Benefits of New HVDC Transmission for RPS Goals

University of Illinois
2013

Hans Detweiler
Clean Line Energy Partners
Best U.S. onshore wind resources are distant from population centers

Annual Average Wind Speed at 80 m
Best wind resources are located in areas with the weakest transmission systems

Existing high voltage transmission system

- **Existing AC Transmission (kV)**
  - 345 - 360
  - 361 - 500
  - 501 - 800

- **Existing DC Transmission (kV)**
  - 99 - 360
  - 361 - 500
Clean Line’s projects connect the best wind resources to load centers.
Rock Island will connect western Iowa with PJM 765 kV system

**KEY MILESTONES**

<table>
<thead>
<tr>
<th>Regulatory</th>
<th>STATUS</th>
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<tr>
<td></td>
<td>• Received FERC negotiated rate approval</td>
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<td>• Filed with the Illinois Commerce Commission for public utility status and route approval; will submit preferred route to the Iowa Utilities Board in 2013</td>
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<td>Interconnection</td>
<td>• Facilities study underway in PJM and no harm studies underway in MISO</td>
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<td>Converter Stations</td>
<td>• Converter station land options acquired in Illinois and Iowa</td>
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<td>• Development agreement with Siemens for HVDC converter stations</td>
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<td>Outreach</td>
<td>• Invited more than 40,000 property owners and residents within study corridors to 33 open house meetings</td>
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<td>• Held 10 local business open houses to build supply chain database</td>
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<tr>
<td>Agreements &amp; Partnerships</td>
<td>• MOU with Kiewit for EPC development support</td>
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<td>• Preferred supplier agreement with Southwire (IL)</td>
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</table>
~15 million MWh/year = 3x Hoover Dam
HVDC transmission lines bring economic, environmental and electric reliability benefits

**More efficient** — Lower line losses

**Lower cost** — Requires less infrastructure, results in lower costs and lower prices for delivered renewable energy

**Smaller footprint** — Use narrower right-of-way than equivalent alternating current (AC)

**AC**

Three 500 kV lines

3000-4000 MW Capacity

**DC**

One ± 500kV bipole

CLEAN LINE ENERGY PARTNERS
HVDC delivery of renewable energy will augment the existing grid

DELIVERING RENEWABLE ENERGY WITH HVDC

Typical converter station and switchyard
Rock Island Clean Line Results in Significant Economic Benefits

**ECONOMIC BENEFITS**

- **OPERATIONS JOBS**: 500+
- **CONSTRUCTION JOBS**: 5,000+
- **PROPERTY TAX REVENUE**: MILLIONS PER YEAR
- **HOMES POWERED**: 1.4 MILLION PER YEAR
- **NEW WIND FARM INVESTMENTS**: $7 BILLION
- **INCREASED MARKET COMPETITION**: 
- **CONSUMER BENEFITS**: 
Rock Island Clean Line Results in Significant Environmental Benefits

**ENVIRONMENTAL BENEFITS**

- **CO₂**
  - 9 MILLION TONS
  - (EQUAL TO TAKING 1.7 MILLION CARS OFF THE ROAD EACH YEAR)

- **SO₂**
  - 16,100 TONS PER YEAR
  - (SULFUR OXIDE IS A PRECURSOR TO ACID RAIN)

- **NOₓ**
  - 8,300 TONS PER YEAR
  - (NITROGEN OXIDE CONTRIBUTES TO SMOG)

- **H₂O**
  - OVER 3.5 BILLION GALLONS PER YEAR

- **Hg**
  - 140 POUNDS PER YEAR

**Water Use Reduction**

**Sulfur Oxide Pollution Reduction**

**Nitrogen Oxide Pollution Reduction**

**Carbon Dioxide Pollution Reduction**

**Mercury Pollution Reduction**
Rock Island could help address the projected shortfall in renewable energy supply in the PJM states

Renewable energy supply and demand in PJM states
Thousand GWh

1. Wind projects currently under construction within the PJM states (as of 2Q 2012)
2. Energy from existing wind, biomass, and solar projects within the PJM states (as of 2Q 2012)
3. Demand for renewable energy credits within PJM. States with voluntary goals not included in the demand calculations.

Source: EIA; DSIRE; AWEA
### Wind Power Curve Correlation of Best Capacity Factor Sites Across Five States

#### Correlation of 10-Minute Wind Energy Generated

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- **Low correlation**: between 0.0 and 0.25
- **Medium correlation**: between 0.25 and 0.5
- **High correlation**: between 0.5 and 1.0

1. “Low correlation”: between 0.0 and 0.25; “Medium correlation”: between 0.25 and 0.5; “High correlation”: between 0.5 and 1.0

Source: EWITS; Clean Line analysis

**CLEAN LINE ENERGY PARTNERS**
Rock Island Partners and Schedule

ROCK ISLAND CLEAN LINE SCHEDULE

JANUARY 2010
KICKOFF

2010 - 2013
PUBLIC OUTREACH, REGULATORY APPROVALS, SITING, PERMITTING AND BEGIN RIGHT-OF-WAY ACQUISITION

2013-2014
SECURE CUSTOMERS, SURVEYING AND ENGINEERING

2014-2017
CONSTRUCTION

CLEAN LINE ENERGY PARTNERS
Rock Island Clean Line Study Corridors
Preserving agricultural lands

CLEAN LINE ENERGY WILL MINIMIZE AND MITIGATE IMPACTS BY:

• Considering land use impact when choosing structure design and route
• Minimizing interference with drainage tile and repairing tile to the same or better quality
• Restoring soil compaction and rutted land
• Repairing any damage to soil conservation practices
• Compensating for any crop damage
• Engaging an independent agricultural inspector to monitor construction and to verify compliance with stated policies

AGRICULTURAL IMPACT MITIGATION AGREEMENT

Clean Line Energy is working with the Illinois Department of Agriculture to establish an Agricultural Impact Mitigation Agreement, which will govern certain routing, engineering, and construction practices.
How do I get involved in the Rock Island project?

• Sign a support letter
• Post supportive comments on the Illinois Commerce Commission’s website and other online media outlets
• Gather additional support letters
• Attend the Public Hearing for the Rock Island Clean Line project
Illinois Commerce Commission Website

- [http://www.icc.illinois.gov/](http://www.icc.illinois.gov/)
- Under the Consumers tab:
  - “Comment on a Case”
• Select “P” 12-0560

• Proceed to fill out a supportive comment for the Rock Island Clean Line project

Select a case from the list or by case number:

P 12 0560 Select

12-0560
Rock Island Clean Line LLC
Petition for an Order granting Rock Island Clean Line LLC a Certificate of Public Convenience and Necessity pursuant to Section 8-406 of the Public Utilities Act as a Transmission Public Utility and to Construct, Operate and Maintain an Electric Transmission Line and Authorizing and Directing Rock Island Rock Island pursuant to Section 8-503 of the Public Utilities Act to Construct an Electric Transmission Line.
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