HVDC Transmission Line Project for Moving ERCOT Wind Into SERC

ERCOT RPG Meeting
August 13, 2010
Agenda

- Pattern Energy Group
- SERC and ERCOT Market Drivers
- Southern Cross Project Overview
- Project Development Status
- RPG Group and Transmission Planning Path Forward
Pattern and Market Background
# Pattern Energy Group

## Pattern Energy
- Pattern is an independent, fully integrated energy company that develops, constructs, owns and operates clean energy and transmission assets in the United States, Canada and Latin America
- Formed in June 2009 by Riverstone and a premier management team with a proven track record
- Pattern team developed over 2,000 MW wind

## Riverstone Holdings LLC
- Riverstone is an energy focused private equity firm with the largest renewable energy fund in the world
- Riverstone is committing a significant amount of capital to support and expand Pattern’s business
- Pattern will be the sole wind energy platform for Riverstone in North America

## Growth Projected Strong & Steady
- More than 520 MW operational or under construction within first nine months
- 4 GW of wind projects in various development stages
- 5 large-scale transmission projects in development
# Pattern Energy Group - Texas

## Texas Assets

<table>
<thead>
<tr>
<th>Operational</th>
<th>283 MW Gulf Wind Project</th>
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<tbody>
<tr>
<td>Under Development</td>
<td>1000 MW Panhandle Wind</td>
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<tr>
<td></td>
<td>Gulf Wind Phase II</td>
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<tr>
<td></td>
<td>Majestic 2 (SPP wind)</td>
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## Texas Offices

- Houston – Development & Operations HQ
- Austin – Regional Office
- Dallas – Regional Office

## Past Texas Development

Pattern team also developed or co-developed:
- Sweetwater Wind
- South Trent Wind
- Majestic I (SPP wind)
Renewable Energy Market Drivers

- Texas has outstanding wind resources and leads the nation in installed capacity
- CREZ development that is underway will allow access to additional very high capacity wind resource areas
- Texas’s available wind resources likely exceed the demand for renewable energy within the state
- Inadequate economic renewable resources within SERC to meet even a modest Renewable Energy Standard (“RES”)
- Existing or planned transmission availability for delivery of wind from outside SERC into SERC is limited
- TVA has begun contracting for long-term wind energy purchases from the Midwest (Iowa, Kansas, North Dakota, etc.), and other SERC utilities are evaluating renewables options
Wind Energy Resource Map: Limited Options for the Southeast

What if We Had a 15% RES?
Excess/Shortfall of Available Renewable Energy by NERC Region

Limited Transmission to Assist SERC in Importing Renewable Energy

Southern Cross Project
Overview
Why is Pattern Proposing the Project?

• Pattern teamed with Burns & McDonnell to study transmission routes eastward from the central United States:
  – Wind resources in Kansas, Oklahoma, Texas and all of the Southeast
  – Studied SPP, ERCOT, and SERC transmission systems
  – Cost and load flow analyses on many combinations of source points (Central Plains, ERCOT), sink points, size (1000 – 3000 MW), and technology (500 kV, 765 kV, HVDC, etc.)

• Based on those studies, Pattern concluded:
  – Utilizing Texas wind resources transmitted via the ERCOT transmission system provides significant cost advantages over other alternatives
  – Dedicated transmission lines from Central Plains are substantially longer, more expensive, and technically challenging
  – Capability for delivery via existing SPP networks is limited
  – There are very limited economically efficient wind resources in SERC
Pattern’s Proposed “Southern Cross” Project

• Western End: New 345 kV ERCOT Switchyard in Rusk County, Texas
• Eastern End: One or more Existing 500 kV Switchyards in Northeastern Mississippi
• Technology: Bi-directional conventional HVDC bipole
• Sizing:
  – Initially targeting 1500 MW with Anchor Tenants
  – Expandable up to 3000 MW (subject to reliability study)
• Target Markets: TVA, Southern Company, Entergy, Others
• Target Online Date: 2015
Preliminary Southern Cross Map

- ERCOT transmission utilized
- Proposed 500-kV DC Transmission Line
Proposed ERCOT Interconnection
Connection to Three 345-kV Lines Near Martin Lake
Proposed SERC Points of Interconnection
Proposed SERC Points of Interconnection

Tennessee Valley Authority POI
Southern Companies POI
Entergy POI
Benefits to ERCOT from the Southern Cross Project

- Project allows Texas to expand its traditional role as an energy supplier, adding wind energy to its portfolio of major exports
- Economic development of incremental wind investment in Texas
- Cost of HVDC line will not be included in ERCOT transmission rates
- Reduction in transmission costs to ERCOT customers due to export charges paid by Southern Cross shippers and better utilization of CREZ transmission investment
- The bi-directional HVDC connection between the two markets allows for optimal economic dispatch of the two markets, resulting in net benefits for consumers
- Interconnection to SERC provides ERCOT with another “generation resource” that is primarily coal, nuclear and hydro based, thus increasing diversity and reliability of supply and ancillary services potential
- Project will obtain a FERC disclaimer of jurisdiction to ensure regulatory status quo is protected
Benefits to SERC from the Southern Cross Project

- SERC can gain access to the highest capacity factor wind resources in the country.
- Interconnection with ERCOT provides closest and most robust path for delivery of renewable energy.
- Delivered cost of renewable power through Southern Cross will be materially lower than local renewable options, and will be competitive with conventional generation options.
- Significant economic development in Louisiana and Mississippi from HVDC line and converter stations.
- Cost of the Project will be funded through bilateral contracts and not broad region-wide ratepayers.
- The bi-directional HVDC connection between the two markets allows for optimal economic dispatch of the two markets, resulting in net benefits for consumers.
- Interconnection to ERCOT provides SERC with another “generation resource” that is primarily gas based, thus increasing diversity and reliability of supply.
Development Status – General

• Conducted technical evaluation and selected configuration, technology (HVDC) and endpoints
• Selected optimal project sizing based on evaluation of available technologies and scale efficiencies
• Selected primary and alternate route corridors after comprehensive corridor study
• Completed project cost estimates, economic studies, proforma and indicative commercial proposals for delivery of renewable energy to SERC and confirmed economic viability
• Developed feasible target schedule based on permitting, land acquisition, and construction constraints
• Met with individual stakeholders throughout Texas and the Southeast
• Reviewed project with FERC and now preparing 210/211 and tariff filings
• Ongoing discussions with southeastern offtakers / shippers
Development Status –
Transmission Planning

- Completed steady state load-flow analyses through Burns & McDonnell
  - ERCOT and SERC
  - Bi-directional (load and generation)
  - Several source and sink points
  - Several model scenarios
- Solicited ERCOT and SERC utility feedback on project concept
- Initiated interconnection process with TVA, Southern, and Entergy (SPP ICT)
- Initiated feasibility study with TVA
RPG Proposed Path Forward

- August 13 – Project Overview Presentation
- August 27 – Formal RPG Submittal by Pattern
  - Project overview
  - Prior load flow study results
  - Proposed economic study scope
- Solicit stakeholder feedback - 21 day comment period
- September – Commence nodal economic benefit study (Resero/LCG)
- Fall - Initiate necessary reliability studies
Conclusions

- Texas wind resources are abundant and ERCOT is uniquely positioned to benefit from its proximity to SERC
- SERC has inadequate economic renewable resources to fully meet an even modest local or national RES
- Delivered cost of renewable power through Southern Cross will be materially lower than local renewable options, and will be competitive with conventional generation options
- We propose to use RPG as a forum for broad stakeholder input in the project and welcome all input as we work together to develop this project
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