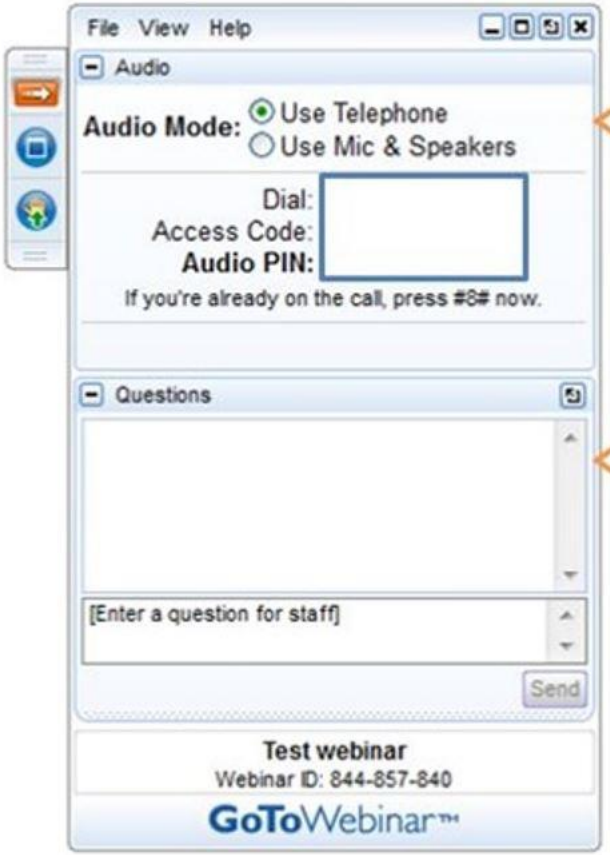
State-Federal RPS Collaborative Webinar

Tracking Systems and Section 111(d) State Plans

Hosted by
Warren Leon, Executive Director, CESA

Wednesday, December 10, 2014

Housekeeping



All participants are in "Listen-Only" mode. Select "Use Mic & Speakers" to avoid toll charges and use your computer's VOIP capabilities. Or select "Use Telephone" and enter your PIN onto your phone key pad.

Submit your questions at any time by typing in the Question Box and hitting Send.

This webinar is being recorded.

You will find a recording of this webinar, as well as all previous CESA webcasts, archived on the CESA website at

www.cesa.org/webinars

About CESA

Clean Energy States Alliance (CESA) is a national nonprofit organization working to implement smart clean energy policies, programs, technology innovation, and financing tools, primarily at the state level. At its core, CESA is a national network of public agencies that are individually and collectively working to advance clean energy.

State-Federal RPS Collaborative

- With funding from the Energy Foundation and the US Department of Energy, CESA facilitates the **Collaborative**.
- Includes **state RPS administrators**, **federal agency representatives**, and other stakeholders.
- Advances dialogue and learning about RPS programs by **examining the challenges and potential solutions** for successful implementation of state RPS programs, including **identification of best practices**.
- To sign up for the Collaborative listserve to get the **monthly newsletter** and announcements of **upcoming events**, see: www.cesa.org/projects/state-federal-rps-collaborative

Today's Guest Speaker

- **Lars Kvale**, Head of Environmental Markets, APX

APX

Energy. Environment. Market Integrity.

RPS Collaborative Webinar: Tracking Systems and Section 111(d) State Plans

Wednesday December 10, 2014 1:00 PM - 2:00 PM EST

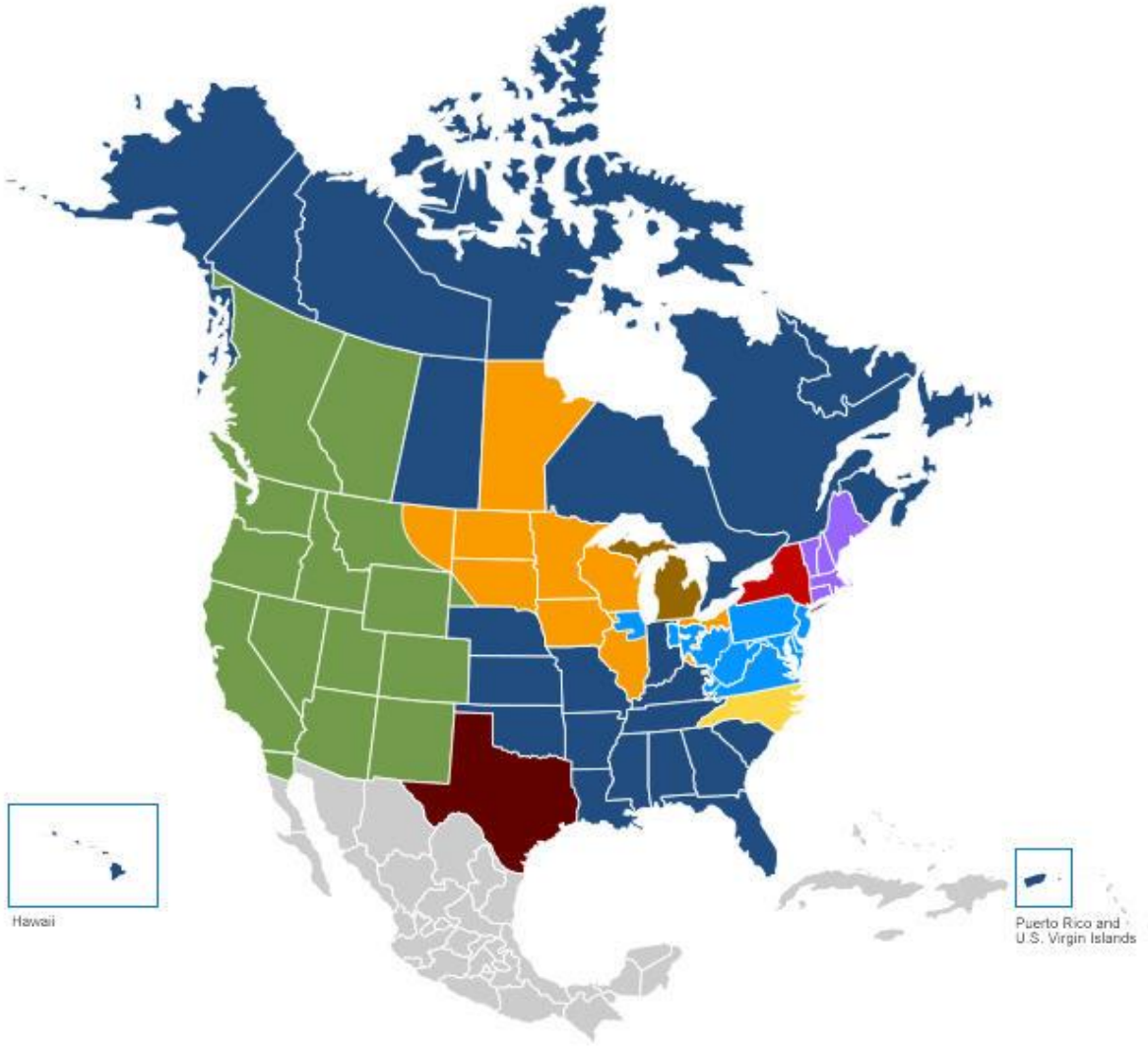
Lars Kvale, APX, Inc.

Clean Air Act

- Renewable Portfolio Standards, Registries and RECs
- Section 111(d), Renewable Attributes and Energy Efficiency
- Existing Registry Elements & Section 111(d)
- Implementation Options
- Further Thoughts and Questions

Disclaimer:
The information in this presentation is based upon an analysis of the Proposed EPA Rules and data displayed on publicly available reports. APX, Inc. works with tracking systems across the United States but the statements in this analysis presents APX's analysis and not those of any of the registries or organizations we work with. Finally, as the process moves forward it is likely that the EPA rules and interpretations of their intent will change. As this occurs APX will continue to support its clients with updated analyses.

Renewable Energy Registries

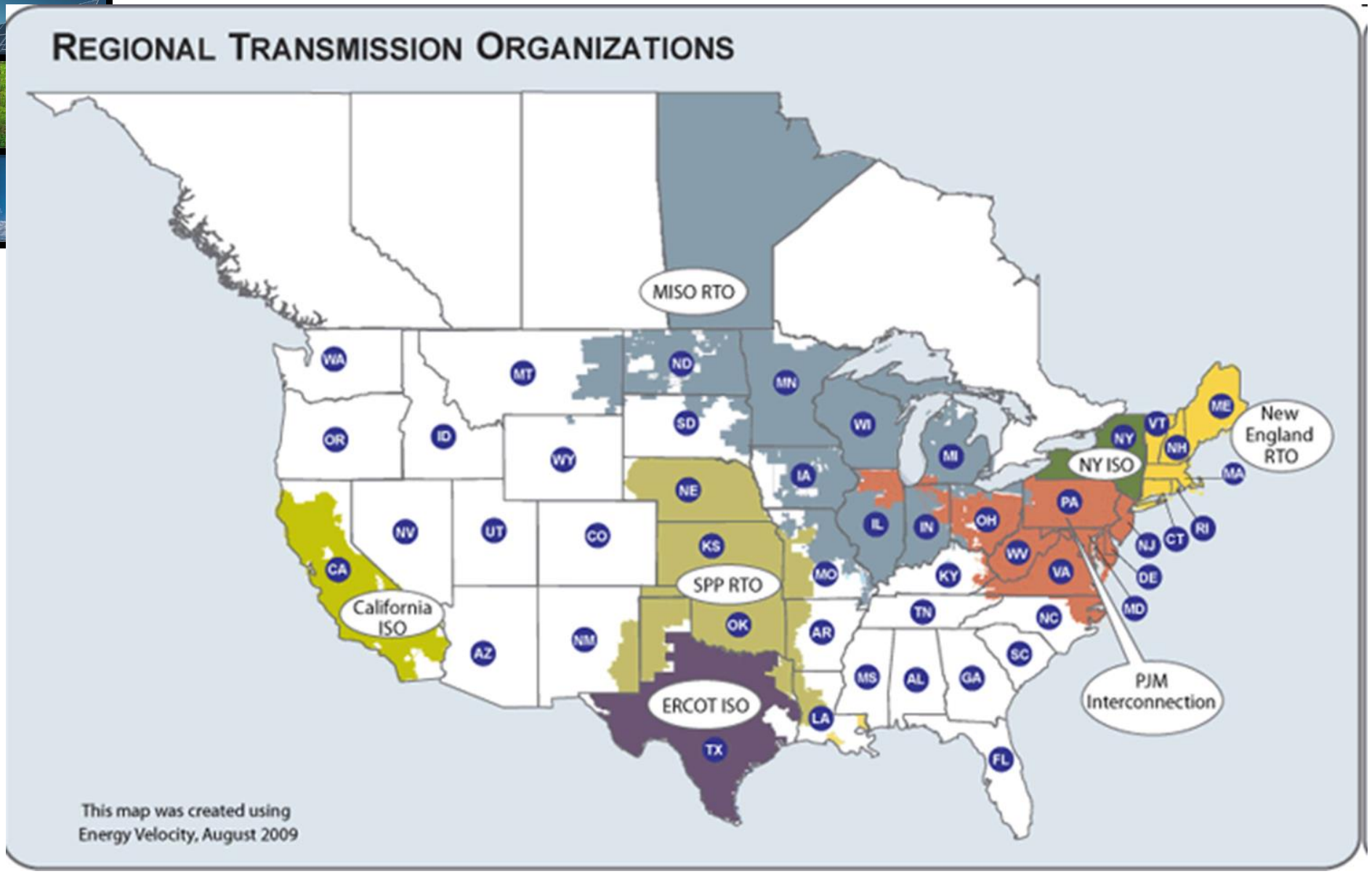


Key to Map

You may click on registry names to visit the registry's website.

- ERCOT
- MIRECS
- M-RETS
- NAR
- NC-RETS
- NEPOOL
- NYSERDA (in development)
- PJM-GATS
- WREGIS

Power Markets



Energy, RECs and Renewable Portfolio Standards

REC

RPS Markets

Voluntary Markets

Energy
(Null Power)

Power Markets (ISOs)

RECs (generally) include environmental attributes but how are they defined?

- **-Carbon?**
- **-Other Pollutants?**
- **-Other Benefits?**

Clean Air Act (from Nixon to Obama)

1970: Passage of Muskie Bill (i.e. The Clean Air Act)

1990: Institution of Acid Rain Cap-and-Trade Program

- ❖ CAA Title I – Provisions for Attainment and Maintenance of NAAQS
  - ✓ Six Criteria Air Pollutants: Particulate Matter, Sulfur Dioxide, Nitrogen Dioxide, Carbon Monoxide, Ozone, Lead
  - ✓ SIP Implementation of SOx Scrubbers, NOx Selective/Non-Selective Catalytic Reduction Units, and Particulate Baghouses and Electrostatic Precipitators (40 CFR Part 52)

2012: § 111(b) – Emission Performance Standards for New, Modified, and Reconstructed Power Plants

2014: § 111(d) – Emission Performance Guidelines for Existing Power Plants

- ❖ Plans, Pollutants, Facilities
  - ✓ Flexible Standards for State Compliance via Market-Based Incentive Mechanisms and RPS/EERS Programs
    - Options: Portfolio Strategies, Regional Greenhouse Gas Initiative, Equivalency Pathway
      - June 1, 2014: Proposed Rule Deadline
      - June 1, 2015: Final Rule Deadline
      - June 30, 2016: Initial SIPs Deadline
      - June 30, 2017: Final SIPs Deadline
      - June 30, 2018: Final SIPs Deadline for Multi-State Collaboration Participants

CAA §111(d): Clean Power Plan

- Proposal to regulate GHG emissions from fossil fuel-fired Generating Units (EGUs) in the form of state implementation plans
  - This proposal does not directly regulate EGU emissions but instead, the EPA is proposing statewide CO_2 emission goals and guidelines, i.e. setting CO_2 emission intensity targets for the power sector for each state.
    - ✓ Establishes standard of performance for any existing source, whereby the EPA must determine the best system of emissions reduction (BSER) adequately demonstrated.
- By 2030, EPA expects this proposed rule to achieve 30% CO_2 emissions reduction from estimated 2005 CO_2 emissions from power sector.
  - This is not an absolute target, but rather the EPA expects emissions to be reduced by 30% if all States comply with their emissions intensity target.

Baselines:
EPA calculated baselines for each state

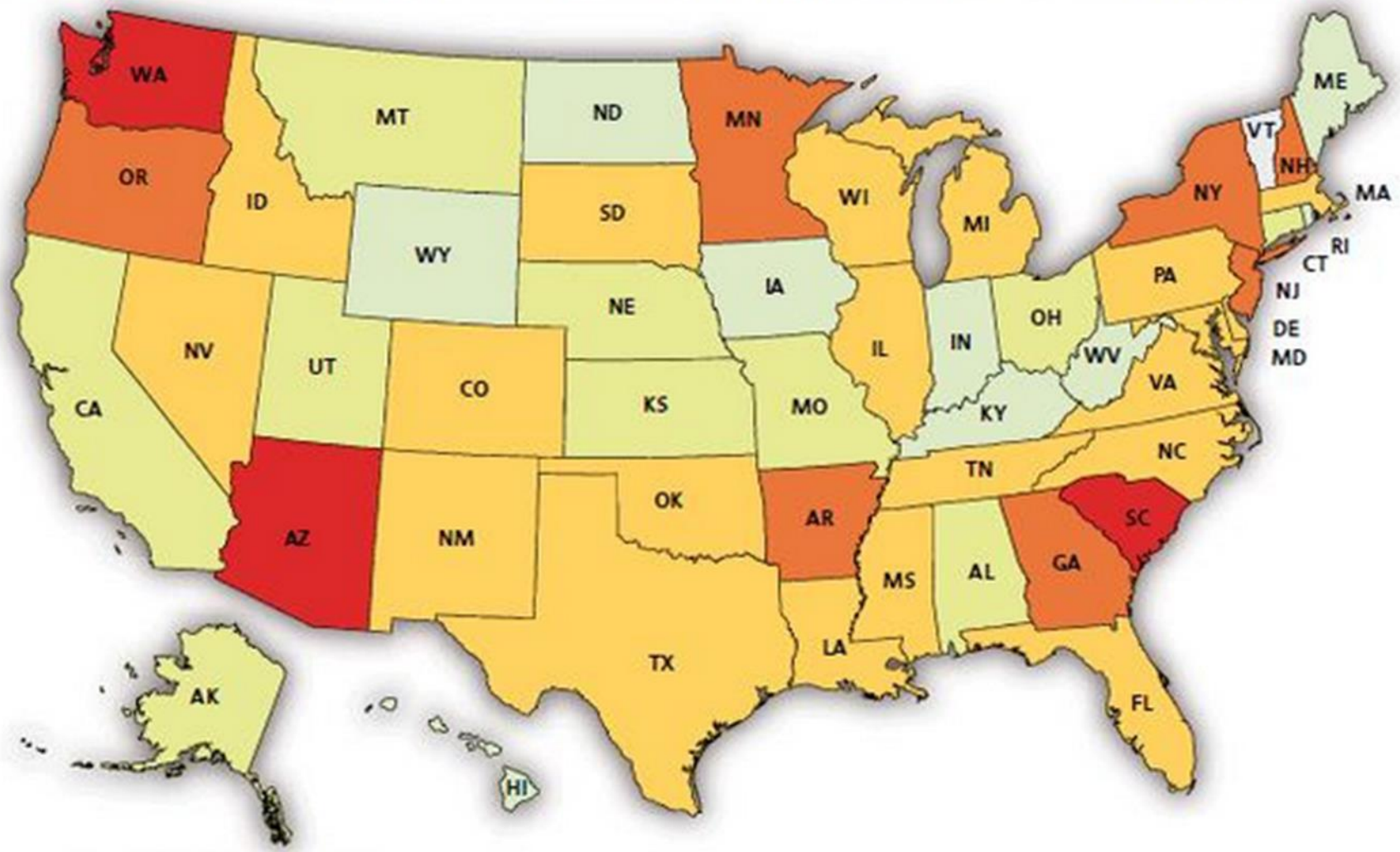
Emission Targets:
-State specific set by EPA based on current policies and available options for reducing emissions
-Rate based (lbs./MWh) or mass Based (lbs.)

Building Blocks:
1) Plant Efficiency Improvements
2) Re-dispatch Existing NGCC Power Sources
3) Renewable Energy Generation
4) Demand-Side Energy Efficiency

State	Historical emissions rate (2012)	Avg. interim emissions rate goal (2020 - 2029)	Final emissions rate goal (2030+)	Required change (2012-2030)
Alabama	1,444	1,147	1,059	27%
Alaska	1,351	1,097	1,003	26%
Arizona	1,453	735	702	52%
Arkansas	1,640	968	910	45%
California	698	556	537	23%
Colorado	1,714	1,159	1,108	35%
Connecticut	765	597	540	29%
Delaware	1,234	913	841	32%
Florida	1,200	794	740	38%
Georgia	1,500	891	834	44%
Hawaii	1,540	1,378	1,306	15%
Idaho	339	244	228	33%
Illinois	1,895	1,366	1,271	33%
Indiana	1,923	1,607	1,531	20%
Iowa	1,552	1,341	1,301	16%
Kansas	1,940	1,578	1,499	23%
Kentucky	2,158	1,844	1,763	18%
Louisiana	1,466	948	883	40%
Maine	437	393	378	14%
Maryland	1,870	1,347	1,187	37%
Massachusetts	925	655	576	38%
Michigan	1,696	1,227	1,161	32%
Minnesota	1,470	911	873	41%
Mississippi	1,130	732	692	39%
Missouri	1,963	1,621	1,544	21%
Montana	2,245	1,882	1,771	21%
Nebraska	2,009	1,596	1,479	26%
Nevada	988	697	647	34%
New Hampshire	905	546	486	46%
New Jersey	932	647	531	43%
New Mexico	1,586	1,107	1,048	34%
New York	983	635	549	44%
North Carolina	1,646	1,077	992	40%
North Dakota	1,994	1,817	1,783	11%
Ohio	1,850	1,452	1,338	28%
Oklahoma	1,397	931	895	36%
Oregon	717	407	372	48%
Pennsylvania	1,540	1,179	1,052	32%
Rhode Island	907	822	782	14%
South Carolina	1,597	840	772	52%
South Dakota	1,135	800	741	35%
Tennessee	1,903	1,254	1,163	39%
Texas	1,298	853	791	39%
Utah	1,813	1,378	1,322	27%
Virginia	1,297	884	810	38%
Washington	763	264	215	72%
West Virginia	2,019	1,748	1,620	20%
Wisconsin	1,827	1,281	1,203	34%
Wyoming	2,115	1,808	1,714	19%

Sources: U.S. EPA Clean Power Plan, CleanPowerPlanmaps.epa.gov
Map credit: Whit Varner

EPA's proposed carbon emissions rates for existing power plants (lbs/MWh)



Percent change (2012-2030)

11% - 20% | 21% - 30% | 31% - 40% | 41% - 50% | 51% - 72%

SNL

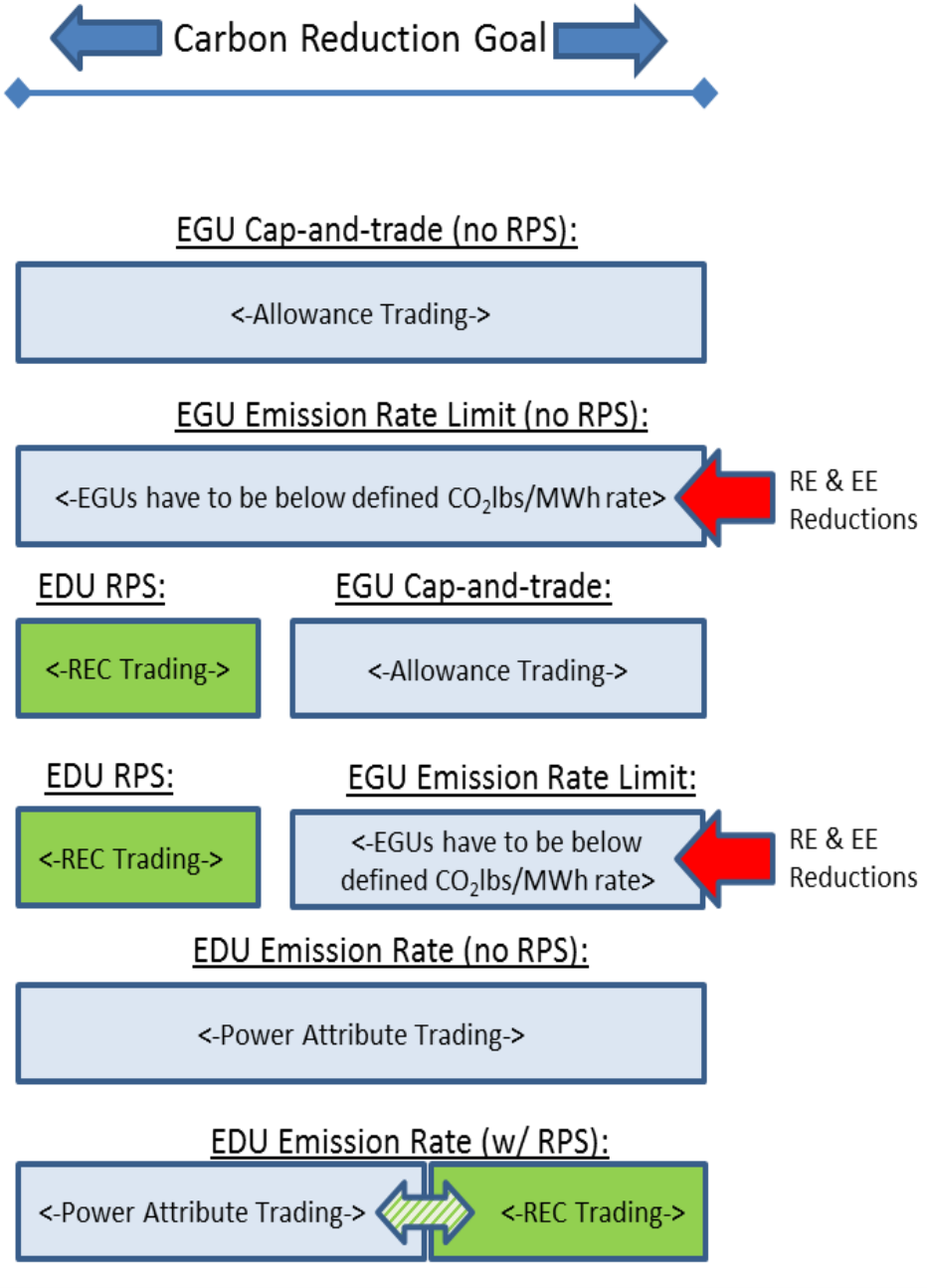
EPA's Approach to RECs and RPS Markets

- EPA defines that the attributes/greenhouse gas reductions caused by renewable energy belong to the owner of the RECs
- Therefore states may claim CO2 emissions reductions regardless of location
- How can this be accounted for in power markets that span several states?
- What if neighboring states choose different implementation options (rate vs mass-based)?
- What about the emission liabilities from emitting resources exporting power?
- Not all RECs are created equal

Registry Element	Supports:
Tracking emissions attributes for every MWh generated	Allocation of emission liabilities for purchased power
Calculation of average and residual system emission rates	Allocation of emission liabilities for purchased power Applying emission attribute to imported and exported power
Tracking Energy Efficiency savings	The inclusion of energy efficiency certificates in tradable markets
Calculation and tracking of emission reductions from RE & EE	The inclusion of energy efficiency and renewable energy to adjust emission rates
Tagging emission attributes from source to sink	Interaction with other regional power markets and the attribution of emission characteristics to power imports and exports
Tracking inter-state power transactions	The ability to set-up a state market that does not align with regional power market borders
Inter-registry Import and Exports	Guarantees that attributes are not double-counted between regions
Support carbon allowance adjustment based on voluntary green power	Enables allowance adjustments whether for green power markets or RPS compliance results
Public Reports	Provides transparency to all stakeholders

Implementation Scenarios

#	Approach	Carbon Compliance on:	REC (&EEC) CO2 Attribute	RPS	Trading Unit
1	Simple	EGU	n/a	No	Tons (Mass-based)
2	Simple	EGU	Avoidance (negative) value or 0 Emissions	No	Tons/MWh (Rate-based)
3	Portfolio	EGU	0 Emissions	Yes	RECs & Tons (Mass-based)
4	Portfolio	EGU	Avoidance (negative) value or 0 Emissions	Yes	Tons/MWh (Rate-based)
5	Portfolio	EDU	0 Emissions	No	MWh Attributes (Rate-based)
6	Portfolio	EDU	0 Emissions	Yes	MWh Attributes (Rate-based)

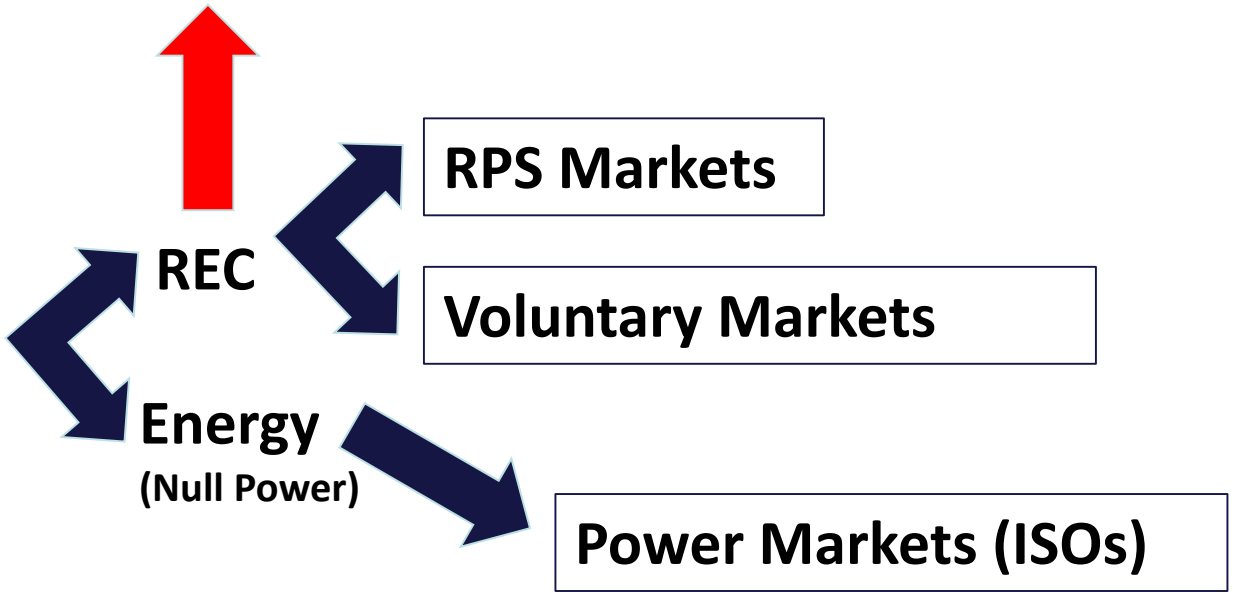


Scenario 2 and 4: RECs and Rate-based targets

Generator (EGU):
Target: 1,003 lbs./MWh (AK)
Actual: 7,500,000 lbs. emitted/5,000 MWh generated => 1,500 lbs./MWh

Buys 2,500 RECs:
7,500,000 lbs./5,000 MWh generated + 2,500 MWh (RECs) => 1,000 lbs./MWh

RECs: 0 lbs. emitted/MWh



Scenario 3: Mass-based target and RPS

Under *Reduction Target* policy

Generator (EGU):
Emissions: 10,000,000 lbs.
Limit: 7,000,000 lbs.

Buys 2,000 RECs:
2,000 MWh (RECs) * 1500 lbs. reduced/MWh = 3,000,000 lbs

Under *Cap-and-trade* policy

Generator (EGU):
Emissions: 10,000,000 lbs.

Buys Allowances: 7,000,000 lbs.
Buys 2,000 RECs:
2,000 MWh(RECs) * 1500 lbs. reduced/MWh = 3,000,000 lbs

RECs: 1500 lbs. reduced/MWh

REC

RPS Markets

Voluntary Markets

Energy
(Null Power)

Power Markets (ISOs)

Scenario 5 & 6: EDU Compliance and All Generation Tracking

Load Serving Entity (EDU):
Target: 873 lbs./MWh (MN) - Total Sales: 10,000,000 MWh

Energy
(Null Power)

Power Attributes
(Emitting and non-emitting)

Voluntary Markets

RPS Markets

Certificates:
3,000 Coal Certificates (@2,000 lbs./MWh)
2,000 Gas Certificates (@ 800 lbs./MWh)
1,500 Nuclear Certificates (@ 0 lbs./MWh)

Null Power:
3,500 Residual Mix Certificates (@ 1,000 lbs./MWh)

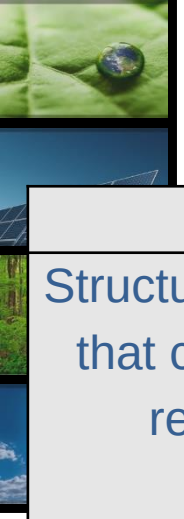
Emissions: 11,100,000 lbs.
Emission Rate: 1,110 lbs/MWh

Buys RECs

Certificates:
3,000 Coal Certificates (@2,000 lbs./MWh)
2,000 Gas Certificates (@ 800 lbs./MWh)
1,500 Nuclear Certificates (@ 0 lbs./MWh)
2,500 Wind Certificates (@ 0 lbs./MWh)

Null Power:
1,500 Residual Mix Certificates (@ 1,000 lbs./MWh)

Emissions: 8,600,000 lbs.
Emission Rate: 860 tons/MWh



Interstate Trading Solutions

Option	Advantages	Disadvantages
Structure regional programs that correspond to power region boundaries	Simplifies accounting and power market transactions	Not necessarily a feasible option for most states as they are participating in more than one region
Rely on GHG restrictions being implemented equally across States	Does not reflect physical power flows which could contribute to other issues	States could implement rules on varying timetables providing unequal market conditions
Track intra-region transactions and match with attributes	Most accurate accounting as the attributes reflect the physical transactions	Requires work to better understand and compute intra-region power flows
Rely on all generation tracking for emissions liabilities and performance	If all states within a power region follow this approach all emission liabilities will be accounted for	Some states participate in more than one power region

Complexity

- The challenge of integrating Section 111(d) State Implementation plans with:
  - RPS
  - Cap-and-trade
  - Regional power markets
  - Electricity regulation
  - Energy efficiency initiatives
  - (Renewable) Power attribute markets.
- All States (except Hawaii) are involved in cross-state REC markets
- Power regions cut across state lines (ISOs, sub eGRID regions, power pools)
- Indirect vs Direct Emissions
- More info: http://www.apx.com/2014/10/27/apx-research-section-111d-tracking-systems/

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Thank you for attending our webinar

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