

RETI Phase 2A - Conceptual Transmission Plan Status Report

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Phase 2 Conceptual Planning Goals

- Identify upgrades to the state's transmission network which may be needed to enable California to meet a 33% RPS standard.
- Compare relative merits of these network upgrades to access renewable energy resources and deliver this energy to consumers.
- Comparison methodology to be:
 - Transparent, objective, based on best available data.

Limitations & Caveats

- Plan attempts to accommodate uncertainty about which resources will be developed, and when.
- Assumptions drive results.
- Data is never perfect; data accuracy difficult to estimate.
- Benefits other than renewable energy access not assessed.
- Phase 2A assessment is limited to *network* upgrades, i.e. segments in which power flows are bi-directional.
 - Needed “trunklines” and “gen-ties” are assumed to be in place.

Data

- CREZ
 - Phase 2 Revised CREZ economic, environmental rankings
 - Commercial interest (PPAs, queue positions)
 - GWh to be accessed, given assumed development “success factor”
- Renewable “net short” for each LSE
- Network line segments to access each CREZ
- Environmental rating of line segments

Net Short Data

- 33% of forecast LSE energy deliveries in 2020
- Minus RPS qualifying energy delivered in 2008.
- Specific for each LSE
- RETI planning target: 1.6x Net Short, = 96,000 GWh/year in 2020

Line Segment Data

- Power distribution factors, aka “shift factors”
 - Are the relative amounts of renewable energy from each CREZ carried by each line segment
 - Depend on assumptions:
 - CREZ development and assumed interconnection configuration
 - other network components
 - system response to renewable inputs
 - Rely on LSE net short data
- Standardized tower, line, substation costs
 - ROW costs ignored

Criteria to Assess Line Segments

- For each line segment:
 - Absolute value of shift factors summed over all CREZ
 - Number of CREZ for which segment carries more than 5% of CREZ's energy
 - Total renewable energy carried (Criterion A)
 - Total renewable energy weighted by (revised) CREZ economic score (Criterion B-1)
 - Total renewable energy weighted by CREZ environmental score (Criterion B-2)
 - Total (revised) CREZ energy with known commercial interest (Criterion C)
 - CREZ energy divided by environmental concern rating (Criterion D)

Line Segment Environmental Data

- Segment length (miles)
- New Rights of Way requirements
 - E.g. along existing lines, in designated corridor
- Construction type
 - E.g. reconductoring, rebuild, new line
- Expert judgment of relative environmental concern
 - See sample Environmental Concerns Checklist

Environmental Assessment Results

- For each line segment:
 - Environmental score (higher scores indicate higher levels of concern)
 - Environmental score equal to renewable energy carried divided by environmental rating score (Criterion D)

Technical/Electrical Rating Issues

- Many line segments (> 100)
- Line segments may serve different functions
- Criteria A, B1, B2, C are highly correlated since all depend on renewable energy carried by segment.
- Energy accessed per dollar of transmission cost (original criteria formulas) a problematic metric
 - Cost estimates very rough
 - ROW costs not included
 - Line segment cost small compared to value of energy delivered over 50-year transmission asset life

Combining Segments into Groups

- Criteria scores reported for each segment.
- Segments serve different functions.
- Commercial transmission projects likely to be made up of more than one segment
 - Combine line segments into logical groups.
 - Combine Criteria A, B1, B2, C results into single value; add to produce rating for each group.
 - Report results with and without costs.
 - Report environmental rating for each group.

Group Line Segments by Function

- Line segments whose primary renewable energy function is to:
 - Collect energy from CREZ
 - “Renewable collection lines”
 - Make energy available to all load centers
 - “Renewable foundation lines”
 - Make energy from foundation lines available to load centers
 - “Renewable delivery lines”
 - Other

Line Segment Groups (cont)

- Foundation lines
 - Segments between Sacramento and Palm Springs (Devers) able to move renewable energy north or south as needed to meet loads
- Delivery lines
 - Segments connecting Foundation lines to load centers
- Other
 - Tehachapi segments collect energy but also serve foundation and delivery functions
 - LEAPS provides alternative renewable path to LA via Sunrise and to San Diego via Banning Pass tx

Line Segment Groups

- Collection lines
 - North Out of State to BC
 - Northeast CA (connect N. CA CREZ; NW Nevada; OR)
 - Carrizo
 - Barren Ridge
 - Inyo
 - Mountain Pass
 - Iron Mountain
 - Pisgah West
 - Riverside
 - Imperial

Reporting Results

- List groups sorted (highest to lowest) on:
 - Combined energy score (also show criteria scores)
 - Combined energy score per dollar transmission cost
 - Environmental rating score
- Also sort groups by in-service date.
- Color-code segments on map by functional group.
 - CPWG recommends bubble chart not be used

Proposed SSC Recommendations

- For Renewable Foundation and Delivery lines:
 - Appropriate planning entities should study all renewable foundation and delivery line segments ASAP to determine need, timing, etc.
- Joint IOU-POU projects should be encouraged to avoid redundant facilities
- Tehachapi Segments 4-11
 - CPCN application under consideration
- LEAPS
 - Compare renewable energy value relative to Imperial export lines

Proposed Recommendations (cont)

- Renewable collection lines
 - Planning and permitting authorities should consider RETI results when evaluating overall merit of proposed transmission projects.
 - RETI should evaluate parallel or possibly redundant line segments.
 - Joint IOU-POU projects should be encouraged to avoid redundant facilities
 - Formal designation of transmission corridors should proceed immediately.

Issues for Future RETI Analysis

- Updates of all data and assumptions, with special focus on:
 - Out-of-State resource issues
 - Impact of proposed East Mojave Nat'l Monument
 - Possible conflicts with MWD facilities
 - Trunklines needed in the plan
 - identify location, length and size of trunk-lines where logical CREZ collection points appear distant from existing or proposed network facilities