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# THE CLEAN POWER PLAN

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## **Emission Trading 101: Introductory Concepts of Mass- and Rate-based Emission Trading Programs**

Webinar

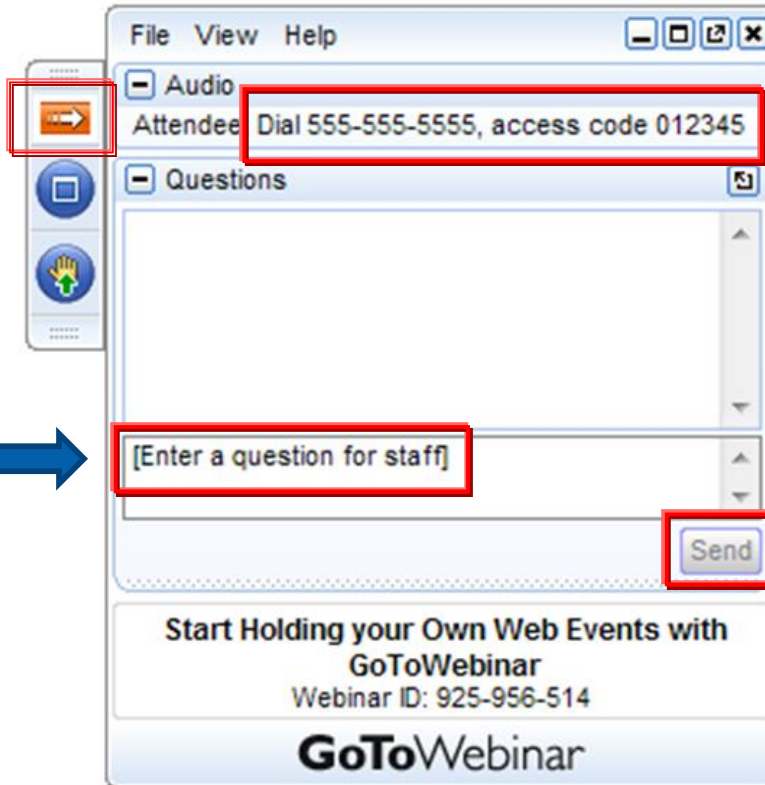
January 11, 2016

The final CPP is available at 80 FR 64661. In the event of any conflict between the provisions of the final rule and these slides, the final rule and requirements within are controlling.



# How to Participate Today

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Participants are on mute  
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Lauren Marti at: [Lauren.Pederson@icfi.com](mailto:Lauren.Pederson@icfi.com)



# Outline

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- Overview
- History of emission trading
- Mass-based trading approach
  - Design
  - Operation
  - Key points
- Rate-based trading approach
  - Design
  - Operation
  - Key points
- Additional resources



# Overview of emission trading

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## Emission goal

- Government establishes environmental goal
- Government distributes mass-based allowances or rate-based goals to affected sources

## Compliance strategy

- Affected sources decide how and how much to reduce emissions on-site versus using tradeable compliance instruments

## Emission measurement

- Affected sources must measure and report emissions and other relevant data

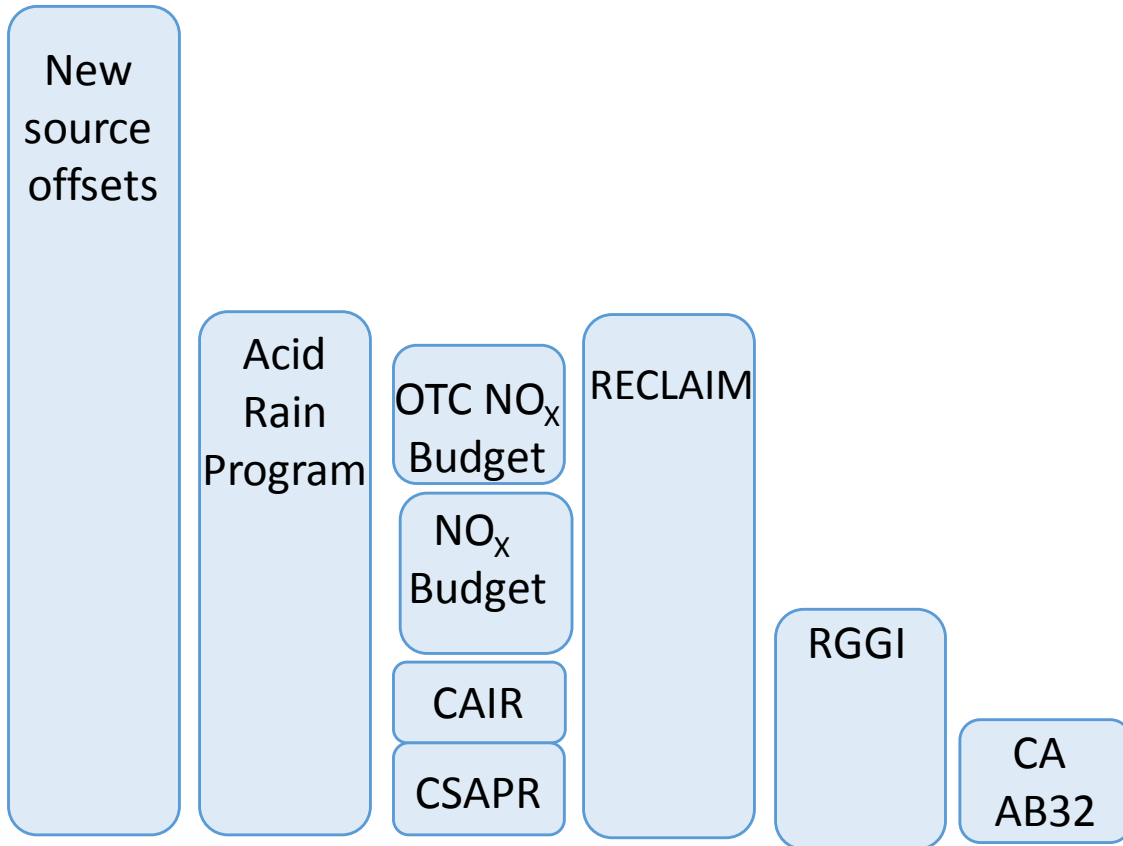
## Compliance assessment

- Based on emission data, affected sources must submit compliance instruments to meet compliance obligations
- Government levies automatic penalties for non-compliance

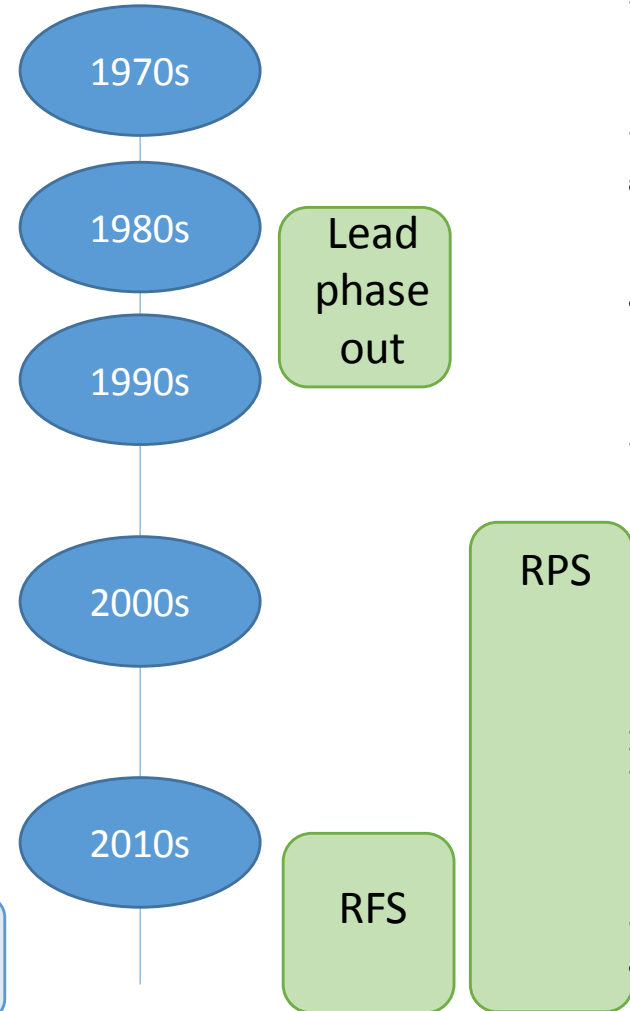


# Experience with emission trading

## Mass-based trading



## Rate-based trading



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# Mass-based emission trading

## An introduction



# Mass-based trading terminology

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- Emission budget: a mass-based emission limit for all affected sources within a state or group of states
- Allowance: a limited authorization to emit a specific quantity (e.g., 1 ton) of a pollutant from an affected source
- Allocation: a method to initially distribute allowances to affected sources and/or other entities
- Set-aside: a quantity of allowances reserved for distribution to encourage certain actions (e.g., installing renewable energy sources) or to provide allowances to specific types of sources (e.g., new sources)
- True up: a process of reconciling emissions and allowances to assess compliance with allowance holding obligations
- Borrowing: using future allowances to meet a compliance obligation in an earlier compliance period (note: most trading programs prohibit borrowing)
- Banking: saving unused allowances for future compliance periods





# Mass-based trading: Overview

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## Emission goal

- Government establishes environmental goal expressed as total allowable mass emissions; goal may change over time
- Government issues allowances representing an authorization to emit a quantity of an emission (e.g., 1 ton)
- Government allocates allowances to affected sources

## Compliance strategy

- Affected sources decide how and how much to reduce emissions on-site and/or purchase allowances

## Emission measurement

- Affected sources must measure and report emissions and other relevant data

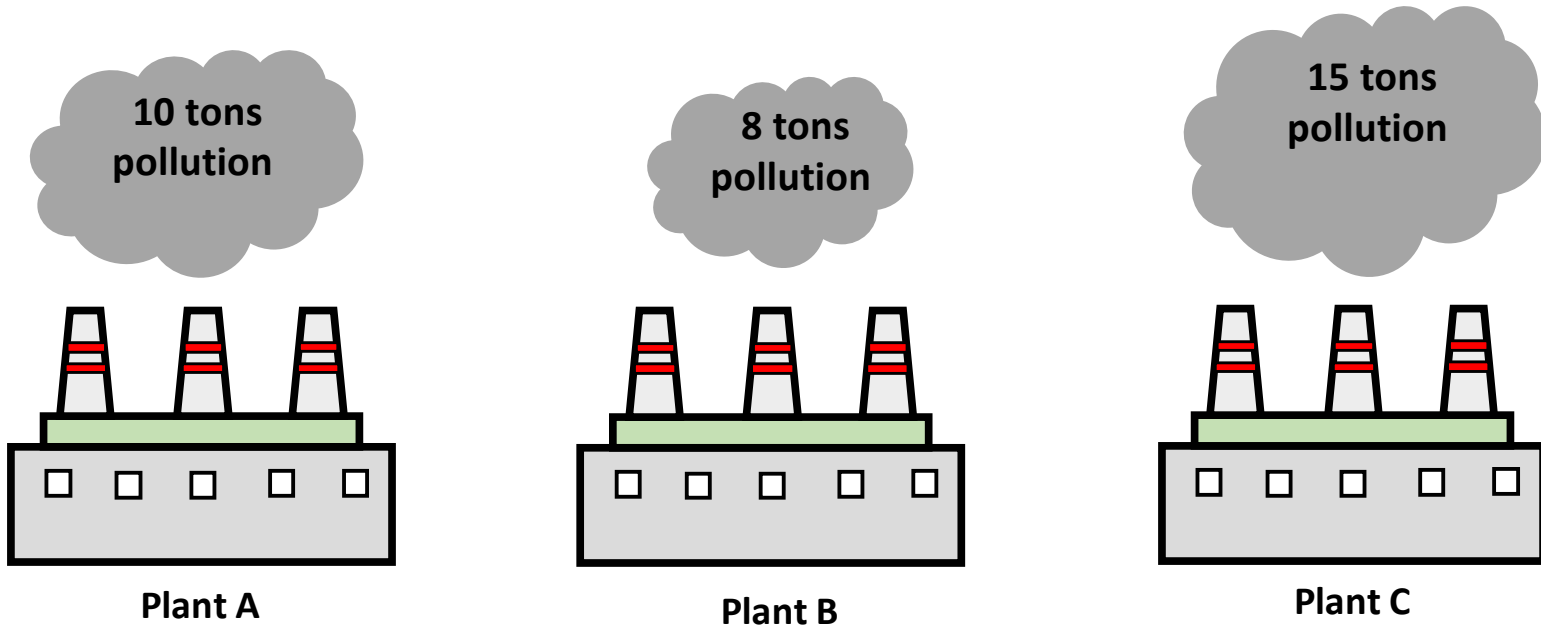
## Compliance assessment

- Based on emission data, each affected source must submit allowances to meet compliance obligations (e.g., 1 allowance per ton of emissions)
- Predictable automatic penalties are levied for non-compliance



# Mass-based trading: Emission measurement and reporting

- Each affected source must measure and report emissions to the government administrator

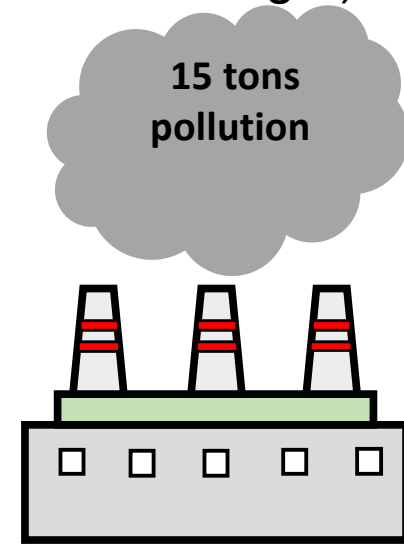
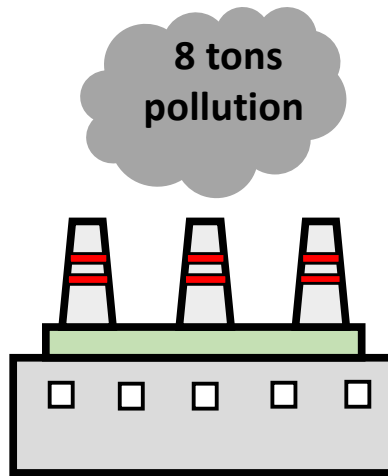
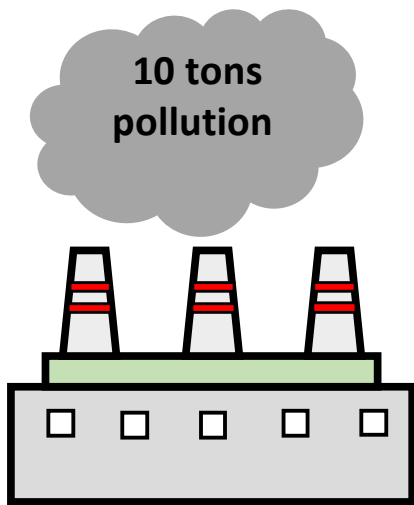


Total emissions: 33 tons pollution



# Mass-based trading: Allowance trading

- Government distributes allowances to each affected source (total allowances are equal to or less than the budget)



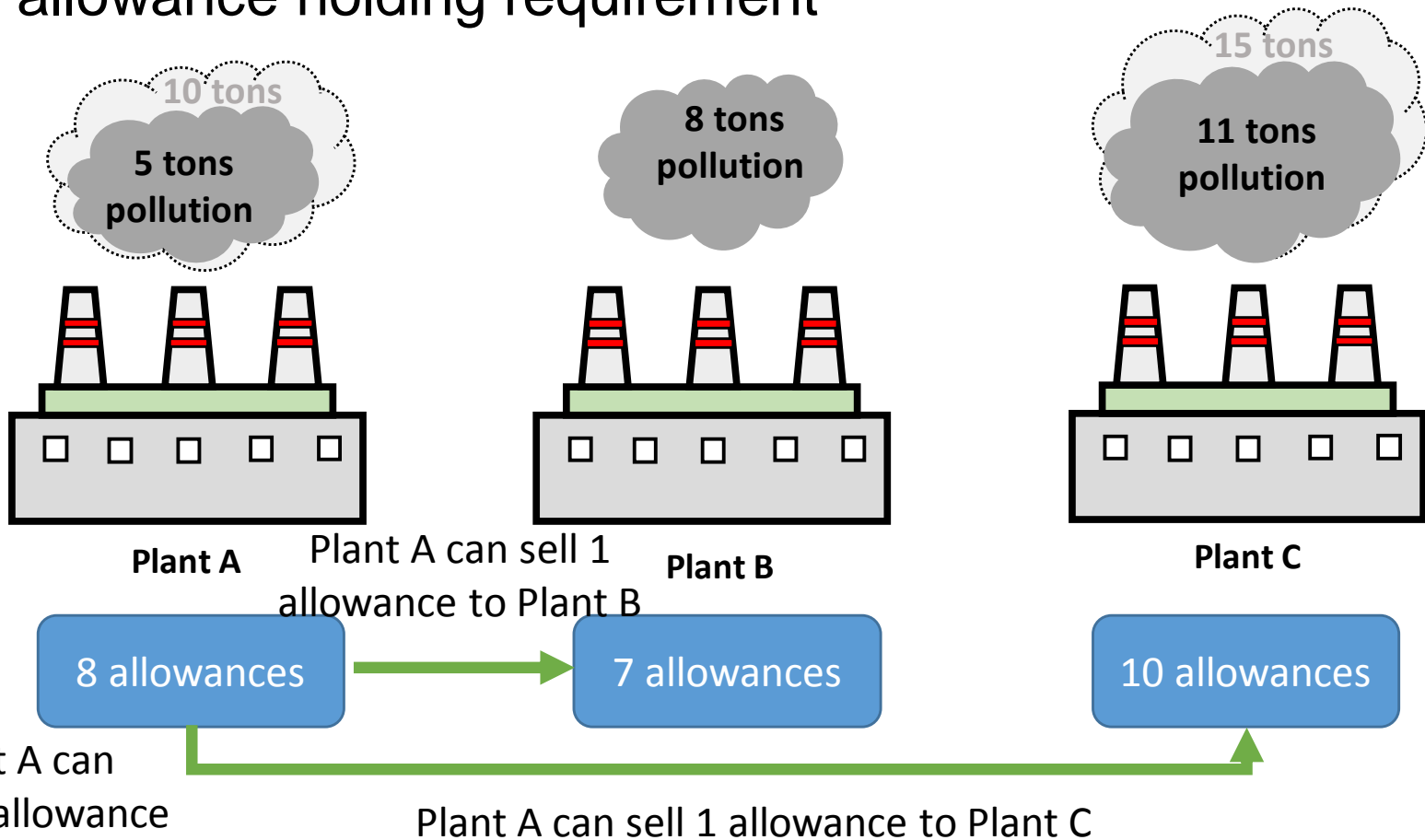
Total emissions: 33 tons pollution

Total budget: 25 tons pollution (allowances)



# Mass-based trading: Allowance trading

- Each affected source decides how to comply with allowance holding requirement



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# Mass-based trading: Design and operation

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## Design

- Setting the emission budget
- Assigning responsibility for meeting the emission budget
- Developing allowance allocation methodology
- Establishing rules and timelines for allowances, emission measurement, and compliance
- Creating emission reporting systems and allowance tracking systems

## Operation

- Distributing allowances
- Tracking allowance transactions
- Collecting and auditing emission reports
- Providing compliance assistance
- Determining compliance
- Imposing penalties for non-compliance



# Mass-based trading: Allowance allocation

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- Allocations are a method for the government to initially distribute allowances to affected sources and/or other entities
- Common allocation approaches include
  - Free allowance allocations
  - Allowance allocation through auctions
  - Allowance allocation through set asides
- Governments may use one or more allocation approaches



# Mass-based trading: Free allowance allocations

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- Allowances can be allocated at no cost to affected sources based on past or projected performance and a benchmark allocation rate
  - Example: Allowance allocations might be calculated using historical electricity generation data and a benchmark emission rate (e.g., X pounds/MWh)

$$\text{Historical generation (MWh)} \times \text{benchmark emission rate} \left( \frac{\text{pounds}}{\text{MWh}} \right)$$

- The choice of data period, benchmark and methodology can reward different source characteristics and actions
  - Input-based allocations benefit sources that are lower emitting (e.g., use cleaner-burning fuels or emission controls)
  - Output-based allocations benefit sources that are lower emitting and/or more efficient (i.e., fewer emissions per unit of output)
- Free allocation of allowances provides a financial benefit to the recipient equal to the market value of the allowances



# Mass-based trading: Allowance allocation through auctions

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- Allowances can be allocated through auction to highest bidders
- Revenues from the auction can be used to support policy goals, including
  - Investments in energy efficiency
  - Investments in renewables
  - Energy assistance to mitigate potential impacts for electricity ratepayers
- Most trading programs with auctions conduct the auctions quarterly or annually
  - Acid Rain Program has an annual nonrevenue-raising auction
  - California AB32 and RGGI have quarterly auctions with some of the proceeds invested for the benefit of ratepayers<sup>1</sup>

<sup>1</sup> For more info see RGGI, Inc (2014). [Regional Investment of RGGI CO2 Allowance Proceeds, 2012](http://www.rggi.org/docs/Documents/2012-Investment-Report.pdf).  
<http://www.rggi.org/docs/Documents/2012-Investment-Report.pdf>





# Mass-based trading: Allocation through allowance set-asides

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- Allowances from within the state(s) budget are set aside for a specific use
  - Providing an incentive for certain actions (e.g., investments in energy efficiency, renewable energy, emission controls)
  - Addressing equity concerns
  - Providing a resource for new sources to purchase allowances
- Affected sources can use the allowances for compliance
- Other entities (i.e., not affected sources) can sell the allowances to receive the financial benefit
- Unused allowances from the set-aside can be saved for future compliance periods or distributed through auction or free allocation to affected sources



# Mass-based trading: Emission measurement and reporting

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- Affected sources must monitor and report total mass emissions
- Emission measurements are the basis for determining each affected source's compliance obligation – number of allowances the source must submit for compliance
- Accurate and consistent emission measurement ensures that one ton of pollution measured at one source is equal to one ton of pollution measured at another source



# Mass-based trading: Allowance transaction tracking

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- The government administrator's allowance tracking system is the official record of allowance holdings and transactions
  - All official transactions, including allocations/distributions, transfers, and compliance use, are recorded in the tracking system
  - Compliance with the obligation to hold allowances (i.e., hold sufficient allowances at the end of the compliance period to cover the source's emissions) is based on the number of eligible allowances in the source's compliance account



# Mass-based trading: Compliance assessment

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- At the end of the compliance period, affected sources are given a short grace period to transfer sufficient allowances to a compliance account
- Allowance obligation is based on each source's total emissions during the compliance period

$$\textit{Eligible allowances} \geq \textit{total emissions}$$

- Automatic non-compliance penalties are levied for each excess ton of emissions (other non-compliance penalties may also apply)



## Mass-based trading: Incentives for renewable energy and demand-side energy efficiency

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- Zero-emitting energy sources are not required to submit allowances for compliance
- Improved demand-side energy efficiency reduces demand for electricity and, as a result, a source's emissions and need for allowances
  - Can offer a cost-effective strategy to reduce emissions
- Allowance allocations to renewable energy sources and energy efficiency programs can provide a source of revenue (from sale of allowances)



# Mass-based trading: Key points

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- Simple program design is easier to implement and enforce
- Trading can complement other policies to promote pollution reduction and/or energy efficiency
- High quality emission data are important to assess compliance and ensure environmental integrity
- Allowance tracking systems are essential for program operation
- Transparency builds confidence and credibility in the program



# Rate-based emission trading

## An introduction



# Rate-based trading terminology

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- Emission rate goal: an allowable quantity of emissions per unit of input or output (e.g., electricity generation)

$$\frac{\textit{emissions}}{\textit{MWh}}$$

- Credit: a compliance instrument representing verified emission or energy reductions (e.g., a MWh of zero-emitting electricity or energy savings)
- True up: a process of reconciling emissions rate goals and credits to assess compliance with goal
- Banking: saving unused credits for future compliance periods
- Borrowing: using expected future credits to meet a compliance obligation in an earlier compliance period





# Rate-based emission trading: Overview

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## Emission goal

- Government establishes environmental goal expressed as allowable emission rate (emissions per unit of input/output); goal may change over time

## Compliance strategy

- Affected sources decide how and how much to reduce emissions on site and/or purchase credits
- Options to obtain credits include on-site emission reductions, investing in zero-/low-emitting electricity and purchasing credits

## Emission rate measurement

- Affected sources must measure and report emissions, input/output and other relevant data
- Government issues credits for affected sources operating below the emission rate goal

## Project measurement

- Eligible projects (e.g., renewable and energy efficiency projects) measure results (e.g., electricity generation or savings)
- Government issues credits for approved and verified projects

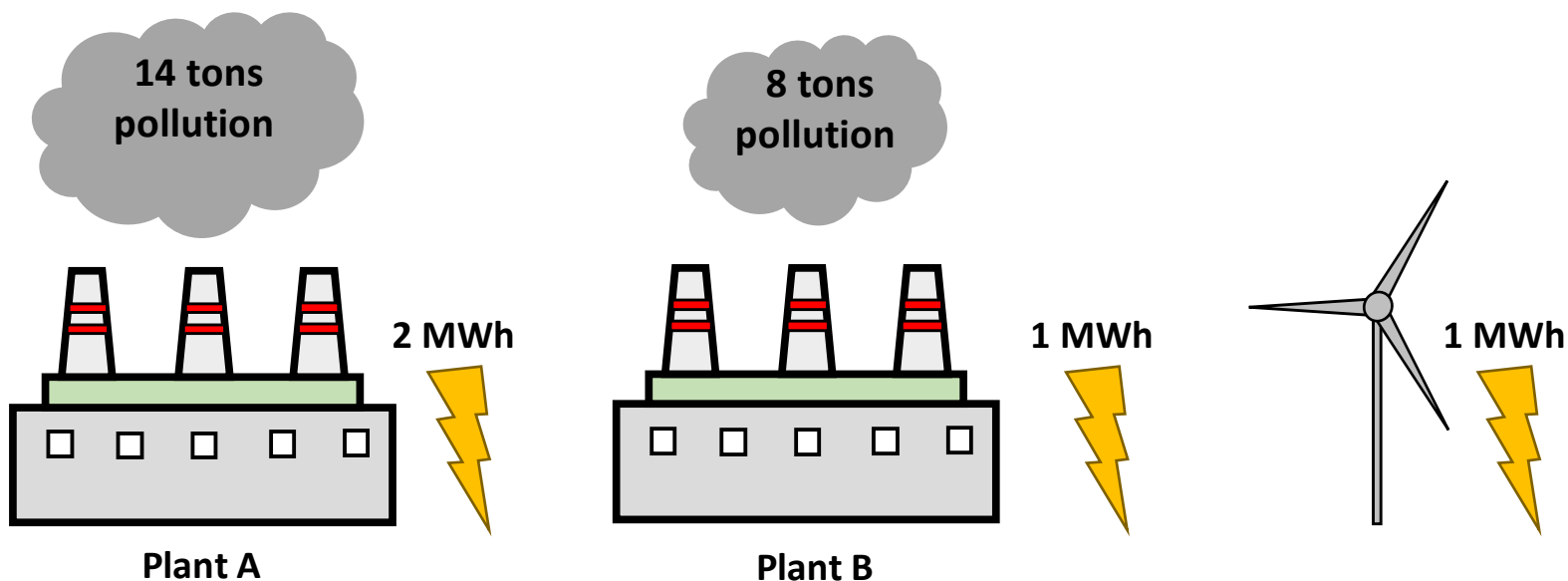
## Compliance assessment

- Based on emission and input/output data, each affected source must submit credits to meet its emission rate goal
- Predictable automatic penalties are levied for non-compliance



# Rate-based trading: Measurement and reporting

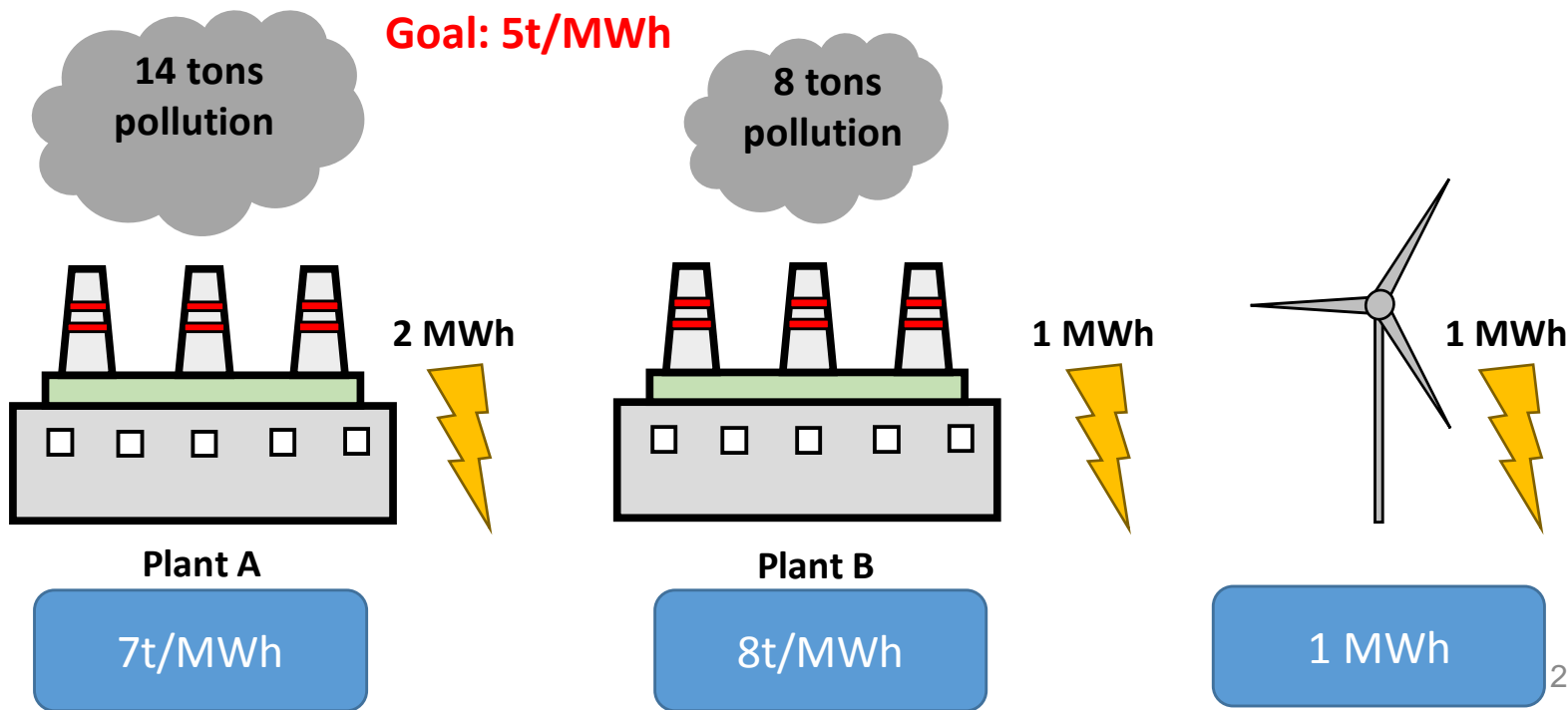
- Each affected source must measure and report emissions and electricity generation to the government administrator
- Eligible renewable or energy efficiency projects must measure and report electricity generation/savings





# Rate-based trading: Credit trading

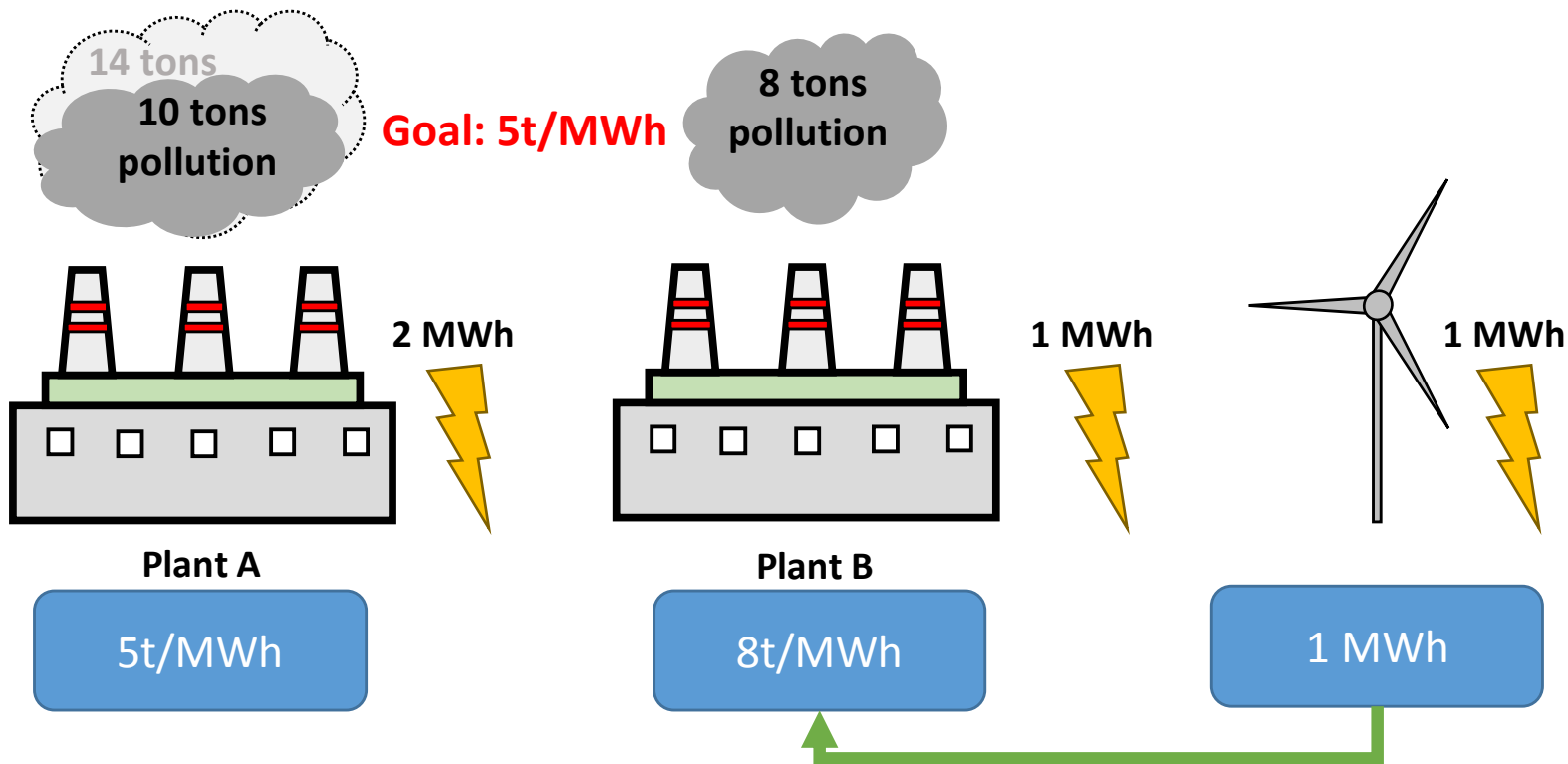
- Government establishes emission rate goals
- Government issues credits
  - Eligible and verified renewable energy generation and energy efficiency savings through an evaluation, measurement and verification process
  - Affected sources with emission rates below the emission rate goal





# Rate-based trading: Credit trading

- Each affected source decides how to comply with emission rate goal



RE project can sell 1 credit to Plant B  
Plant B's emission rate would be  $8t/2 \text{ MWh}$ , or  $4t/\text{MWh}$



# Rate-based trading: Design and operation

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## Design

- Setting the emission rate goal
- Assigning responsibility for meeting the emission rate goals
- Developing requirements for eligible projects and procedures for evaluation, measurement and verification (EM&V)
- Creating project reporting and tracking systems
- Establishing rules, procedures and timelines for credit issuance, emission measurement, and compliance
- Creating emission and input/output reporting systems and credit tracking systems

## Operation

- Issuing credits to affected sources operating below the emission rate goal
- Approving eligible projects and EM&V plans
- Reviewing EM&V reports from eligible projects and issuing credits
- Tracking credit transactions
- Collecting and auditing emission and generation reports
- Providing compliance assistance
- Determining compliance
- Imposing penalties for non-compliance



# Rate-based trading: Project evaluation and verification

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- Zero-/low-emitting measures that are eligible for credits, must be able to document that results are reliably and accurately quantified and verified
- Governments provide standardized methods and approaches for evaluation, measurement and verification (EM&V) for each category of measure (e.g., renewable energy and demand-side efficiency)
- Examples of quantification and verification
  - Technical requirements for metering utility-scale renewable generation
  - Statistical methods for quantifying generation from distributed renewable installations
  - Statistical methods for quantifying savings from demand-side efficiency projects
  - Requirements and standards for independent verification of quantified generation or energy savings



# Rate-based trading: Measurement and reporting

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- Affected sources must monitor and report mass emissions and input/output (i.e., emission rate denominator)
- Emission rate measurements are the basis for determining each affected source's compliance obligation – number of credits the source must submit for compliance
- Government may issue credits to an affected source if the source operated better than its emission rate goal



# Rate-based trading: Credit transaction tracking

---

- The government administrator's credit tracking system is the official record of credit holdings and transactions
  - All official transactions, including credit issuance, transfers, and compliance use, are recorded in the tracking system
  - Compliance with the obligation to hold credits is based on the number of eligible credits in the source's compliance account





# Rate-based trading: Compliance assessment

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- At the end of the compliance period, affected sources are given a short grace period to transfer sufficient credits to a compliance account
- Credit-holding obligation is based on each source's emissions rate during the compliance period

$$\text{Eligible credits} \geq \frac{\left( \frac{\text{emissions}}{\text{input or output}} - \text{emission rate goal} \right)}{\text{emission rate goal}} \times \text{input or output}$$

- Automatic non-compliance penalties are levied (other non-compliance penalties may also apply)



# Rate-based trading: Key points

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- High quality data are important to assess compliance and ensure environmental integrity
- Comprehensive, high quality project evaluation and verification are necessary to ensure environmental integrity
- Credit tracking systems are essential for program operation
- Transparency builds confidence and credibility in the program



# Additional resources

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- [Clean Power Plan Toolbox for States](#)

<http://www.epa.gov/cleanpowerplantoolbox>

- [Tools of the Trade: A Guide to Designing and Operating a Cap and Trade Program for Pollution Control](#)

<http://www.epa.gov/sites/production/files/2015-06/documents/tools.pdf>