

# State Scenarios

## EPA's Clean Power Plan: Compliance Pathways

DECEMBER 7, 2015

**Important:** The findings presented in this report were generated by M.J. Bradley and Associates, LLC., using its proprietary Clean Power Plan Compliance Tool (CPP Tool) based on scenarios defined by Environmental Defense Fund (EDF). EDF further directed all policy specifications and assumptions used in this analysis.

## SUMMARY OF FINDINGS

## Findings (1 of 3)

- This analysis indicates that the carbon dioxide emission reduction targets laid out in the Clean Power Plan can be achieved by the movant states within the time periods covered by the Rule. For each of the movant states, the analysis takes into account planned investments in new generation and already announced retirements that power companies have been planning independently of the Clean Power Plan.
- This analysis uses several public sources of industry-provided information. It also considers existing policies in the movant states, such as renewable portfolio and energy efficiency resource standards, and assumes those policies continue to be implemented as currently planned.
- The resulting scenarios therefore represent “business-as-usual” or “planned” investments by industry combined with implementation of existing policies in the movant states, deployed in a manner that maximizes emission reductions.
- The analysis finds that the majority of the movant states can fully comply with the Clean Power Plan emission targets in the initial years of the compliance period — and in many cases, all the way through 2030 — by relying exclusively on existing generation, investments already planned within each state and implementation of respective existing state policies.

## Findings (2 of 3)

- The analysis concludes that existing and planned investments could bring as many as 21 of the 27 states into compliance through the first three-year compliance period (2022-2024), and as many as 18 of the 27 states into compliance all the way through 2030.
- When limiting the analysis to only those projects that are in the most advanced stages of development (i.e., plants that are already operating, under construction, undergoing site preparation or testing, and those that have been permitted), the analysis finds that 16 of the 27 states could still come into compliance through the first three-year compliance period based on these investments and existing state policies alone.
- The analysis further finds that all of the states could come into compliance in the first three-year compliance period by pursuing energy efficiency projects and new generation at a rate comparable to the average of their neighboring states beginning in 2019.



## Findings (3 of 3)

- The previous results represent a world in which affected entities in the movant states do not take advantage of emission reduction opportunities outside their own state boundaries. In practice, the Clean Power Plan's flexible approach provides several options to leverage out-of-state emission reduction opportunities: through interstate emissions trading, or by establishing power purchase agreements for carbon free electricity in nearby states. The results presented above do not reflect these opportunities.
- The analysis does include a separate scenario that shows that if the 27 movant states were to allow regulated power plants to access emission reduction opportunities within any of the movant states – for example, through trading of allowances or credits – then all 27 movant states could come into compliance with the Clean Power Plan targets all the way through 2030 by leveraging existing generation, investments already planned within each state and implementation of respective existing state policies.
- However, even this scenario does not account for the additional flexibility to leverage opportunities in non-movant states, for example, by emissions trading.
- This analysis depicts the emissions reductions that would occur if generating resources were deployed in a manner that maximizes their emissions benefits. It is not meant to represent how generation resources would be run in the absence of the Clean Power Plan: the signals provided by the Rule could encourage this new generation to be deployed in a way that achieves the most beneficial emissions outcomes.

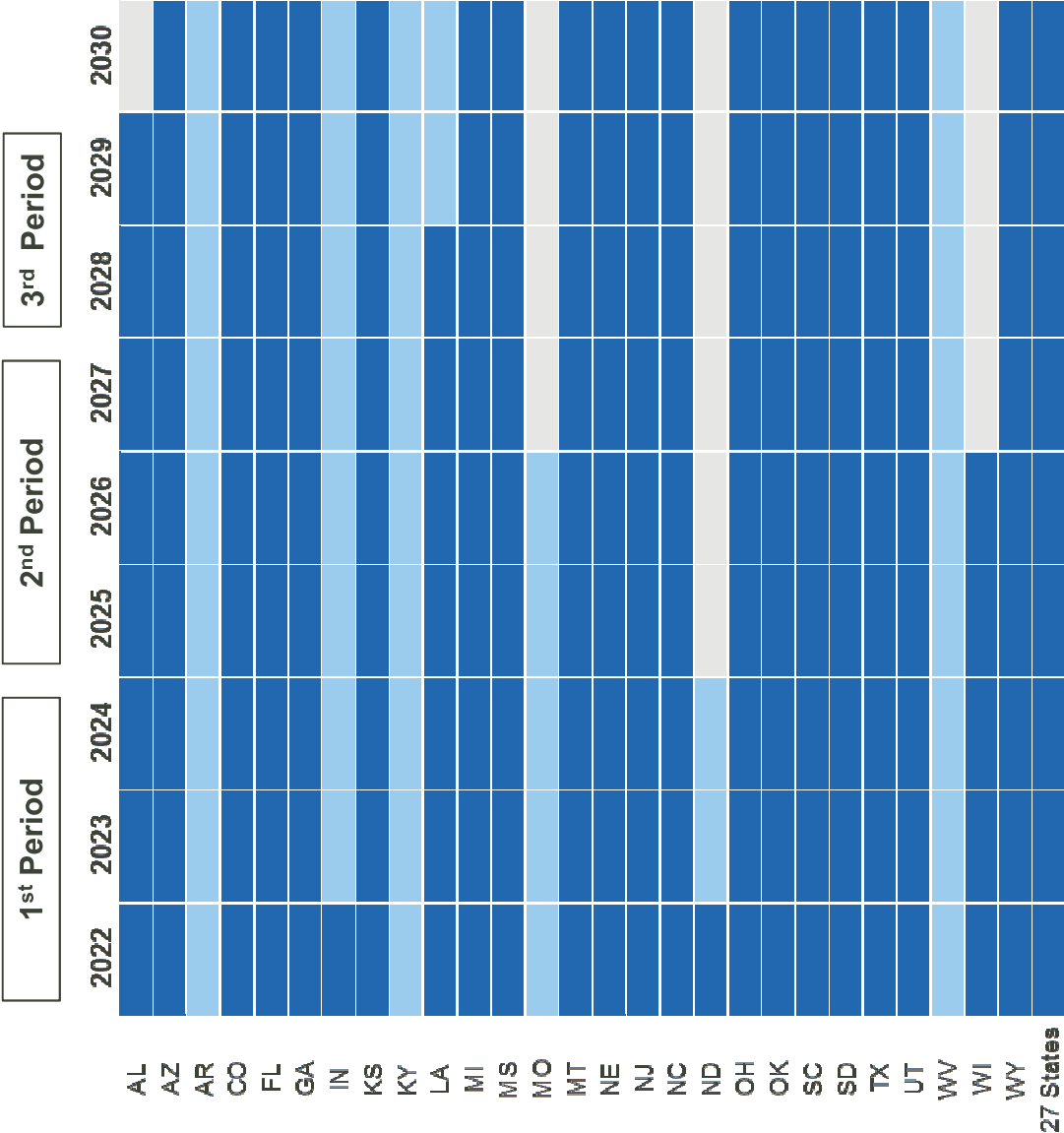
# State Compliance with the Clean Power Plan (2022-2030)

As shown here, existing and planned investments could allow the vast majority of the 27 movant states to come into compliance with the Clean Power in the initial years of the compliance period (21 states) — and in many cases, all the way through 2030 (18 states).

When the 27 movant states are allowed to access emission reductions within any of the movant states, all 27 are able to comply through 2030.

## Indicates Compliance Under:

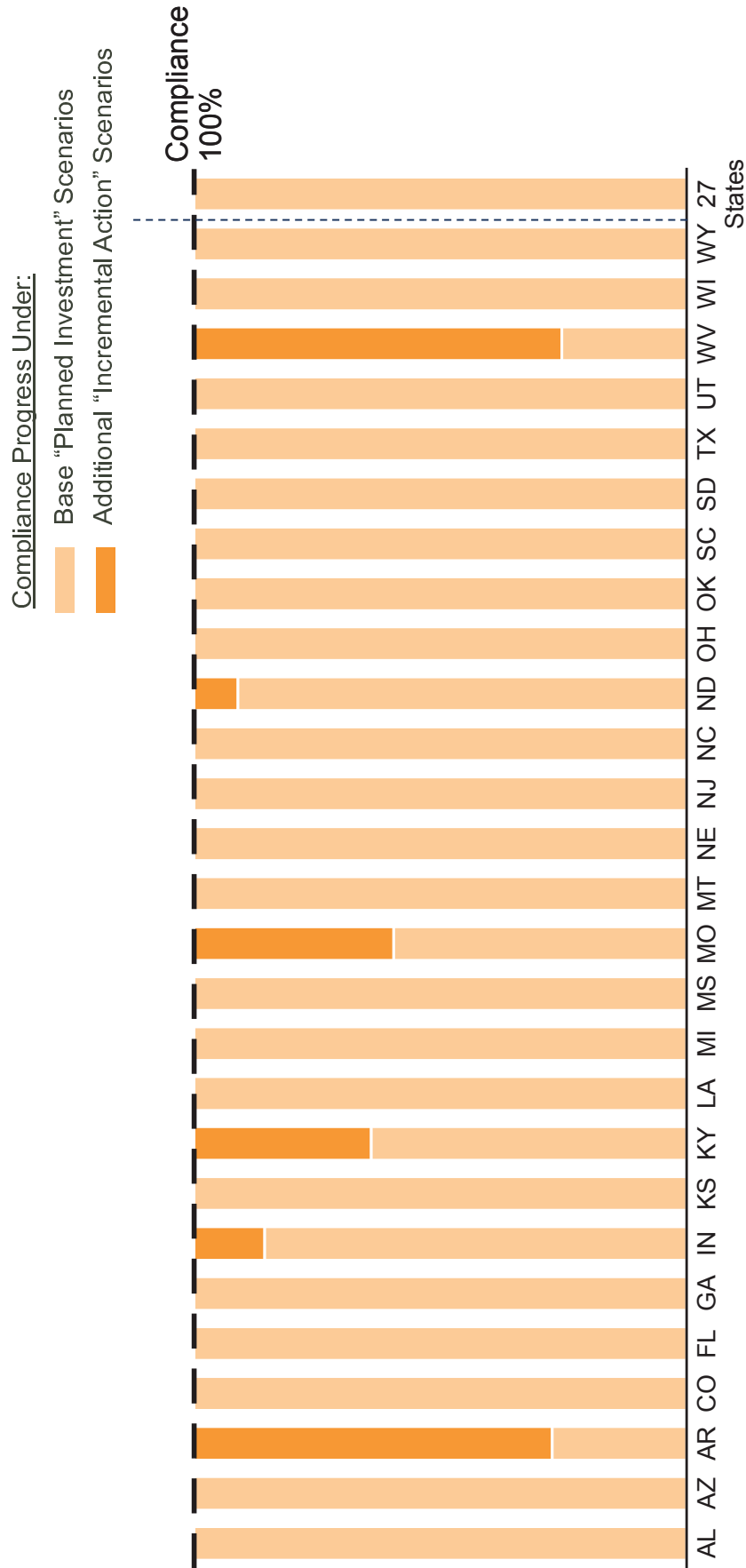
- Base “Planned Investment” Scenarios
- Additional “Incremental Action” Scenarios



\* These results show the furthest level of compliance for each state considering all scenarios and compliance options included in this analysis.

# State Progress in the First Compliance Period (2022-2024)

States that do not meet their emission reduction targets under the planned investment scenarios could close the gap and come into compliance by deploying new investments at a rate comparable to their average neighbor.



\* These results show the furthest level of compliance for each state considering all scenarios and compliance options included in this analysis.

## OVERVIEW OF STUDY

# Overview

- This analysis explores how compliance with the Clean Power Plan would be impacted by: 1) deploying planned new builds such that emission reductions are maximized; 2) meeting renewable and efficiency requirements already required by state law or regulation, and similarly assuming that those clean resources are deployed to displace high-emitting generation; and 3) factoring in announced retirements.
- The analysis examines three discrete planned investment scenarios that each rely on different industry-produced information on new builds already in the development pipeline. The first scenario relies on information from integrated resource plans found within the respective state. The other two scenarios explore options for deploying “advanced development” and “early development” projects by relying on data included in the Velocity Suite, a top-tier industry database of announced new generation. Both sources, integrated resource plans and the Velocity Suite, are described in greater detail in the pages that follow.

## Overview (continued)

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- For each state, compliance status was evaluated with respect to the interim compliance periods of 2022-2024, 2025-2027, 2028-2029, as well as the final target in 2030, following the timelines established in the final rule. Where states were found to over-comply in the early years of the program, surplus allowances or credits were banked for use in later years, as the final rule allows.
- The analysis assumed that each of the movant states would rely exclusively on activities required by the respective state policies and through investments already planned and documented within each state.

## Overview (continued)

- The analysis separately considered a “combined” scenario that explores the potential for regulated entities in each of the movant states to access emission reduction opportunities in other movant states.
- Under the Clean Power Plan, this could occur via the interstate trading of credits or allowances, or by the establishment of power purchase agreements for carbon free electricity in nearby states. EPA has facilitated such opportunities by finalizing a trading-ready framework within the Rule that allows states to take advantage of these opportunities with other states that have similar program designs, without having to submit multi-state plans.
- The “combined” scenario does not account for the additional flexibility states have to leverage opportunities with states outside the group of movant states.
- For all scenarios examined, the analysis assumes that any reductions in generation that result from announced retirements are first met by energy efficiency and zero-emitting generation, then by existing natural gas generation, and then by new natural gas resources coming online. In the case of some states, output from new natural gas resources reduces higher emitting generation further. The analysis is designed to minimize shifts in each state’s balance of electricity imports and exports to the extent possible.

## SCENARIOS CONSIDERED



## Base “Planned Investment” Scenarios

The analysis examines the following three discrete planned investment scenarios that each rely on different industry-produced information on new builds already in the development pipeline.

- 1. Deployment of all New Resources in Advanced Development** – This scenario considers electric generation projects that are far along in their development, and is limited to those that were recently built and now operating, as well as plants that are under construction, undergoing site preparation or testing, and those that have been permitted.
- 2. Deployment of New Resources Based on Integrated Resource Plans** – This scenario draws from available Integrated Resource Plans (IRP) submitted by vertically integrated utilities in the movant states.
- 3. Deployment of all New Resources in Early Development** – This scenario considers electric generation projects that are in advanced development as well as additional projects that have either been publicly proposed by a power company or have permit applications pending with regulatory agencies. While this data set is more expansive than the other two scenarios considered, it still contains 20 percent fewer new builds than have been observed over the most recent equivalent time horizon years.

## Scenario Based on IRP Submissions

- This scenario draws from integrated resource plans submitted by vertically integrated utilities in the movant states. Integrated resource plans are routinely developed by utilities, usually at the direction of state public utility commissions, to evaluate options for meeting forecasted energy demand over a specified time period and for ensuring that reliability, air quality, and other policy requirements are met while considering affordability and cost effectiveness. These plans typically cover a planning horizon of 10 to 20 years, and are often updated every two to three years.
- More than 40 state utility commissions require integrated resource plans or similar analyses and use them to develop long range plans for the electric system. The development of these plans frequently involves a public stakeholder engagement process as well as the oversight and approval of the state public utility commission.
- Because of their long-term nature, integrated resource plans do not represent an unalterable projection of what will happen in the future. However, integrated resource plans generally represent the result of a serious, rigorous exercise by the utilities and the state public utility commission to determine what resources would be reasonable to build – and retire – over the planning period. While important factors affecting the electricity system may change such that plans are adjusted over time, deviation from an existing integrated resource plan often requires justification by the utilities. For this reason, examining the resource expansion and retirements considered as part of these plans can provide insight into future investments in the system.

## Scenario Based on IRP Submissions (continued)

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- This scenario relies solely on integrated resource plans from large vertically integrated utilities. Investment plans by entities that are not subject to integrated resource planning requirements, such as independent power producers, municipal power companies and electric cooperatives, are frequently not captured in integrated resource plans and thus would not be captured by this approach.
- Integrated resource plan information was included in the analysis only where a recent integrated resource plan existed and where there was sufficient data for use in the tool.
- Thus, this scenario was not applied for New Jersey or Texas, where their deregulated electricity markets do not require submission of integrated resource plans, or to Kansas, Mississippi, or West Virginia as we were not able to identify any integrated resource plans for review during their screen.

## Advanced and Early Development Scenarios Based on the Velocity Suite

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- For the “Advanced Development” and “Early Development” scenarios, the analysis relied on new power generating project information contained in the Velocity Suite database, which is maintained by ABB Energy Market Intelligence.
- The Velocity Suite is a top-tier industry data set available to anyone who subscribes to ABB Energy Market Intelligence. According to ABB, most major participants in the U.S. electric power sector, including 19 of the top 20 power generators and all seven Regional Transmission Organizations and Independent System Operators, use their information service as inputs into decision making. The New Entrants database is updated on a daily basis, leveraging FERC filings, National and State Regulatory websites, State and County Planning and Zoning Departments, among other sources.
- The Velocity Suite provides information on actions underway in all states including those with restructured electric markets where power companies are not vertically integrated and there is no IRP information to apply within the tool (such as Texas and New Jersey). In addition, the Velocity Suite contains information on projects undertaken by entities such as independent power producers, municipal power companies and electric cooperatives that may not be required to file IRPs.

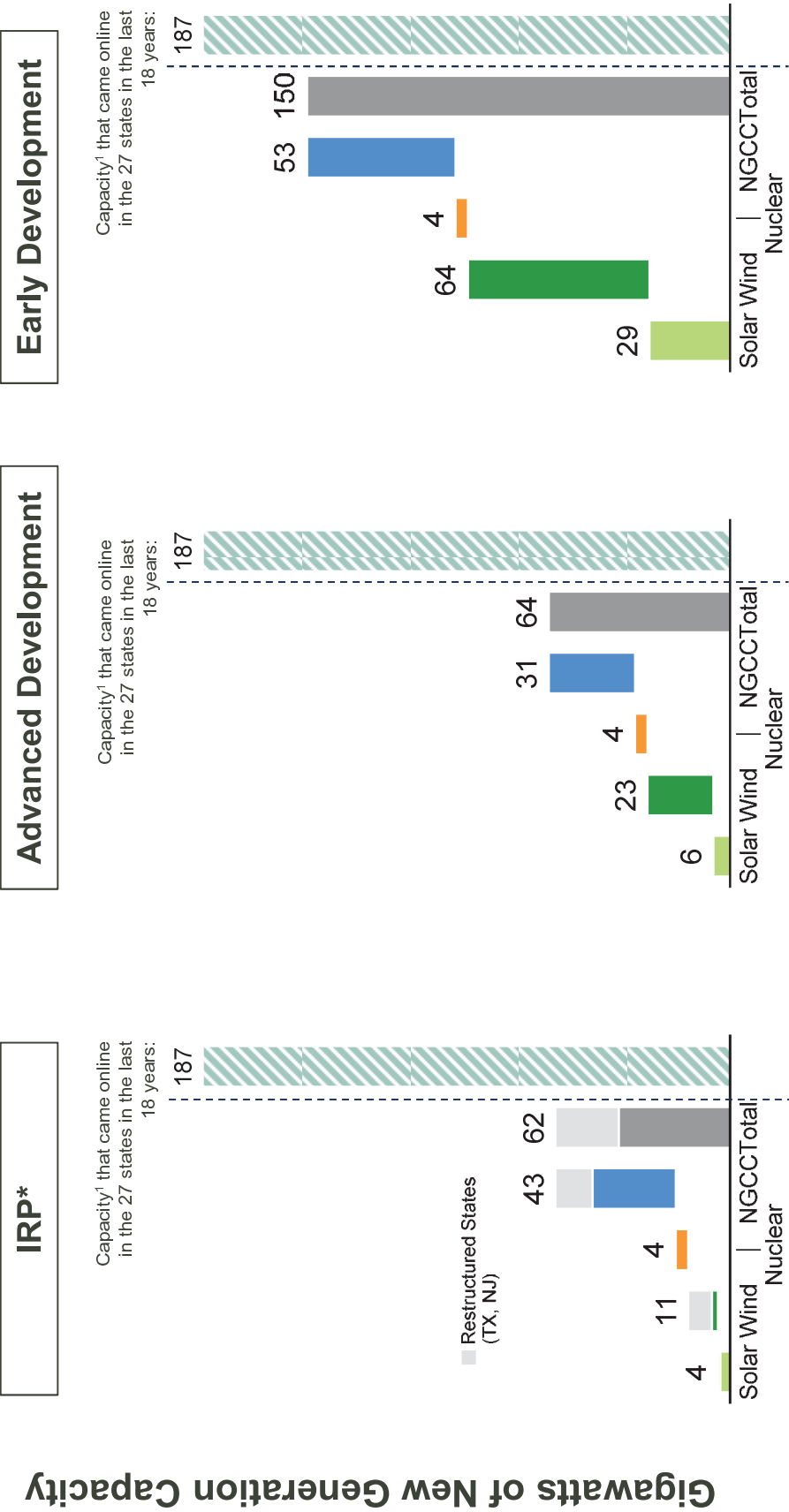
# Advanced and Early Development Scenarios Based on the Velocity Suite (continued)

Advanced Development	Operating	Generator is available to operate
	Testing	Generator is operating under test conditions, but not yet in commercial service
	Under Construction	Planned generator is under construction
	Site Prep	The power plant site is being prepared for construction
	Permitted	The approval of one or more mandated federal, state, and/or regional regulatory permits for the given power generating facility or unit
Early Development	Includes all projects in “Advanced Development” plus:	
	Application Pending	Regulatory approval pending for one or more applications filed for permits
	Proposed	New generator planned for installation

# New Builds From 2013 through 2030

(27 state total)

The following figure shows new generation relative to the 2012 base year, as defined under the Clean Power Plan. Note that even in the early development scenario, which considers all projects in early development, that new builds over the period considered are still roughly 20 percent lower than the amount of new build capacity over the most recent historical period of comparable length.



\* The light gray bars in the IRP scenario represent new generation in advanced development in the restructured states that do not have IRPs (i.e. TX and NJ). This was included for illustrative purposes only on this slide in order to enable a more direct comparison across scenarios, but was not included in the IRP scenario analysis.

<sup>1</sup>Includes solar, wind, nuclear, and NGCC

## Additional “Incremental Action” Scenario

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This scenario examines what would happen if a state took incremental action equivalent to their average neighbor. Specifically, it assumed:

1. The state constructed new generation based on their neighbors’ average historical new construction of wind, solar, and natural gas combined cycle units over the period 2010 to 2015. States with significantly high levels of historic new build development were excluded from the calculation of the averages. For example, Texas was not considered in the calculation of average new build rate of neighbors for application
2. The state pursued energy efficiency opportunities at a level equivalent to the average of their neighbors, taking into account the states’ energy efficiency standards, and historical investments in states that do not have energy efficiency standards.

We assumed that no additional investments occurred until after the deadline for submitting state plans under the Clean Power Plan. Thus, incremental action did not commence until 2019.

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# ANALYTIC FRAMEWORK



# Overview of M.J. Bradley Clean Power Plan Compliance Tool

- The M.J. Bradley & Associates (“M.J. Bradley”) Compliance Tool (the “tool”) is designed to allow users to analyze state and multi-state region progress towards compliance with the Clean Power Plan under a range of electricity demand and generation scenarios.
- The tool incorporates policy options outlined in the final rule, and provides the ability to alter all major drivers of state electric sector emissions and estimate the impact on the state’s Clean Power Plan compliance status. Using the tool, policymakers can evaluate how planned actions, rules, and laws already on the books would affect a state’s compliance status. Users have the ability to examine the impact of new generation resources as well as the way in which resources are deployed or run. The tool can, among other things, show how those changes impact emissions and emission rates of the electricity system in comparison to the Clean Power Plan targets.
- Thus, the tool has the ability to show the impact on compliance of –
  - Complying with existing energy efficiency resource standard and renewable portfolio standard programs
  - Putting new generating resources into service
  - Retiring fossil resources
  - Modifying electricity demand growth rates
- The tool is highly flexible and includes detailed data for the power sector, with unit level control of all fossil and nuclear generating units. It is also extremely transparent, in that any member of the public can access the tool and utilize the documentation that M.J. Bradley has provided to build compliance scenarios.

## Who is Using the M.J. Bradley Clean Power Plan Compliance Tool?

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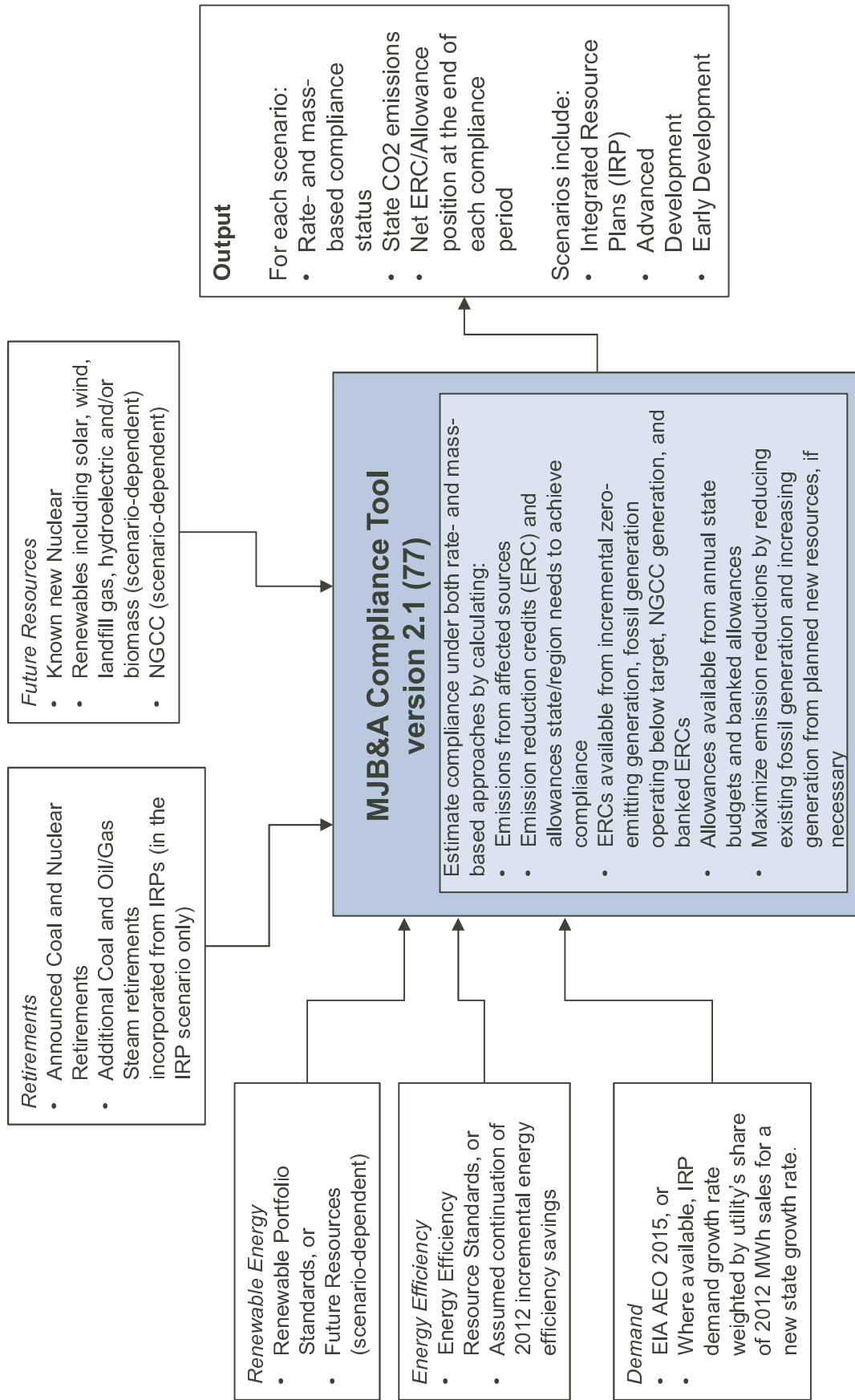
- As of November 2015, **over 500 unique users** had registered for access to the Clean Power Plan Compliance Tool
- Users include policymakers from a majority of U.S. states and multiple federal agencies, utilities, independent power producers, grid operators, electric industry stakeholders and non-governmental organizations
- Utilities, their industry associations, and state/federal regulatory agencies together make up the majority of all users of the Compliance Tool
- M.J. Bradley Clean Power Plan Tools have been in development since 2014; several updates and improvements have occurred since EPA released the final Clean Power Plan Rule in August 2015
- The tool is publicly available and can be downloaded from the website at: <http://www.mjbradley.com/about-us/case-studies/clean-power-plan-evaluation-tools>

## Why is the M.J. Bradley Clean Power Plan Compliance Tool well-suited for this analysis?

- The tool was chosen for this particular analysis because it is flexible and can rapidly evaluate multiple scenarios. This analysis is not intended to project what the future of the electricity grid would look like in the absence of the Clean Power Plan, nor is it intended to illustrate the most likely or cost-effective compliance outcomes under the Rule. However, it is appropriate for evaluating options that movant states could use to meet the standards through the combination of state policies and investments taken within their own borders, assuming that generating assets are operated in such a way as to maximize the potential for emission reductions.
- The tool should not be confused with an economic model that dispatches generation based on assumptions about relative generation costs, such as the Integrated Planning Model (IPM) used by EPA, power companies, state regulators, and others. IPM captures the economically driven electricity sector dispatch of resources, based on least-cost optimization for the system. The tool used here instead relies on user inputs – in this case industry assessments of likely new builds and assumptions about how those units will run. In these ways, IPM is a fundamentally different type of analytic platform from the tool used here, and their results, while complementary, should not be considered comparable. Each provides a distinct approach to understanding compliance options within the context of the Clean Power Plan.
- In addition, the M.J. Bradley tool does not directly account for transmission needs. However, this analysis minimizes such demands by constraining any additional generation to existing plants, planned or proposed new builds, and new renewables required by law which accordingly will have transmission associated with them.

## **METHODS & ASSUMPTIONS**

# Scenario Modeling Framework



# Inputs to the M.J. Bradley Compliance Tool

## Electricity Demand

- Electricity demand projections were based on the Energy Information Administration's Annual Energy Outlook 2015 (which was also used in EPA's analysis of the Clean Power Plan). When the data was available, these were supplemented by demand projections in utility Integrated Resource Plans (IRP) for consistency with the new build assumptions. Utility-specific projections in IRPs were converted into state-level projections after weighting them to account for each utility's share of 2012 total in-state sales.

## Energy Efficiency

- Where state energy efficiency resource standards existed, sufficient energy efficiency was deployed to meet the respective goals.
- Many utilities invest in consumer-side efficiency improvements even when they are not required to do so by law. They do this for a variety of reasons, including encouragement from their state commission as well as customer demand. Therefore, when states did not have energy efficiency resource standards, the analysis assumed that current levels of investment continue into the future. While the total savings from these voluntary investments is well below those investments made under mandatory programs, the analysis assumed that these investments remain fixed.
- When evaluating state compliance on a rate-basis, all eligible energy efficiency investments were fully credited in the form of Emission Reduction Credits (ERCs).

# Inputs to the M.J. Bradley Compliance Tool (continued)

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## Renewable Energy

- The scenarios examined new renewable generation projected as a result of state renewable standards, as well as new builds indicated in the respective scenario data. In order to prevent double counting, the higher build rate was used, and not both. For analytic purposes new builds were assumed to be used to help the state comply with its carbon pollution targets under the Clean Power Plan.

## Future Resources

- In order to avoid double counting, the Compliance Tool's built-in database of known new resources was eliminated and replaced with new builds indicated in the respective scenario's data sources. Known future nuclear for Georgia and South Carolina were included in all scenarios. Maximum generation from new resources was defined based on standard capacity factors built into the Compliance Tool.



# Inputs to the M.J. Bradley Compliance Tool (continued)

## Resource Retirements and Energy Balance

- All announced coal retirements tracked by M.J. Bradley & Associates were included. This list of retirements can be viewed in the downloadable tool.
- The IRP scenario also included any additional coal and oil/gas steam retirements (and/or natural gas repowers) indicated in IRPs.
- Known nuclear retirements for New Jersey and Wisconsin were included in all scenarios.
- Electric output lost to retired generation was first replaced with a mix of energy efficiency and zero-emitting generation, up to the amount specified by the inputs described previously. If the amount of this incremental generation exceeded the resource gap left by retiring fossil units, then it served to replace coal-fired generation. If instead, a resource gap remained, generation lost due to retirements was replaced by increasing natural gas-fired generation at existing units. The relevant resource gap was defined in a manner that attempts to hold the state's balance of imports and exports relatively constant from 2012 through 2030, such that into the future this balance is kept as closely in line as possible with recent historic trends.



# Inputs to the M.J. Bradley Compliance Tool (continued)

## New Natural Gas Combined-Cycle Units

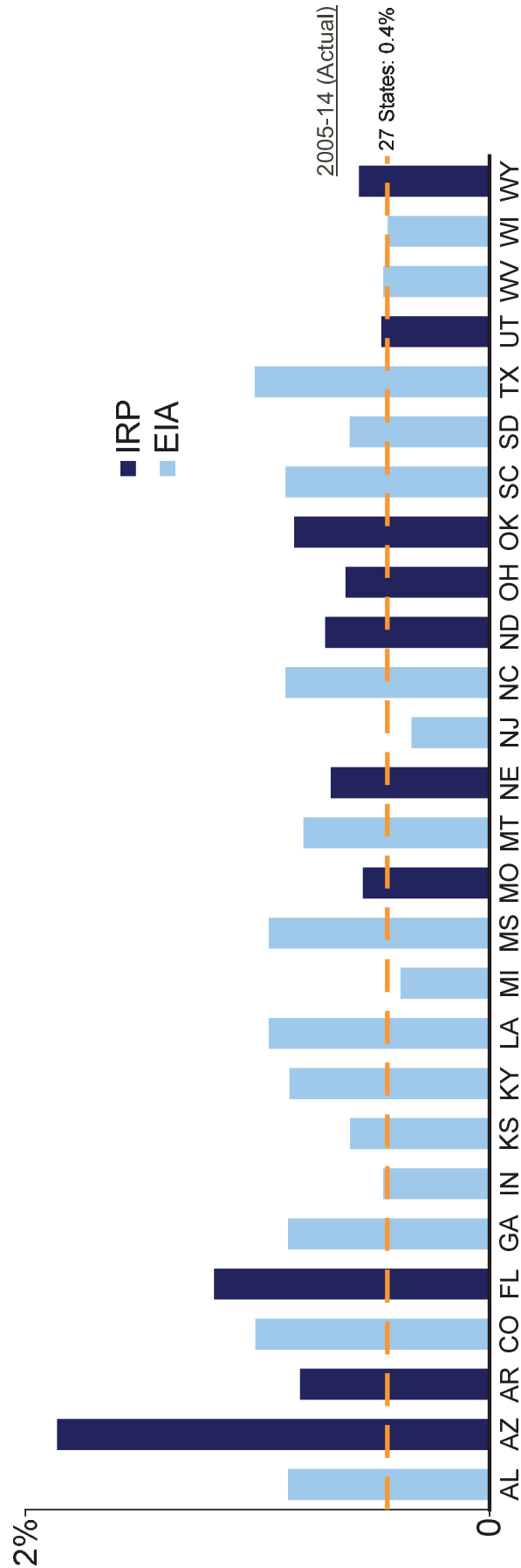
- For purposes of this analysis new natural gas-fired generation was limited to only those plants listed in the IRP or Velocity database, as appropriate for the particular scenario.
- Generation output from those new units was determined by first satisfying any lingering resource gap.
- Generation was further increased as necessary to help the state reduce emissions of carbon pollution in line with the requirements of the Clean Power Plan up to a maximum capacity factor of 75 percent. The analysis assumed that this generation would be used to offset the highest emitting generation in the state.

# Outputs

- Compliance status was evaluated under three of the compliance options specified by EPA in the final rule:
  - a “dual rate” option in which steam electric generating units and natural gas combined cycle plants are each subject to the respective national performance rates set forth in the Clean Power Plan;
  - a “blended rate” option in which all regulated power plants are subject to a single rate-based standard; and
  - mass-based compliance for affected existing generating units plus new emitting sources.
- For each state, compliance status was evaluated with respect to the interim compliance periods of 2022-2024, 2025-2027, 2028-2029, as well as the final target in 2030, following the timelines established in the final rule. For conservatism, the analysis did not take into account the flexibility the Clean Power Plan provides for states to shift emission reductions to later in the compliance period
- Where states were found to over-comply in the early years of the program, surplus allowances or credits were banked for use in later years, as the final rule allows.
- For the “combined” 27-movant state scenario, states were allowed to leverage the flexibility allowed to compliance entities by accessing opportunities across state boundaries – for example, through trading of allowances or credits.

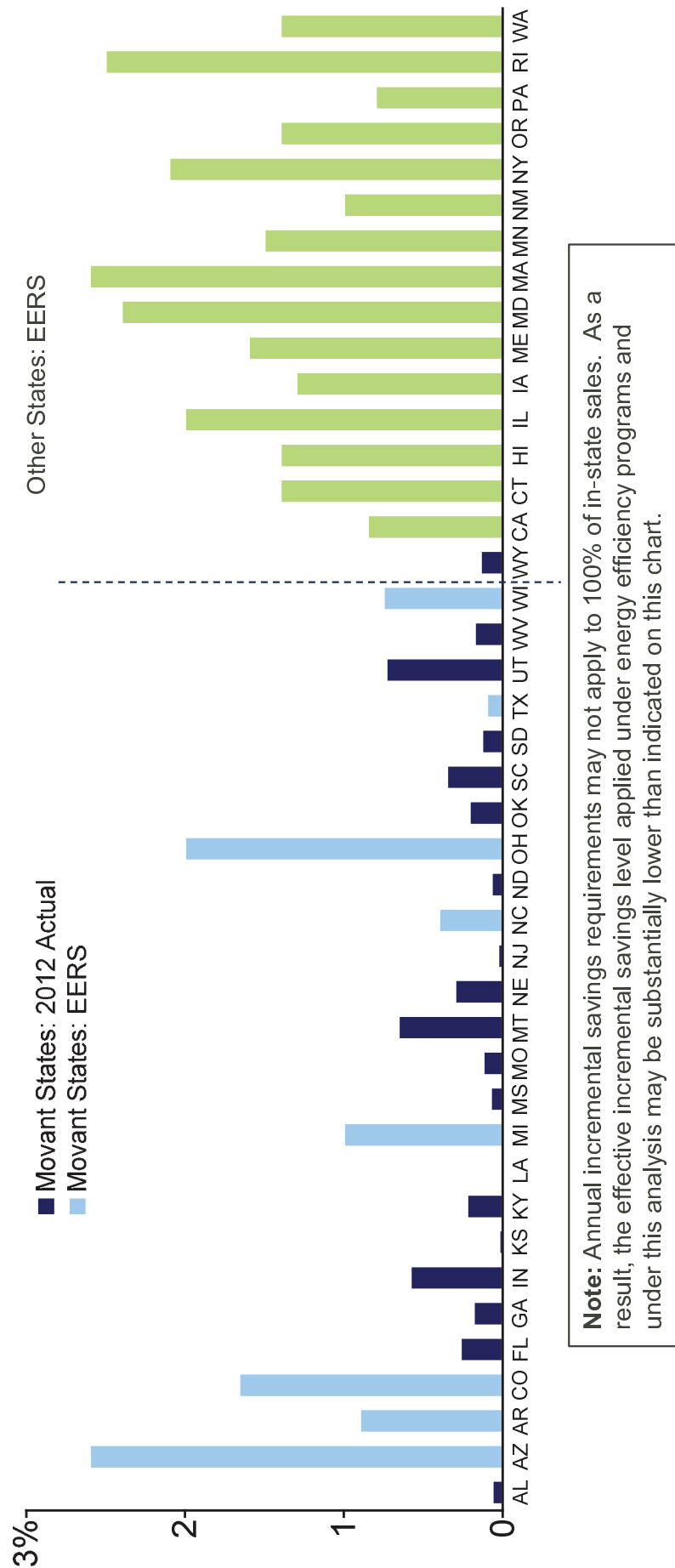
# Average Annual Electricity Demand Growth (% of sales)

Electricity demand growth rates were used either from the Energy Information Administration's Annual Energy Outlook 2015 projections (also used in EPA's analysis of the Clean Power Plan) or Integrated Resource Plans (IRP), where available. Under the scenarios considered, most of the movant states are assumed to have higher demand growth projected for future years than past recent years.



# Average Annual Electricity Efficiency Savings (incremental; % of sales)

This figure depicts assumed future energy efficiency investments. The analysis assumed that states with energy efficiency requirements on the books (such as energy efficiency resource standards) would continue to see utilities meet those standards. Where those standards did not exist, the analysis assumed that states met recent levels of historical deployment. For comparison purposes this figure also shows states that have committed to deploying significant levels of energy efficiency through energy efficiency resource standards. These states considerably exceed the efficiency improvements the analysis assumed for most movant states.



# Integrated Resource Plans Considered

The analysis considered the following integrated resource plans from the movant states.

State	Utility	Year of Submission
Alabama	Alabama Power Co.	2013
Arizona	Arizona Public Service Co.	2014
	Tuscon Electric Power Co.	2014
	Arizona Electric Power Cooperative	2012
Arkansas	Entergy Arkansas	2012
	Southwestern Electric Power Co.	2012
Colorado	Xcel Energy	2013
	Boulder City Electric Utility	2013
	Colorado Springs Utility	2012
	Tri-State Gen. and Transmission	2010
Florida	Florida Power & Light Co.	2015
	Duke Energy Florida	2015
	Tampa Electric Company	2015
	Gulf Power	2015
	Orlando Utilities Commission	2015
	JEA	2015
	Seminole Electric Cooperative	2015
Georgia	Florida Municipal Power Agency	2015
	Georgia Power Co.	2013
State	Utility	Year of Submission
Indiana	NIPSCO (NiSource)	2014
	Indianapolis Power & Light Co.	2014
	Vectren	2014
	Hoosier Energy	2014
	AEP Indiana Michigan Power	2013
Kansas	Duke Energy Indiana	2013
	Wabash Valley Power Assoc. Inc.	2013
Kentucky	No IRPs submitted	
Louisiana	Louisville Gas & Electric Co. and Kentucky Utilities Co.	2014
	East Kentucky Power Cooperative	2012
	Big Rivers Electric Corp.	2014
	Entergy New Orleans	2015
Michigan	Entergy LA & Gulf States	2015
	Cleco Power	2015
	Southwestern Electric Power Co.	2012
Mississippi	AEP Indiana Michigan Power Consumers Energy Co.	2013
	No IRPs submitted	2015

# Integrated Resource Plans Considered (continued)

State	Utility	Year of Submission
Missouri	KCP&L	2015
	KCP&L GMO	2015
	Ameren Missouri	2015
Montana	Montana-Dakota Utilities Co.	2015
	NorthWestern Energy	2013
Nebraska	Nebraska Public Power District	2013
New Jersey	Deregulated: No IRP scenario	
North Carolina	Virginia Electric & Power Co. (Dominion)	2015
	Duke Carolinas	2014
North Dakota	Montana-Dakota Utilities Co.	2015
	Otter Tail Power Co.	2014
	Great River Energy	2015
	Minnkota Power Cooperative	2006
Ohio	Duke Energy Ohio	2013
	Appalachian Power Co.	2015
Oklahoma	Oklahoma Gas and Electric Co.	2015
	AEP Public Service Co. of OK	2012
	Western Farmers Electric Coop.	2014
	Empire District Electric Co.	2012
South Carolina	SC Gas & Electric Co. (SCANA)	2015
	Duke Carolinas	2015
South Dakota	Montana-Dakota Utilities Co.	2015
	NorthWestern Energy	2013
	Black Hills Power	2012
Texas	Deregulated: No IRP scenario	
Utah	PacifiCorp	2015
Wisconsin	Public Service Commission of WI	2012
West Virginia	No IRPs submitted	
Wyoming	PacifiCorp	2015
	Black Hills Power	2011

## DETAILED FINDINGS

## Summary Findings

- All three planned investment scenarios envision the continued expansion of low carbon generation that has been occurring over the last two decades. Both the scenario based on integrated resource plan data, and the two scenarios derived from the Velocity Suite, indicate that power companies have already proposed and are developing significant expansions of wind, solar, and natural gas generating capacity.
- Assuming movant states leverage only existing and planned investments within each state, as many as 21 of the 27 states could comply with the Clean Power Plan through the first three-year compliance period (2022-2024), and as many as 18 of the 27 states could comply through 2030.
- When limiting the analysis to only those projects in the most advanced stages of development (the “advanced development” scenario based on Velocity Suite), 16 of the 27 states could come into compliance through the first three-year compliance period.
- The remaining states can come into compliance by pursuing energy efficiency projects and new generation at a rate comparable to the average of their neighboring states beginning in 2019, after state plans are due.



## Detailed Findings: Advanced Development Scenario

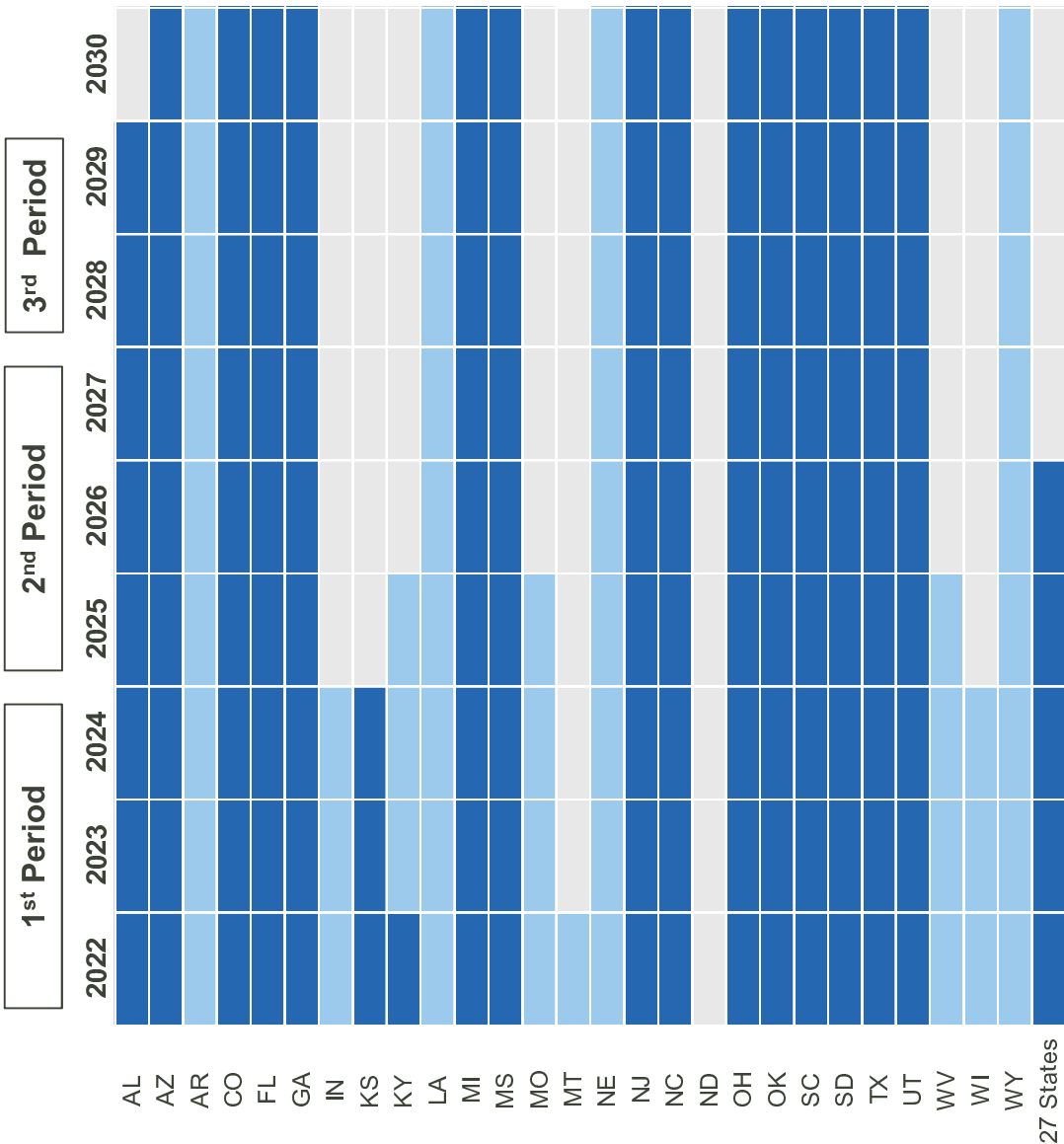
- When considering only the new builds in the most advanced stages of development as well as renewable energy and energy efficiency investments required by state law, the analysis found that 16 of the 27 states could come into compliance through the first compliance period (2022-2024), and 14 of the 27 states could come into compliance all the way through 2030.
- Thus, a majority of movant states achieve compliance in early years or throughout the Clean Power Plan compliance periods relying only through implementation of current state policies (e.g., renewable and efficiency standards) and new generation that is already operating, under construction, or permitted in the state. No additional incremental action is necessary for these states to achieve compliance.
- Of the 11 states that are not in compliance at the start of the program, 9 could come into compliance in the 2022-2024 period merely by pursuing new generation projects at the same rate as the average of their neighboring states.
- The only state that could not come 90 percent or more of the way into compliance – North Dakota – could come into compliance if it instead simply continued to take the same steps in the coming years as they have in the recent past. Specifically we examined what would happen if the state continued to build new wind turbines beginning in 2019 at the same rate it averaged new wind generation from 2010 through 2015.
- New builds in this scenario are only approximately one-third the amount of new builds seen over a comparable historical period (i.e. the last 18 years as the scenarios considered here reflected new builds from 2013-2030).

## Advanced Development Scenario: State Compliance with the Clean Power Plan (2022-2030)

As shown here, existing and planned investments could bring the vast majority of the 27 movant states into compliance with the Clean Power Plan emission targets through the first compliance period (16 states) — and in many cases, all the way through 2030 (14 states).

Indicates Compliance Under:

- Base “Advanced Development” Scenario
- Additional “Incremental Action” Scenario





## Detailed Findings: Integrated Resource Plans

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- This analysis considered the impact of planned projects that were identified by power companies through the integrated resource planning process.
- This analysis was not possible for New Jersey and Texas because they do not apply an integrated resource plan process. In addition, M.J. Bradley & Associates were not able to identify any integrated resource plans for Kansas, Mississippi, or West Virginia.
- The analysis found that 14 of the 22 states considered were in compliance through the first compliance period (2022-2024), and 11 of the 22 states were in compliance through 2030.

## Detailed Findings: Early Development Scenario

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- This scenario considered the full range of projects under development in the Velocity database as well as renewable and energy efficiency investments required to comply with state law. This included projects identified as being in stages of “advanced development” as well as those that had permit applications pending and were proposed.
- This scenario found that 20 of the 27 states were in compliance through the first compliance period (2022-2024), and 18 of the 27 states were in compliance through 2030.
- All states were found to be able to come into compliance in the first compliance period (2022-2024) if they matched their neighbors’ average recent historical investments in energy efficiency and generation in the years that followed the deadline for submitting state plans.
- Notably, new builds under the “early development” scenario are more than 20 percent lower than new builds observed over a comparable historical period (i.e., the last 18 years as the scenarios considered here reflected new builds from 2013-2030).

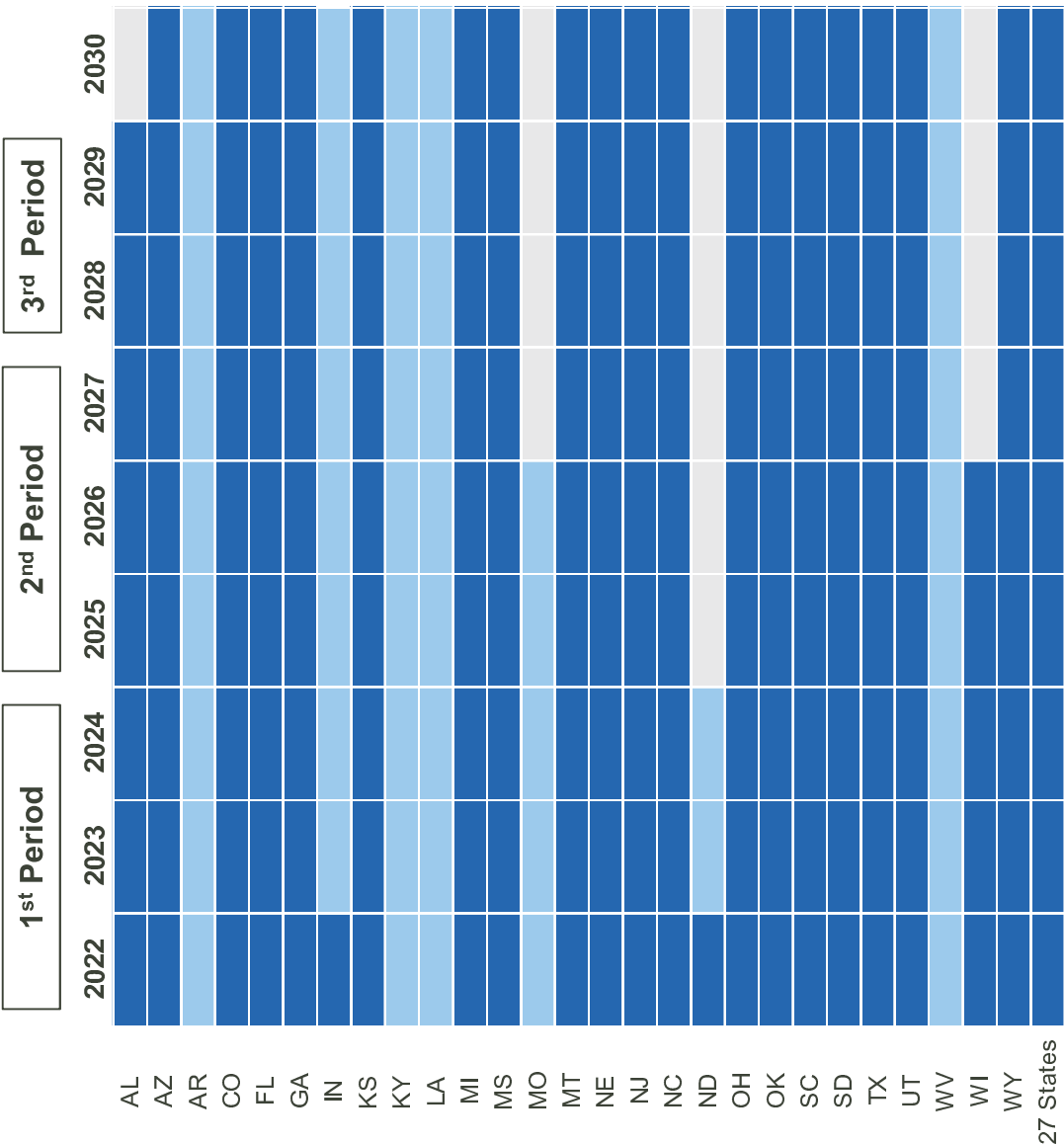
## Early Development Scenario: State Compliance with the Clean Power Plan (2022-2030)

As shown here, existing and planned investments could bring the vast majority of the 27 movant states into compliance with the Clean Power Plan emission targets through the first compliance period (20 states) — and in many cases, all the way through 2030 (18 states).

Indicates Compliance Under:

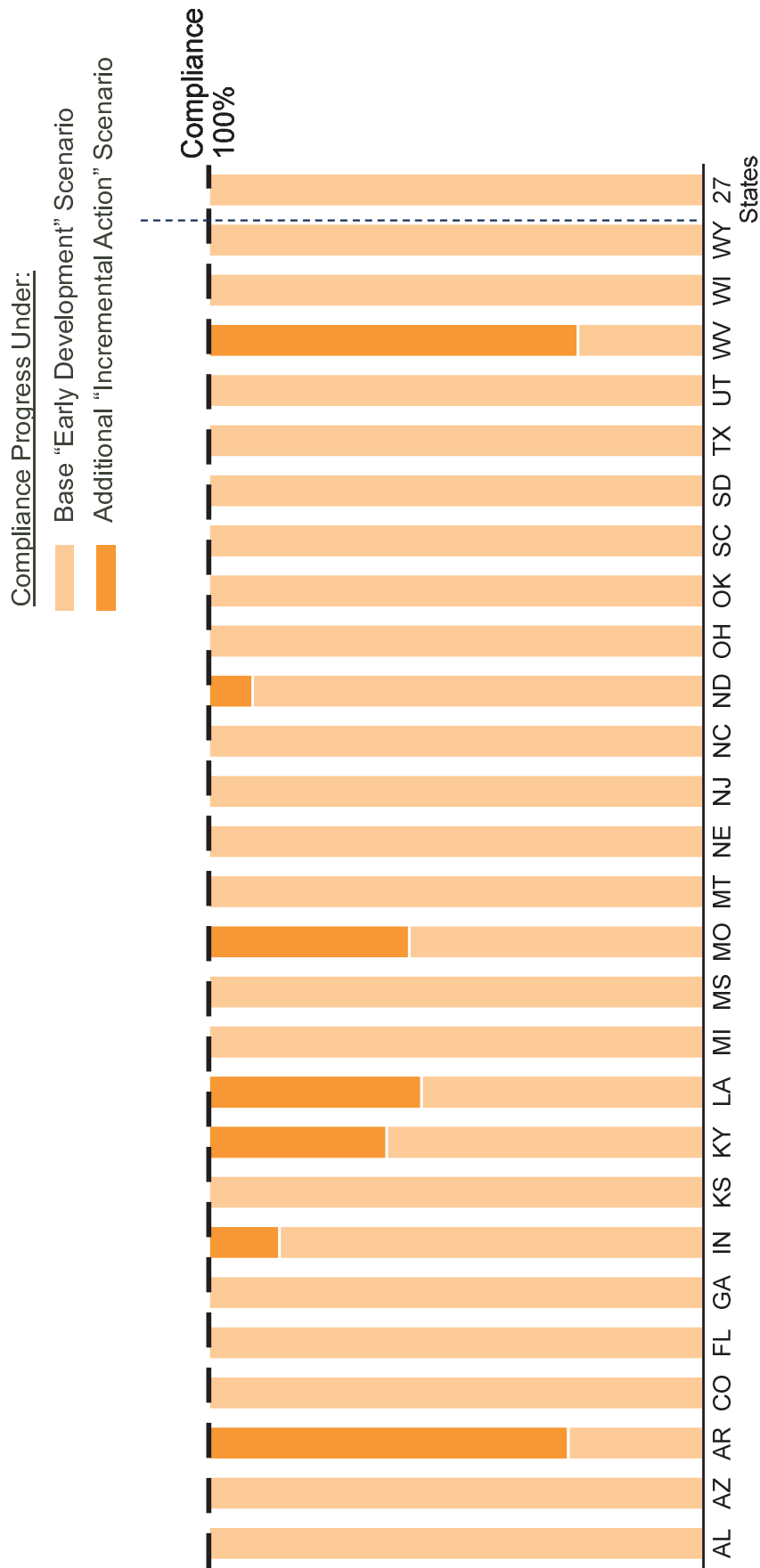
Base “Early Development” Scenario

Additional “Incremental Action” Scenario



## Early Development Scenario: State Progress in the First Compliance Period (2022-2024)

Under this scenario, the majority of states meet the CO<sub>2</sub> emission reduction targets in the first compliance period. States that do not meet their targets could close the gap to fully achieve compliance in the first period by deploying new investments at a rate comparable to their average neighbor.



## Detailed Findings: Collective Action

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- As noted, the previous results are based on the assumption that sources within each of the movant states do not take advantage of emission reduction opportunities in other states.
- Under all three of the planned investment scenarios examined, the analysis found that all 27 movant states could collectively achieve compliance in the first compliance period without incremental action if they leveraged cross-border emission reduction opportunities through mechanisms such as interstate trading.
- When considering the early deployment scenario, the analysis found that the 27 movant states could collectively achieve compliance through 2030.
- Notably, this scenario does not account for the ability for these states to leverage opportunities with states outside the group of movant states.





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