California Energy Commission

Renewable Power: Status and Issues

2011 Integrated Energy Policy Report Proceeding

September 14, 2011

Today's Agenda

- Overview of draft report
- Panel discussion

  Valerie Winn, PG&E
  Gary Stern, SCE
  Wayne Sakarias, SDG&E
  Anthony Andreoni, CMUA
  Neil Millar, Mark Rothleder, CAISO
  Julie Fitch, CPUC
  Rich Ferguson, CEERT
  Carl Zichella, NRDC
  Jane Williams, CCAT
  Dan Adler, CCEF
  Nancy Rader, CalWEA
  Ed Murray, CalSEIA
  Steven Kelly, IEP

- Public Comment

Integrated Energy Policy Report

- **Public Resources Code Section 25301**(a): "At least every two years, the commission shall conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety."

2011 Integrated Energy Policy Report

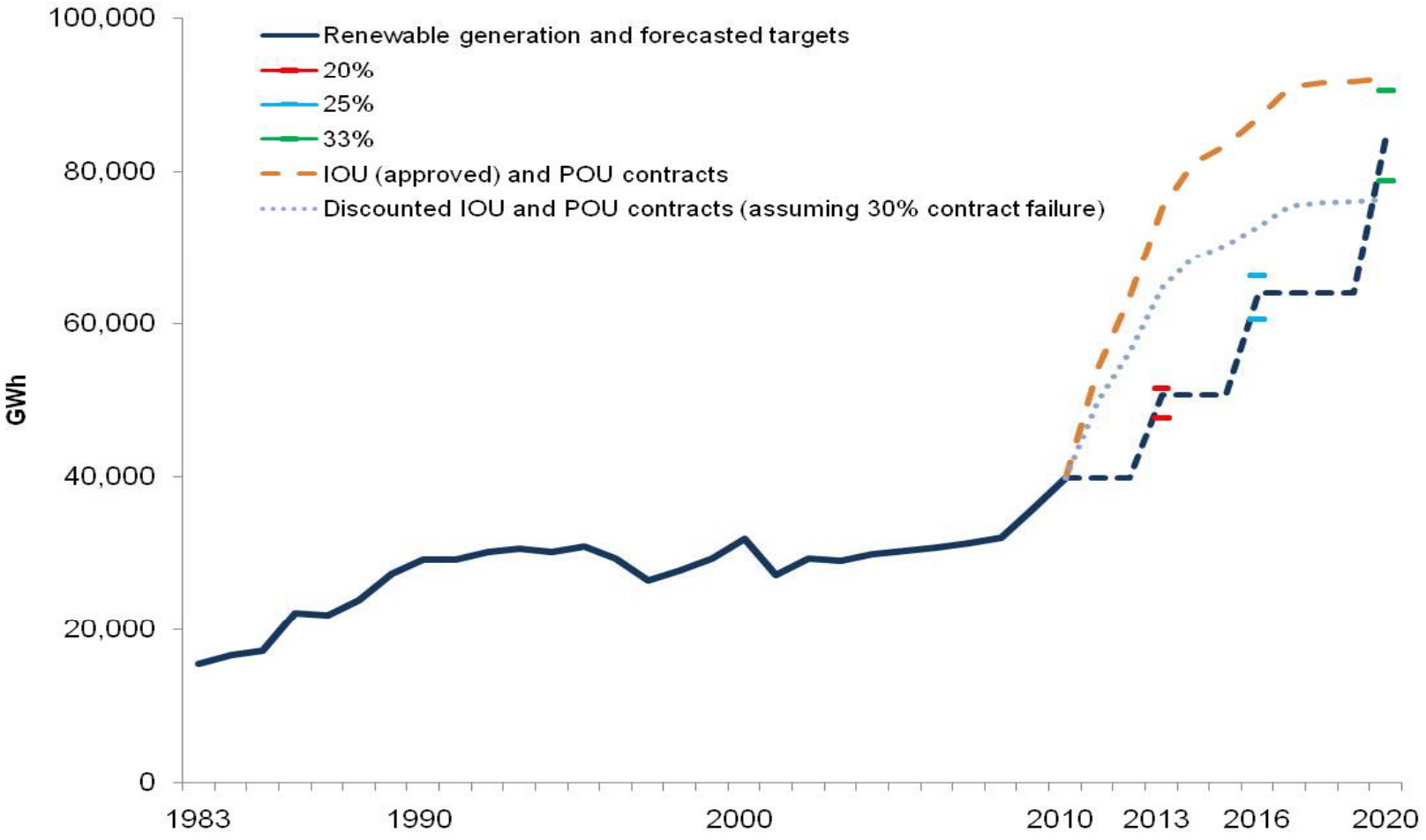
- Governor's Clean Energy Jobs Plan: CEC to prepare a "renewable energy plan…that will expedite permitting of the highest priority generation and transmission projects."
- 2011 IEPR Scoping Order: Develop strategic plan for renewable development.
  - "Renewable Power: Status and Issues" report will be foundation for strategic plan

Renewable Energy Goals

- Renewable generation to equal:
  - Average of 20% of retail sales during compliance period ending December 31, 2013
  - 25% by December 31, 2016
  - 33% by December 31, 2020
- 20,000 MW of new renewable capacity by 2020
  - 8,000 MW utility-scale renewables
  - 12,000 MW of renewable DG

Progress Toward Goals

- Renewable generation 15.7% of statewide retail sales in 2010
- 9,435 MW of renewable capacity permitted in 2010
- 3,278 MW of installed renewable DG capacity
- As of May 2011, enough renewable generation on-line or contracted to meet estimates of renewable energy needed to achieve 33% by 2020 target.


Renewable generation and forecasted targets
20%
25%
33%
IOU (approved) and POU contracts
Discounted IOU and POU contracts (assuming 30% contract failure)
GWh
100,000
80,000
60,000
40,000
20,000
0
1983
1990
2000
2010
2013
2016
2020

Regional Targets for 12,000 MW of Renewable DG

Region	Behind the Meter (all technologies)	Wholesale	Undefined (mix of behind the meter and wholesale)	Total
Central Coast	280	90	0	370
Central Valley	830	1590	0	2,420
East Bay	420	30	0	450
Imperial	50	90	0	140
Inland Empire	480	430	0	910
Los Angeles, *city and county	970	860	2170	4,000
North Bay	220	0	0	220
North Valley	120	50	0	170
Sacramento Region	410	170	220	800
San Diego	500	50	630	1,180
SF Peninsula	480	10	310	800
Sierras	30	40	0	70
Orange	420	10	40	470
Total	**5,210**	**3,420**	**3,370**	**12,000**

Regional Targets for 8,000 MW of Utility-Scale Renewables

Identified Transmission Line (s)	CREZ Served	Capacity with New/Upgraded Lines (MW)	Project Capacity Permitted in 2010 Associated with the New/Upgrades (MW)	Additional Project Capacity for 8,000 MW of New Large-Scale Renewables (MW)
Sunrise Powerlink	Imperial North and South, San Diego South	1,700	760	940
Tehachapi and Barren Ridge	Tehachapi, Fairmont	5,500	2,810	2,690
Colorado River, West of Devers, and Path 42 Upgrade	Riverside East, Palm Springs, Imperial Valley	4,700	1,825	2,875
Eldorado-Ivanpah, Pisgah-Lugo, and Coolwater-Jasper-Lugo	Mountain Pass, Pisgah, Kramer	2,450	1,470	980
Borden-Gregg	Westlands	800	145	655
South of Contra Costa	Solano	535	155	380
Carrizo-Midway	Carrizo South, Santa Barbara	900	800	100
TOTAL				8,620

Post-2020 Renewable Investments

- 33% by 2020 considered floor goal
- Additional renewable generation could be needed to:
  - Meet increased demand from high EV penetration
  - Replace generation from retiring coal plants
  - Provide zero-emission generation to meet 2050 GHG emission reduction goals
- Could need from 67-79 percent renewables by 2050

Increased Interest in Renewables

- 2009 RPS Solicitation – enough generation bid in to meet half of IOU load in 2020
- Signed contracts for 9,300-10,500 MW new capacity
- 9,435 MW permitted in 2010; additional 26,000 MW in permitting process
- 57,000 MW in CAISO Interconnection Queue
- 5,200 MW in Wholesale Distribution Access Tariff queue

Renewable Technical Potential

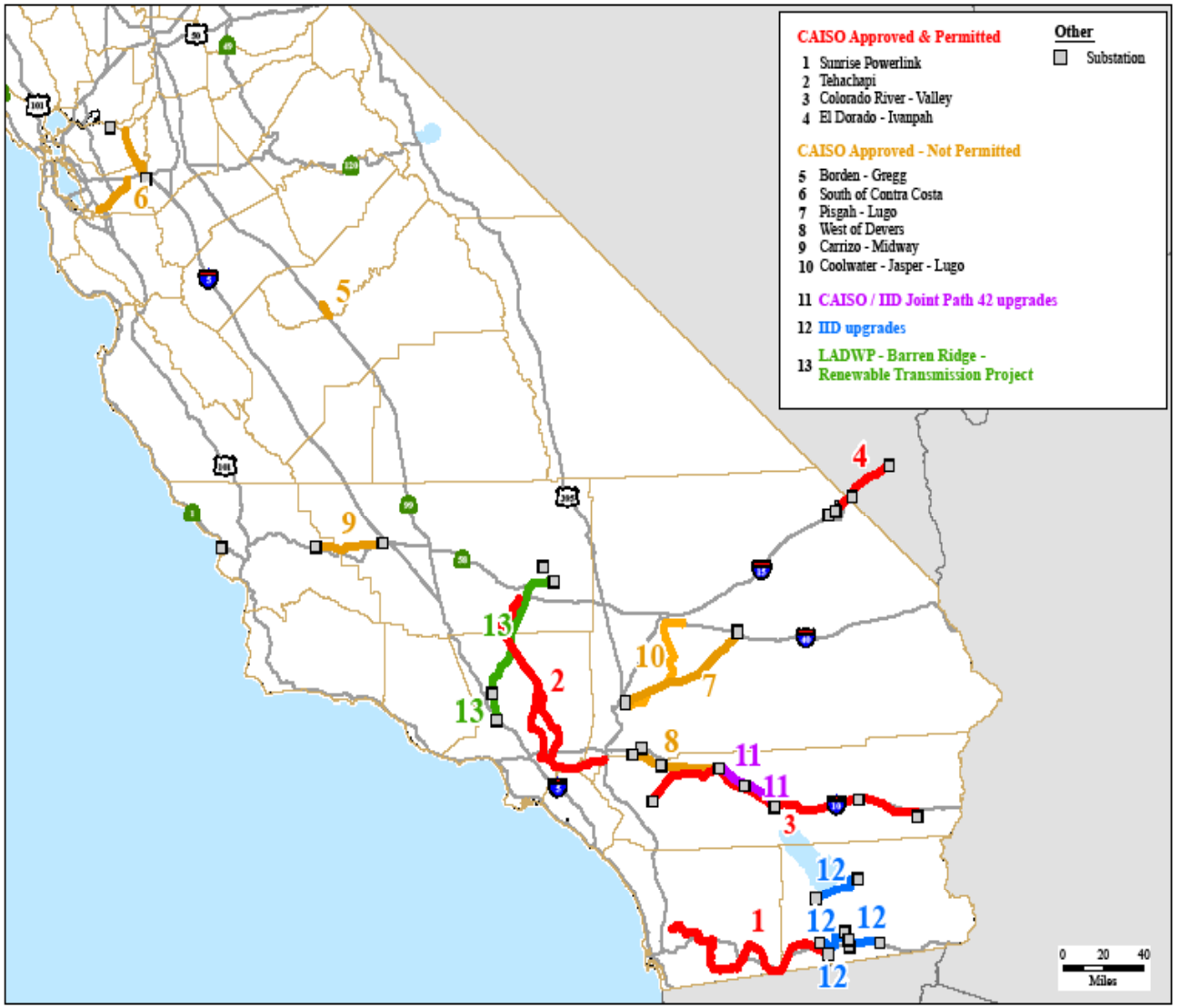
Technology	Technical Potential (MW)
Biomass	3,820
Geothermal	4,825
Small Hydro	2,158
Solar	
Concentrating Solar Power	1,061,362
PV	17,000,000
Wave and Tidal	32,763
Wind	
On-shore	34,000
Off-shore	75,400
TOTAL TECHNICAL POTENTIAL	**18,214,328**

Permitting/Environmental Issues

- Environmental/Land Use Issues
  - Impacts on sensitive plant/animal species
  - Water issues
  - Cultural resources
  - Land use concerns
- Permitting Process Issues
  - Fragmented and overlapping processes
  - Varying codes, standards, fees for DG projects

Transmission Issues

- Interconnection of ARRA-funded renewable projects
- Need for coordinated land use/transmission planning
- Optimize use of existing grid and rights-of-way


CAISO Approved & Permitted
1 Sunrise Powerlink
2 Tehachapi
3 Colorado River - Valley
4 El Dorado - Ivanpah
CAISO Approved - Not Permitted
5 Borden - Gregg
6 South of Contra Costa
7 Pisgah - Lugo
8 West of Devers
9 Carrizo - Midway
10 Coolwater - Jasper - Lugo
11 CAISO / IID Joint Path 42 upgrades
12 IID upgrades
13 LADWP - Barren Ridge - Renewable Transmission Project
Other
Substation
0 20 40
Miles

Transmission Projects Licensed or Under Construction

- SDG&E Sunrise Powerlink
- SCE Tehachapi Renewable Transmission Project
- SCE Colorado River – Valley transmission line (ARRA)
- SCE El Dorado-Ivanpah Upgrade (ARRA)
- Imperial Irrigation District upgrades
- LADWP Barren Ridge Renewable Transmission Project (ARRA)

Transmission Projects without Active Licensing Applications

- PG&E Borden – Gregg 230 kV reconductoring
- PG&E South of Contra Costa reconductoring
- SCE Pisgah – Lugo 500 kV upgrade (ARRA)
- SCE West of Devers upgrades (ARRA)
- PG&E Carrizo – Midway 230 kV reconductoring
- SCE Coolwater – Jasper – Lugo 230 kV line (ARRA)
- California ISO/IID Joint Path 42 upgrades

Need for Coordinated Land Use/ Transmission Planning

- Transmission planning and utility project development processes essentially sequential
- Transmission planning, consideration of routing issues, and construction of project can each take as much as 2 years.

Use of Existing Transmission Grid

- Emphasizing existing line upgrades and use of existing rights-of-way reduces environmental concerns
- Allowing upsizing of projects beyond current need could provide unused capacity for future use
- R&D needed to identify technologies to improve performance of existing grid

Grid-Level Integration Issues

- Need for regulation, ramping, spinning reserves, replacement power.
- Need to address potential overgeneration issues and improve forecasting of intermittent resources
- Use complementary technologies (natural gas plants, energy storage, demand response) to provide integration services

Distribution-Level Integration

- Modernize aging distribution system
- Develop smart grid technologies to facilitate two-way flow of electricity
- Develop better protection systems, standards, and cyber security
- Improve interconnection processes to reduce time and cost of interconnection

Investment/Financing Issues

- Overall reduced investment in energy R&D
- Private companies unwilling to invest in innovation without guarantee of returns
- Funding gaps at R&D and early commercial stages
- Recession affecting developer ability to use traditional financing tools

Cost Issues

- Seeing rapid cost reductions in solar technologies
- Both utility-scale and DG solar coming in below CPUC's MPR
- Cost challenges include environmental review and permitting, project construction, and interconnection
- Need to consider portfolio value of renewables

Cross-Cutting Issues

- R&D to develop technologies to integrate renewables and bring costs down
- EJ concerns
- State and local government coordination
- Adequate and well-trained workforce
- Renewables on state properties

Panel Discussion - Morning

- Valerie Winn, PG&E
- Gary Stern, SCE
- Wayne Sakarias, SDG&E
- Anthony Andreoni, CMUA

LUNCH

Workshop will resume at 1:00

Panel Discussion (cont'd)

- Neil Millar and Mark Rothleder, CAISO
- Julie Fitch, CPUC
- Rich Ferguson, CEERT
- Carl Zichella, NRDC
- Jane Williams, CCAT

BREAK
will reconvene at 2:55

Panel Discussion (cont'd)

- Dan Adler, CCEF
- Nancy Rader, CalWEA
- Ed Murray, CalSEIA
- Steven Kelly, IEP

PUBLIC COMMENT

Next Steps

- Written comments due COB October 5
- Instructions for submitting written comments available under the September 14 heading at:

www.energy.ca.gov/2011_energypolicy/notices/