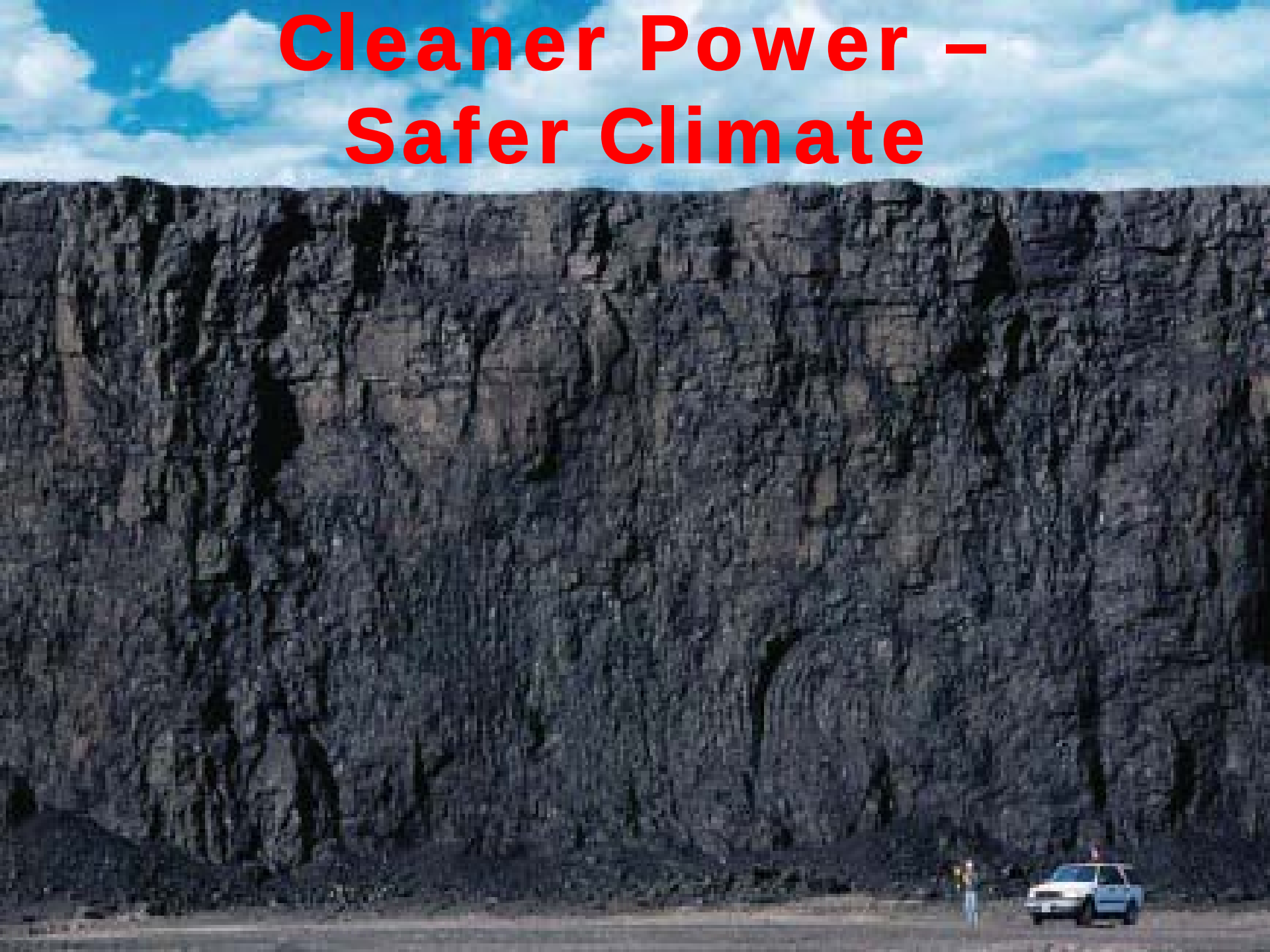
Cleaner Power – Safer Climate



The Carbon Budget

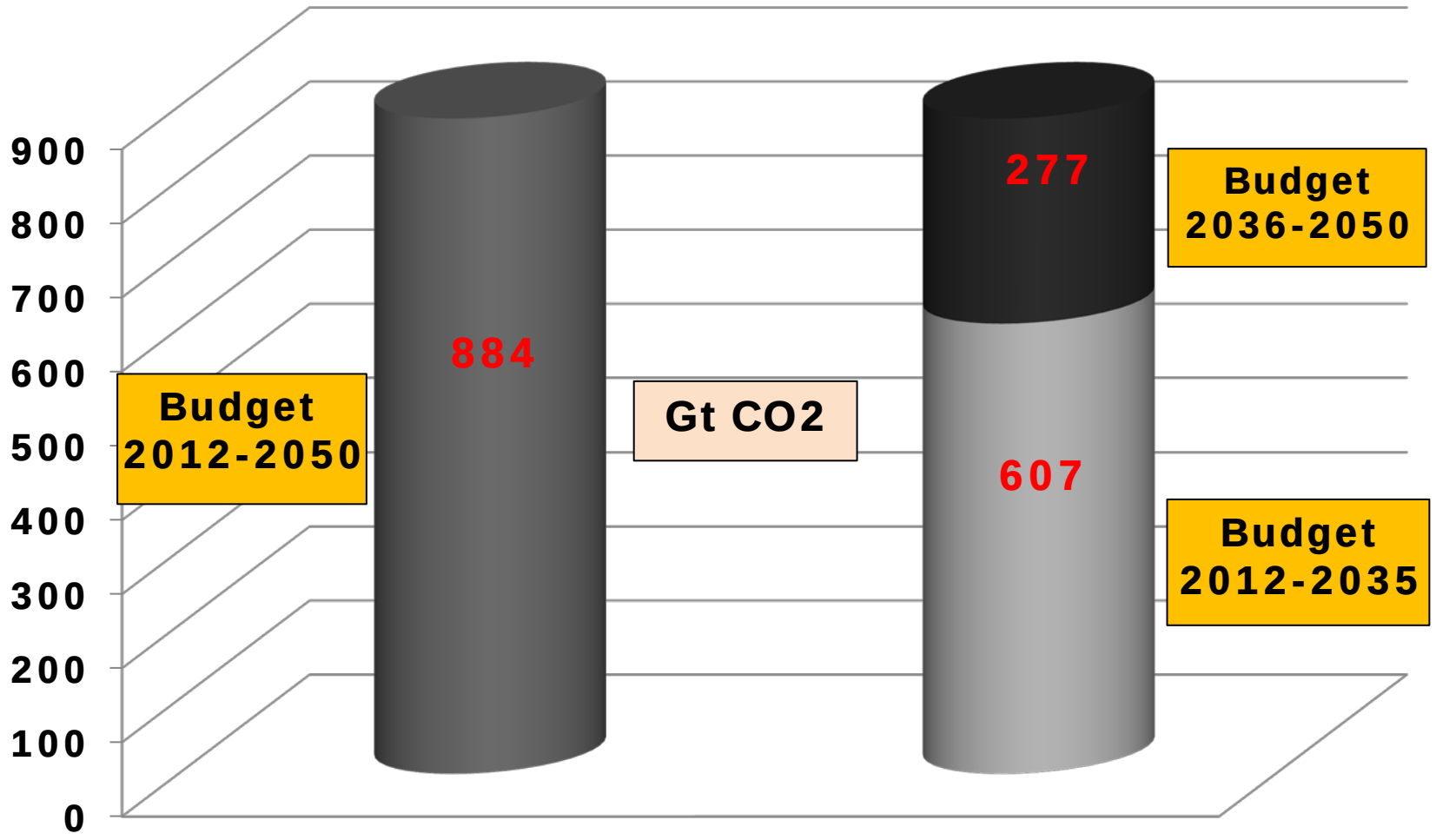
To prevent global temperatures from
rising above any given level
there is one cumulative budget
for all future GHG emissions.

This is not an annual budget;
it is a single budget for the future

that we can spend only once.

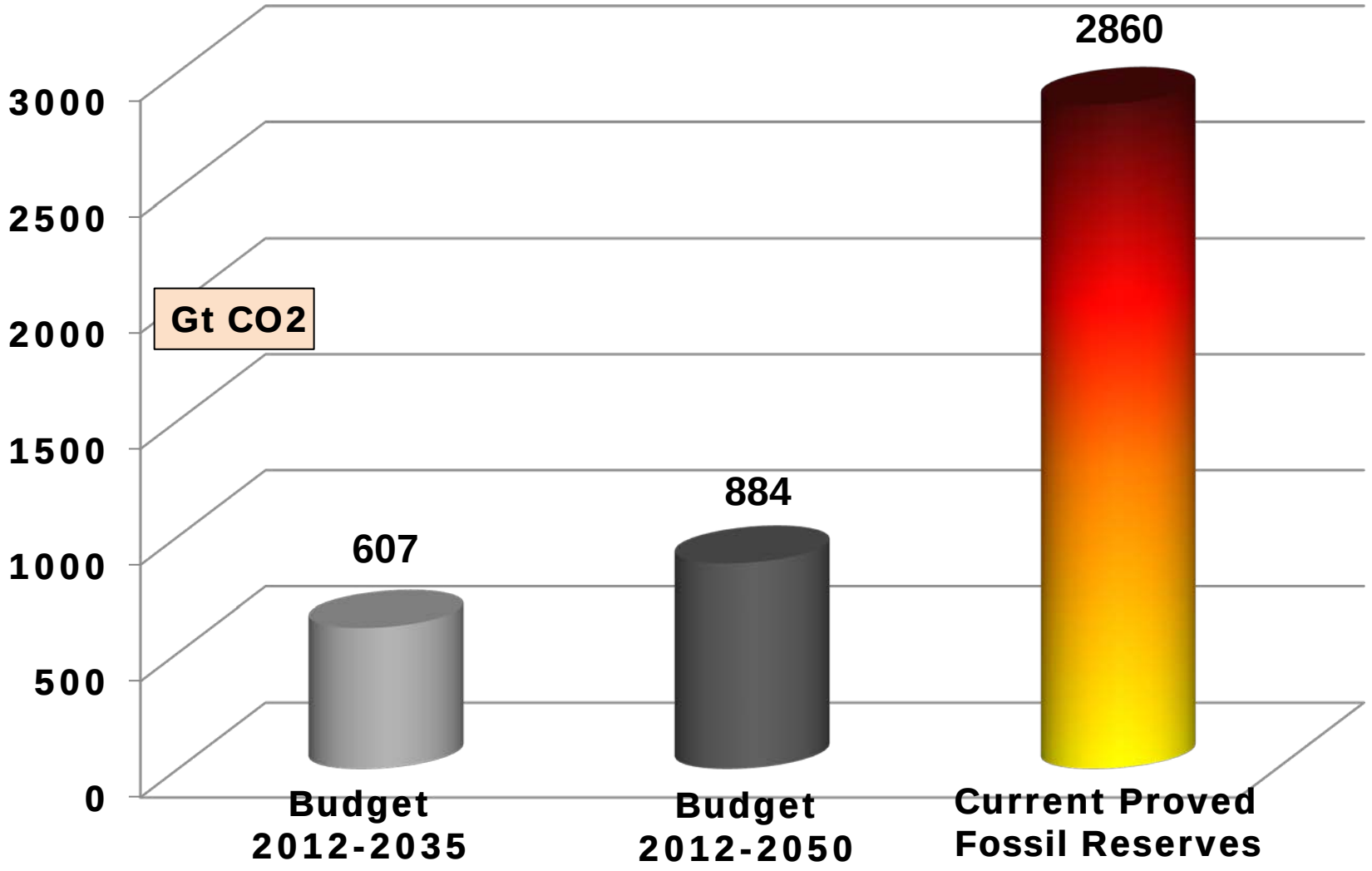
IEA 2° Energy CO2 Budget

50% chance of exceeding 2°



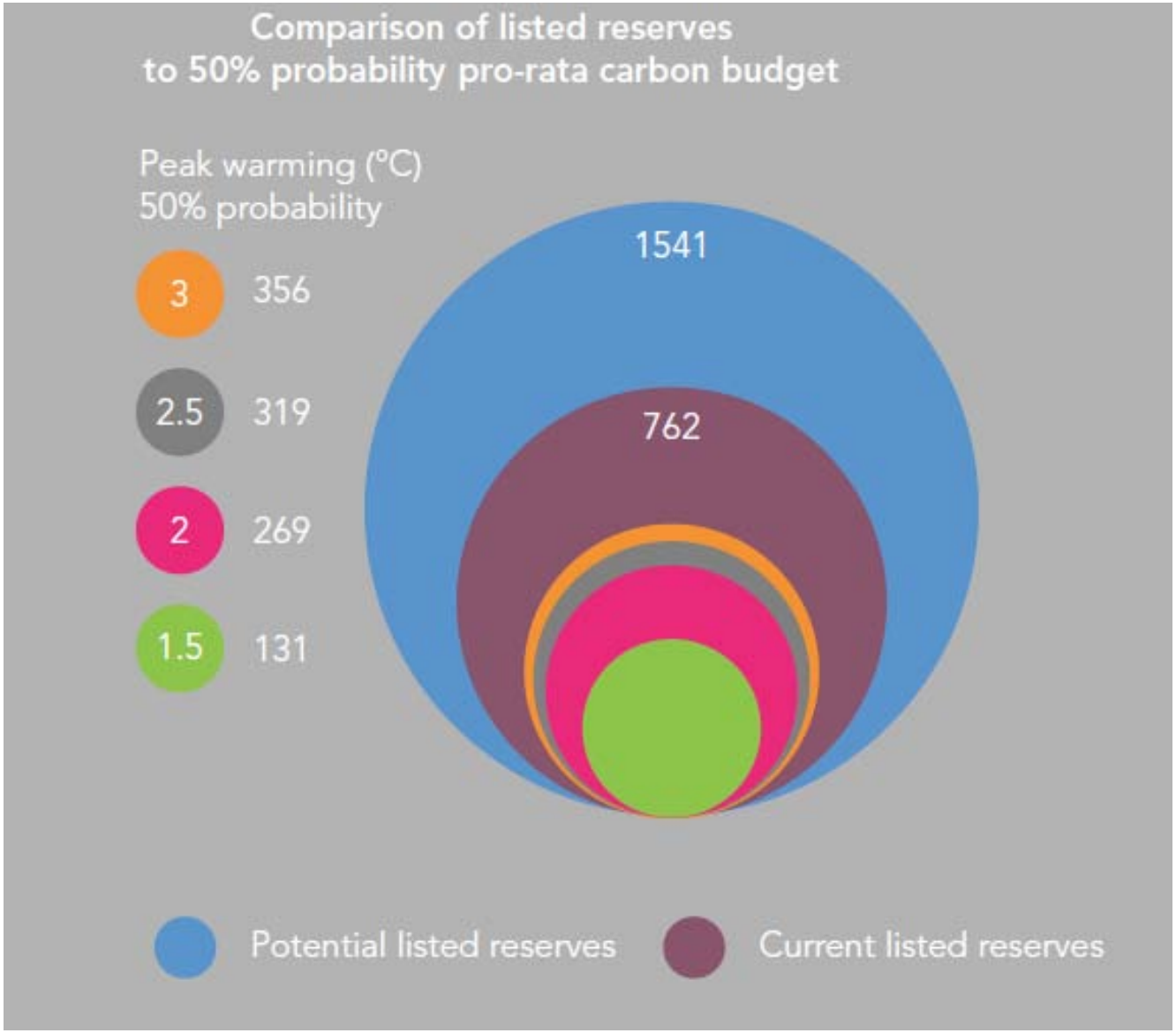
Source: IEA, WEO 2012

Stranded Fossil Assets



Source: IEA, WEO 2012 ©OECD/IEA 2012

Stranded Fossil Assets

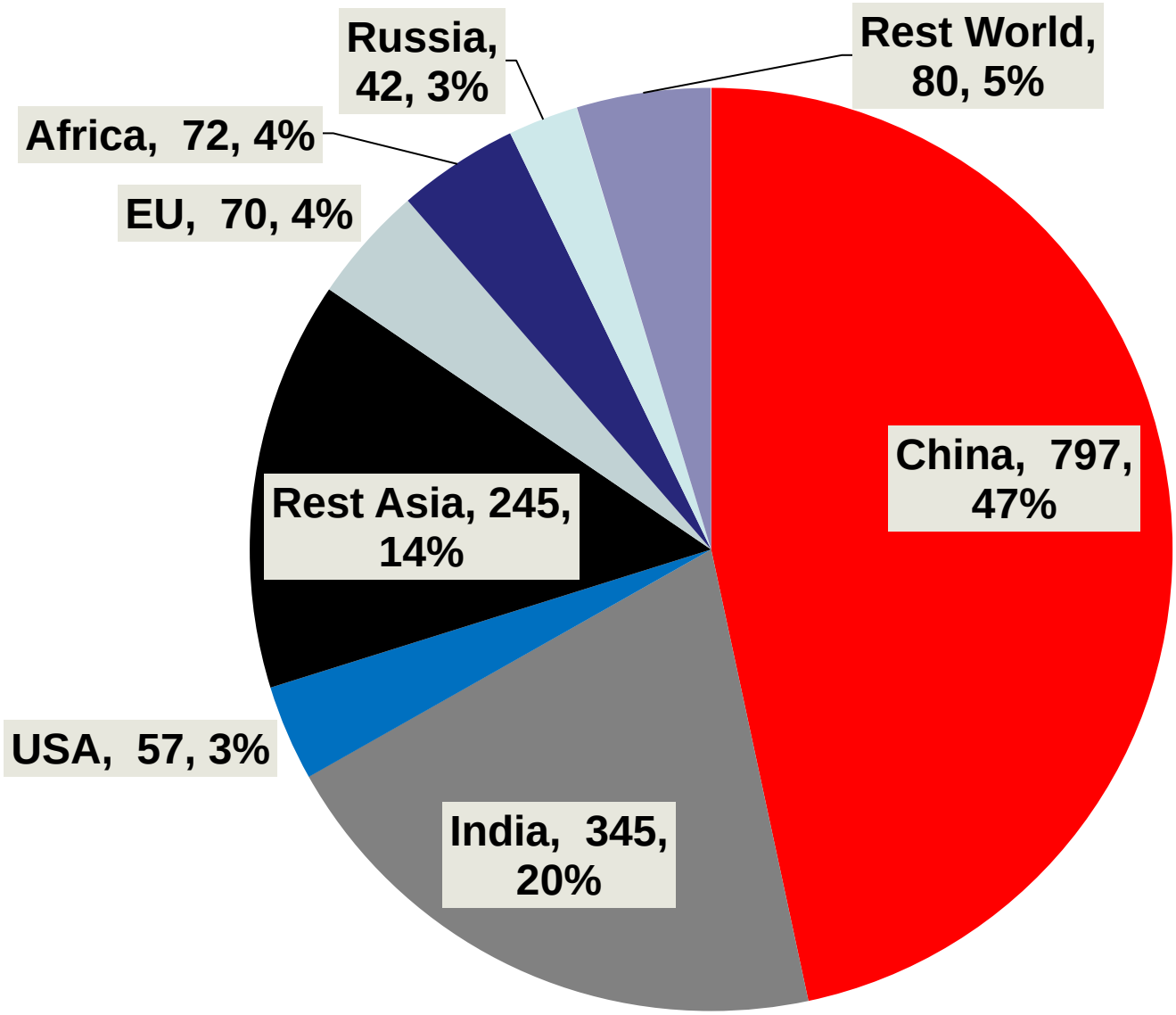


Source : Carbontracker.com, “Unburnable Carbon 2013”

Lock-in from Coal Power

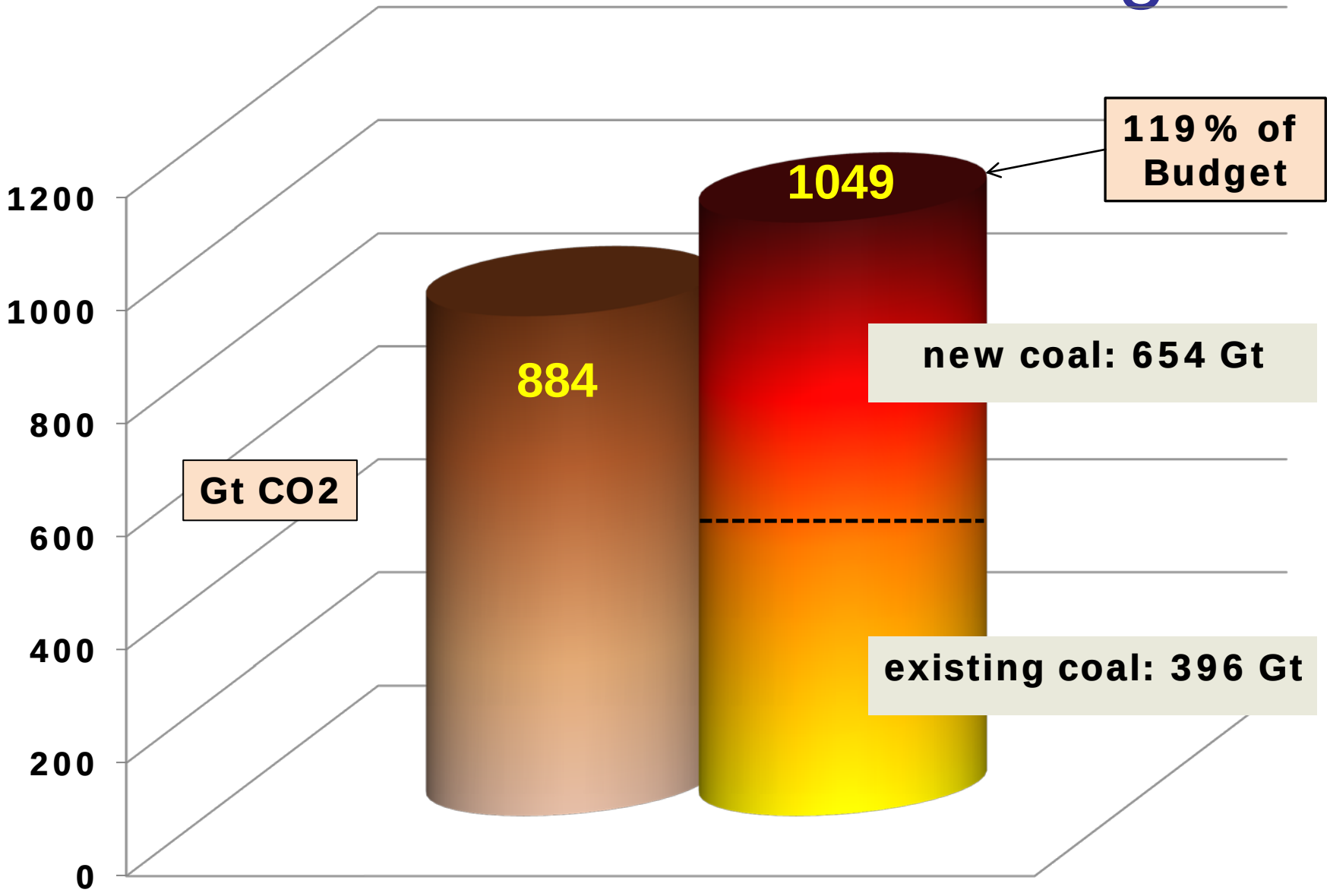
- Large budget lock-in from:
  - existing coal plants
  - and new planned coal plants

New Coal Build 2012-2035: CPS (1709 GW)



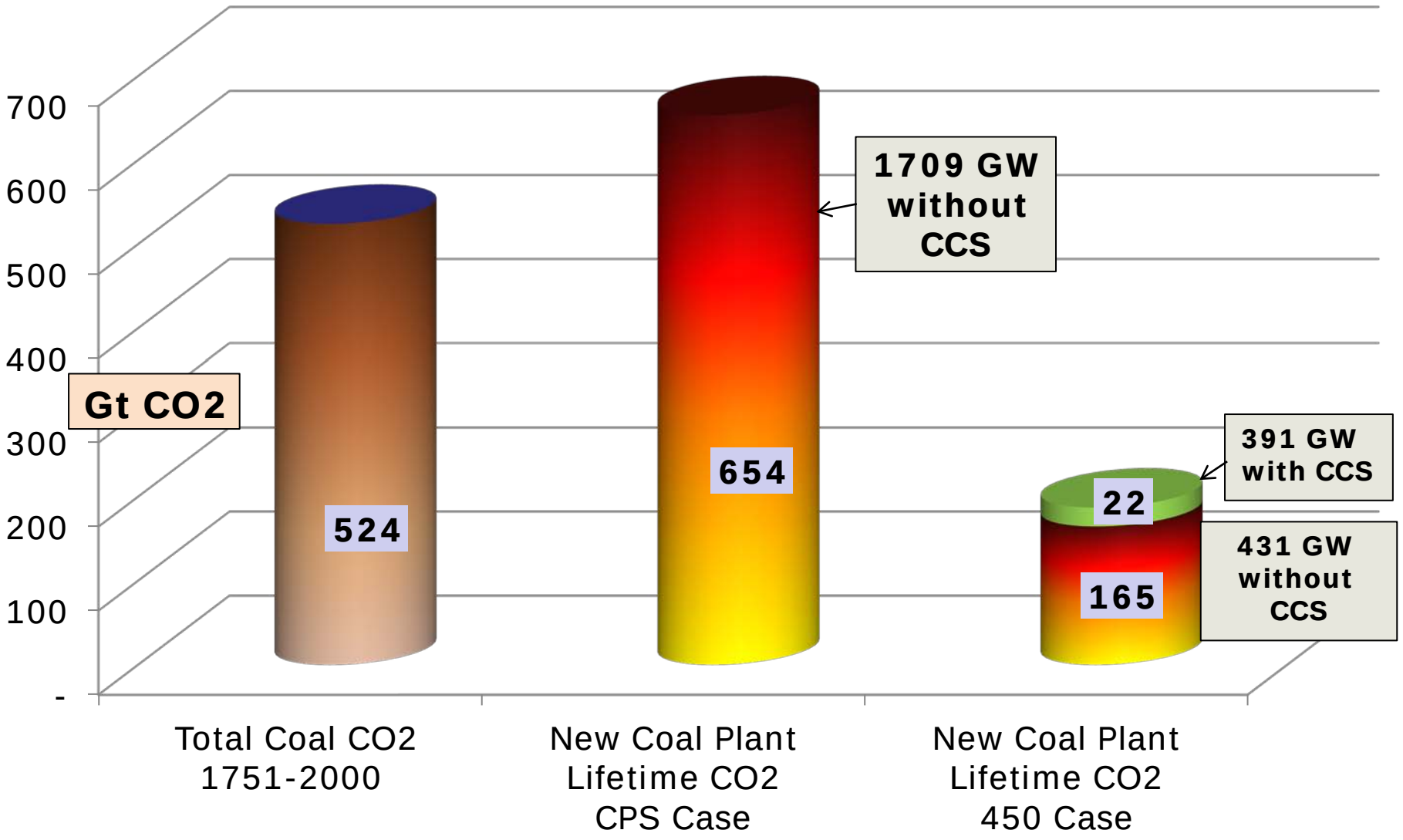
Source: IEA, WEO 2012

Coal Power v. Carbon Budget



Based on IEA, WEO 2012

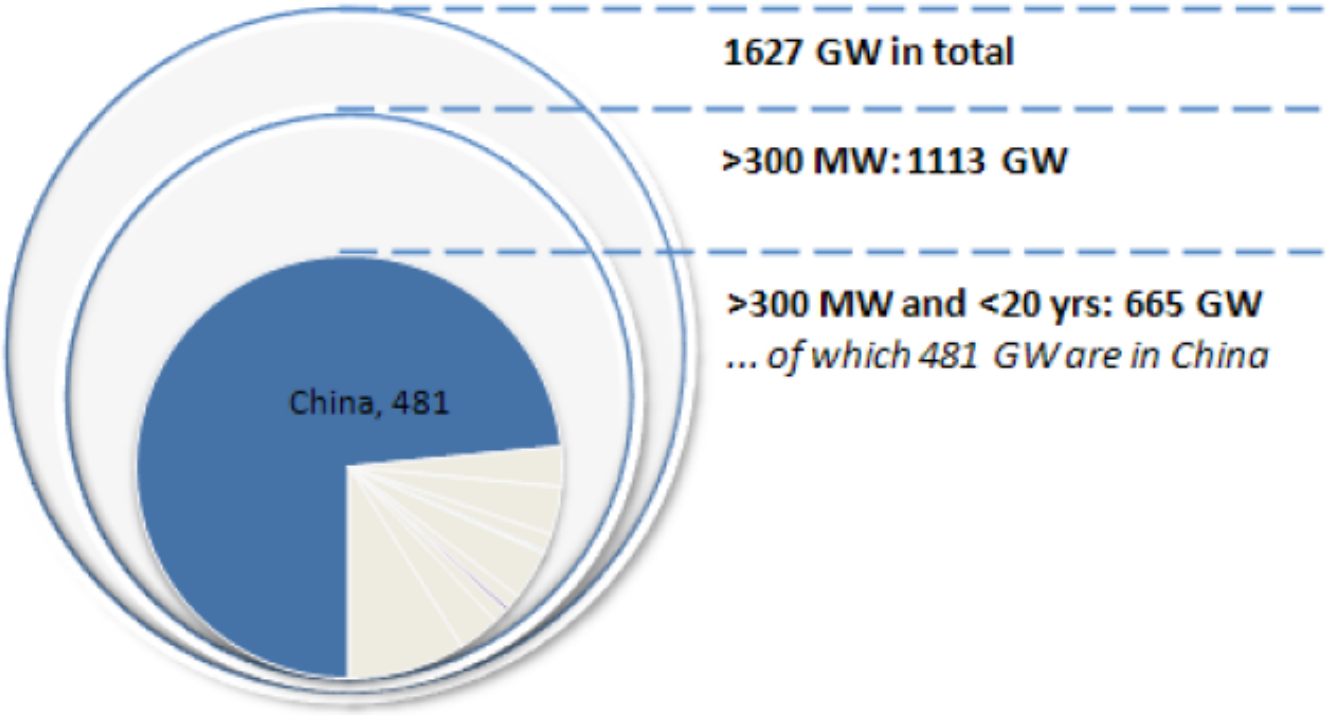
Cutting CO2 Lock-in from New Coal



Source: IEA, WEO 2012

Prime CCS Retrofit Candidates

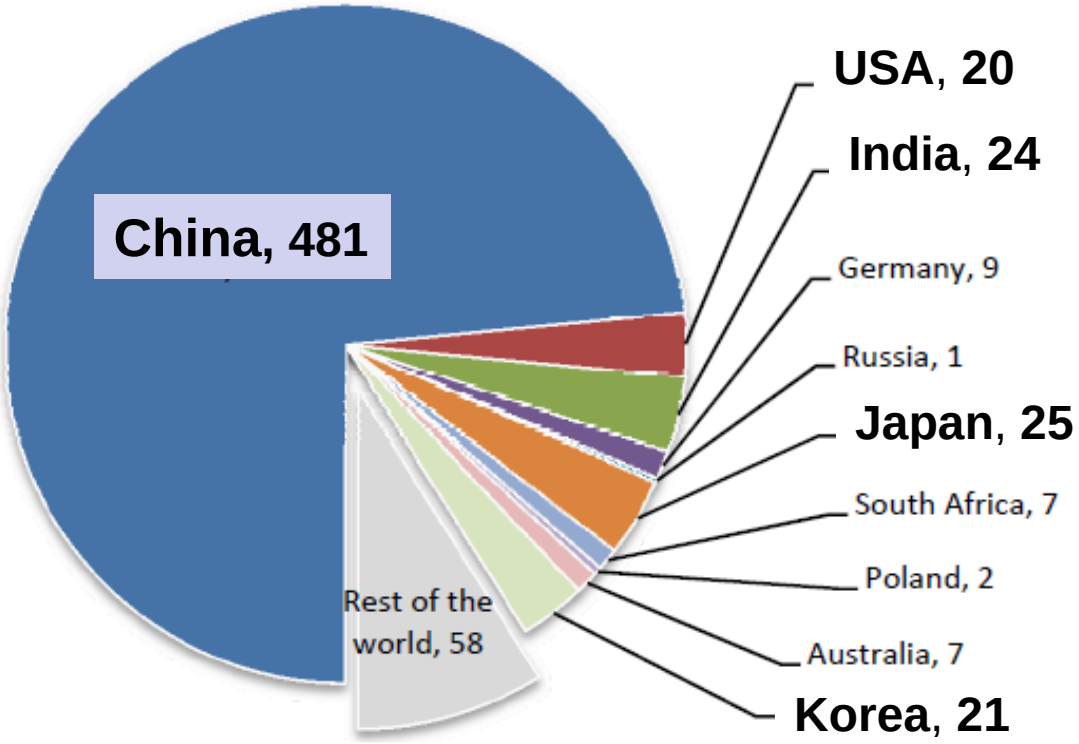
Figure 9 • Installed total coal-fired power plant capacity in all countries and breakdown by age and capacity



Source: IEA CCS Retrofit Paper, 2012

Prime CCS Retrofits by Country

Figure 10 • Breakdown of young (<20 years) and large (>300 MW) coal-fired power plants



Source: IEA CCS Retrofit Paper, 2012

Carbon/Energy Impacts of CCS

- Cut CO2 from new fossil sources
- Cut CO2 from existing sources pre-retirement
- Create space in the budget for easier transition away from oil.
- Reduce bio-energy pressure on forested lands

Proposed CO2 Stds – New Power Plants

- New NGCC: 1000 lbs/MWh
- New Coal: 1000-1100 lbs/MWh
- Coal limit based on use of partial CCS
- CAA does not require EPA to show a technology is in commercial use at current power plants.
- EPA estimates LCOE of coal with partial CCS:20% more than SCPC w/out EOR; +/-5% with EOR sales

  (SCPC: $92; SCPC+CCS (no EOR):$110; SCPC+CCS+EOR:$88-96;Nuclear:$107)

CO_2 Standards for *Existing* Plants

- 2.4 billion tons CO_2 from existing plants each year
- Clean Air Act requires CO_2 standards for existing plants (Section 111(d))
- EPA sets performance standards; states implement through SIPs
- Proposal 6/14; Final 6/15; SIPs due 6/16

NRDC PROPOSAL: LARGE BENEFITS, LOW COSTS

Pollution cuts: 560 million tons less carbon pollution in 2020; twice the reductions from the clean car standards

Health protections: up to 3,600 lives saved, and thousands of asthma attacks and other health incidents prevented in 2020 alone

Clean energy investments: $90 billion in energy efficiency and renewables investments between now and 2020

Low costs: only $4 billion in compliance costs in 2020

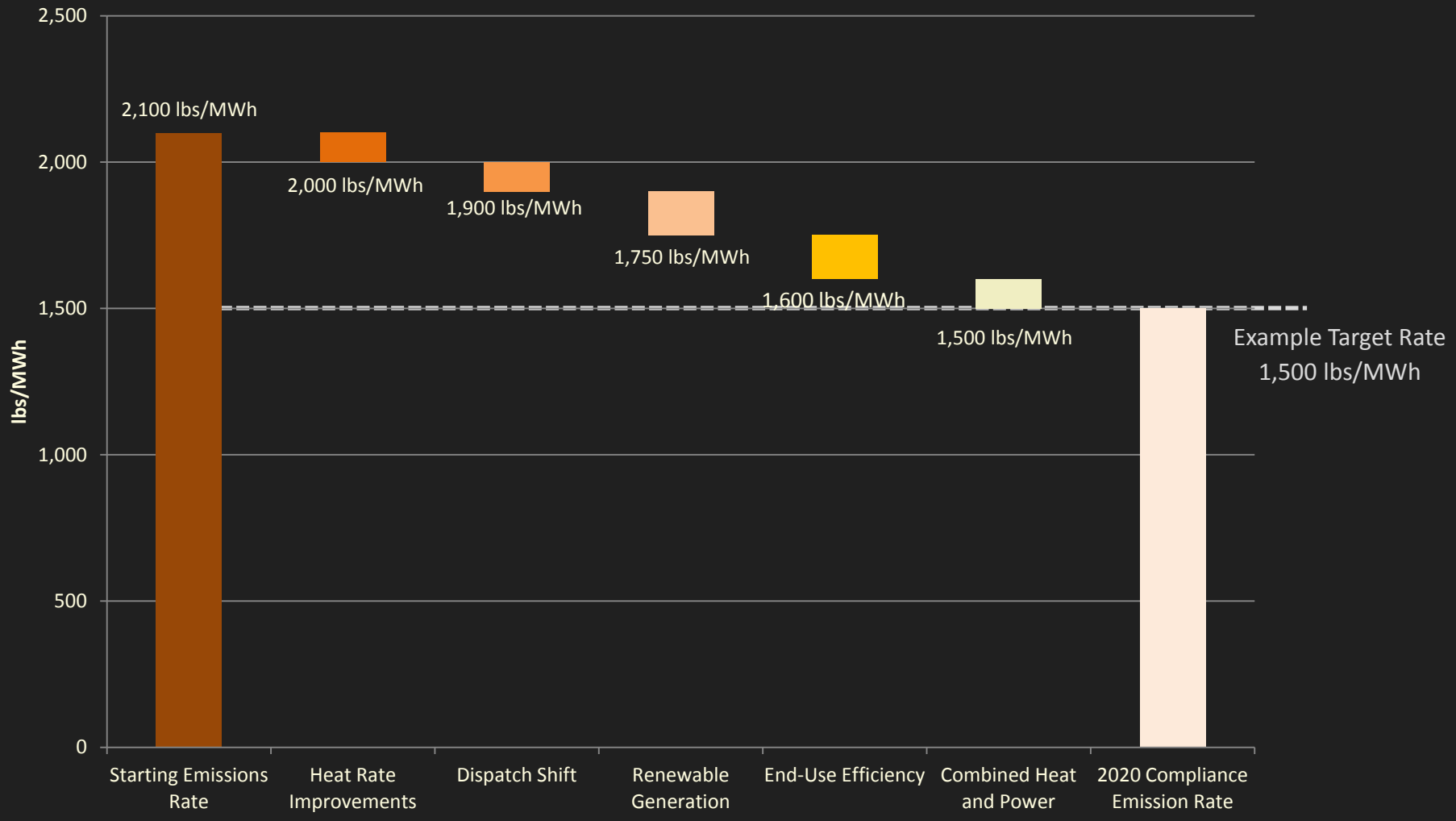
Large benefits: $25-60 billion value of avoided climate change and health effects in 2020

POLICY DESIGN
STRONG STANDARDS, MAXIMUM FLEXIBILITY

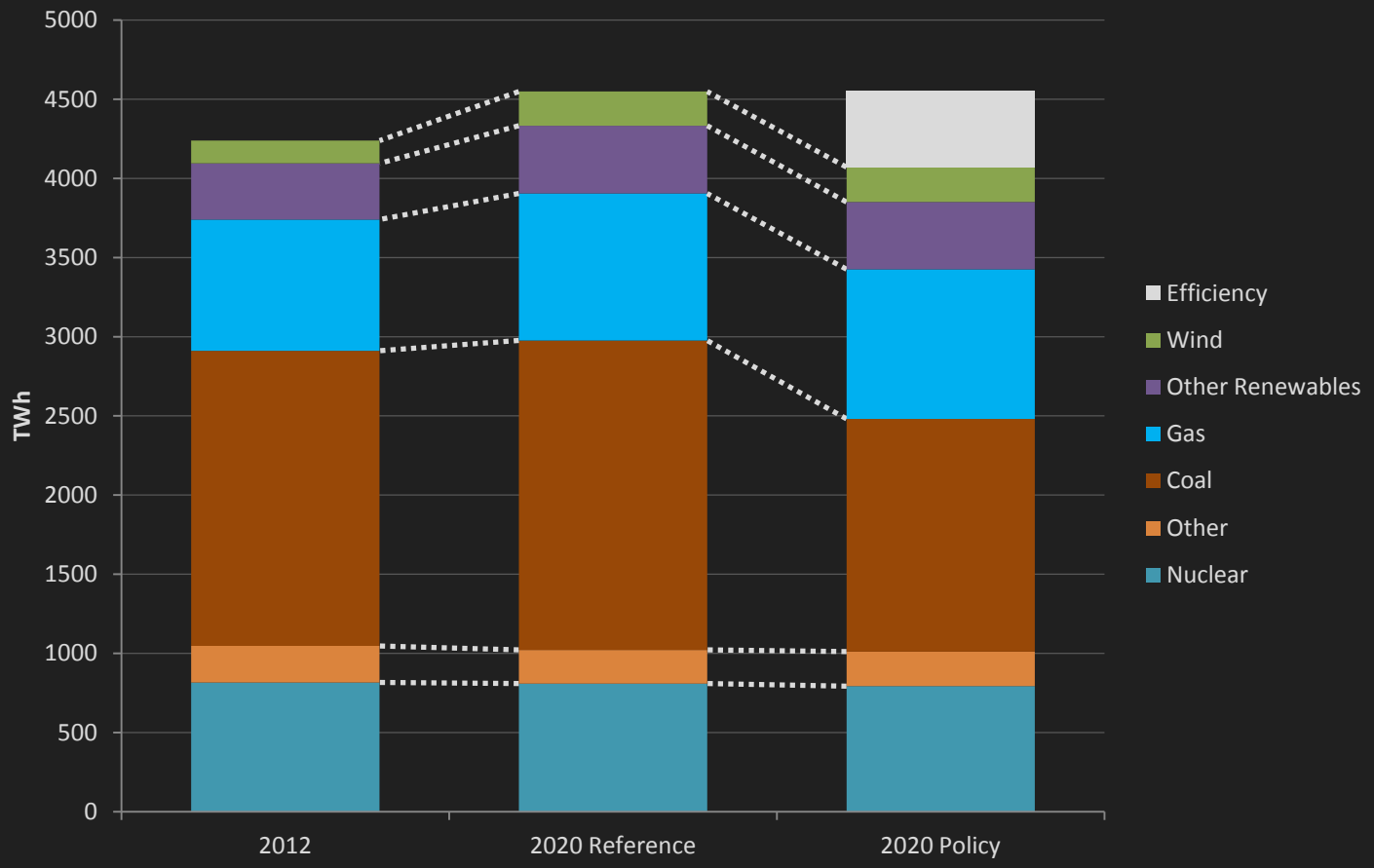
- **FAIR:** State-specific fossil-fleet average CO_2 emission rate standards
  - Different standard for each state, recognizing differences in baseline coal/gas generation mix
  - All fossil fuel generators within a state subject to same lbs/MWh standard in 2020 and 2025

- **FLEXIBLE:** Full range of emission reduction measures count
  - Reducing heat rates at individual power plants
  - Shifting dispatch from high-emissions to low-emissions units
  - Credit for incremental renewables and energy efficiency
  - States may opt in to interstate averaging or credit trading
  - States may adopt alternative compliance plan that achieves equivalent emission reductions

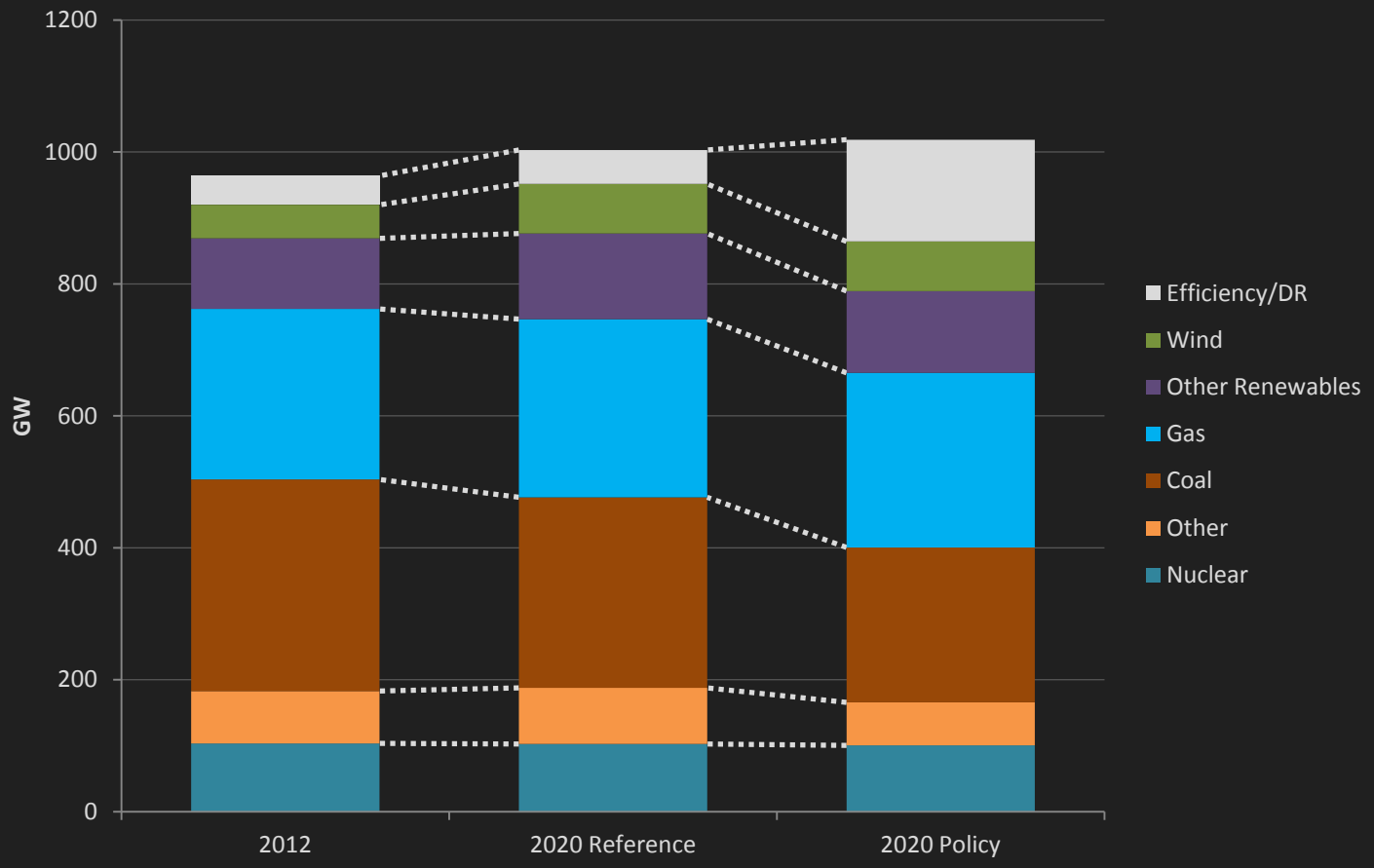
FLEXIBLE COMPLIANCE OPTIONS



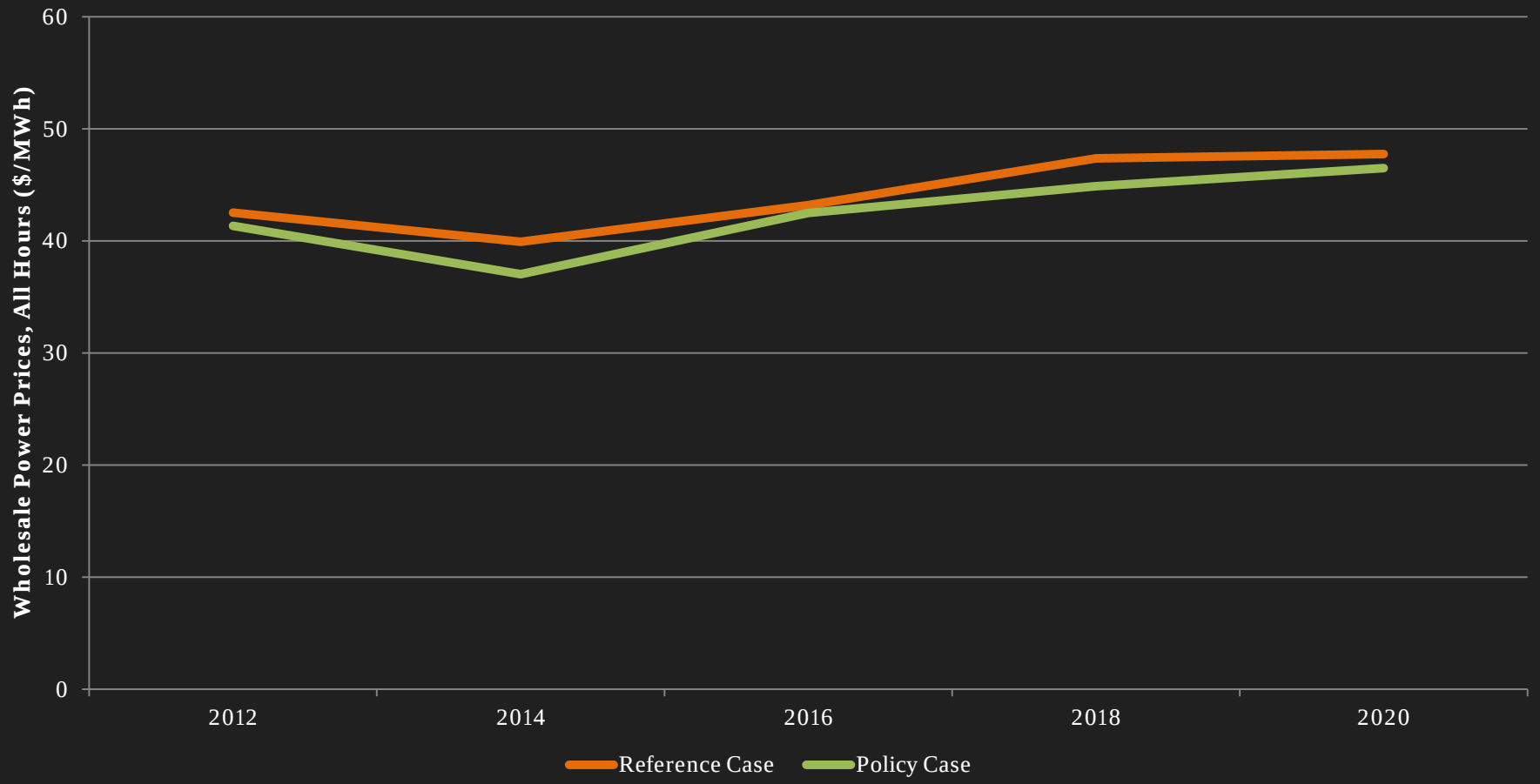
PROJECTED GENERATION CHANGES IN THE U.S. POWER SECTOR



PROJECTED CAPACITY CHANGES IN THE U.S. POWER SECTOR



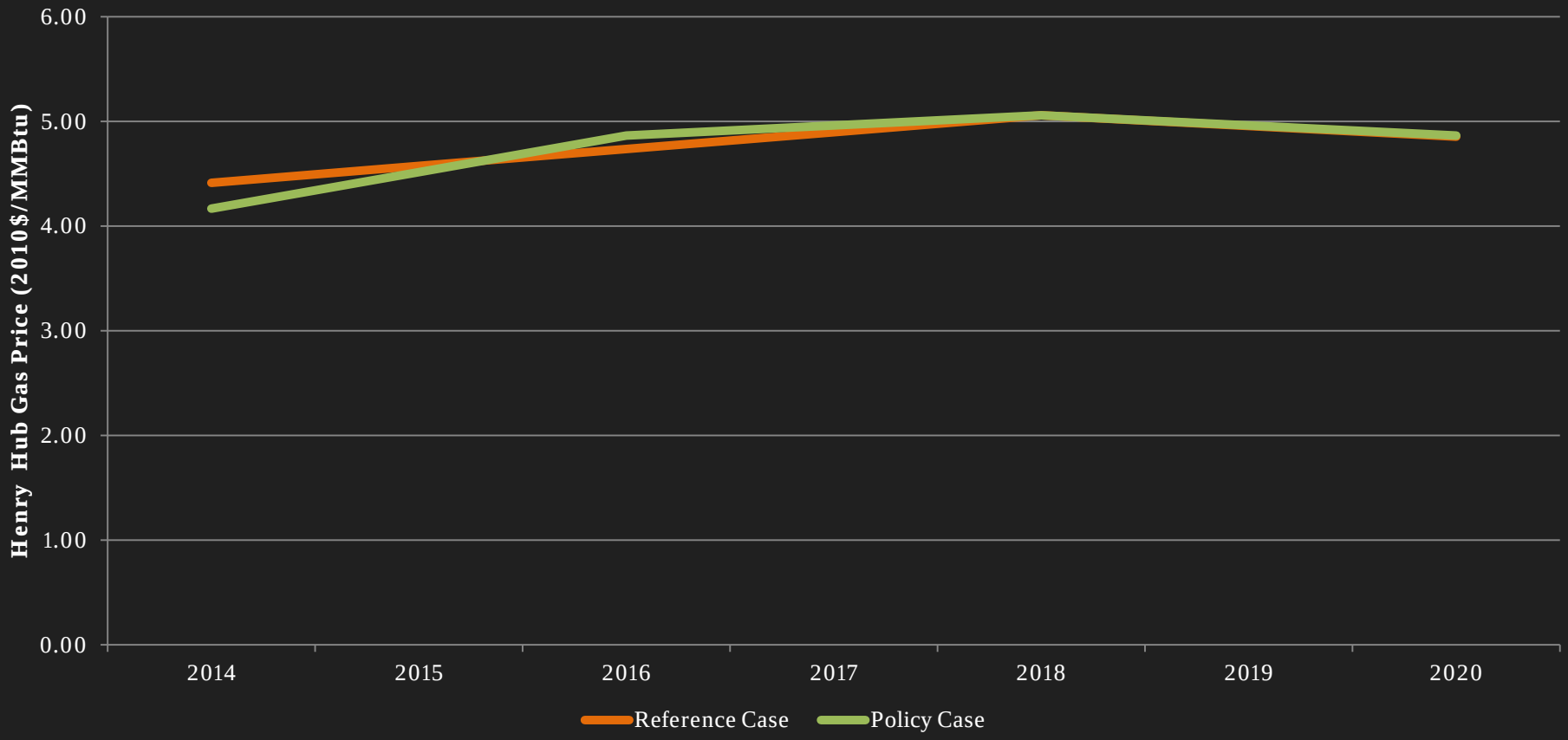
COMPARATIVE WHOLESALE POWER PRICES
FIVE-REGION AVERAGE (2010$/MWh)



Note: Generation-weighted average of PJM, Southeast (excluding Florida), MISO, NYISO, ISO-NE, accounting for 60% of national generation

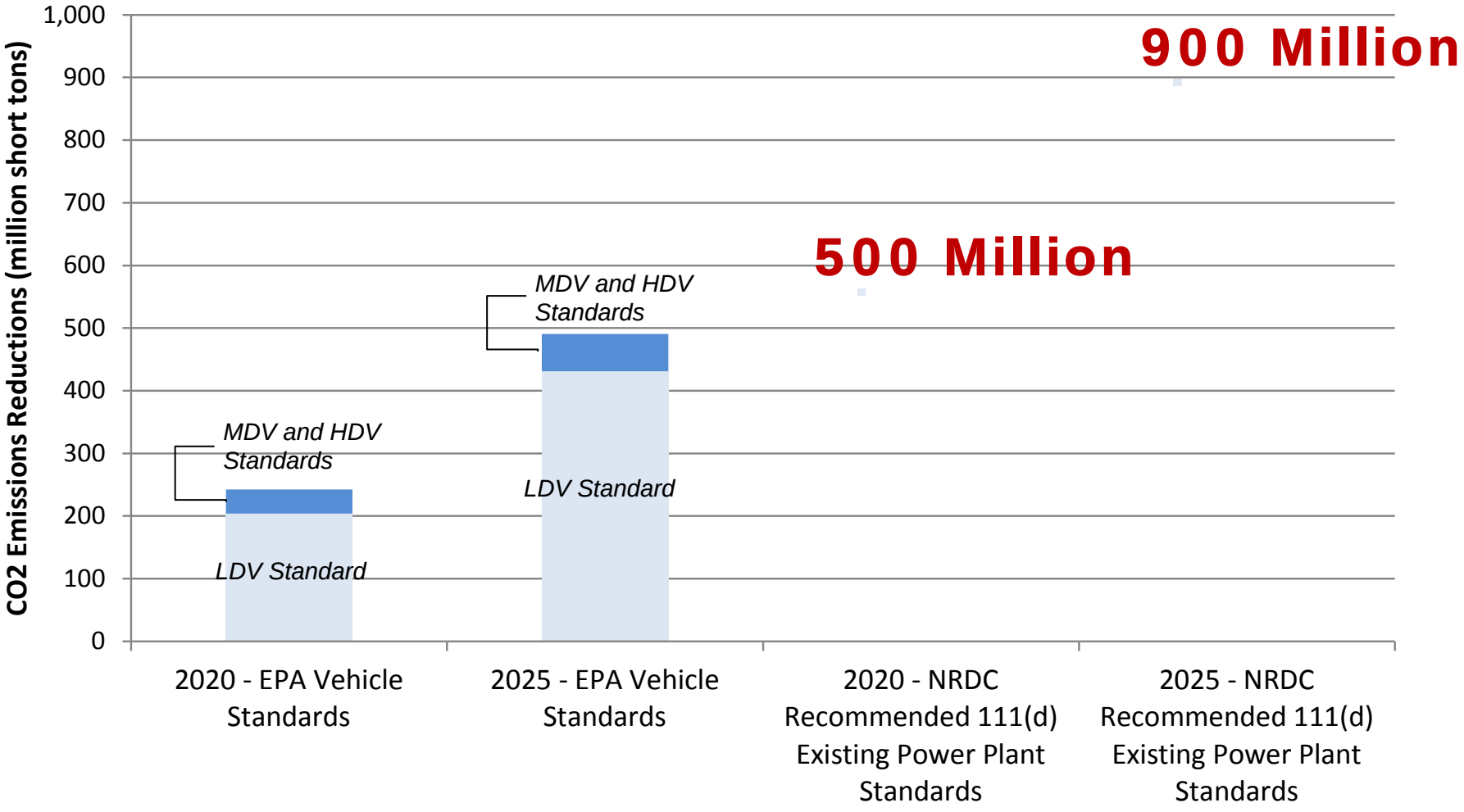
COMPARATIVE HENRY HUB GAS PRICES

NATIONAL AVERAGE (2010$/MMBtu)



Note: For the purposes of this assessment, natural gas prices are a projection of IPM based on assumed natural gas supply fundamentals and the power sector gas demand resulting from NRDC specified assumptions. Natural gas supply curves for the forecast years were developed based on the amount of resource available and the E&P

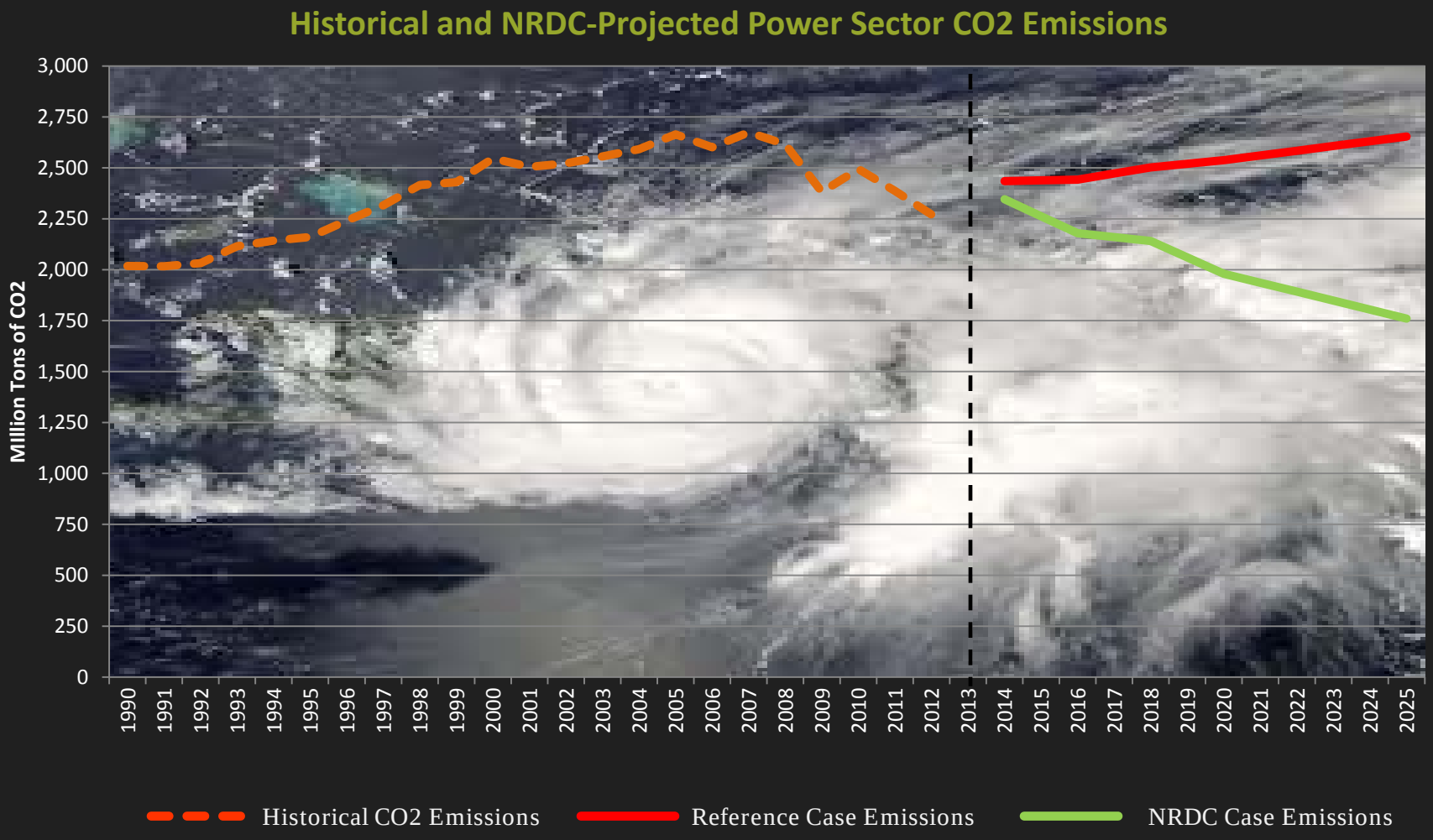
Potential Reductions from Power Sector
...Twice What's Being Achieved by Clean Car Standards



Note: The reductions shown are from BAU in the forecast years.

Sources: EPA/NHTSA rule documents at http://www.epa.gov/otaq/climate/regulations.htm and NRDC estimates.

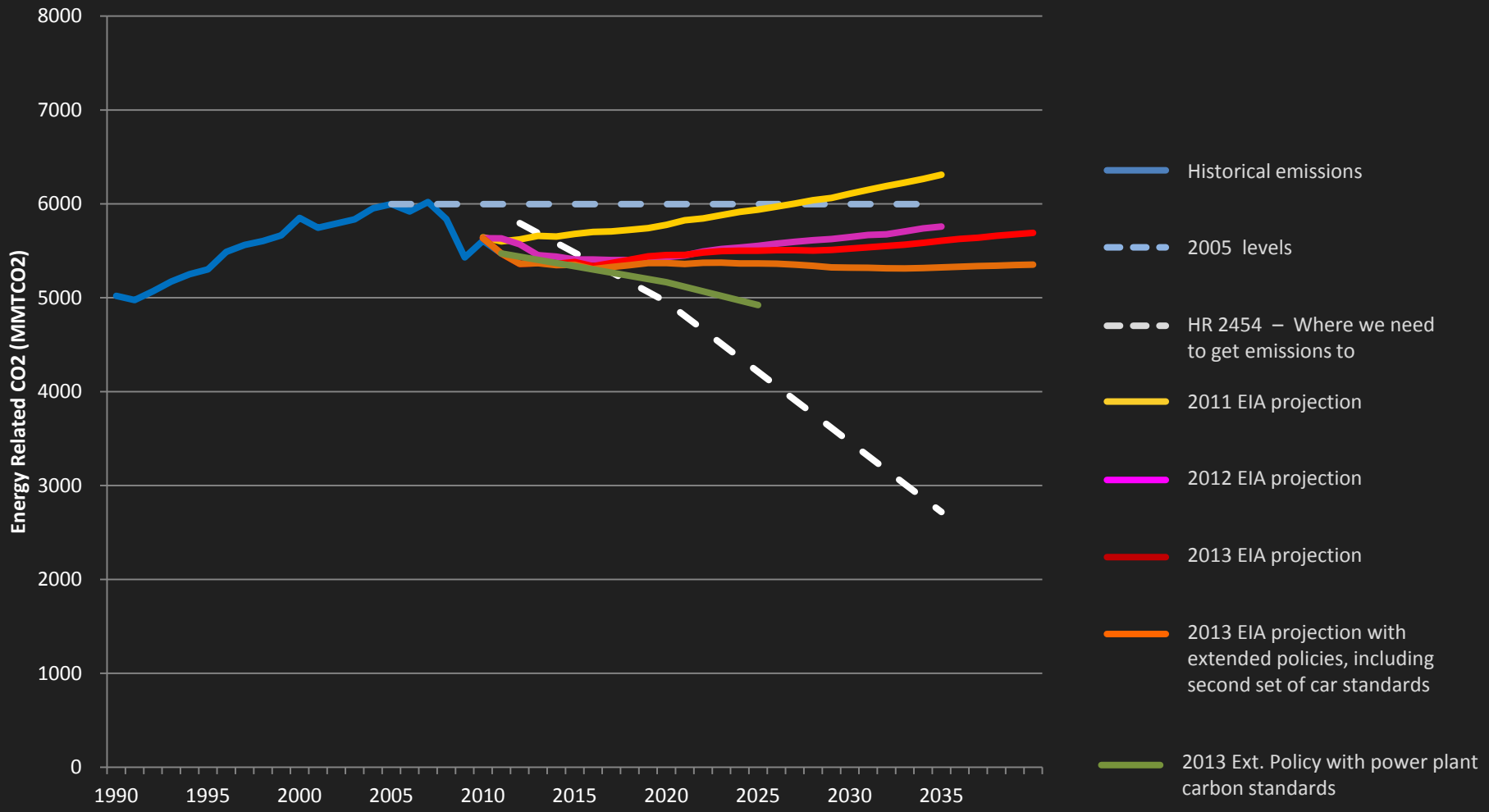
LESS CARBON



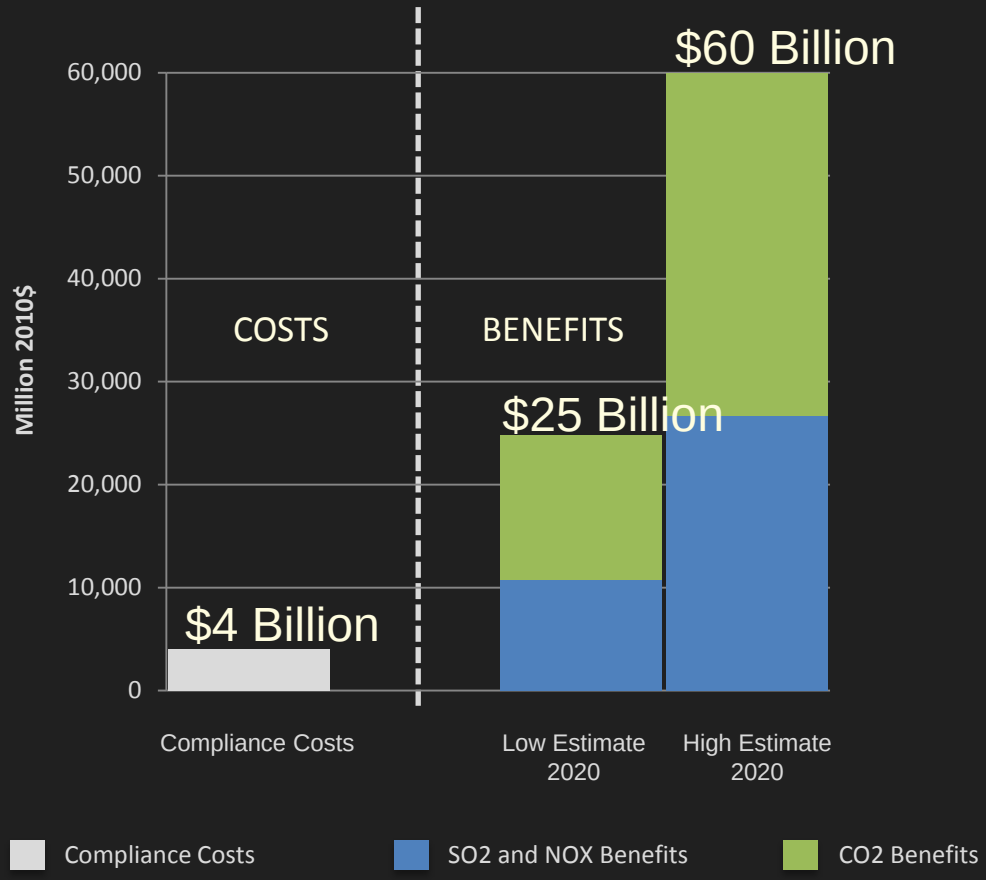
Source for historical CO2 emissions data: EIA.

STRONG STANDARDS MEAN HUGE EMISSIONS REDUCTIONS

Car and Power Plant Standards Get Us Four-Fifths of the Way to President's 2020 Target (17% below 2005 levels by 2020 Reduction)



LARGE BENEFITS, LOW COSTS



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