Central California Clean Energy Transmission Project (C3ETP)  
1st Stakeholder Meeting, Jan 9th, 2008, Folsom CA  

Study Plan – Economic Assessment  

Department of Planning and Infrastructure Development, CAISO  

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- General Concepts
- Methodology and Study Assumptions
- Expected Deliverables
An Example of Transmission Congestion

Congestion:
- Costs: $19M
- Duration: 417 hours

The example is from an Economic Planning Study by the CAISO through production simulation.

All congestion is bad. Mitigating congestion brings economic benefits. However, there are costs associated with mitigating congestion.

Economic assessment weighs investment (costs) and return (benefits).
Long-Term Transmission Planning
Costs vs. Benefits

- Congestion relieved to some extent
  - Moderate benefit
  - Economic
- Build more transmission
- Build even more transmission
  - Hardly more benefit
  - Uneconomic
- Congestion relieved almost completely
  - Large benefit
  - Economic
- Congestion relieved completely
  - More benefit
  - Economic

Cost (Investment)
Benefit (Return)
## Reliability Study vs. Economic Study
### Each Has Its Unique Value

<table>
<thead>
<tr>
<th>Reliability Study</th>
<th>Economic Study</th>
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<tbody>
<tr>
<td>Addresses thermal, voltage and stability issues.</td>
<td>Addresses thermal issues, but not voltage and stability issues.</td>
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<tr>
<td>Typically computes two or three seasonal scenarios for a study year.</td>
<td>Typically computes 8760 consecutive scenarios for the whole study year.</td>
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<td>Makes assumptions on major path flows between different areas.</td>
<td>Determines path flows automatically as a result of economic dispatch.</td>
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<td>Dispatches generation manually according to experience and assumptions.</td>
<td>Dispatches thermal generation automatically according to their costs.</td>
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<tr>
<td>Identifies congestion under stressed conditions.</td>
<td>Identifies congestion for all hours in a year. Summarizes congestion costs and duration.</td>
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<tr>
<td>Identify reliability needs.</td>
<td>Quantifies economic benefits of congestion mitigation measures.</td>
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Transmission Economic Assessment Methodology (TEAM)

Generation and load assumptions:
- CEC 1-in-2 load forecast
- Gas price $7/MMBtu at Henry Hub
- CA renewable scenarios 26.5% (2015) and 33% (2020)

Production simulation tool GridView™:
- SCUC and SCED optimization algorithms
- Nodal LMP with a WECC network model
- Simulation for 8760 hours in a year

Economic evaluation parameters:
- Project lifespan 45 years
- Benefits real escalation rate 1% and inflation rate 2%
- Benefits discount rate 10%

C3ETP
(this project)

Sunrise project

Tehachapi project

WECC production simulation database

~14,000 buses
~2,800 generators
~19,000 branches
Project’s Economic Benefits
In CAISO Ratepayers’ Perspective

System with congestion
Congestion relieved by a mitigation plan (i.e. “the project”)

Pre-Project   Post-Project   Change
$17,316M   $17,262M   $54M
$4,029M    $4,026M   -$3M
$574M      $544M    -$30M

Total energy benefits: $21M

LCR and system RA benefits: $15M
Any other benefits: $5M
Total economic benefits in year 20xx: $41M
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- General Concepts
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Congestion Evaluation
Congestion Costs ($M) and Duration (Hrs)
Economic Benefits of Different Alternatives
Compute and Compare

Year 2015
Year 2020

Production Simulation
Economic Analysis

Alternatives i = 1,2,...,n

Alternative 1: $1,2015 $1,2020 $1
Alternative 2: $2,2015 $2,2020 $2
Alternative n: $n,2015 $n,2020 $n

Project Costs
Net Benefits

Project Benefits

Note: This slide is just an illustration of study Deliverables. Nothing shown in this example are actual study results.
Account for Uncertainties
Sensitivity Analysis

In this study, sensitivity analysis will be performed for two selected alternatives.

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Your comments and questions are welcome.

For written comments, please send to: RegionalTransmission@caiso.com