Transmission Competition Under FERC Order No. 1000 at a Crossroads

Discussion Paper

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PREPARED FOR:
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This presentation, prepared for LSP Transmission Holdings and GridLiiance, is based on the authors’ analyses of publicly-available transmission data reported in FERC Forms 1 and ISO/RTO transmission project tracking reports, as assembled for prior client engagements and conference presentations.
Focus of this presentation: An examination of transmission investment trends and current experience with competitive transmission planning in ISO/RTO regions as mandated under FERC Order 1000

- U.S. transmission investments by FERC-jurisdictional transmission providers increased from $2 billion/year in the 1990s to $20 billion/year in last 5 years
- We project $120-160 billion of investments over the next decade (for reliability, to integrate new resources, upgrade/replace aging existing facilities built in 1950-70s)

Why competition? In 2011, FERC Order 1000 mandated competition in transmission planning to promote “more efficient or cost-effective transmission development”

- We explore competition in ISO/RTO transmission planning to date and planning criteria that currently limit the scope of competitive processes
- We assess the extent to which the experience with competition to date points to potential customer savings and how these savings would increase if the scope of competitive planning processes can be expanded
Transmission investment remain largely regulated, based on state or regional planning with cost recovery at regulated rates

Transmission is a public good:
- Benefits broad in scope, wide-spread geographically, diverse in impacts on market participants, and occurring over many decades
- Owners generally unable to capture sufficient portion of benefits
- Will tend to lead to under-investment and over-use without regulated cost recovery

Competition is mostly for transmission projects with regulated cost recovery
- Out-of-footprint investments by established transmission owners and independent developers
- Elimination of “Right of First Refusal” (ROFR) of incumbent transmission owners for new builds approved in regional transmission plans as required by Order 1000

Some competitive “merchant” transmission projects (but not the scope of this presentation)
- Mostly HVDC lines between regions with sustained price differentials, resource needs, and ineffective interregional planning of regulated transmission
- HVDC is more likely to allow owner capture the benefits of the merchant lines
Background

Competition Mostly for “Regulated” Transmission (2/2)

U.S. competitively-planned, regulated transmission opportunities for non-incumbents are limited to:

- Some regionally-planned projects in FERC-jurisdictional RTO/ISO regions
  U.S. ISO/RTOs are at different stages of using various frameworks for competitive planning processes, largely as a result of FERC Order 1000
- ERCOT’s transmission for competitive renewable energy zones (CREZ)

**Important international experience** with competition for regulated projects

- **Alberta**: Developed a competitive process for major new projects; assigned first $1.4 billion project (significantly below AESO estimates)
- **Ontario**: Two competitive solicitations for transmission to date
- **Brazil**: Since 1999 all transmission projects have been auctioned off (similar processes in other Latin American countries, such as Chile)
- **UK**: Tenders for offshore grid projects
U.S. transmission investments have stabilized at approx. $20 billion/year in the last five years, after rising steadily from $2 billion/year in 1990s.
Historical Transmission Investment in the U.S.

Majority of U.S. Transmission Investments are made within ISO/RTO-Operated Regions

Transmission investments in markets operated by FERC-jurisdictional ISO/RTOs and ERCOT account for 85% of current transmission investments.

Transmission investments in ISO/RTO regions also have grown by more (10-16% annually) than investments in the non-ISO/RTO regions (6-10% annually).


<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO</td>
<td>$0.33</td>
<td>$1.7</td>
<td>$0.9</td>
<td>$3.5</td>
<td>$3.2</td>
<td>$2.6</td>
<td>$2.5</td>
<td>$2.4</td>
<td>$1.8</td>
<td>$12.6</td>
<td>10%</td>
</tr>
<tr>
<td>ISO-NE</td>
<td>$0.09</td>
<td>$0.7</td>
<td>$0.6</td>
<td>$1.4</td>
<td>$1.8</td>
<td>$1.4</td>
<td>$1.7</td>
<td>$1.4</td>
<td>$1.2</td>
<td>$7.5</td>
<td>15%</td>
</tr>
<tr>
<td>MISO</td>
<td>$0.34</td>
<td>$1.4</td>
<td>$1.0</td>
<td>$1.3</td>
<td>$2.5</td>
<td>$2.7</td>
<td>$3.0</td>
<td>$4.0</td>
<td>$3.3</td>
<td>$15.5</td>
<td>14%</td>
</tr>
<tr>
<td>NYISO</td>
<td>$0.08</td>
<td>$0.5</td>
<td>$0.7</td>
<td>$0.3</td>
<td>$0.4</td>
<td>$0.5</td>
<td>$0.5</td>
<td>$0.5</td>
<td>$0.6</td>
<td>$2.6</td>
<td>12%</td>
</tr>
<tr>
<td>PJ M</td>
<td>$0.46</td>
<td>$1.9</td>
<td>$3.4</td>
<td>$2.9</td>
<td>$4.1</td>
<td>$6.6</td>
<td>$7.3</td>
<td>$7.1</td>
<td>$6.4</td>
<td>$31.5</td>
<td>16%</td>
</tr>
<tr>
<td>SPP</td>
<td>$0.11</td>
<td>$0.8</td>
<td>$0.6</td>
<td>$1.2</td>
<td>$1.0</td>
<td>$2.1</td>
<td>$0.9</td>
<td>$1.4</td>
<td>$0.9</td>
<td>$6.2</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Subtotal FERC-jurisdictional ISO/RTOs</strong></td>
<td><strong>$1.43</strong></td>
<td><strong>$7.0</strong></td>
<td><strong>$7.3</strong></td>
<td><strong>$10.6</strong></td>
<td><strong>$12.9</strong></td>
<td><strong>$15.9</strong></td>
<td><strong>$15.8</strong></td>
<td><strong>$16.9</strong></td>
<td><strong>$14.4</strong></td>
<td><strong>$75.9</strong></td>
<td><strong>14%</strong></td>
</tr>
<tr>
<td>ERCOT</td>
<td>$0.14</td>
<td>$0.8</td>
<td>$1.2</td>
<td>$1.0</td>
<td>$5.3</td>
<td>$0.9</td>
<td>$0.9</td>
<td>$2.0</td>
<td>$1.1</td>
<td>$10.2</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Subtotal U.S. ISO/RTOs</strong></td>
<td><strong>$1.56</strong></td>
<td><strong>$7.8</strong></td>
<td><strong>$8.4</strong></td>
<td><strong>$11.7</strong></td>
<td><strong>$18.2</strong></td>
<td><strong>$16.8</strong></td>
<td><strong>$16.8</strong></td>
<td><strong>$18.9</strong></td>
<td><strong>$15.5</strong></td>
<td><strong>$86.1</strong></td>
<td><strong>14%</strong></td>
</tr>
<tr>
<td>Other WECC</td>
<td>$0.32</td>
<td>$1.7</td>
<td>$0.7</td>
<td>$0.8</td>
<td>$1.2</td>
<td>$0.8</td>
<td>$1.3</td>
<td>$1.0</td>
<td>$0.9</td>
<td>$5.2</td>
<td>6%</td>
</tr>
<tr>
<td>Southeast &amp; Other</td>
<td>$0.43</td>
<td>$1.3</td>
<td>$1.8</td>
<td>$1.8</td>
<td>$1.6</td>
<td>$1.6</td>
<td>$1.9</td>
<td>$1.9</td>
<td>$2.3</td>
<td>$9.4</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total US Reported to FERC and in ERCOT</strong></td>
<td><strong>$2.31</strong></td>
<td><strong>$10.8</strong></td>
<td><strong>$11.0</strong></td>
<td><strong>$14.3</strong></td>
<td><strong>$21.0</strong></td>
<td><strong>$19.1</strong></td>
<td><strong>$19.9</strong></td>
<td><strong>$21.8</strong></td>
<td><strong>$18.8</strong></td>
<td><strong>$100.7</strong></td>
<td><strong>12%</strong></td>
</tr>
</tbody>
</table>
Of $70 billion in transmission investments by FERC-jurisdictional TOs in ISO/RTO regions over the last 4-5 years, almost half was made without full ISO/RTO and stakeholder engagement in the planning process.

- Investments based on local planning processes of incumbent TOs are only subject to limited ISO/RTO review.
- FERC’s August 31 Order (Docket No. EL17-45, still subject to rehearing): only transmission “expansion” activities are subject to full regional planning requirements.

### Transmission Investments Subject to Full or Limited Review in ISO/RTO Regional Planning Processes

<table>
<thead>
<tr>
<th>Iso/Rto</th>
<th>Years Reviewed</th>
<th>FERC Jurisdictional Additions by Transmission Owners (nominal $million, based on FERC Form 1 Filings)</th>
<th>Investments Approved Through Full ISO/RTO Planning Process (nominal $million)</th>
<th>% of Total FERC Jurisdictional Investments Approved Through Full ISO/RTO Planning Process</th>
<th>% of Total FERC Jurisdictional Investments with Limited ISO/RTO Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO</td>
<td>2014 - 2016</td>
<td>$7,528</td>
<td>$4,043</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td>ISO-NE</td>
<td>2013 - 2017</td>
<td>$7,488</td>
<td>$5,300</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>MISO</td>
<td>2013 - 2017</td>
<td>$15,530</td>
<td>$8,068</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>NYISO</td>
<td>2013 - 2017</td>
<td>$2,592</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>PJM</td>
<td>2013 - 2017</td>
<td>$31,469</td>
<td>$14,458</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>SPP</td>
<td>2013 - 2017</td>
<td>$6,202</td>
<td>$4,226</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>$70,810</td>
<td>$36,095</td>
<td>53%</td>
<td>47%</td>
</tr>
</tbody>
</table>

**Sources & Notes:** Data based on FERC Form 1 and ISO/RTO Tracking Reports. CAISO data reflects only select transmission additions/approved investments of PG&E, SCE, and SDG&E for 2014-2016, based on available data. Aggregate Investment for each ISO/RTO reflects total FERC Form 1 transmission additions over indicated time periods. Investments approved by ISO/RTO reflects total value of transmission additions placed in-service over indicated time periods, approved through ISO/RTO processes.
Developers compete to provide and build **innovative solutions** to meet needs

- Planning entities identify needs and solicit competitive proposals/solutions
- Planning entities select preferred solution; winner has rights to finance, build, own, and operate projects
- **Examples:** PJM, ISO-NE, NYISO

Developers only compete to finance, build, own, and operate **specified projects**

- Planning entities identify need and specify solutions (i.e., specific projects)
- Competition to finance, own, and construct the specified project based on a number of factors, including costs
- **Examples:** CAISO, MISO, SPP, ERCOT, Brazil, Alberta, Ontario,
State of Competition
Experience with Competition in U.S. ISO/RTO Transmission Planning Processes

Since implementation of FERC Order 1000 (around 2013), FERC-jurisdictional ISO/RTOs have completed **29 competitive transmission project solicitations**

- Of the 29 ISO/RTO competitive processes, 10 were by CAISO, 16 by PJM, and one each in NYISO, MISO, and SPP. These processes have resulted in 15 competitive projects to date.

**Since 2013, only 2%** of all FERC-jurisdictional transmission investments have been subject to competitive processes

<table>
<thead>
<tr>
<th>Year</th>
<th>CAISO</th>
<th>ISO-NE</th>
<th>MISO</th>
<th>NYISO</th>
<th>PJM</th>
<th>SPP</th>
<th>Total Estimated Competitive Project Costs 2013 - 2017 ($million)</th>
<th>Total Reported Investment in Each RTO 2013-2017 ($billion)</th>
<th>Estimated Total Competitive Project Costs as a % of Total RTO Spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>$144</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$851</td>
<td>$12.6</td>
<td>6.8%</td>
</tr>
<tr>
<td>2014</td>
<td>$148</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$851</td>
<td>$7.5</td>
<td>0.0%</td>
</tr>
<tr>
<td>2015</td>
<td>$425</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$283</td>
<td>$0</td>
<td>$851</td>
<td>$15.5</td>
<td>0.3%</td>
</tr>
<tr>
<td>2016</td>
<td>$133</td>
<td>$0</td>
<td>$50</td>
<td>$0</td>
<td>$320</td>
<td>$8</td>
<td>$851</td>
<td>$2.6</td>
<td>7.0%</td>
</tr>
<tr>
<td>2017</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$181</td>
<td>$0</td>
<td>$0</td>
<td>$851</td>
<td>$31.5</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

**Total Estimated Competitive Project Costs**

- **$1,693 million**

**Total Reported Investment in Each RTO 2013-2017**

- **$75.9 billion**

**Estimated Total Competitive Project Costs as a % of Total RTO Spend**

- **6.8% CAISO, 0.0% ISO-NE, 0.3% MISO, 7.0% NYISO, 1.9% PJM, 0.1% SPP, 2.2% All Six FERC Jurisdictional ISO/RTOs**
Despite the limited number of competitive projects, independent TOs have competed successfully across ISO/RTO regions:

- 15 projects in the U.S. plus 3 in Canada
- Independent developers won in both NYISO’s and MISO’s first competitive procurements and in 40% of all of CAISO’s
- PJM has awarded projects mostly to incumbents:
  - Out of 16 projects, all but 2 were awarded to the incumbent TOs
  - PJM received 622 proposals between 2013 and 2016, of which 37% to 50% were submitted by non-incumbents

Participation in competitive processes (as documented by FERC staff) indicates strong interest by both incumbent and independent developers, but RTO criteria are limiting competitive opportunities.

### Competitive Transmission Project Summary

<table>
<thead>
<tr>
<th>ISO/RTO</th>
<th>Project</th>
<th>Decision Year</th>
<th>Winner</th>
<th>Incumbent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO</td>
<td>Gates-Gregg</td>
<td>2013</td>
<td>PG &amp; E/MidAmerican Citizen Energy</td>
<td>Yes</td>
</tr>
<tr>
<td>CAISO</td>
<td>Imperial Valley</td>
<td>2013</td>
<td>Imperial Irrigation District</td>
<td>Yes</td>
</tr>
<tr>
<td>CAISO</td>
<td>Sycamore-Peñasquitos 230 kV</td>
<td>2014</td>
<td>SDG &amp; E w/ Citizen Energy</td>
<td>Yes</td>
</tr>
<tr>
<td>CAISO</td>
<td>Delaney-Colorado River</td>
<td>2015</td>
<td>DCR Transmission</td>
<td>No</td>
</tr>
<tr>
<td>CAISO</td>
<td>Estrella Substation</td>
<td>2015</td>
<td>NextEra</td>
<td>No</td>
</tr>
<tr>
<td>CAISO</td>
<td>Wheeler Ridge Junction</td>
<td>2015</td>
<td>PG &amp; E</td>
<td>Yes</td>
</tr>
<tr>
<td>CAISO</td>
<td>Suncrest Project</td>
<td>2015</td>
<td>NextEra</td>
<td>No</td>
</tr>
<tr>
<td>CAISO</td>
<td>Spring Substation</td>
<td>2015</td>
<td>PG &amp; E</td>
<td>Yes</td>
</tr>
<tr>
<td>CAISO</td>
<td>Harry Allen-Eldorado</td>
<td>2016</td>
<td>Desert Link</td>
<td>No</td>
</tr>
<tr>
<td>CAISO</td>
<td>Miguel Substation</td>
<td>2014</td>
<td>SDG &amp; E</td>
<td>Yes</td>
</tr>
<tr>
<td>MISO</td>
<td>Duff-Coleman 345 kV</td>
<td>2016</td>
<td>LS Power w/ Big Rivers</td>
<td>No</td>
</tr>
<tr>
<td>NYISO</td>
<td>Western NY Public Policy</td>
<td>2017</td>
<td>NextEra</td>
<td>No</td>
</tr>
<tr>
<td>PJM</td>
<td>Artificial Island</td>
<td>2015</td>
<td>LS Power</td>
<td>No</td>
</tr>
<tr>
<td>PJM</td>
<td>ApSouth Market Efficiency</td>
<td>2016</td>
<td>Transource, BGE, and Allegheny Power</td>
<td>No</td>
</tr>
<tr>
<td>SPP</td>
<td>North Liberal - Walkemeyer 115 kV</td>
<td>2016</td>
<td>Mid Kansas Electric</td>
<td>Yes</td>
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<tr>
<td>AESO</td>
<td>Fort McMurray West 500 kV</td>
<td>2014</td>
<td>Alberta PowerLine</td>
<td>Yes</td>
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<tr>
<td>IESO</td>
<td>East West Tie Line</td>
<td>2013</td>
<td>NextBridge</td>
<td>No</td>
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<tr>
<td>IESO</td>
<td>Wataynikaneyap Power</td>
<td>2015</td>
<td>Fortis Inc.</td>
<td>No</td>
</tr>
</tbody>
</table>
ISO/RTO qualifications and exclusion criteria greatly reduce the scope of projects eligible for competitive processes. Experience shows scope can be increased.

<table>
<thead>
<tr>
<th>Types of Projects Eligible for Competition</th>
<th>CAISO</th>
<th>ISO-NE</th>
<th>MISO</th>
<th>NYISO</th>
<th>PJM</th>
<th>SPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability, Economic, Public Policy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Exclusions Based on Need Date</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
</tr>
<tr>
<td>Exclusions for Local Reliability or Local Cost Allocated</td>
<td>✓</td>
<td>✓</td>
<td>✓ (Except for MVP)</td>
<td>✓ (For Reliability)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Excludes Upgrades/ Addition to Existing Facilities and on Existing ROW</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>State Mandated Exclusion</td>
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<td>✓</td>
<td>✓</td>
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<td>✓</td>
</tr>
<tr>
<td>Exclusions Based on Minimum Cost Requirements</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Additional Exclusions Based on Voltage**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>CAISO</th>
<th>ISO-NE</th>
<th>MISO</th>
<th>NYISO</th>
<th>PJM</th>
<th>SPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 300 kV</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
<td>✓ (For Reliability)</td>
</tr>
<tr>
<td>200-300 kV</td>
<td>✓</td>
<td>✓</td>
<td>✓ (Except for MVP)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>100-200 kV</td>
<td>✓</td>
<td>✓</td>
<td>✓ (Except for MVP)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>&lt; 100 kV</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Experience with 15 projects selected through the ISO/RTO competitive planning processes show potentially large cost advantages of competition

- On average, the winning bids of these 15 competitive transmission projects have been priced **40% below** the ISO/RTOs’ or incumbent TO’s initial project cost estimates
- Similar bid cost advantages observed in Alberta
- However, all 15 projects are still under development (in-service dates post-2019), so final costs are not yet known
- In addition to low bid prices, winning bids generally offer **cost caps or cost-control** measures, reducing the risk and magnitude of significant cost increases as they are developed and constructed

Cost advantage calculated as:

- Bid-based processes (MISO, SPP, CAISO): cost difference = between costs of winning bids and ISO/RTO’s or TO’s initial reference cost estimate for the project
- Sponsorship-based processes (PJM and NYISO): cost difference = between winning bid and lowest-bid of incumbent TOs

### Differences in Competitive Bids and Initial Cost Estimates for Competitive Processes of FERC-Jurisdictional ISO/RTOs

<table>
<thead>
<tr>
<th>RTO</th>
<th>Number of Competitive Projects</th>
<th>ISO/RTO or Incumbent Estimate of Project Cost ($million)</th>
<th>Winning Bid of Competitive Projects ($million)</th>
<th>Average Cost Advantage of Competitive Bids</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO*</td>
<td>10</td>
<td>$1,180</td>
<td>$833</td>
<td>29%</td>
</tr>
<tr>
<td>ISO-NE</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>MISO</td>
<td>1</td>
<td>$59</td>
<td>$50</td>
<td>15%</td>
</tr>
<tr>
<td>NYISO</td>
<td>1</td>
<td>$232</td>
<td>$181</td>
<td>22%</td>
</tr>
<tr>
<td>PJ M*</td>
<td>2</td>
<td>$692</td>
<td>$280</td>
<td>60%</td>
</tr>
<tr>
<td>SPP</td>
<td>1</td>
<td>$17</td>
<td>$8</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>$1,948</strong></td>
<td><strong>$1,171</strong></td>
<td><strong>40%</strong></td>
</tr>
</tbody>
</table>

* Note: The only competitively selected project in NYISO project is not reflected in the average cost advantage. Additionally, just 1 of 2 competitively selected projects in PJM projects are reflected in the average cost advantage.
Transmission investments outside competitive processes (98% of total since Order 1000 was implemented) often experience cost escalations:

- Comparing initial estimates and final project costs of transmission projects not subject to competitive processes shows cost escalations average **34%**

- Average cost escalations range from 18% (for projects in MISO and SPP) to 33%–70% (for projects in CAISO and ISO-NE)

- A portion of these observed cost escalations reflects inflation, routing changes, etc.

- The absence of cost-tracking mechanisms in some ISO/RTOs (CAISO and NYISO) makes it difficult to document project cost increases (CAISO data from FERC Complaint, EL17-45)

- More consistent and transparent project cost tracking and reporting standards are needed

### Historical Cost Escalations of Non-Competitive Projects In FERC-Jurisdictional ISO/RTOs

<table>
<thead>
<tr>
<th>RTO</th>
<th>Years Reviewed</th>
<th>Transmission Cost Data Analyzed</th>
<th>Average Cost Escalation of Non-Competitive Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAISO</td>
<td>2014-16</td>
<td>2014-2016 PG&amp;E and SDG&amp;E projects for which data is available (from FERC Complaint)</td>
<td>41%</td>
</tr>
<tr>
<td>ISO-NE</td>
<td>2013-17</td>
<td>Reflects eleven major 345 kV/115 kV projects approved by ISO-NE between 2002 and 2016</td>
<td>70%</td>
</tr>
<tr>
<td>MISO</td>
<td>2013-17</td>
<td>2014-2017 In-Service or Under-Construction Baseline &amp; Network Upgrade projects.</td>
<td>18%</td>
</tr>
<tr>
<td>NYISO</td>
<td>2013-17</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>PJM</td>
<td>2013-17</td>
<td>2015-2017 In-Service, and 2018 In-Service or Under-Construction projects</td>
<td>22%</td>
</tr>
<tr>
<td>SPP</td>
<td>2013-17</td>
<td>Selected 2012-2016 ITP Portfolio Projects, and completed Balanced Portfolio and Priority projects, as reported in SPP’s 2017 Quarterly Project Tracking Reports</td>
<td>18%</td>
</tr>
</tbody>
</table>

*Weighted Average of Cost Escalation* **34%**

*Weighted average based on competitively selected transmission investments in each ISO/RTO. ISO-NE has yet to select any transmission project through its competitive planning processes. Therefore, the weighted average of historical cost escalation in non-competitive projects shown above excludes ISO-NE projects’ observed historical cost-escalation.
The experience with ISO/RTO competitive transmission planning processes to date indicates a significant potential for customer savings:

- Winning bids of FERC-jurisdictional competitive projects selected by ISO/RTOs on average were priced **40% below** the ISO/RTOs’ initial project cost estimates or the lowest-cost incumbent bids:
  - Bids generally include cost caps or cost controls, reducing the risk and magnitude of cost escalations.
- In contrast, historical cost escalations of non-competitive ISO/RTO projects averaged **34% above** initial cost estimates (including inflation).
- As a result, if competitive projects can be developed as bid (without further cost escalations), **savings would be 55%** relative to the escalated costs of non-competitive projects.
Conclusions and Recommendations

While the scope of competition has been limited to 2% of total U.S. transmission investments since 2013, competitive planning processes have shown potential for significant customer savings:

- Competitive processes led to significant innovations in proposed solutions, low bids, cost caps, cost control measures, and innovative financial structuring.
- Winning bids average 40% below initial cost estimates while non-competitive projects are completed at 34% above initial estimates, offering 55% of potential cost savings.
- Long-term savings likely less than the currently-observed 55% cost differences, but real prospect of significant customer benefits and innovation nevertheless.
- Even if long-term savings were only half the 55% difference, if the scope of competition could be expanded from 2% to 33% of total transmission investments, estimated customer benefits would be approximately $8 billion over just five years.
- Lower costs will also make transmission more competitive to address market efficiency and public policy needs (e.g., relative to more costly local and distributed generation).

Recommendations:

- Reduce qualification thresholds for competitive process and develop consistent criteria, drawing from best practices from least-restrictive RTOs to expand scope of competition.
- Establish and implement consistent minimum reporting requirements to facilitate better tracking of project costs across all regions.
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