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PacifiCorp Transmission Technical Workshop

RFP – Attachment 13

January 2010

Presented by PacifiCorp Transmission

PacifiCorp Transmission Update

- Integrated Resource Plan
- Attachment 13 – Point of Receipt Detail
- Interconnection Request - Study Information

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Integrated Resource Plan

Attachment 13 Methodology

- PacifiCorp IRP - identified points of receipt for potential resource and load bubble needs
- High level planning review of the required transmission infrastructure needs required to deliver the resource to adjacent network load bubbles

Integrated Resource Plan

- Attachment 13 represents proxy results only
  - Actual infrastructure requirements
  - Resulting costs
- Any off-system resources require firm transmission through any third party provider as required to deliver to points of receipt identified in Attachment 13
- Attachment 13 costs will be used as one data point by independent evaluators to short list projects

Study Result Accuracy

- Reviews based on existing information, i.e. past studies (local and regional) and known information on the existing system capabilities
- Generator specifics, size, actual interconnection configuration, and queue priority were not known at the time Attachment 13 was prepared
- Actual interconnection system impact study is more in depth and results may/will change actual requirements
  - LGIA studies include: load flow, fault study, stability, and impacted system analysis that determine final infrastructure needs

Cost Estimate

- Energy Gateway project costs are excluded from Attachment 13 integration costs (this is a modification from the posted Draft version dated July 3, 2008)
- Estimates use PacifiCorp's estimating tool based on high level information with very generic project scope (no engineering design, EPC delivery strategy)
- Recent vendor quotes, material and labor costs continue to rise over historic trends
- Costs are based upon requirements without complete design (without line routes, final structures, etc) from study requirements or from a facility design

Summary –

Estimates are based on applying standard cost data for what is known at this time and are subject to change when detailed studies are conducted

Energy Gateway Project Topology

Relevant Transmission Projects

Priority One Base Load Service and Reliability	**Gateway Segments**	
	▪ Segment B (Populus to Terminal 345-kV)	2010
	▪ Segment C (Mona to Oquirrh 500/345-kV)	2013
	▪ Segment G (Sigurd to Red Butte 345-kV)	2014
	Other Projects	
	▪ Wallula to McNary 230-kV	2011
	▪ Vantage to Pomona Heights 230-kV	2012

Priority Two Wind Integration and Resource Adequacy	**Gateway Segments**	
	▪ Segment D (Windstar to Populus 500-kV)	2014/16

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Attachment 13

Transmission Integration Costs
Background Information

Draft version - July 3, 2008

http://www.oasis.pacificorp.com/oasis/ppw/Draft7-30-2008rfpattachment13.doc

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Salt Lake Valley – 138 kV

- $100 Million
- 600 MW delivered into the Salt Lake load bubble
- Upgrades to unknown lines (underlying transmission system)
- Reconstruction and upgrades to multiple 138-kV lines
- Upgrades to multiple 138-kV substations

Lakeside - 345 kV

- $66 Million
- 600 MW delivered into the Salt Lake load bubble
- New 345-kV substation at Lakeside
- Looping the existing Camp Williams to Emery and Camp Williams to Spanish Fork 345-kV lines into the new sub
- New 15 mile Lakeside to Camp Williams 345-kV line
- Additions to Camp Williams, Emery, and Spanish Fork substations to accommodate line terminations and operation
- *Subsequent review indicates the Lakeside to Camp Williams presents permitting challenges*
  - *alternatives are under review to improve schedule and ensure delivery*

Mona - Current Creek

- $62 Million (update to prior Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- New 0.6 mile 345-kV Current Creek to Mona line
- Additions to Current Creek and Mona substations
- Energy Gateway projects as noted below: (required but excluded from costs above)
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations

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Glen Canyon

- $310 Million (update to prior Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- New 160 mile 345-kV Glen Canyon to Sigurd line (existing line is fully subscribed to firm contracts)
  - Significant permitting issues expected
- Phase shifting transformer at Glen Canyon
- Additions at Glen Canyon, and Sigurd substations to accommodate termination and operation of the new lines
- Energy Gateway projects as noted below:
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations

Gonder

- $282 Million (update to prior Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- New 190 mile 345-kV Gonder to Mona line (existing line is subscribed to firm contracts)
- Additions at Gonder and Mona for the termination and operation of the new line
- Energy Gateway projects as noted below:
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations

Harry Allen

- $73 Million (update to posted Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- Additions at Harry Allen and Red Butte substations for the termination and operation of the new line
- Includes a second 230/345-kV transformer at Harry Allen, static VAr compensation, and series compensation
- Energy Gateway projects as noted below:
  - A second 160 mile 345-kV Sigurd to Red Butte transmission line (new line is proposed for Red Butte load service and excluded from costs)
  - Existing line is fully subscribed to firm contracts
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations

Crystal

- $415 Million (updated cost from Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- New 120 mile line Crystal to Red Butte 345-kV transmission line
- Additions at Crystal and Red Butte substations for the termination and operation of the new lines
- Includes a phase shifting and transformation at Crystal
- Energy Gateway projects as noted below:
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations
  - A second 160 mile 345-kV Sigurd to Red Butte transmission line (new line is proposed for Red Butte load service)

Four Corners

- $738 Million (update to prior Attachment 13)
- 600 MW delivered into the Salt Lake load bubble
- New 255 mile 345-kV Four Corners to Emery transmission line
  - Existing line is fully subscribed to firm contracts
  - Significant permitting issues expected
- New 80 mile 345-kV Emery to Mona transmission line
  - existing line is fully subscribed to firm contracts
- Energy Gateway projects as noted below:
  - New 90 mile Mona to Oquirrh line (existing lines are fully subscribed to firm contracts)
  - Additions to substations

Wyoming

- $160 Million
- Substation upgrades
- 400 MW delivered to the Energy Gateway project at the new Windstar, Aelolus, or Bridger hub
  - **Requires new Energy Gateway West or South infrastructure (current schedule is 2014 to 2016)**
- Resources located south or west of the Naughton-Monument 230-kV line may not be as impacted by existing Wyoming export constraints once the Populus to Terminal upgrade is completed

Borah, Brady, or Kinport

- Zero $
- Assumes proposed Energy Gateway segment B (Path C) upgrade is completed
  - December 2010 or later
  - Resources located off system must include firm transmission rights through any third party transmission provider

Mid Columbia

- Zero $
- 600 MW delivered to Yakima load bubble
- Completion of new 60 mile 230-kV Vantage to Pomona Heights transmission line
  - In-service date is currently 2012, driven by permitting issues
  - Additions at Vantage and Pomona Heights substations for the termination and operation of the new line

California - Oregon Border

- $290 Million
- 600 MW delivered to Southern Oregon load bubble
  - Some incremental capacity required to existing COI rights
- New 60 mile 230-kV Dixonville to Alvey transmission line
  - Existing line is fully subscribed to firm contracts
- Additions at Dixonville and Alvey substations for the termination and operation of the new line

Paul – 500 kV

- $14 million per year for 3rd party transmission wheeling to deliver resources to PacifiCorp loads from Paul
- Costs represent renewal of a wheeling contract with BPA to move energy to PacifiCorp loads from the Paul point of receipt

Portland – Troutdale

- $200 Million
- 400 MW delivered to the Portland load bubble
- New 55 mile 230-kV Troutdale to Bethel transmission line
  - existing line is fully subscribed to firm use
- Additions at Troutdale and Bethel substations for the termination and operation of the new line

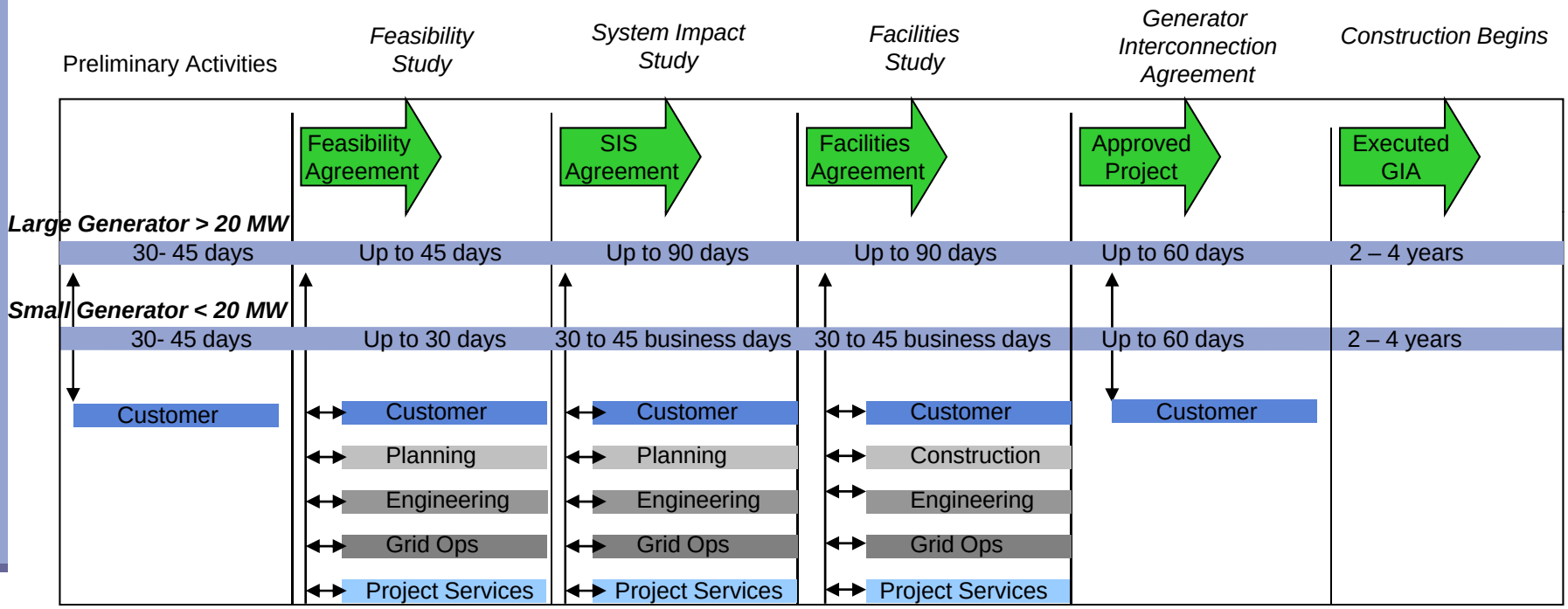
Willamette Valley

- $290 Million
- 600 MW delivered to Willamette Valley load bubble
- New 60 mile 230-kV Dixonville to Alvey transmission line
  - existing line is fully subscribed to firm use
- Additions at Dixonville and Alvey substations for the termination and operation of the new line

Chiloquin Southern Oregon

- $100 Million
- Delivery of 400 MW into the southern Oregon load bubble
- New 30 mile 230-kV Chiloquin to Klamath Falls transmission line
  - existing line is fully subscribed to firm use
- Additions at the Chiloquin and Klamath Falls substations for the termination and operation of the new line

Typical Interconnection Study Timeline



45-day Feasibility Study - includes:

- Circuit breaker short circuit capability limits exceeded
- Thermal overload or voltage limit violations
- Description and cost estimate of facilities required
- If network resource, a description and cost estimate of transmission modifications required to deliver generation to network load

90-day System Impact Study - includes:

- Short circuit analysis
- Stability analysis
- Power flow analysis
- Estimate of the cost responsibility
- Estimated time to construct

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LGIA Network Resource/Energy Resource

- Generators don't need a network resource interconnection for PacifiCorp Merchant to designate them as a network resource in the transmission service queue
- If generators do insist on a network resource interconnection agreement, the interconnection procedures require them to fund all transmission upgrades necessary to deliver the power to load, funding subject to refunds

LGIA Customer Data Requirements

- Application
  - Complete application
  - Site control
  - Deposit
- Feasibility Study
  - One-line diagram
  - Step-up transformer data
  - Radial interconnecting line data

Data Requirements, *continued*

System Impact Study:

- Non-wind:
  - Generator data
  - Excitation system block diagram
  - Power system stabilizer block diagram/data
  - Governor system block diagram/data
- Wind:
  - One-line diagram showing layout of wind farm and impedances for all segments
  - Wind turbine model
  - Size and increments of supplemental reactive compensation