

RETI – Phase 2 and Beyond

IEPR Siting Workshop

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RETI Phase 1

- Renewable Energy Resource Assessment
 - Identification of “competitive renewable energy zones”, aka CREZ
 - California and neighboring states
 - Energy and capacity potential by technology
 - Economic and environmental ratings
 - Phase 1B report posted January 2009, updated in March
 - <http://www.energy.ca.gov/reti/index.html>

RETI Phase 2A

- Conceptual transmission planning
 - Transmission access to all CREZ in CA and neighboring states
 - Delivery of renewable energy to CA loads sufficient to meet 33% RPS
 - CA 2020 33% net short $\approx 59,700$ GWh
 - $\approx 40\%$ of CREZ energy identified in Phase 1
 - Renewable transmission capacity target $\approx 96,000$ GWh
 - About 20,000 and 30,000 MW, depending on technology

RETI Phase 2A

- CREZ Revision
 - Update Phase 1 “proxy” projects in CREZ
 - Land ownership fragmentation
 - BLM development caps
 - Update commercial interest data
 - Update restricted area information
 - Investigate disturbed lands

Conceptual Transmission Plan Goal

- Identify most valuable network transmission line segments providing access to CREZ and delivering renewable energy to load centers.
- Provide needed information to CAISO and POU transmission planners.
- Build public understanding and support for transmission needed to meet renewable goals.

Conceptual Transmission Plan

Sample Components

- Loop existing 500 kV Palo Verde-Devers #1 into SCE Midpoint substation creating 500 kV Palo Verde-SCE Midpoint #1 and 500 kV SCE Midpoint-Devers #1
- Build 500 kV SCE Midpoint-Desert Center #1 line (50 miles) on double circuit towers
- Build 500 kV Desert Center-Devers #1 line (68 miles) on double circuit towers
- Rebuild existing 230 kV Julian Hinds-Eagle Mountain #1 line with double circuit 230 kV towers (15 miles)
- Add new 230 kV Julian Hinds-Eagle Mountain #2 line on open side of towers (15 miles)

Line Segment Prioritization

- 115 network line segments plus ancillary facilities
 - POU and IOU facilities
 - Consensus prioritization methodology
- “Foundational” and “Access” line segments
- Sort into 4 levels of value to meeting RPS target
- On line dates and planning status also considered

Conceptual Transmission Plan Prioritization Criteria

- Transparency
- Objective data
 - Line segment utilization for renewable energy
 - Power distribution factors, aka “shift factors”
 - Access to preferred CREZ
 - Most total energy
 - Lower cost and environmental concern
 - Most energy having PPAs or in queues
 - Environmental concerns associated with lines
 - Cost

Line Segment Utilization

- Shift Factors (power distribution factors)
 - Power inserted into grid from any CREZ spreads throughout all WECC network line segments
 - Shift factor = percentage of inserted power flowing in any line segment
 - Provide the basis for evaluating the usefulness of the line segment to accessing CREZ and delivering energy to load centers

Shift Factor Calculations

- Thanks to Jan Strack and John Jontry at SDG&E!
- Start with lines in WECC 2018 heavy summer case
- Add all proposed CA lines and facilities
- Decrease generation in CA load centers proportional to renewable net short
- Insert one megawatt at each CREZ connection
- GridView program computes shift factors

Line Segment Utilization

Shift Factor Sample

Line Segment ID →	13	14	15	16	17
CREZ Name ↓	MTPS_BARS_1	BARS_LUGO_1	PISG_LUCV_1	LUCV_LUGO_1	PISG_MIRA_1
Baja	-0.0230	0.0285	-0.1803	-0.1782	0.0080
Barstow	0.0423	0.6328	0.0393	0.0390	0.0458
British Columbia	-0.0219	0.0188	0.0352	0.0348	0.0261
Carrizo North	0.0008	-0.0240	0.0469	0.0460	0.0244
Carrizo South	0.0008	-0.0240	0.0469	0.0460	0.0244
Cuyama	0.0008	-0.0240	0.0469	0.0460	0.0244
Fairmont	0.0324	0.0615	0.0130	0.0125	0.0351

Prioritization Criteria Formulas

- Criterion A – Access to total CREZ energy
- Segment Score =
$$\sum \{ \text{segment shift factor for CREZ} \times \text{CREZ energy} \} \div \text{line segment cost}$$
 - Absolute values of shift factors are used
 - Grid response is assumed linear, independent of CREZ energy
- Criteria B & C are similar

Prioritization Criteria Formulas

- Criterion D – Environmental Concern
- Segment Score =
 $\{\text{Environmental rating}\} \times \Sigma \{\text{segment shift factor for CREZ} \times \text{CREZ energy}\}$
- Environmental rating involves:
 - Length of line segment
 - Type of right of way and construction required
 - Expert opinion of environmental issues

Prioritization Challenge

CREZ and Line Segment Data



Bin #1
Most
Important

Bin #2
Next Most
Important

Bin #3
Next Most
Important

Bin #4
Least
Important

Phase 2A Tentative Completion Schedule

- Draft Report sent to SSC- late May.
- SSC meeting to review Draft Report- late May.
- Post Draft Report- early June.
- Public meetings to take comments- June.
- Public comment period ends- Late June.
- SSC meeting to accept Final Report- Early July.
- Post Phase 2A Final Report- Early to Mid-July.

Phase 2B

- Update CA CREZ data
- Update OOS data
- Identify near term measures to access CREZ
- Refine conceptual plan
 - Identify redundant line segments
 - Recalculate shift factors for Bin #1 line segments without others
 - Revise phasing options
 - Power flow analysis

Phase 3 and Beyond

- Support detailed planning of priority renewable transmission projects.
- Continual update of data and conceptual plans.
- Resolution of generation siting issues.
- Support designation of renewable transmission corridors.