Contrasting Competitively-Bid Transmission Investments in the U.S. and Abroad

Presented at

UBS Conference Call

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Agenda

Background: Drivers and Non-incumbent Business Models

Scope of Competitive Processes in Various Regions

Examples of Existing Experience

Implications and Lessons Learned

Background

Focus of this presentation: Competition in the development and construction of transmission projects with regulated cost recovery

- As opposed to merchant transmission projects without regulated cost recovery

Why competition: to find the best solutions to address significant new transmission investment needs at lower cost or higher value

- U.S. transmission investments by FERC-jurisdictional transmission providers increased from $2 billion/year in the 1990s to $10-13 billion/year in last several 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)

Challenge: How to put incumbents and potential competitors on a level playing field without losing value while managing risks?

- Reduce barriers faced by non-incumbent transmission developers without ignoring the real advantages of incumbent transmission providers (local expertise, right-of-way, etc.)
- Reduce barriers to finding innovative solutions to transmission need that provide higher value and/or lower cost

Competition Mostly for "Regulated" Transmission

Transmission is largely infrastructure investments 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

Competition discussed in industry today is mostly for the development of regulated transmission projects

- Out-of-footprint investments by established transmission owners
- Independent transmission 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

Few unregulated ("merchant") transmission projects

- Mostly HVDC lines in or between regions with sustained price differentials or resource needs

Emerging Non-Incumbent Business Models

While focusing primarily on regulated investments, non-incumbent transmission developers have become increasingly active. We identified 10 distinct business models:

	Strategy	Examples
1	Transmission partnerships with incumbents	ITC and AEP JVs in SPP
2	Public-private partnerships	MATL, Transbay Cable, Path15
3	Independent transmission company (new build)	Anbaric, TransElect, AWC
4	Merchant transmission	Zephyr, SunZia, Neptune
5	Transmission bundled with renewables	NextEra, RES Americas
6	Transmission subsidiaries	AEP, Transource, DATC
7	Spin-off of transmission into quasi-ITC	ATC
8	Independent incumbent transmission (acquisitions)	ITC
9	Passive investment	Private Equity
10	Buy/invest in developer	Cleanline, Path 15

Background: Drivers and Non-incumbent Business Models

Scope of Competitive Processes in Various Regions

- Types of transmission projects eligible
- Timing of competition in overall planning process
- U.S. RTOs: Proposed Competitive Processes
- Selection Criteria

Examples of Existing Experience

Implications and Lessons Learned

Jurisdictions with Competitive Processes

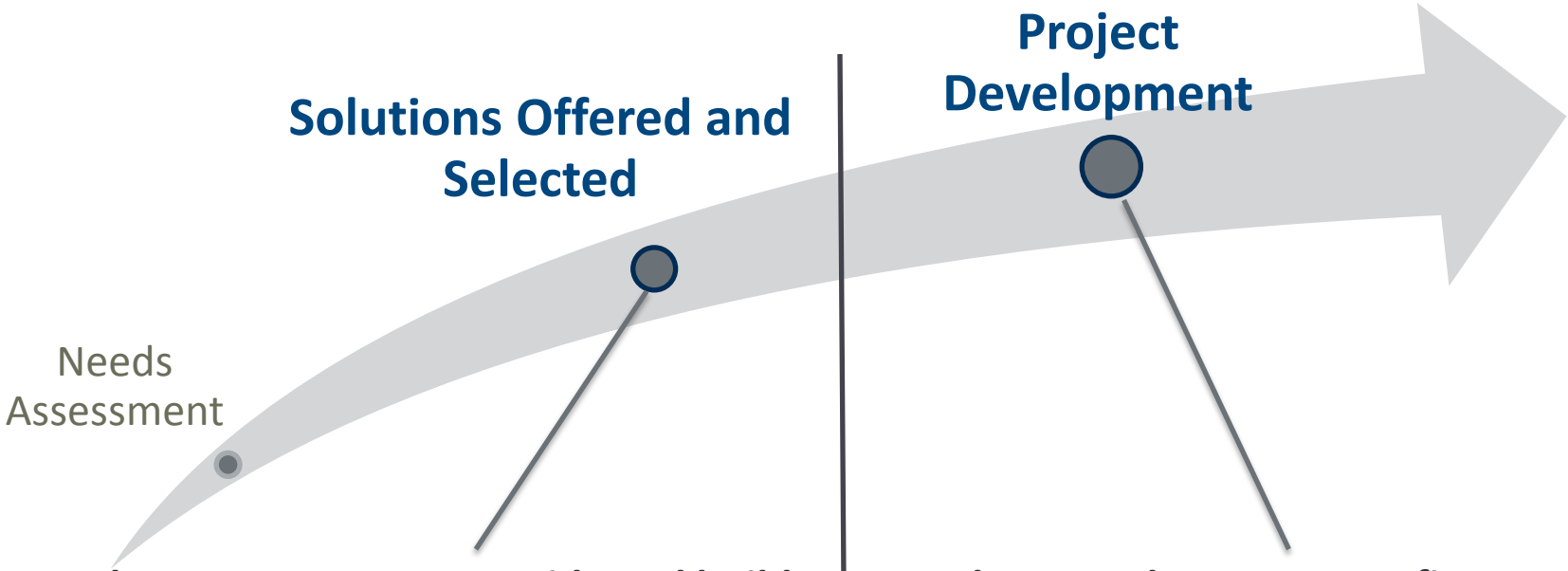
International Experience

- Brazil: Since 1999 all transmission projects have been auctioned (similar processes in other Latin American countries, such as Chile)
- UK: Tenders for offshore grid projects
- Ontario: One competitive solicitation for transmission to date
- Alberta: Developed a competitive process; currently running the first RFP

U.S. Regional Planning Efforts

- ERCOTs' competitive renewable energy zones (CREZ)
- FERC-jurisdictional regions at different stages of implementing various forms of competitive processes, largely as a result of FERC Order 1000

Scope of Competition in Transmission Business



Developers compete to provide and build <u>innovative solutions</u> 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 <u>finance, build, own, and operate specified projects</u>

- Planning entities identify need and specify solutions
- Competition to finance, own, and construct based on a number of factors including costs
- **Examples: Brazil, Alberta, Ontario, CAISO, ERCOT, MISO, SPP**

U.S. RTOs: Proposed Competitive Processes

PJM: Based on need date

- Projects needed in 4 years and beyond are competitive
- Projects needed in 3 years or less are likely designated to incumbent
- FERC ruled that complete rebuilds or new facilities on existing right of way can be competitive
- Artificial Island project first example

SPP: Based on voltage class

- >300kV (Highway) projects are competitive
- 100-300kV (Byway) projects are competitive (unless needed within 3 years)
- July 18th FERC order: accepted >300kV projects as competitive; rejected retention of ROFR for Byway projects (unless needed within 3 years)

MISO: Based on needs driver

- Market Efficiency and Multi-Value Projects (MEP and MVP) are competitive
- Baseline Reliability Projects and other classifications retain ROFR
- MISO proposed many exclusions for projects to retain ROFR, but FERC ordered that MISO must eliminate many of these exclusions to allow for competition
- Proposed to FERC to base 30% of evaluation of competitive projects on cost

Competitive Projects per FERC Order 1000 (cont'd)

CAISO: Based on voltage class and regional designation

- All regional projects (all >200 kV, some <200kV) are competitive
- Incumbents build local projects and upgrades to existing facilities
- FERC mostly accepted CAISO's competitive designations, but asked for clarification on tariff language and revisions to the developer selection process

NYISO: Based on needs driver and need date

- Reliability and economic projects are competitive
- Regulated backstop solutions for reliability are developed if timeline hits "trigger date" on lead time needed to address reliability need
- NYISO did not propose to have a central role in selecting projects to meet public policy needs; FERC required the ISO to submit tariff revisions

ISO-NE: Based on need date

- Above 115kV, reliability (for need > 3 years), economic, and public policy projects are competitive
- Incumbent retains ROFR if reliability project is needed within 3 years or if incumbent is only entity to submit proposal to address an identified need
- Latest filing in November 2013; FERC response TBD

Selection Criteria for Competitive Proposals

✓ - Key Qualification Criteria ✓✓ - Selection Criteria	PJM	NYISO	MISO	SPP	ISO-NE	CAISO	ERCOT /CREZ	ON	AB	UK	Brazil
Pre-Qualification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Planning Process	✓	✓	✓✓	✓	✓	✓					
Experience/Resources	✓	✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓	✓	✓
Design/Technical	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	
Schedule				✓✓	✓✓	✓✓		✓✓	✓	for build option	✓
Public Consultation								✓✓	✓		
ROW	✓	✓			✓✓	✓✓			✓		
Cost Containment						✓✓					
Cost / Cost-Effectiveness	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓	✓✓	✓✓
Scoring System				✓✓				✓✓	✓	✓✓	

- U.S. proposed competitive processes are still subject to revisions and FERC approval
- U.S. RTOs also require non-incumbents to participate in regional planning process to qualify
- Selection of solutions offered may vary based on projects

Background: Drivers and Non-incumbent Business Models

Scope of Competitive Processes in Various Regions

Examples of Existing Experience

- Brazil
- United Kingdom
- Ontario and Alberta
- CAISO, PJM, and ERCOT

Implications and Lessons Learned

Brazil: 15 years of Competitive Transmission

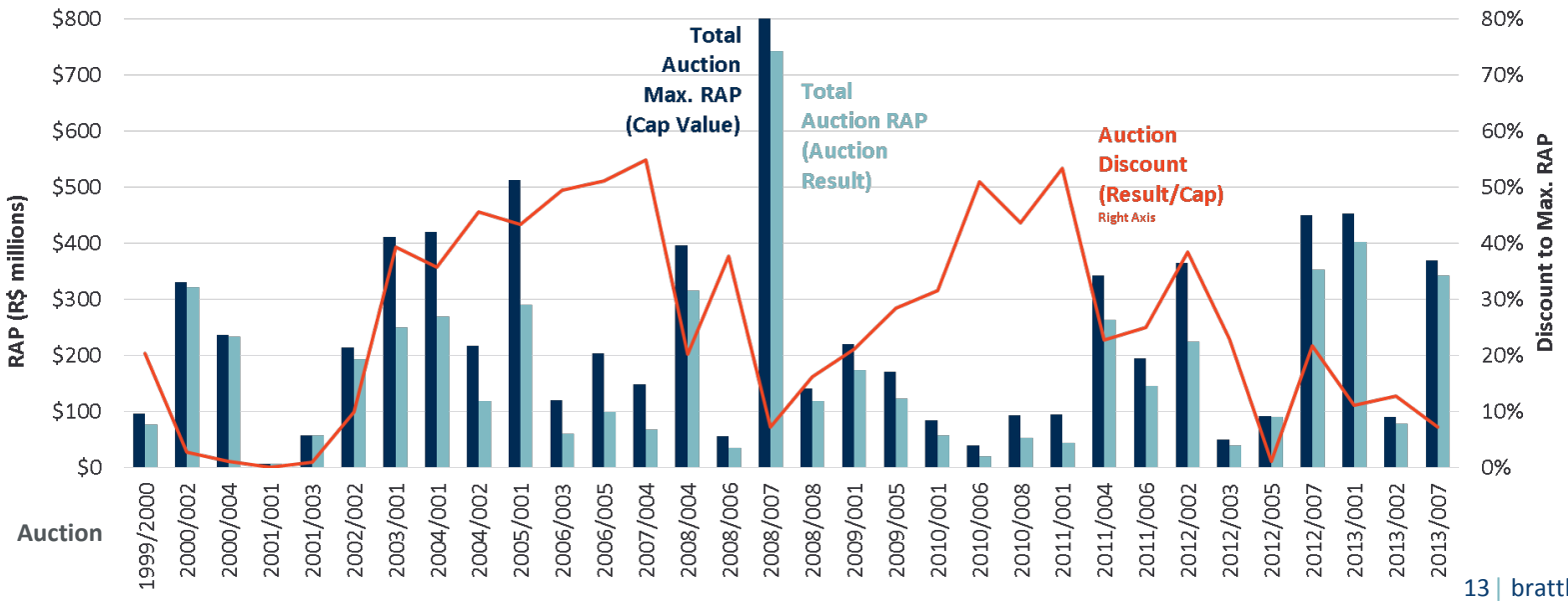
Competitive auctions for transmission since 1999

- Ministry of Mines and Energy determines transmission expansion based on Planning Company (EPE) and System Operator (ONS) studies that include evaluating N-1 security criteria
- The national Electricity Regulator (ANEEL) implements plan and conducts auctions for new projects
- Facilities (≥ 230kV) required to meet system needs are auctioned off to select who builds-operates and owns
- Auction process starts with a maximum reference annual revenue allowed (max. RAP), bidders propose lower RAP with the winner being the lowest
  - Concession is granted for 30 years, after 15 years the RAP payment is reduced by 50%
  - Payment profile is front loaded to facilitate debt payment and faster recovery of asset
  - Annual revenues are revised periodically, reviewed every 5 years
  - Difference between the max. RAP and the winning RAP illustrate the benefits
- Incentives to deliver ahead-of-time and maintain high availability (increase in revenues)
- Agents with a record of delays in project execution are prohibited from participating

Brazil: 15 years of Competitive Transmission (cont'd)

- Over 50,000 km of new transmission built (over 230 kV) with a total investment of $28 billion
  - Proposed revenue requirement would be $4.45 billion per year
  - Actual revenue requirement is $3.35 billion per year -> $1.1 billion lower than RAP (25%)
  - 30 lots were auctioned in 2013 (first three auctions), nine lots were not bid on
    - WSJ reported that government required utilities to write down the value of investments and slash revenues in exchange for contract renewals – resulting in a reduction in investment
    - In previous auctions, when no lots have been bid upon, the lot returns in a later auction

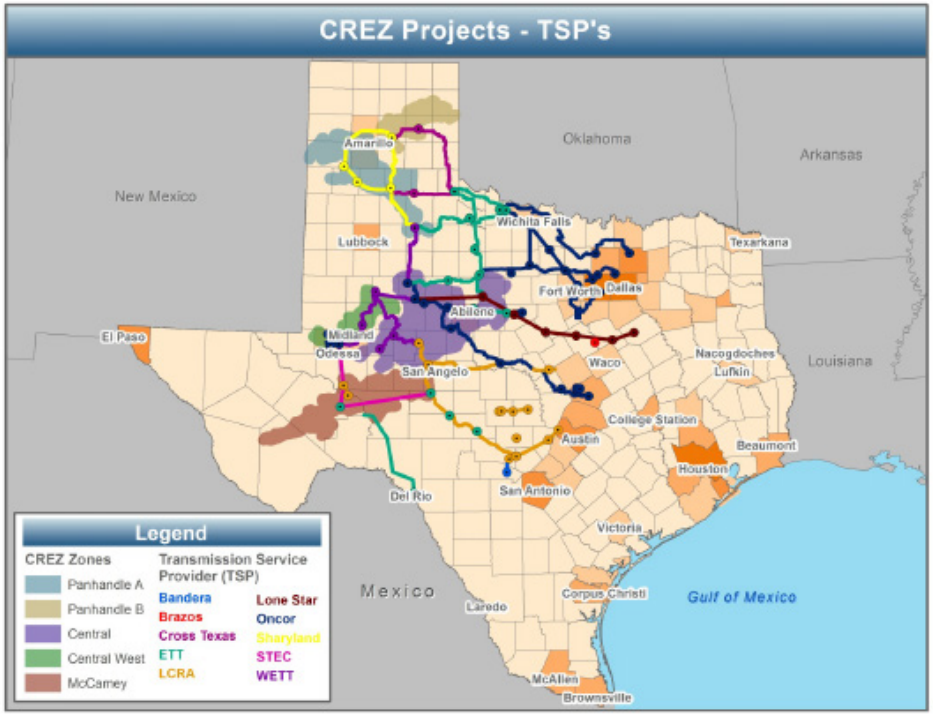
Brazil Transmission Auction Results



Source: ANEEL Transmission Auction Results

ERCOT: Competitive Renewable Energy Zones

In 2008 ERCOT identified transmission needed to integrate an additional 11,000 MW of wind (for 18,000 MW total) in pre-specified Competitive Renewable Energy Zones (CREZ)



Source: Public Utility Commission of Texas (PUCT) – CREZ Progress Report (October 2013)

- First identified high-potential wind zones; then alternative transmission plans to integrate resource in zones
- PUCT selected preferred transmission option
  - Selection based on capabilities to finance, license, construct, operate and maintain facilities in beneficial and cost-effective manner, projected capital and O&M costs, schedule, among others
  - Competitive bidding process, 14 companies awarded projects, including non-incumbents
  - Originally estimated at $4.97B for 2,963 miles of new 345kV transmission lines
  - As of October 2013, estimated cost was $6.81 B for 3,588 miles of new lines

UK: Competitive Offshore Grid

Competitive tender process to connect up to 48 GW of offshore wind by 2020

- To keep transmission unbundled from generation, offshore transmission licenses granted through a competitive tender process
  - First two tenders were for simple radial connections to the shore,
  - Third tender for larger, more complex transmission to wind plants further from shore
- Offshore Transmission Network Owners (OFTO) receive 20 year availability-based revenue stream
- "Transitional regime": wind developers construct the transmission assets, which are then transferred to OFTO through Ofgem's tender process
  - Role of the OFTO is to finance, own and operate the transmission asset
  - OFTO reimbursed wind developer for transmission project costs
- "Enduring regime": wind developers can choose who builds the transmission
  - **Option 1**: Generator develops and builds – same as transitional regime
  - **Option 2**: OFTO's also develops and builds the transmission project, possibly reducing the capital cost of the project
  - Question as to the likelihood of the OFTO-build option since wind plant developers would no longer be in-charge of transmission delivery schedule

UK: Competitive Offshore Grid (cont'd)

First round of competition commenced in 2009

- Ten licenses transferring £1.6 billion have been granted to date in two tenders
  - Three licenses worth (£940 million) are still to be confirmed in second tender
  - All projects are built by generation developer, with assets transferred to OFTO
  - Competition to bring cost savings – Ofgem estimates £350 million of savings from the nine licenses granted in first tender
- Third tender (2 licenses, estimated at ~ £400 million) under the "enduring regime" expected to start in 2014
  - Simpler and quicker combined pre-qualification and qualification to tender process
  - Using the generation developer build option

Audit of initial transactions completed in 2012

- National Audit Office reviewed four license awards worth £254 million by Jan. 2012
- Competitive process has delivered some benefits, and has potential to deliver more
- Transaction costs were 7.5-21% of the value of the assets transferred, though it is expected that this will decline (costs are recovered)
- Further work is required to establish robust benchmarks for transmission construction costs

Ontario: 400km, 230 kV Thunder-Bay-to-Wawa

Ontario Energy Board solicited proposals to:

- Encourage new entrants to transmission in Ontario
- Support competition to drive economic efficiency for the benefit of rate payers

Six bids received with costs significantly below original incumbent proposal

Selection based scores in the following categories:

- Organization & Project Management
- Technical Capability
- Proposed Design
- Cost: Development, Construction, O&M
  - Ranked on project development costs + clarity and completeness of construction and O&M estimates (but not total costs)
- Financial Capacity
- Schedule: Development & Construction
- Community Consultation
- First Nations & Metis Consultation
- First Nations & Metis Participation

Awarded to UCT (NextEra, Enbridge, Borealis)

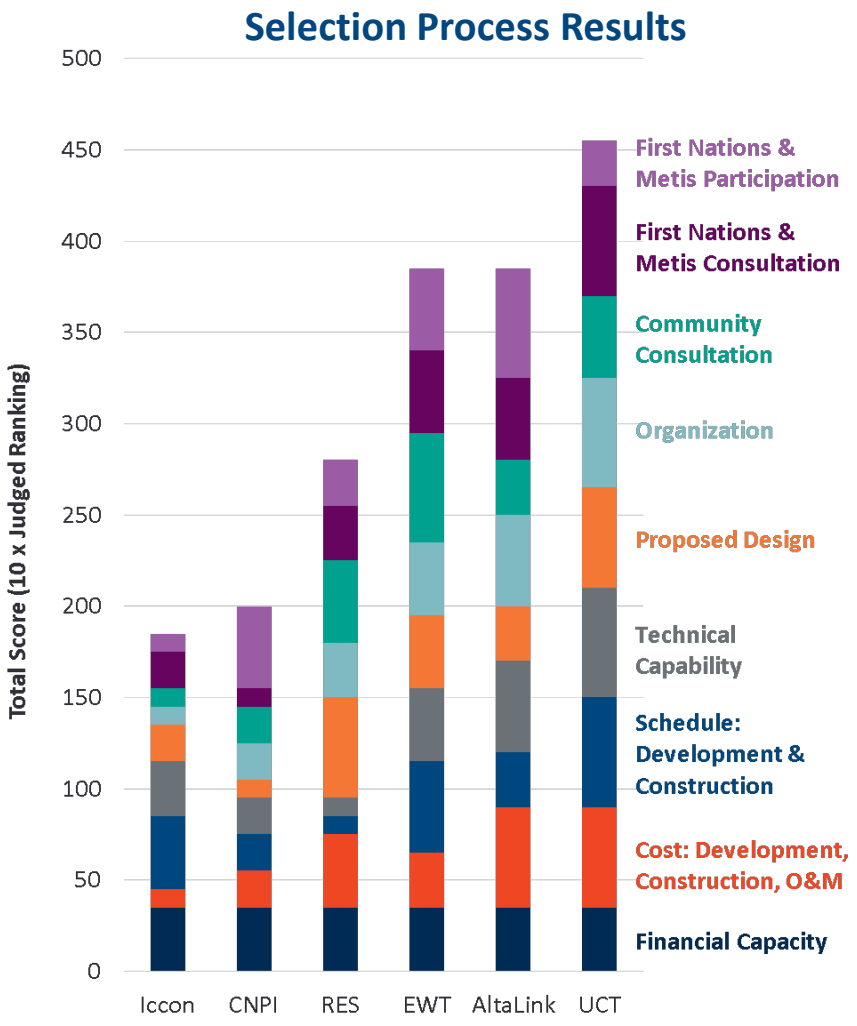
- Ranked highest in 6 of the 9 categories, total score of 455 (out of possible 540)
- Runners up (AltaLink, HydroOne (incumbent) partnership) both scored 385
  - Other participants: REC Canada & MEHC Transmission (scored – 280), Fortis (200), Iccon (Netherlands) & TransCanada (185)

Ontario: 400km, 230 kV Thunder Bay to Wawa (cont'd)

- Selection process was scored on equal category weighting
- Competition on costs was only 1 of 9 categories
  - OEB judged costs based on ranking of project development costs and completeness of cost estimate (not necessarily lowest cost)

Cost Category Judging and Project Development & Construction Costs

Project	OEB Cost Ranking	Development Costs ($ million)	Development Costs Rank	Construction Costs ($ million)	Construction Costs Rank
AltaLink	6	$18.2	6	$454	5
UCT: NextEra, Enbridge, Borealis	6	$22.2	4	$409	6
RES: Renewable Energy Systems Canada, MEHC	4	$21.4	5	$472	4
EWT: Hydro One (Incumbent), Great Lakes Power Transmission	3	$23.7	3	$490	2
CNPI: Fortis	2	$24.0	2	$527	1
Iccon (Netherlands), TransCanada	1	$30.7	1	$487	3



Source: Ontario Energy Board (2013). *East-West Tie Line Designation Phase 2 Decision and Order*

Alberta: 500km, 500 kV Fort McMurray-to-Edmonton

Single circuit line and two substations between Edmonton and Fort McMurray

- Identified in 2009 LTP as "*critical transmission infrastructure*" with ISD of 2019
- AESO directed in 2010 to develop a "fair and open" competitive process to determine who is eligible to apply for the construction and operation of *CTI*
- Single owner model – successful proponent is responsible for all project activities including ownership, operation, and maintenance of the facilities for 35 years
- Process was approved by the Alberta Utilities Commission in Feb. 2013
- Request for Expression of Interest (May – June, 2013)
- Request for Qualifications (October, 2013)
  - Over 30 organizations expressed interest in this phase of the project
  - AESO-selected panel of experts could shortlist up to five bidders for the RFP stage
- Request for Proposal (2014)
  - Five companies were invited to bid, all include local participation
  - Technical and financial submissions evaluated in Q4 – 2014
  - Selection by year-end

Selected Bidders for RFP

Company	Local Participant
Alberta Power Line	ATCO
Athabasca Transmission	AltaLink
NorSpan Partners LP	EPCOR
TAMA Transmission LP	TransAlta
TransCanada/Elecnor	TransCanada Pipelines

Source: AESO Media Release

CAISO: 230 kV Imperial Valley Project

Identified in 2012-2013 Transmission Plan

- Policy project (renewables) with accelerated solicitation
- 11-16 miles, 230 kV substation & short line; 2015 in-service date; $25 MM

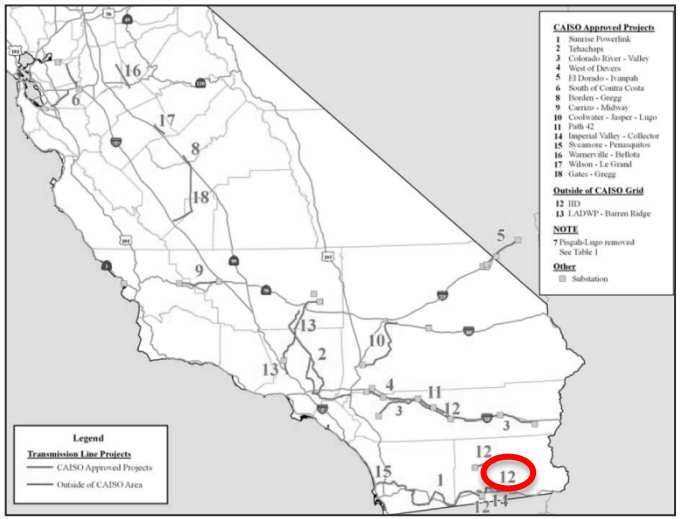
2 Qualified Applicants (Jul 2013 selection)

- Imperial Irrigation District (incumbent): lower binding cost cap of $14.3 MM; in-service date 4 months earlier; ability and experience to expedite permitting
- Competitor: Abengoa T&D (Spain-based); cost cap of $23.3 MM

Incumbent (IID) selected

CAISO subsequently began specifying "key selection factors" in its selection reports; criticism has pushed for publishing this list *prior* to the start of the solicitation process.

Project Location



Source: CEC (2013). *Tracking Progress: Transmission Expansion Projects for Renewable.*

Project Applicants

Sponsor	Primary Location of Operations
AbengoaT&D affiliate	Spain
Imperial Irrigation District	Incumbent

Source: CAISO (2013). *Imperial Valley Policy Element Selection Report*

CAISO: 230 kV Gates-Gregg

Identified in 2012-2013 Transmission Plan

- Reliability project with policy, economic benefits
- 59 miles, 230 kV line between PG&E-owned substations; 2022 in-service date; $115-145 MM

Key Selection Factors (Nov 2013 selection)

- Experience acquiring rights-of-way
- Current & expected capabilities to finance, license, construct, operate, maintain
- Schedule; cost containment

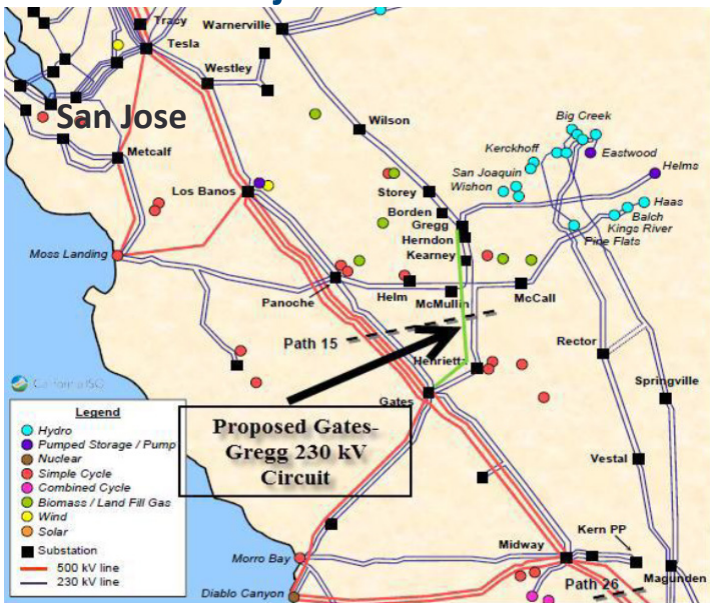
5 Qualified Applicants

- Incumbent: can share ROW with existing line and reduce easement requirements; environmental review and permitting experience
- Non-incumbents: did not have existing ROW and thus would face additional costs, approvals, difficulties with eminent domain, etc.

Incumbent JV (PG&E/Mid-American) selected

Source: CAISO (2013). *Gates-Gregg Project Sponsor Selection Report*

Project Location



Source: CAISO (2013). *Gates-Gregg 230kV Description and Functional Specifications for Competitive Solicitation*

Project Applicants

Sponsor	Primary Location of Operations
Elecnor	Spain
Isolux	Spain
PG&E/MAT	Incumbent
Pattern	Pennsylvania
TBC	California

CAISO: 230 kV Sycamore-Penasquitos

Identified in 2012-2013 Transmission Plan

- Reliability project with policy benefits
- 11-16 miles, 230 kV line between SDG&E-owned substations; 2017 in-service date; $111-221 MM

Key Selection Factors (Mar 2014 selection)

- Existing ROW and substations; experience and authority to acquire ROW
- Current & expected capabilities to finance, license, construct, operate, maintain
- Schedule (esp. important due to SONGS), enviro. permitting, cost containment

4 Qualified Applicants

- Incumbent: experience in CA ROW & enviro. permitting, can utilize existing ROW for most of project, experience to meet schedule, good ratings and financial backing

Incumbent JV (SDG&E/Citizens Energy) selected

Project Location

Source: SDG&E (2014). *Sycamore – Penasquitos CPCN Project*, Volume II of II - Part A PEA, Section 3.0: Project Description

Project Applicants

Sponsor	Primary Location of Operations
AbengoaT&D affiliate	Spain
Elecnor Inc. affiliate	Spain
SDG&E & Citizens Energy Corp.	Incumbent
Trans Bay Cable LLC affiliate	San Francisco Bay

Source: CAISO (2014). *Sycamore-Penasquitos Project Sponsor Selection Report*

PJM: Artificial Island

Competition to address reliability need

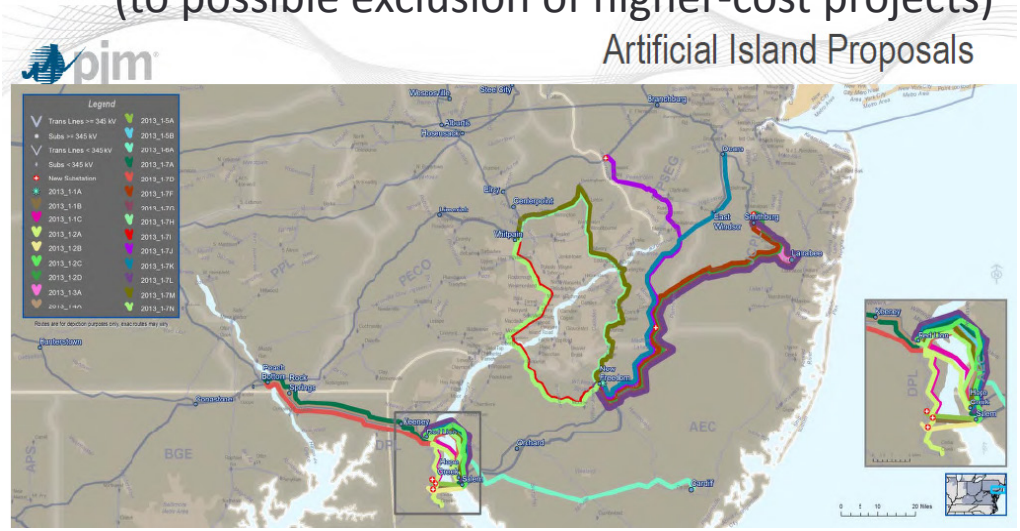
- Improve stability, operational performance, and eliminate potential planning criteria violations at Artificial Island (includes Salem & Hope Creek nuclear plants)

PJM evaluation metrics:

- Project sponsor
- Technical performance of solution (including with enchantment of project by SVC at varying locations)
- Constructability: Cost (sponsor estimate & PJM estimate), Schedule, Permitting
- Evaluation not dependent on passing a cost/benefit threshold

Innovative solutions submitted

- 7 proponents with 26 proposals, various technologies and routes, cost ranging $116 million to $1.5 billion
- PJM conducting studies to determine the most effective solution, including enhancements to proposed projects
- Studies are grouped by routing/ technology
- Proposed lower-cost projects evaluated first (to possible exclusion of higher-cost projects)



Source: PJM TEAC Jan. 2014 Reliability Analysis Update

PJM: Artificial Island (Cont'd)

RTEP window resulted in 26 proposals from 7 proponents

- Cost estimates range from $116 million to $1.5 billion
- Solutions varied in technology including: SVC, 230 kV, 500 kV, HVDC
- Projects have been grouped into two routes for detailed analysis
  - From AI to 230KV System on Delmarva Peninsula (4 proposals from 3 proponents)
  - From AI to Red Lion 500 kV (4 proposals from 4 proponents + various PSE&G proposals)

Artificial Island Proposals

Project ID	Transmission Owner	Estimated Cost	Major Components	Analytical Study Group*
1A	Virginia Electric	$133	500 MVAR SVC near New Freedom	TSC Near New Freedom 500kV
1B	Virginia Electric	$126	New 500kV from Salem - a new station in Delaware	AI to 230KV System on Delmarva Peninsula
1C	Virginia Electric	$202	New 500kV from Hope Creek - a new station in Delaware	AI to Red Lion 500 kV
2A	Transource	$213 - $269	Salem - Cedar Creek 230kV	AI to 230KV System on Delmarva Peninsula
2B	Transource	$165 - $208	Salem - North Cedar Creek (new) 230kV	AI to 230KV System on Delmarva Peninsula
2C	Transource	$123 - $156	Salem - Red Lion 500kV	AI to Red Lion 500 kV
2D	Transource	$788 - $994	New Freedom - Lumberton - North Smithburg (new) 500kV	Higher Cost Solution
3A	First Energy	$411	New Freedom - Smithburg 500kV with loop into Larrabee	Higher Cost Solution
4A	PHI Exelon	$475	Peach Bottom - Keeny - Red Lion - Salem 500kV	From AI to Red Lion 500 kV
5A	LS Power	$116 (overhead) $148 (submarine)	Salem - Silver Run (new) 230kV, Salem 500/2230kV Transformer	AI to 230KV System on Delmarva Peninsula
5B	LS Power	$170	Salem - Red Lion 500kV	AI to Red Lion 500 kV
6A	Atlantic Wind	$1,012	320kV HVDC Salem/Hope Creek - Cardiff	Higher Cost Solution
7A - 7N	PSE&G	$692 - $1548	14 Various Routes	Higher Cost Solutions

Note:. A third study was reviewed for project 1-A but was found not to pass performance testing
Source: PJM TEAC Jan. 2014 Reliability Analysis Update.

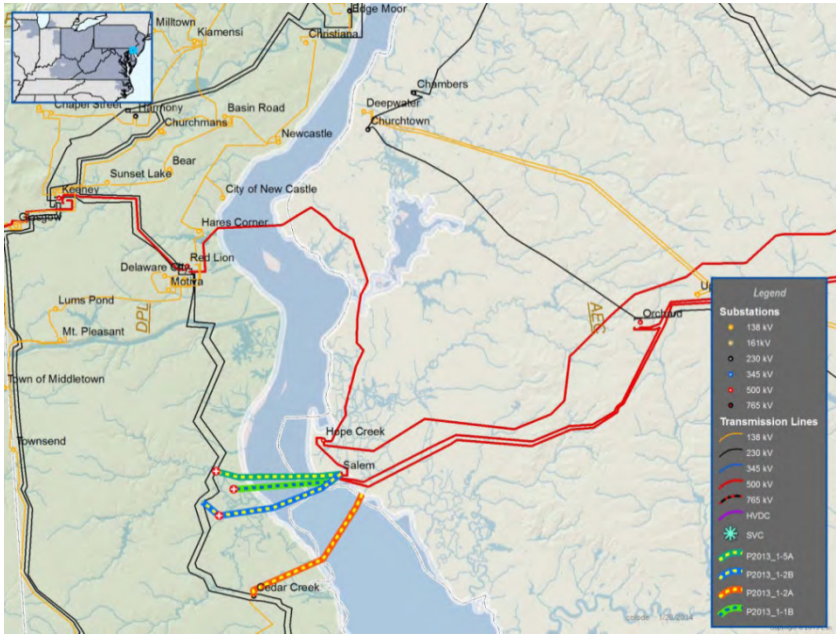
PJM: Artificial Island (Cont'd)

- Selected routes for further analysis all passed technical evaluations, detailed constructability and operational considerations evaluated
- Market efficiency studies for each scenario indicate B/C ratio of ~0.2 for South Crossing ($73m in savings over 15 years) and ~0.15 for AI to Red Lion ($57m)

Southern Delaware Crossing (to 230kV System)

Submarine or aerial line over the Delaware, new or expansion of substation in DE

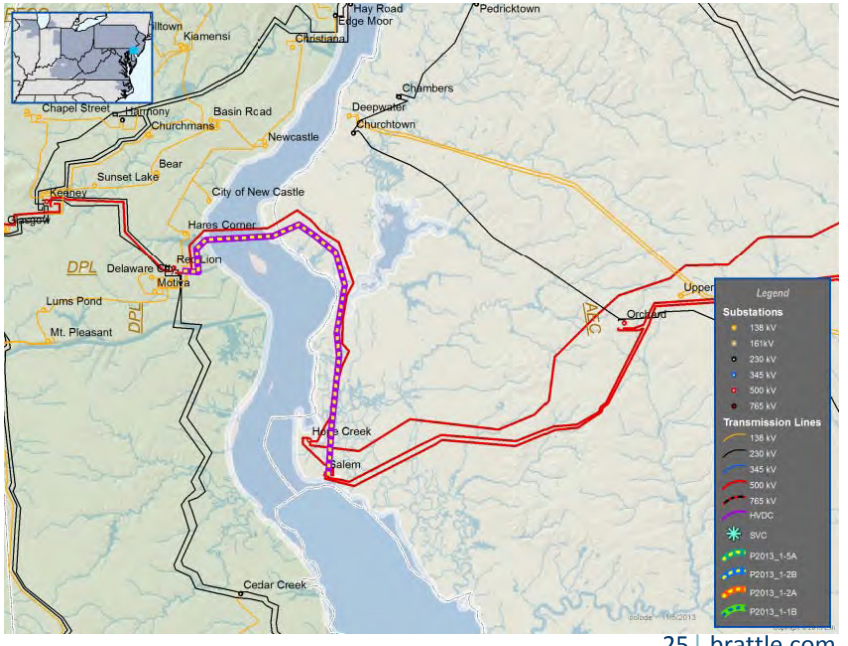
Proposals from: LS Power, Transource, Virginia Electric



AI to Red Lion 500kV Route,

Approx. 17 mile 500 kV line with aerial crossing of the Delaware, parallels existing line

Proposals from: LS Power, PHI/Exelon, PSE&G, Transource, Virginia Electric



Source: PJM TEAC Apr. 2014 Reliability Analysis Update., B/C results from PJM TEAC May. 2014 Reliability Analysis Update

PJM: Artificial Island (Cont'd)

Narrower Range of PJM Cost Estimates

Key considerations for constructability:

- Independent analysis of costs
  - Costs may be higher if provide enhancements and greater reliability
- Estimated time to completion and risks of delays
- Existing land rights and size of ROW
- Amount of permitting required (all have water crossings)
  - Risk of public opposition
  - Environmental impact (wetlands)
- Construction complexity and outage impacts on the region
- Relocation/modification of existing facilities
- Lead times for acquiring equipment (e.g., HVDC converters and cables)

Source: PJM TEAC Jan. 2014 Reliability Analysis Update.

Costs for Short-Listed PJM Proposals

	Estimated Costs	
	Proposal	PJM
	($ million)	
Southern Delaware Crossing		
Virgina Electric (1B, aerial)	$133	$233 - $283
Transource (2A, submarine)	$213 - $269	$378 - $461
Transource (2B, submarine)	$165 - $208	$264 - $321
LS Power (5A, submarine)	$148	$256 - $311
LS Power (5A, overhead)	$116	$211 - $257
AI to Red Lion 500kV Line		
Virgina Electric (1C, aerial)	$199	$242 - $294
PSE&G (7K, aerial)	$297	$249 - $304
PHI Exelon (4A, aerial)	$181	$216 - $263
LS Power (5B, aerial)	$171	$221 - $269
Transource (2C, aerial)	$123 - $ 156	$232 - $282

Source: PJM TEAC Apr. 2014 Reliability Analysis Update.

Next Steps

- Technical meeting: May 19
- Final decision meeting: June 16
- Board Recommendation: July 22
- Total decision making time: One year

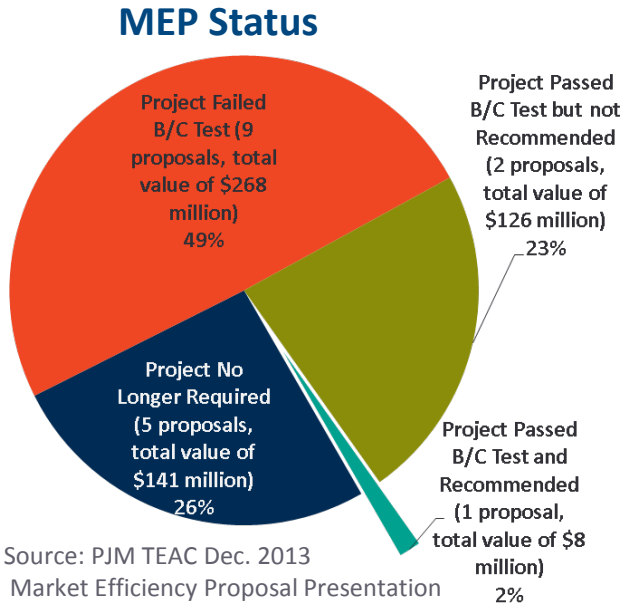
PJM: Market Efficiency Projects (MEPs)

Considered competitive in that any participant can propose solutions for projected congestion points, solicitation through PJM process

- 17 project proposals from 6 proponents
- Most projects did not pass benefit/cost (B/C) test
  - 5 projects were no longer needed
  - 9 projects scored less than 1.25 on B/C test

Three projects passed the B/C test

- All relieved congestion at Hunterstown Transformer and thus solutions compared by PJM for recommendation
  - First Energy: $8 million to install a 2nd transformer and reconductor existing 115kV line
  - LS Power: install new 230kV line
  - LS Power install new substations and new 138kV line
- Comparison of proposals to select project
- Review of B/C test, reliability impacts, sensitivity (delay ISD, gas price, load increases)
- Evaluation of portfolio of combined projects
- Recommendation: lowest-cost ($8 million) project from First Energy



Source: PJM TEAC Dec. 2013 Market Efficiency Proposal Presentation

Background: Drivers and Non-incumbent Business Models

Scope of Competitive Processes in Various Regions

Examples of Existing Experience

Implications and Lessons Learned

Impressions About Evolving Experience in Competitive Transmission

- Experience with established competitive transmission processes (Brazil, UK) suggests competition at the engineering and construction stage can offer some cost savings, but savings likely are greater when competition occurs at the idea/solution stage
  - Greatest potential benefits likely from innovation, ideas and problem solving
  - Processes should allow for competition at these stages
  - But increased complexity of processes that include solutions stage is a challenge
- Unclear how regulated rates and allowed ROE will be affected by competitive solutions
  - How will risks of cost over-runs affect regulated rate of return?
  - How will cost savings would be shared between customers and investors?
  - Will bidding ultimately focus on costs and compete down earned ROEs?
- Emerging Canadian and US experience shows importance of local expertise and incumbent participation
  - Having local experience/partner will often be critical to successful bids
  - Local system knowledge, maintenance crews, and RTO planning relationships
  - Lower-cost opportunities to upgrade existing facilities or sharing of existing ROW

Additional Reading

Chang, Pfeifenberger, Hagerty, "The Benefits of Electric Transmission: Identifying and Analyzing the Value of Investments," prepared for WIRES, July 2013.

Pfeifenberger, "Independent Transmission Companies: Business Models, Opportunities, and Challenges," *American Antitrust Institute's 13th Annual Energy Roundtable*, April 23, 2013.

Pfeifenberger, Chang, Hou, "Bridging the Seams: Interregional planning under FERC Order 1000," *Public Utilities Fortnightly*, November 2012.

Pfeifenberger, "Transmission Investment Trends and Planning Challenges," *EEI Transmission and Wholesale Markets School*, August 8, 2012

Pfeifenberger and Hou, "Seams Cost Allocation: A Flexible Framework to Support Interregional Transmission Planning," prepared for the SPP Regional State Committee, April 2012.

Pfeifenberger and Hou, "Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada," on behalf of WIRES, May 2011.

Pfeifenberger, "Easier Said Than Done: The Continuing Saga of Transmission Cost Allocation," Harvard Electricity Policy Group meeting, Los Angeles, February 24, 2011.

Pfeifenberger, Chang, Hou, Madjarov, "Job and Economic Benefits of Transmission and Wind Generation Investments in the SPP Region," prepared for SPP, March 2010.

"Comments of Peter Fox-Penner, Johannes Pfeifenberger, and Delphine Hou," in response to FERC's Notice of Request for Comments on Transmission Planning and Cost Allocation (Docket AD09-8).

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Hannes has extensive experience in the economic analyses of wholesale power markets and transmission systems. His recent experience includes reviews of RTO capacity market and resource adequacy designs, testimony in contract disputes, and the analysis of transmission benefits, cost allocation, and rate design. He has performed market assessments, market design reviews, asset valuations, and cost-benefit studies for investor-owned utilities, independent system operators, transmission companies, regulatory agencies, public power companies, and generators across North America.

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Ms. Chang has presented at a variety of industry conferences and has advised international and multilateral agencies on the valuation of renewable energy investments. She holds a Master's in Public Policy from Harvard Kennedy School, is a member of the Board of Directors of the Massachusetts Clean Energy Center, and the founding Executive Director of New England Women in Energy and the Environment.

About The Brattle Group

The Brattle Group provides consulting and expert testimony in economics, finance, and regulation to corporations, law firms, and governmental agencies around the world.

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Our services to the electric power industry include:

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