



# The Future of Greenhouse Gas Emissions Trading in North America

14<sup>th</sup> IEA-IETA-EPRI Annual Workshop on Greenhouse Gas  
Emission Trading  
Thursday October 9, 2014

# Agenda

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- California's AB 32 and Cap-and-Trade
- Federal GHG Regulation and the Clean Air Act
- Overview of 111(d) Proposal:
  - Goal Setting
  - State Plans
  - CA Impacts

# Assembly Bill 32: Background

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- Signed into law in 2006; first mandatory greenhouse gas (GHG) reduction law in US
- Requires California to reduce GHG emissions to 1990 levels by 2020 (431 million metric tons (MMT))
  - 15% decrease from 2020 business-as-usual forecast of 509 MMT
- Requires California Air Resources Board (ARB) to develop framework, known as the Scoping Plan, to achieve reductions
- AB 32 Scoping Plan includes program measures (e.g., Low Carbon Fuel Standard, RPS, EE measures) as well as cap-and-trade

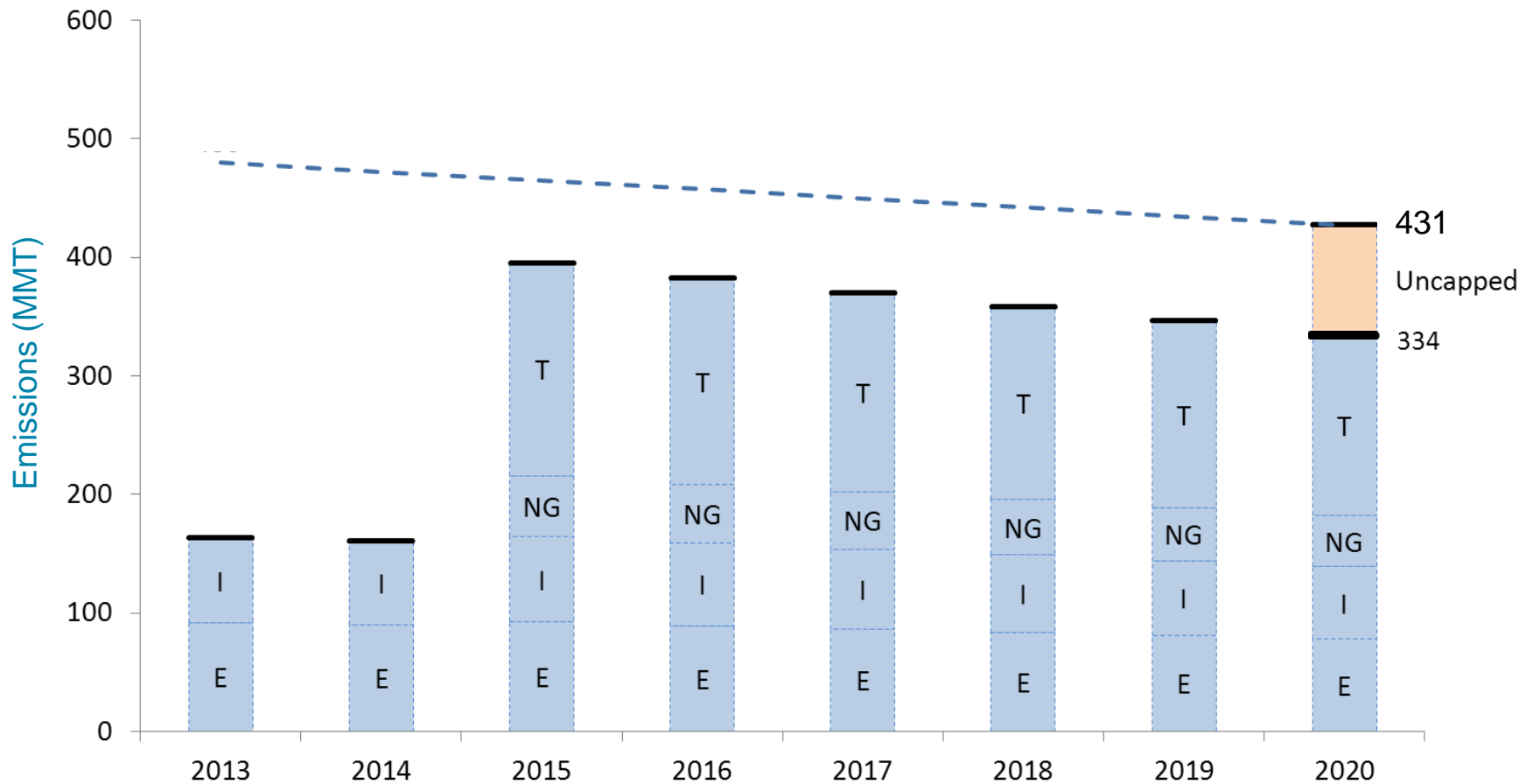
# California's Existing GHG Reduction Measures

- AB 32 Scoping Plan includes program measures (e.g., Low Carbon Fuel Standard, 33% RPS, EE measures) as well as Cap-and-Trade

Statewide Program Measures	CO <sub>2</sub> e Reductions, Year 2020 (MMT CO <sub>2</sub> e)
Electric and Natural Gas Sectors	
Energy Efficiency	12
33% Renewables	12
Other Sector Program Measures	38
<b>Total Program Measures Reductions</b>	<b>62</b>
Cap-and-Trade Program	18
<b>Total Reductions</b>	<b>80</b>

# Cap and Trade Program: Background

- Economy-wide program (covers 85% of the California economy)
- Number of emissions allowances available in the market declines over time
- Three compliance periods- program expands at start of 2<sup>nd</sup> compliance period in 2015



# FEDERAL GHG REGULATION: EPA'S CLEAN POWER PLAN

# Federal GHG Regulation: EPA's Clean Power Plan

Section 111(d) of the Clean Air Act requires EPA to identify control measures that will reduce emissions from existing fossil-fired power plants at reasonable cost.

- EPA's criteria for determining Best System of Emissions Reduction (BSER):
  - Technical feasibility of system
  - Amount of emission reduction system would generate
  - Costs of the system must be reasonable
  - Promotion of the development and implementation of technologies
  - Energy impacts
- EPA proposes to define BSER based on four “building blocks” based on the assumption that each building block reflects measures that states and sources have already implemented to reduce fossil fuel-fired EGU's emissions.
  - Results in significant variation among state targets

# EPA's Best System of Emission Reduction (BSER)

EPA uses four building blocks to determine each state's **emission rate** goals:

1. Heat Rate Improvements at Existing Coal-Fired Power Plants



2. Increased Utilization of Existing NGCC



3. Operation of Zero-Emitting Generation



4. Increased Demand-Side Energy Efficiency



Emission rate: lbs of CO<sub>2</sub> per megawatt hour (lbs/MWh)

**The relative impact of each building block on individual state goals varies substantially**



# Calculating Each State's Goal under 111(d)

- Adjusted Emissions Rate

**2012 Fossil CO<sub>2</sub> Emissions**  
(after coal heat rate improvements and redispatch)

California's  
2030 Goal:

Fossil MWhs generated +

= **537**  
**lbs/MWh**

At Risk Nuclear  
(5.8%)

+

Projected  
RE MWhs

+

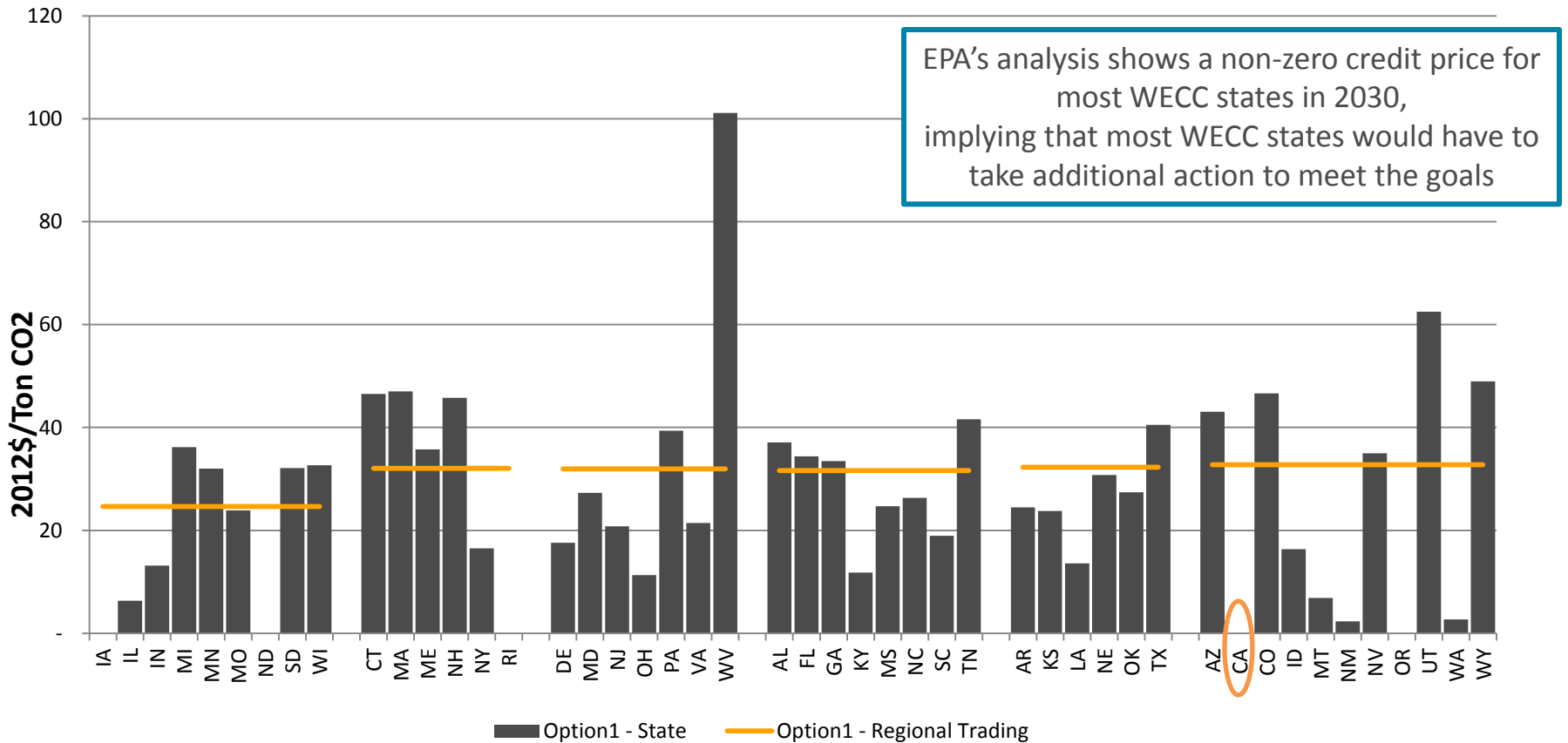
EE Savings

# Clean Air Act Sections 111(d) and 111(b)

- The Clean Air Act provides for structural difference between 111(d) (rules for *existing* power plants) and 111(b) (rules for *new* power plants):
  - 111(b): EPA has *direct authority to regulate new power plants* by setting national performance standards
  - 111(d): EPA has authority to *require states to develop implementation plans* that meet performance standards developed by EPA for existing power plants
    - State plans must be approved by EPA
- In establishing the state guidelines, EPA identifies the *best system of emission reduction* (BSER)
  - EPA has interpreted this to include measures at the affected facility itself as well as changes outside of the "fence line" (e.g., operation of renewables) that reduce emissions at affected facilities

# KEY ISSUES

# EPA's Projected State 111(d) Credit Prices in 2030



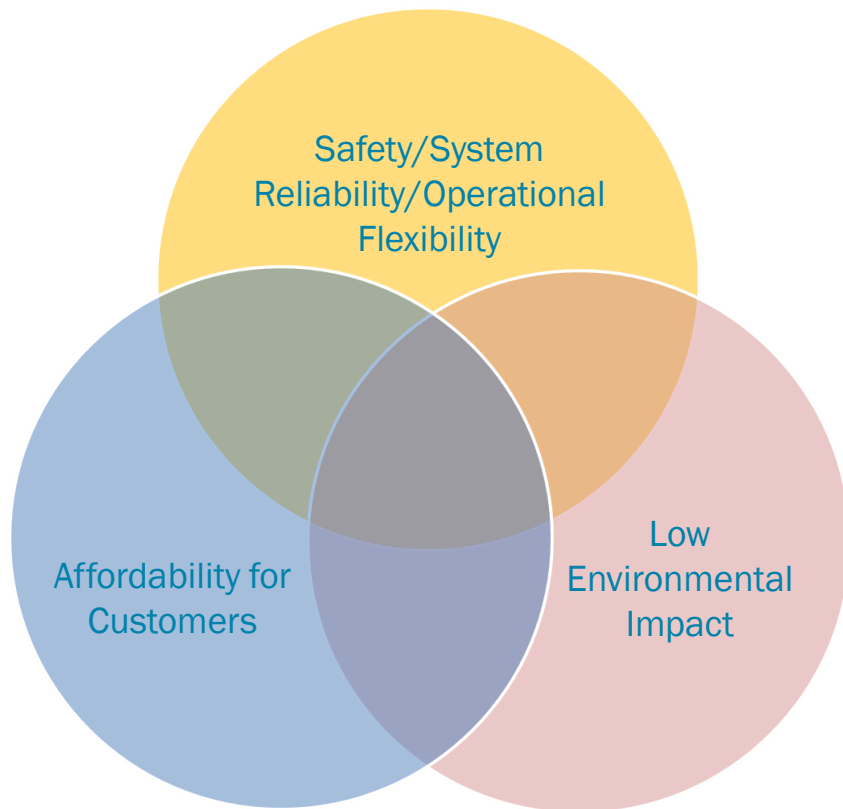
- Credit prices are a measure of the stringency of EPA's proposed goals for each state
- *For CA, extending current policy appears sufficient to meet EPA's proposed goals*
- Only four other states are in this position

# Key 111(d) Issues

1. Best System of Emission Reduction (BSER) Goal-Setting and Compliance
  - Desirable Outcomes:
    - *General equivalence between goal-setting and compliance counting*
    - *Broad compliance flexibility*
2. Conversion of state goals from intensity (lbs/MWh) to mass (tons)
  - Desirable Outcomes:
    - *Ensure goal is achievable after conversion*
    - *Adjustments built-in for key external drivers; for example:*
      - *Transport electrification*
      - *Economic/demographic growth*
      - *Level of imports*
3. Multi-state coordination to avoid a patchwork of state approaches that raise costs and emissions relative to efficient approaches
  - Desirable Outcome:
    - *May be difficult to achieve alignment across WECC given disparate starting points*
    - *Efficient siting and dispatch in the WECC, with beneficial impacts on wholesale prices and emissions levels*

## PG&E and AB 32

- PG&E actively supports energy policy that ensures a cost-effective, reliable source of energy to our customers and helps reduce greenhouse gases statewide

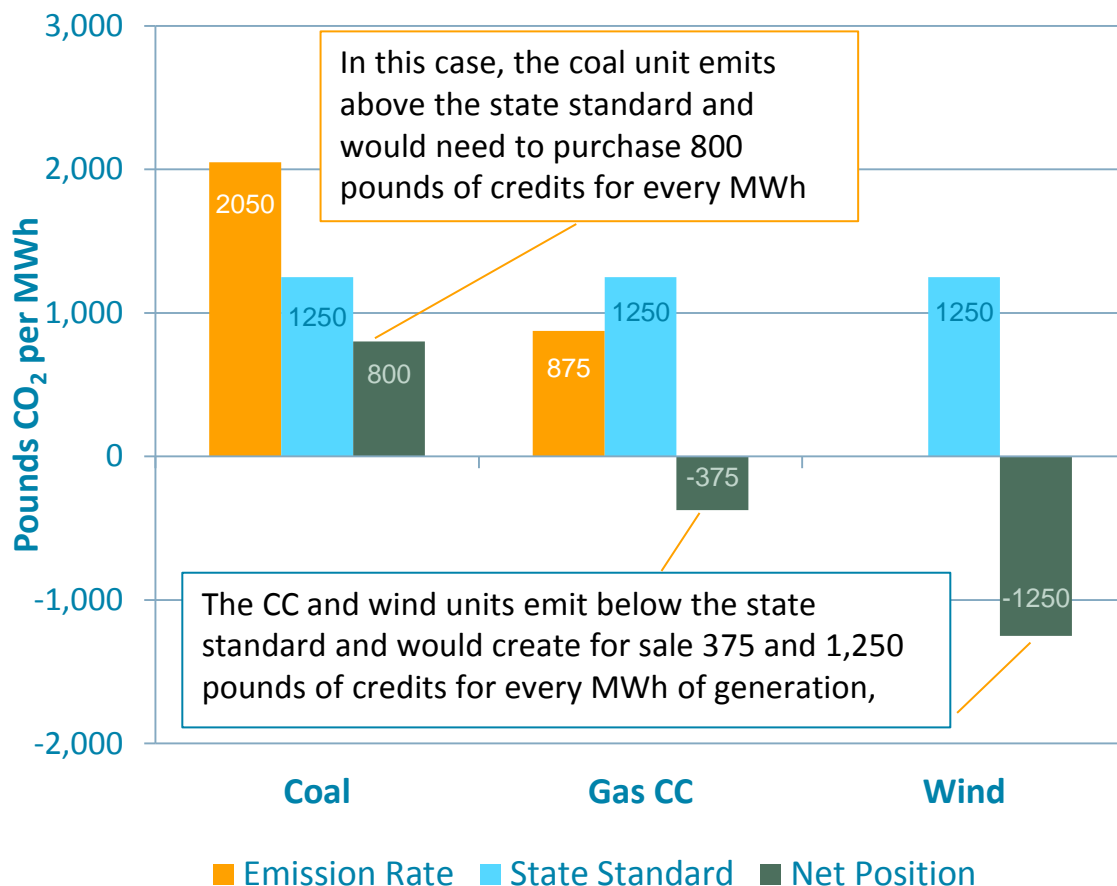


- PG&E supports AB 32 and believes its goals can be achieved cost-effectively
- PG&E is actively implementing all applicable AB 32 measures
- Californians will be best served by a broad mix of cost-effective clean energy policies
- PG&E favors using rigorous and transparent cross-sectoral analyses to evaluate clean energy policies

# APPENDIX

# Different Program Structures have Different Implications for Power Prices

- Tradable rate-based program differs significantly from cap-and-trade program
- Rate standard means less GHG cost to coal and potential subsidies to gas and non-emitting sources
- This dynamic has a direct impact on electricity prices (i.e., less increase than under cap-and-trade and potentially even a decrease relative to a Reference Case)





# Key Differences between Existing CA's Programs and EPA's Proposal

	CA AB32 Cap-and-Trade	US EPA 111(d) Proposal
<b>Scope</b>	Economy-wide (after 2014)	Electric sector
<b>Electric Sector Coverage</b>	1) In-state fossil-fired power plants and 2) emissions associated with imported electricity	In-state fossil-fired power plants
<b>Affected Sources</b>	Sources emitting greater than 25,000 metric tons of CO <sub>2</sub> e annually	Any boiler, IGCC unit or combustion turbine that: (i) is capable of combusting at least 250 million Btu per hour; (ii) combusts fossil fuel for more than 10% of its annual heat input during any 3 consecutive calendar years; (iii) sells the greater of 219,000 MWh per year and 1/3 of its potential electrical output to the grid; and (iv) was in operation or under construction as of January 8, 2014.
<b>Timing</b>	2013-2020	2020-2030+
<b>Form</b>	mass emissions (metric tons)	"adjusted" emissions intensity (lbs/MWh); states can convert to mass emissions