

***Future Energy Scenarios and
the Impact of the American Clean Energy
Security Act
for
MIT-NESCAUM Symposium
New Directions in Energy Policy and Impacts on Air Quality
Endicott House, Dedham MA***

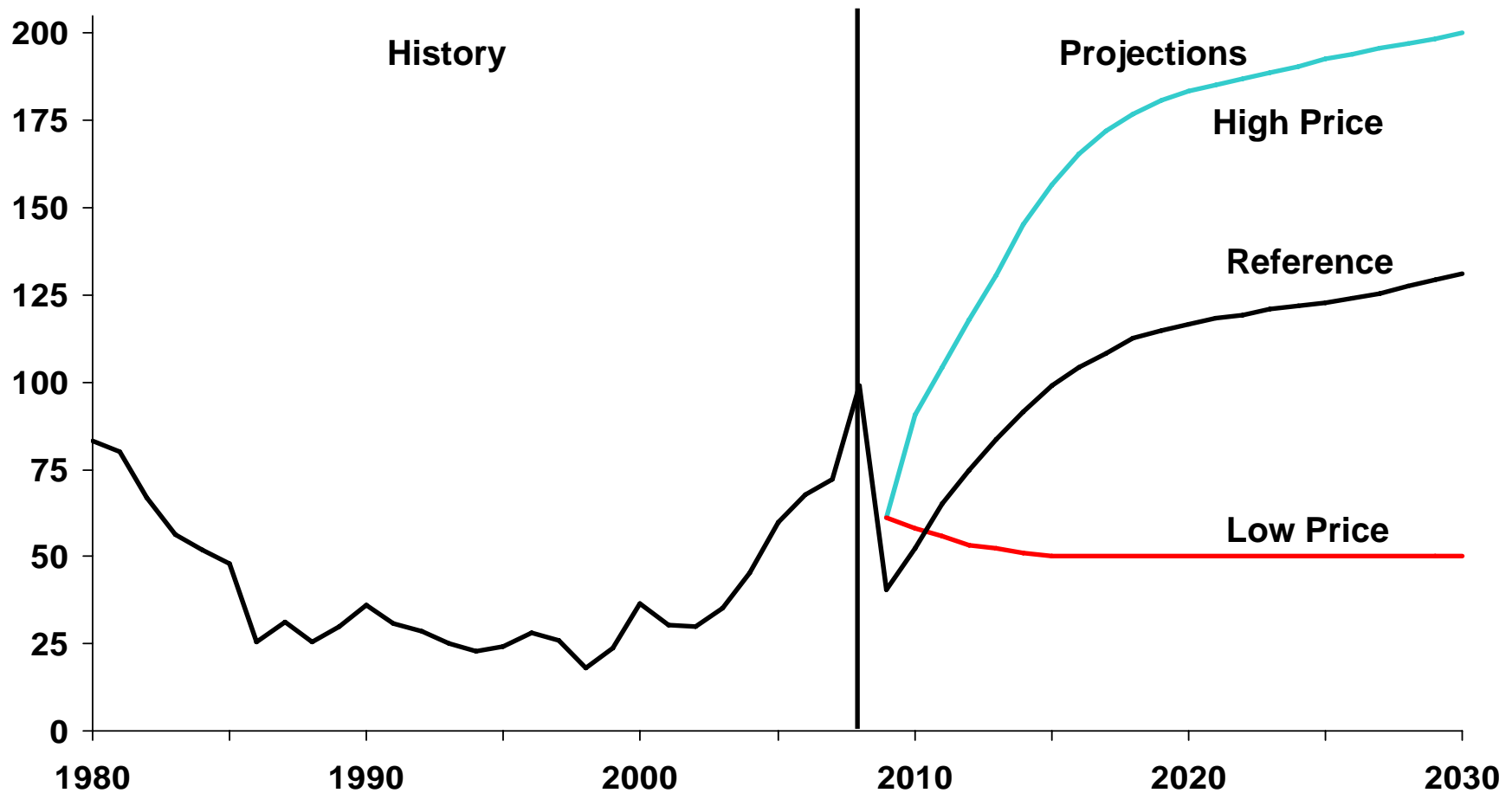
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The economy, oil prices, resources, policies, and behavior drive the updated AEO2009 reference case

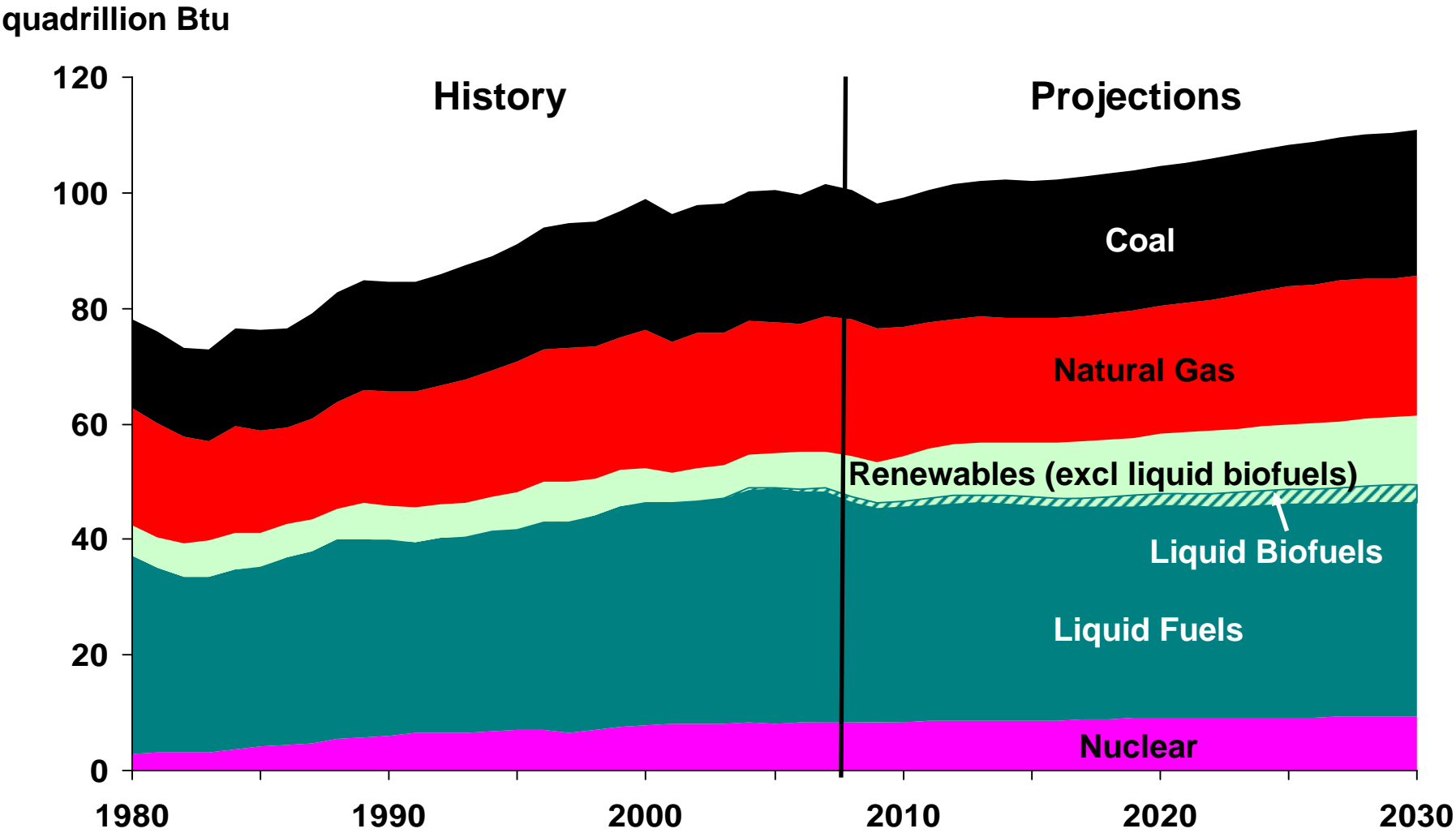
- Long-term economic growth averages about 2.4 percent per year between 2007 and 2030
- World crude oil prices recover from a near-term decline and reach \$130 per barrel (in 2007 dollars) by 2030
- A robust domestic natural gas resource base allows for a steady expansion of production given projected growth in demand and prices
- Very slow projected growth in energy consumption and emissions, even before consideration of the ACES Act proposal.

Oil prices in the reference case rise steadily; the full AEO includes a wide range of price cases

2007 dollars per barrel

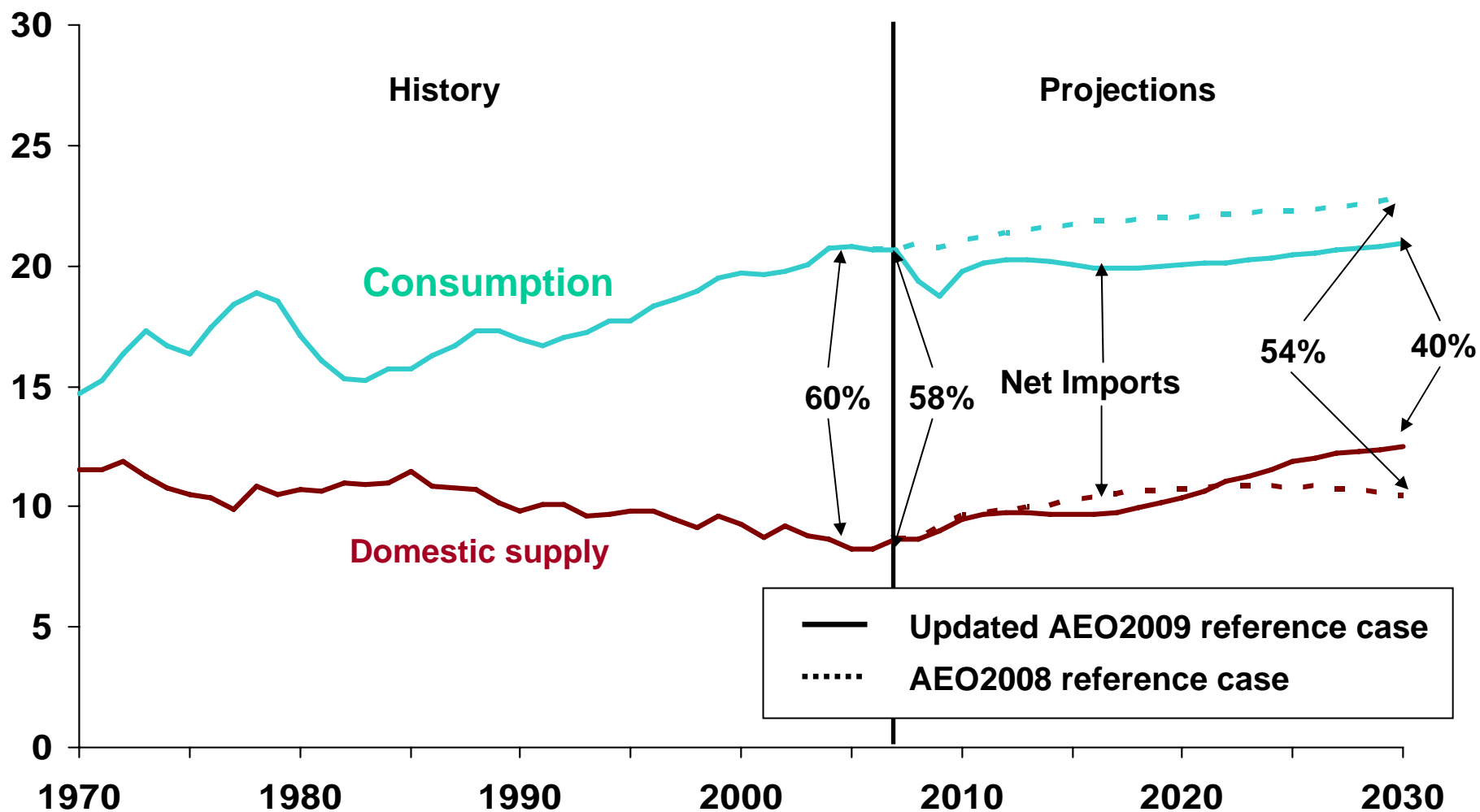


Non-fossil energy use grows rapidly, but fossil fuels still provide 78 percent of total energy use in 2030



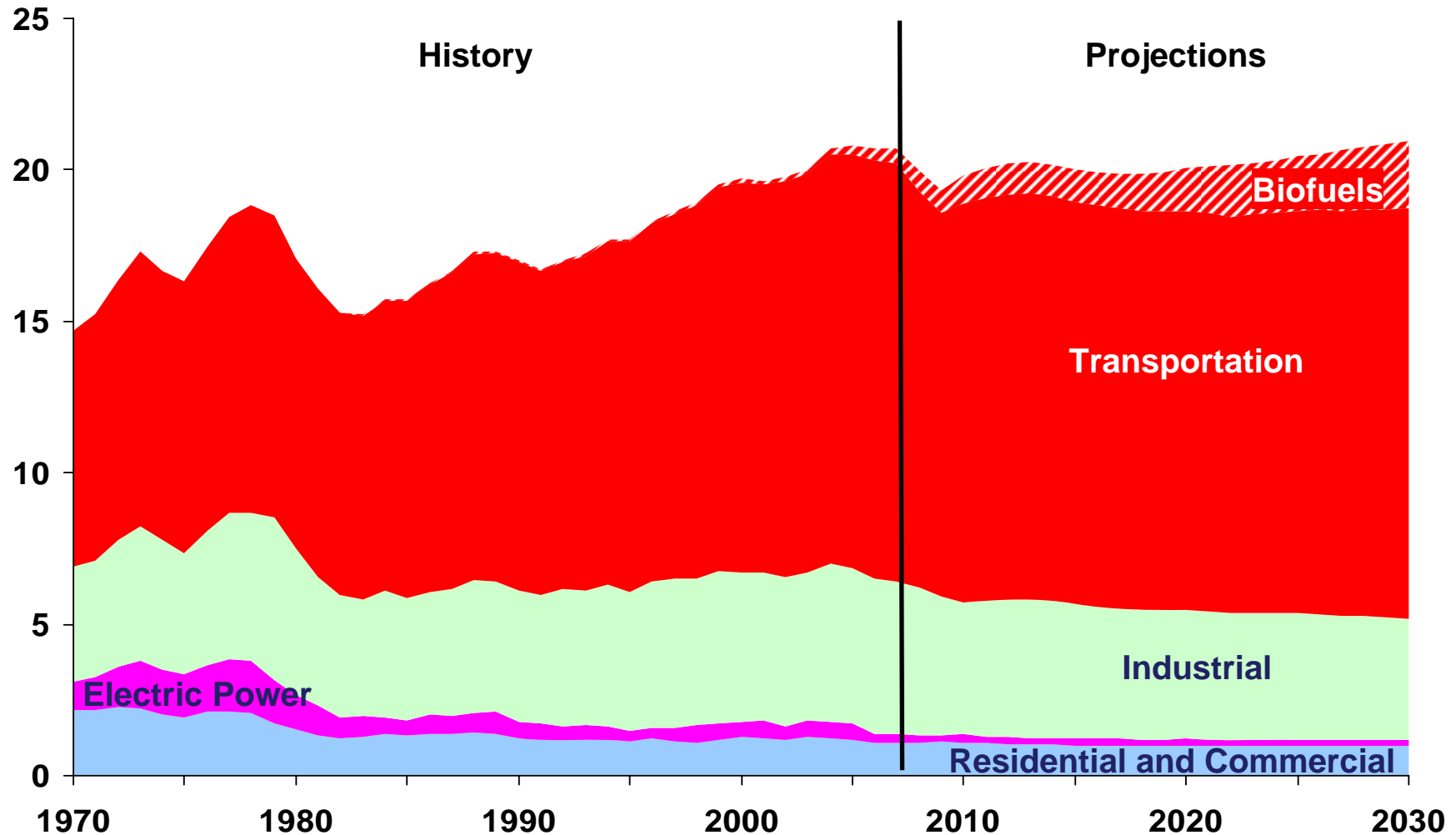
Net dependence on imported liquids declines dramatically over the next 20 years

million barrels per day



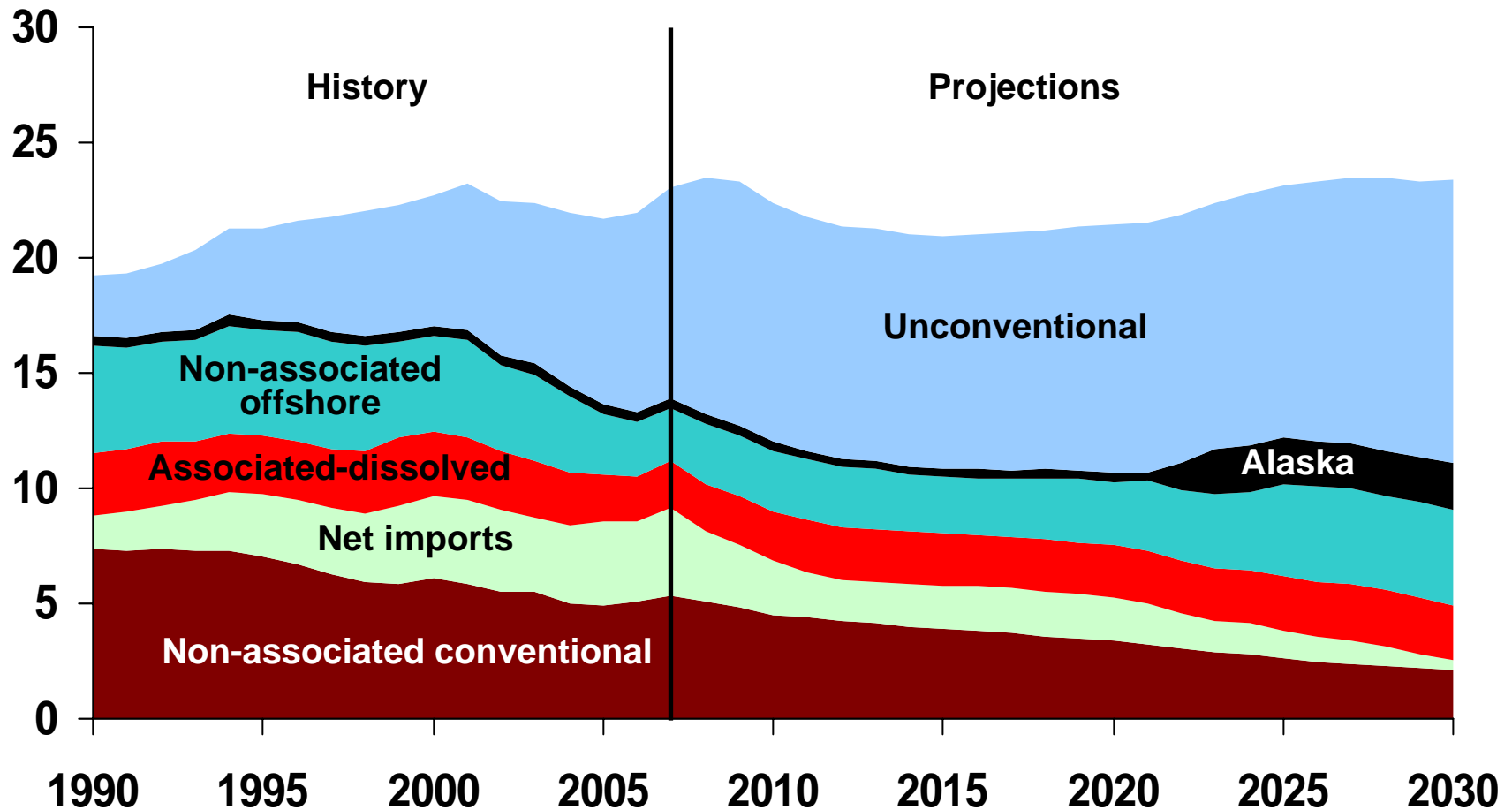
Petroleum-based liquids consumption is projected to be flat as biofuels use grows

million barrels per day



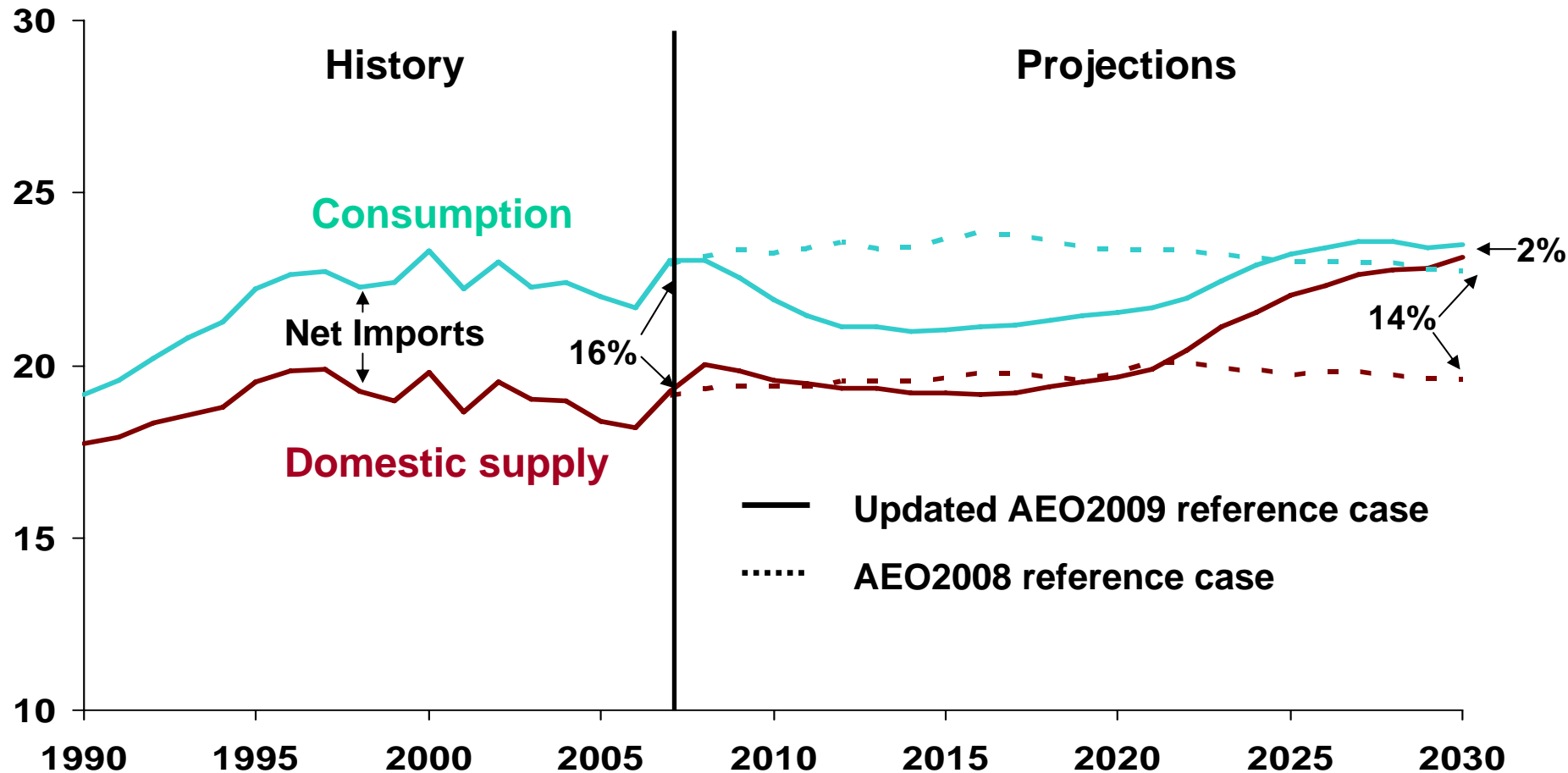
Unconventional production meets most growth in natural gas demand and offsets the decline in conventional production and imports

trillion cubic feet



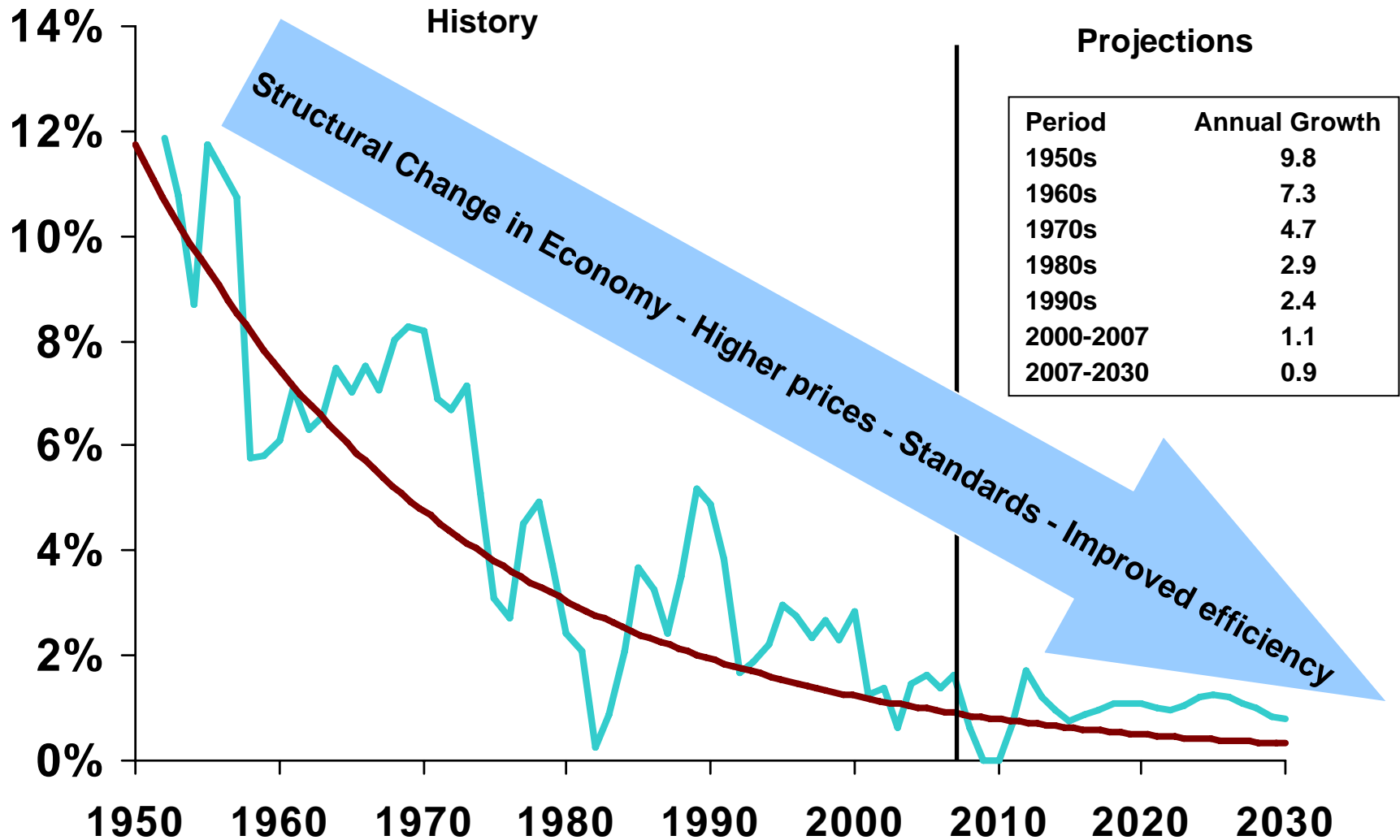
The import share of U.S. natural gas supply declines sharply as domestic supply grows

trillion cubic feet



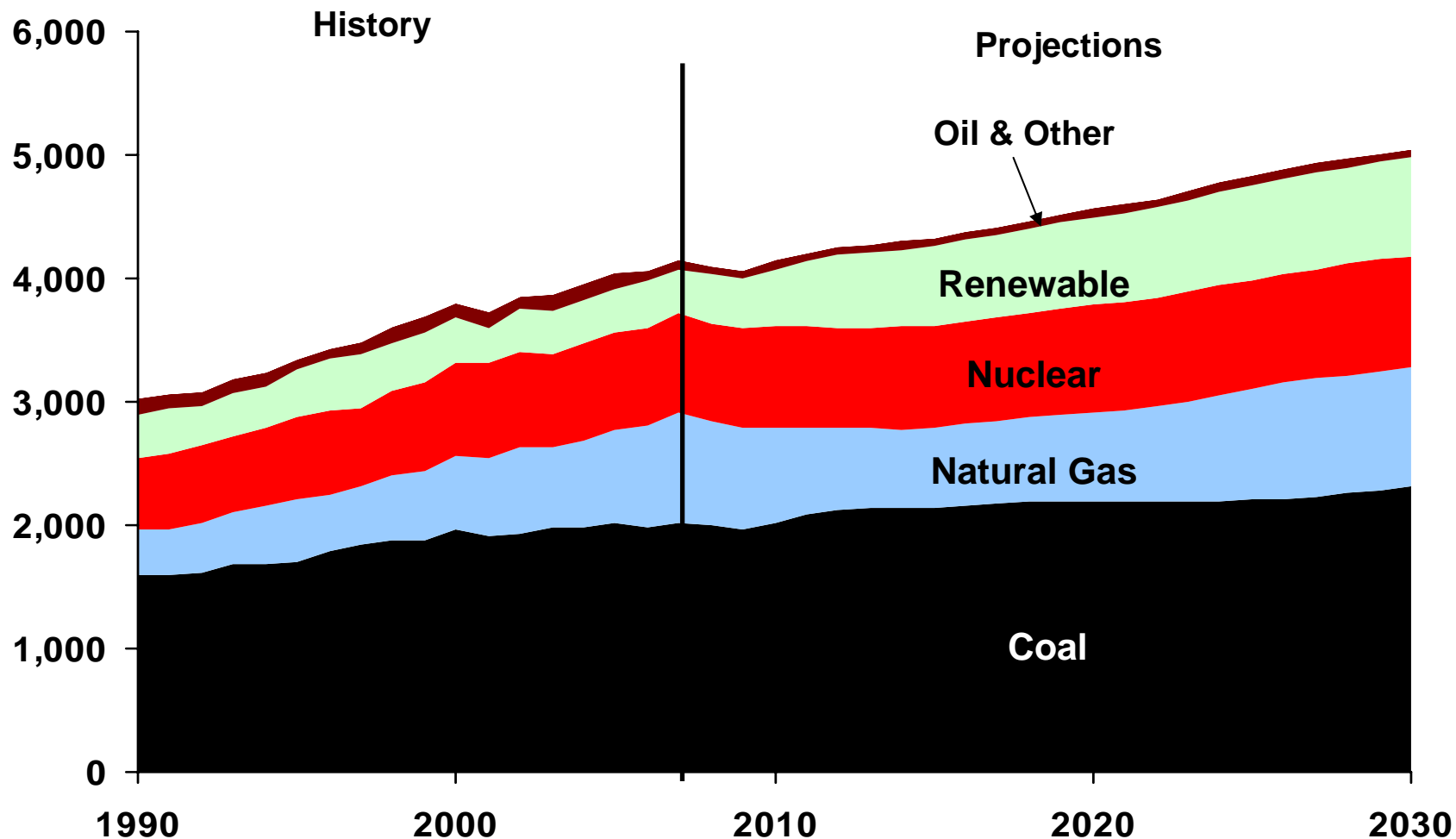
Growth in electricity use continues to slow

3-year rolling average percent growth

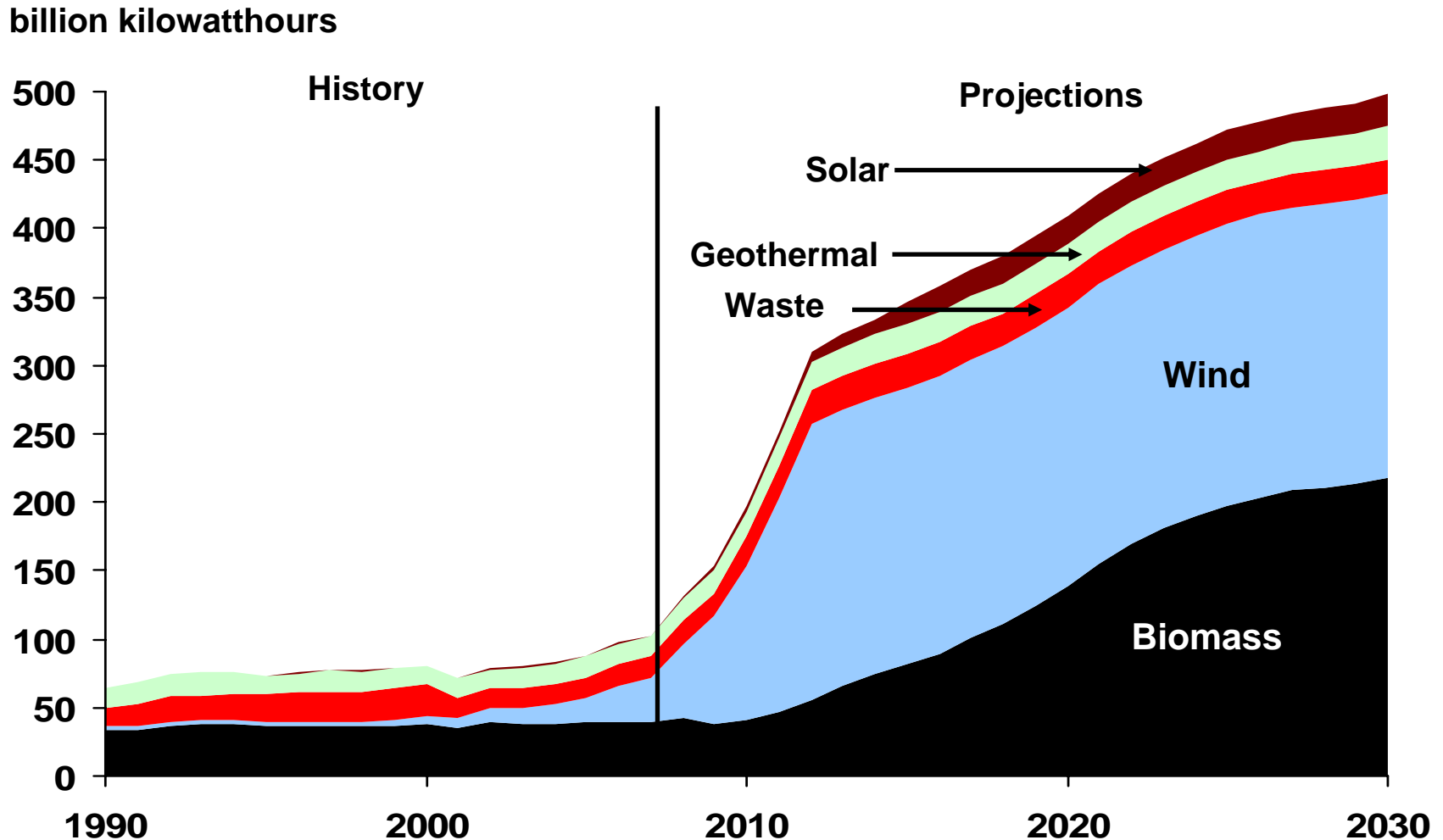


Generation mix gradually shifts to lower carbon options

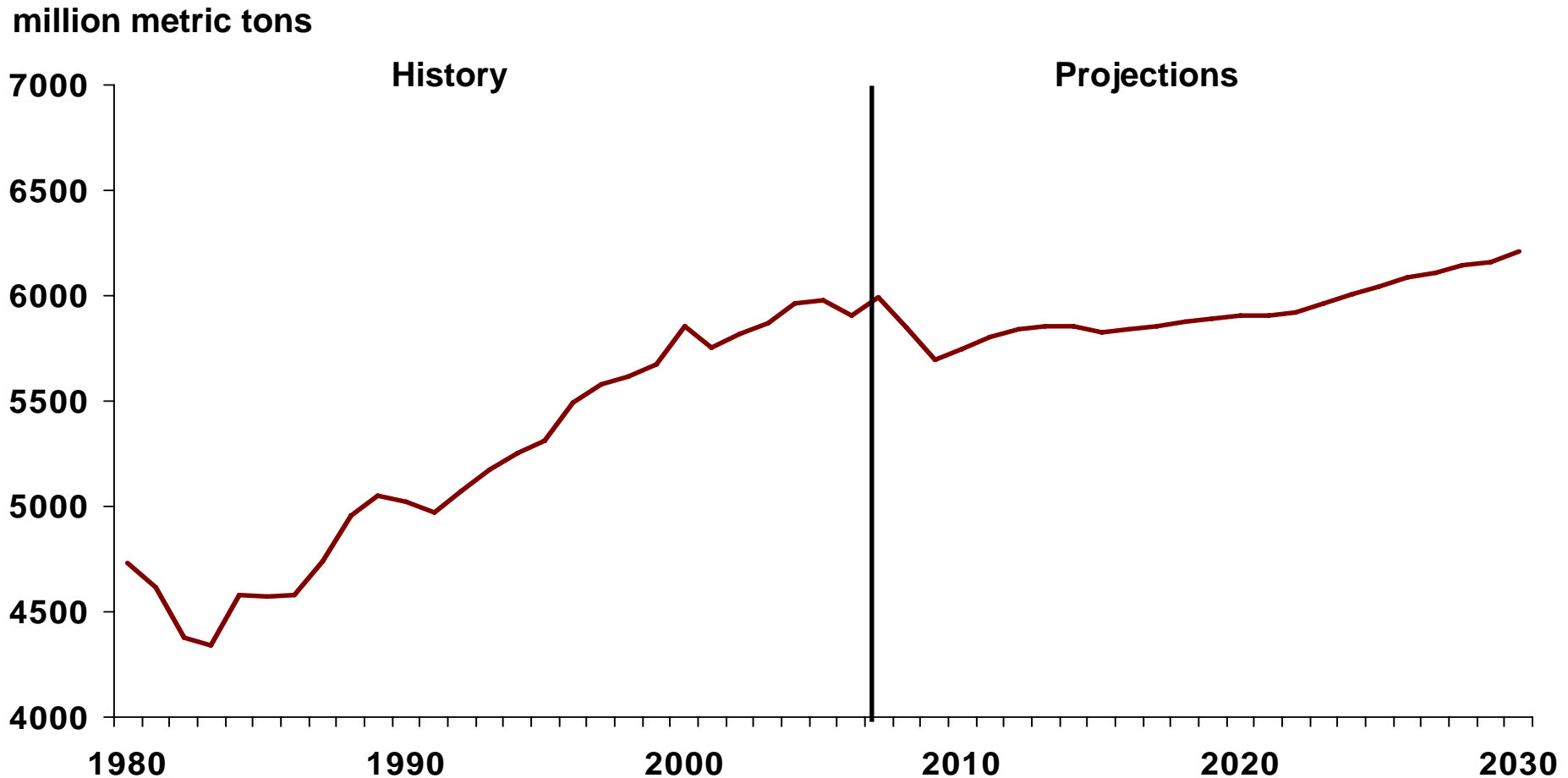
billion kilowatthours



Nonhydropower renewable sources meet 44% of total generation growth between 2007 and 2030



Growth in energy-related CO₂ emissions slows with slowing growth in energy use and a shift to less carbon-intensive fuels



Key results from the AEO2009 reference case

- World oil prices rise to higher levels due to growth in world demand and more limited access to resources
- U.S. oil use remains near its present level through 2030 as modest growth in overall liquids demand is met by biofuels
- U.S. dependence on imported oil, measured as a share of U.S. liquids use, is expected to decline sharply over the next 25 years
- Natural gas import share of total supply also declines sharply due to increased domestic production with higher prices
- Unconventional natural gas production, lead by gas shales, is expected to provide the majority of growth in gas supply
- Energy-related CO₂ emissions grow at 0.2 percent per year, absent any new policies to limit emissions

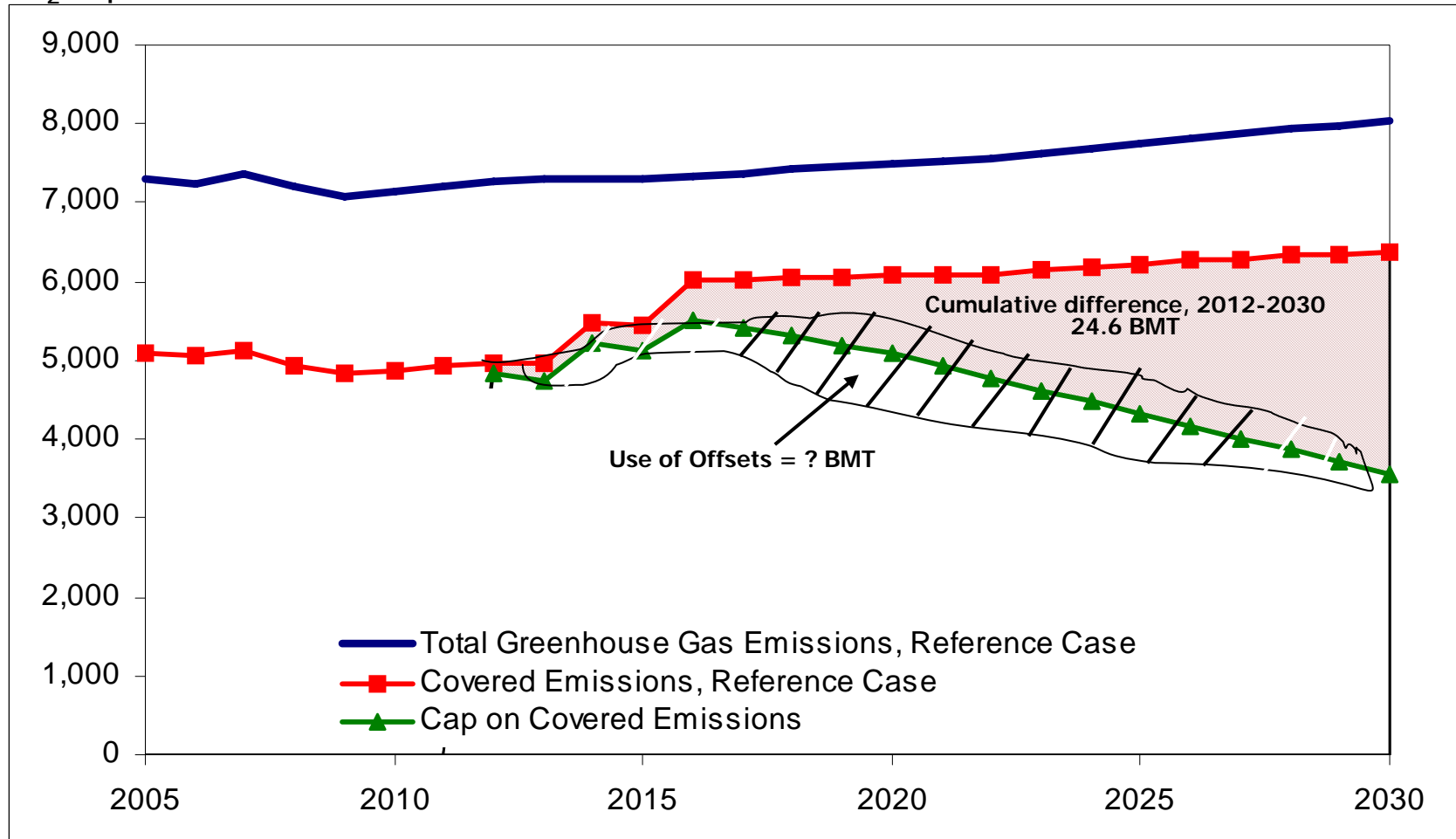
How would H.R. 2454, the American Clean Energy and Security Act, or the Waxman-Markey bill, change things?

ACES Analysis Cases

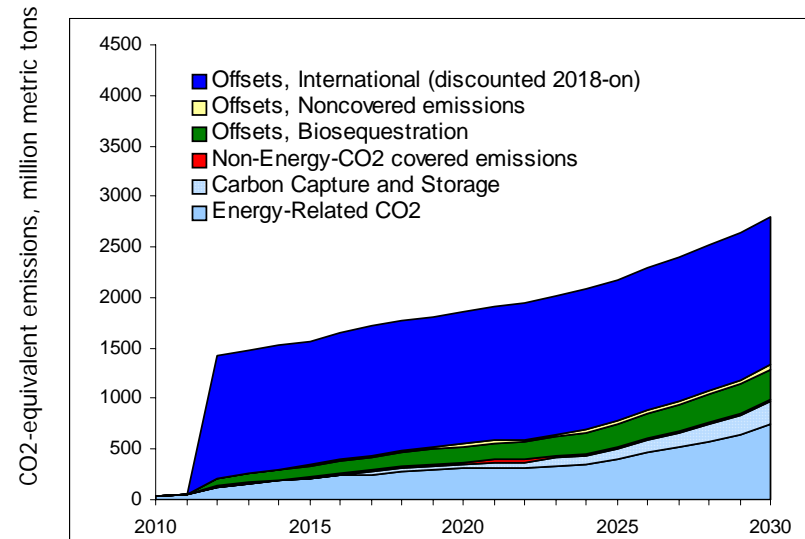
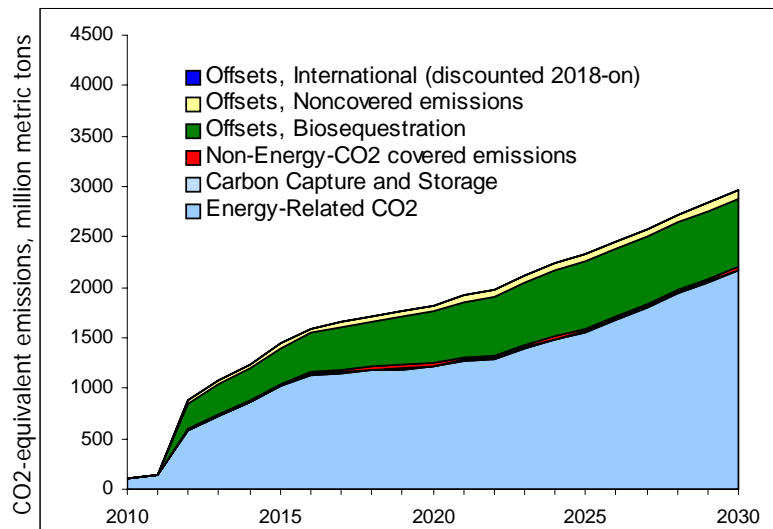
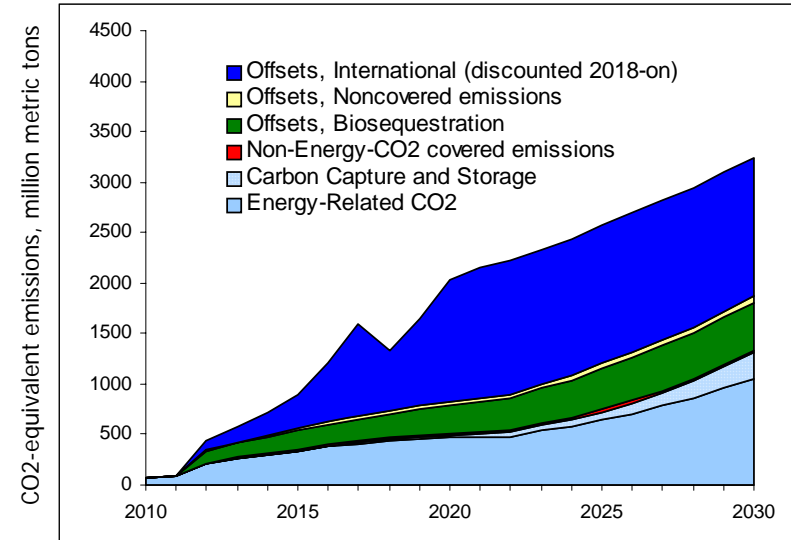
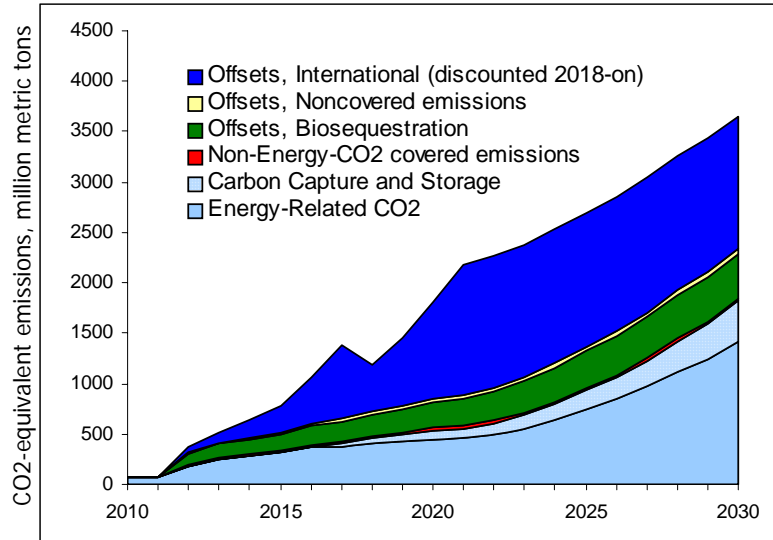
Case Name	Assumptions
Basic	Integrated analysis of all of the modeled provisions of ACESA.
Zero Bank	Same as Basic but no carryover of allowances beyond 2030. Major low- no-carbon energy technology breakthroughs with potential for significant market penetration after 2030 would likely reduce
High Offsets	Same as Basic but assumes increased use of international offsets.
High Cost	Same as Basic but assumes that nuclear, fossil with CCS and biomass gasification costs are 50 % higher
No International	Same as Basic but assumes international offsets are too expensive or unable to meet the requirements for use
No Int. / Limited	Same as Basic but limits additions of nuclear, fossil with CCS and biomass to Reference Case levels of 11, 2, and 6 thousand megawatts, respectively. Also no international offsets.

The ACESA Cap-and-Trade Program targets require a cumulative 24.6- billion-metric-ton reduction in covered GHG emissions over the 2012 to 2030 period. The actual reduction in U.S. covered emissions over this period can be either smaller or larger depending on the use of offsets and banking.

CO₂-equivalent emissions, million metric tons

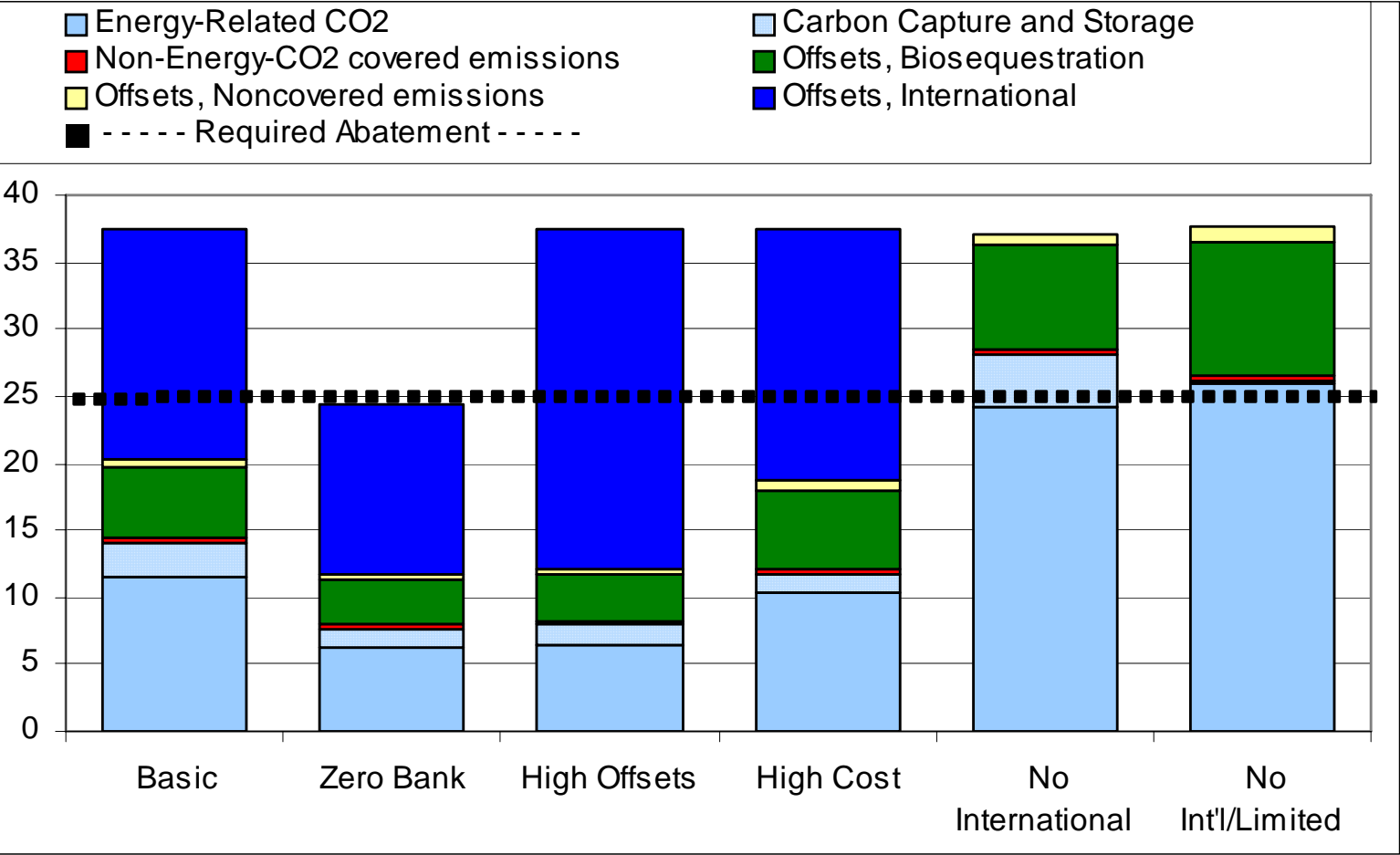


The energy sector's share of overall compliance (the two bottom wedges) varies significantly across cases



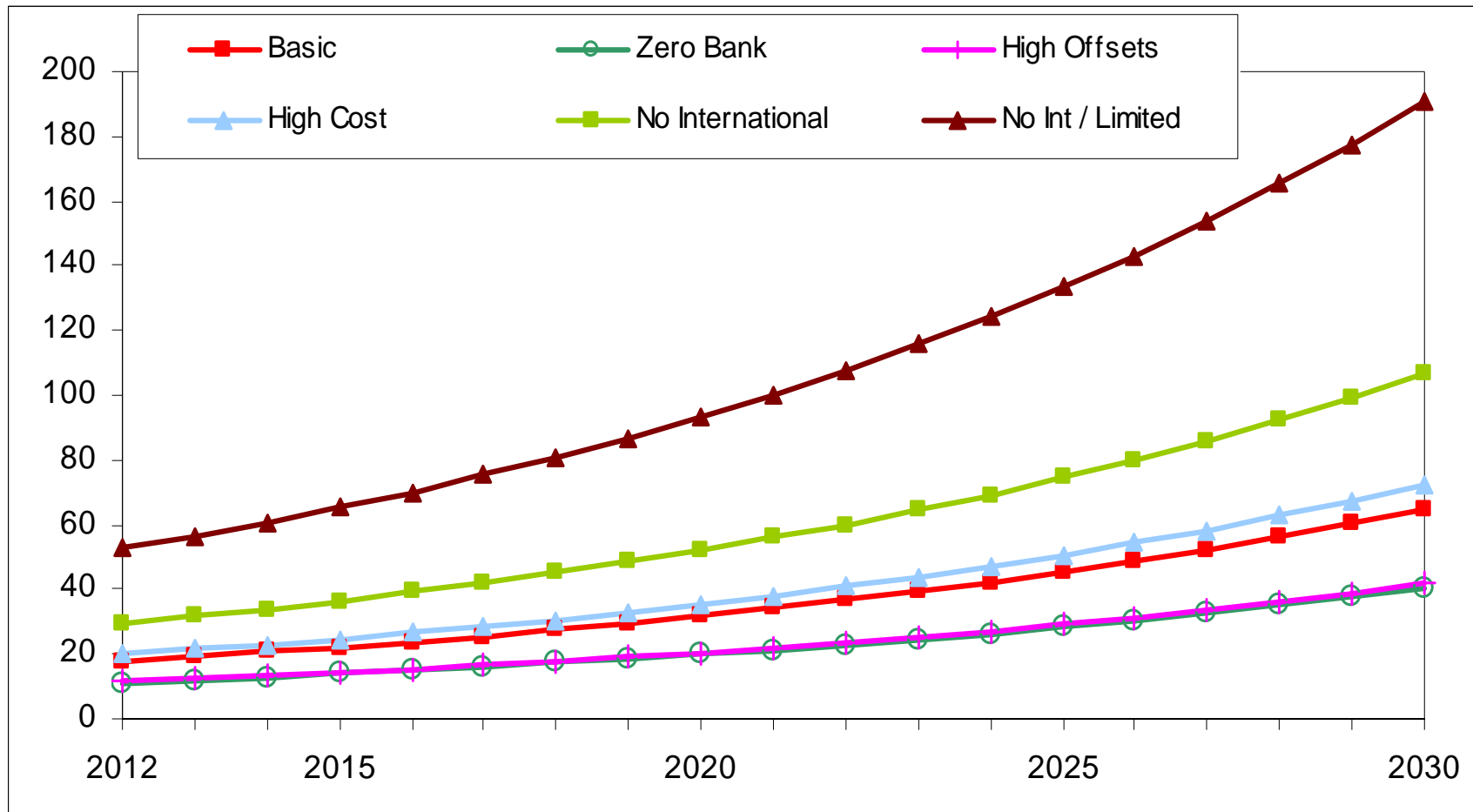
Cumulative reductions in energy-related carbon dioxide emissions (blue and blue hatched areas) over the 2012 to 2030 period vary widely depending on the use of offsets, the availability of low- and no- carbon baseload generation technologies, and the size of the allowance bank in 2030

Cumulative compliance, 2012-2030 (billion metric tons)



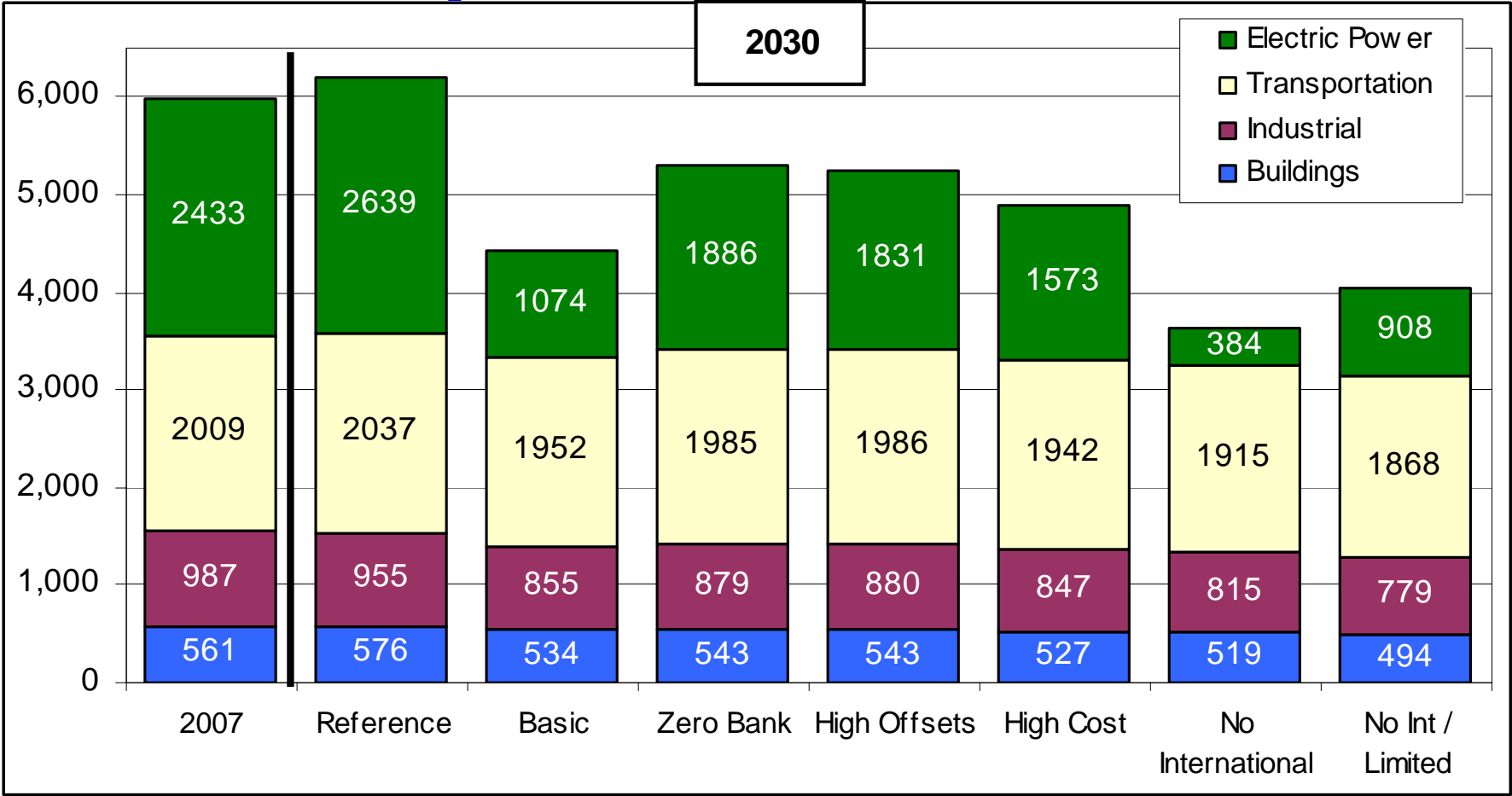
Allowance prices depend on the availability of offsets and low- and no- carbon electricity generation technologies

Projected Allowance Prices (2007 dollars per metric ton CO₂-equivalent)



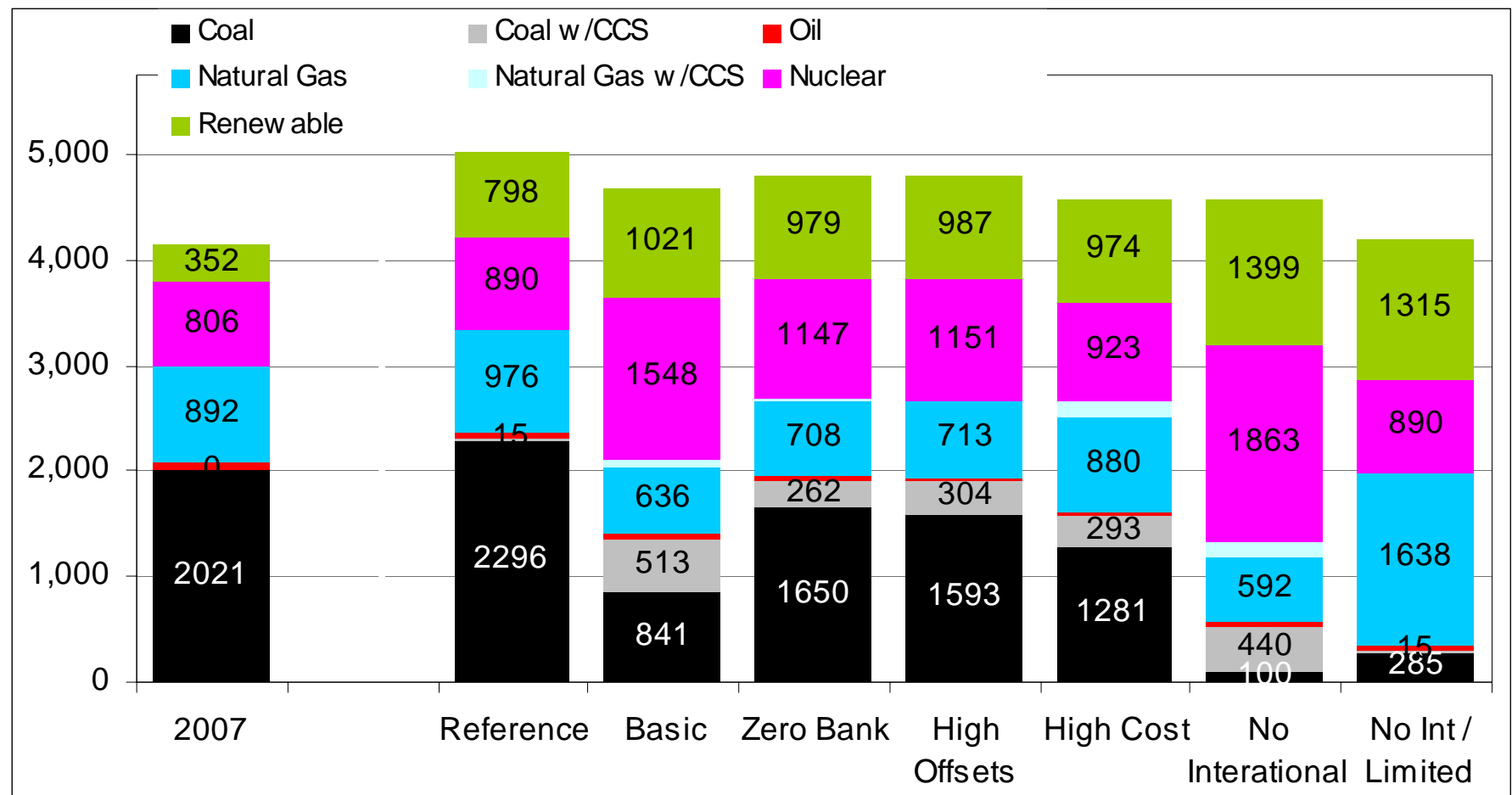
Emissions reductions in the electric power sector are much larger in both percentage and absolute terms than those in other energy uses

2030 Energy Related CO₂ Emissions (million metric tons CO₂ equivalent)



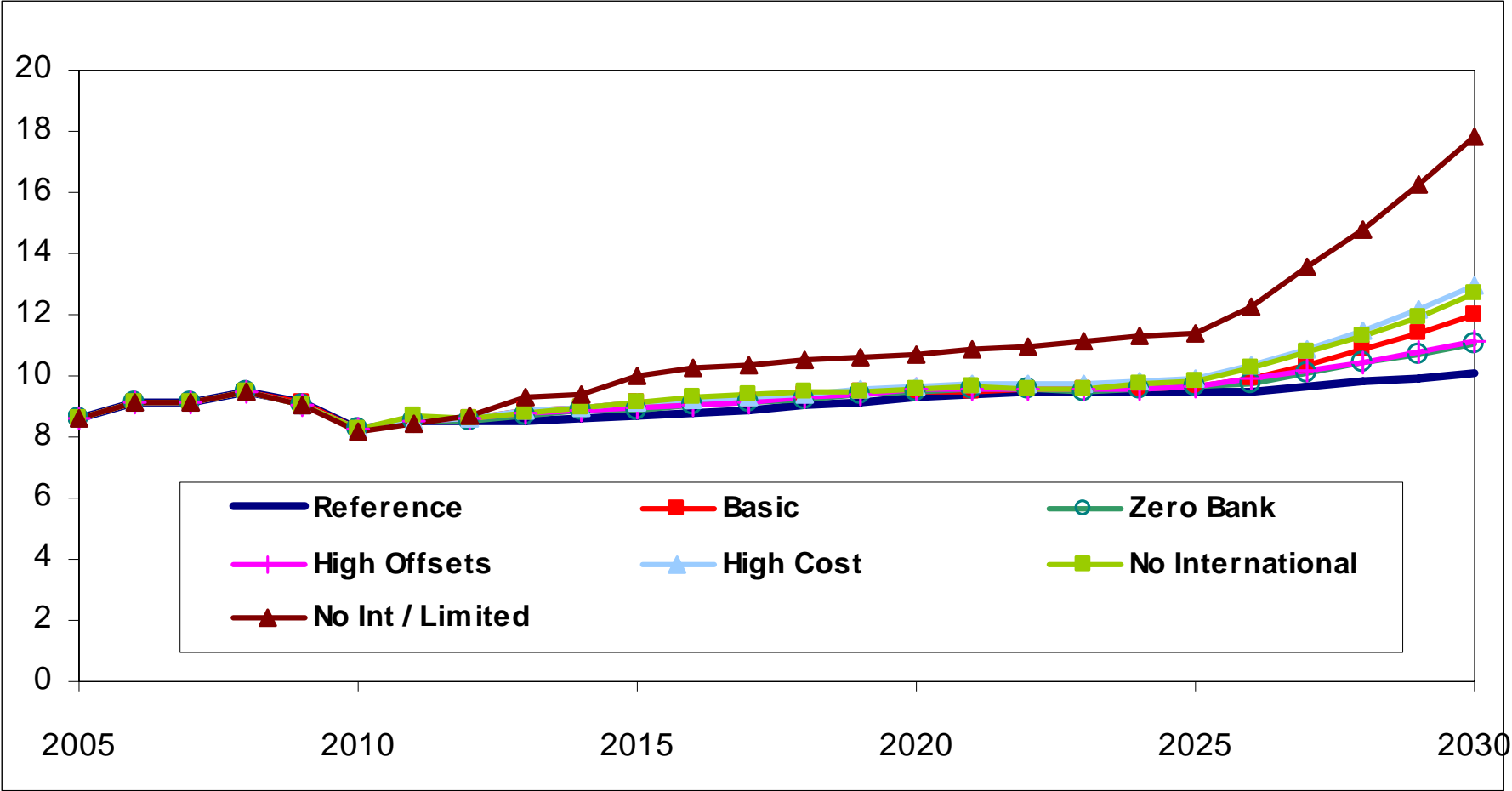
The generation fuel mix in 2030 varies widely across cases; natural gas generation can either rise or fall relative to the reference case.

2030 Generation by Fuel (billion kilowatthours)



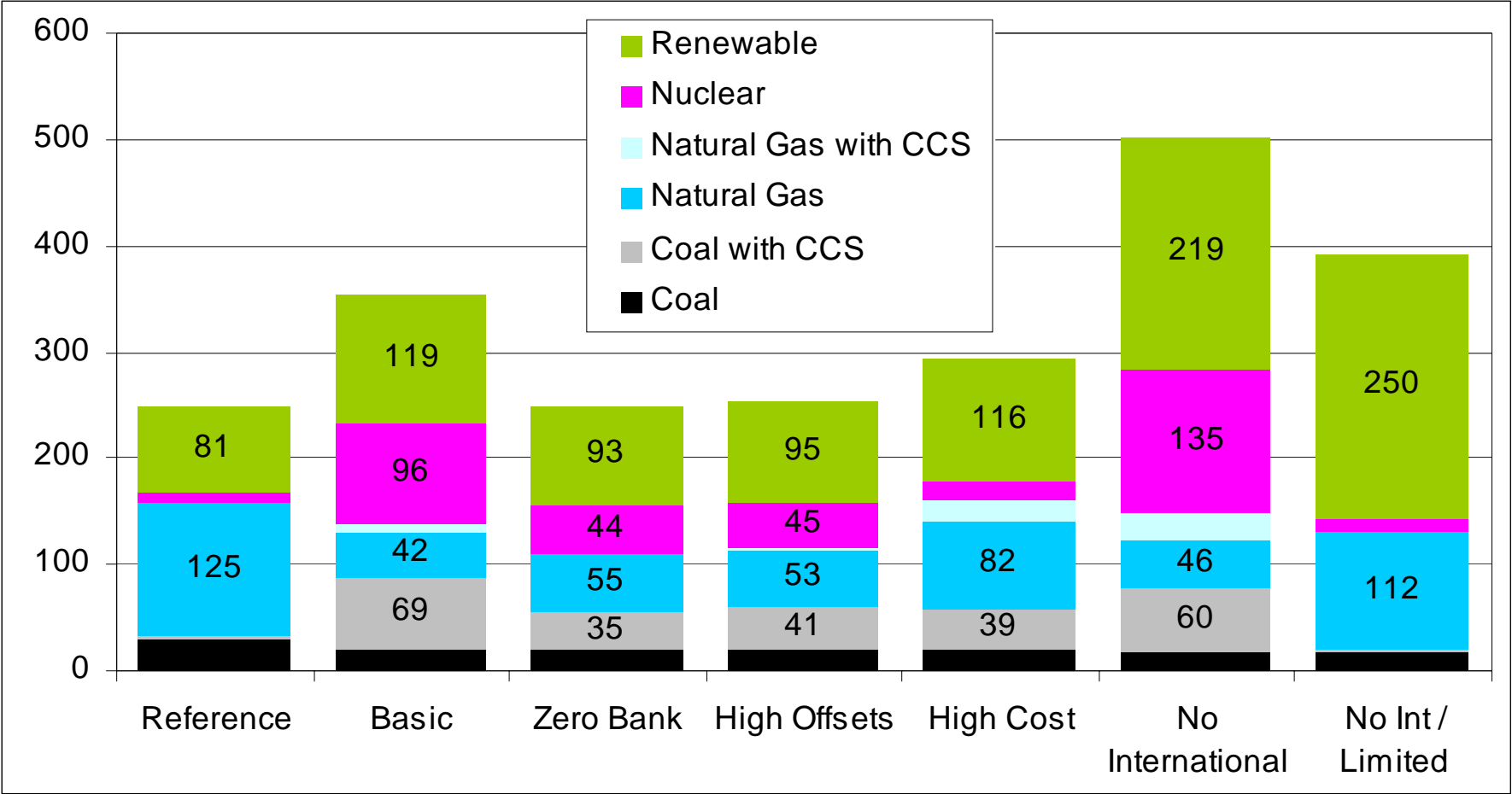
Electricity prices stay near the baseline level through 2025 in all but one ACESA case; prices rise after 2025 in all cases

Electricity Prices (2007 cents per kilowatthour, all sectors average)



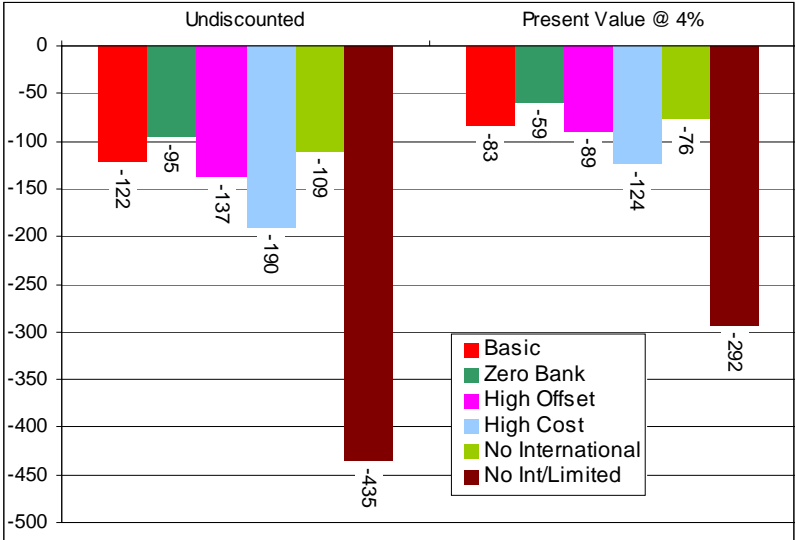
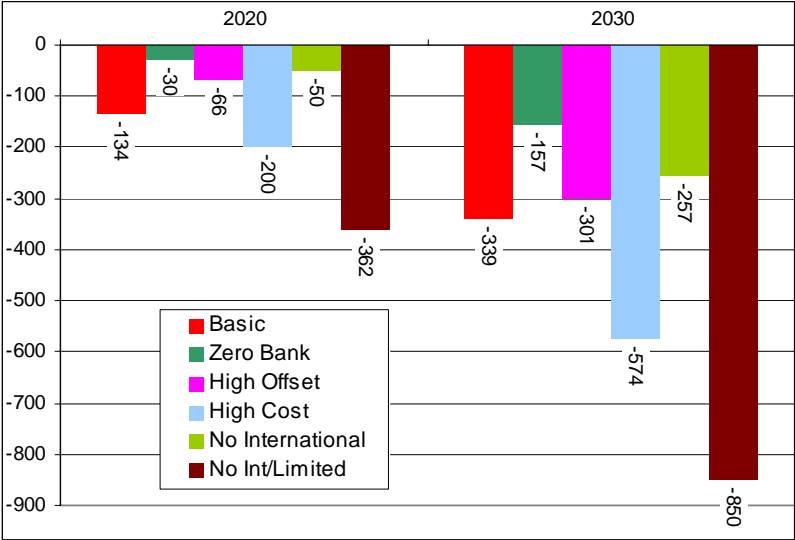
ACESA increases additions of electric generating capacity, but the mix of capacity added varies significantly across cases.

Capacity Additions, 2008 to 2030 (thousand megawatts)

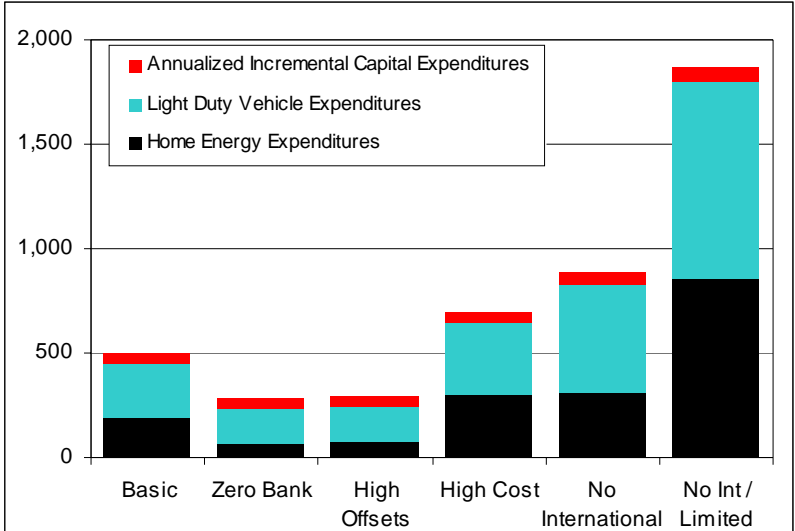
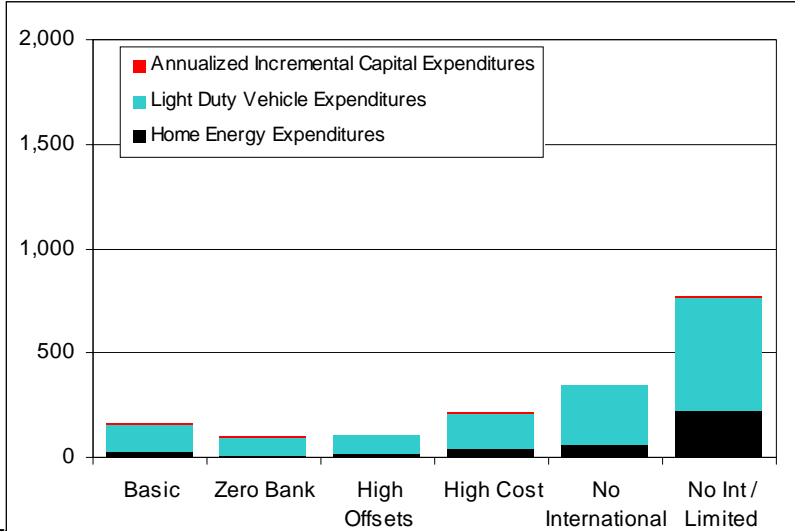


Consumption impacts are smaller than energy bill impacts due to ACESA revenue allocation; impacts vary substantially across cases, and rise over time within each case.

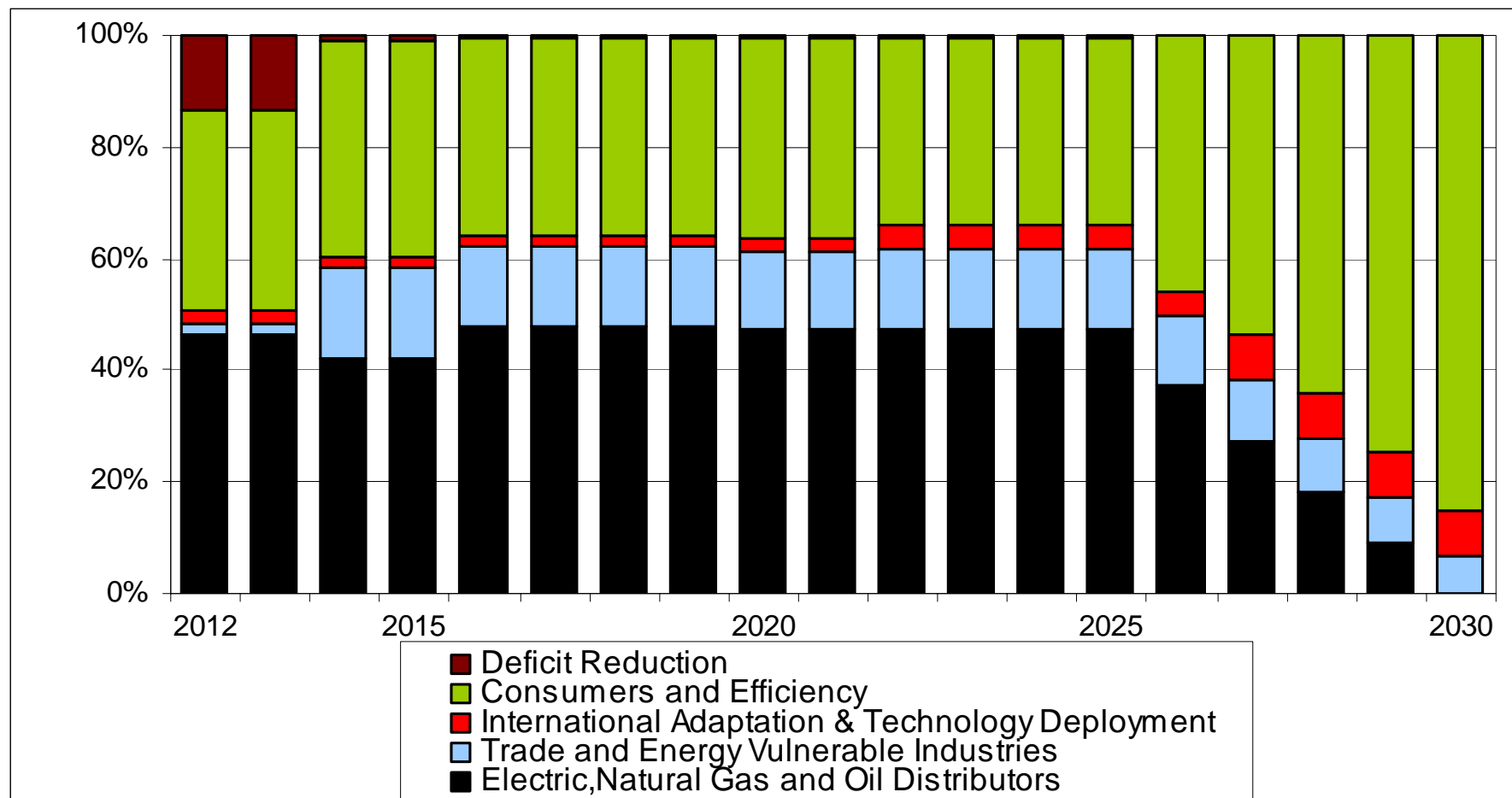
Change in Consumption per Household
2020 and 2030 (2007 dollars) **Average Annual, 2012-2030**



2020 **Average Change in Household Energy Bills** **2030**



Over 94 percent of allowances and/or allowance revenues are allocated to electricity and gas distributors, energy-intensive industries, and consumers over the 2014 to 2026 period



Over the 2012-2030 period, present-value GDP losses range from 0.20 to 0.37 percent, while consumption losses range from 0.13 percent to 0.26 percent in 5 of the analysis cases. Impacts are significantly higher in the No International/Limited Alternatives case.

