

# Interaction of Carbon and Clean Energy Accounting

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Workshop 4  
August 28, 2020

# Overview

- Energy System Context for Carbon and Clean Energy Accounting
- Comparison of Cap and Trade and Clean Energy Programs
  - History and policy goals
- Distinction between RECs, Energy & Emissions
- Interaction of Carbon and Clean Accounting

# Energy System Factors Relevant for Carbon and Clean Energy Accounting

- An Integrated Energy System:
  - Electricity injected into and taken out of grid at many different points
  - Although the WECC does not yet have organized markets outside those operated by the CAISO (day-ahead and WEIM), all states share electricity
  - Multiple electricity market participants: Utilities, BPA, Independent Power Producers, Brokers, Marketers, Exchanges (ICE)
  - Contracts generally do not determine which resources are dispatched nor how electricity flows
    - Generator prices and grid conditions determine which resources are dispatched in real time
    - Physics dictates the actual flow of electrons from point a to point b
  - Buyers have no control over generating resource when purchasing undifferentiated market power
    - Transactions are often undertaken weeks, months, years in advance of when power is needed
    - Often transacted through intermediaries (e.g. marketers) or via an exchange
  - Undifferentiated market power is important
    - Existence of commoditized contract (i.e. firm Schedule C) provides market liquidity
    - Allows utilities to hedge for costs and risks

# Energy System Factors Relevant for Carbon and Clean Energy Accounting - continued

- Organized markets add efficiency and lower costs by optimizing dispatch across a broader geographic footprint, rather than individual utility systems
  - Electricity Markets dispatch based on price signals
    - Each generator bids a price necessary to cover its operational costs
    - The Market algorithm looks for the least cost, most efficient dispatch solution
- Organized markets also help to integrate renewable resources
  - More geographic diversity in generation and load reduces curtailment
- The West is moving inexorably toward organized markets
  - Puget, Pacificorp, Seattle City Light already in WEIM
  - BPA, Avista and Tacoma joining in 2022
  - Over time, more and more electricity will be dispatched through organized markets

# Comparison of Cap and Trade and Clean Energy Programs

- Cap and Trade and Clean Energy programs, such as RPS and the CETA, share a common policy objective (reducing emissions) but take fundamentally different approaches, and accordingly accounting is very different
- Carbon compliance programs focus on actual emissions to the atmosphere from regulated sources
  - Under an emission trading program
    - The cap limits total emissions
    - The ability to trade allowances creates a carbon price signal to incent changes in behavior, and in the case of electricity, changes in *both* dispatch and investment
  - Accounting is of emissions from regulated sources
- Clean Energy programs focus on procurement of clean resources
  - Drives investment in renewable and nonemitting resources, but does not create price signal for dispatch of fossil generation
  - Accounting is of eligible MWh of renewable or nonemitting electricity purchased by utility

# California Cap and Trade was Designed to Integrate with Electricity Markets

- California is a geographically limited area within the larger WECC electricity system
  - California annually imports 25-30% of electricity consumed in state
  - In 2012, approximately 50% of electric sector emissions were associated with these imports
  - If emissions associated with electricity imports were not covered under the cap, leakage would seriously undermine environmental effectiveness
    - California's is the *only* GHG cap and trade program in the world that covers imported electricity
- Importance of CAISO markets in meeting state load necessitated the need for a source-based hybrid approach
  - California's border is closely aligned with the CAISO footprint – all state IOUs participate
  - Carbon price allows emission intensity of generators to impact dispatch and imports
- Electricity market participants considered it important for importers to be responsible for emissions associated with electricity imports
  - Importers able to control through bids whether electricity is imported to California
  - Importers have better knowledge of source of imports (operational control or contracts)
  - Responsibility for emissions or benefit of low carbon resources flows to entity that controls the import, and upstream to generator through specified source requirements

# Renewable Portfolio Standards Evolved in Parallel with Organized Energy Markets

- First proposed in the mid-90's to promote renewable resources in context of emerging competitive power markets
  - California was first to consider (but not adopt) in 1995
  - Texas was the first state to pass legislation to adopt an RPS using REC tracking in 1999
    - This same bill turned ERCOT into an ISO
- RECs were created intentionally to enable tracking of RPS compliance *separately* from the underlying electricity
  - Necessary because of the impossibility of tracking electricity from specific sources to specific loads

# Both Cap and Trade and RPS Programs Benefit Renewable Generation

- RPS programs create utility demand for renewable generation and create an additional value stream for renewable resources that is captured by the sale of RECs
- Carbon pricing creates additional value for zero emission resources by enabling capture of additional revenue for power sales into electricity markets where the cost of carbon is included in energy prices
  - But where zero emission resources have no compliance costs
- The Financial benefits of carbon pricing and RPS programs should not be mutually exclusive
  - As a matter of good public policy, if we want to promote renewable energy and keep rate-payer costs low, we should allow renewable generation to benefit from both types of program
    - Renewable resources in California benefit from higher energy prices under cap and trade, as well as sale of RECs to California utilities



# Distinction between RECs, Energy and Emissions

- RECs, Energy and GHG Emissions are different things
- Fact that we distinguish between bundled and unbundled RECs demonstrates that energy can be separated from RECs
  - The use of RECs for compliance accounting enables this separation to occur
- RECs were not designed to account for emissions
  - To the extent that REC definitions in state programs address emissions, these generally refer to 'GHG benefits' or 'avoided GHG emissions'
  - In contrast, GHG programs, including cap and trade, are concerned with the direct emissions of resources
  - For example
    - Direct emissions of wind generation = 0 MTCO<sub>2</sub>eq. or 0 MTCO<sub>2</sub>eq /MWH
    - Avoided emissions of wind generation = the emissions of the fossil generation that wind displaced, e.g. .5 MTCO<sub>2</sub>eq
- We need to ensure no double-counting of each of RECs, energy and direct and avoided emissions, but separate use of each does *not* constitute double-counting

# Interaction of GHG and Renewable Accounting

## Base Case: Only Gas Generation

	<b>Base Case: Only Gas Generation</b>		
	<b>Wash</b>	<b>Cali</b>	<b>Else</b>
Gas Generation (MWh)	100	300	300
Renewable Generation (MWh)	0	0	0
RECs claimed (RPS/CETA)	NA	NA	NA
Direct RE emissions counted under C&T	--	NA	--
System Emissions (MTCO <sub>2</sub> eq)	350		
Avoided system emissions (MTCO <sub>2</sub> eq)	NA		
In-state generation emissions (MTCO <sub>2</sub> eq)	50	150	150
California C&T Emissions (MTCO <sub>2</sub> eq)	--	150	--

Consider a simple electricity system with only gas generation on the system and only 3 regions:  
Washington load =100 MWh  
California load: 300 MWh  
Load elsewhere in the WECC: 300 MWh

# Interaction of GHG and Renewable Accounting

Scenario 1: 100 MWh of Renewable Energy added in California and contracted to California Utilities

	Base Case: Only Gas Generation			100 MWh RE Gen in California, contracted to California Utilities		
	Wash	Cali	Else	Wash	Cali	Else
Gas Generation (MWh)	100	300	300	100	200	300
Renewable Generation (MWh)	0	0	0	0	100	0
RECs claimed (RPS/CETA)	NA	NA	NA	0	100	0
Direct RE emissions counted under C&T	--	NA	--	NA	yes	NA
System Emissions (MTCO <sub>2</sub> eq)	350			300		
Avoided system emissions (MTCO <sub>2</sub> eq)	NA			50		
In-state generation emissions (MTCO <sub>2</sub> eq)	50	150	150	50	100	150
California C&T Emissions (MTCO <sub>2</sub> eq)	--	150	--	--	100	--

- Addition of renewable energy displaces gas generation
  - Because of carbon price and fact that California imports significant amount of electricity, displacement is likely to occur within California
  - California in-state emissions reduced by 50 MTCO<sub>2</sub>eq.
- Renewable electricity is contracted to California utility and claimed under the California RPS
- Renewable generation has no compliance obligation under cap and trade system
  - Direct emissions (0 MTCO<sub>2</sub>eq.) 'claimed' by the resource operator
  - Cap and trade emissions reduced by 50 MTCO<sub>2</sub>eq.
- Displacement of gas reduces system emissions from 350 to 300 MTCO<sub>2</sub>eq.
  - Avoided system emissions equal 50 MTCO<sub>2</sub>eq.
  - In-state emissions in Washington and elsewhere remain the same

# Interaction of GHG and Renewable Accounting

Scenario 2: 100 MW of Renewable Energy added in California and contracted to Washington Utilities

	<i>Base Case: Only Gas Generation</i>			<i>100 MWh RE Gen in California, contracted to California Utilities</i>			<i>100 MWh RE Gen in California, contracted to Washington Utilities</i>		
	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else
Gas Generation (MWh)	100	300	300	100	200	300	100	200	300
Renewable Generation (MWh)	0	0	0	0	100	0	0	100	0
RECs claimed (RPS/CETA)	NA	NA	NA	0	100	0	100	0	0
Direct RE emissions counted under C&T	--	NA	--	NA	yes	NA	NA	yes	NA
System Emissions (MTCO <sub>2</sub> eq)	350			300			300		
Avoided system emissions (MTCO <sub>2</sub> eq)	NA			50			50		
In-state generation emissions (MTCO <sub>2</sub> eq)	50	150	150	50	100	150	50	100	150
California C&T Emissions (MTCO <sub>2</sub> eq)	--	150	--	--	100	--	--	100	--

- Under this scenario, total renewable generation, total system emissions, avoided emissions, in-state generation emissions and cap and trade emissions are the same as in previous scenario
  - Only difference is that renewable electricity was contracted to Washington utilities
- Direct emissions attribute of renewable generation is still claimed under the California cap and trade program
  - If it were not, the carbon obligation would disadvantage renewable generation relative to fossil resources
- Whether the electricity actually flows north would depend on grid conditions and net interchange

# Interaction of GHG and Renewable Accounting

Scenario 3: 100 MW of Renewable Energy added Elsewhere and contracted to Washington Utilities

	Base Case: Only Gas Generation			100 MWh RE Gen in California, contracted to California Utilities			100 MWh RE Gen in California, contracted to Washington Utilities			100 MWh RE Gen elsewhere, contracted to Washington Utilities		
	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else
Gas Generation (MWh)	100	300	300	100	200	300	100	200	300	100	300	200
Renewable Generation (MWh)	0	0	0	0	100	0	0	100	0	0	0	100
RECs claimed (RPS/CETA)	NA	NA	NA	0	100	0	100	0	0	100	0	0
Direct RE emissions counted under C&T	--	NA	--	NA	yes	NA	NA	yes	NA	NA	no	NA
System Emissions (MTCO <sub>2</sub> eq)	350			300			300			300		
Avoided system emissions (MTCO <sub>2</sub> eq)	NA			50			50			50		
In-state generation emissions (MTCO <sub>2</sub> eq)	50	150	150	50	100	150	50	100	150	50	150	100
California C&T Emissions (MTCO <sub>2</sub> eq)	--	150	--	--	100	--	--	100	--	--	150	--

- Under this scenario, the renewable resources are located elsewhere in the WECC and contracted to Washington Utilities
  - Assume that this is a bundled REC transaction and that the electricity can't be resold as specified
- No claim to renewable energy or direct emissions under California cap and trade program
  - System and avoided emissions the same but instate emissions elsewhere 50 MTCO<sub>2</sub>eq. lower than under scenario 2
  - California instate emissions and cap and trade emissions 50 MTCO<sub>2</sub>eq. higher

# Interaction of GHG and Renewable Accounting

Scenario 4: 100 MW of Renewable Energy added Elsewhere, contracted to Washington Utilities and resold as specified energy

	Base Case: Only Gas Generation			100 MWh RE Gen in California, contracted to California Utilities			100 MWh RE Gen in California, contracted to Washington Utilities			100 MWh RE Gen elsewhere, contracted to Washington Utilities			100 MWh RE Gen elsewhere, contracted to Washington utilities, specified power into California		
	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else	Wash	Cali	Else
Gas Generation (MWh)	100	300	300	100	200	300	100	200	300	100	300	200	100	200	300
Renewable Generation (MWh)	0	0	0	0	100	0	0	100	0	0	0	100	0	0	100
RECs claimed (RPS/CETA)	NA	NA	NA	0	100	0	100	0	0	100	0	0	100	0	0
Direct RE emissions counted under C&T	--	NA	--	NA	yes	NA	NA	yes	NA	NA	no	NA	NA	yes	NA
System Emissions (MTCO <sub>2</sub> eq)	350			300			300			300			300		
Avoided system emissions (MTCO <sub>2</sub> eq)	NA			50			50			50			50		
In-state generation emissions (MTCO <sub>2</sub> eq)	50	150	150	50	100	150	50	100	150	50	150	100	50	100	150
California C&T Emissions (MTCO <sub>2</sub> eq)	--	150	--	--	100	--	--	100	--	--	150	--	--	100	--

- Under this scenario, assume this is an unbundled REC transaction and that the electricity can be resold as specified
  - The energy and direct emissions of renewable generation are claimed under the California cap and trade program and displace gas generation in California
  - System and avoided emissions are the same, but cap and trade emissions are reduced to same level as in scenarios 1 and 2
  - Instate emissions elsewhere increase, as gas generation not displaced
- In this case, Washington utilities are claiming the RECs but *not* the energy
  - The avoided emission attribute of the RECs under the alternative compliance obligation are essentially being used to offset fossil electricity
- There is no double-counting of energy, no double-counting of RECs, no double counting of direct emissions, and no double-counting of avoided emissions

# Concluding Remarks

- CETA must work within the context of organizing markets
- CETA is essentially an RPS type program, not an emissions program
  - The procurement obligation falls on load-serving entities (utilities)
  - Utility compliance is based on retirement of bundled and unbundled RECs (plus some nonemitting electricity)
  - CETA does not price carbon in electricity generation or imports
- When considering the potential for double-counting, distinction should be made between RECs, energy, direct emissions and avoided emissions
  - No double-counting if energy and direct emissions associated with Renewable generation are claimed as import into California and RECs and avoided emissions are claimed in Washington
- Use of renewable energy under the 80% GHG Neutral standard and the Clean Energy standard is a claim to *both* RECs and the associated energy
  - Associated energy and direct emissions of the renewable resource cannot be claimed in California or elsewhere
- Use of unbundled RECs as an alternative compliance option under the 20% GHG neutral standard is a claim to the REC, but *not* the energy
  - In this case the REC is essentially being used to offset fossil generation
    - The REC represents a claim to the avoided emissions attribute
    - Direct emissions of renewable generation should convey with the energy, not the REC