Briefing on ISO's 2020 Technical Analysis Based On Input From the RETI Process

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ISO 2020 technical analysis is the initial step into Phase 3 of the overall RETI process

- RETI Phase 1 & 2 efforts were intended to define CREZs, their resource makeup, and conceptual transmission plan
- Phase 3 was intended for the ISO, IOUs, and POUs to use Phase 1&2 data, and perform technical analysis to define needed transmission to CREZs
- Initial timeline was for RETI to complete Phase 2A by March 2009; then for ISO and POUs to move into technical studies
- CPUC's schedule was for the ISO to present its initial "renewable" plan to its Board in the Q1 2010 and POUs were to move forward according to their decision authority's schedule
- RETI Phase 2A report was delayed beyond ISO's Order 890 timeframe; ISO moved forward with RETI data available as of April 2009 in order to meet its Q1 2010 commitment to RETI
- ISO posted its initial 2020 technical analysis results on September 15, 2009
- RETI Phase 2A report was finalized September 2009

ISO's 2020 technical analysis assumptions are based on RETI CREZ, resource, and transmission assumptions

- ISO initial 2020 technical analysis was a collective effort between the ISO and IOUs
- Queue information from the ISO, LADWP, and IID was utilized
- ISO ranked CREZ's based on commercial activity; i.e., the number of PPAs signed
- If no PPAs were indentified, CREZs were further ranked by their proposed installed capacity in the queues
- A "net short" renewable target of 69,000 GWh/year developed by RETI was used
- CREZs with the highest ranking were selected first; and successively until the "net short" target was met; a total of 14 CREZs were identified
- Transmission to connect the CREZs was selected by ISO and IOU staff based on engineering judgment
- Base cases were developed and analysis run

RETI Resource Additions in 33% Case

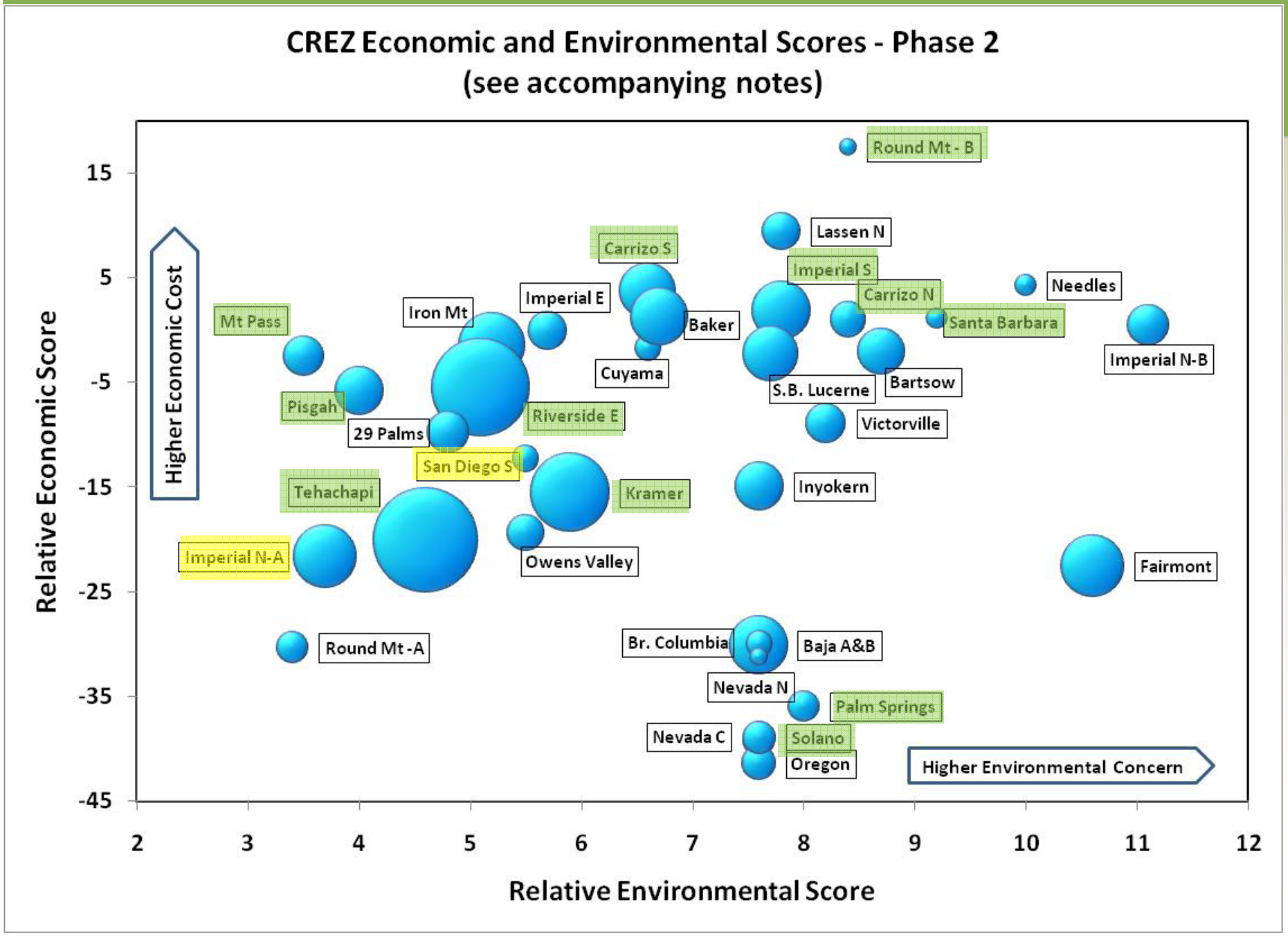
			Assumed make up					On peak	Off peak (April 12pm)
CREZ #	CREZ Name	Units	ST	PV	Wind	Other	Total	(Aug. 3-4pm)	50% load
	Total	**MW**	**10,440**	**4,450**	**8,005**	**3,980**	**26,875**	**17,067**	**18,320**
crez_out of st*			1,000.0	500.0	2,000.0	2,000.0	5,500.0	3340.0	3785.0
52	Tehachapi	MW	650.0	600.0	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		

The 2020 technical analysis was not intended to be exhaustive; rather a “reasonable & balanced” approach to quickly identify “no regrets” transmission segments for more detailed analysis

- Two power flow base cases were developed
  - 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
  - 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.

In general, base cases indicate that a 33% renewable integration during off-peak periods of the year will be challenging

- 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)
  - Operational reliability (regulation; ramping; etc.) will be impacted
  - To maintain reliability criteria CA would have to become huge net exporter of power to keep sufficient generation on-line


CREZ Economic and Environmental Scores - Phase 2
(see accompanying notes)
Relative Economic Score
Relative Environmental Score
Higher Economic Cost
Higher Environmental Concern
15
5
-5
-15
-25
-35
-45
2
3
4
5
6
7
8
9
10
11
12
Round Mt - B
Lassen N
Carrizo S
Imperial S
Needles
Carrizo N
Imperial E
Iron Mt
Mt Pass
Baker
Santa Barbara
Imperial N-B
Cuyama
S.B. Lucerne
Bartsow
Pisgah
Riverside E
Victorville
29 Palms
San Diego S
Tehachapi
Kramer
Inyokern
Imperial N-A
Owens Valley
Fairmont
Round Mt -A
Br. Columbia
Baja A&B
Nevada N
Palm Springs
Nevada C
Solano
Oregon

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California ISO
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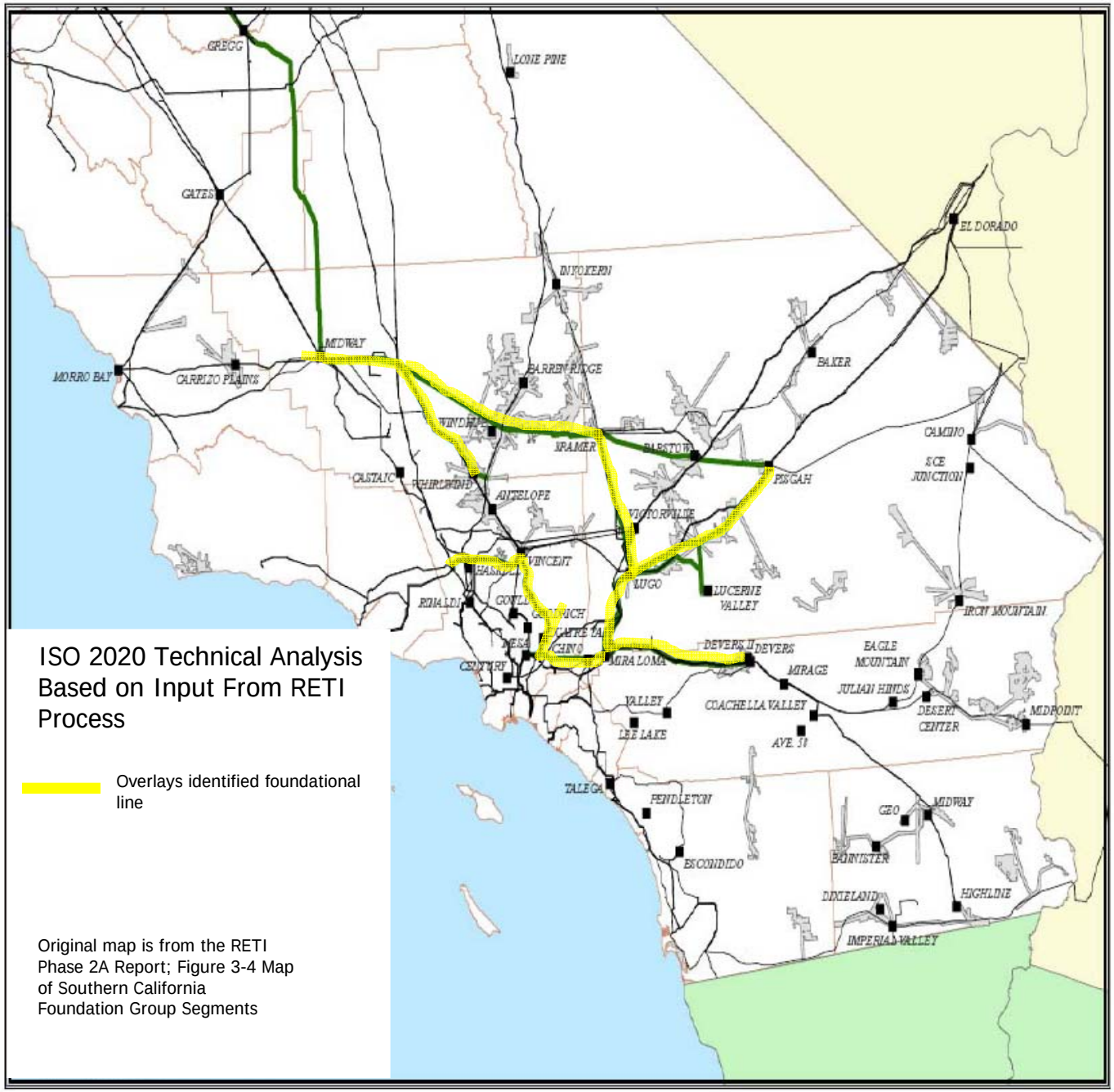

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The work represents extensive work by California utilities and the ISO, which could become a platform for additional work with CTPG.

- The ISO would like to present base cases and technical results to the CTPG technical committee at the earliest possible time.
- Additional “scenario” cases are needed to complete analysis and ISO wants to move analysis into the CTPG forum to complete an overall, coordinated analysis.
- The ISO would like CTPG to set a goal for having report on renewable-related transmission by the end of the year.
- The document would coordinate all study work and results and propose recommendations for initial renewable transmission development
- The ISO would present the report to its Board as a coordinated recommendation for its balancing authority area.