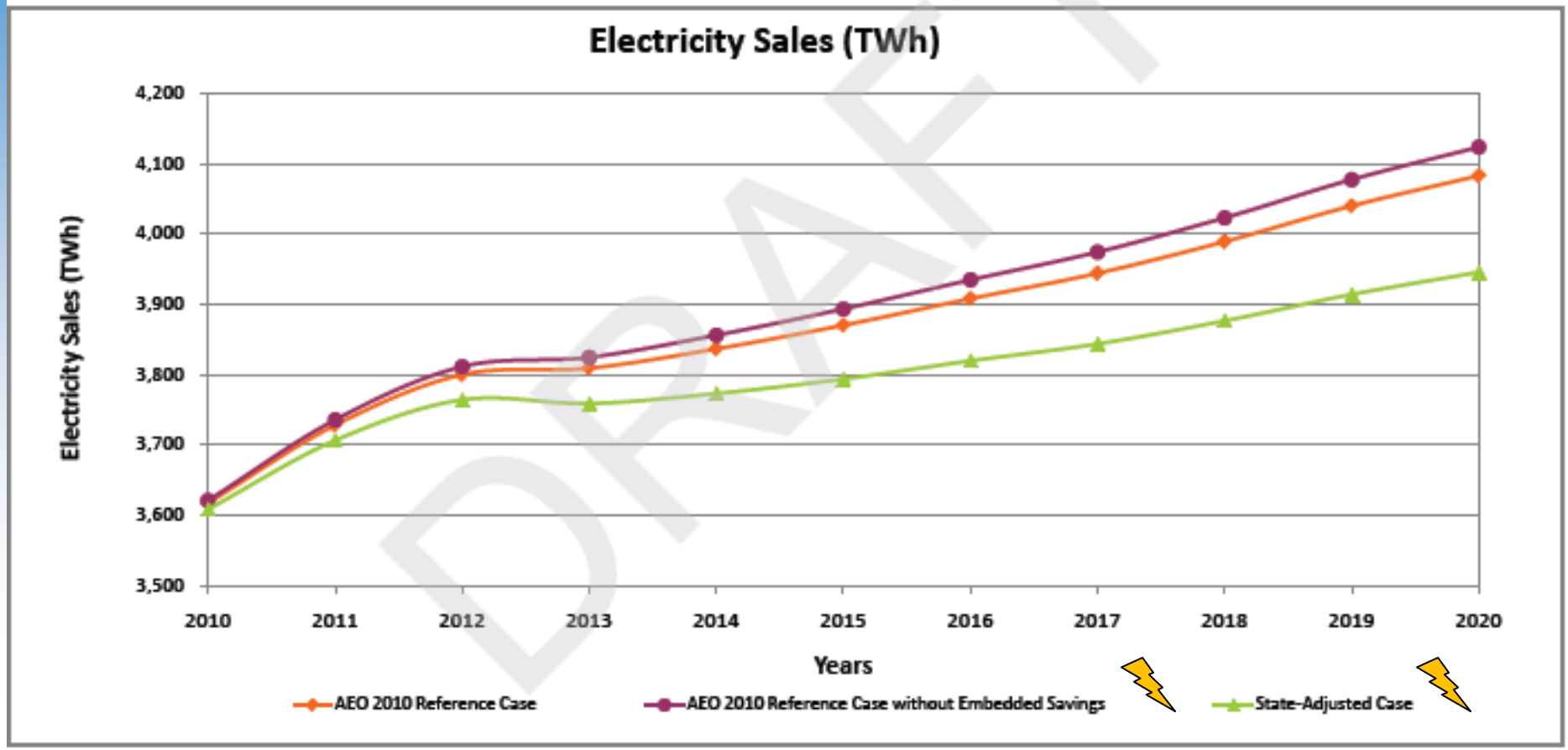
*** Only includes states without EERS**

Draft National Results: Revised Demand Forecast Accounting for EE Policies



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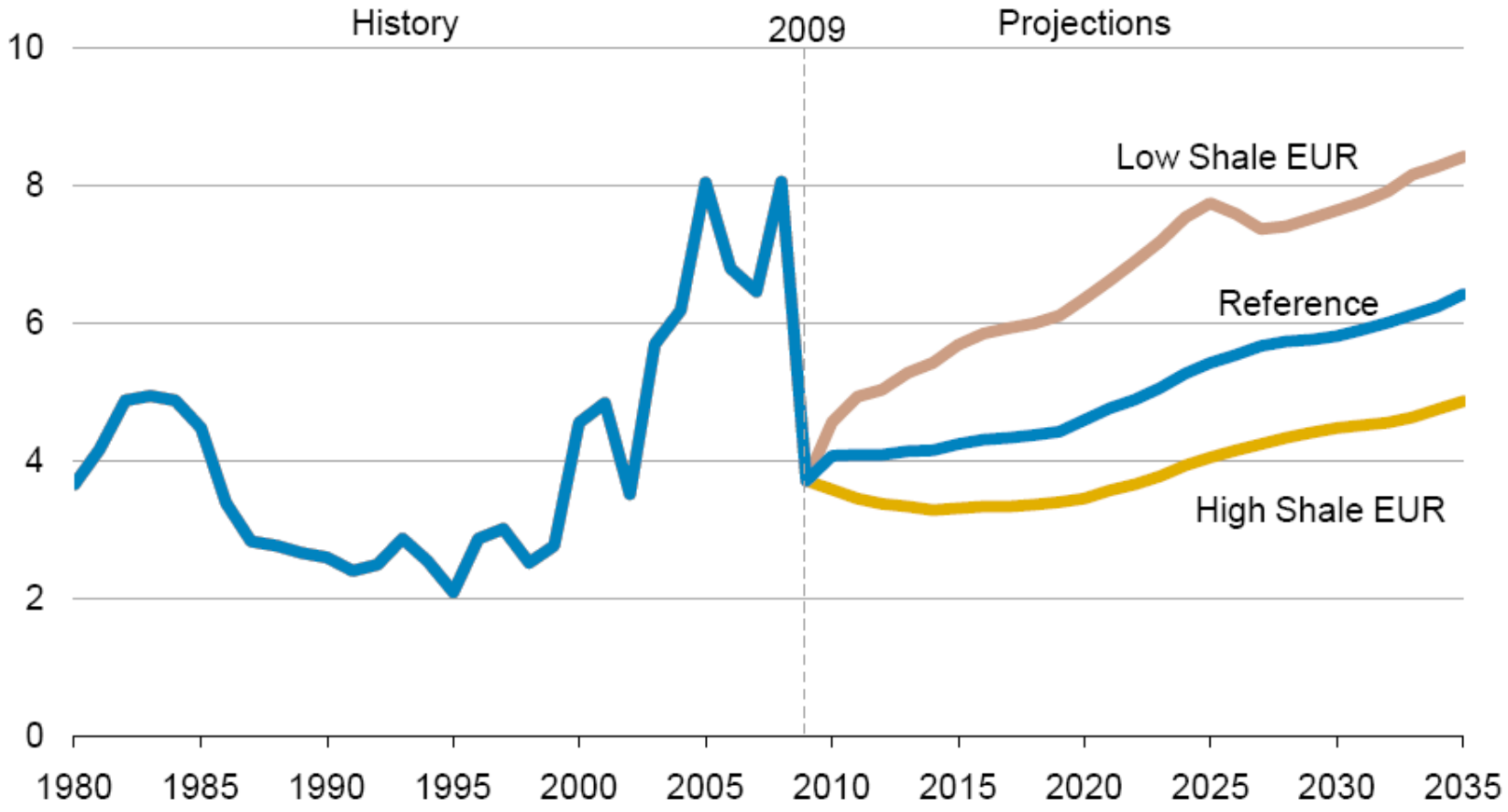
These forecasts are derived from EPA's draft state-level analysis

Sensitivity Analysis

- Common practice to perform sensitivity analysis to:
  - address uncertainty with key assumptions
  - investigate the potential impacts of alternative policies
- Examples:
  - EIA AEO side cases
  - EPA EE Sensitivity as part of proposed Mercury and Air Toxics Standard

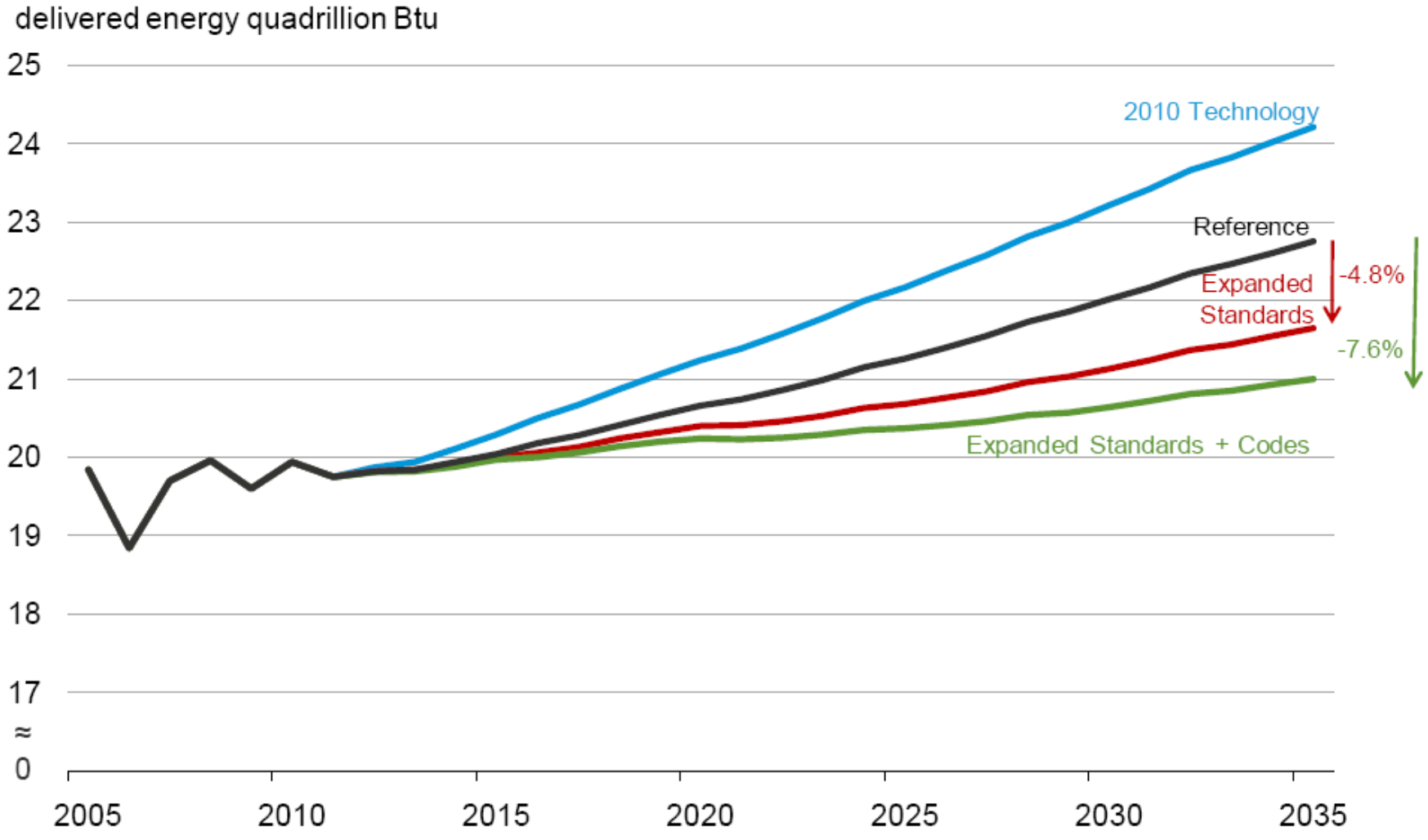
Natural gas price projections vary based on resource base assumptions

lower-48 average natural gas wellhead price
2009 dollars per thousand cubic feet



Source: EIA, Annual Energy Outlook 2011

Expanded standards and codes case limits combined buildings delivered energy to 21 quadrillion Btu by 2035



Source: EIA, Annual Energy Outlook 2011

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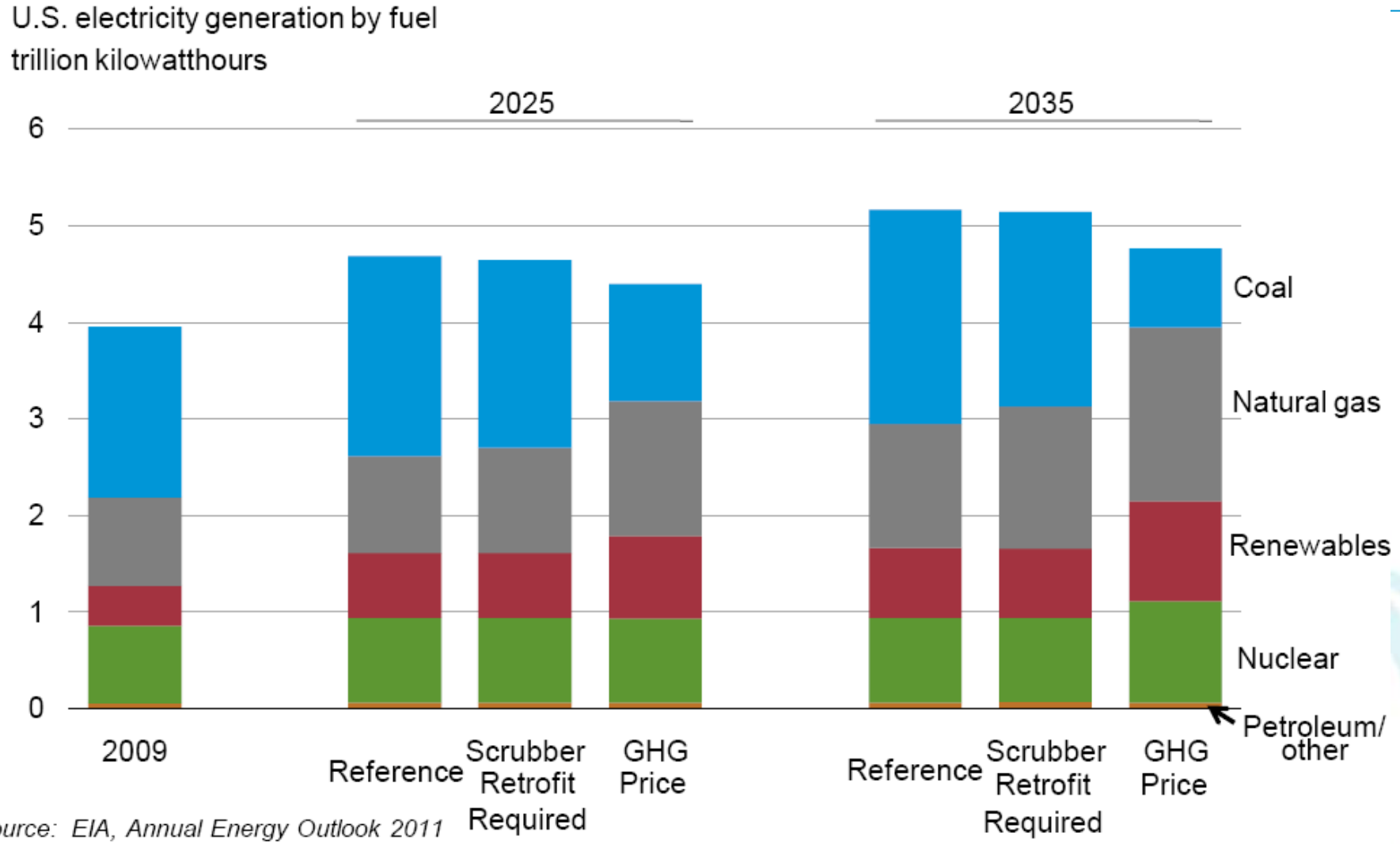
The projected electricity mix gradually shifts to lower-carbon options, with generation from natural gas rising 40% and renewables rising 75%



Source: EIA, Annual Energy Outlook 2011

EE Sensitivity as part of proposed Mercury and Air Toxics Standard

- Developed scenario to illustrate impacts of integrating EE within compliance strategy
  - "EE sensitivity" based upon two key drivers of future EE investments
    - Ratepayer-funded EE programs (state policy driven)
    - Federal appliance standards (DOE rulemakings required by current statutes)
  - Represents significant reductions in US electricity demand (5.3% in 2020 and 6.6% in 2030)
  - Modeled power sector impacts using IPM and combined with estimates of EE costs
- Positive results
  - Economic benefits
    - Reduces costs of Toxics Rule
    - Reduces electricity and natural gas prices
  - Reliability benefits
    - Reduces required new generation
    - Reduces required new emissions controls
  - Reduces air emissions of NOx, SO2, Hg, and CO2

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