# Low Carbon Grid and Regionalization

Don Furman October 5, 2017

#### Agenda

- What is a low carbon grid, and why do we need it?
- What does a low carbon grid require?
- What does regionalization mean?
  - A little history
  - Independent System Operators
  - CAISO, and why its different
- Why do ISOs produce lower costs?
- What are the other benefits?

A few acronyms:

- ISO = Independent System Operator
- CAISO = California ISO
- FERC = Federal Energy Regulatory Commission



#### What is a Low Carbon Grid?

#### An electrical network that runs on renewable energy using automation to operate optimally and at lowest cost

- The West has most of the ingredients
  - Ample *solar, wind, geothermal and distributed resources*
  - Legacy large scale hydro
  - Large, high voltage *transmission system*
- Recent technology developments now make that dream *affordable* 
  - Solar and wind keep getting cheaper
  - Distributed storage prices (batteries) have fallen even more
  - Independent system operators can integrate lots of renewables at less cost

### Why a Low Carbon Grid?

#### **Environmental Benefits**:

- Climate change is upon us (see the new documentary, Chasing Coral)
- It also reduces criteria pollutants because we stop burning things

#### **Cost Containment:**

• It is *feasible at reasonable cost* 

#### Job Creation:

- California *leads the world* in the two main ingredients: digital technology and clean energy technology
- The transformation will drive jobs across the sector

### IT IS A MORAL ISSUE

#### Key Components to a Low Carbon Grid

- Accurate and timely *tracking of carbon emissions*, enabling carbon regulation
- *Diversity* of geography, technology, weather and time zone.
- Centralized grid operator to optimize such a diverse portfolio
- Transparency around the *impacts* of generators on *communities*

## What Is Regionalization?





What is "Regionalization"

The addition of non-member utilities to the CAISO, to give it more diversity, and thereby lower the cost of managing large amounts of renewables.

### A Little History

1800s Initially, each town got a power plant and wires to distribute

1900s Cities eventually regulated prices, safety, and rights of way

1911 State regulation unlocked economies of scale

1935 Federal regulation filled jurisdictional gaps

1942 – Feds require utilities to interconnect to fuel the war effort



### Federal Regulation of Utilities

- Federal Power Act (1920, amended 1935)
- Established "bright line" of federal jurisdiction:
  - Transmission
  - Wholesale markets

• Created the Federal Power Commission (now FERC)

- States retained jurisdiction over retail markets, and therefore retained the bulk of the oversight responsibilities
- Operated under this system until the 1990s

#### FERC Creates Independent System Operator

- Goal: reduce the market power of the big utilities for the benefit of the consumers
- Non-profit corporation responsible for wholesale operations
  - Dispatch and Reliability
  - Planning
  - Operating markets



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#### California Independent System Operator <a>D</a>



- 70% of California ratepayers
- Operates:
  - Physical transmission system
  - Markets for electricity and related services
- Does not include Los Angeles or Sacramento
- One small out-of-state member
- Independent board appointed by the Governor
- State-of-the art technology

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#### The Western System Today

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- Blue circles indicate size of demand
- Red circles import
- Grey circles export
- Synchronously connected but market disconnected

California ISO operates within the legacy system



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#### Renewables and ISOs

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- ISOs intended to address market power and improve efficiency
- As wind became significant, big differences emerged between ISOs and stand-alone utilities:
  - ISO's have much lower costs of "integrating" renewables
  - ISO fast markets provide solutions to variability







## ISO Analogy: Lyft

- ISO
  Share power plants and transmission
- Savings:
  - Don't need to build as many plants and lines
  - Fast dispatch and markets allows adjustments for variation
  - Lower prices due to competition

#### <u>Lyft</u>

- Share somebody else's car
- Savings:
  - Don't need to buy a car
  - Fewer cars
  - More timely dispatch
  - Competition drives down prices

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#### Challenges to Low Carbon Grid

- Complexity
- Concern for state environmental regulation
- Distraction of PacifiCorp's earlier foray <a>D</a>
- Other political priorities  $\square$

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#### Seizing the Opportunity

- California can benefit by taking in new out-of-state members
  - Improve diversity (weather, geography, transmission): the more options available to run the system, the cheaper the cost
  - Spread fixed costs over more consumers
- Other states benefit, too
  - Cheaper to join an existing ISO than starting from scratch
  - Access to modern, automated markets to lower costs
- *Entire west* gets a higher ceiling on amount of renewables that can be integrated, and therefore can increase and accelerate fossil fuel retirements

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# Appendix



#### KdL's 2016 Letter

STATE C	APITOL CRO	STANDING COMMITTEE	
ROOM SACRAMENT TEL (916) ( FAX (916) ( DISTRICT 1800 W. SUN LOS ANGELE TEL (213) 4 FAX (213) 4	DO EXAMPLE SUBJECT EXAMPLE EXAMPLE SUBJECT EXAMPLE SUBJECT SENATOR KEVIN DE LEÓN PRESIDENT PRO TEMPORE	SENATE RULES CHAIR	
А	ugust 10, 2016		
D C P F R	avid Olsen, Member AISO Governing Board O. Box 639014 olsom, CA 95630 E: CAISO PacifiCorp Merger		
D	ear Board Member Olsen:		
A pr ar T h	At present, there remain significant unanswered questions to be resolved before the state proceeds with regionalization. I have outlined those issues below in the hope that your administration responds to each as it reports to the Legislature and proceeds with next steps. These issues need to be reviewed and responded to by independent outside parties in order to have credibility, and not simply by those who have a vested interest in the merger of the two control areas.		
1	No preemption or weakening of California's clean energy and climate laws. travels to Paris show that California is a world leader in climate and energy p same time the US Congressional majorities and other states—including sever within the current PC service area—actively oppose these policies.	Our recent olicy. At the al of which are	
	Regionalization undertaken improperly could result in a revamped regional g subject only to jurisdiction of the Federal Energy Regulatory Commission (F1) where its actions conflict with California law. Conflicts between California a revamped ISO would likely be resolved in the federal administrative agencies not by California's elected representatives or their appointes. The proposed must not undermine state sovereignty or code authority of our state's cutting energy and climate policies to others who do not have the same strong comm framework to reduce climate poliution and promote clean energy.	rid operator GRC), even nd the regionalization odge clean timent and legal	
2	<u>Air and GHG pollution should be reduced</u> . Expansion of the CAISO into a w grid would add states heavily invested in coal and other high GHG emitting r California law prohibits our ultilities from investing in new coal resources that GHG emissions performance standard.	restern regional esources. t do not meet a	
	Any regionalization proposal should guarantee that an expanded regional gric continue the path California has charted to reduce region-wide and localized pollution, particularly in California nonattainment areas and in disadvantaged by delivering renewable energy to California load centers and displacing foss generation in those areas.	l operator will air and GHG communities, il fuel	

- No weakening of environmental laws
- Pollution reduced
- RPS protected
- Lower consumer costs
- Transparency and access
- Support transportation electrification
- Promote growth and jobs

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#### The Nature of Power Supply Has Changed



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