



EPA's Clean Power Plan
Summary of IPM Modeling Results:
U.S. and Missouri

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Outline

Clean Power Plan

IPM Description

IPM Results

EPA's Clean Power Plan

- **June 2014:** EPA proposed carbon dioxide (CO_2) standards for existing power plants under the authority of Clean Air Act section 111(d) (i.e., the Clean Power Plan)
- **August 2015: EPA issued final standards to regulate CO_2 emissions from existing power plants**
  - Under the final Clean Power Plan, EPA estimates that the U.S. will achieve a 32% reduction in GHG emissions from 2005 levels by 2030 from the electric sector
  - The Clean Power Plan includes both national (rate) and state-by-state (rate and mass) CO_2 performance targets; states must develop plans for their power plants to meet these targets
- **February 2016:** The U.S. Supreme Court unexpectedly issued a stay, suspending the plan's implementation until pending litigation is completed
- **The case is set to be heard by the D.C. Circuit *en banc* on September 27, 2016**

Rate-Based Standards: Two Options

National "Dual" Emission Standards (lb/MWh)

Subcategory	Interim Standards	Final Standards
Fossil Steam Units	1,534	1,305
NGCC	832	771

Missouri: State "Blended" Fossil Standards (lb/MWh)

Category	Interim Standards	Final Standards
All Affected EGUs	1,490	1,272

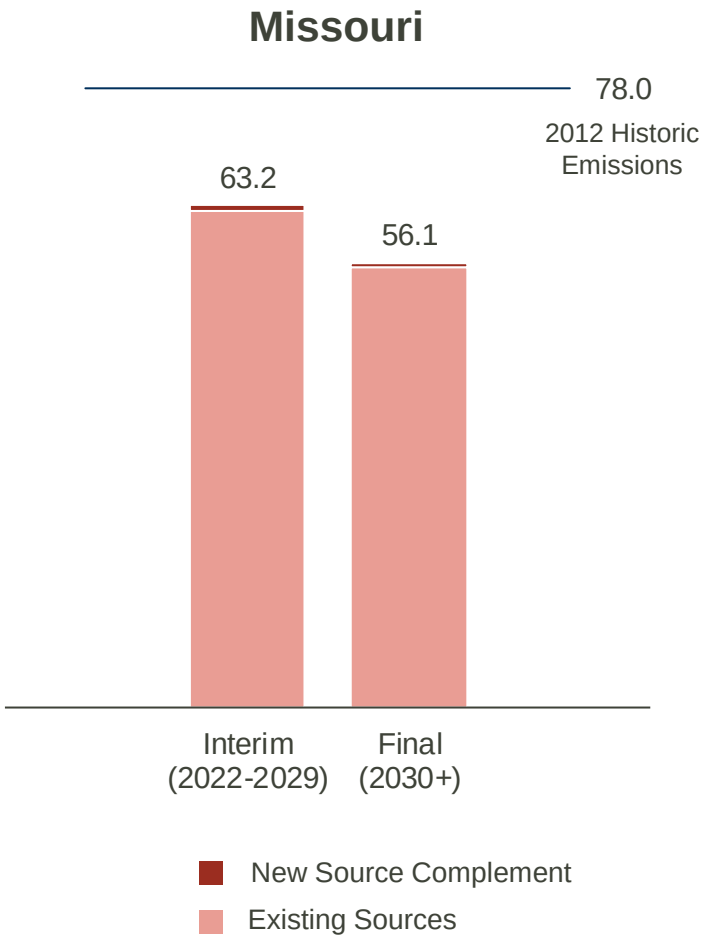
Note: Blended fossil standards = weighted average based on historic (2012) fossil steam MWhs and NGCC MWhs. In Missouri, fossil steams MWhs = 94%, NGCC MWhs = 6%.

Mass-Based Standards: Two Options

Affected Sources (million short ton)

	Interim Targets	Final Targets
Existing Sources	62.6	55.5
New Source Complement	0.7	0.6

Values may not align to chart due to rounding.



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Integrated Planning Model

- The Integrated Planning Model, or IPM® is widely used by government, utilities and the financial and investor communities for evaluating the impacts of policy and technology decisions in the power sector.
- Modelers input a set of projections and assumptions – such as demand, technology costs, environmental policies and fuel prices.
- IPM® is a "capacity expansion" model that will both add new capacity and retire existing capacity based on economics. Other types of models are more appropriate for examining short-term scenarios, but capacity expansion models like IPM are the tools of choice for representing long-term decision-making in the power sector.
- IPM® also incorporates a comprehensive database of existing power plants and transmission lines to create a detailed representation of the current U.S. power sector. And because the model can account for a range of complex policy constraints, IPM® has the ability to represent various pathways states might choose in order to meet the Clean Power Plan limits.
- This analysis of the final Clean Power Plan (CPP) is based on IPM® runs conducted by ICF International, and assumptions developed by M.J. Bradley & Associates (MJB&A) for a coalition of groups (NGOs and utilities).

Scenarios Evaluated: Integrated Planning Model (IPM®)

Reference Case Scenarios

Abbreviated Assumptions	Regulatory Approach	Level of Energy Efficiency
RCa [no EE]	No Clean Power Plan	No EE
RCb [CEE]	No Clean Power Plan	Current EE: RCb assumes additional energy efficiency savings beyond what is reflected in the AEO 2015 demand growth forecast. States are assumed to achieve their current (2013) annual savings rates between 2018 and 2030.

Mass-Based Scenarios

Abbreviated Assumptions	Regulatory Approach	Level of Energy Efficiency	Trading Zones
E+N, National, CEE	Mass-Based (Existing + New)	Current EE	**Nationwide trading** (except California)
E+N, National, EE1	Mass-Based (Existing + New)	Modest EE (1%)	**Nationwide trading** (except California)
E+N, National, EE2	Mass-Based (Existing + New)	Significant EE (2%)	**Nationwide trading** (except California)

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National Allowance Prices

- The allowance prices are relatively modest across the scenarios
- As the level of energy efficiency increases, the model forecasts a reduction in allowance prices

Allowance Prices **(2012$/ton)**

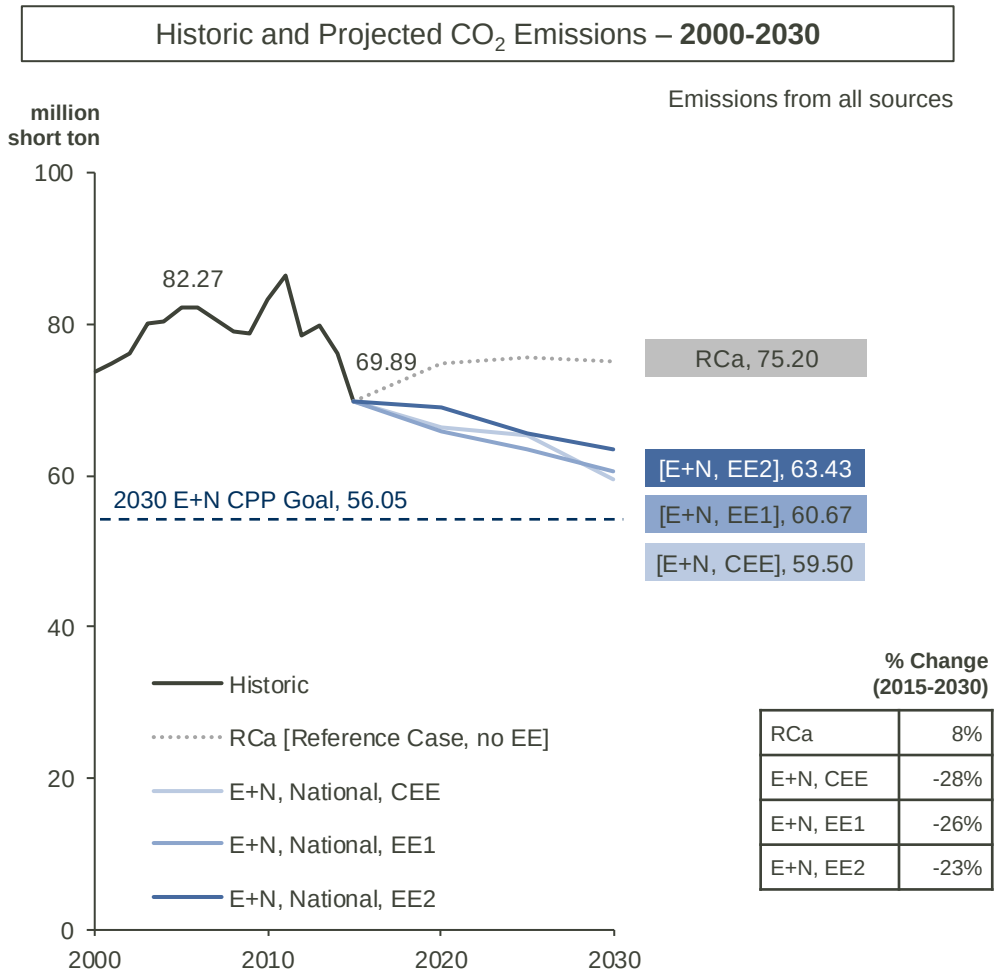
Assumptions	2025	2030
Existing + New, National, Current EE	$0.00	$6.05
Existing + New, National, 1% EE	$0.00	$2.97
Existing + New, National, 2% EE	$0.00	$0.00

Note: This analysis does not assume banking of allowances and the CPP goals are assumed to remain constant post-2030.

Missouri
Electric Sector CO_2 Emissions

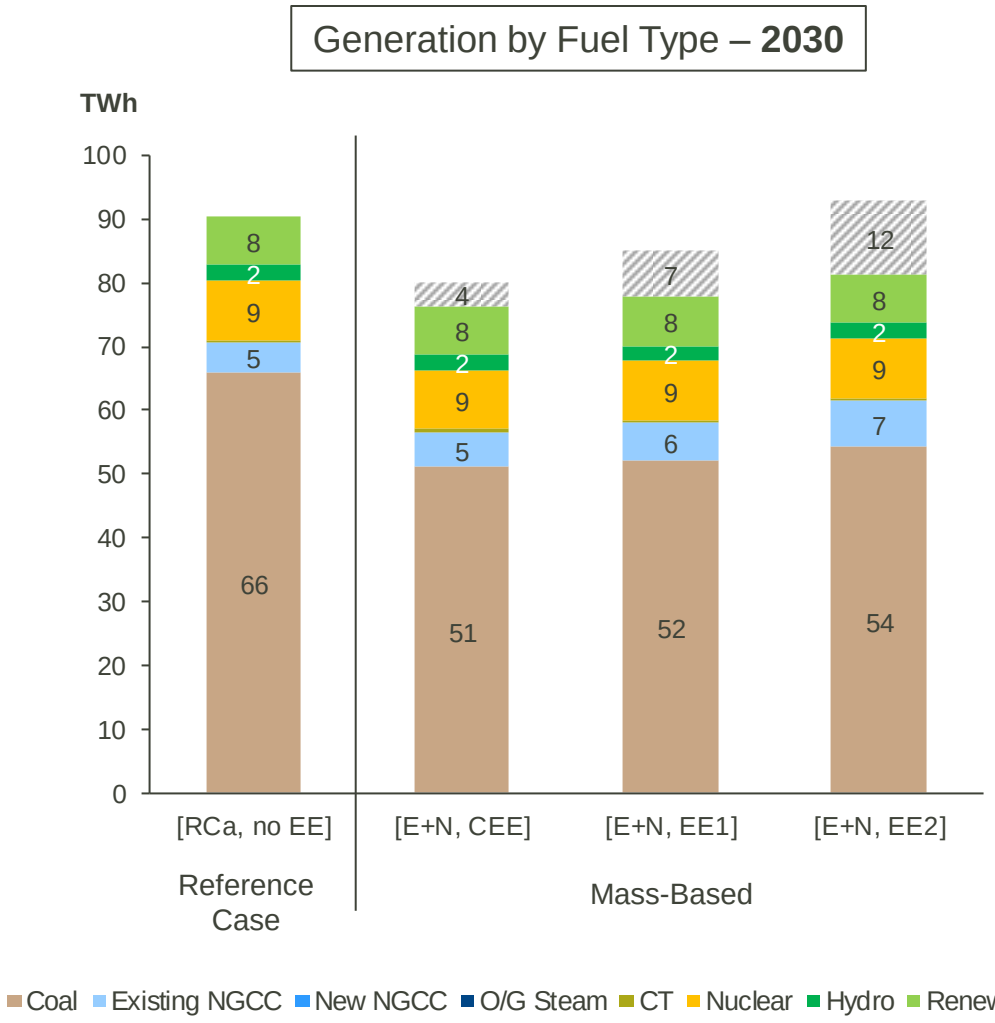
The modeling projects a gradual reduction in electric sector CO_2 emissions in Missouri.

Projected emissions reduced between 23% and 28% below 2015 levels by 2030 across the mass-based scenarios with nationwide trading.



% Change (2015-2030)	
RCa	8%
E+N, CEE	-28%
E+N, EE1	-26%
E+N, EE2	-23%

Missouri
Generation Fuel Mix

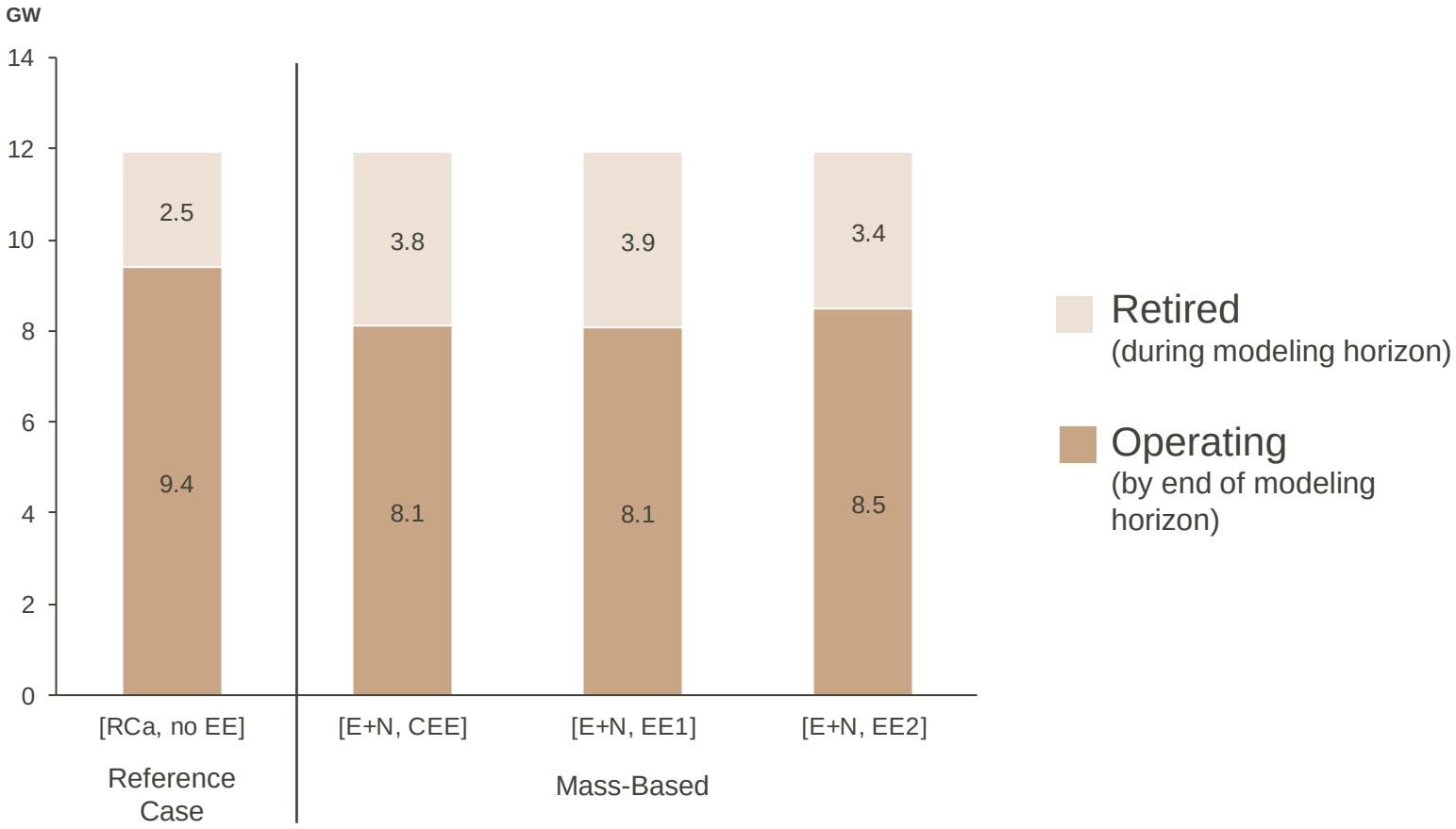


There is modest variation in the projected generation mix across the scenarios.

Relative to the reference case, coal generation declines an average of 20% by 2030.

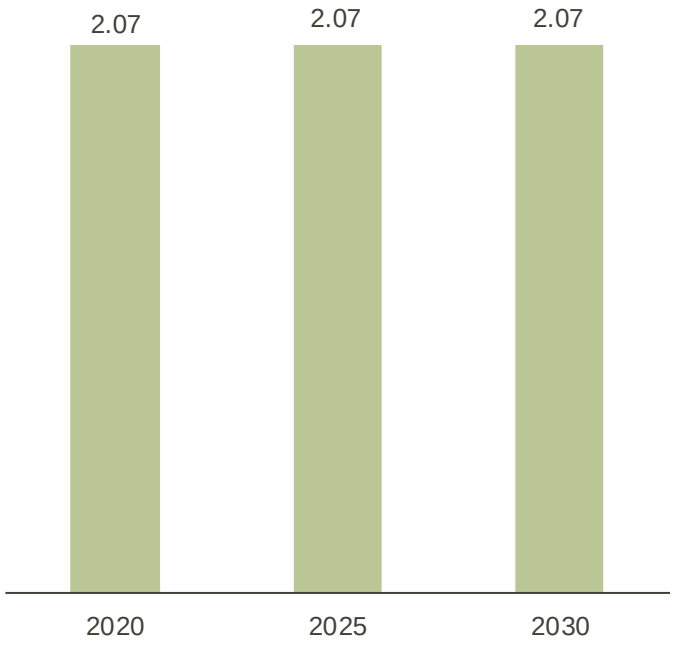
Wind energy generation is constant across the runs at 7.4 TWh (2 GW of capacity).

Missouri
Coal Capacity by 2030

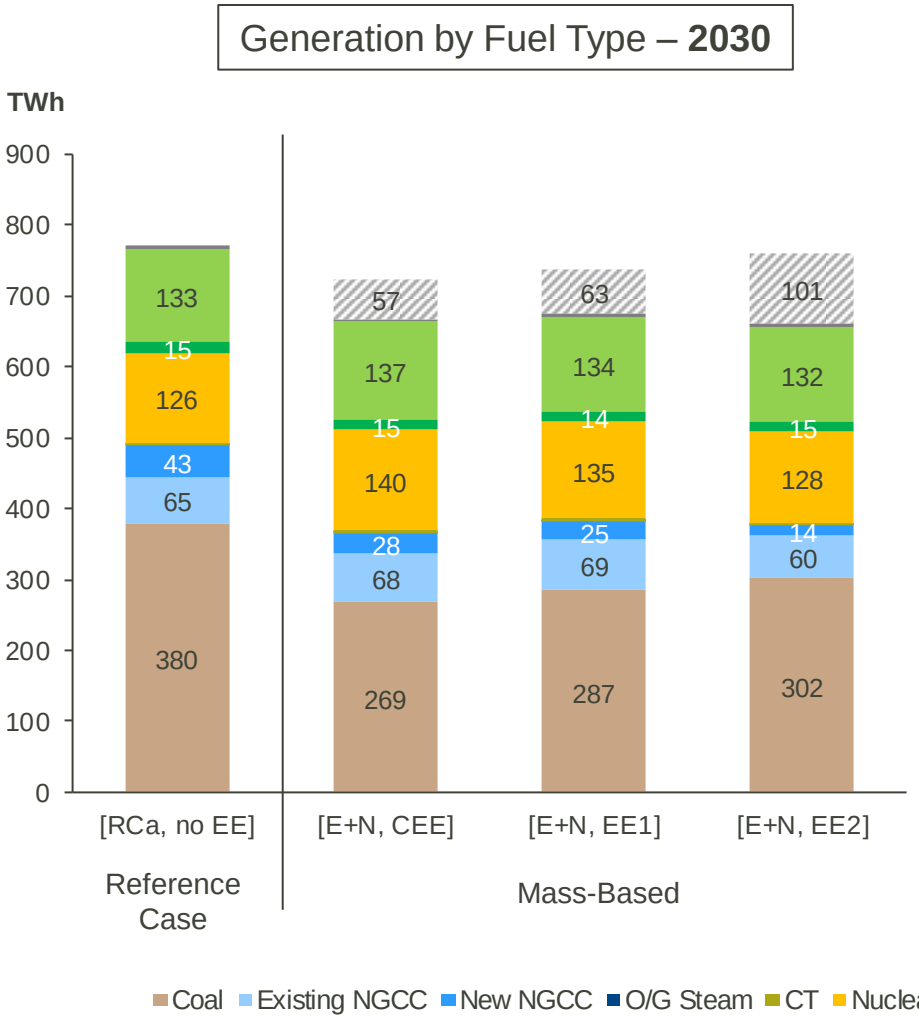


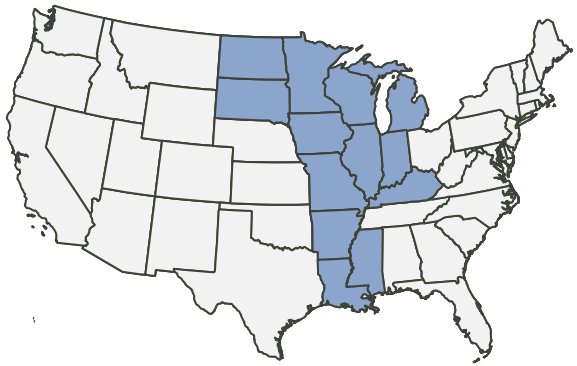
Missouri
Wind Capacity (GW) for All Cases 2020-2030

The Reference Cases and all mass-based policy cases project equivalent levels of wind capacity additions in Missouri.



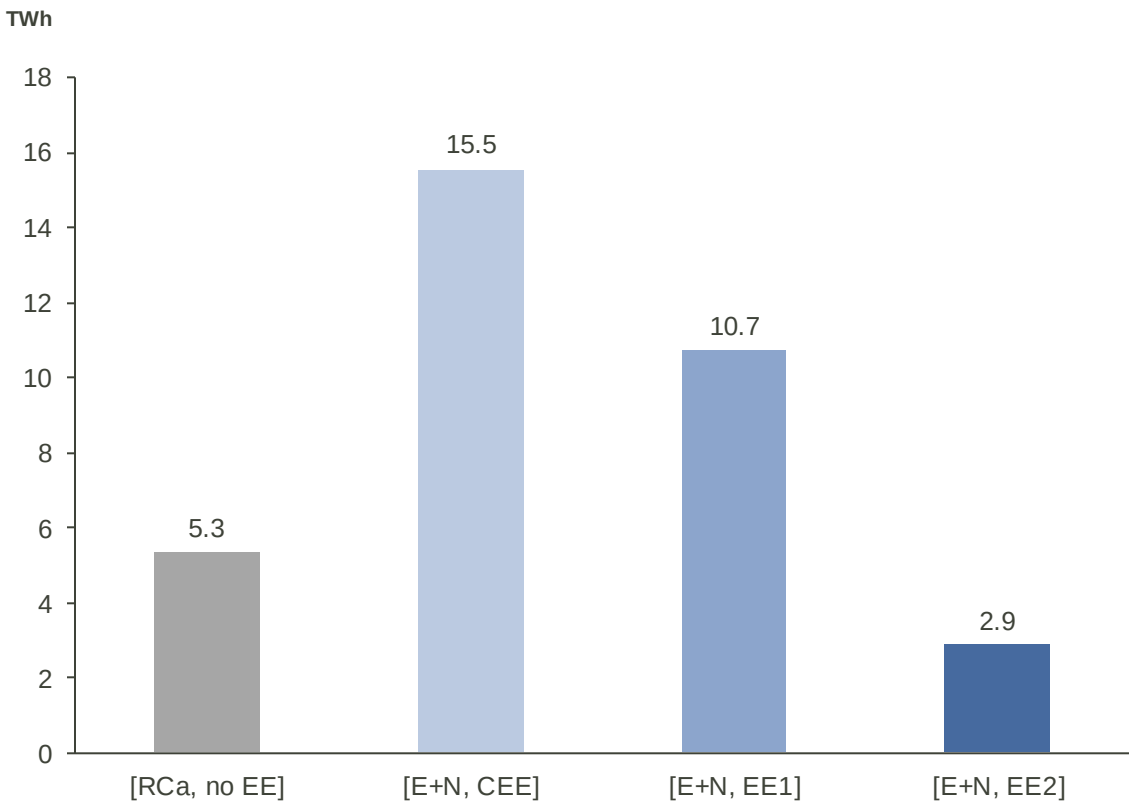
Central Region
Generation Fuel Mix





Missouri
Net Imports

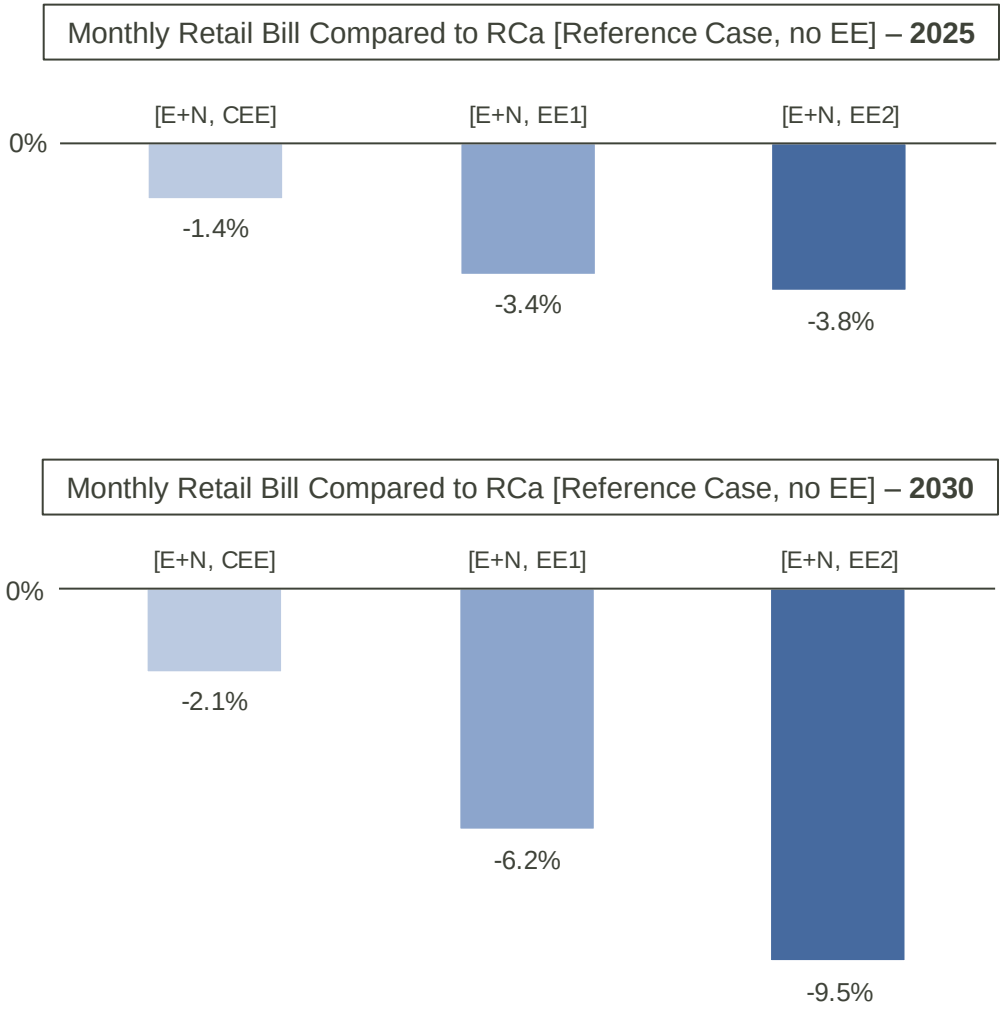
Net Imports by Scenario – **2030**



Missouri
Monthly Retail Bill ($/month)

Retail electricity bills are projected to be lower than the No Clean Power Plan Reference Case.

This is the result of a combination of lower fuel costs and lower average consumption from energy efficiency investments.



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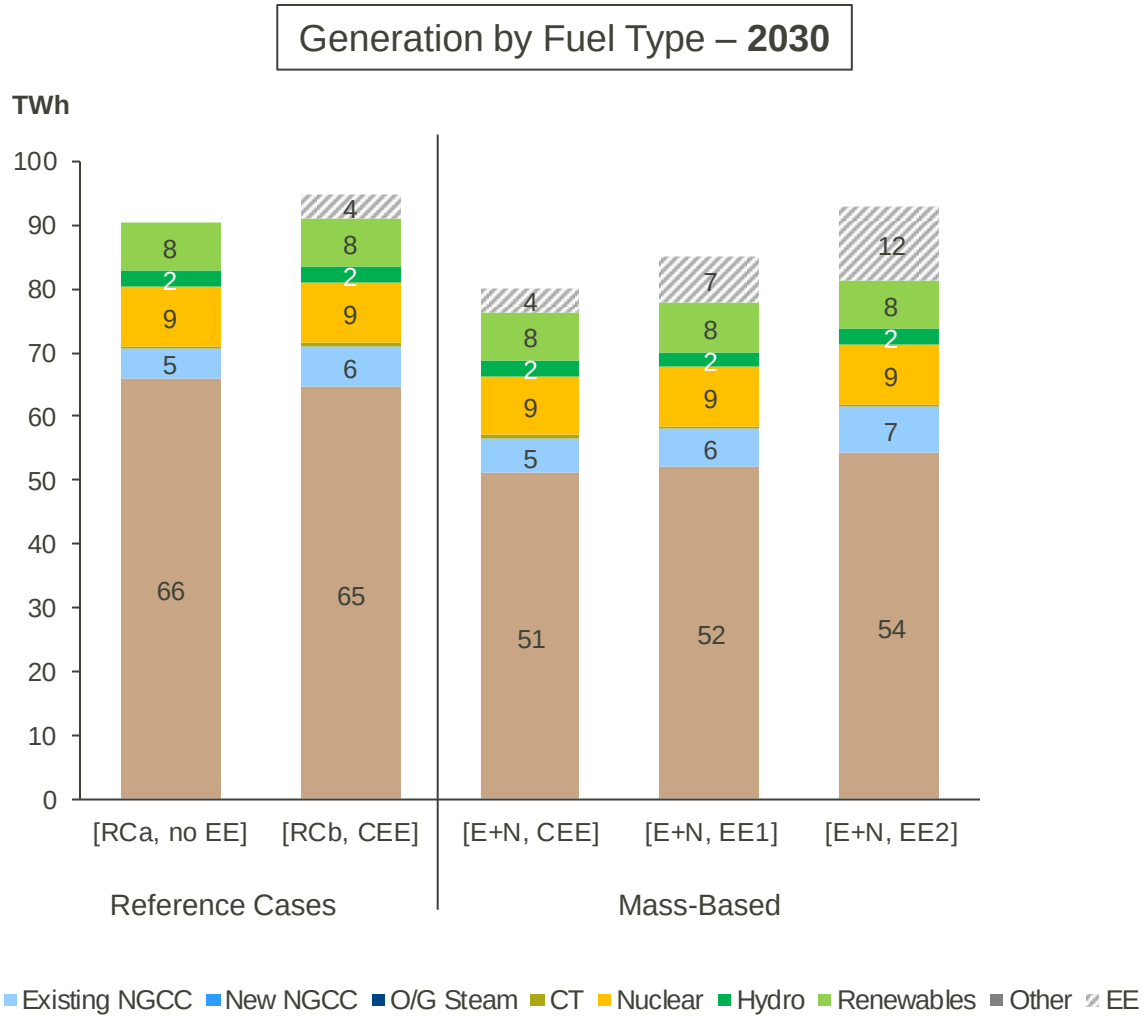
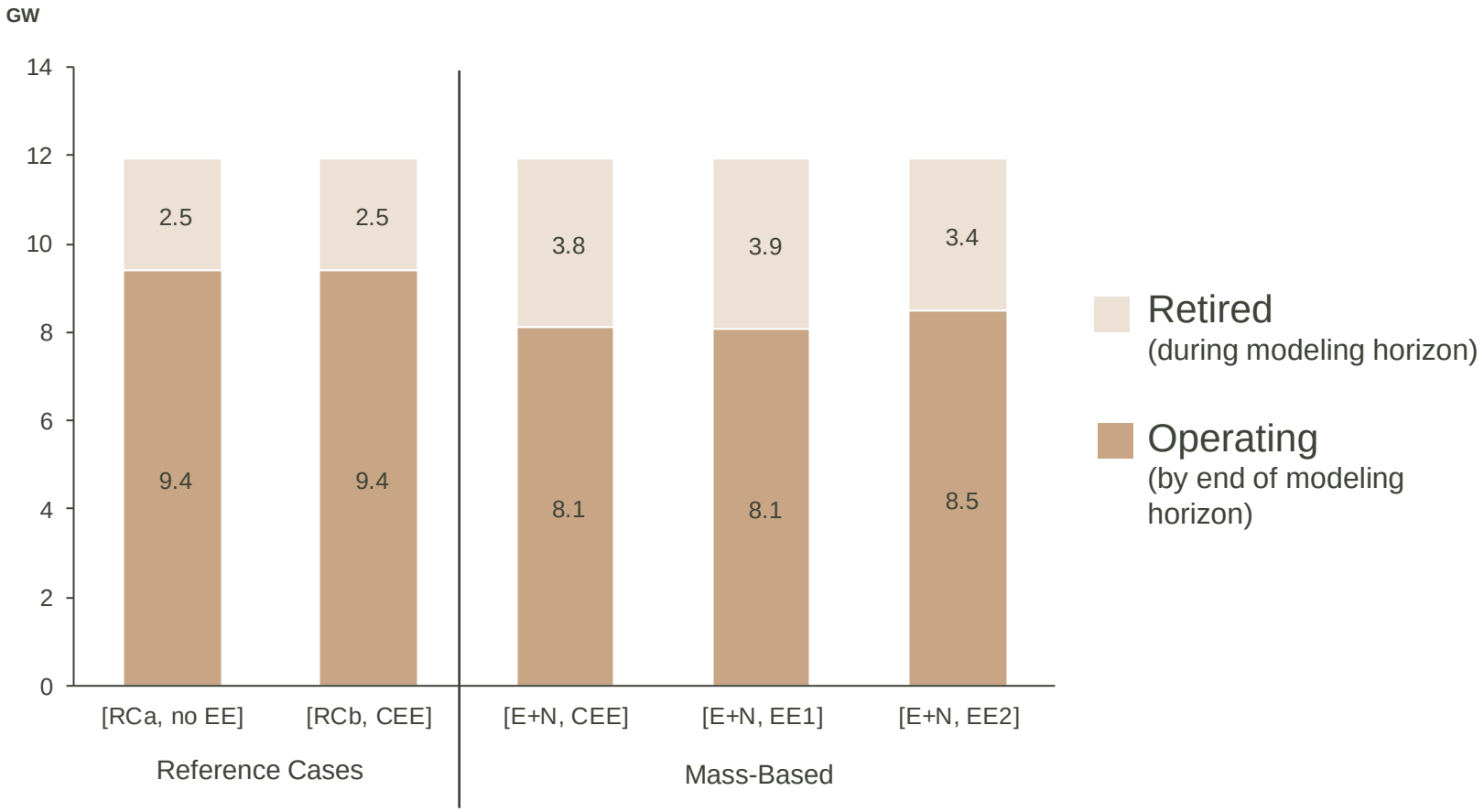
Missouri
Generation Fuel Mix



Missouri
Coal Capacity by 2030



Missouri
Monthly Retail Bill ($/month)