

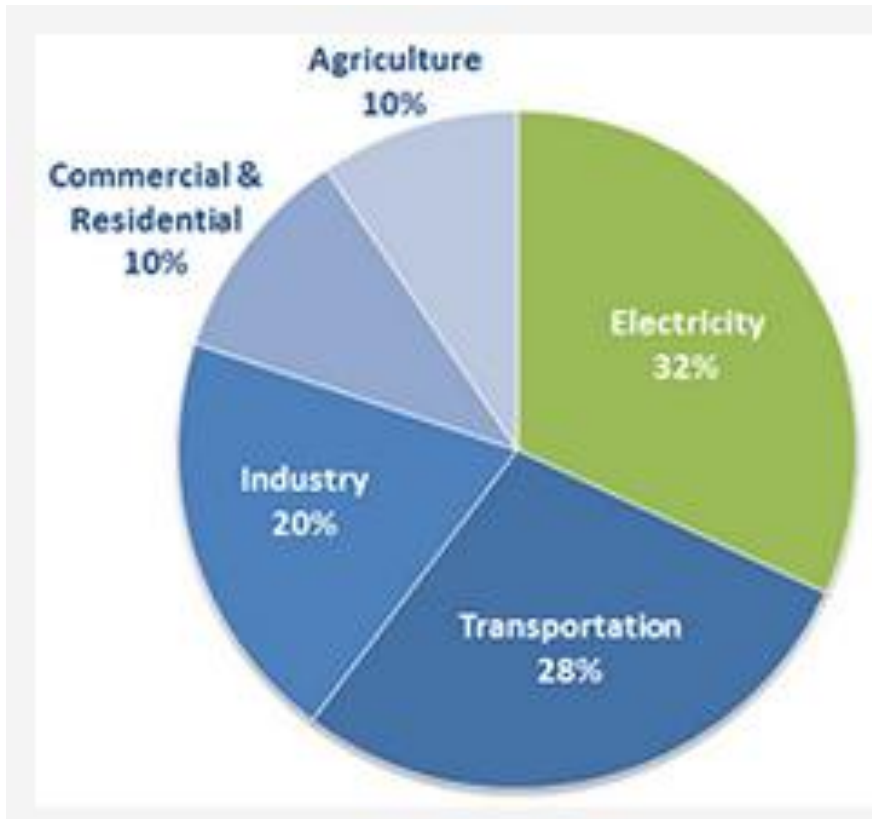
Reducing Carbon Emissions in the Electricity Production Sector

Sam White

University of Michigan

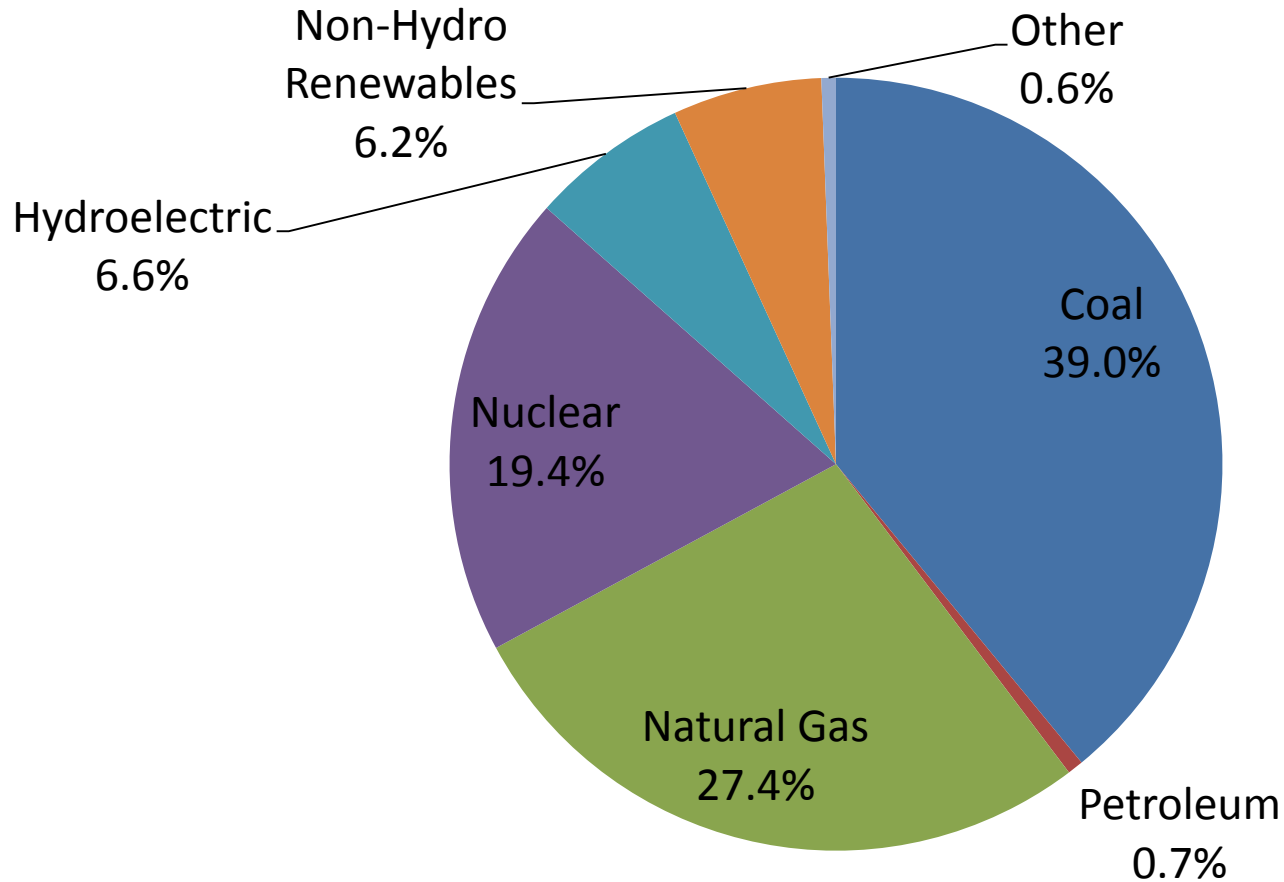
WISE Program – AIChE

Greenhouse Gas Emissions By Economic Sector, 2012



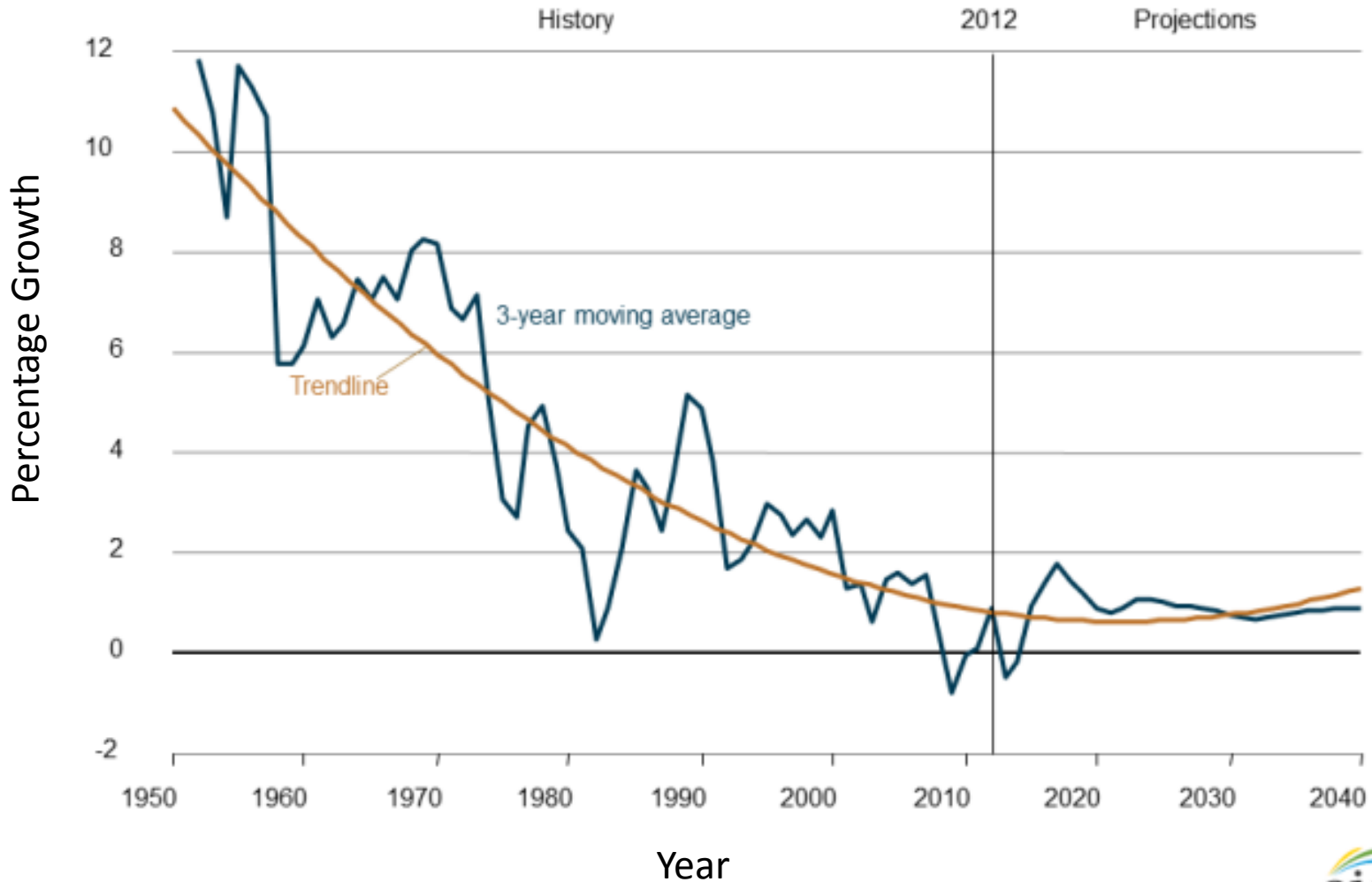
- Electricity Production Sector accounts for the largest amount of greenhouse gas emissions of any energy sector
- Luckily, alternative energy sources with low carbon emissions are best suited for electricity production
- A transition to alternatives in the Electricity Production Sector would lead to the largest overall environmental impact

Share of Electricity Production Sector By Source, 2012



Adapted from www.eia.gov

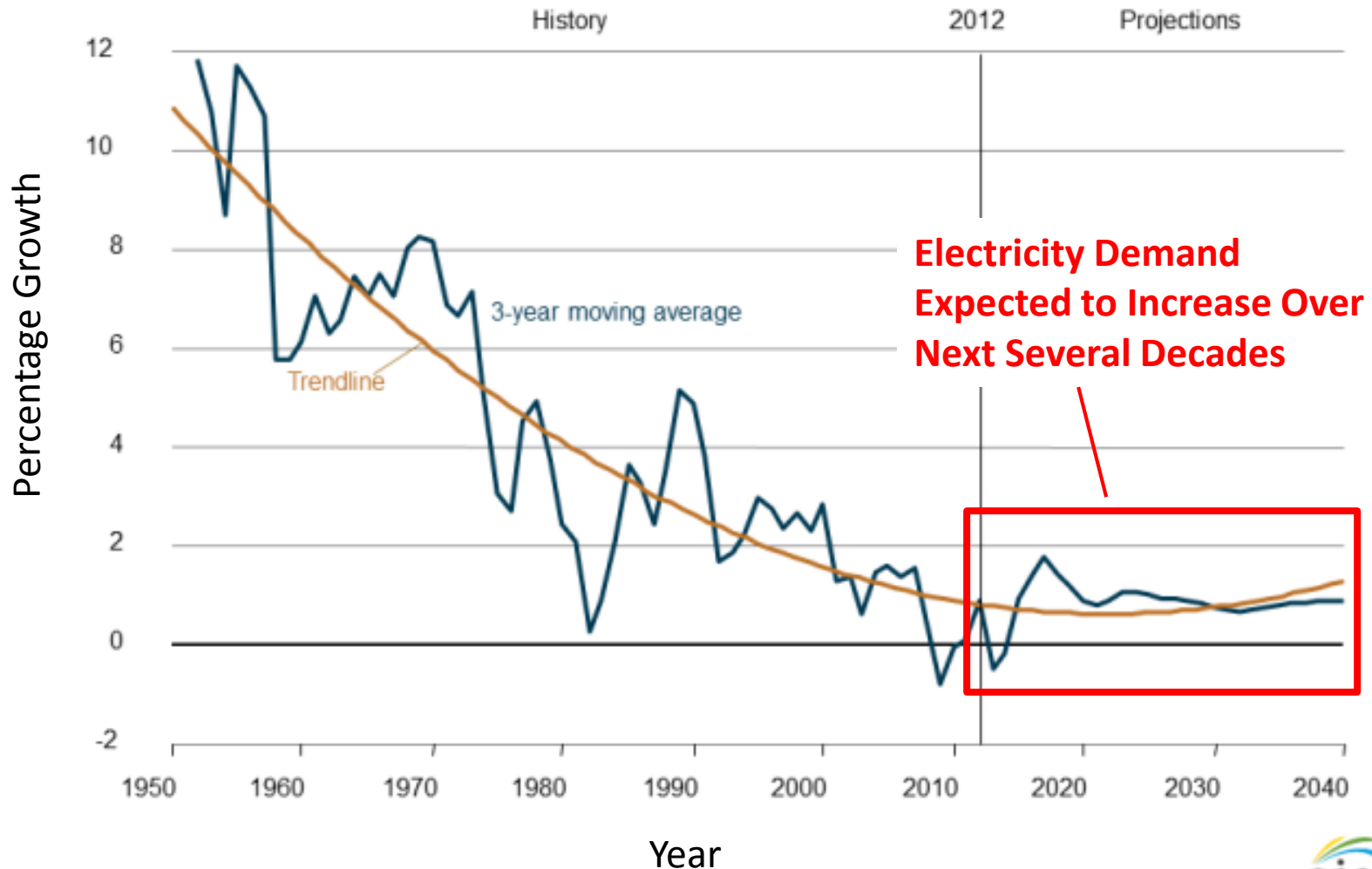
Electricity Demand Growth (%)



From www.eia.gov



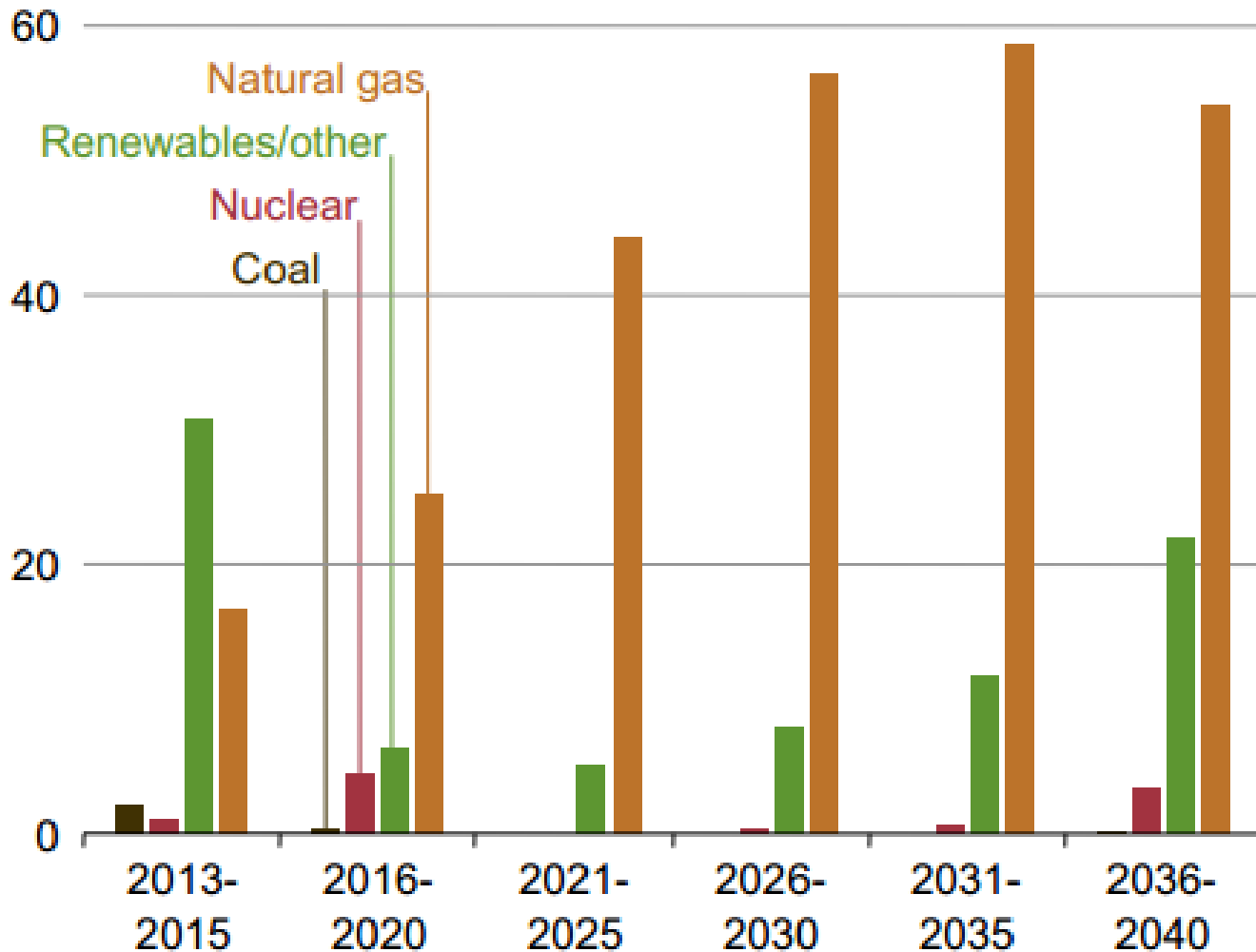
Electricity Demand Growth (%)



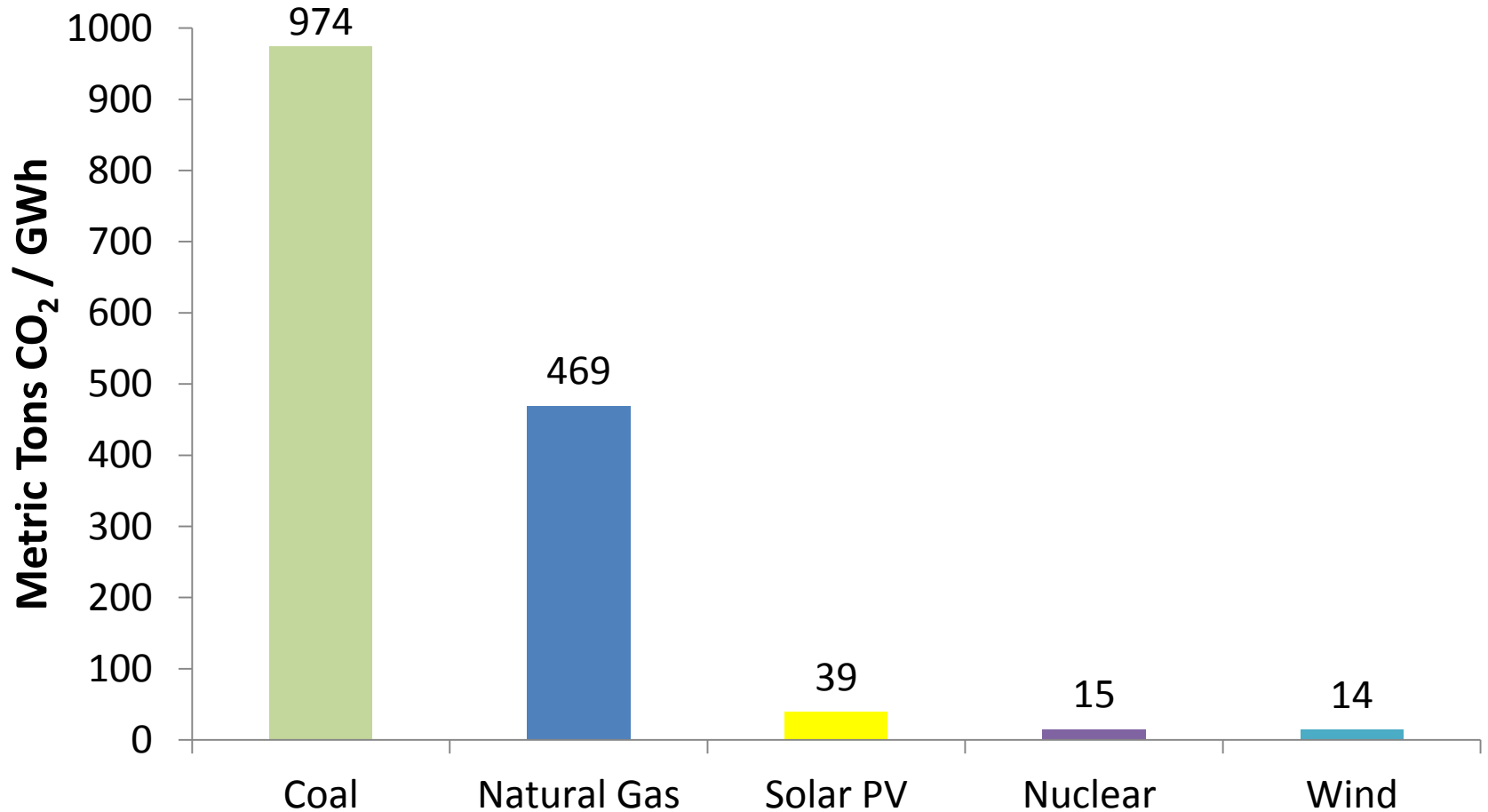
From www.eia.gov



Projected Electricity Capacity Additions, 2014 (GW)

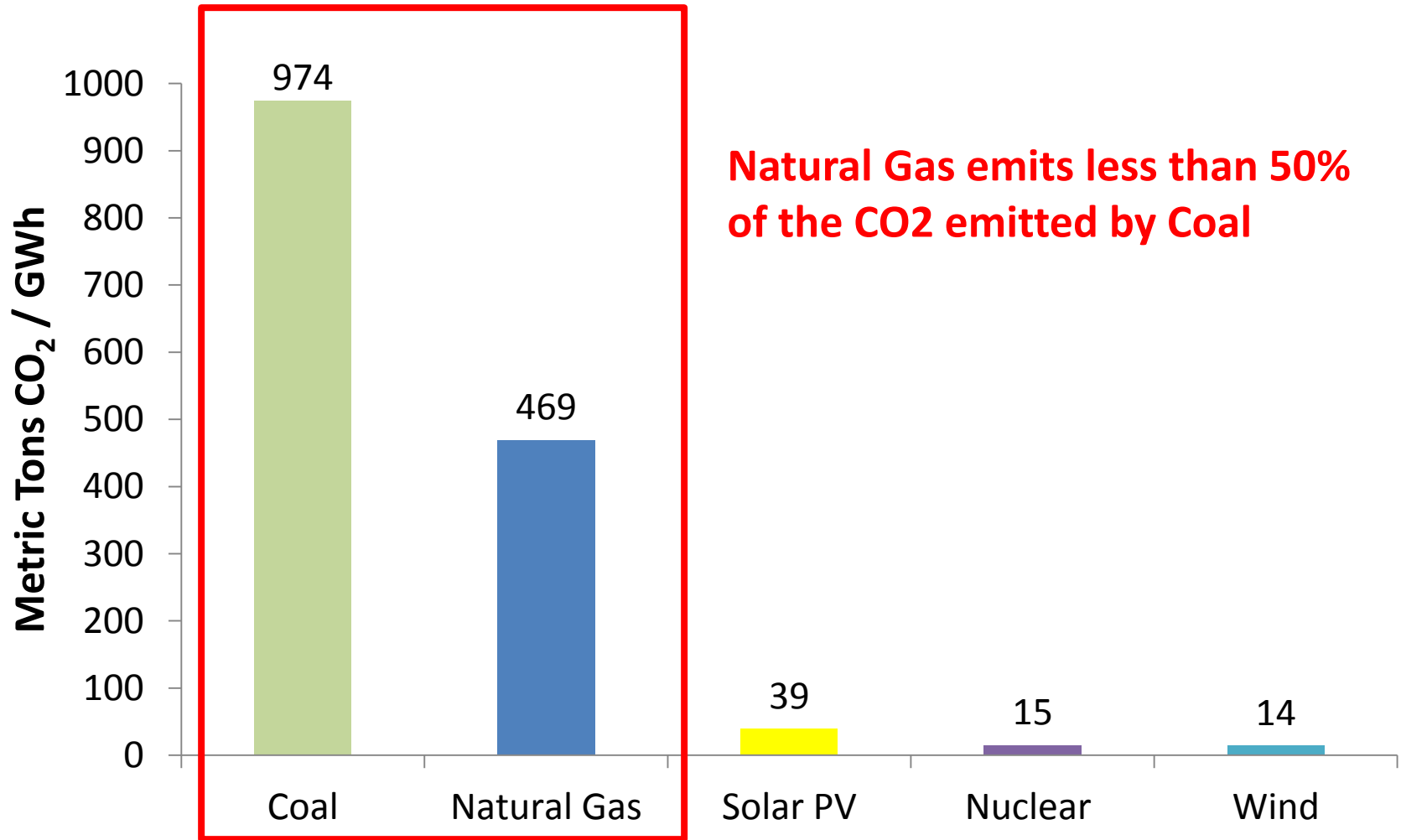


Life-Cycle Emissions Assessment



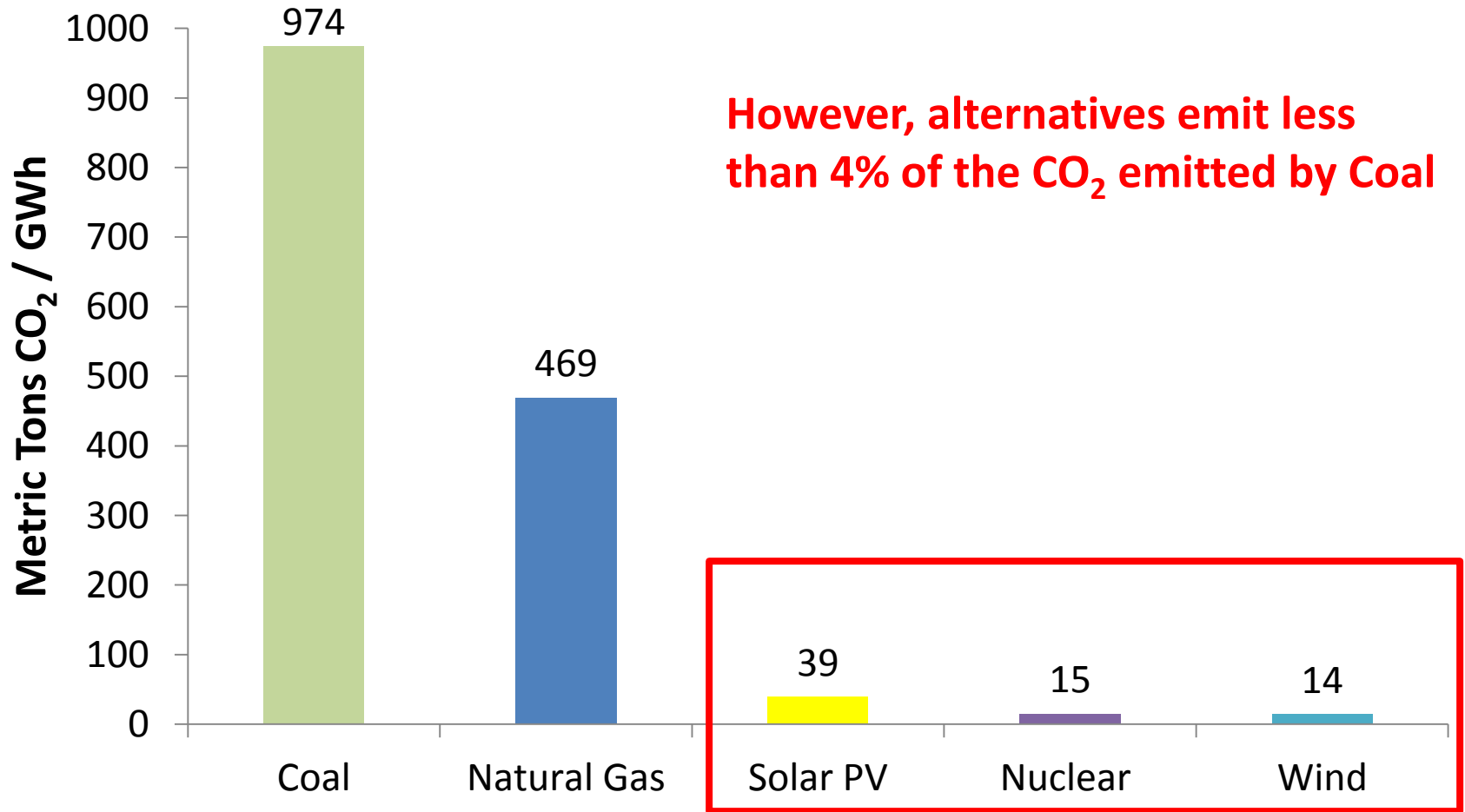
From fit.neep.wisc.edu/pdf/fdm1181.pdf

Life-Cycle Emissions Assessment

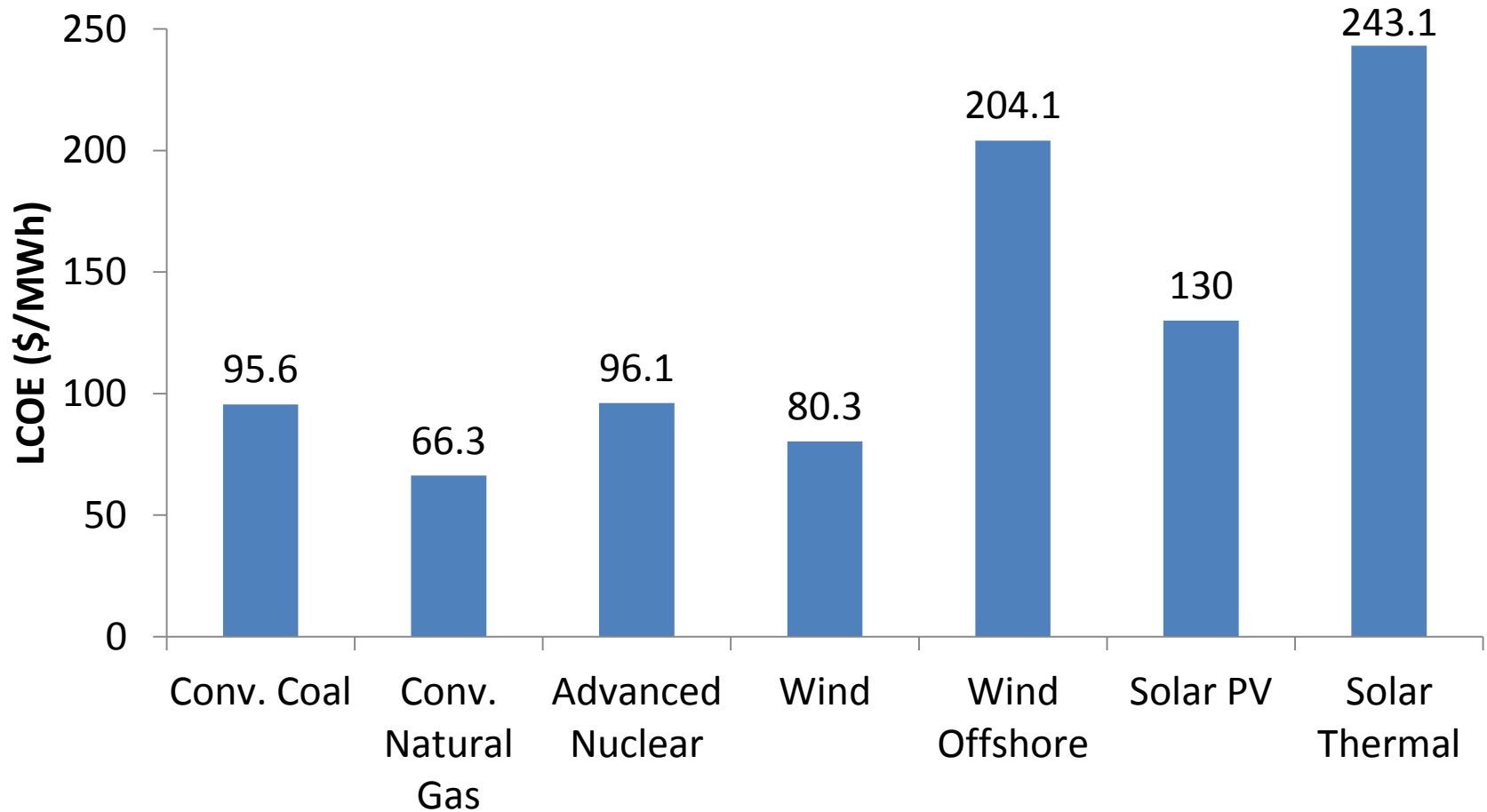


From fit.neep.wisc.edu/pdf/fdm1181.pdf

Life-Cycle Emissions Assessment

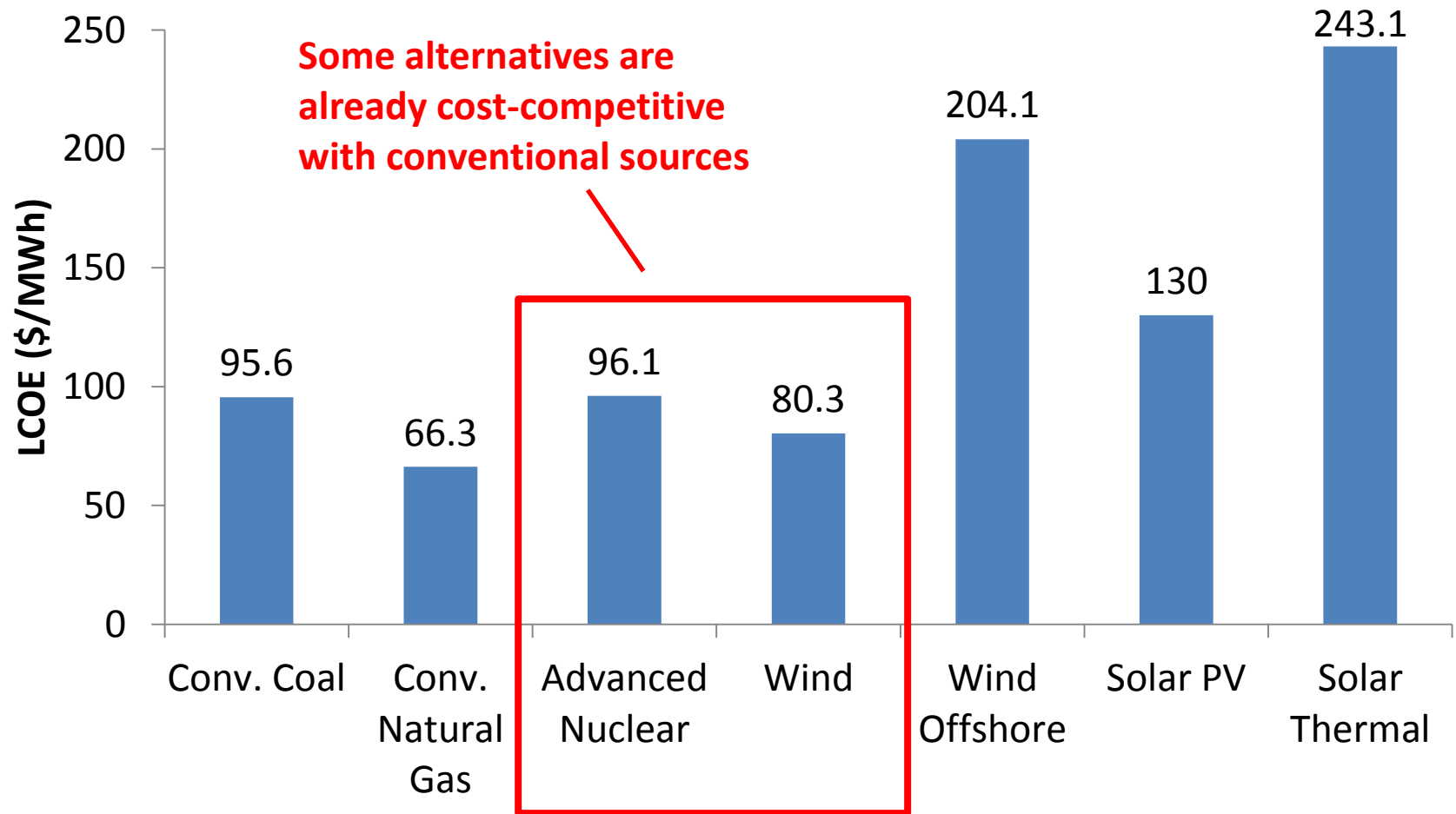


Levelized Cost of Electricity by Source

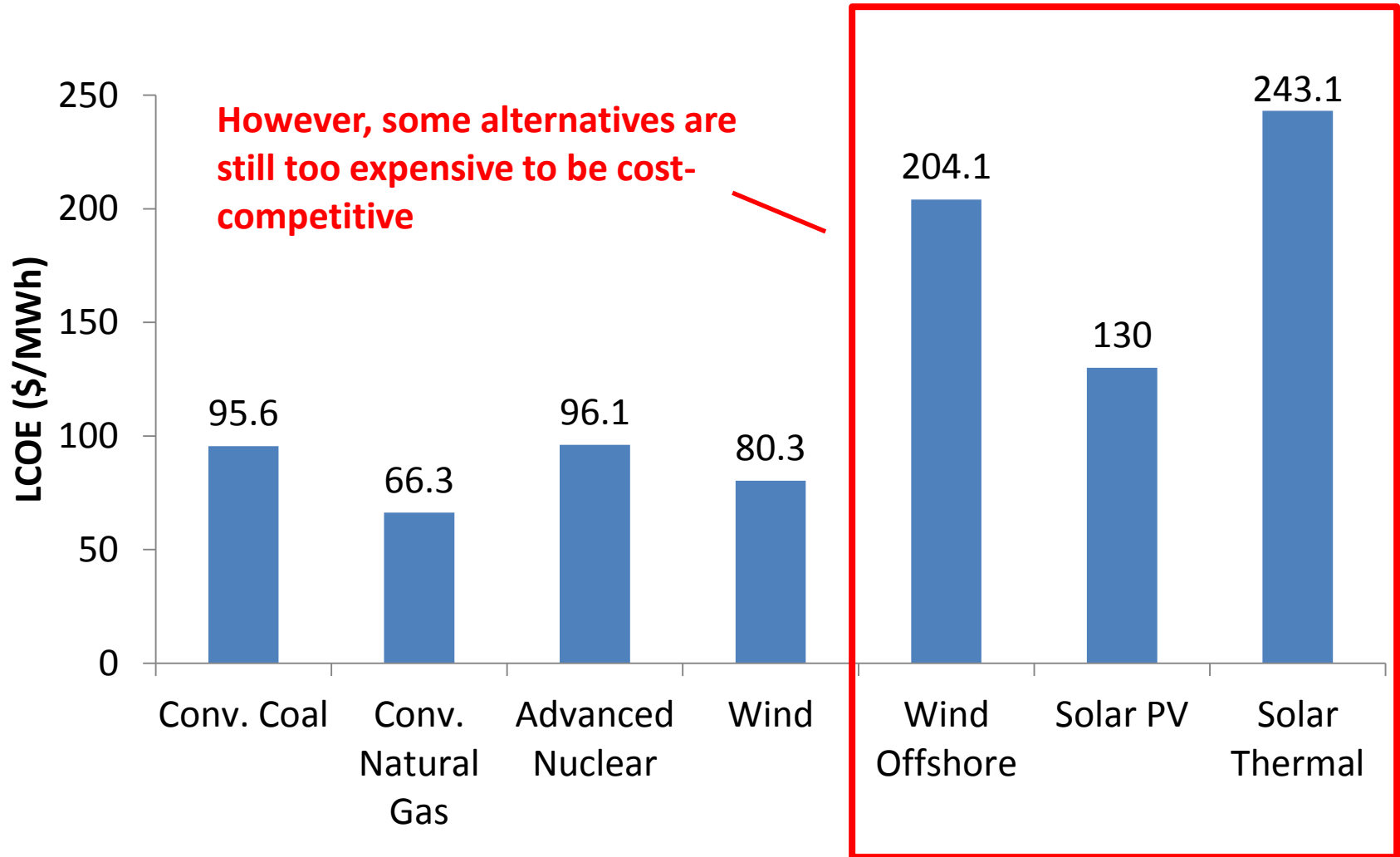


From www.eia.gov

Levelized Cost of Electricity by Source



Levelized Cost of Electricity by Source

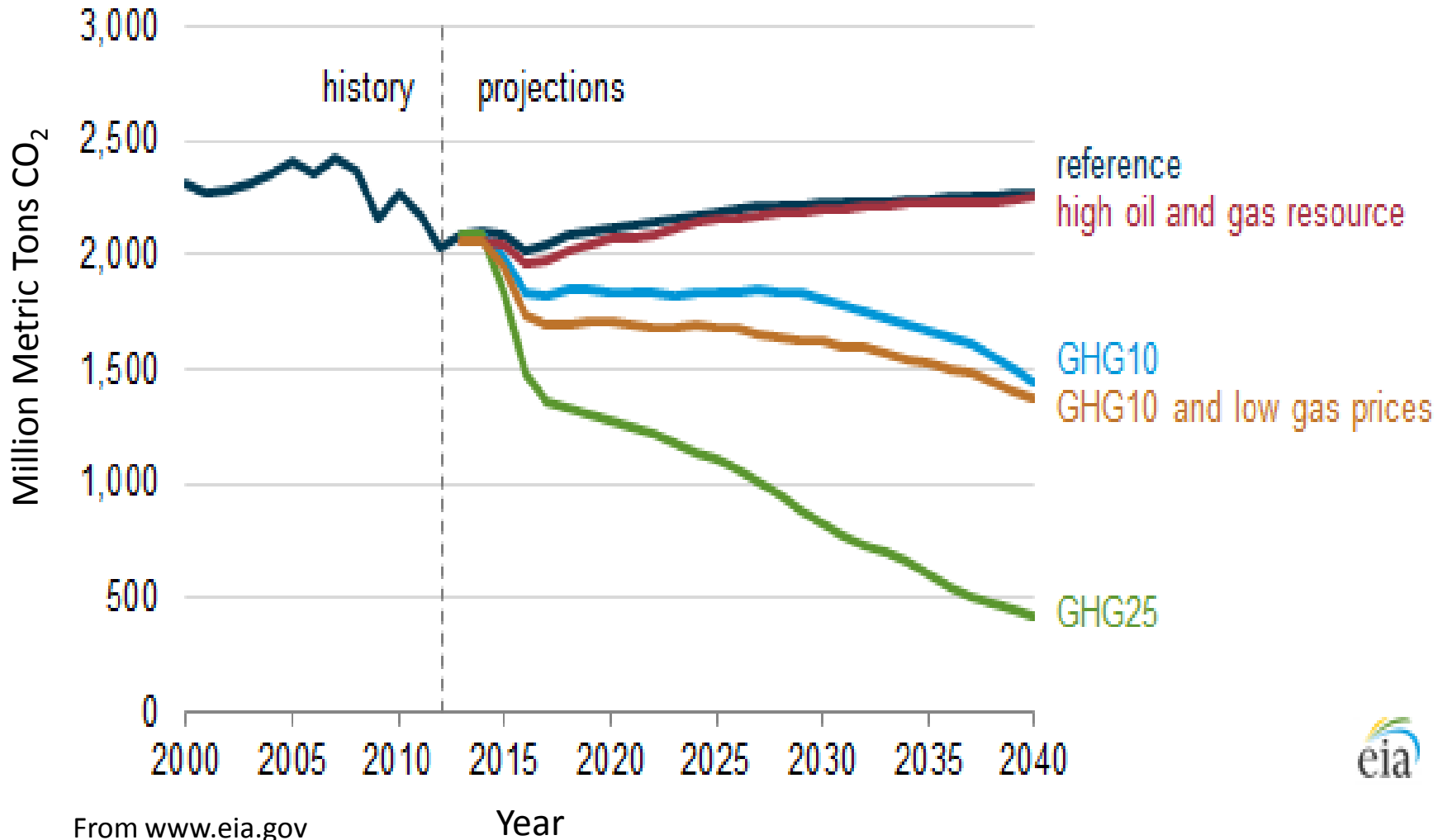


Recent Policy Strategies

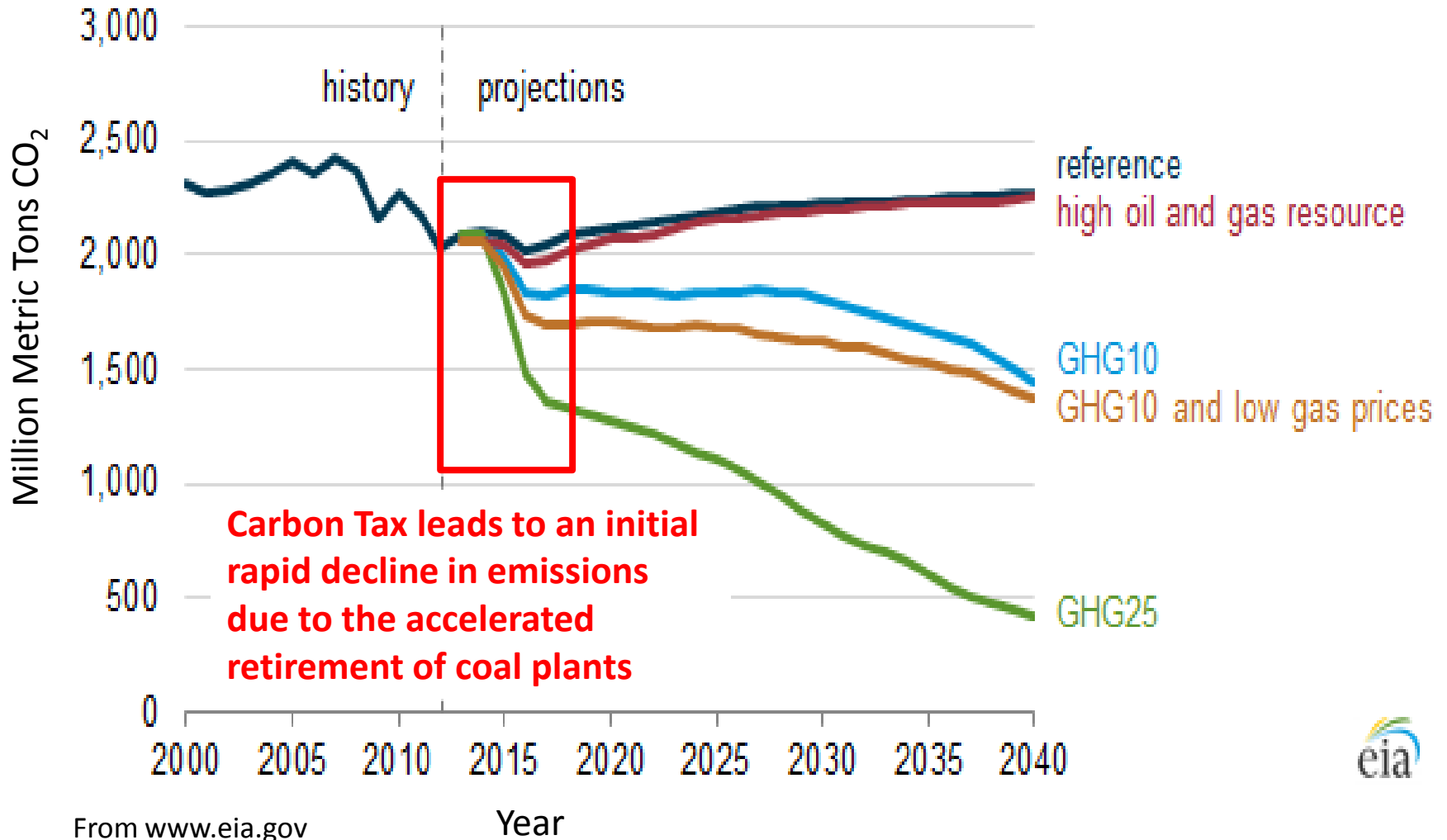
- Tax Incentives for Renewables
 - Investment Tax Credit
 - Production Tax Credit

- Carbon Mitigation
 - Carbon Tax
 - Cap-and-Trade

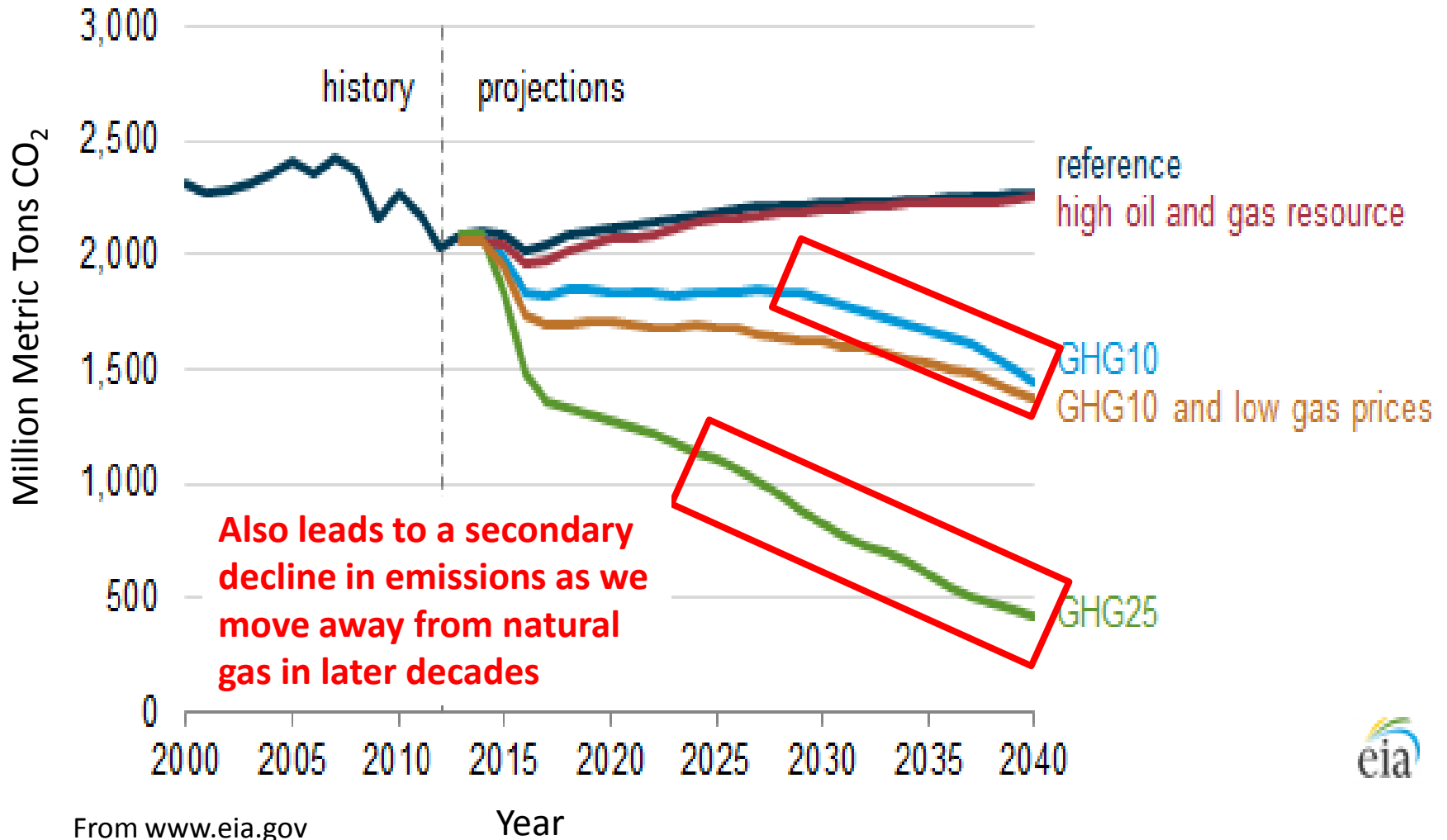
Policy Effects: Emissions



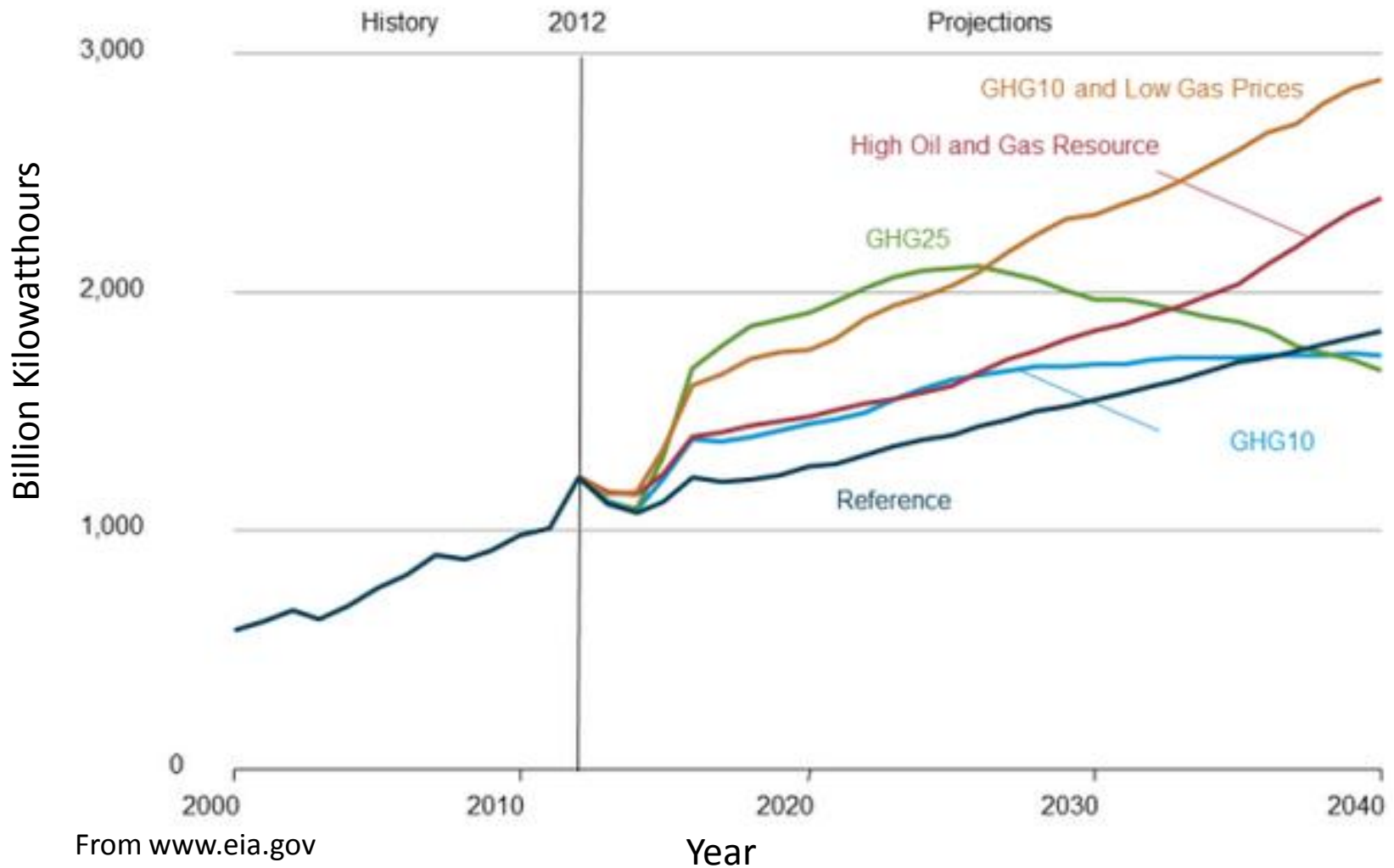
Policy Effects: Emissions



Policy Effects: Emissions

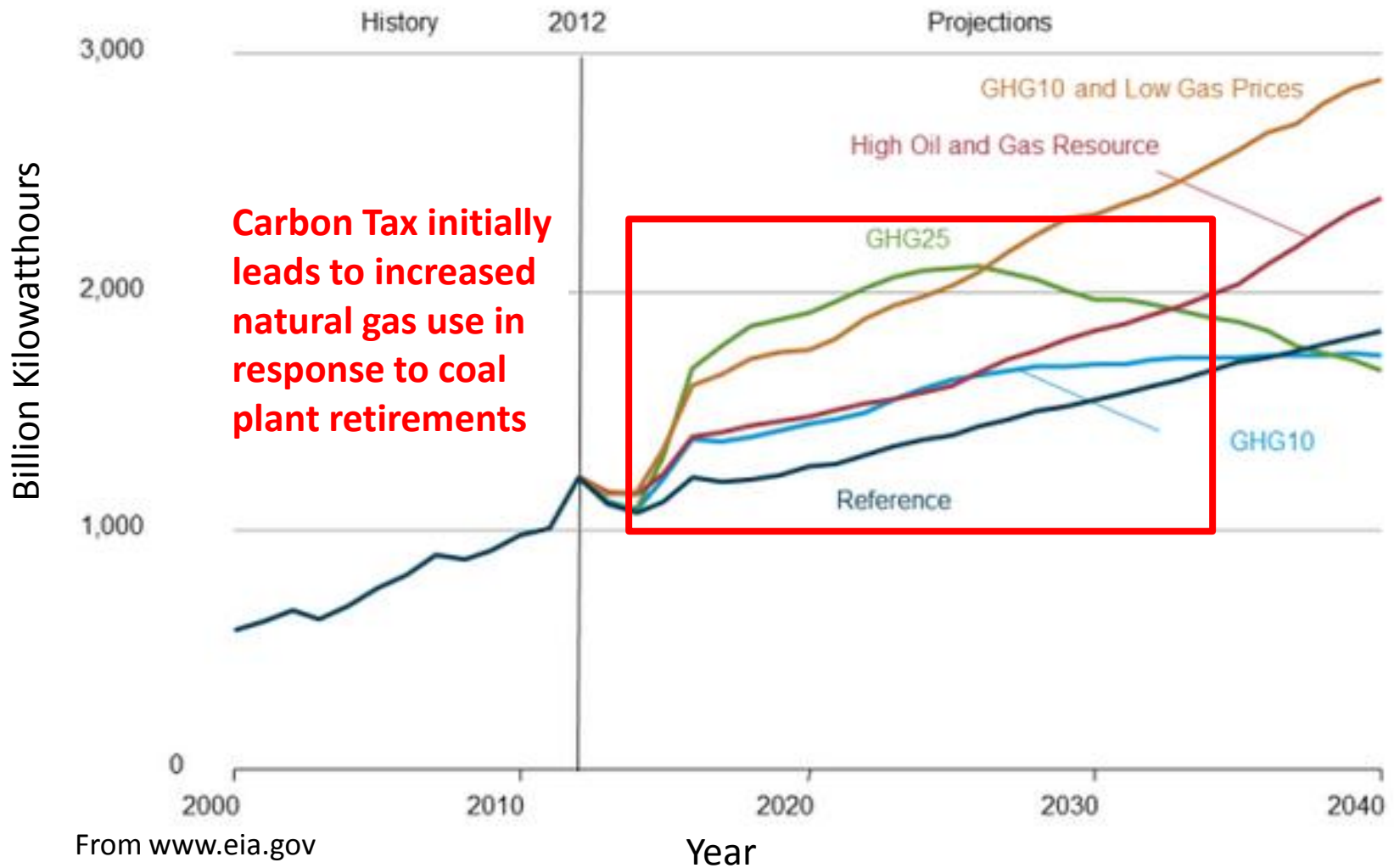


Policy Effects: Natural Gas

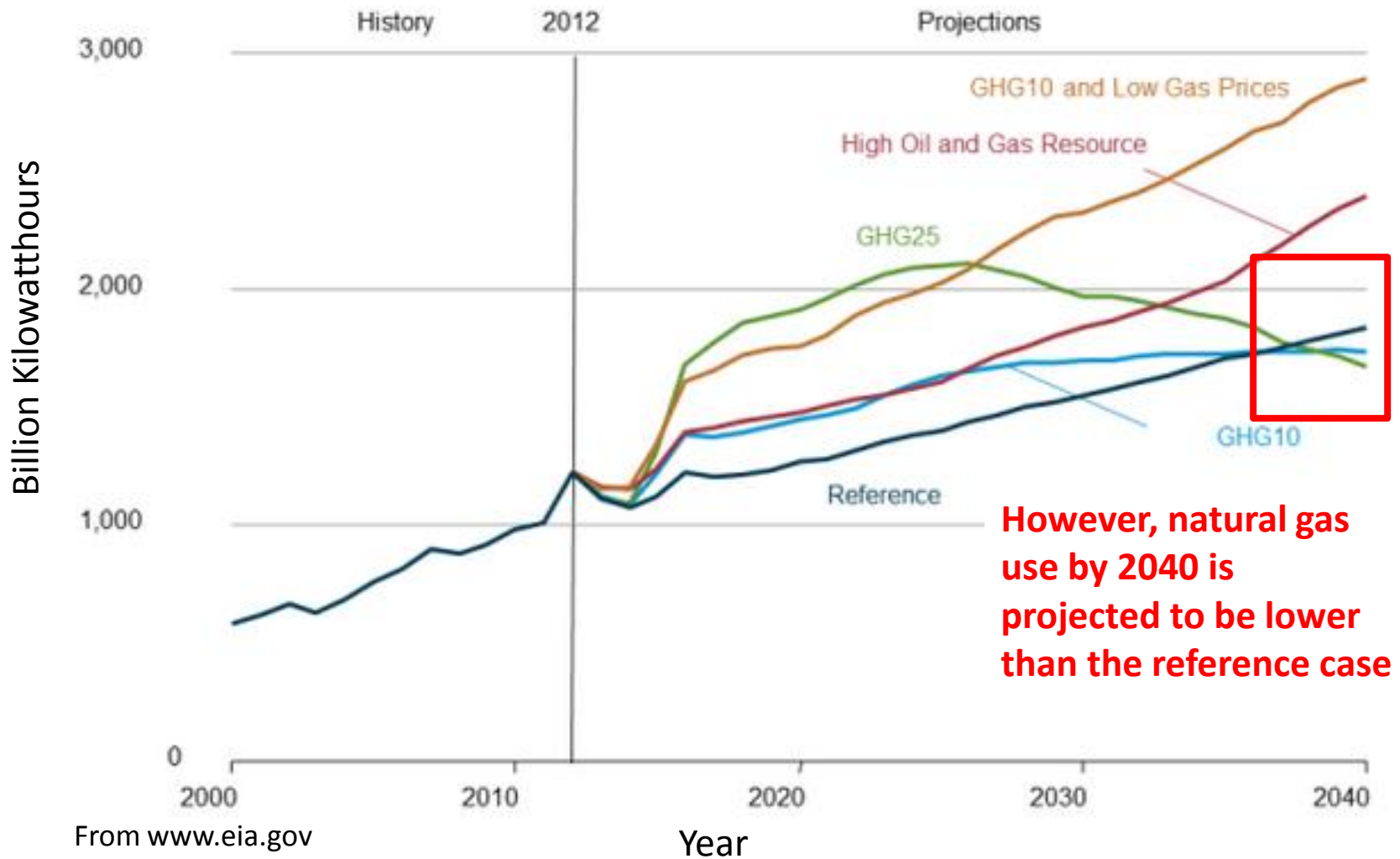


From www.eia.gov

Policy Effects: Natural Gas

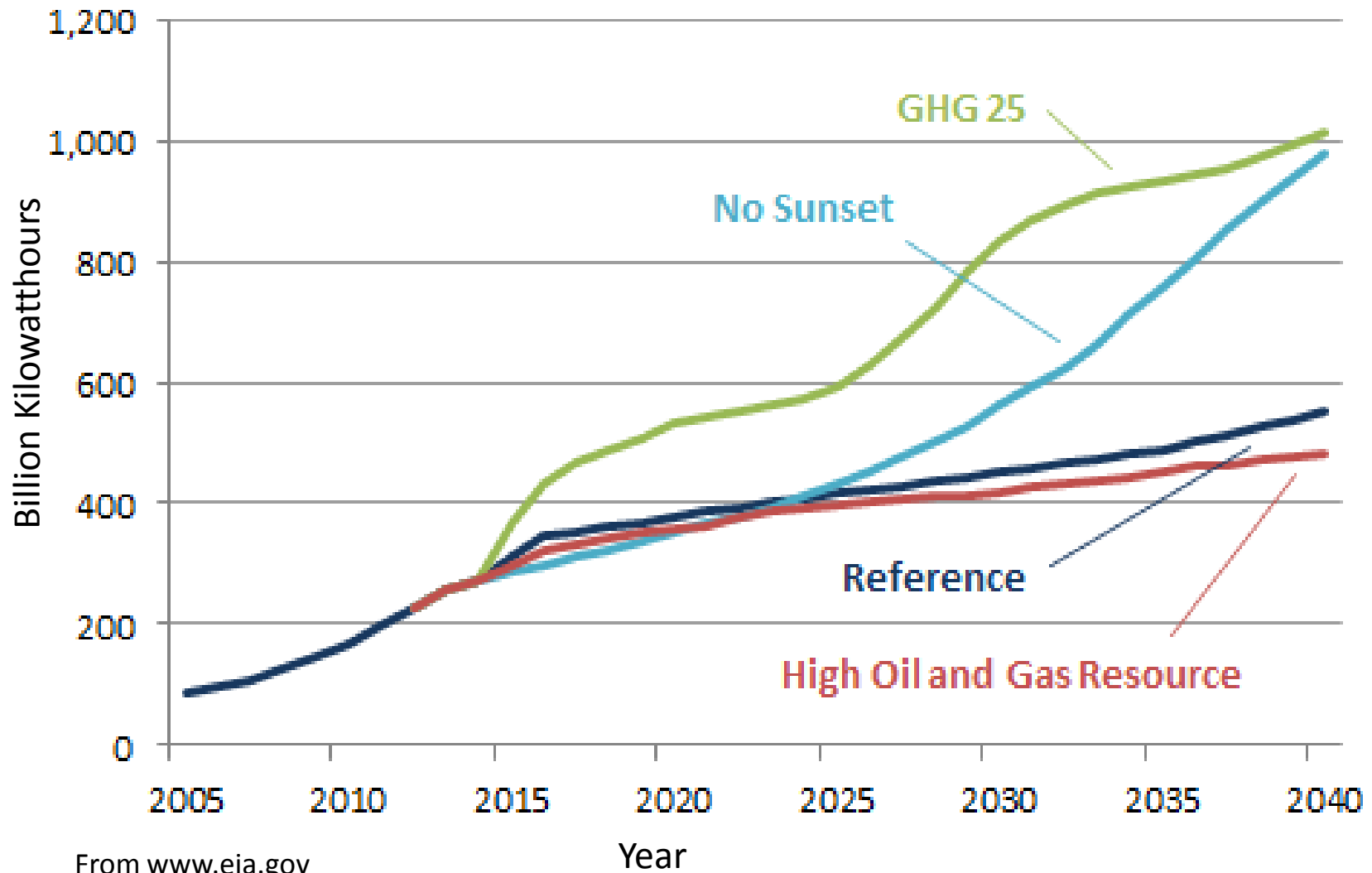


Policy Effects: Natural Gas



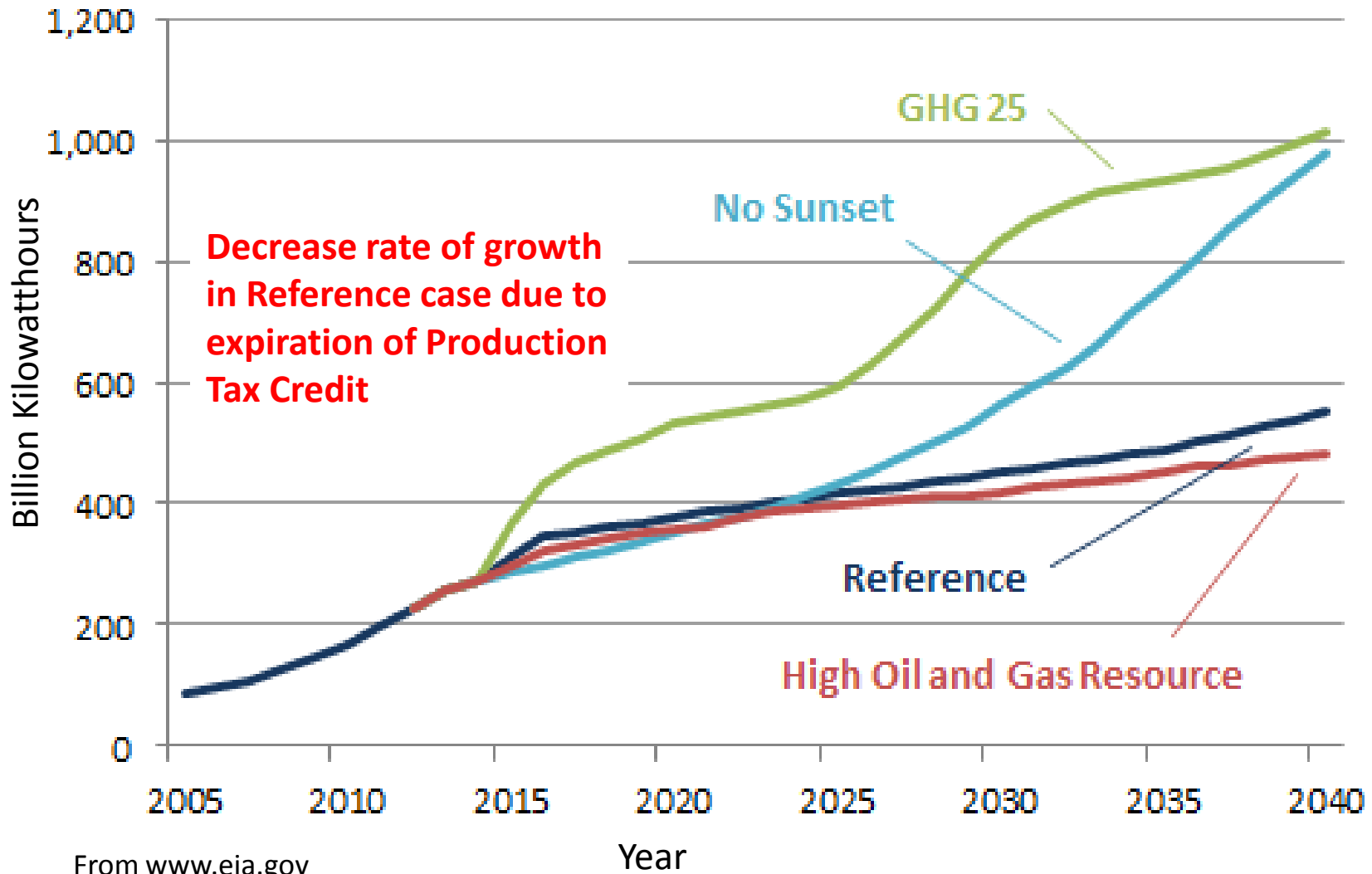
From www.eia.gov

Policy Effects: Renewables



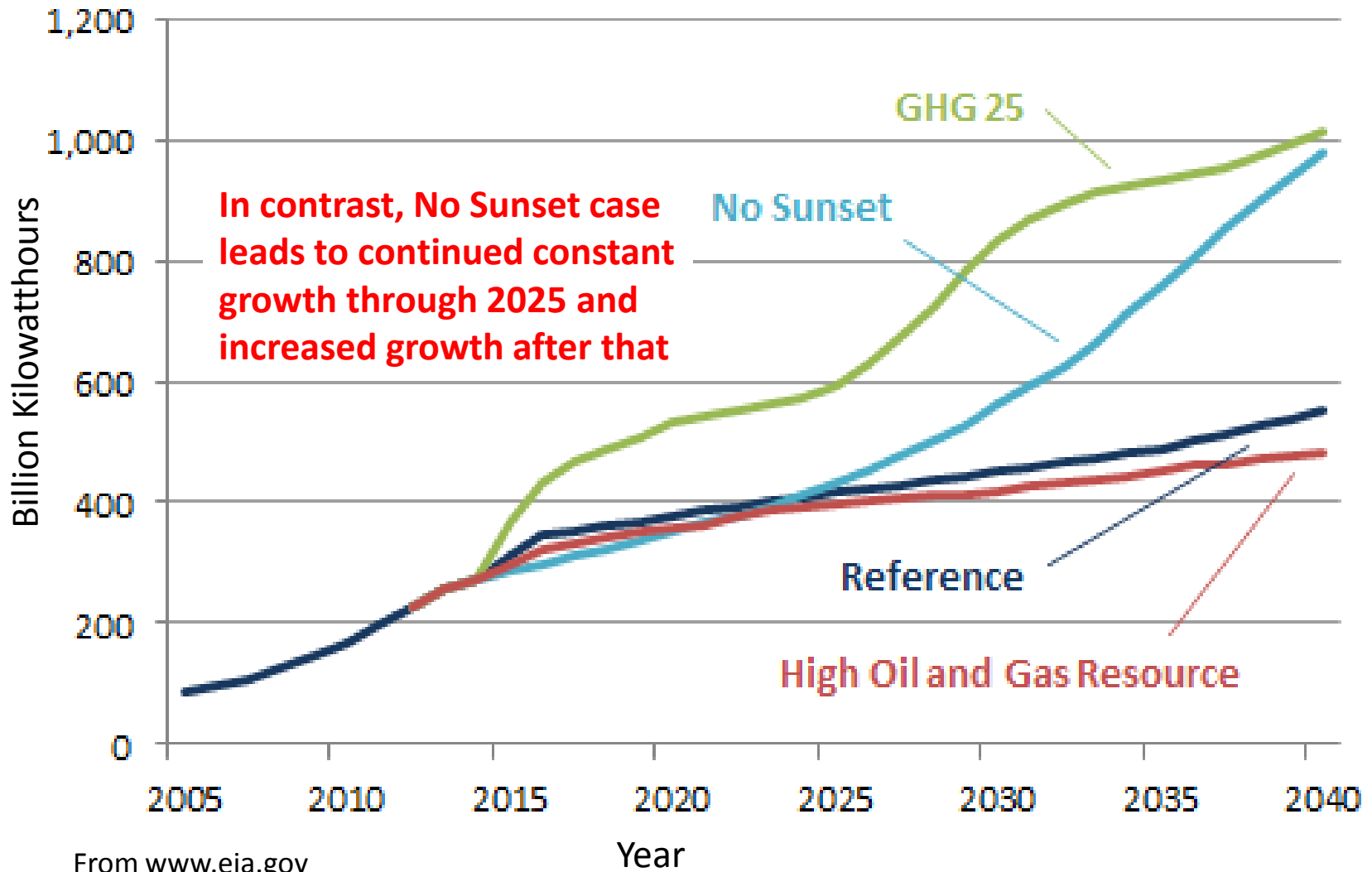
From www.eia.gov

Policy Effects: Renewables



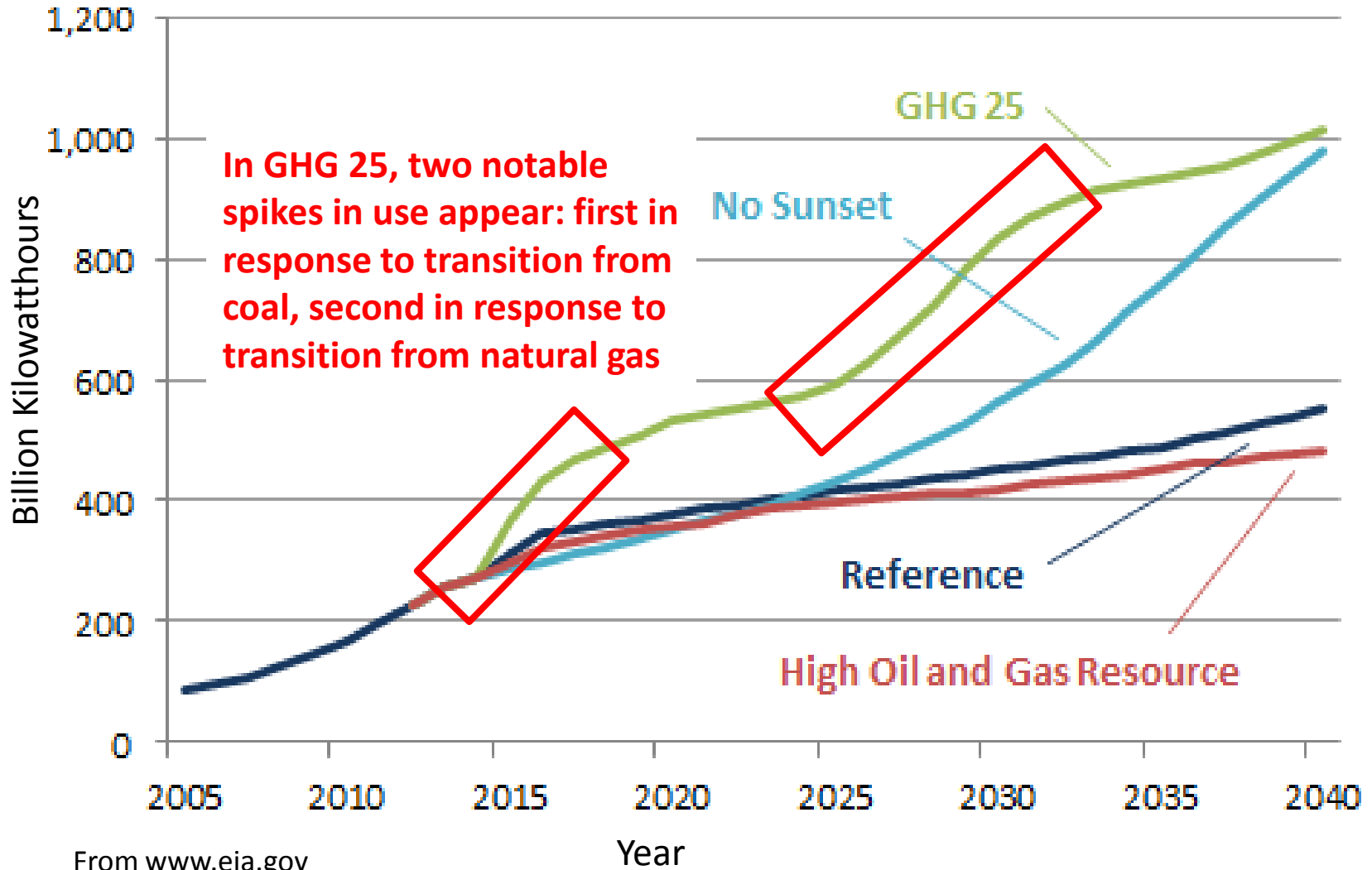
From www.eia.gov

Policy Effects: Renewables

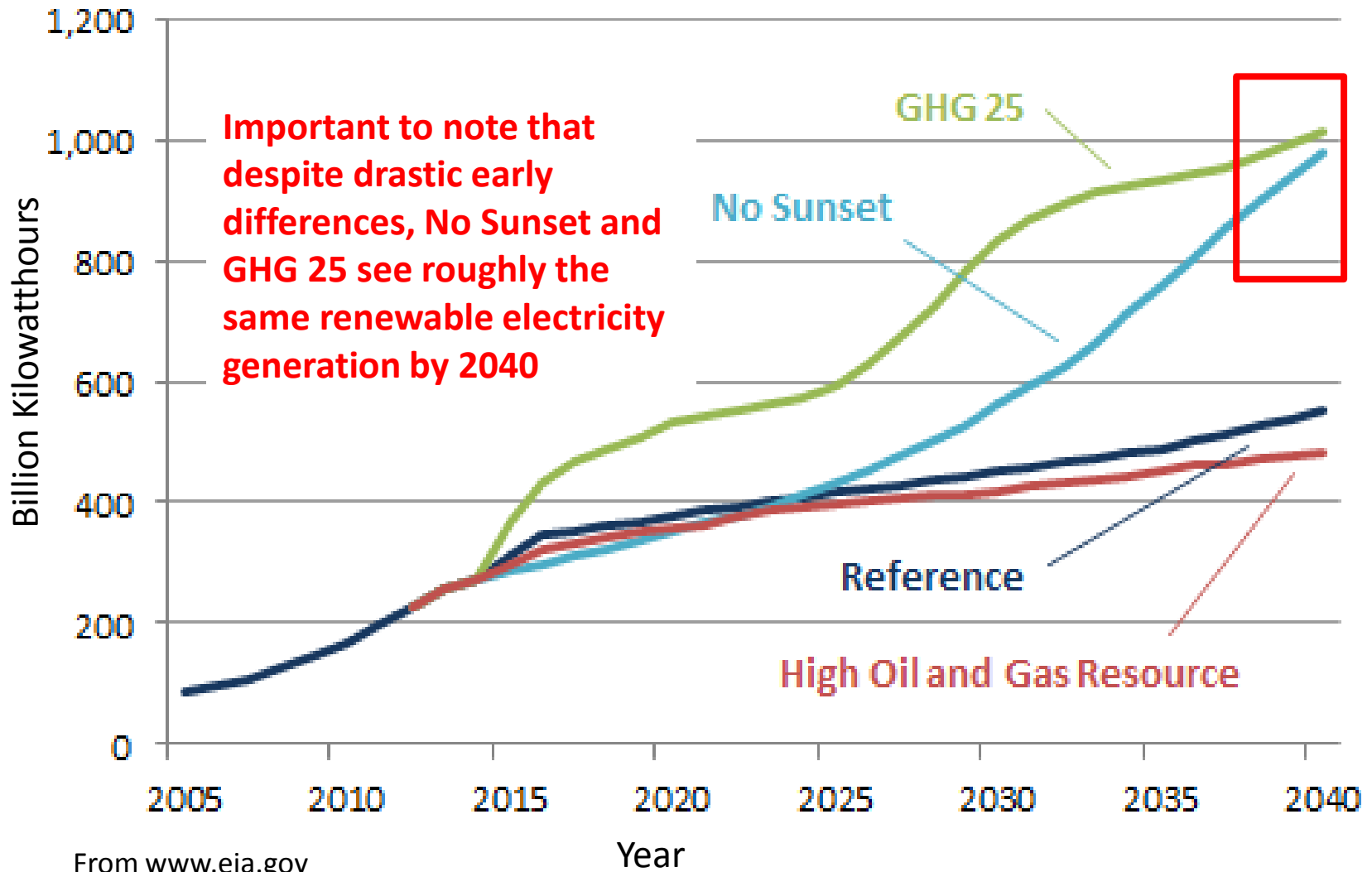


From www.eia.gov

Policy Effects: Renewables



Policy Effects: Renewables



Recommendations

- Two-Pronged Approach
 - Carbon Tax:
 - \$10/metric ton CO₂ or equivalent cap-and-trade
 - Increase 5% / yr after inflation, long-term
 - Embrace PTC:
 - 2.3 cents / kwh for all renewables
 - Decrease 5% / yr after inflation, long-term
 - Produce an average of \$5.5 billion / yr in revenue

Questions?