

U.S. EIA Annual Energy Outlook: Issues in Focus



Bipartisan Policy Center: Understanding the New Energy Landscape
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Overview

- Changes to the Reference Case
- Sensitivity/Scenarios
- Issues in Focus Articles
- Impact of extending and expanding certain energy policies
- Impact of alternative world oil prices on supply and demand
- Implications of alternative crude oil and natural gas resource estimates
- Impact of changes in fuel prices and environmental regulations on electric power generation
- Changes in the transportation sector fuel consumption landscape

Updated AEO2012 Reference Case

- The Mercury and Air Toxics Standards (MATS) issued by the EPA in December 2011 was incorporated.
- Higher capital costs for fabric filters were adopted based on EPA data.
- Macroeconomic data based on the November 2011 long-term projection from IHS Global Insights, Inc. was incorporated.
- The California Low Carbon Fuel Standard (LCFS) was removed.
- Revised NHTSA and FHWA transportation data were incorporated
- A new cement model was incorporated in the industrial sector.
- Historical data for Photovoltaic capacity estimates were updated.
- Gulf of Mexico production data were revised to reflect data reported by the Bureau of Ocean Energy Management.
- Electric sector financial data became available and were incorporated.
- Reservoir-level oil API gravity and sulfur content data elements were derived and incorporated.
- The volume of natural gas used at export liquefaction facilities were revised.

AEO2012 scenarios

- Reference
- High and low economic growth (2)
- High and low oil price (2)
- Demand sector technology cases (2011, High, and Buildings Best Available) (3)
- Integrated high and low technology (applied to demand sectors; renewable; and electric power and refinery sector fossil; and nuclear) (2)
- High and low coal cost (2)
- High and low estimated ultimate recovery cases and high technically recoverable resources (3)
- High and low nuclear (2)
- Low renewable cost (1)
- Liquid Fuels Market Module (1)
- Policy related: Extended Policy, No Sunset, No Greenhouse Gas Concern, carbon dioxide allowance fee (\$15 and \$25), and 5-year investment recovery with reference and with low natural gas prices (7)
- Proposed light-duty vehicle CAFE standards; advanced battery technology; heavy-duty truck natural gas potential (3)

AEO 2012 Issues and Focus Articles

1. No Sunset and Extended Policies cases
2. Oil price and production trends in AEO2012
3. Potential efficiency improvements and their impacts on end-use energy demand
4. Energy impacts of proposed CAFE standards for light-duty vehicles, model years 2017 to 2025
5. Impacts of a breakthrough in battery vehicle technology
6. Heavy-duty natural gas vehicles
7. Changing structure of the refining industry
8. Changing environment for fuel use in electricity generation
9. Nuclear power in AEO2012
10. Potential impact of minimum pipeline throughput constraints on Alaska North Slope oil production
11. U.S. crude oil and natural gas resource uncertainty
12. Evolving Marcellus shale gas resource estimates.

No Sunset and Extended Policies Scenarios

No Sunset case

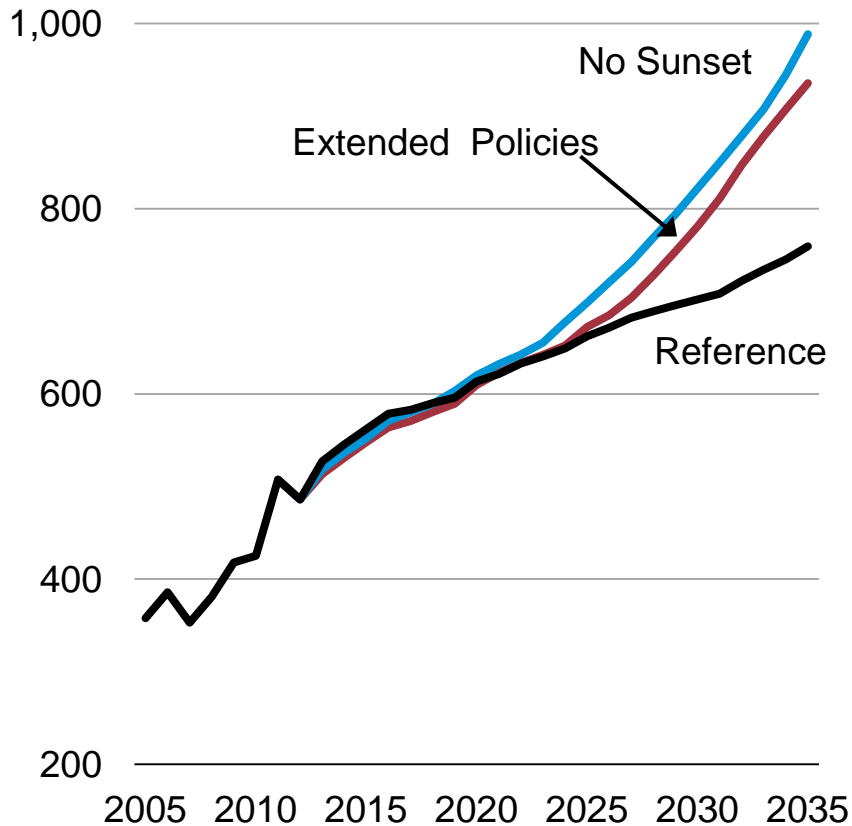
- Extends the Production Tax Credit (PTC) for cellulosic biofuels of up to \$1.01 per gallon through 2035 .
- Extends tax credits for renewable energy sources for energy-efficient equipment in the buildings sector, including, the PTC of 2.2 cents per kilowatthour or the 30-percent investment tax credit (ITC) available for wind, geothermal, biomass, hydroelectric, and landfill gas resources.

Extended Policies case

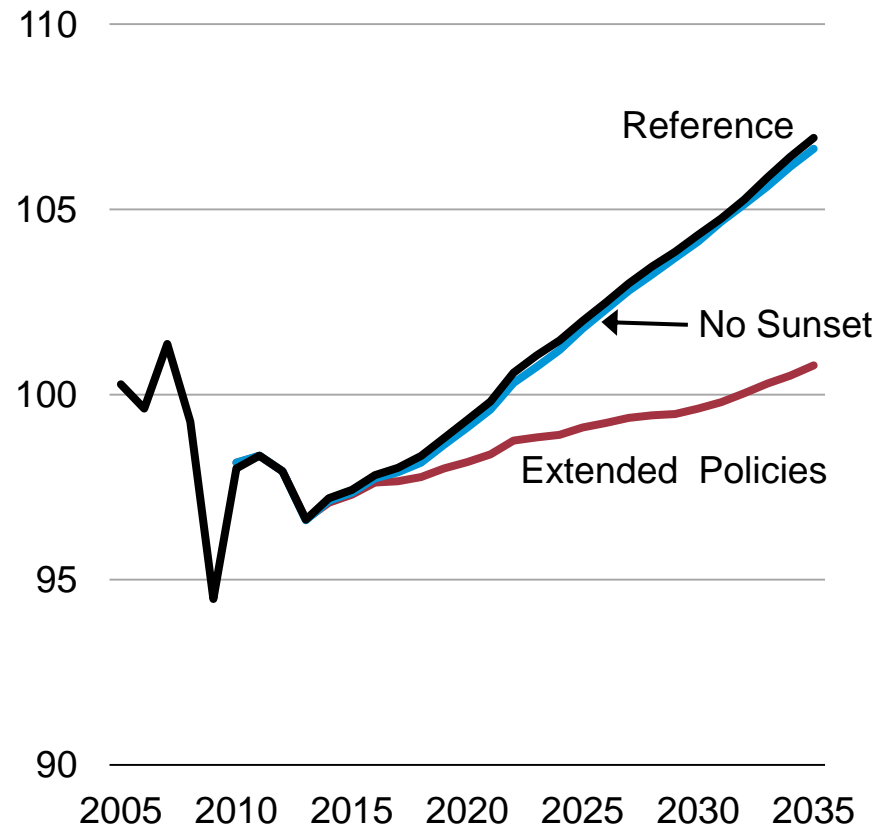
- Federal equipment efficiency standards are updated at periodic intervals and new standards are introduced for products that are not currently subject to Federal efficiency standards.
- Federal residential and commercial building energy codes are strengthened.
- Includes the proposed CAFE standards recently announced by the EPA and NHTSA for MY 2017 through MY 2025. After 2025, CAFE standards are assumed to increase at an average annual rate of 1.5 percent through 2035.
- The Investment Tax Credit for Combined Heat and Power is extended and expanded.

No Sunset & Extended Policies Scenarios: Renewable energy consumption up and overall consumption down

renewable electricity generation
billion kilowatthours



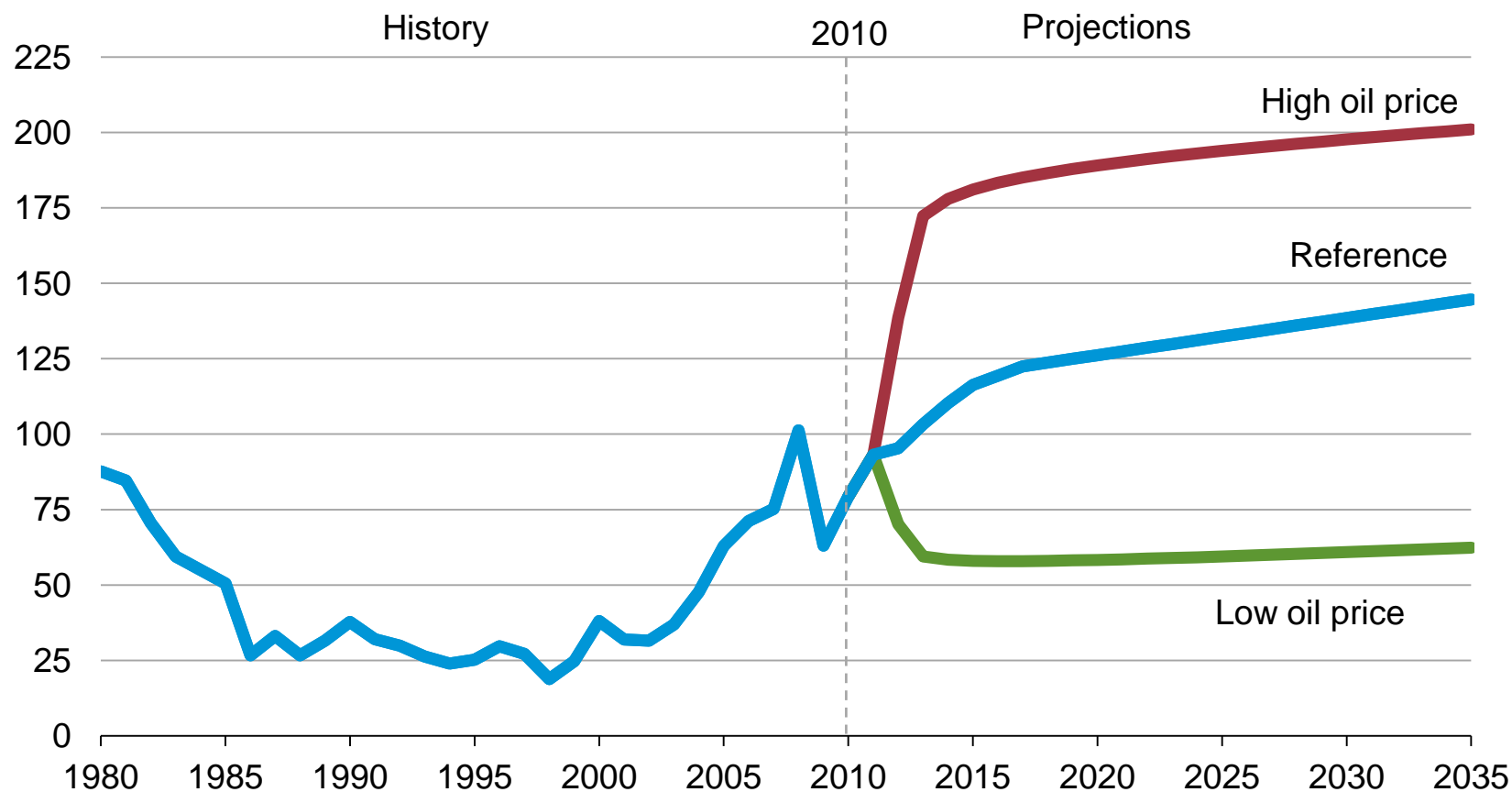
primary energy consumption
quadrillion btu



Source: EIA, Annual Energy Outlook 2012

Oil prices (LLS) in the Reference case rise steadily; the *AEO2012* includes a wide range of prices

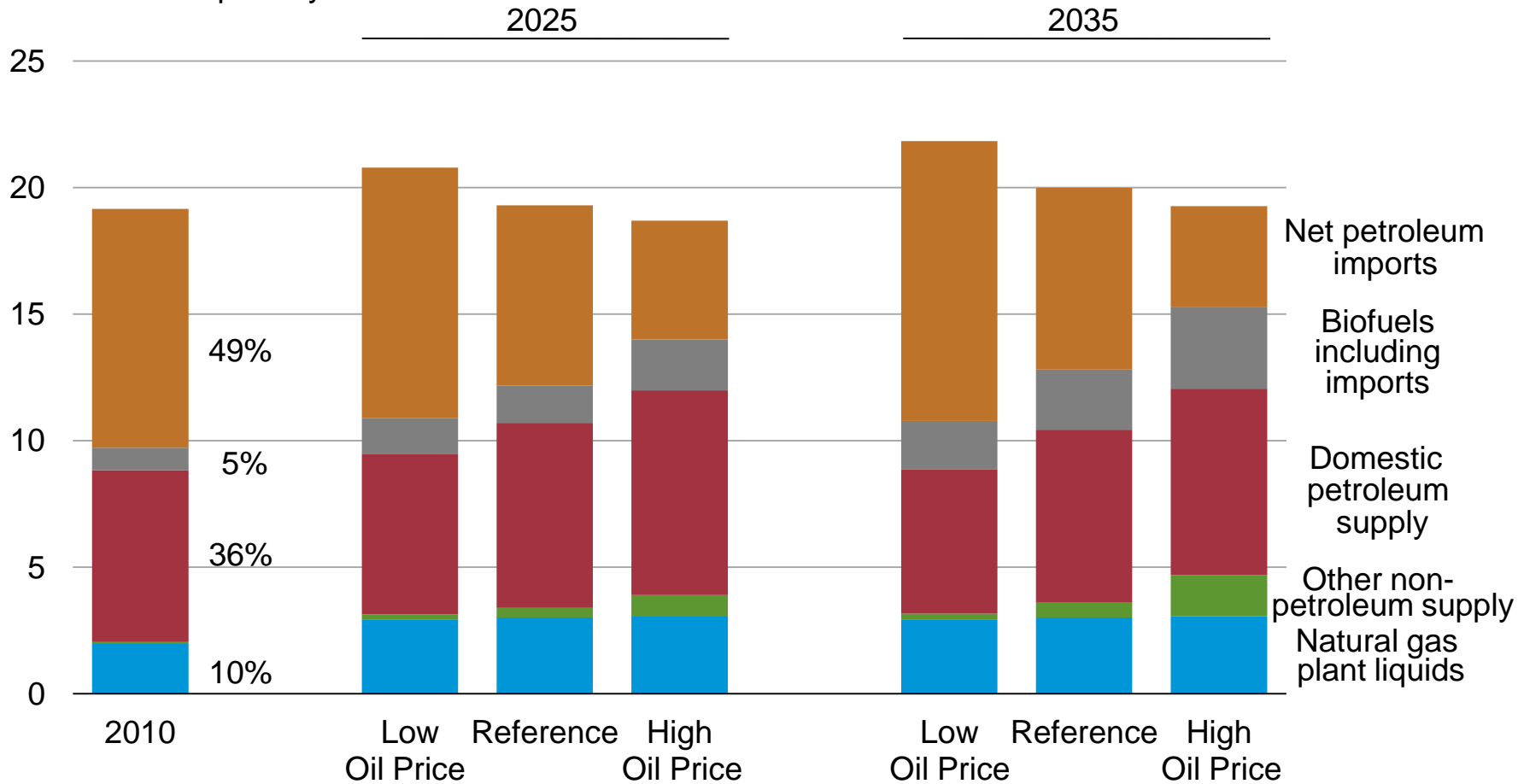
average annual price of low sulfur light crude oil
2010 dollars per barrel



Source: EIA, Annual Energy Outlook 2012

U.S. imports of liquid fuels fall due to increased domestic production – including biofuels – and greater efficiency

U.S. liquid fuels consumption
million barrels per day



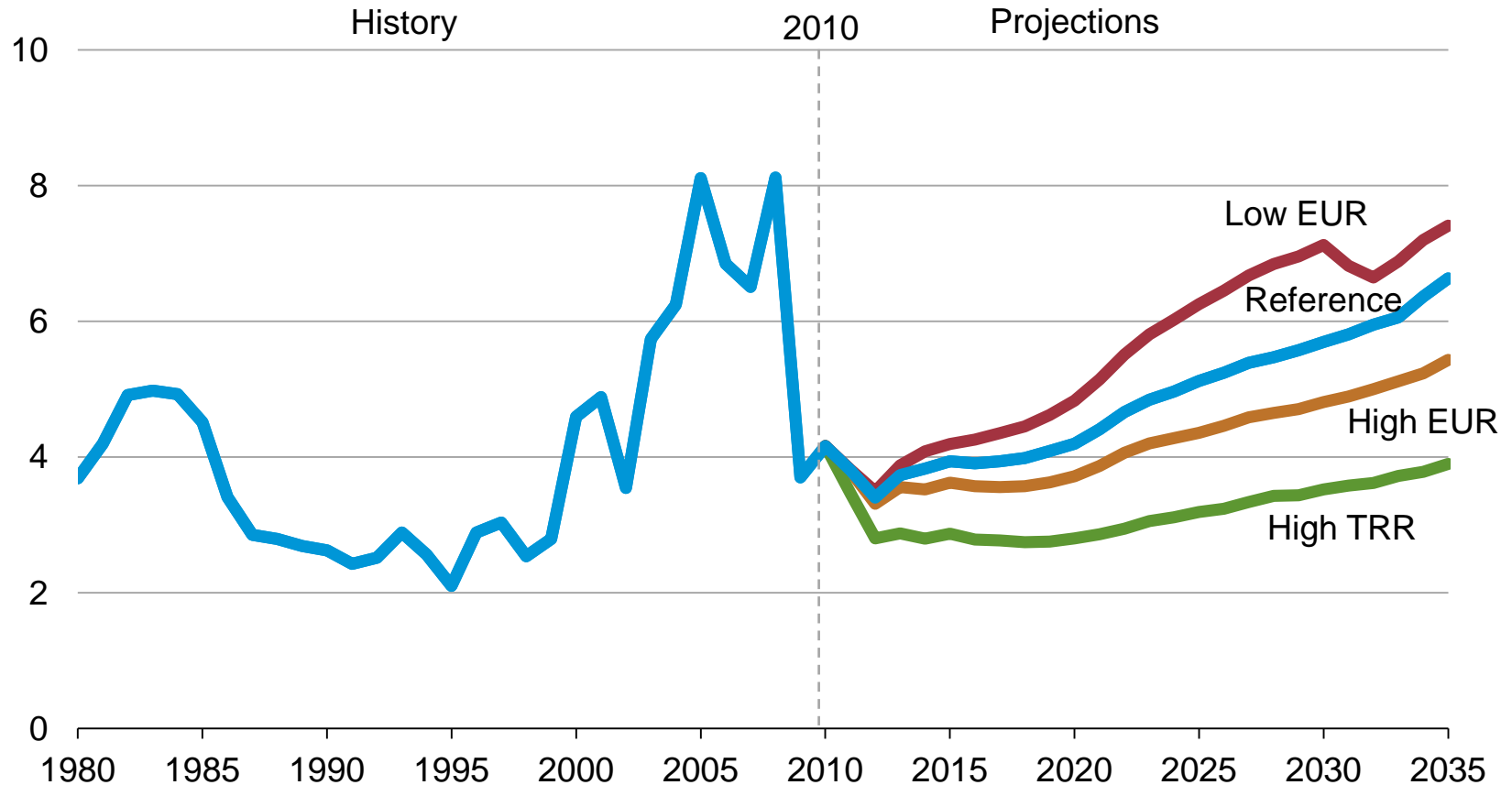
Source: EIA, Annual Energy Outlook 2012

U.S. crude oil and natural gas resource uncertainty

- The AEO2012 contains 3 scenarios of alternative resource estimates for domestic oil and gas resources. Estimates vary by play.
- The *Low Estimated Ultimate Recovery (EUR)* case assumes that the EUR per tight oil or shale gas well is 50 percent lower than in the Reference case.
- The *High EUR* case assumes that the EUR per tight oil or shale gas well is 50 percent higher than in the Reference case.
- In the *High Technically Recoverable Resources (TRR)* case, the well spacing for all tight oil and shale gas plays is increased, and the EUR per tight oil or shale gas well is assumed to be 50 percent higher than in the Reference case.

Natural gas price projections vary based on resource base assumptions

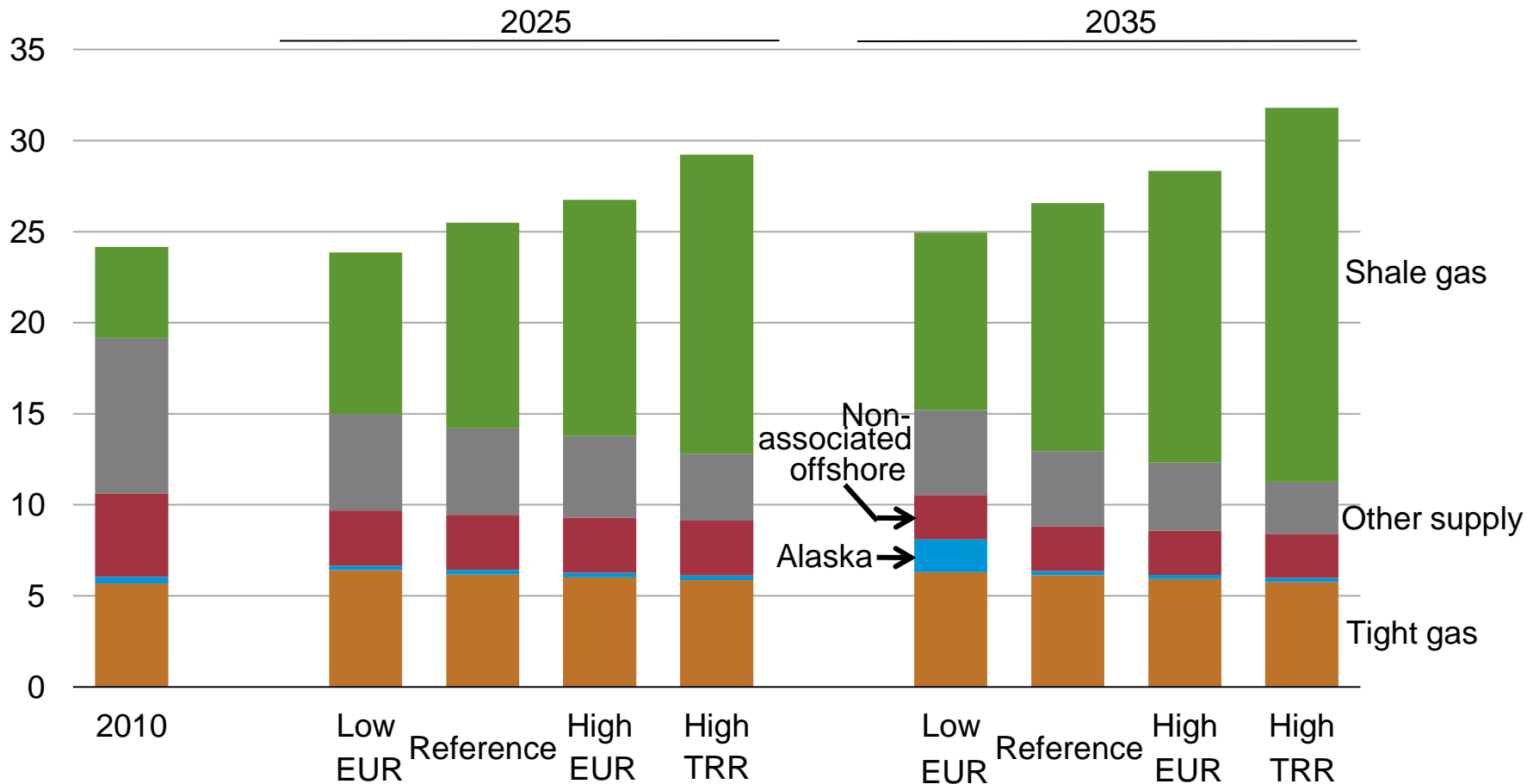
lower-48 average natural gas wellhead price
2010 dollars per thousand cubic feet



Source: EIA, Annual Energy Outlook 2012

Uncertainty surrounding shale gas resource estimates can result in significantly different futures for natural gas production.

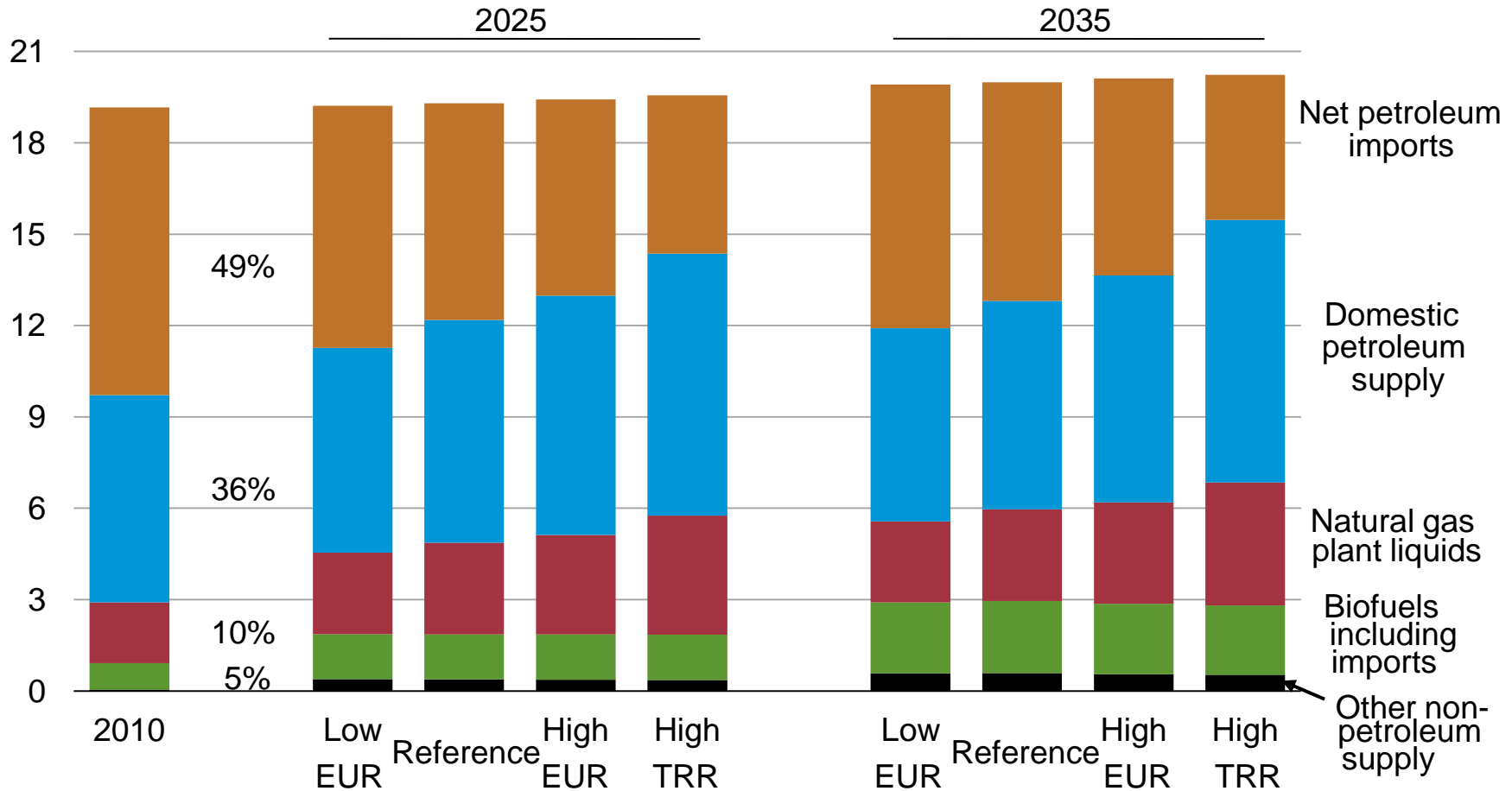
U.S. dry natural gas
trillion cubic feet per year



Source: EIA, Annual Energy Outlook 2012

U.S. imports of liquid fuels fall due to increased domestic production – including biofuels – and greater efficiency

U.S. liquid fuels consumption
million barrels per day



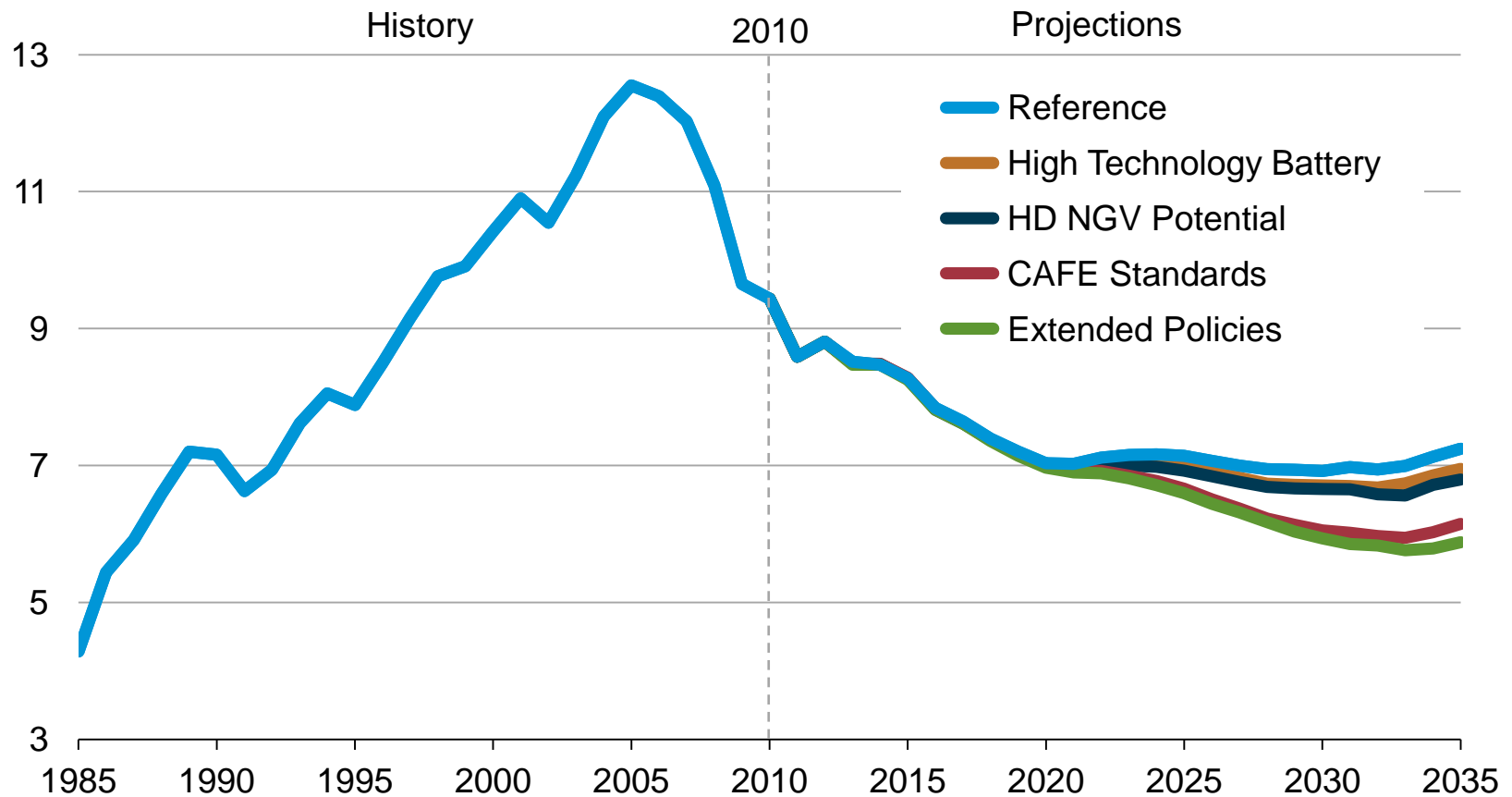
Source: EIA, Annual Energy Outlook 2012

Changes in the transportation sector fuel consumption landscape

- There are four different sections of the *Issues in Focus* that deal with transportation issues.
- The four scenarios highlighted here are:
 - *CAFE Standards*: incorporates the proposed NHTSA fuel economy standards for MY 2017 through MY 2025 (~3.9 percent per year).
 - *Extended Policies*: incorporates the proposed CAFE standards for MY 2017 through MY 2025 and assumes the standards increase at an average annual rate of 1.5 percent through 2035.
 - *High Technology Battery*: assumes the attainment of program goals established by DOE's Office of Energy Efficiency and Renewable Energy (EERE) for high-energy battery storage cost, maximum depth of discharge, and cost of a nonbattery traction drive system for 2015 and 2030.
 - *HD NGV Potential*: incremental costs are determined by assuming a set cost for CNG or LNG engines plus a tank cost based on the average amount of daily travel and the vehicle size class. The refueling infrastructure is assumed to develop over time.

U.S. net import of liquid fuels across alternative transportation scenarios

U.S. net imports of petroleum and other liquids
million barrels per day



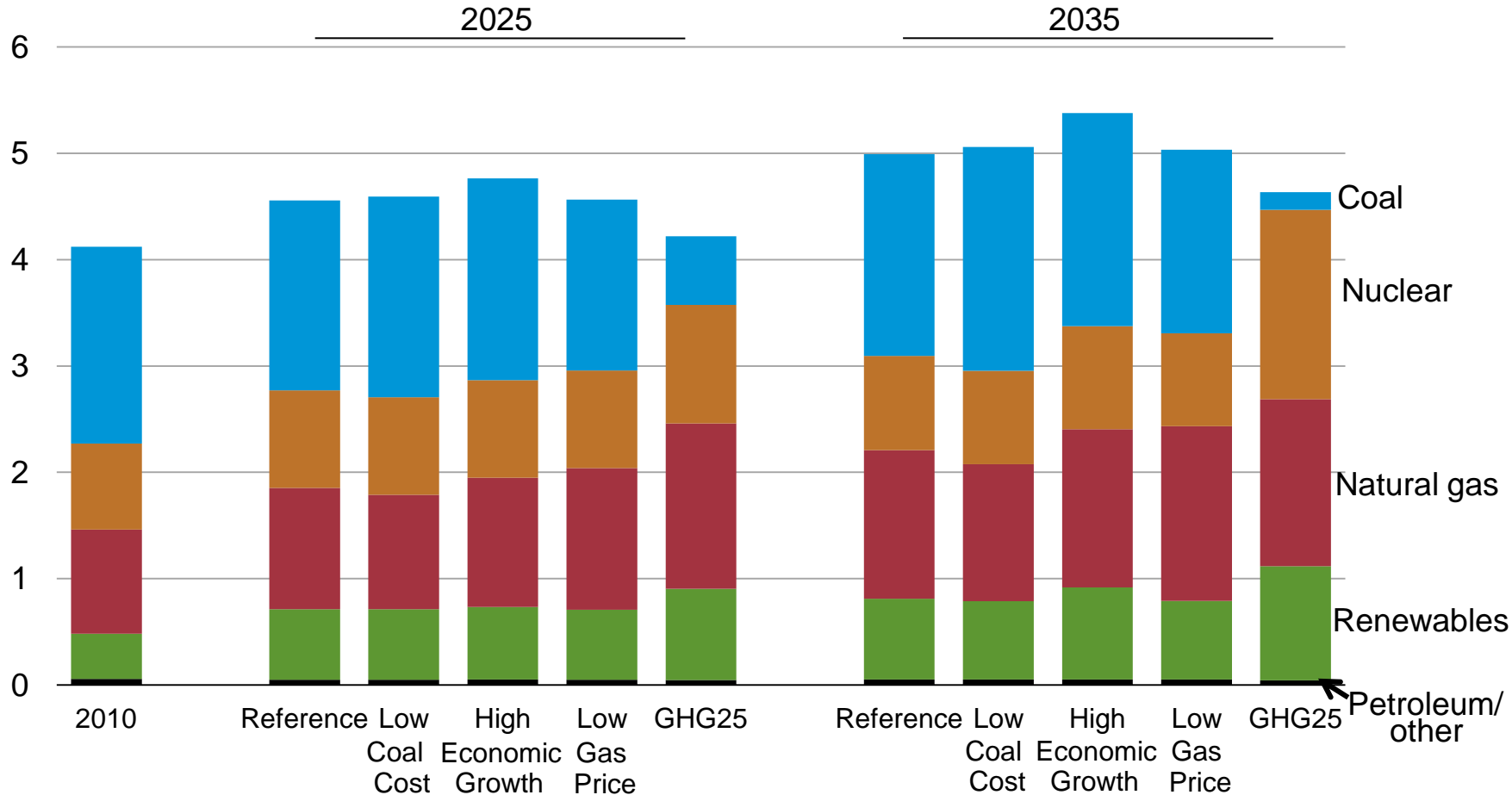
Source: EIA, Annual Energy Outlook 2012

Impacts of changes in fuel prices and environmental regulations on electric power markets

- The Issues in Focus contains 10 cases illustrating the impact of alternative fuel prices, recovery periods, demand levels, and environmental regulation.
- Four cases are presented here that tend to illustrate the largest impact on electric generation. They are:
 - The *Low Gas Price 05* case combines the more optimistic assumptions about future volumes of shale gas production from the High EUR case with a 5-year recovery period for investments in new environmental controls.
 - The *Low Coal Cost* case assumes higher mining productivity and lower costs for labor, mine equipment, and coal transportation, which result in lower coal prices.
 - The *High Economic Growth* case assumes higher growth rates for economic variables, which increases demand for electricity.
 - The *GHG25* case assumes the CO₂ price is set at \$25 per metric ton in 2013 and increases at a real annual rate of 5 percent per year.

Sources of electric power generation can vary significantly in the projections depending on relative fuel prices and emissions standards.

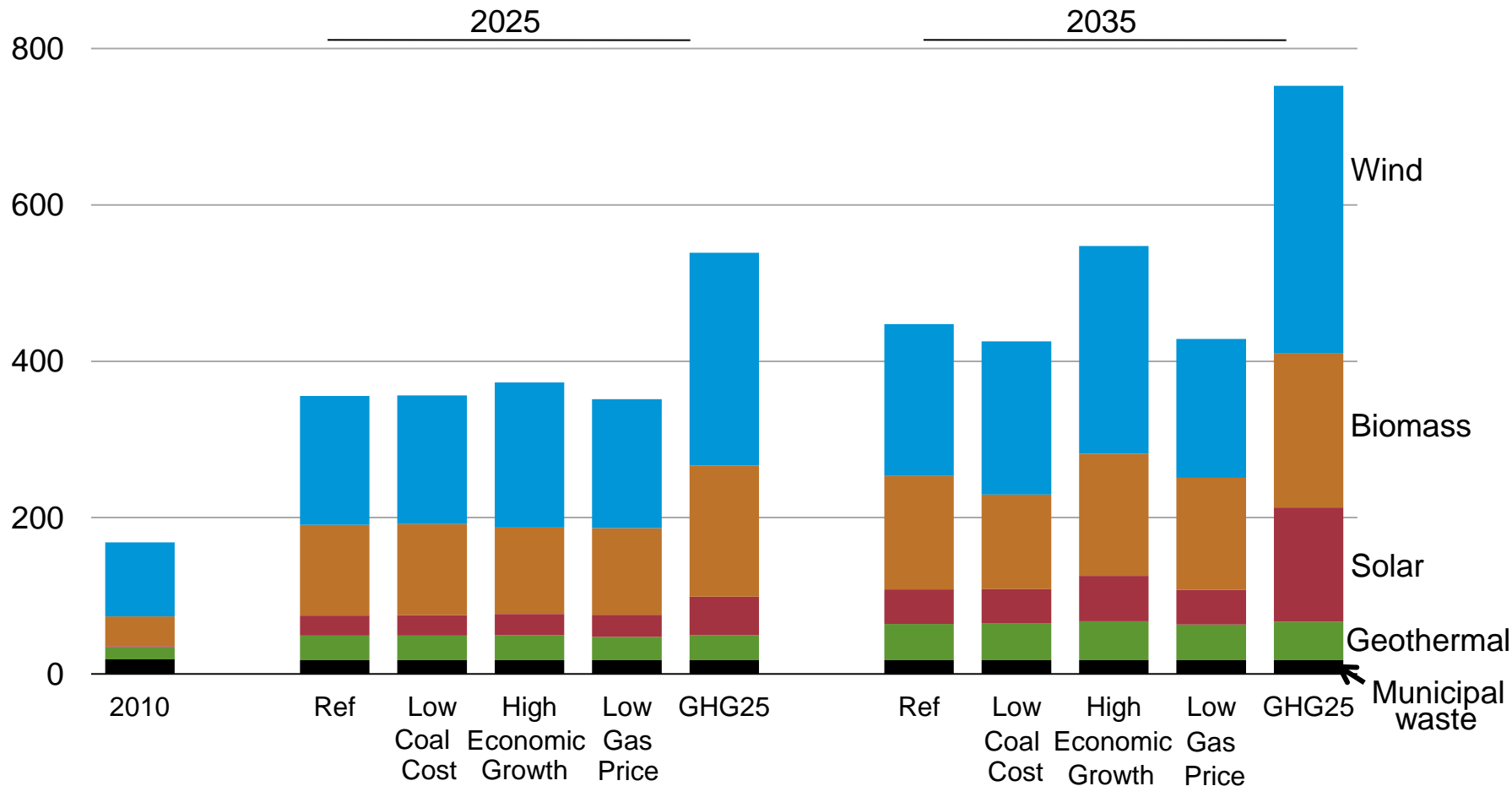
U.S. electricity generation by fuel
trillion kilowatthours



Source: EIA, Annual Energy Outlook 2012

Non-hydro renewable sources grow nearly three-fold by 2035; growth climbs to nearly five-fold with a price on CO₂ emissions

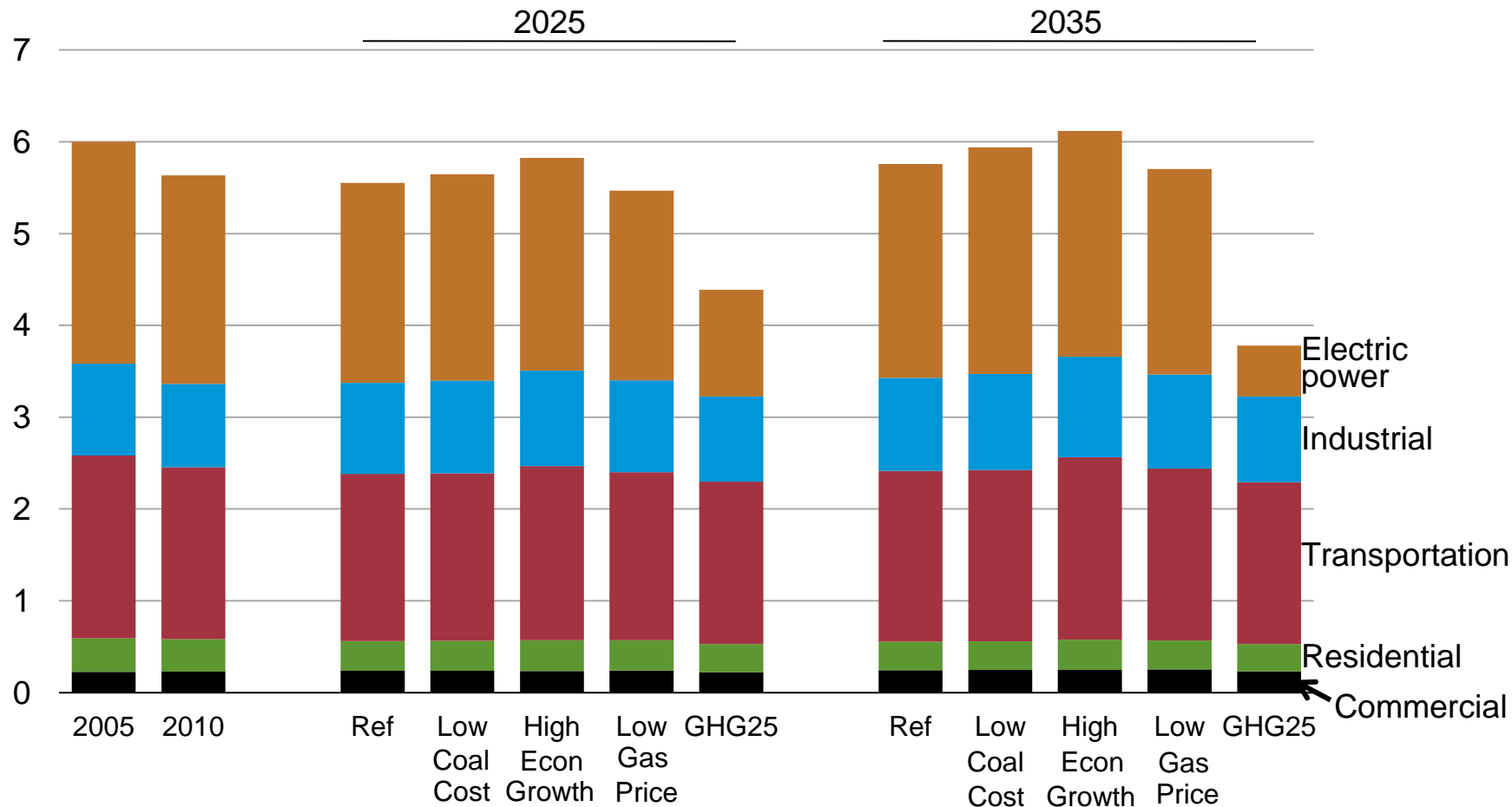
non-hydropower renewable generation
billion kilowatthours



Source: EIA, Annual Energy Outlook 2012

U.S. carbon dioxide emissions do not reach 2005 levels throughout the projection period

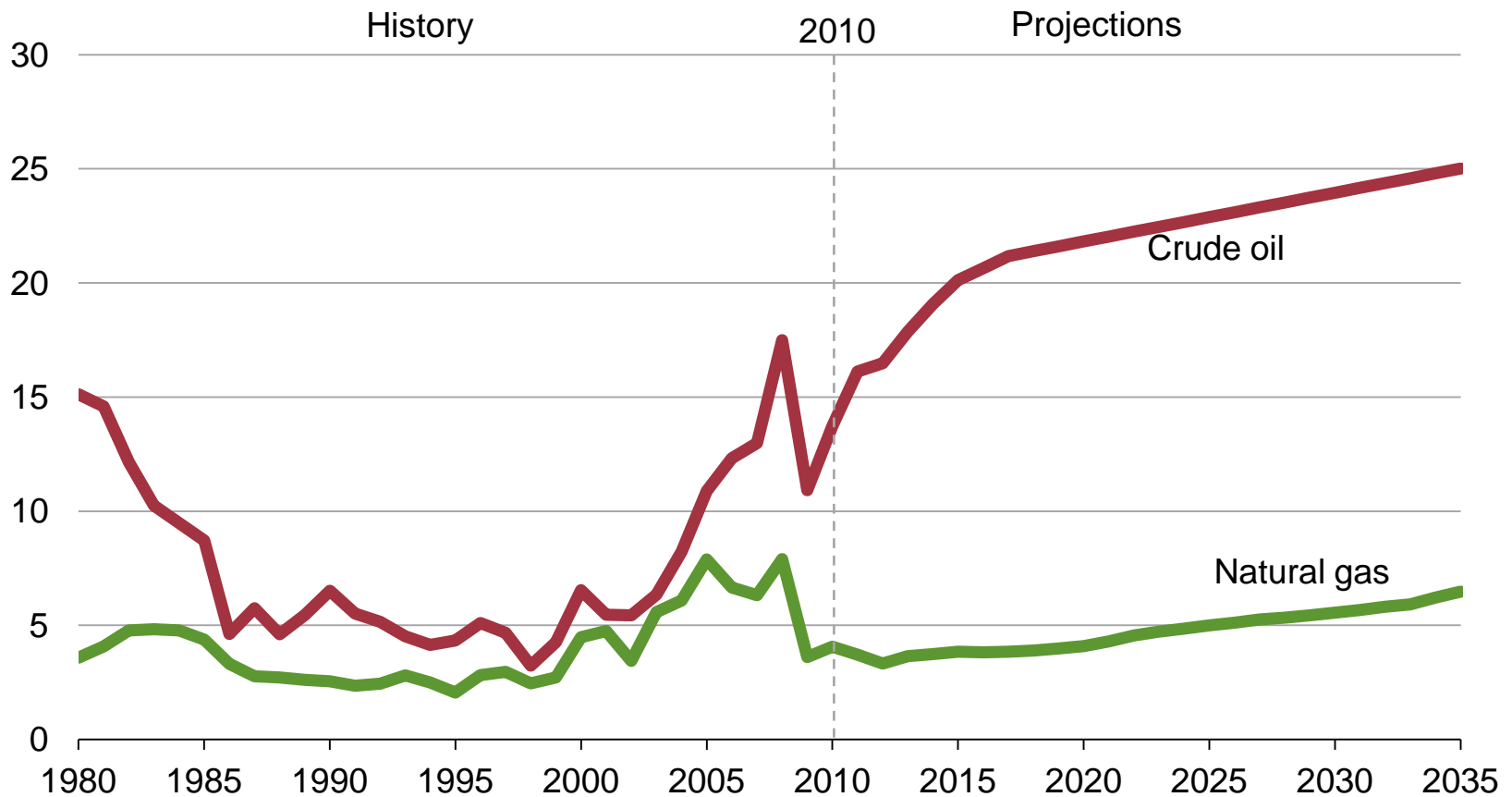
U.S. carbon dioxide emissions
billion metric tons carbon dioxide



Source: EIA, Annual Energy Outlook 2012

Crude oil price and lower 48 natural gas wellhead price

lower 48 average natural gas wellhead price and low sulfur light crude oil
2010 dollars per million Btu



Source: EIA, Annual Energy Outlook 2012

For more information

U.S. Energy Information Administration home page | www.eia.gov

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