




STRONG CARBON POLLUTION STANDARDS FOR DIRTY POWER PLANTS

A photograph of two large, cylindrical industrial smokestacks. The stack on the right is taller and has a white upper section and a tan lower section. It is emitting a thick, white plume of smoke that rises into the sky. The stack on the left is shorter and has a tan surface. The sky is blue with scattered white and grey clouds. The image is taken from a low angle, looking up at the stacks.

Clean Air Act carbon standards are a powerful tool to protect our climate, health, and America's economy.



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

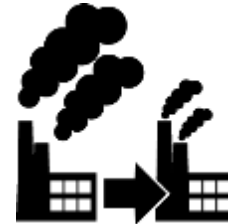
STRONG STANDARDS, MAXIMUM FLEXIBILITY

- **FAIR:** State-specific fossil-fleet average CO₂ emission rate standards
 - Different standard for each state in 2020 and 2025, **recognizing differences** in baseline coal/gas generation mix
 - **E.g.**, state standards for 2020 range from 1,500 to 1,000 lbs/MWh depending on each state's coal/gas generation mix in 2008-10 baseline period
 - 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



HEAT RATE REDUCTIONS



CLEANER POWER SOURCES

FLEXIBLE COMPLIANCE

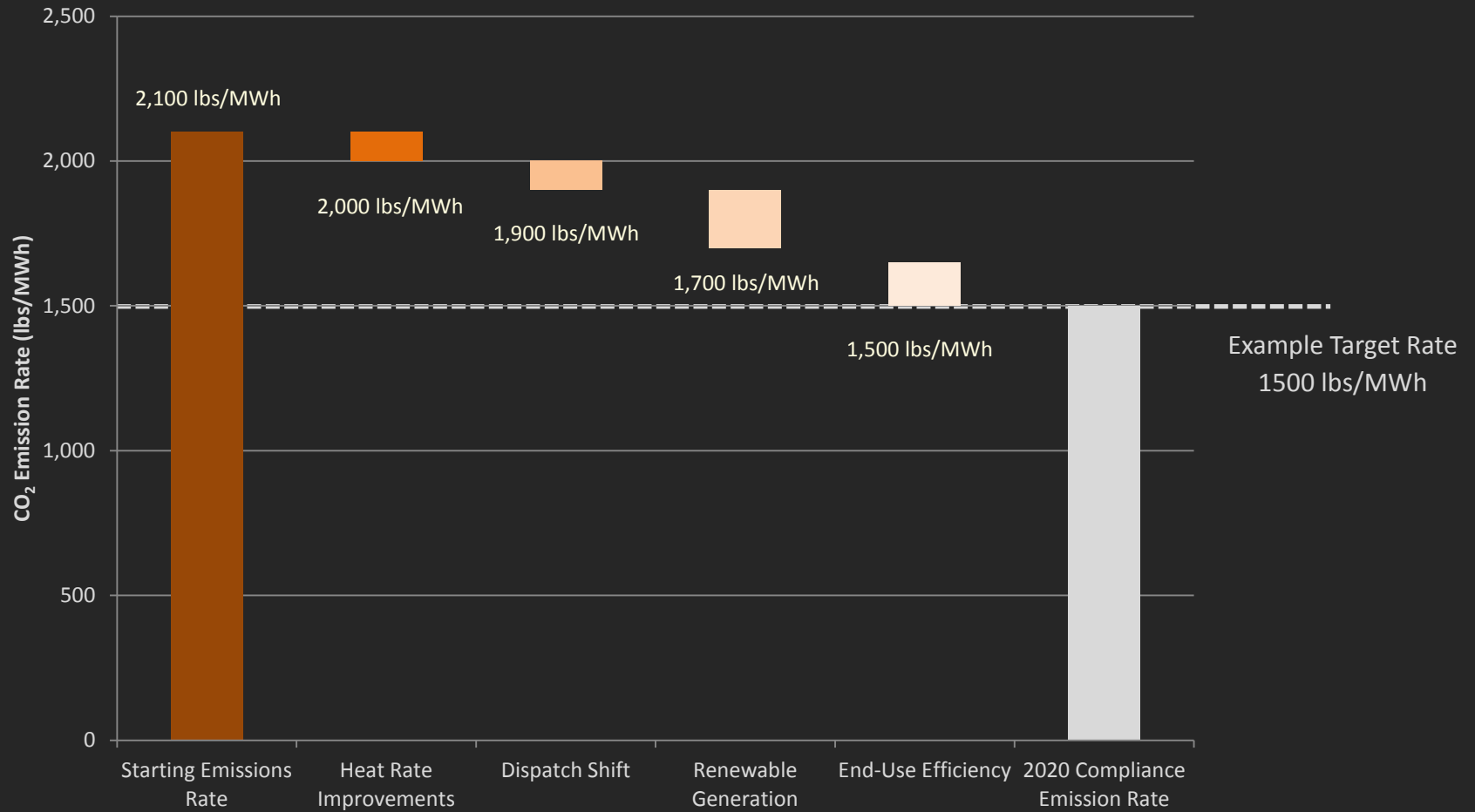


MORE RENEWABLES



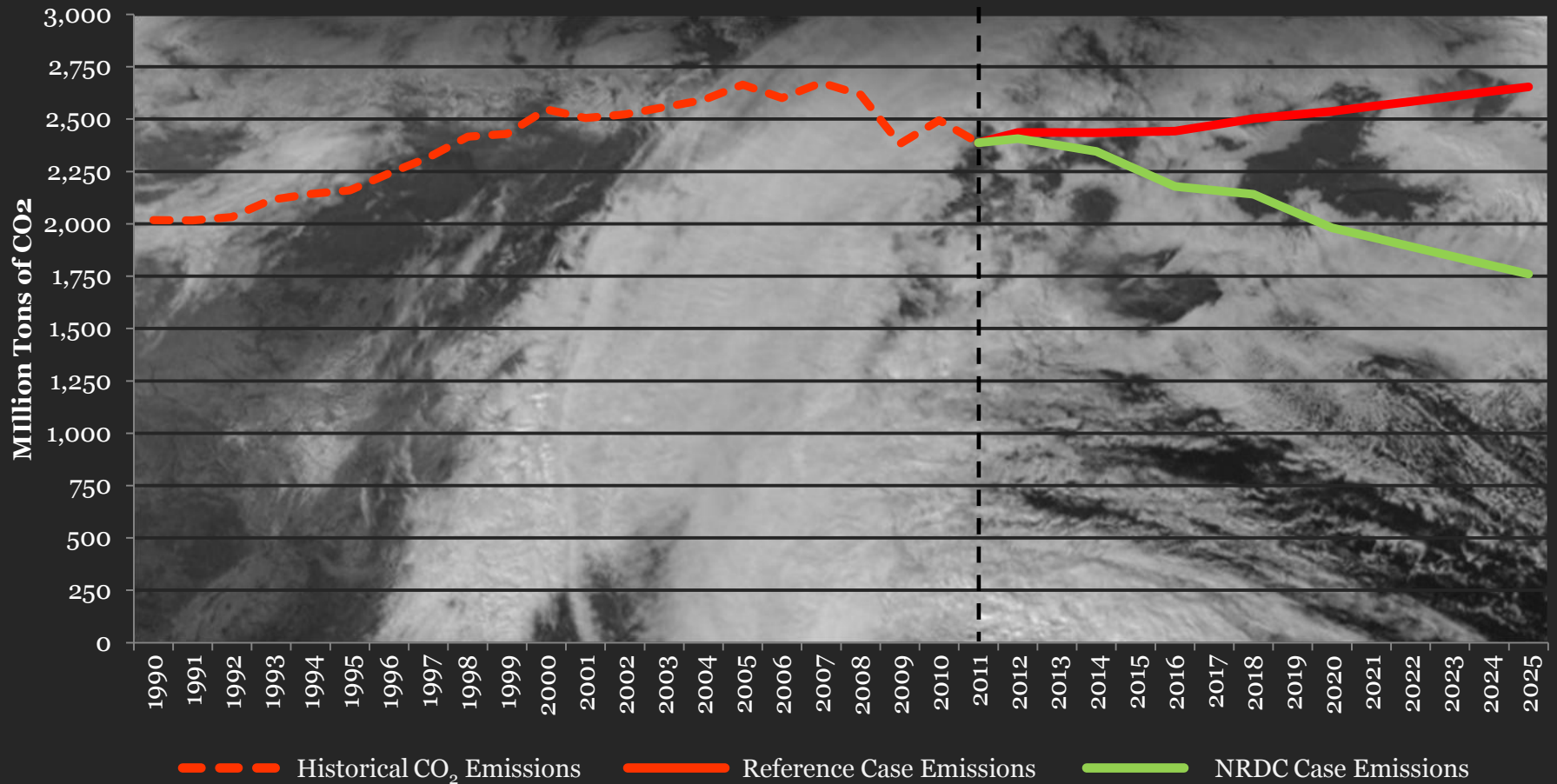
INVESTMENTS IN EFFICIENCY

FLEXIBLE COMPLIANCE OPTIONS



BIG REDUCTIONS

Historical and NRDC-Projected Power Sector CO₂ Emissions



Source for historical CO₂ emissions data: EIA.

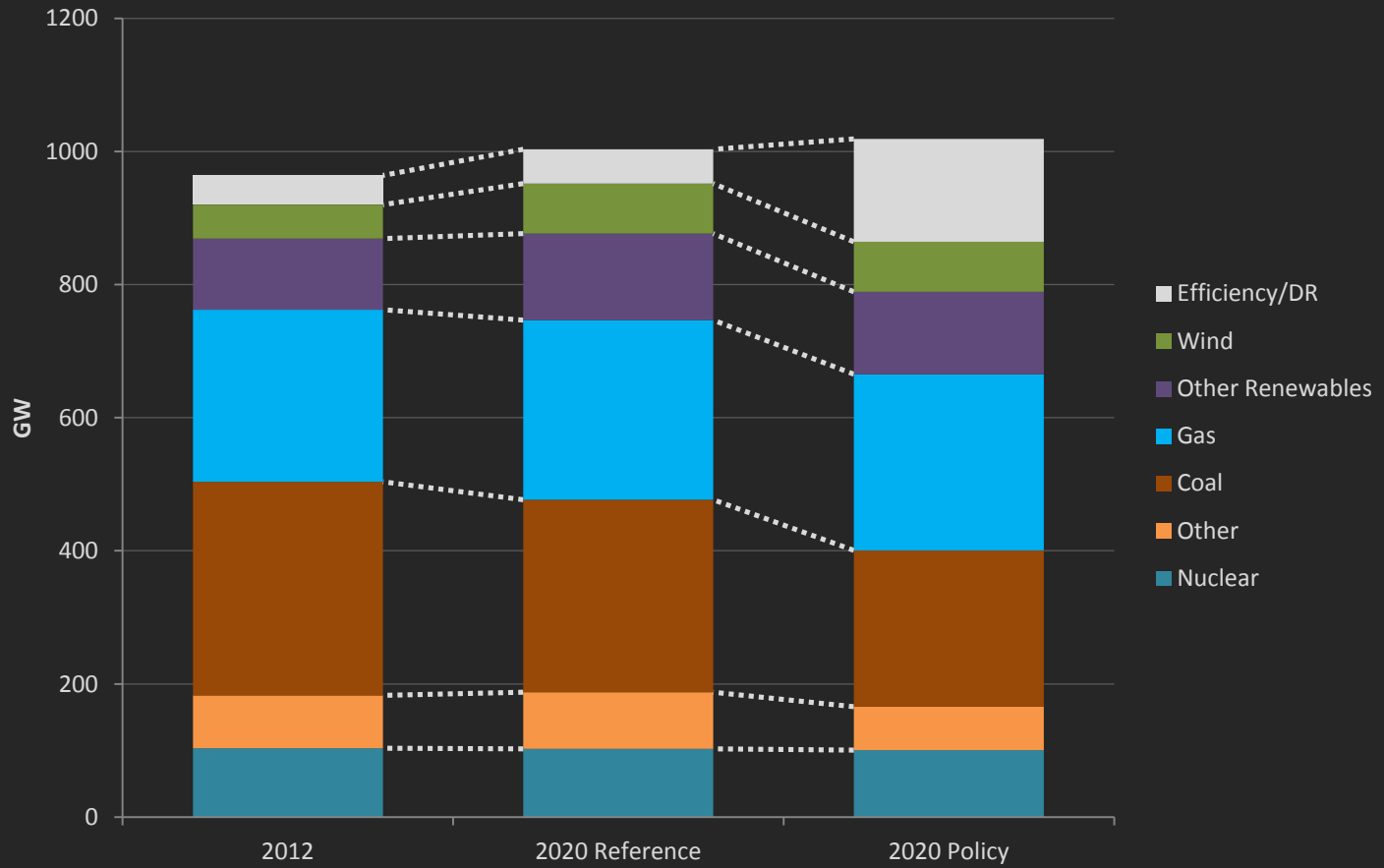


SMART STANDARDS DRIVE BILLIONS OF INVESTMENT DOLLARS TOWARD ENERGY EFFICIENCY

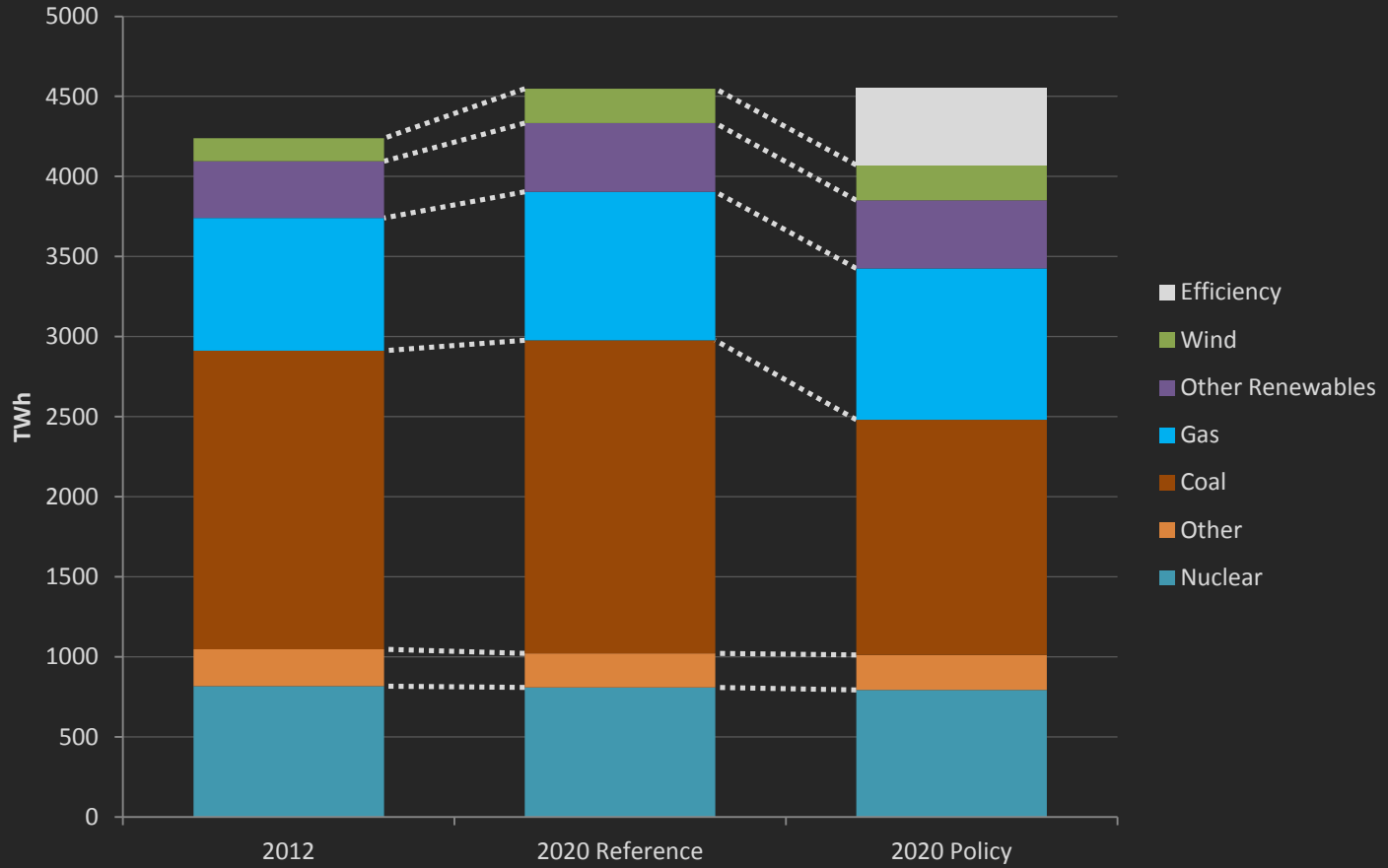


Smart carbon standards encourage states to adopt policies that can drive over \$90 billion in investments toward energy efficiency by 2020, while reducing spending on fuel and power plants. Similarly, states will have an incentive to strengthen and implement their renewable portfolio standards, also driving billions of dollars in investment.

PROJECTED CAPACITY CHANGES IN THE U.S. POWER SECTOR

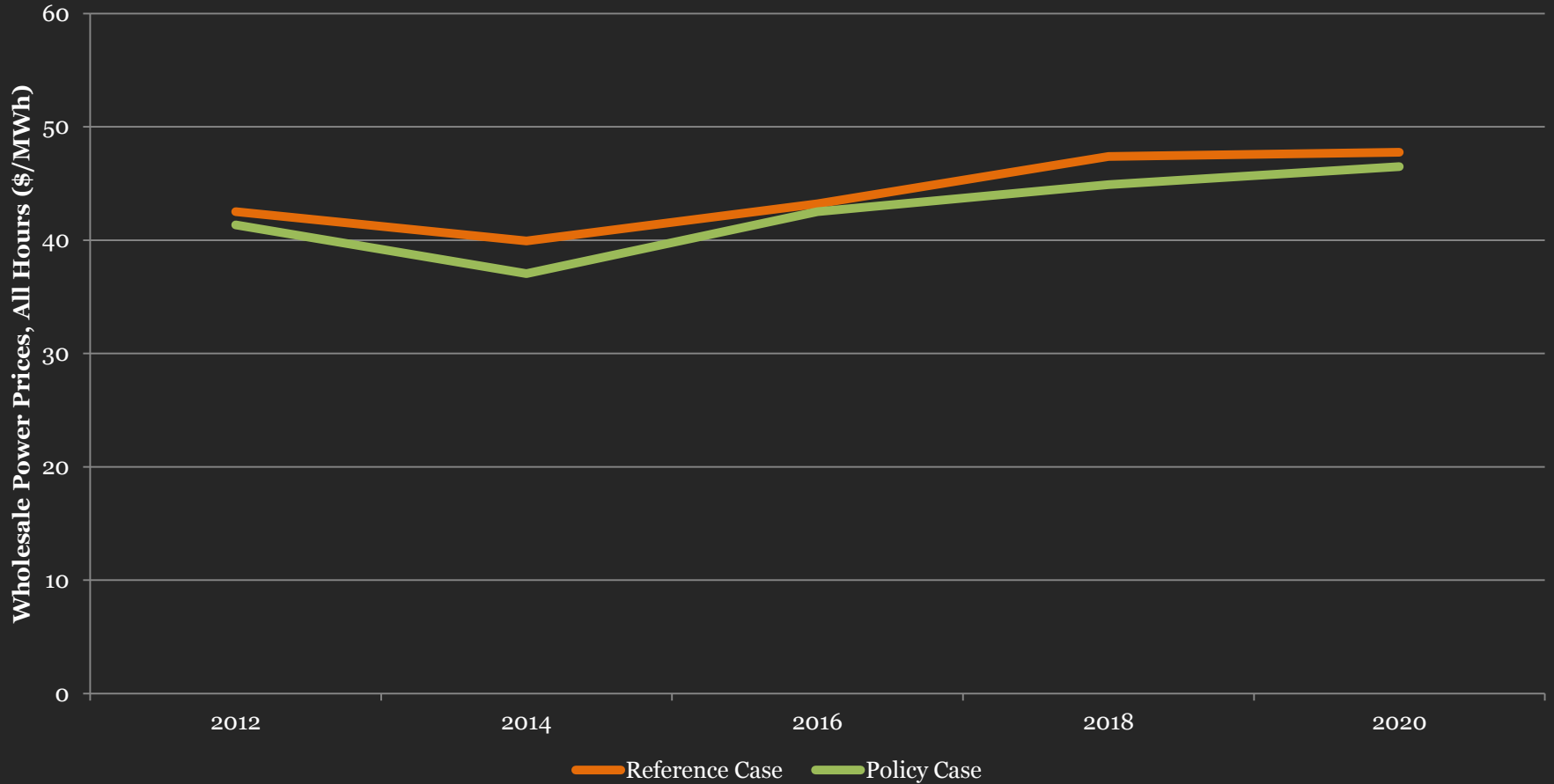


PROJECTED GENERATION CHANGES IN THE U.S. POWER SECTOR





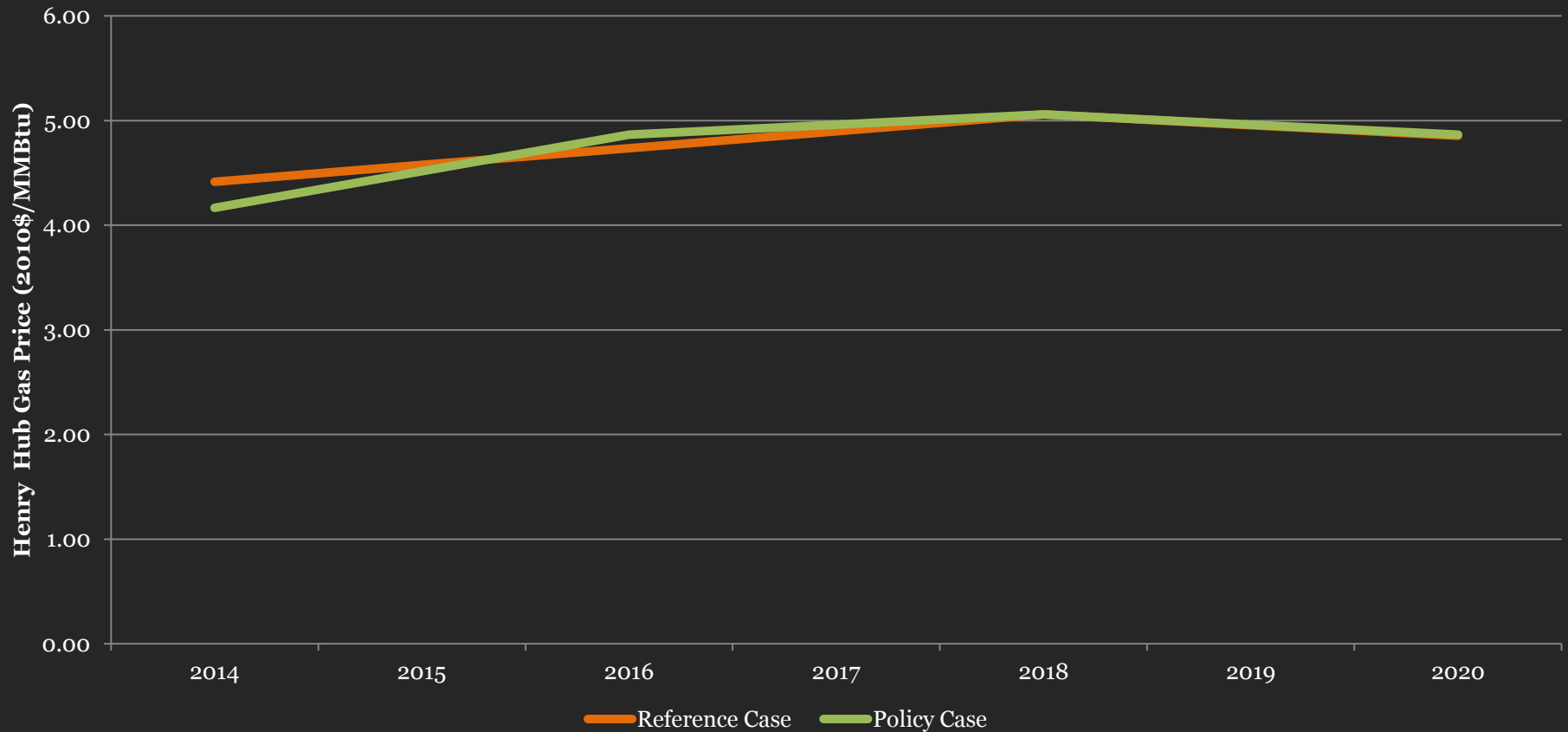
COMPARATIVE WHOLESALE POWER PRICES FIVE-REGION AVERAGE (2010\$/MWh)



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 finding and development costs (fixed and variable costs for exploration, development and O&M costs) associated with the different types of gas resources across the U.S. and Canada, accounting for LNG exports and imports.

SAVING LIVES AND REDUCING COSTLY HEALTH PROBLEMS



CARBON LIMITS WILL CUT OTHER POLLUTANTS AND...

save as many as 3,600 lives

prevent over 23,000 asthma attacks

avoid over 2,300 emergency room visits and hospital admissions

prevent nearly 1.2 million restricted activity and work loss days

AVOIDING UP TO \$26 BILLION IN HEALTH DAMAGES FOR AMERICANS IN 2020 ALONE



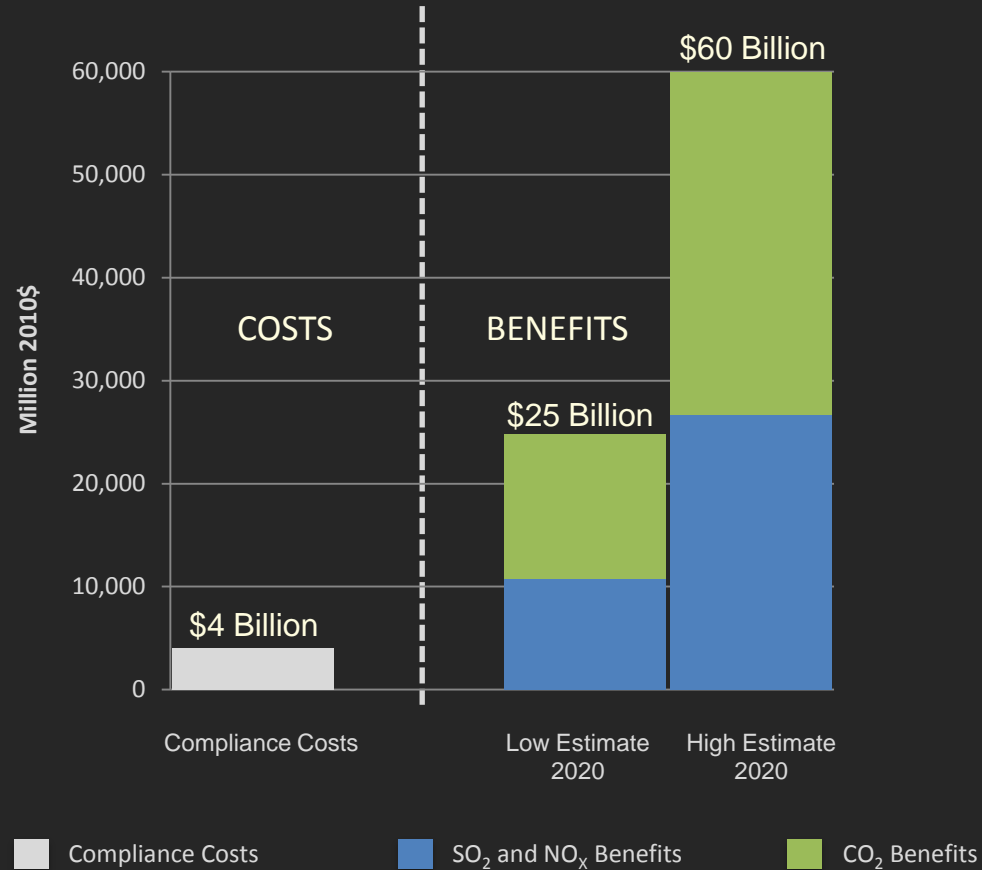
RESULT OF MODEL RUNS

SO₂ and NO_x EMISSIONS PROJECTIONS BELOW REFERENCE CASE (THOUSAND SHORT TONS)

Incremental NRDC-Projected Power Sector SO₂ and NO_x Emissions

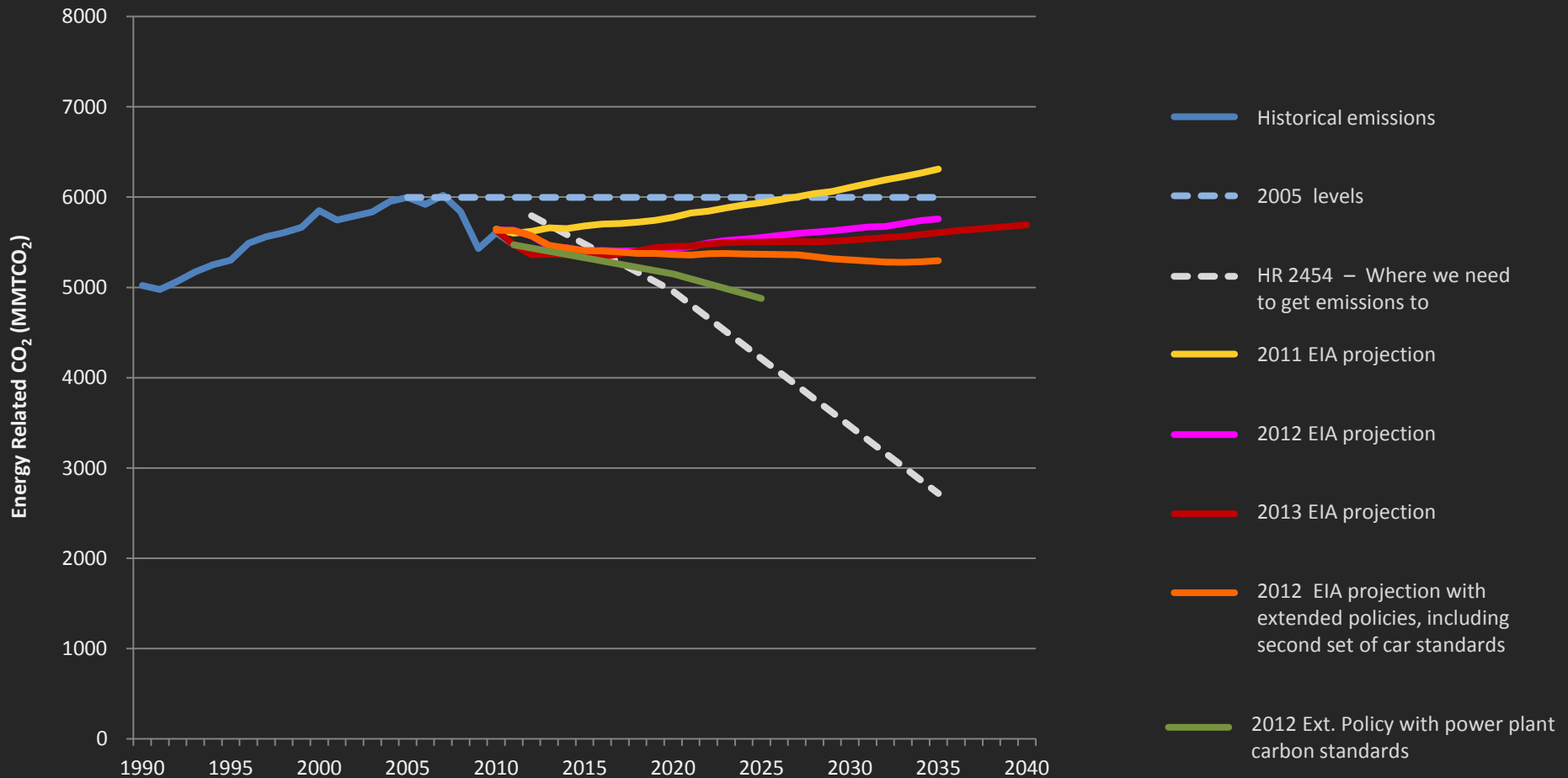


ESTIMATED COSTS AND BENEFITS FROM REDUCTIONS IN CO₂, SO₂ AND NO_x (2020)



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)





- **EPA Emissions Guideline Document & State Plans**
 - Under Section 111(d) and EPA regulations, EPA issues “emission guideline document” containing a performance standard and accompanying compliance provisions.
 - States have a period of time to adopt state plans and submit them to EPA. EPA approves or disapproves after notice and comment.
 - If a state submits no plan, or one that cannot be approved, EPA must propose and issue a federal plan.
- **Emissions Guideline Document Serves As:**
 - Template for approvable plans: Guideline sets programmatic template for approvable plans. State plans that follow the template will be approved.
 - Yardstick for alternative plans: States may submit plans of different design, e.g., a limit on total power sector emissions. EPA will approve if the state demonstrates its plan will achieve power sector CO₂ emissions equal to or less than the template program.
 - Advance notice of FIP: If a state does not submit an approvable plan, EPA will issue a federal plan based on the template.

ENVIRONMENTAL POLICY ASSUMPTIONS AND MODELING APPROACH

- “Reference Case” and “Policy Case”
 - Modeled by ICF using IPM
 - Analysis period 2012-2025
 - Geographic scope: National, with 5 focus regions: ISONE, NYISO, MISO, PJM, Southeast
- Both cases include same assumptions for non-CO₂ environmental policies:
 - Cross State Air Pollution Rule (“CSAPR”)
 - Mercury and Air Toxics Standards (“MATS”)
 - Cooling tower requirements under Clean Water Act Section 316(b)
 - Coal ash, or coal combustion residuals (CCR) under RCRA Section D
- Policy Case includes
 - State-specific CO₂ emission rate standards, derived from baseline generation shares and emission rate benchmarks of
 - Coal: 1500 lbs/MWh in 2020; 1200 lbs/MWh in 2025
 - Gas: 1000 lbs/MWh
 - Energy efficiency credited towards compliance
 - Based on demand reductions from the EIA/AEO 2011 Reference case in each region from Synapse report, *Toward a Sustainable Future for the U.S. Power Sector: Beyond Business as Usual 2011* (November)

Note: Policy assumptions regarding EPA rules were based on NRDC’s assessment of plausible outcomes, and do not necessarily reflect NRDC’s position or EPA’s subsequent proposals or final rules.



SYNAPSE TRANSITION SCENARIO DSM ASSUMPTIONS

- Synapse adjusted AEO 2011 demand forecasts to simulate the effects of more aggressive EE and DR programs nationwide
- Energy Efficiency
 - Synapse assumed increased EE/DR penetration starting in 2012, ramping to an annual savings rate of 2% of the previous year's electricity sales by 2020
 - On a generation basis, this is equivalent to an average growth rate of -0.2% per year from 2011 - 2020, compared to AEO 2011's 0.9% rate
 - The assumed costs of EE are 4.7 cents/kWh saved in the 2011-2020 period, and 5.3 cents/kWh saved between 2021 – 2025
- Demand Response
 - For DR, Synapse followed the 2019 Achievable Participation DR levels in the June 2009 FERC report prepared by The Brattle Group, reducing national peak load by up to 20%
 - Synapse assumed DR costs rise linearly as time goes on and greater amounts of DR substitute for generating capacity



PROJECTED CAPACITY CHANGES IN THE U.S. POWER SECTOR

GW	2012	Reference Case (2020)	NRDC (2020)
Combined Cycle (Gas)	167	175	173
Combustion Turbine (Gas)	91	95	91
Coal (Conventional)	319	288	229
Coal (CCS & IGCC)	1	1	6
Oil/Gas Steam	45	53	37
Nuclear	104	103	101
Hydro	97	96	96
Wind	51	74	75
Biomass	3	5	5
Other Renewables	7	23	23
Other Non-renewables	35	34	28
Demand Response	44	51	65
Energy Efficiency	0	0	89
Total	964	998	1,019
	(920)	(947)	(864)



PROJECTED GENERATION CHANGES IN THE U.S. POWER SECTOR

TWh	2012	Reference Case (2020)	NRDC (2020)
Combined Cycle (Gas)	804	889	883
Combustion Turbine (Gas)	25	40	62
Coal (Conventional)	1,859	1,946	1,426
Coal (CCS & IGCC)	5	8	44
Oil/Gas Steam	18	29	31
Nuclear	816	809	793
Hydro	292	292	292
Wind	144	216	220
Biomass	23	38	38
Other Renewables	40	98	95
Other Non-renewables	214	213	183
Demand Response	0	0	0
Energy Efficiency	0	0	482
Total	4,239	4,578	4,550
	(4,239)	(4,578)	(4,068)