

OVERVIEW OF THE CLEAN POWER PLAN AND MASS-BASED EMISSIONS TRADING

Presentation by the Abrams Environmental Law Clinic
at the Illinois Pollution Control Board

July 7, 2016

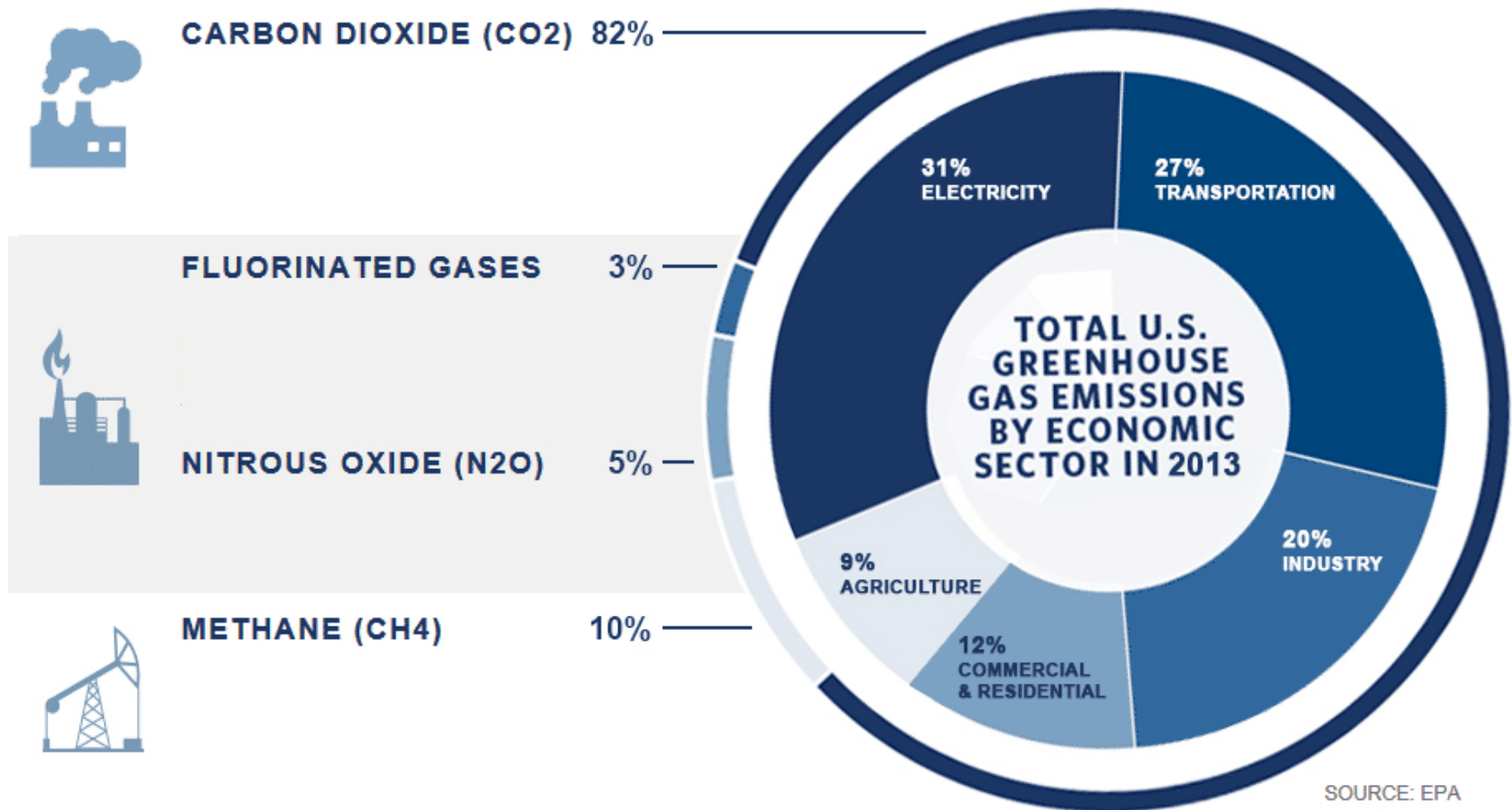
Abrams Environmental Clinic gives law students “in-role” experience

- Based at the University of Chicago Law School
- Started 4.5 years ago by Mark Templeton, former Director of Missouri Department of Natural Resources (which includes state EPA, state energy office, mining, water quantity, state parks)
- Staffed by two faculty and sixteen students, who typically participate in the clinic part-time for one to two years
- Gives students “in-role” experience on real cases and controversies and regulatory projects

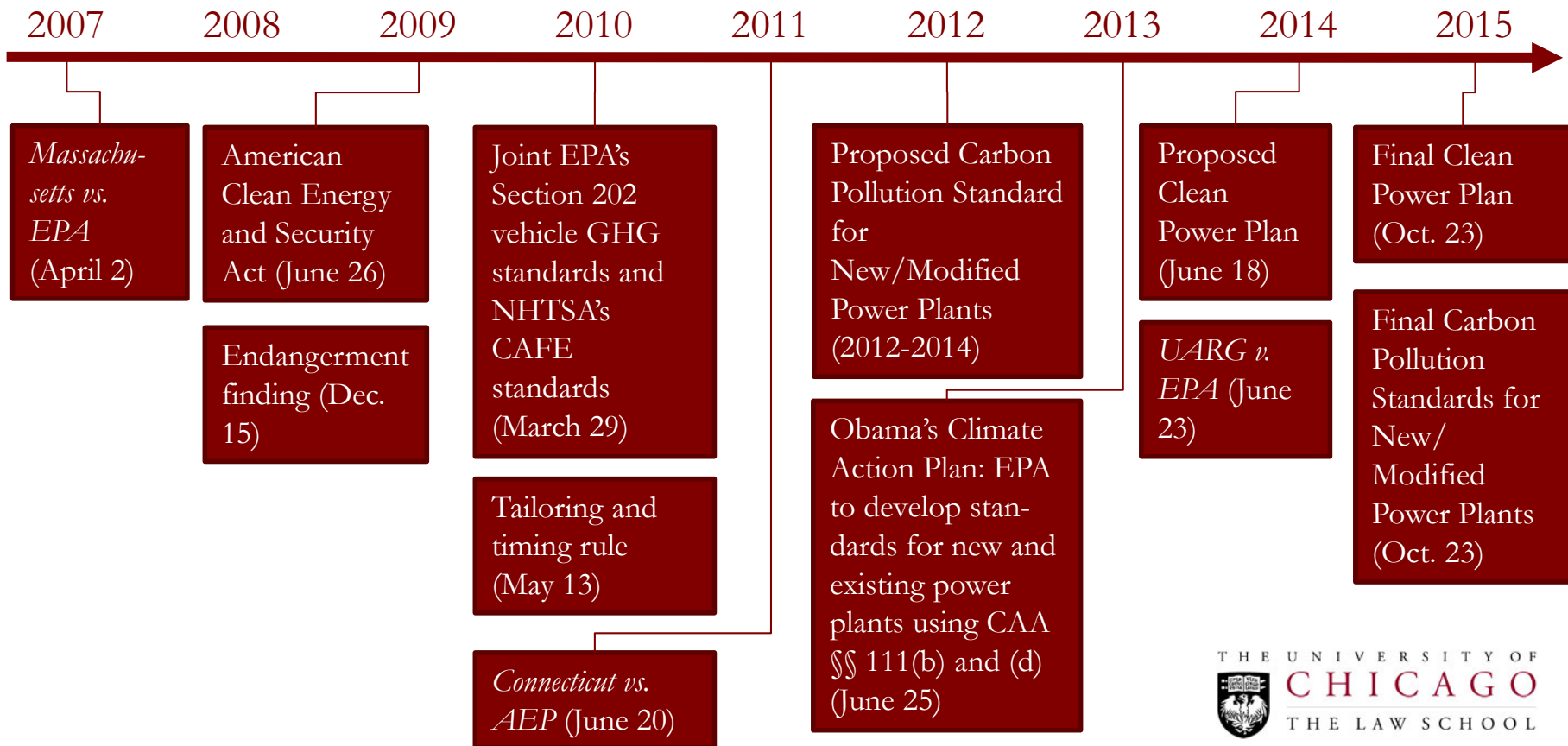
Today's agenda

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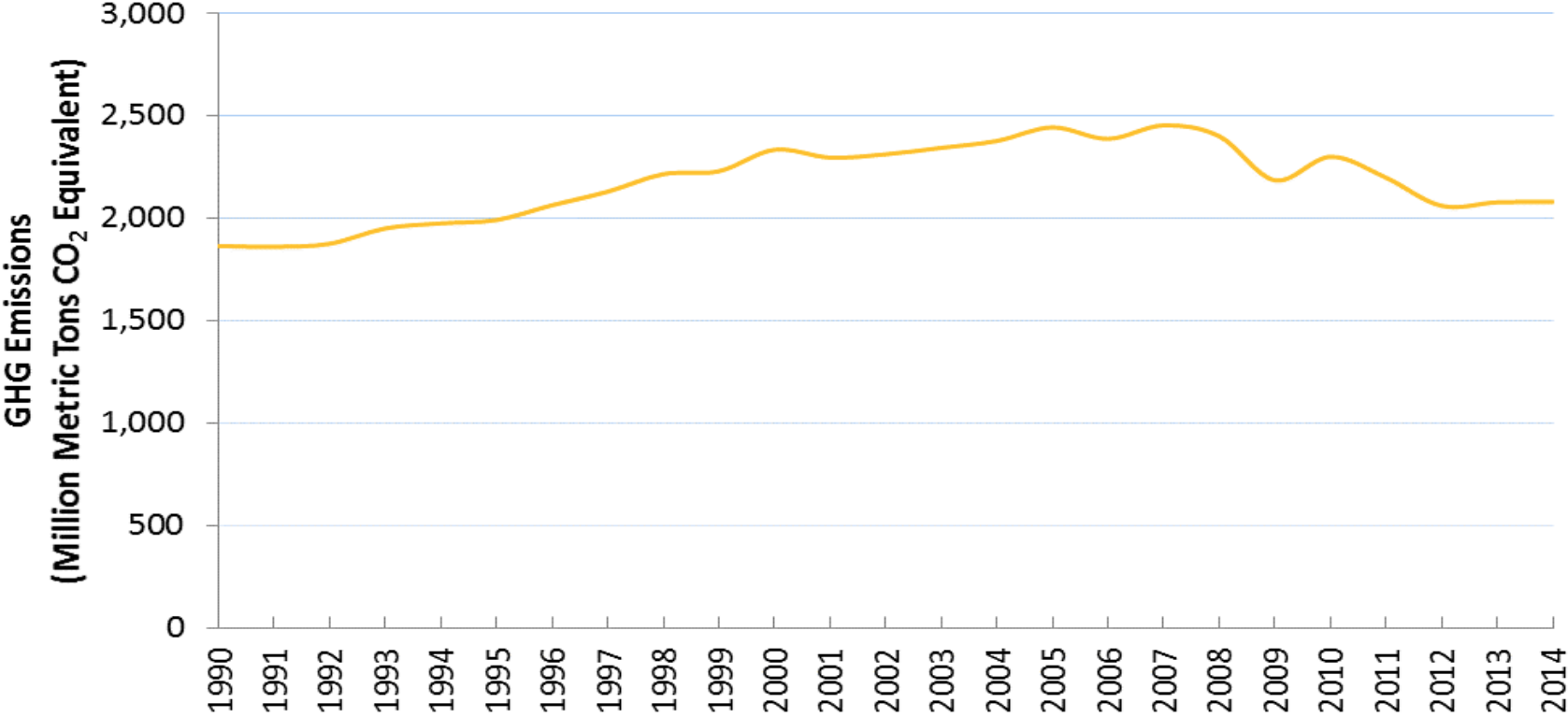
Electricity generating sources produced 31% of U.S. CO₂ emissions in 2013



It took a number of legal steps to get from *Massachusetts vs. EPA* to the CPP

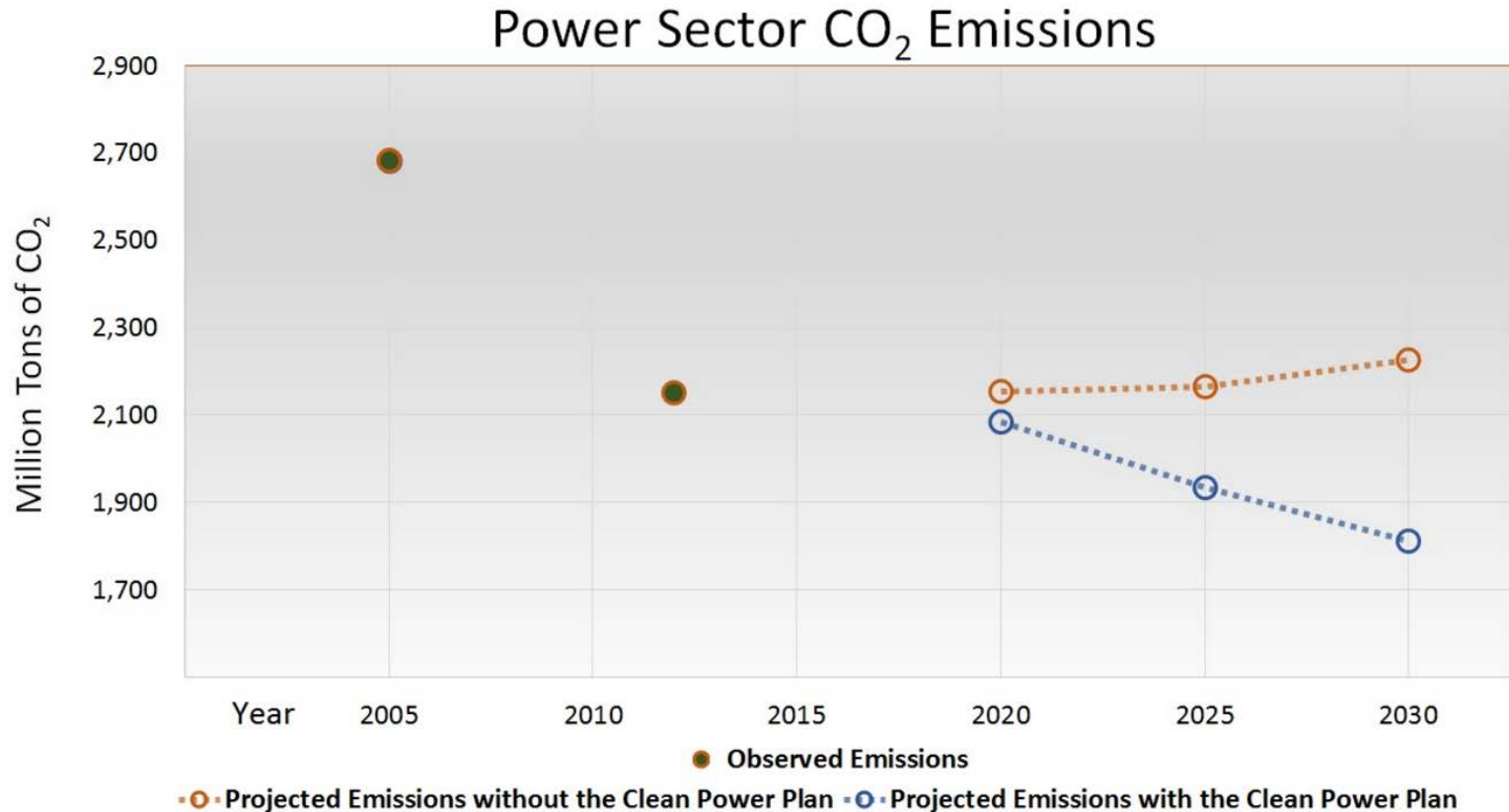


Greenhouse Gas Emissions from Electricity



USEPA *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014.*

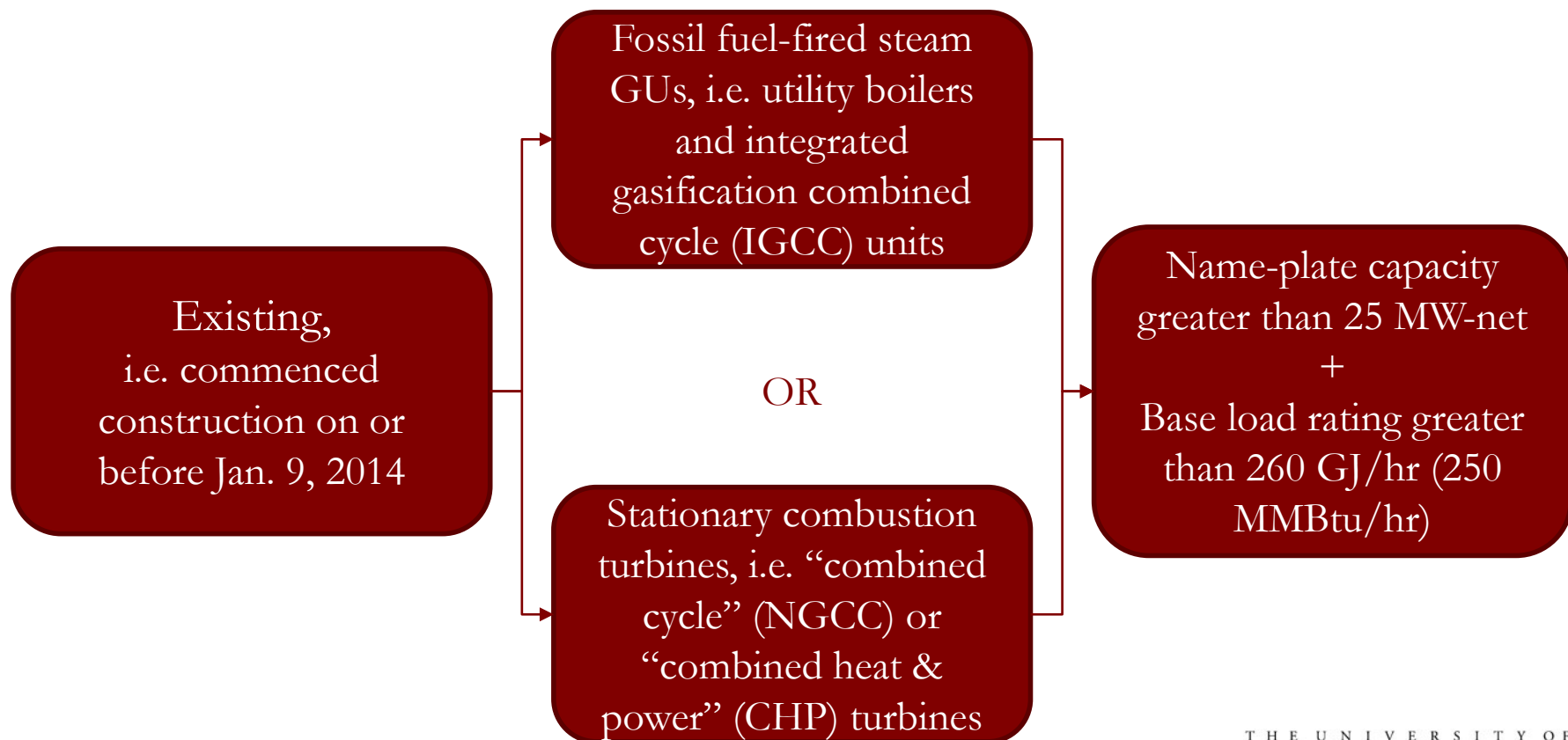
US EPA said the CPP will reduce emissions relative to “business-as-usual” projections



CAA section 111 requires the Best System of Emissions Reduction (BSER) for existing sources

- CAA section 111(d)(1) states, “The Administrator shall prescribe regulations which ... establishes standards of performance for any existing source for any air pollutant...”
- Under section 111(a)(1), a “‘standard of performance’... reflects the degree of emission limitation achievable through the application of the best system of emission reduction ... adequately demonstrated”
- Takes “into account the cost of achieving such reduction and any non-air quality health and environmental impact and energy requirements”

The CPP defines “covered” or “affected” units



US EPA determined BSER for electric generating units (EGUs) based on three “building blocks”

Building blocks:

1. Improving heat rate at affected coal-fired steam EGUs;
2. Substituting increased generation from lower-emitting existing natural-gas combined cycle units for generation from higher-emitting affected steam generating units; and
3. Substituting increased generation from new zero-emitting renewable energy generating capacity for generation from affected fossil fuel-fired generating units.



Resulting BSER:

- 1,305 lbs/MWh for existing fossil fuel-fired electric steam generating units (generally, coal-fired power plants)
- 771 lbs/MWh for existing natural-gas combined cycle units

States implement the CPP, with US EPA as a backstop

- State: Under section 111(d)(1), US EPA shall prescribe regulations, similar to section 110, for a state to submit to US EPA a plan which establishes the standards of performance for any existing source
- Federal: Under section 111(d)(2), EPA has the authority
 - To prescribe a plan for a state if it fails to submit a satisfactory plan (same as under section 110(c)), and
 - To enforce such plan if a state does not (same as under sections 113 and 114)

The timetable for implementation is uncertain

Initial timetable:

- Sept. 6, 2016: Initial SIP submittal deadline
- Sept. 6, 2018: Final SIP submittal deadline
- 2022 - 2029: Emissions-reduction “glide path”
- 2030: Final implementation

Selected subsequent events:

- Feb. 9, 2016: U.S. Supreme Court stays the CPP
- Feb. 13, 2016: Justice Scalia dies
- May 16, 2016: U.S. Court of Appeals for the D.C. Circuit decides to hear the case *en banc* in September

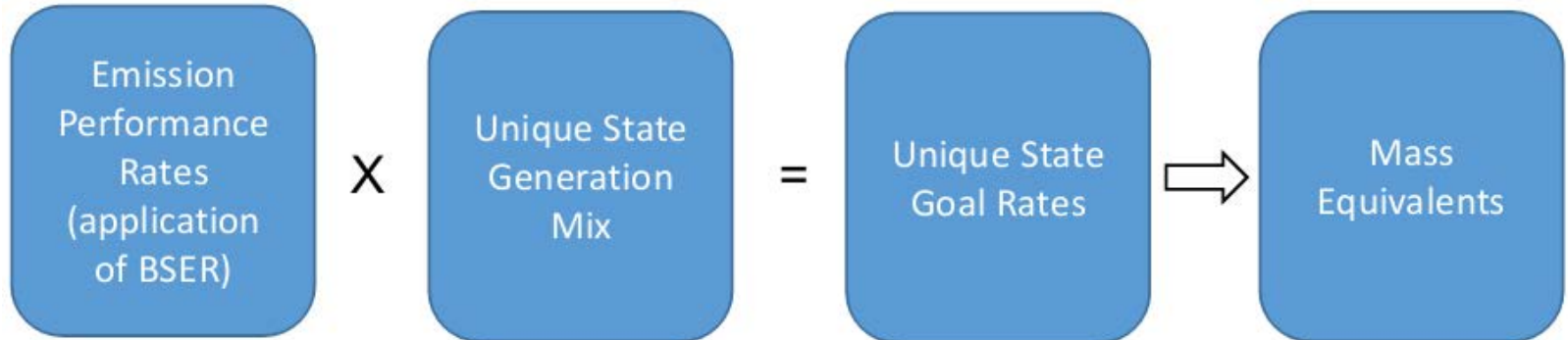
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Each state plan must make three fundamental design choices

- I. Emissions-standards approach or state-measures approach
- II. Mass-based or rate-based
- III. Trading, e.g.,
 - A. No trading,
 - B. Intra-state trading, or
 - C. Inter-state trading

US EPA translated BSER rates into mass equivalents



US EPA has set interim and final goals for each state, including Illinois

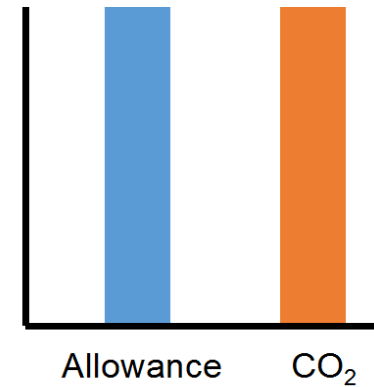
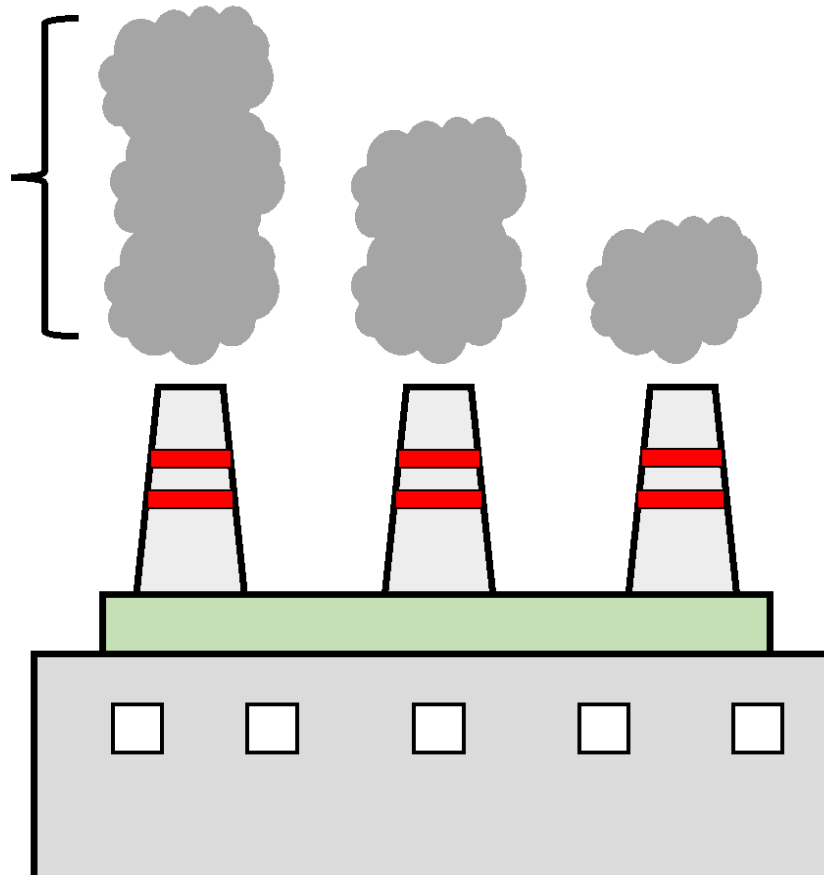
Illinois's Interim (2022-2029) and Final Goals (2030)

ILLINOIS			
	CO ₂ Rate (lbs/Net MWh)	CO ₂ Emissions (short tons)	
2012 Historic ¹	2,208	96,106,169	
2020 Projections (without CPP)	1,705	75,112,620	
	Rate-based Goal	Mass-based Goal (annual average CO ₂ emissions in short tons)	Mass Goal (Existing) & New Source Complement
Interim Period 2022-2029	1,456	74,800,876	75,619,224
Interim Step 1 Period 2022-2024 ²	1,582	80,396,108	80,731,921
Interim Step 2 Period 2025-2027 ³	1,423	73,124,936	74,257,813
Interim Step 3 Period 2028-2029 ⁴	1,313	68,921,937	69,992,293
Final Goal 2030 and Beyond	1,245	66,477,157	67,199,174

Source: <http://www.epa.gov/airquality/cpptoolbox/illinois.pdf>

Mass-based CO₂ emissions and allowances

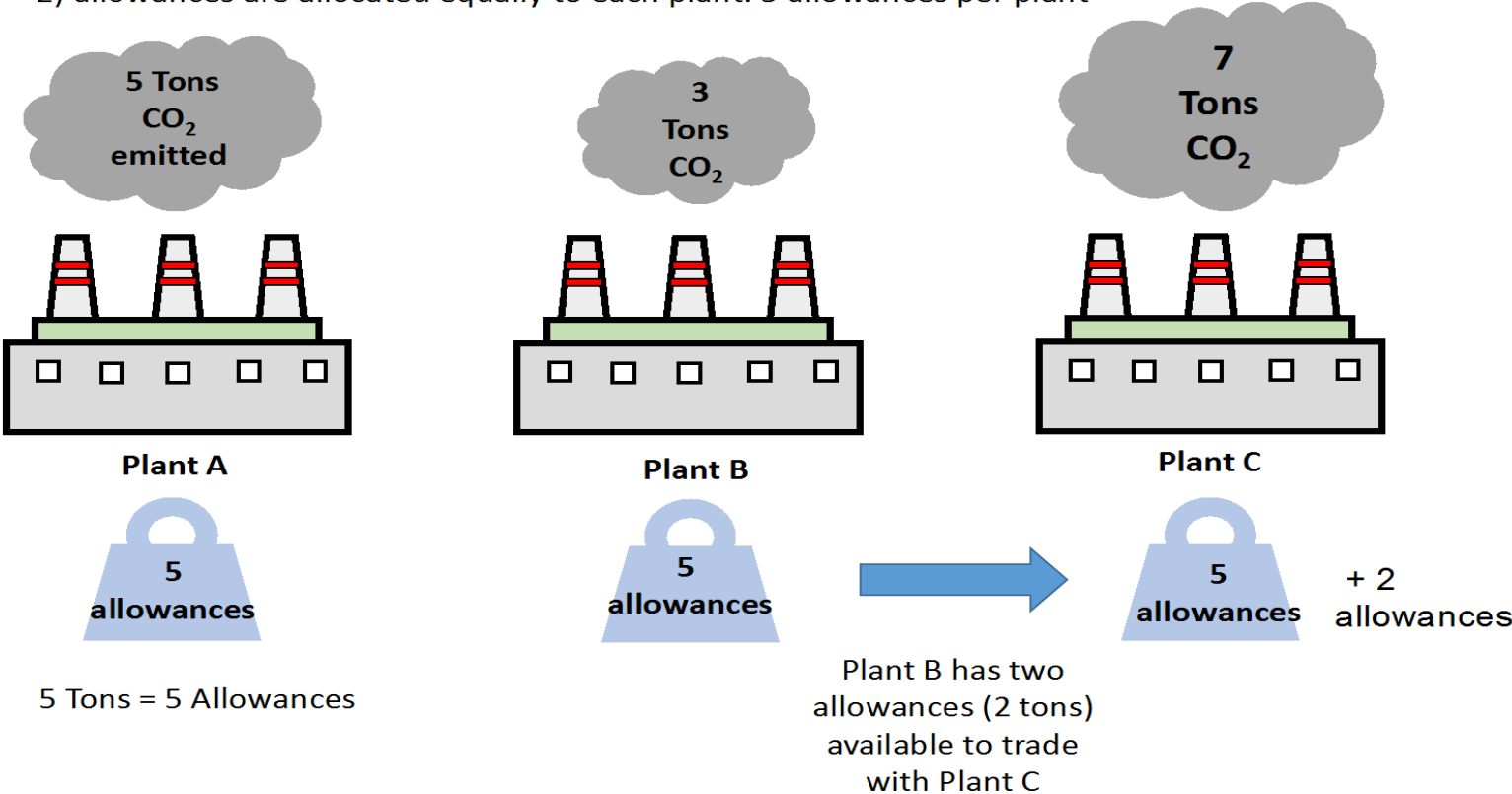
Every plant must measure, monitor and report its CO₂ emissions



Every plant must have sufficient allowances to cover its emissions at the end of each compliance period

Mass-based emissions trading in a nutshell

- Example Assumptions:
- 1) a total budget of 15 tons of CO₂ for a state with 3 plants
 - 2) allowances are allocated equally to each plant: 5 allowances per plant



Source: EPA, www.epa.gov/cleanpowerplan/december-2015-presentation-fpmr-communities

CPP anticipates trading, but does not mandate it

- “[S]tates should be expected to allow their affected EGUs to trade ... because trading is well-established for this industry and has the effect of focusing costs on the affected EGUs for which reducing emissions is most cost-effective.”
- “Because trading facilitates implementation of the building blocks and may help to optimize cost-effectiveness, trading is a method of implementing the BSER as well.”

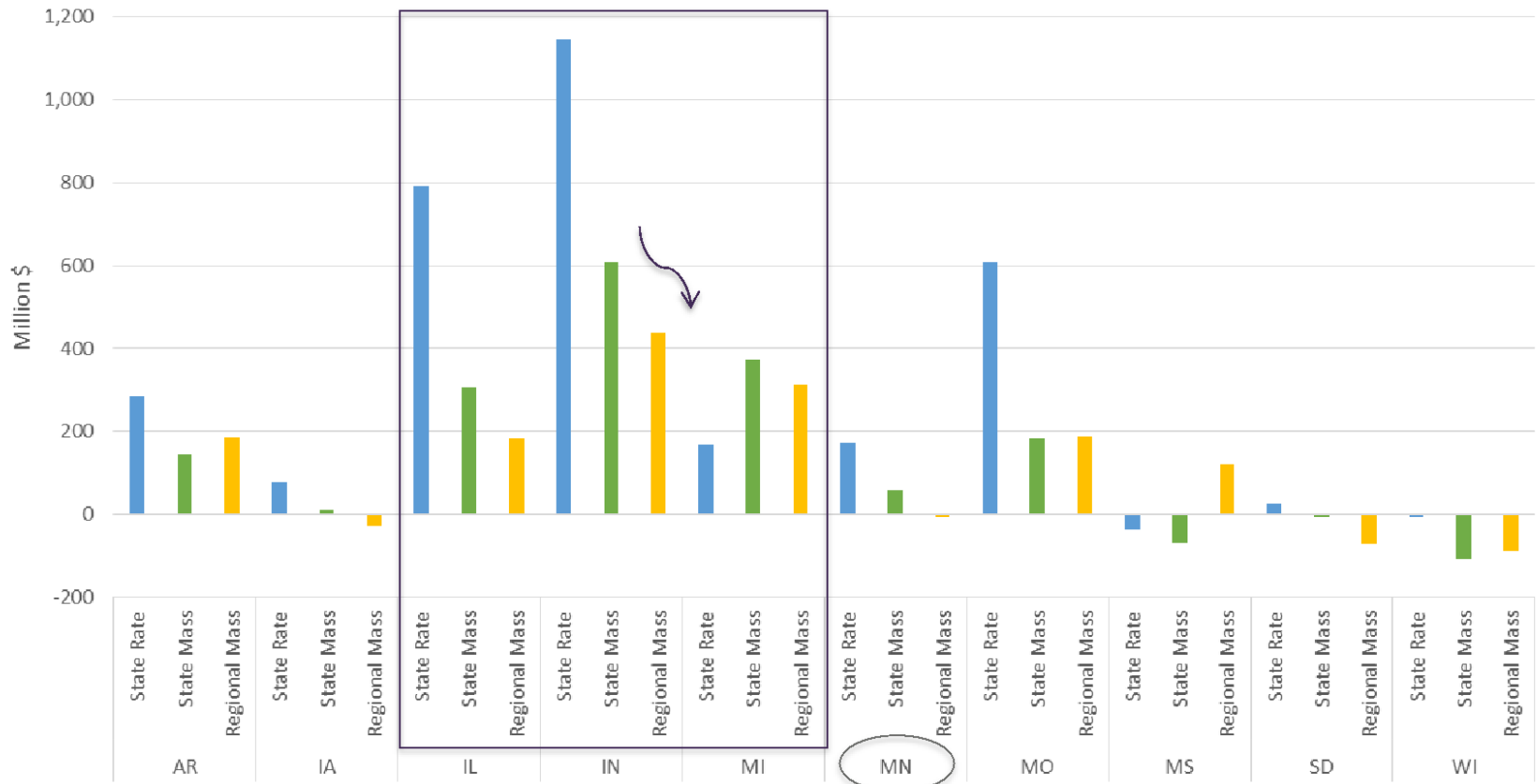
Source: CPP at 80 Fed. Reg. 64,709.

EGU operators are familiar with trading

- Existing programs allow for trading, e.g., Title IV (acid rain program), Cross-State Air Pollution Rule, California Global Warming Solutions Act (aka AB32), Regional Greenhouse Gas Initiative (RGGI).
- Some of those who have expressed concerns about the CPP have stated that they would want trading options if CO₂ regulations are upheld.

Some models find mass-based trading to be the lowest cost option for Illinois

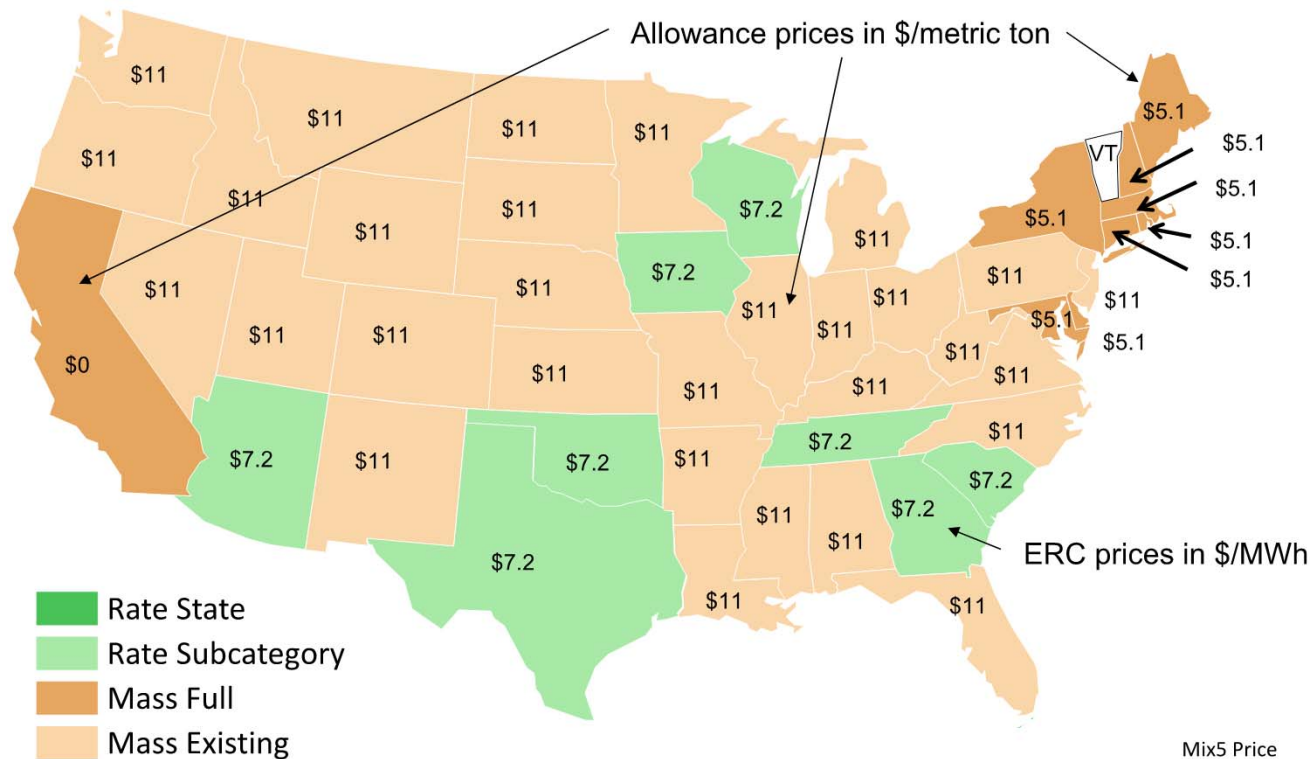
MSEER States Average Annual Compliance Cost (2023-2033)



Source: Jennifer Macedonia And Blair Beasley, Modelling of the Final Clean Power Plan, Minnesota Stakeholder Meeting, March 16, 2016, Bipartisan Policy Center

Selections by other states affect allowance price (EPRI's low gas price, trading scenario)

2030 Mix2 ERC/Allowance Pricing with Low Gas Prices



Assumptions:

- Multi-state trading
- Low gas prices (remaining between \$3 and \$4/MMBtu until 2050) (AEO 2015 HEUR)

Result:

- Most states chose mass path

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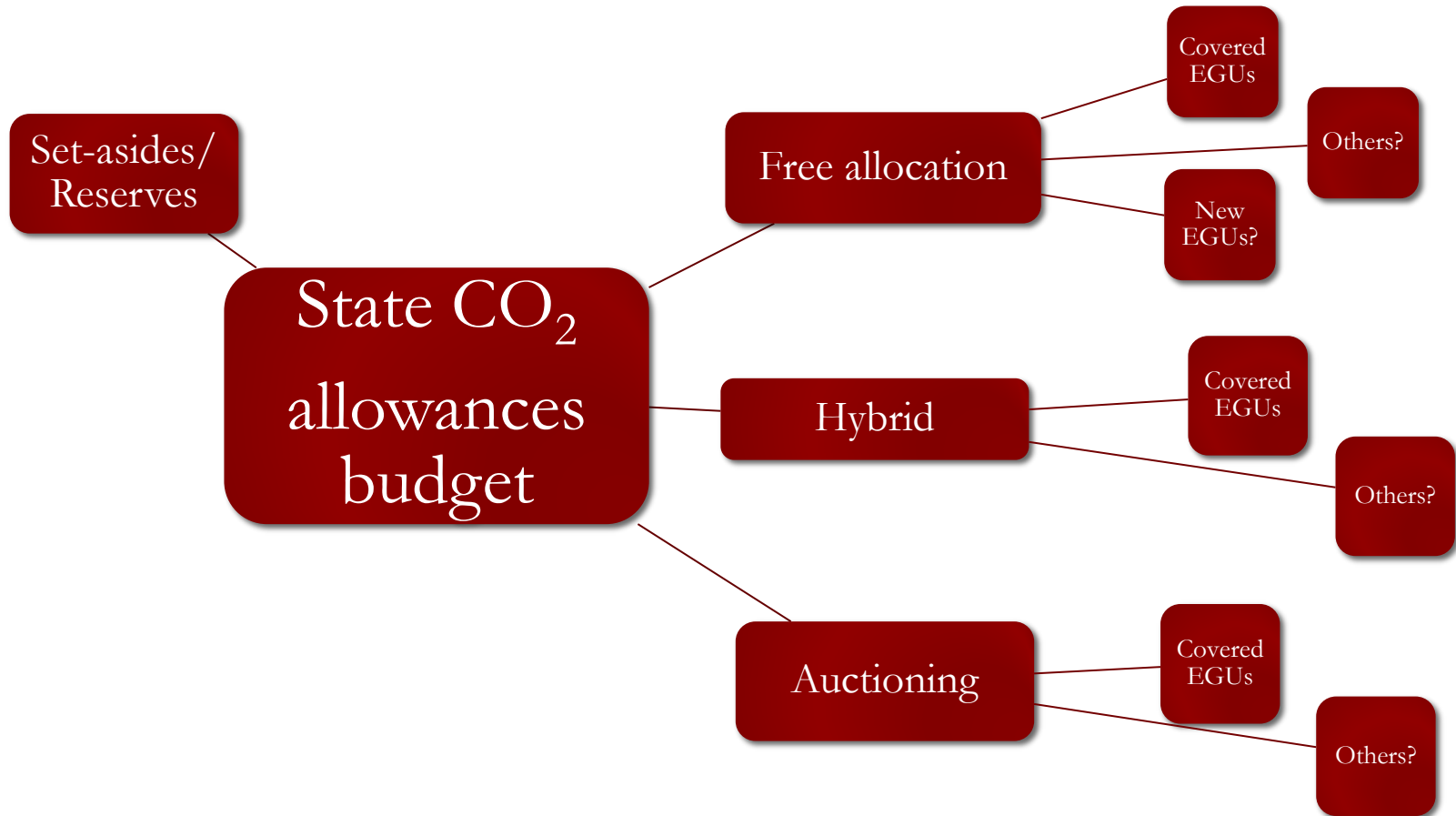
THE UNIVERSITY OF CHICAGO
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Source: EPRI

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A mass-based plan must address a number of additional considerations

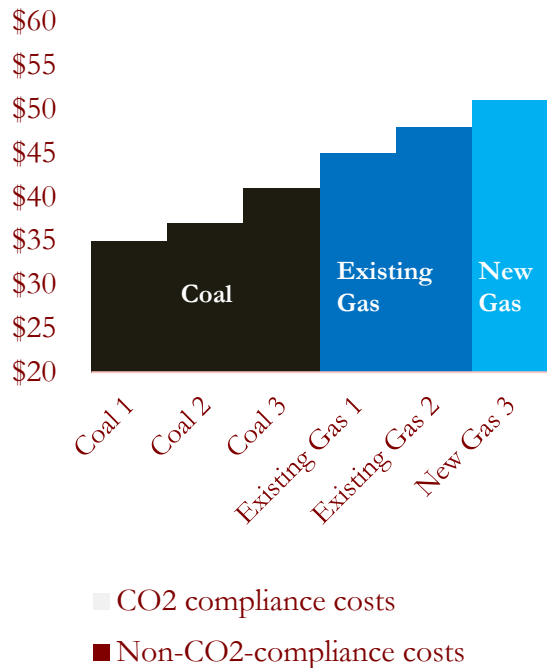


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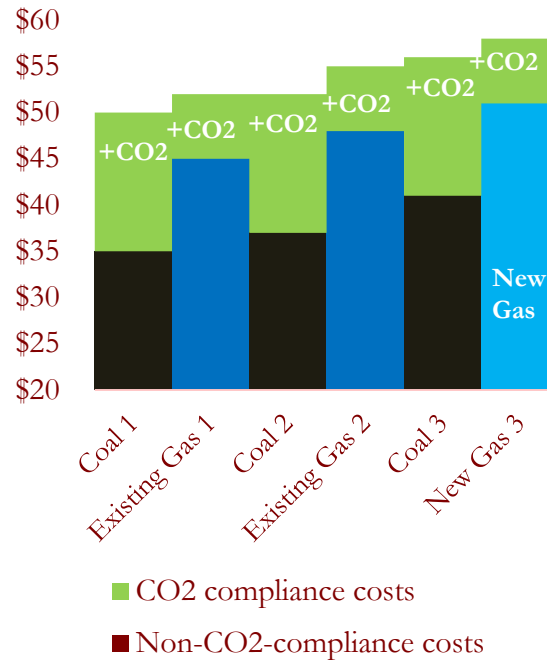
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If no adjustments are made, new emitters could avoid compliance costs

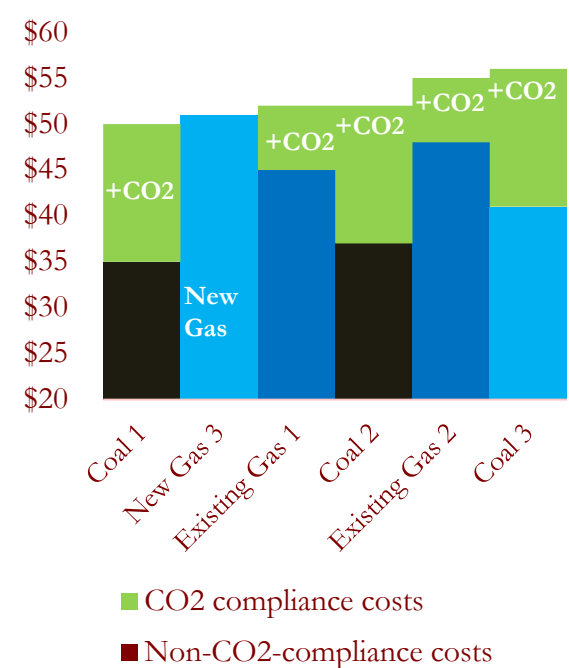
Supply curve without CO₂ cost



Supply curve with CO₂ cost for new and existing sources



Supply curve with CO₂ cost for existing sources only



Source: Franz Litz and Brian Murray, Mass-Based Trading under the Clean Power Plan: Options for Allowance Allocation, Working Paper NI WP 16-04 March 2016

CPP gives different options for addressing leakage

To address leakage, a state can either

- Include new sources in the same program with existing sources through the “new source complement”; or
- Cover existing sources only and make a set of adjustments to try to level the playing field between existing and new sources

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There are various options for distributing allowances

- Free allocation
- Auction
- Hybrid

Policy goals may influence allocation decisions

Alternative Policy Priorities	Models	Illustrative Mechanisms
1. Mitigate retail rate increases	SO ₂ & NO _x	Free allocation to EGUs
	CPP (primary allocation)	Free allocation to regulated EGUs
2. Provide asset compensation	CPP (primary allocation)	Free allocation to merchant EGUs
3. Deter gas-on-gas leakage	CPP gas set-aside (~6%)	Free allocation to eligible gas
	CPP RE set-aside (~5%)	Free allocation to new RE
4. Address other market distortions (e.g. early nuclear retirement)		Credit allocation
5. Support new resources		<ul style="list-style-type: none"> • Multi-state auctions/ states spend • State auctions / state invests
<ul style="list-style-type: none"> • Renewable energy and energy efficiency 	RGGI CA GHG Program CPP CEIP set-aside (~5%)	Free allocation to eligible RE & EE
<ul style="list-style-type: none"> • Carbon capture & storage 		Credit allocation
<ul style="list-style-type: none"> • Nuclear 		Credit allocation

Entity type might affect allocation decision

Distribute to whom?	On what basis?
Covered power plants (“affected EGUs”)	<ul style="list-style-type: none"> • Historical heat input • Historical output • Historical emissions • Output updating
All generators, including non-covered sources	Share of output
Load-serving entities (LSEs)	Share of load served
Entities other than power producers	To achieve specific purposes (e.g., energy efficiency)
Buyers through auction	Highest bidder at the auction

Source: Franz Litz and Brian Murray, Mass-Based Trading under the Clean Power Plan: Options for Allowance Allocation, Working Paper NI WP 16-04 March 2016

Allocation baseline affects who receives value

Illustrative	% of a state	If total allowances = 80 million (1 per ton of CO ₂)
I. Output-based allocation		
• Nuclear	50%	38.7 million
• Coal	40%	34.5 million
• Wind	5%	4.0 million
• Natural Gas	4%	2.2 million
• Other	1%	0.6 million
II. Emissions-based allocation		
• Nuclear	0%	
• Coal	70%	50.6 million
• Wind	0%	
• Natural Gas	30%	29.5 million

There are other allocation baseline decisions

Historical (fixed):

- Uses a fixed historical baseline:
 - CO₂ emissions/electricity production during a reference period
 - Set (e.g., 2012)
- Examples:
 - Acid Rain program
 - NO_x trading programs in CA (RECLAIM)

Recent (updating):

- Makes adjustments over time
 - Adjusts in response to shifts in emissions
 - Could be structured as “average annual net generation in the two years prior to the allocation year”
- Examples:
 - EPA CPP FIP set-asides
 - CAIR NO_x trading program in Illinois

Classic Auction

- CO₂ allowances sold to the highest bidder
- State or a third-party can run the auction
- Revenue for public benefit
- Bids reflect EGUs' abatement costs
- Previous example: RGGI (nearly 100% auction)

Hybrid (e.g., Consignment Auction)

- Holders of free allowances required (or allowed) to “consign”
- Proceeds go back to holders (i.e. no revenue for the state)
- All can bid/purchase
- Previous examples:
 - Acid Rain program (3% of allowances auctioned/sold)
 - California AB 32 (voluntary consignment)

A state can combine different approaches

Examples:

- Tailored free allocation to low emissions sources based on generation capacity
- Free allocation with partial auction
 - Pure or consignment
 - Freedom to design set-asides in alignment with state goals
- Allocate to load-serving entities and direct them to sell allowances to generators, with mandatory use of proceeds towards rate reductions and investments in energy efficiency

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EPA guidelines anticipate four potential set asides (aka reserves)

1. **Clean Energy Incentive Program:** Renewable energy and energy efficiency projects commencing after Sep. 6, 2018 that generate savings in 2020-2021 will receive up to 300 million allowances
2. **Output-based allocation reserve:** Existing natural gas-fired combined cycle that generate more get allocations to mitigate against leakage to new sources
3. **Renewable energy installation incentive**
4. **Emergency reserve:** EPA will distribute remaining allowances pro-rata to EGUs compelled to provide critical generation if there is no available supply of needed allowances to offset emissions

States need to consider other design elements

- Timing, e.g.,
 - Cap reductions
 - Length of compliance periods
 - Banking
 - Limited borrowing
- Dampening price volatility, e.g.,
 - Third-party purchasers
 - Price floors
- Reducing energy use and burden on local ratepayers
- Considering impact on environmental justice communities

States need to review their existing legal authorities

- Greenhouse gases
- Trading
- Allocation
- Revenues, if any

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Questions?

Thank you

Mark Templeton

Associate Clinical Professor of Law and
Director of Abrams Environmental Law Clinic

templeton@uchicago.edu

(773) 702-9611

Tetyana Rabczak, JD, LL.M

trabczak@uchicago.edu