

# Clean Power Plan Overview

February 24, 2015

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# Overview of EPA's Proposal

- First rules to address CO<sub>2</sub> emissions from existing power plants.
- Relies on EPA's statutory authority under Clean Air Act § 111(d).
- Aims to reduce U.S. power sector emissions 30% by 2030 (vs. 2005 levels).
- Assigns numeric emissions goals to each state.

# Regulatory Timeline

## Rulemaking

- ✓ June 2014 – Notice of Proposed Rulemaking
- ✓ October 2014 – Notice of Data Availability
- ✓ December 2014 – Written Comment Deadline
- Summer 2015 – Final Rulemaking

## Proposed Compliance Schedule

- Summer 2016 – State plans due.
- Summer 2017 – State plans due if eligible for 1-year extension.
- Summer 2018 – Multi-state plans due

# Proposed Options for States

**Rate-based goal**

*(average lbs/MWh CO<sub>2</sub> emissions)*

*or*

**Mass-based goal**

*(total lbs CO<sub>2</sub> emissions)*

**Single-state plan**

*or*

**Multi-state plan**

*(extends deadline for plan submittal)*

# CO<sub>2</sub> Emissions Rates in Arizona

Power Plant Type	Total Generation, 2012 (GWh)	Average Rate, 2012 (lbs/MWh)
Coal (Steam)	24,336	2,268
Natural Gas (CC)	26,802	900
Oil and Gas (Steam)	1,034	1,563
Renewable	1,698 <sup>a</sup>	0
Nuclear	31,934 <sup>b</sup>	0
Energy Efficiency	1,211 <sup>c</sup>	0
<b>All Sources (2012)</b>		<b>1,453<sup>d</sup></b>
<b>EPA's Goal (2030)</b>		<b>702</b>

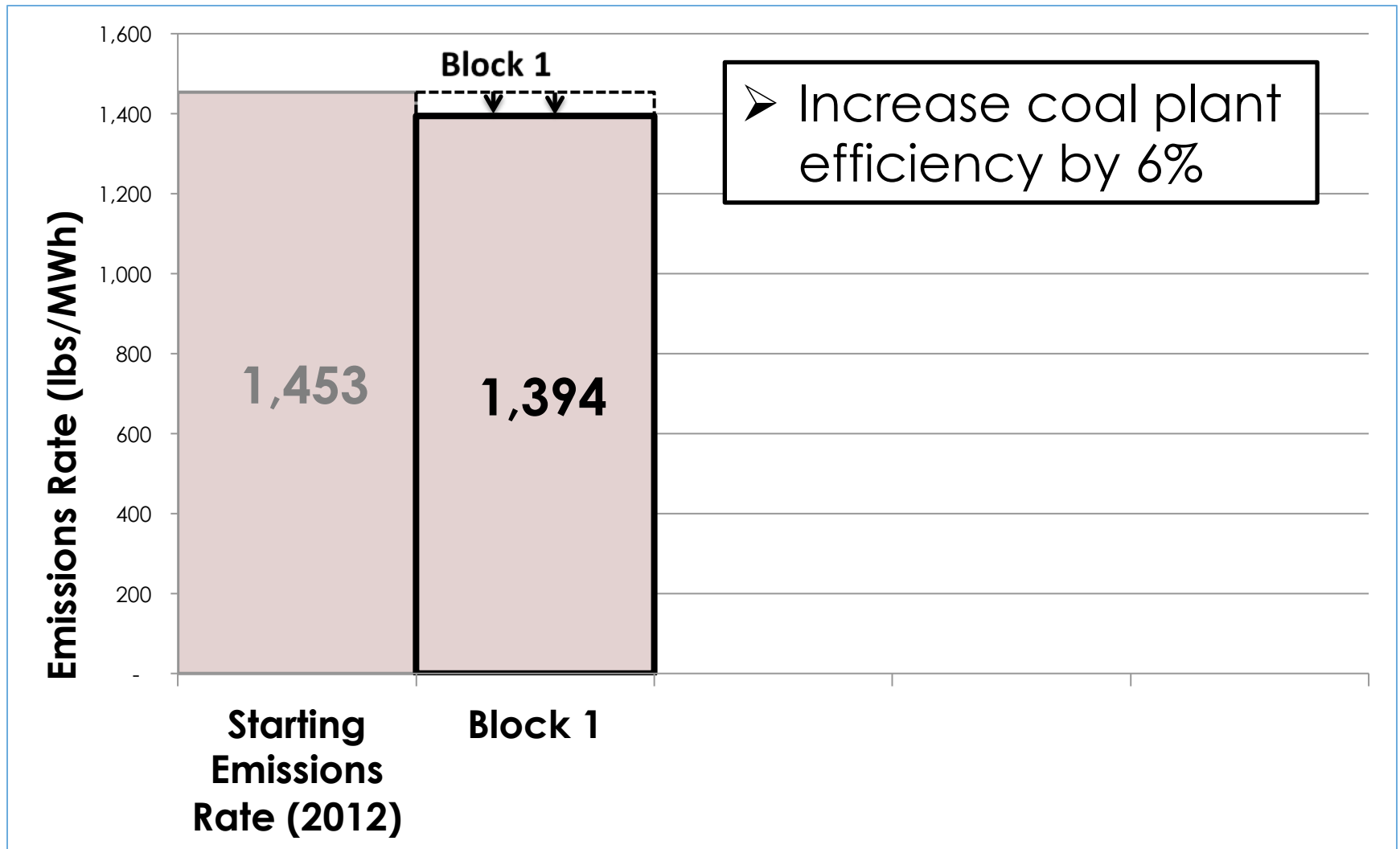
[a]: Excludes 6,717 GWh of existing hydro, which is not included in EPA's proposed goal calculation.

[b]: In EPA's goal calculation only 1,818 GWh out of 31,934 GWh total nuclear generation is included. This represents ~6% of nuclear generation assumed to be "at risk."

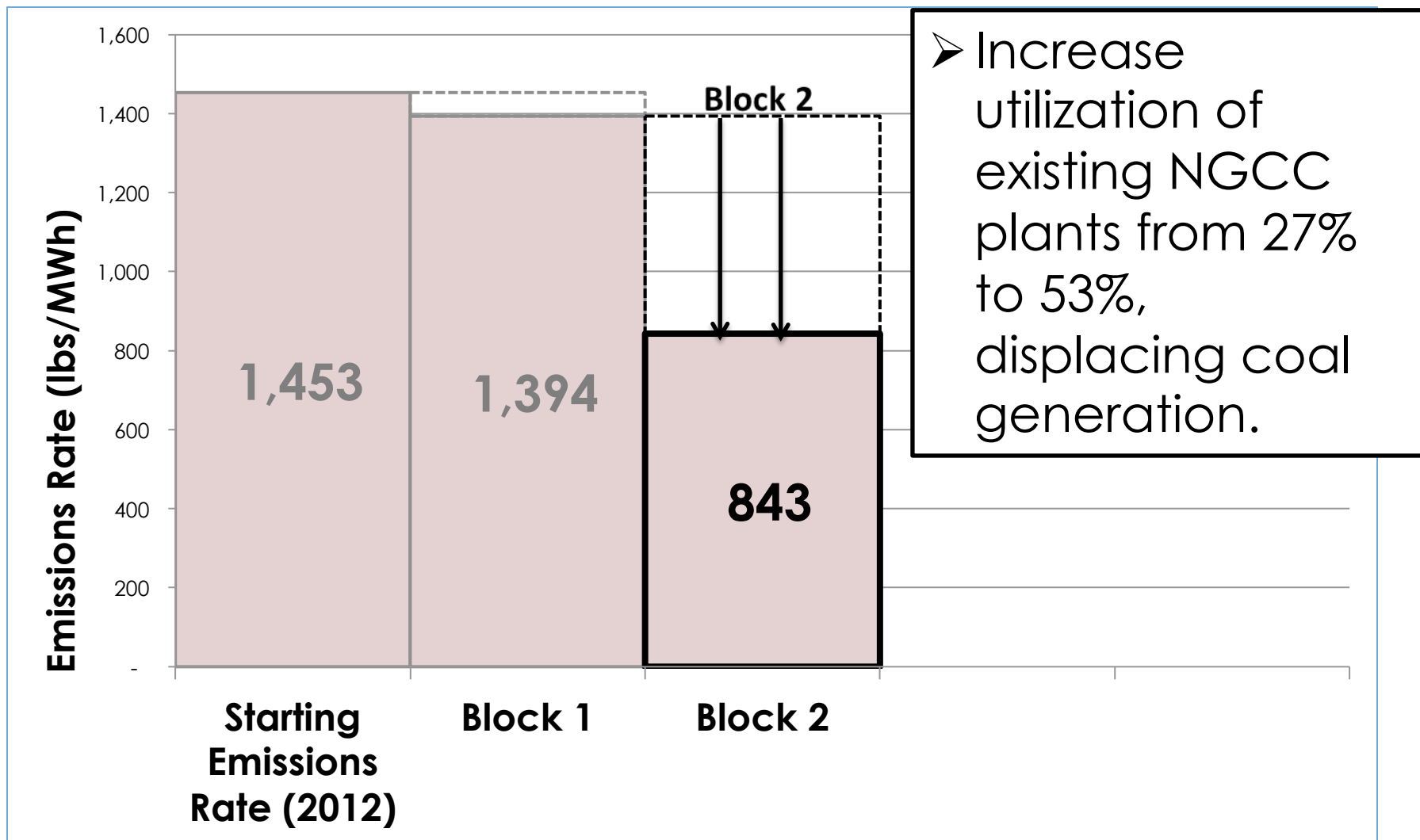
[c]: Total Incremental Energy Efficiency (EE) achieved by AZ utilities in 2012 as reported in EIA-861 is shown here for information purposes. EPA proposed that only EE measures implemented after June 2014 would be eligible for compliance. Thus, EE in 2012 is not included in the goal calculation.

[d]: This was computed according to EPA's goal calculation methodology and does not include certain sources as indicated above in [a], [b], and [c].

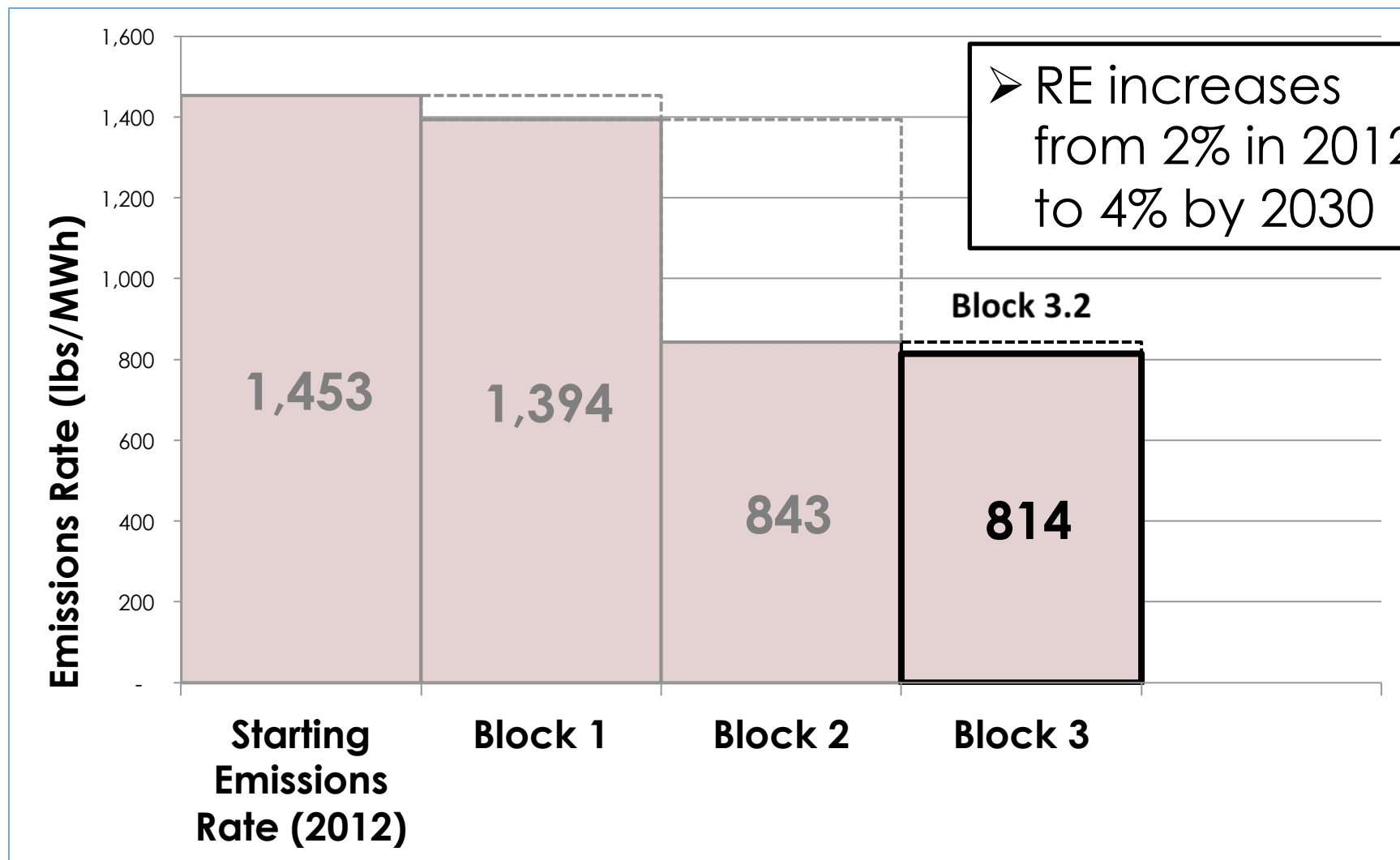
# Block 1: Heat Rate Improvements



# Block 2: Redispatch (coal to gas)

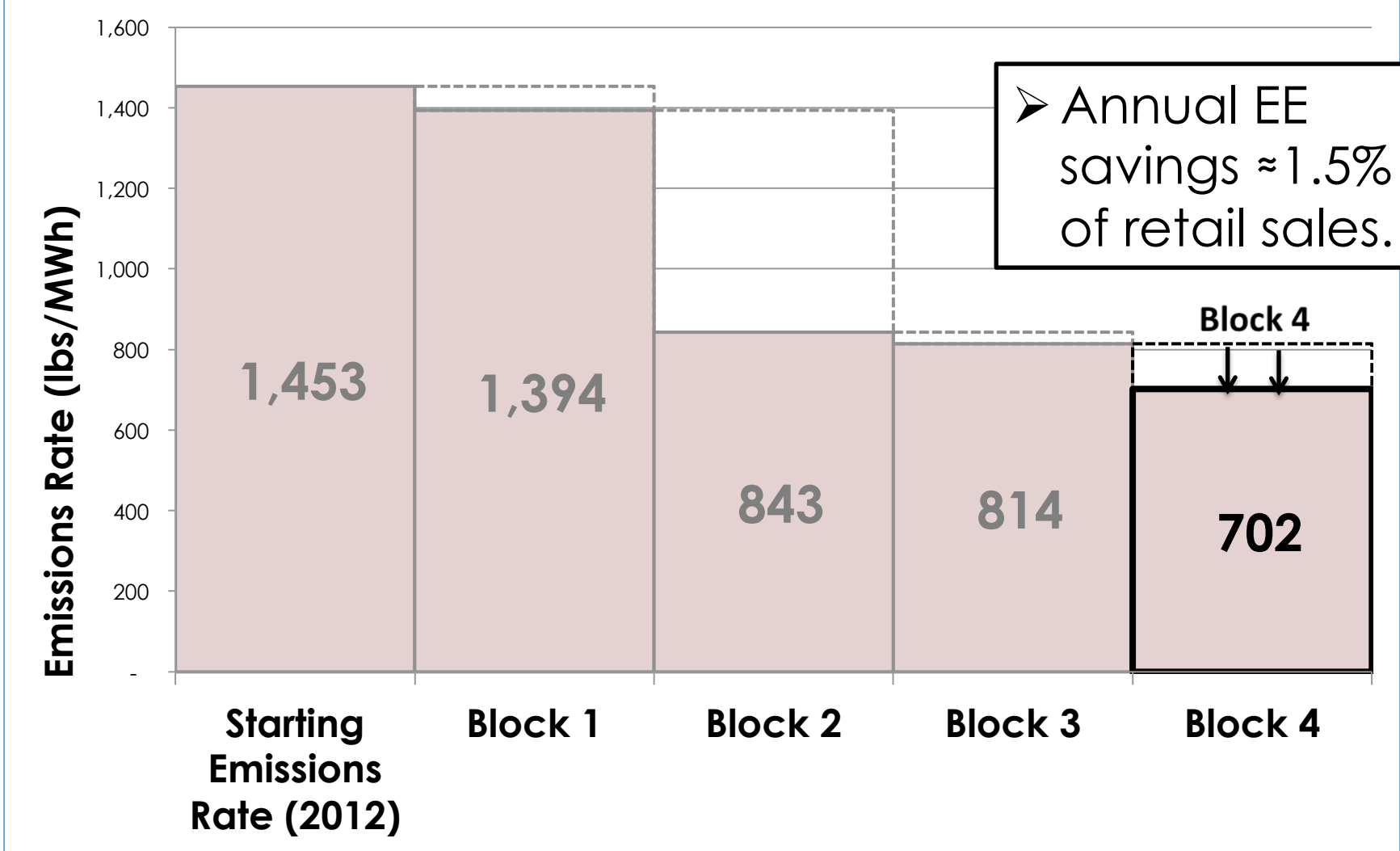


# Block 3: Cleaner Generation



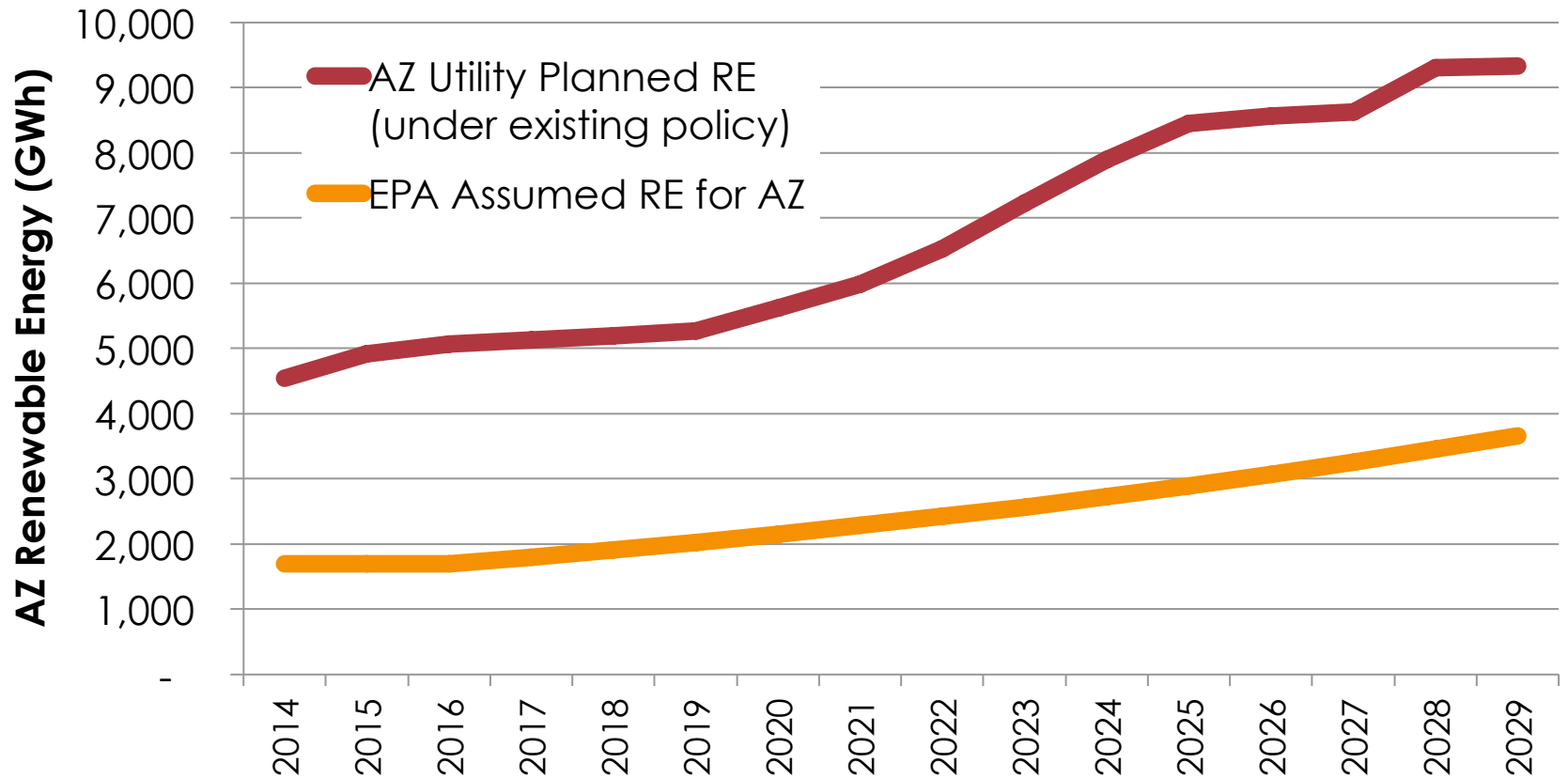


# Block 4: Energy Efficiency



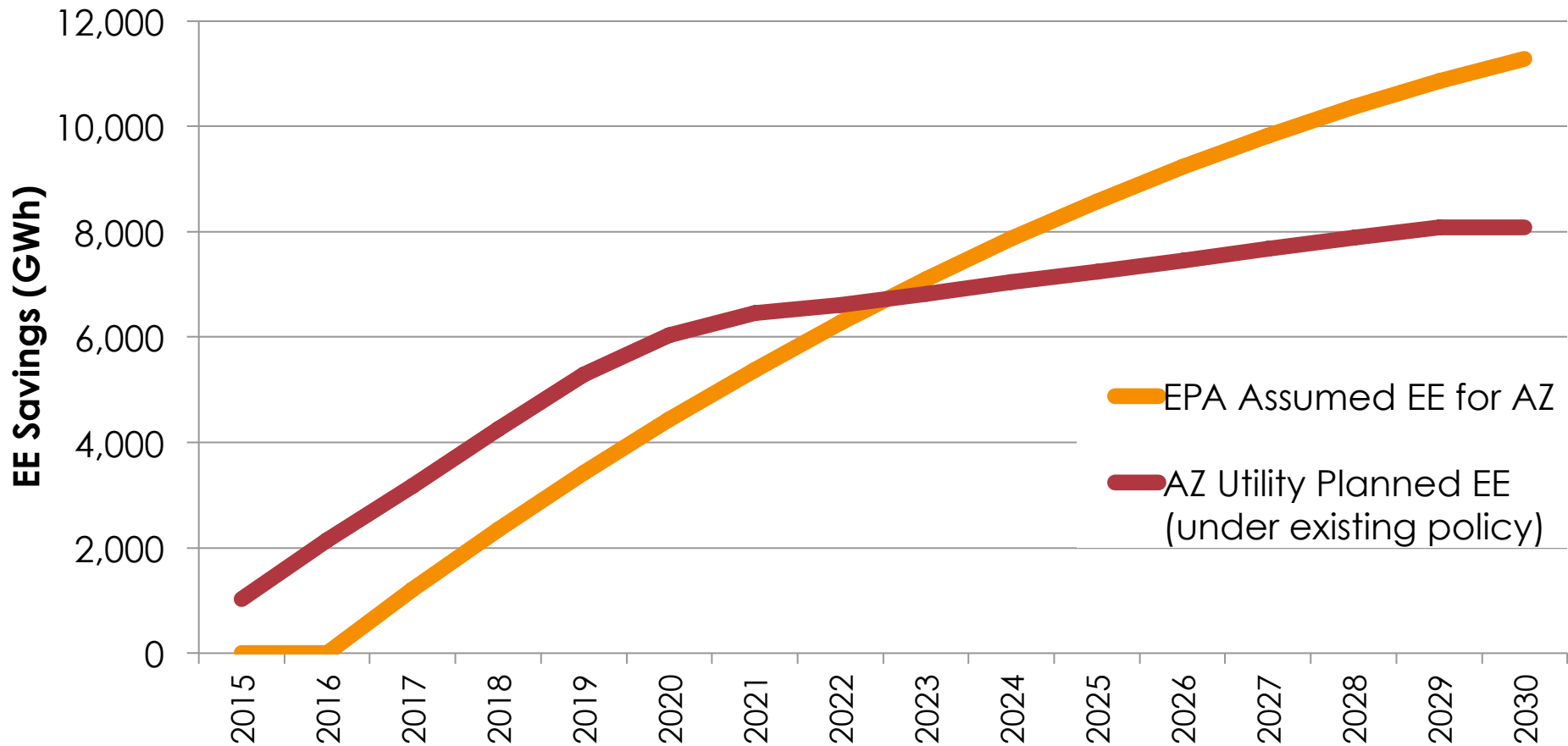
# Existing AZ Policy: RE

## Renewable Energy in AZ (2014-2029)

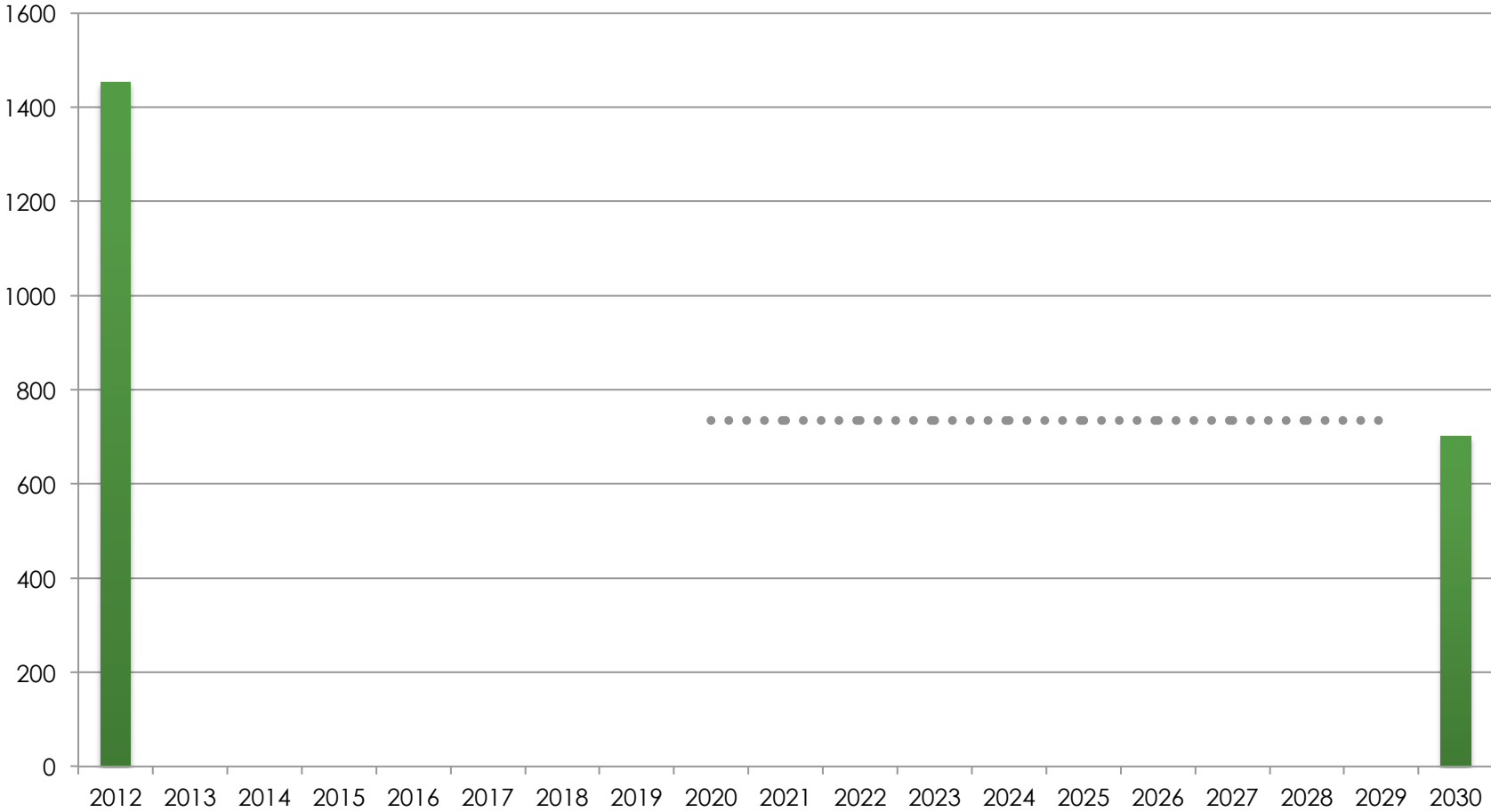


# Existing AZ Policy: EE

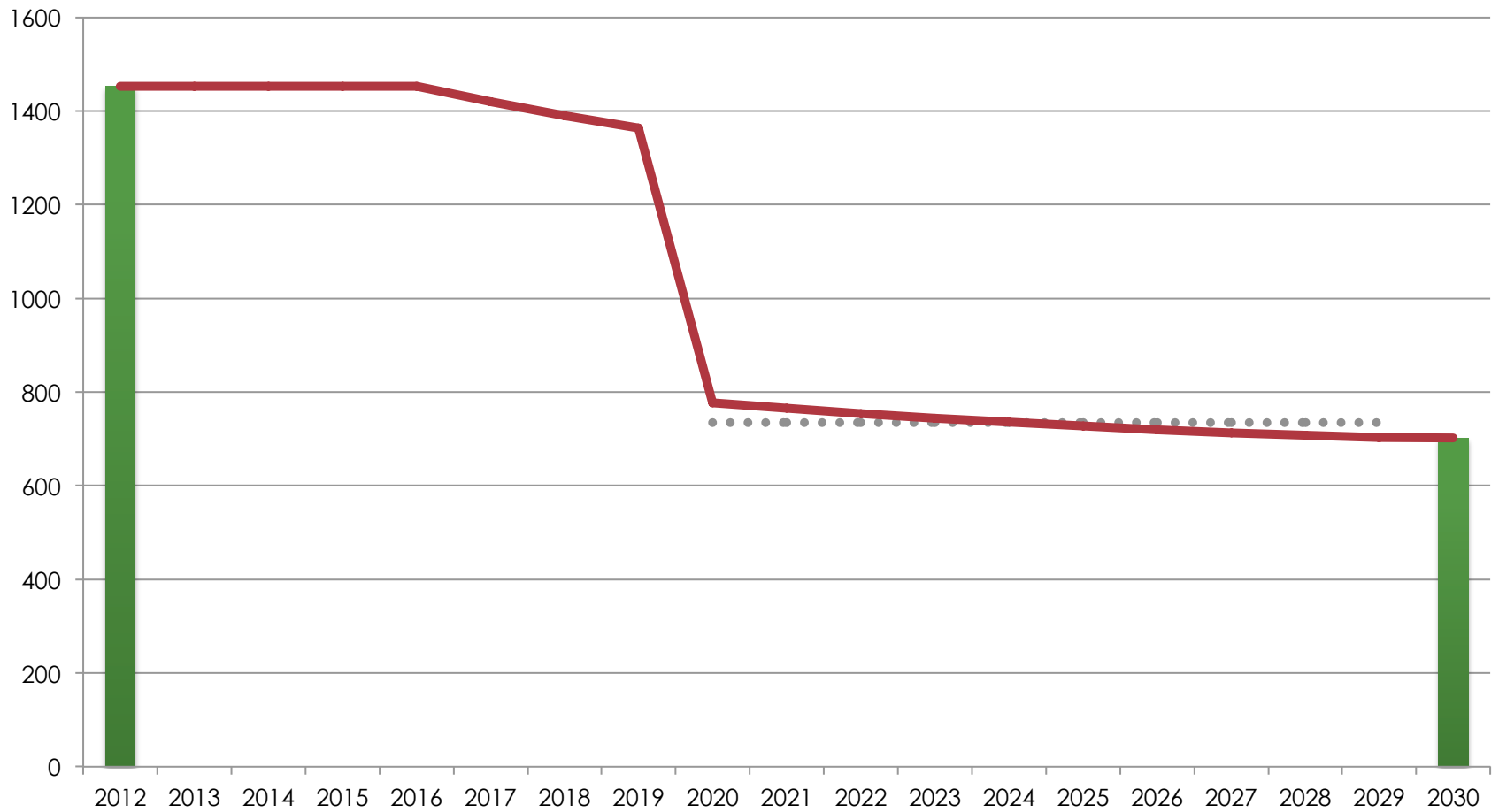
## Cumulative Energy Efficiency Savings in AZ (2015-2030)



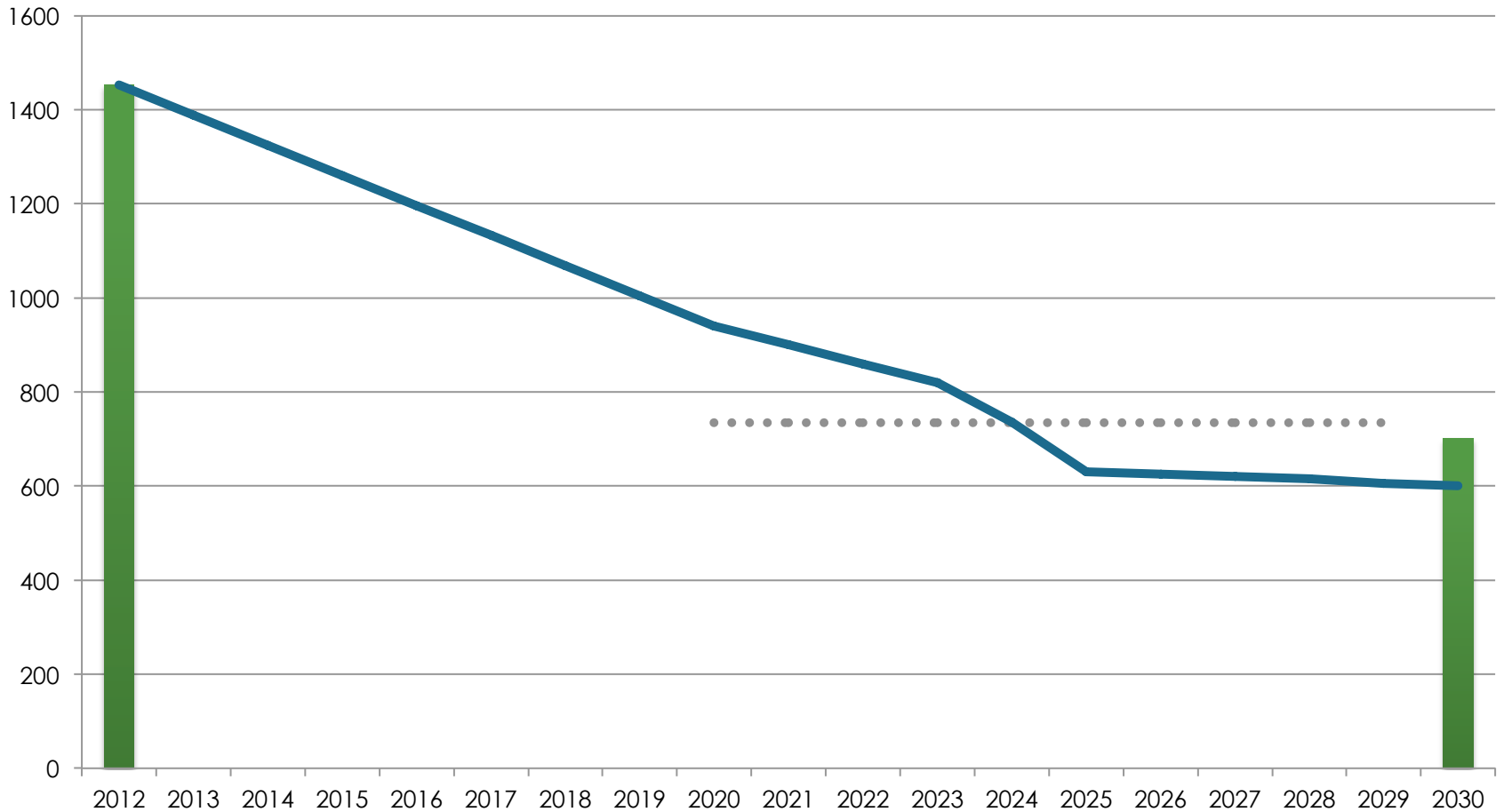
# Arizona's Interim Goal (2020-2029 average)



# One Possible Trajectory



# What Are Some Alternatives?



# Compliance scenario screening tool (beta version 0.2)

Clean Power Plan: Compliance Screening Tool						
Directions: Modify any of the cells in yellow below. Confirm if your scenario has achieved the EPA interim and final targets.						
INTERIM GOAL ACHIEVEMENT		Interim Goal	FINAL GOAL ACHIEVEMENT		Final	
Interim Emissions Rate Achieved (lbs/MWh)	735	735	Final Emissions Rate Achieved (lbs/MWh)	703	702	
Mass-based Equivalent (thousand metric tons)	23,314		Mass-based Equivalent (thousand metric tons)	23,500		
EPA Interim Goal Met?	<b>YES</b>		EPA Final Goal Met?	<b>NO</b>		
Coal Generation in 2020 (% of MWh in 2012)	36%		Coal Preserved in 2030 (% of MWh in 2012)	31%		
Coal Retired by 2020 (MW)	907		Coal Retired by 2030 (MW)	1,333		
Coal Retained in 2020 (MW)	3,201		Coal Retained in 2030 (MW)	2,775		
Goal Selection (select from drop-down)		EPA Proposed				
Renewable Energy	Annual RE as % Retail Sales	RES Level (for reference)	Energy Efficiency	Incremental EE Savings (% of prior year sales; statewide)	EERS Level (for reference)	SPP Level (for reference)
2013	2.0%	4.0%				
2014	3.0%	4.5%	2014	1.50%	1.80%	1.50%
2015	4.0%	5.0%	2015	2.00%	2.05%	1.75%
2016	5.0%	6.0%	2016	2.00%	2.05%	1.75%
2017	6.0%	7.0%	2017	2.00%	2.30%	1.75%
2018	7.0%	8.0%	2018	2.00%	2.30%	2.00%
2019	8.5%	9.0%	2019	2.00%	2.30%	2.00%
2020	10.0%	10.0%	2020	2.00%	2.30%	2.00%

# Compliance scenario screening tool (beta version 0.2)

## Clean Power Plan: Compliance Screening Tool

Directions: Modify any of the cells in yellow below. Confirm if your scenario has achieved the EPA interim and final targets.

### INTERIM GOALS

Interim Emissions Rate Achieved (lbs/MWh)
Mass-based Equivalent (thousand metric tons)
EPA Interim Goal Met?
Coal Generation in 2020 (% of 2012)
Coal Retired by 2020 (MW)
Coal Retained in 2020 (MW)

Final  
702

## Not a complete analysis

- Does not yet include reliability or economic impacts.
- More improvements to come.

Goal Selection (select from drop-down) EPA Proposed

Renewable Energy	Annual RE as % Retail Sales	RES Level (for reference)	Energy Efficiency	Incremental EE Savings (% of prior year sales; statewide)	EERS Level (for reference)	SPP Level (for reference)
2013	2.0%	4.0%				
2014	3.0%	4.5%	2014	1.50%	1.80%	1.50%
2015	4.0%	5.0%	2015	2.00%	2.05%	1.75%
2016	5.0%	6.0%	2016	2.00%	2.05%	1.75%
2017	6.0%	7.0%	2017	2.00%	2.30%	1.75%
2018	7.0%	8.0%	2018	2.00%	2.30%	2.00%
2019	8.5%	9.0%	2019	2.00%	2.30%	2.00%
2020	10.0%	10.0%	2020	2.00%	2.30%	2.00%



# Improvements based on comments from DEQ :

Comment	Response/Improvement
Some plants may be repowered, not fully retired.	Added repowering option.
Example scenario schedule for BB 3&4 is too aggressive.	Identified scenarios with more modest BB 3&4 schedules.
Example scenario meets EPA goal ahead of schedule.	Added option to adjust capacity factors for coal/OG plants; identified scenarios that do not exceed EPA goal.
Example scenario retires coal plants built recently or with major new environmental upgrades.	Identified scenarios that do not retire these plants.

# Additional Improvements:

- Mass-based goal conversion,
- Option to select goal framework (EPA, NODA, & AUG),
- Option to customize HRI for specific plants,
- Updated treatment of load growth & exports.

# Future work being considered by ASU

- Additional screening tool refinements
- Reliability impact analysis
- Economic impact analysis
- “Deep dive” workshops:
  - April (TBD)
  - May (economics)