

Output-Based Emission Regulation and Allowance Allocation

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Overview of the Issues

- ◆ What is an output-based regulation?
- ◆ Why adopt output-based regulation?
 - To recognize efficiency: CHP
 - To recognize renewables
- ◆ How do I develop output-based regulations?
- ◆ Who else has developed output-based regulations?



What is an Output-based Regulation?

- ◆ Output-based regulation relates emissions to the productive output of the process
- ◆ Output-based emission standards
 - Conventional emission standards that account for the emissions benefit of efficiency.
- ◆ Output-basis for allowance allocation in emission trading programs.
 - Provides more allowances to more efficient plants. Can also allocate to renewable generators and efficiency projects.



Output-based Units of Measure

For this type of energy production...	Using...	An output-based measure is...
Electricity generation	Boilers/steam turbines Reciprocating engines Combustion turbines	pounds per megawatt hour (lbs/MWh)
Steam or hot water generation	Industrial boilers Commercial boilers	pounds per million British Thermal Units (lbs/MMBtu _{heat output})
Mechanical power	Reciprocating engines	grams/brake horsepower-hour (g/bhp-hr)



Output-based Measurement is Not New

- ◆ Recip engines use g/bhp-hr
- ◆ Many industrial processes measured in lb emissions/unit of product (cement clinker, melted glass or metal)
- ◆ Auto CAFÉ standards in g/mi

But the common power generation and steam boiler sources have not used this format.



Why Adopt Output-based Regulation?

- ◆ Recognizes/ incentivizes:
 - Efficiency
 - Renewables
 - Pollution prevention
- ◆ More accurate/consistent emission measurement.



Emission Reduction Benefits of Efficiency

- ◆ Creates multi-pollutant emission reductions
- ◆ No start-up/shut-down emissions
- ◆ Reduced fuel use
- ◆ Avoids upstream and secondary pollutants
- ◆ Lower compliance costs



How Have Output-Based Regulations Been Applied?

- ◆ Conventional Rate Limits
- ◆ DG Regulations
- ◆ Emission Trading Programs
- ◆ State Multi-pollutant Programs
- ◆ Federal Multi-pollutant Programs
- ◆ Generation Performance Standards
- ◆ Greenhouse Gas Registry
- ◆ New Source Review



Output-based Emission Standards

- ◆ Relate emissions to productive output, i.e., lb/MWh, lb/MMBtu_{out}.
- ◆ Account for increased process efficiency such as combustion efficiency, heat recovery, reduced parasitic losses.
 - Not related to efficiency of energy end use, (i.e., the light bulb).
- ◆ Allow efficiency and renewables to be used as part of the emission control strategy.



Issues for Output-based Regulation

- ◆ Output-measurement – both electricity and thermal output can be reliably and accurately measured.
- ◆ Set standards – can be based on new data or conversion from input-based standards.
- ◆ Transaction costs – cost of documentation, application and administration can be a deterrent for smaller renewable, efficiency and CHP projects.



Allowance Trading Programs

- ◆ Establish emissions tonnage cap for group of affected sources.
- ◆ Distribute emission allowances equal to the cap.
- ◆ Each plant must hold allowances equal to its emissions at the compliance point.
- ◆ Plants can buy or sell allowances.



The Role of Allocation

- ◆ Emission allowances must be distributed at the beginning of the program - distributing the “chips” in the trading system.
- ◆ Allocation does not determine the near-term compliance strategy but does affect profitability of individual plants or companies.
 - Can encourage the development of new, clean technologies.



Allocation Options

- ◆ Emission-based – based on historic emissions – rewards historic high emitters.
- ◆ Input-based – based on historic fuel consumption – rewards less efficient plants.
- ◆ Output-based – based on historic generation – rewards more efficient plants.
 - Can include renewables and thermal output of CHP facilities.

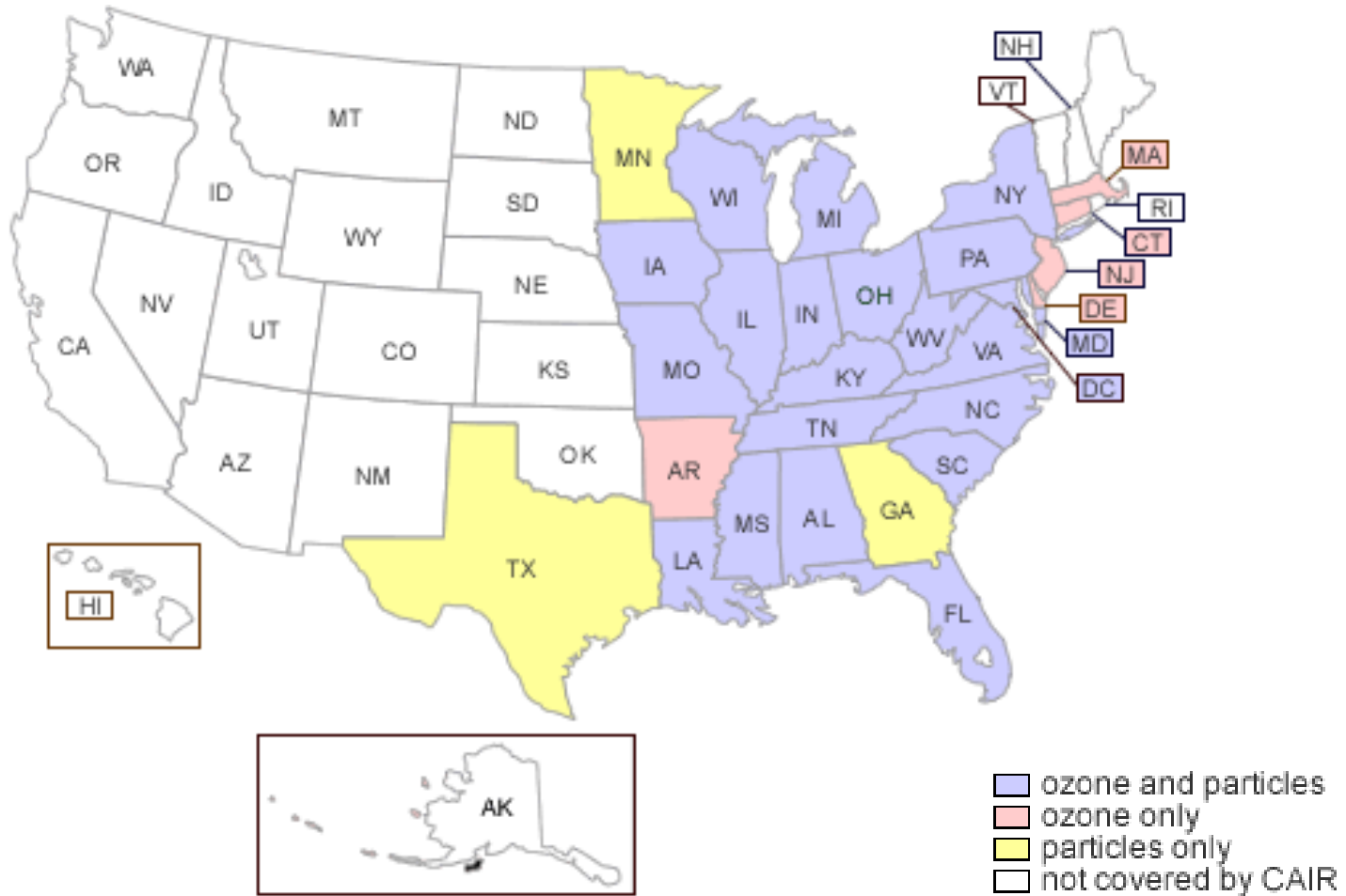


Allocation Example: CAIR

- ◆ Clean Air Interstate Rule - regulates NO_x , SO_2 in 28 eastern states.
 - NO_x is the primary target for allocation.
- ◆ Allocation process left to the states. EPA has provided model language.
 - Can be easily extended to include CHP and renewables.



CAIR Coverage



CAIR Model Rule

- ◆ Output-based allocation for new (2001+) generators.
- ◆ Thermal output included for new CHP generators.
- ◆ Easily expanded to include renewables.
- ◆ Treatment of CHP can be improved.



STAPPA/ALAPCO Model

- ◆ Provides model rule language for direct allocation and renewable energy setasides as well as other NO_x allowance allocation options.
- ◆ *Alternative NO_x Allowance Allocation Language for the Clean Air Interstate Rule (August 2005)*
<http://www.4cleanair.org/Bluestein-cairallocation-final.pdf>



Summary

- ◆ Output-based regulation can be used in many regulatory programs to encourage renewables and various forms of energy efficiency, including CHP.
- ◆ Many states have already implemented such programs and there is a variety of resources available to assist in future program development.

