Transmission Expansion Advisory Committee

Artificial Island

December 9, 2014

Meeting Agenda and Format

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- Evaluation update - PJM
- Project Presentations – Finalist Proposers
- Break
- General Artificial Island Q&A session

Artificial Island Analysis Summary
Recent Activities

Summary of Actions Taken by PJM

- Requested and received supplemental cost proposals from finalist proposing entities
- Conducted meetings with finalist proposing entities and FERC Administrative Law Judge
- Performed additional performance analysis of the TCSC project
- Gathered input from permitting and regulatory entities
- Met with FACTS based device industry representatives
- Performed additional constructability reports

FERC Administrative Law Judge Letter

- Conducted meetings to ensure PJM has a clear understanding of the terms and conditions of the responses to PJM's offer
- Provided an overview of the process followed at the meetings
- Affirmed that meeting formats and durations were the same for all four Proposing Entities
- Concluded that all Proposing Entities were treated equally under the process
- http://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20141203-3013

Performance Analysis Summary

FACTS Device Industry Representative Meetings

- PJM met independently with FACTS based device industry representatives
  - Expand PJM's understanding of the technology and implementation
    - Typical applications
    - Operation
    - Modeling
    - Failure modes
    - Construction timeframes
  - Summary:

    (1) TCSC components are employed in the industry with high reliability;

    (2) TCSC application is a variant of existing FACTS installations using similar components (see 1 above)

- PJM Simulations
  - Validated the performance of the TCSC under several failure and outage mode scenarios
    - Critical pre-contingency outage conditions
    - Critical faults
    - Assumed combinations of failure modes and outage conditions
    - Performance

TCSC Outage and Failure Mode Evaluation

	TCSC on 5023	TCSC on 5024	SVC at New Freedom	Stability	line outage in pre-contingency	Note
Assume TCSC Outage - simulate as open circuit	outage	outage	in	unstable	Two line outages	N-2-1 Beyond criteria
	outage	in	in	stable	One line outage	N-1-1
	in	outage	in	stable		N-1-1
Assume TCSC Failure - simulate as 0% compensation	failure	failure	in	unstable		N-1-3 Beyond criteria
				unstable		N-1-3 Beyond criteria
	failure	in	in	stable		N-1-2 Beyond criteria
				stable		N-1-2 Beyond criteria
	in	failure	in	stable		N-1-2 Beyond criteria
				stable		N-1-2 Beyond criteria
	failure	failure	in	stable	no line outage	N-3 Beyond criteria
	failure	in	in	stable	no line outage	N-2 for two un-related elements - Beyond criteria
	in	failure	in	stable	no line outage	N-2 for two un-related elements - Beyond criteria
Assume SVC outage	in	in	outage	stable	no line outage	N-1-1
	in	in	outage	unstable	One line outage	N-2-1 Beyond the criteria
	in	in	outage	unstable		N-2-1 Beyond the criteria

- Dominion 1A TCSC project proposal includes double breaker installations at four existing substations

  - During study, it was determined that one proposed breaker at Hope Creek could be removed from the project scope with no impact to performance

TCSC Analysis – SSR Study

- Engaged consultant to perform a Sub-Synchronous Resonance (SSR) study
  - Expected to be complete and posted at the end of December

Constructability Analysis Summary

Constructability Reports - Permit Comparison

- Report was commissioned that compares the permitting challenges between the Red Lion to Artificial Island project against those of the southern Delaware crossing projects.
  - Permitting issues identified are consistent with prior constructability reviews and stakeholder comments
  - National Environmental Policy Act (NEPA) review potential risk
  - Risk factors are such that neither has clear advantage in terms of siting and permitting hurdles to overcome
  - Final report has been posted on pjm.com

Constructability Reports – Dominion 1A

- Report was commissioned to review the Dominion 1A FACTS based device project
  - Identified permitting challenges for the proposed project locations
    - Three of the four sites will face significant permitting challenges
  - Proposed project cost was evaluated
    - Concluded that the contingency applied could be greater due to some risk factors
  - Final report will be posted on pjm.com

Permitting and Regulatory Agency Discussions

- NJ DEP
  - Permitting issues identified are consistent with prior constructability reviews and stakeholder comments

- NRC
  - No concerns raised about the use of FACTS-devices in the vicinity of Artificial Island
  - Nuclear licensee (PSEG Nuclear) will need to perform a 10CFR50.59 Safety Evaluation. If the evaluation concludes that there is a nuclear safety impact and a Technical Specification change is required, then NRC approval is required.

Permitting and Regulatory Agency Discussions

- US Army Corps of Engineers
  - Discussed the NEPA process and Army Corps of Engineers' role
  - Southern Delaware crossing
    - Depth of 70 feet below mean low water required for a submarine cable within the shipping channel (based on 45ft depth in shipping channel and 25 ft. burial depth for cable)
  - Red Lion to Hope Creek line
    - Navigational concerns associated with tower foundations would need to be addressed
  - Identified that both routes face significant routing and permitting hurdles

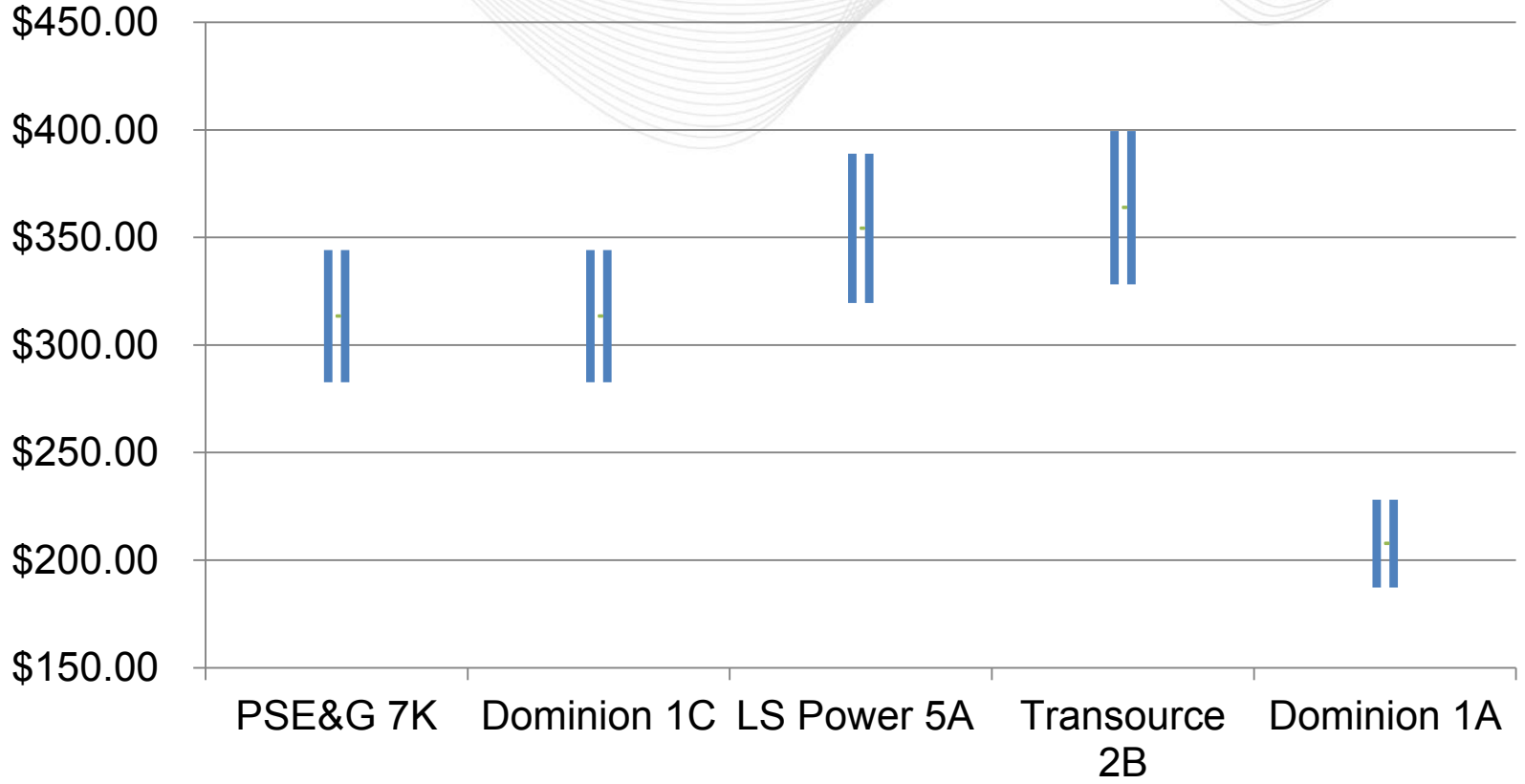
Non-Incumbent Developers in Delaware

- Questions were raised about the ability of non-incumbent developers to build and operate transmission infrastructure in Delaware

- Delaware issued an order affirming a non-incumbent's ability to construct, own and operate, subject to having to apply for a CPCN for specific project.

Cost Estimate Summary

PJM Cost Estimates



- Estimates are in millions of dollars

Cost Estimates Incorporating Cost Containment/Cap

- Total cost estimates that combine Proposing Entity cost containment numbers with PJM cost estimates
  - Costs estimates provided by Proposing Entities for project components within their cost containment mechanisms utilized
  - PJM cost estimates used for project components outside of proposed cost containment mechanisms

Cost Estimates Incorporating Cost Containment/Cap

LS Power 5A	
Cost Containment	$146
Salem Expansion	$61.3 - $74.7
SVC Cost Estimate	$71 - $86
Project Total	$278 - $307

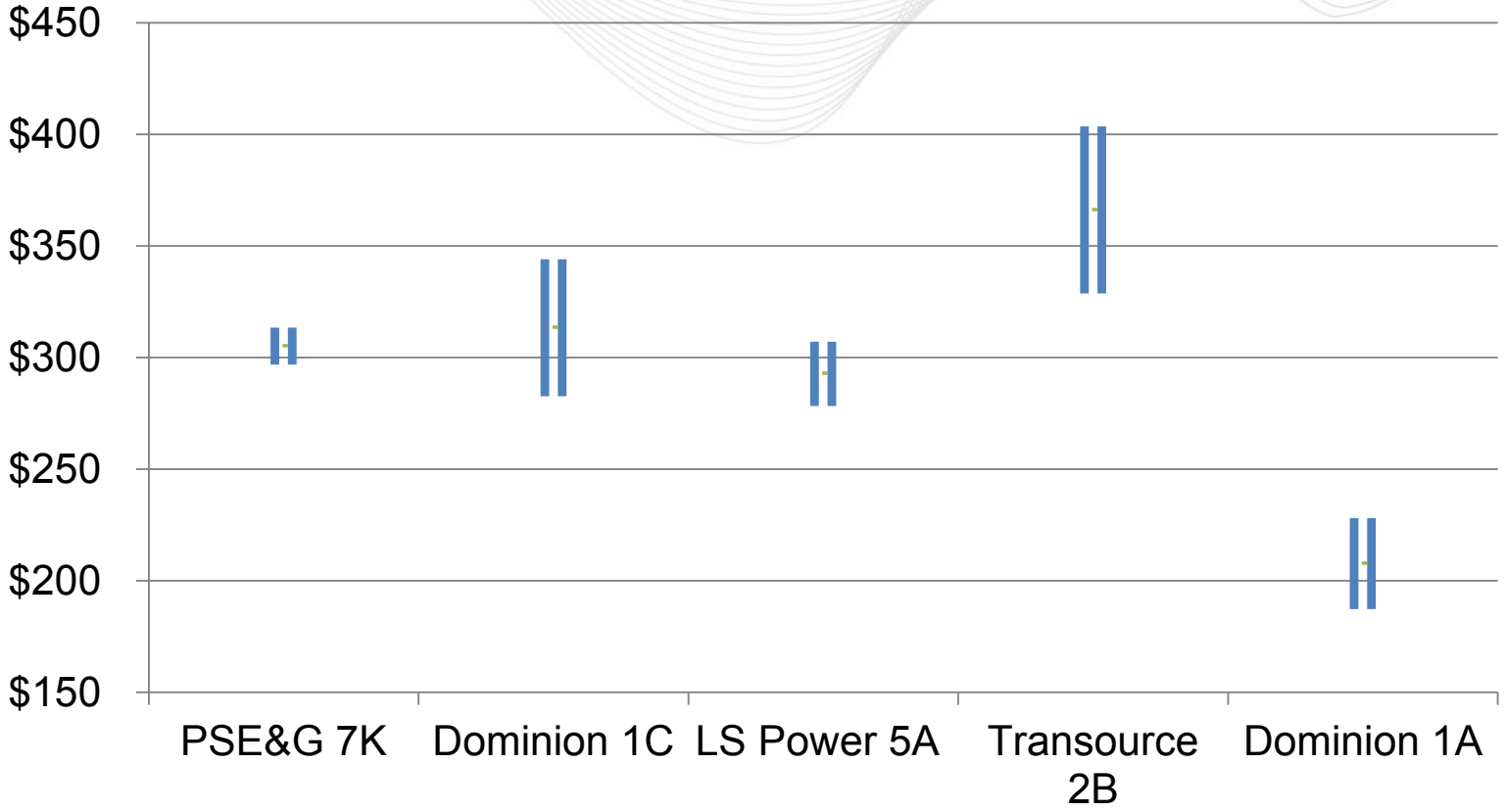
Transource 2B	
Cost Containment	$203 - $255
New Salem Substation	$41
Salem Expansion	$14.3 - $17.4
SVC Cost Estimate	$71 - $86
Project Total	$329 - $404

Dominion 1A	
Cost Containment	$0
Project Cost Estimate	$187 - $228

PSE&G 7K	
Cost Containment	$221
Red Lion Expansion	$4.9 - $6.0
SVC Cost Estimate	$71 - $86
Project Total	$297 - $313

Dominion 1C	
Cost Containment	$0
Project Cost Estimate	$211.7 - $257.7
SVC Cost Estimate	$71 - $86
Project Total	$283 - $344

Cost Estimates Incorporating Cost Containment/Cap



- Estimates are in millions of dollars

Questions?

Email: RTEP@pjm.com

Appendix

Supplemental Information Summary

Supplemental Information Request Timeline

- 08/12 – Letter sent to Proposing Entity ‘finalists’ to provide opportunity to supplement their proposals
- 09/12 – Supplemental information submitted to PJM by all ‘finalists’
- 09/18 – Redacted versions of the supplemental information is posted to PJM.com
- Oct 22 through Nov 3 – Meetings with FERC Administrative Law Judge and finalists to review and confirm information

LS Power Cost Containment Mechanism

- Costs included under the containment mechanism
  - Permits and government approvals
  - Land acquisition
  - Environmental assessment and mitigation
  - Engineering
  - Equipment, supplies and other material procurement
  - All development and construction activities

LS Power Cost Containment Mechanism

- $146 Million

- Physical scope of work included under proposed mechanism
  - Aerial or submarine line
  - New substation located near the existing 230kV right-of-way in Delaware

- Physical scope of work not included under proposed mechanism
  - Salem substation modifications
    - New bay position
    - New 500/230kV transformer
  - 230kV turning poles cutting the two Delaware transmission lines

LS Power Cost Containment Mechanism

- Costs not included under the containment mechanism
  - Financing costs
  - AFUDC
  - Additions and modifications to the project scope due to
    - “any material change in the enforcement, interpretation of application of any statue, rule, regulation, order or other applicable law existing..”
    - “any Breach or Default by PJM of its obligations under the DEA or any request by PJM to delay or suspend any activities associated with the Project”.
    - “any breach, default, interference or failure to cooperate by any Transmission Owner in connection with the Interconnection Coordination Agreement or interconnection agreement”

Transource Cost Containment Mechanism

- Proposed tiered cost containment mechanism
  - Up to $243 Million: entitled to recover all FERC approved ROE plus incentives
  - Portion from $243 to $299.8 million: forego 50% of any FERC approved ROE incentives
  - Above $299.8 million: forego 100% of any FERC approved ROE incentives

- Physical scope of work included under proposed mechanism
  - 230kV submarine cable from Salem substation to new substation in Delaware
  - New substation located near the existing 230kV right-of-way in Delaware
  - New 500/230kV substation adjacent to Salem substation

- Physical scope of work not included under proposed mechanism
  - Modifications in and near Salem substation
    - New bay position at Salem
  - 230kV turning poles cutting the two Delaware transmission lines

Transource Cost Containment Mechanism

- Transource provided a contingency amount of $52.3 million which is included in the second tier of their cost containment mechanism
  - Some specific contingency items identified (redacted)
  - General 10% project contingency

PSE&G Cost Containment Mechanism

- $221 Million

- Physical scope of work included under proposed mechanism
  - Aerial 500kV line from Hope Creek to Red Lion substations
  - Upgrade work at Hope Creek to create the new line bay

- Physical scope of work not included under proposed mechanism
  - Upgrade work at Red Lion to create the new line bay

PSE&G Cost Containment Mechanism

- Costs included under the containment mechanism
  - All project costs with exceptions as noted below
  - Clarity is needed on what is meant by “all project costs”

- Costs not included under the containment mechanism
  - Costs associated with PJM modifications or additions to the scope of work
  - Costs incurred from the following events deemed outside of the control of PSE&G:
    - Changes in applicable laws and regulations
    - Obtaining governmental approvals and permits
    - Obtaining necessary property rights to construct the Project
    - Environmental permitting, remediation and mitigation
    - Orders of courts or action or in action by governmental agencies

Dominion Supplemental Information

- Dominion did not provide a cost containment mechanism, but rather provided reasons for confidence in their ability to meet cost estimates and elaborated on project management approach and past experience with transmission projects
  - Red Lion to Hope Creek: agreed with PJM's cost estimate of $242 to $292 million
  - FACTS based solution: provided a revised cost estimate of $174.1 million
    - $86.4 million based upon vendor not-to-exceed budget prices