



EPA's Clean Power Plan: Arizona's Rate-Based Goal

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- Rate Calculation Basics
- Baseline Rate
- Effect of Building Block 2
- Impact of Interim Goal

- Rate = Weighted Average lbs CO₂/MWh for all covered EGUs:

$$\frac{\sum (Gen \times Rate)}{\sum Gen}$$

For each type of generation

- Coal, NGCC, Oil and Gas Steam (OG)
- Exception: “Other” – emissions added directly

■ Categories of covered EGUs:

Output	Type of EGU				
	Steam Generating Unit		Natural Gas Turbines		IGCC
	Coal	Oil and Gas Steam	Combined Cycle	Simple Cycle (High Capacity)	
Electricity	HRI + Redispatch From	Redispatch From	Redispatch To	Other	
Useful Thermal Output	Other				

- 3 ways to reduce rate:
 - Subtract generation from numerator
 - Shift from generation with high rate to generation with low rate
 - Add generation to denominator

- Baseline Year = 2012
- Arizona's Baseline Data

Generation Type	Generation (MWh)	Rate (lbs CO ₂ /MWh)
Coal	24,335,930	2,268
NGCC	26,782,325	900
OG	1,033,871	1,563

- “Other”
 - 19,361 MWh
 - 17,227,768 lbs CO₂
- Renewable Energy (RE): 1,697,652 MWh
- 6% Nuclear (“at risk”): 1,818,486 MWh

- For covered EGUs only:

1551 lbs CO₂/MWh


- For covered EGUs, RE and At-Risk Nuclear:

1453 lbs CO₂/MWh

- Final goal for 2030:

702 lbs CO₂/MWh

- Shift from Coal, OG to NGCC
 - EPA: NGCC capable of operating at 70% capacity
 - 70 % - Actual *annual* capacity factor (CF) = unused capacity
 - Goal reflects shift or “redispatch” from Coal and OG to NGCC to extent of unused capacity

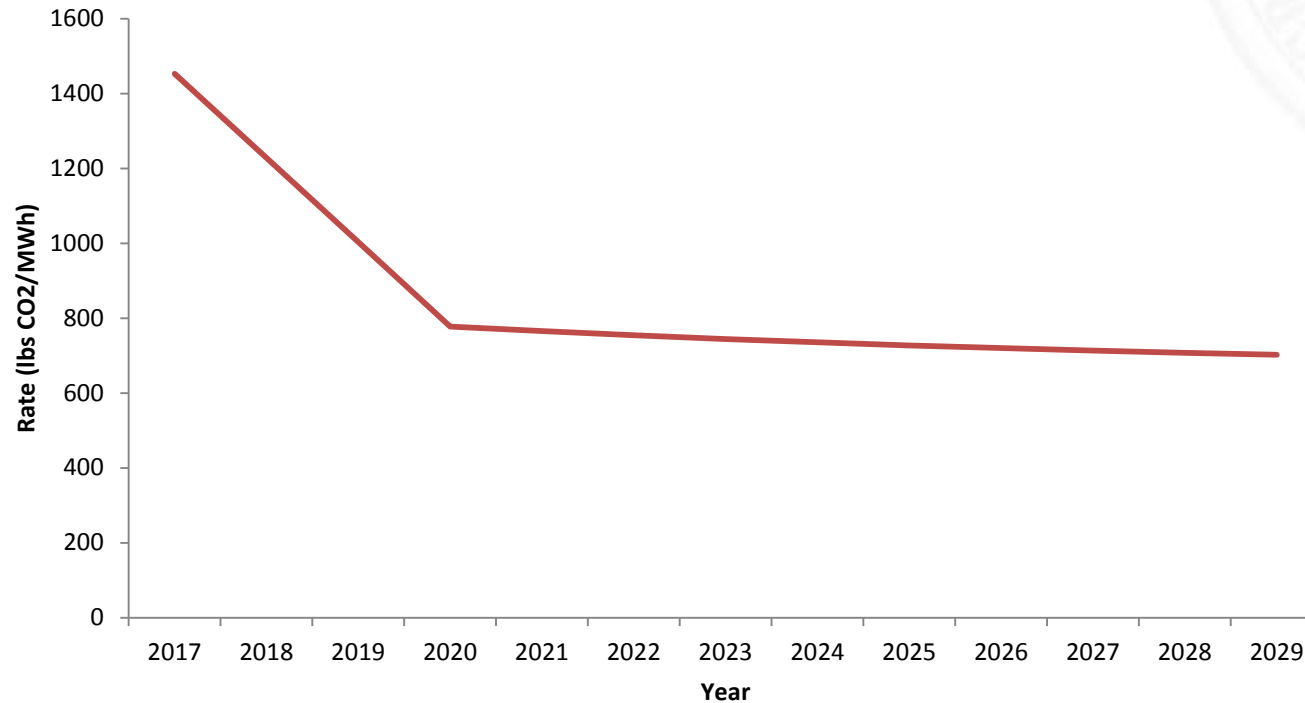
- Arizona
 - 2012 annual NGCC capacity factor = 27%
 - If increase to 70%, more than sufficient to displace *all* Coal and OG generation
 - Rate based goal incorporates this assumption:
1453 lbs CO₂/MWh  900 lbs CO₂/MWh
 - 74% of reduction required
- Problems (e.g.)
 - Peak usage
 - Un-recouped investment

- Average of rate-based goals for 2020-2029
- In calculating, EPA assumed building blocks 1 and 2 could be implemented by 2020
- Effect: interim goal = 735 lbs CO₂/MWh:

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Rate	778	765	754	744	735	727	720	713	707	702

- Reductions from 2020-2029 = RE and EE

- Rate reduction curve:



■ Alternative approach to Building Blocks:

	Step 3a & 3b (Redispatch)			Step 6&7 (State Goal Phase I & II (lbs/MWh))	
Scenario	Redispatched Coal Gen. (MWh)	Redispatch O/G steam Gen. (MWh)	Redispatched NGCC Gen. (MWh)	Interim Goal or Rate (2020 - 2029 average)	Final Goal or Rate (2030 and thereafter)
1. EPA Goal Calculation	0	0	52,152,127	735	702
2. 15 % RE and 1.61 % Incremental EE Savings	6,532,309	277,514	45,342,304	774	702
3. 21 % RE and 1.61 % Incremental EE Savings	9,707,768	412,418	42,031,940	803	702
4. 33 % RE and 2.00 % Incremental EE Savings	17,289,395	734,511	34,128,220	858	702
5. 33 % RE and 2.00 % Incremental EE Savings	9,476,915	402,611	42,272,601	735	601

- Scenarios presented for illustration only. ADEQ has not evaluated the technical or economic feasibility of any of the RE or EE alternatives included.