ISO 33% Renewable Analysis

RETI SSC Meeting

September 16, 2009

ISO 33% Renewables Analysis Summary

- On 9/15/09, ISO published several reports from the 2010 Transmission Planning Process, including:

- *2020 RENEWABLE TRANSMISSION CONCEPTUAL PLAN BASED ON INPUTS FROM THE RETI PROCESS*

  http://www.caiso.com/242a/242ae729af70.pdf

- ISO is developing paper on renewable transmission
  - Defining new transmission type that would allow for "supersizing" transmission to meet potential requirements

    http://www.caiso.com/242a/242afa1d3c210.pdf
- ISO has posted case *results* on its web site

ISO 33% Plan Elements

- CREZ Transmission Additions
  - ISO and IOUs identified transmission lines to connect to 14 CREZs, total of 21,375 MW
    - 18,568 MW Southern California
    - 2,807 MW Northern California (based on assumed PPA capacity)
- Other Transmission Additions
  - 500 kV transmission lines between south and north portion of the ISO network to transfer renewable energy from southern California to northern California load centers.

ISO 33% Power Flow Analysis

Conducted two power flow base case analysis

- 2020 Summer Peak (August, 3-4 pm)
- 2020 Spring Off-Peak (April, 12 pm [noon] – load at 50% of annual summer peak load).

An existing 2019 WECC summer peak power flow base-case , updated for year 2020 conditions (load, resource and transmission configuration) was used as a starting case

Both cases were run through N-1 and N-2 contingency analysis. Contingency analysis designed to:

- Confirm network upgrades selected in the initial step are adequate for grid reliability purposes
- Identify any additional network upgrades that might also be needed to accommodate the assumed level of renewable resource development without violating applicable grid reliability criteria.

RETI Resource Additions in 33% Case

			Assumed make up					On peak	Off peak (April 12pm)
CREZ #	CREZ Name	Units	ST	PV	Wind	Other	Total	(Aug. 3-4pm)	50% load
	Total	**MW**	**10,440**	**4,450**	**8,005**	**3,980**	**26,875**	**17,067**	**18,320**
crez_out of st*			1,000.0	500.0	2,000.0	2,000.0	5,500.0	3340.0	3785.0
52	Tehachapi	MW	650.0	600.0	3,250.0		4,500.0	2504.1	2271.0
43	Pisgah	MW	2,500.0			1,000.0	3,500.0	2691.0	2973.1
30	Imperial South	MW	1,100.0		600.0	300.0	2,000.0	1129.7	1325.6
18	Carrizo South	MW	250.0	750.0			1,000.0	646.6	812.8
8	Solano	MW			900.0		900.0	353.6	261.2
40	Mountain Pass	MW	1,100.0	100.0			1,200.0	862.8	1015.2
16	Santa Barbara	MW			120.0		120.0	20.6	32.0
14	Carrizo North	MW	200.0	400.0			600.0	401.3	492.1
3b	Round Mountain - B	MW			187.0		187.0	46.0	118.1
32	Palm Springs	MW			270.0	500.0	770.0	548.1	528.5
36	Riverside East	MW	1,500.0	1,500.0			3,000.0	2002.8	2303.6
50	Kramer	MW	1,600.0	600.0			2,200.0	1861.6	1510.3
37	Iron Mountain	MW					0.0		
38	Twentynine Palms	MW					0.0		
31a	Imperial North - A	MW	540.0			180.0	720.0	517.9	606.7
41	San Bernardino - Baker	MW					0.0		
29	Imperial East	MW					0.0		
46	Victorville	MW					0.0		
27	San Diego South	MW			678.0		678.0	141.4	284.4
1	Lassen South	MW					0.0		
47	Fairmont	MW					0.0		
44	San Bernardino - Lucerne	MW					0.0		
34	Needles	MW					0.0		
45	Barstow	MW					0.0		
26	San Diego North Central	MW					0.0		
17	Cuyama	MW					0.0		
51	Inyokern	MW					0.0		
2	Lassen North	MW					0.0		
3a	Round Mountain - A	MW					0.0		
25	Owen's Valley	MW					0.0		
31b	Imperial North - B	MW					0.0		

Transmission Additions in 33% Case

- CAISO and IOUs identified potential transmission required to access selected CREZ
- Through TPP, transmission was refined to insure case was “feasible” from load flow standpoint

Case Results

Summer on-peak:

- Heavy load, renewable output high
- Feasible

Spring off-peak:

- Load light, renewable resource output is high
- “Difficult to simultaneously accommodate qualifying facilities (QF), must-run hydro, production from nuclear units, and energy from renewable resources (including imported renewable energy). “ (p.15)
- To maintain reliability criteria CA would have to become huge net exporter of power to keep sufficient generation on-line

What's Next ?

- Stakeholder meeting on 33% renewables on September 23, 2009 at CAISO. This will address:
  - How will the ISO go about considering transmission to get to 33%
  - Work with Consolidated Transmission Group to develop new case
  - New transmission category proposal