Linking low cost renewable energy to key markets

National Association of State Energy Officials
National Meeting September 2011

San Antonio TX

CLEAN LINE
ENERGY PARTNERS

Introduction to Clean Line Energy

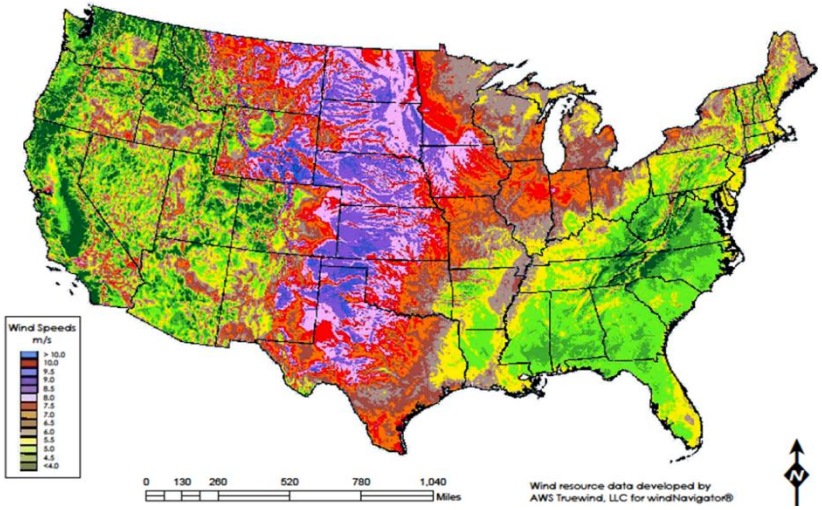
Connecting renewable energy to demand

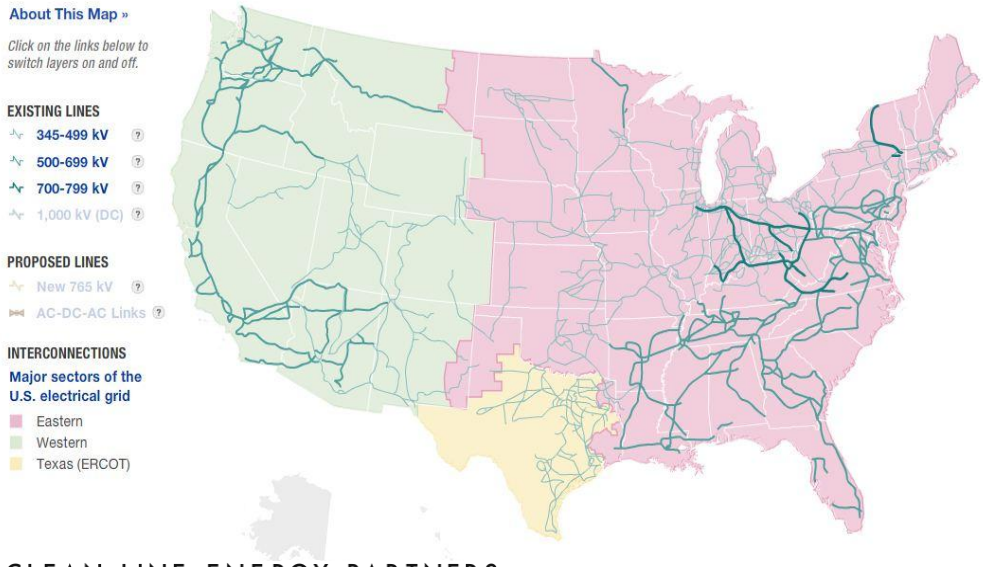
- Clean Line Energy focuses on building transmission lines to connect renewable resources to load centers
- Clean Line seeks to develop, own and operate long haul, high voltage direct current (HVDC) transmission lines across the United States, helping solve one of the most vexing challenges to a cleaner energy future
- Clean Line's principals, partners and investors bring unique perspective, experience and focus to transmission development along with a track record of success in energy project development

Integrating large clean energy sources with demand centers

Why do we need new transmission?

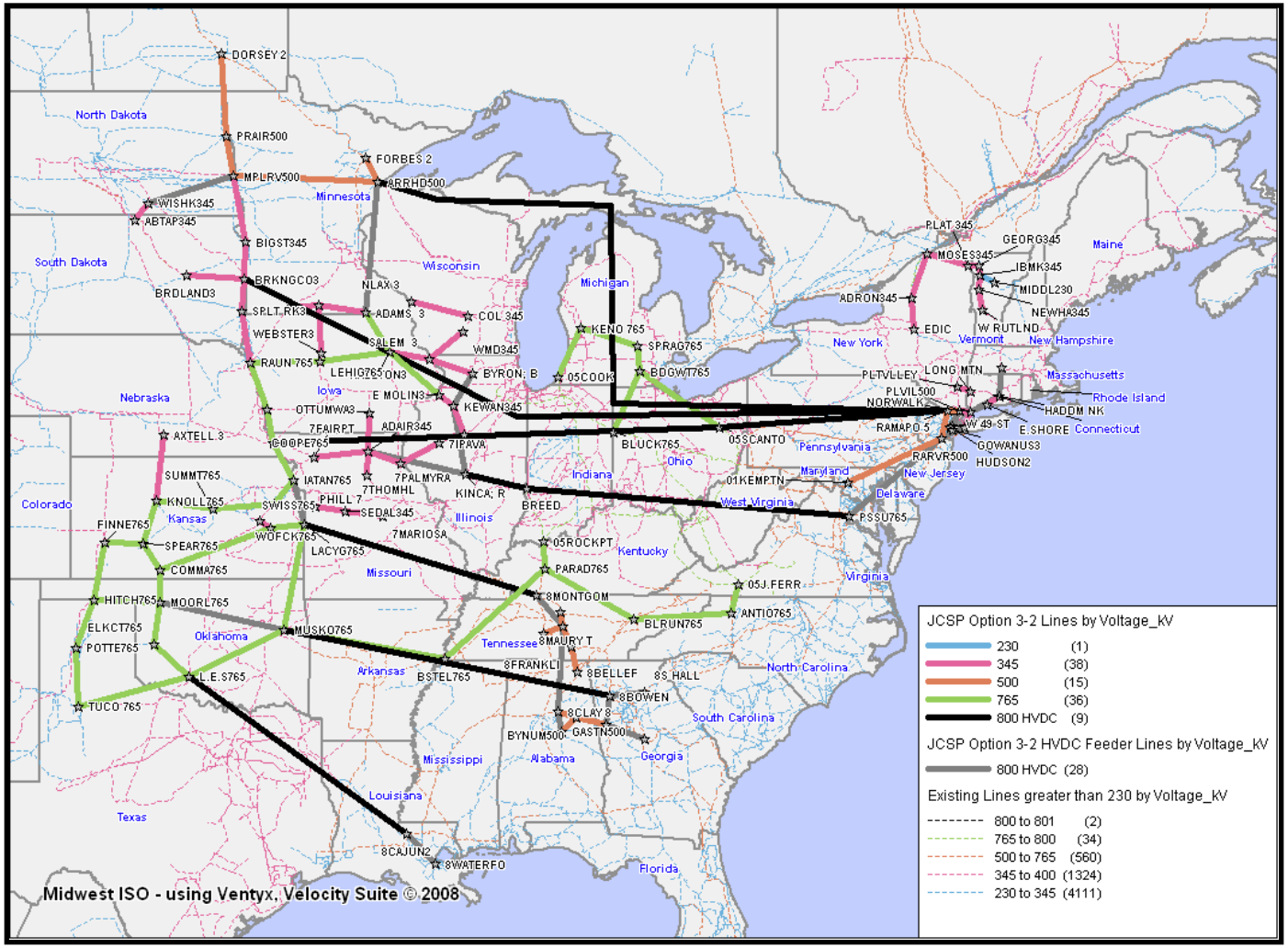
Best wind resources are in central spine of the United States far from major population centers





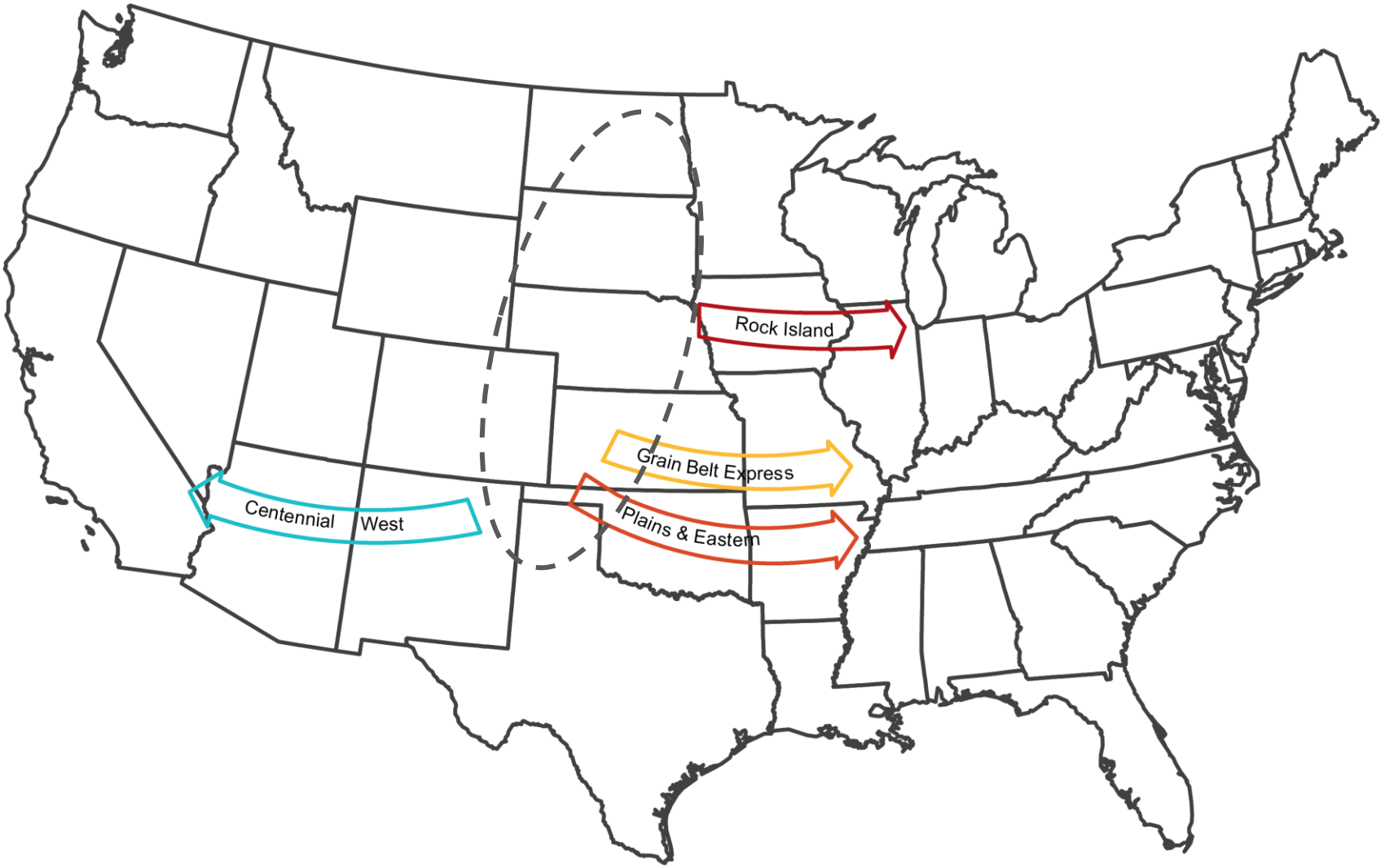
…with limited access to robust transmission systems

Joint Coordinated System Plan identified seven HVDC lines to move wind energy from Great Plains to the East



Source: Joint Coordinated System Plan 2008

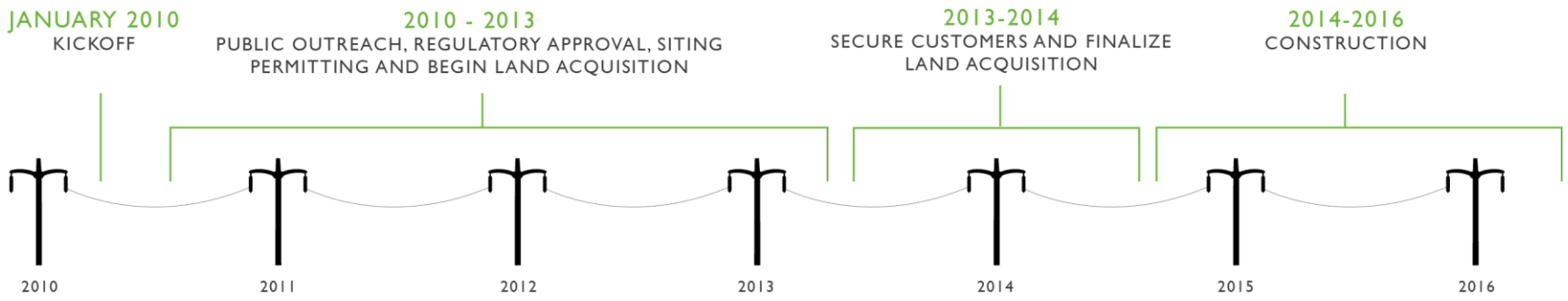
Clean Line portfolio focused on taking power from best wind areas to distant demand



Clean Line projects share common rationale

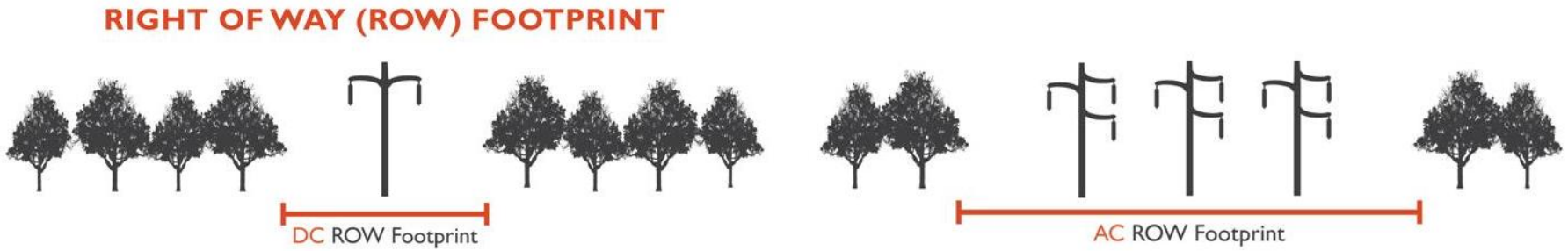
- **Connect areas with outstanding renewable resources and low load to areas with weaker renewable resources and higher load:** "Wind belt" states cannot absorb enough wind to get to10% penetration on a national basis. In addition, because of wind's diurnal profile and variability, it is more difficult to absorb the best resources where they are located
- **Line length of 550-800 miles:** This length is long enough to connect separate regions but can keep transmission cost at about $30/MWh
- **HVDC technology:** HVDC is the most electrically efficient and cost effective technology to move robust wind resources to load centers
- **Merchant model:** Clean Line will fund the development costs of the transmission projects and will sell transmission capacity to wind generators and/or the purchasers of that power

TYPICAL CLEAN LINE PROJECT SCHEDULE



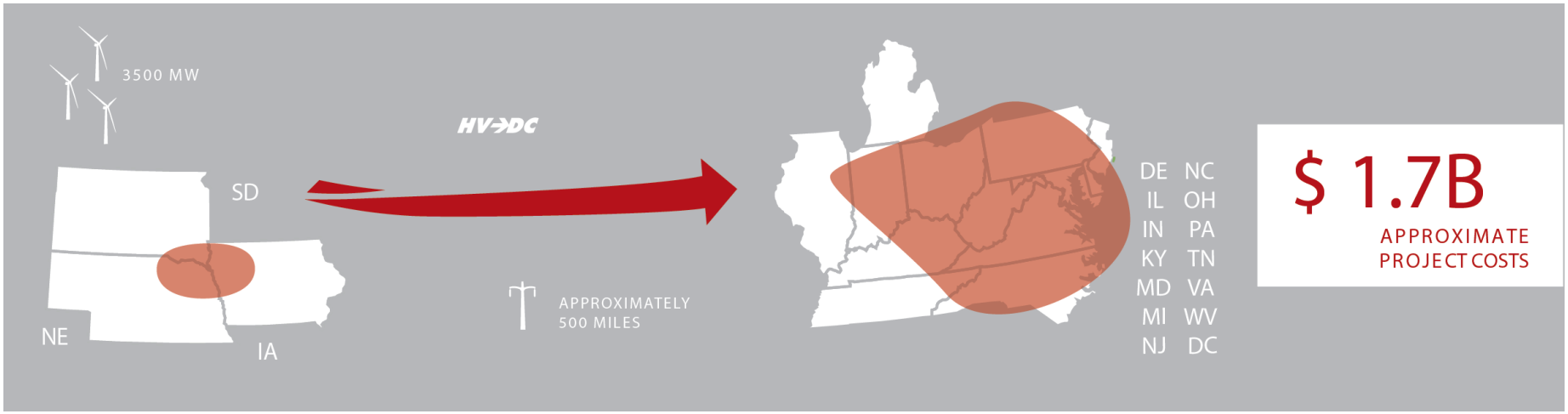
HVDC is the most efficient method to transmit large amounts of electricity over long distances

- More efficient — Lower line losses
- Lower cost — Requires less infrastructure, results in lower costs and lower prices for delivered renewable energy
- Improved reliability — Control of power flow enhances system stability and lowers cost of integrating wind
- Smaller footprint — Use narrower right-of-way than equivalent Alternating Current (AC)



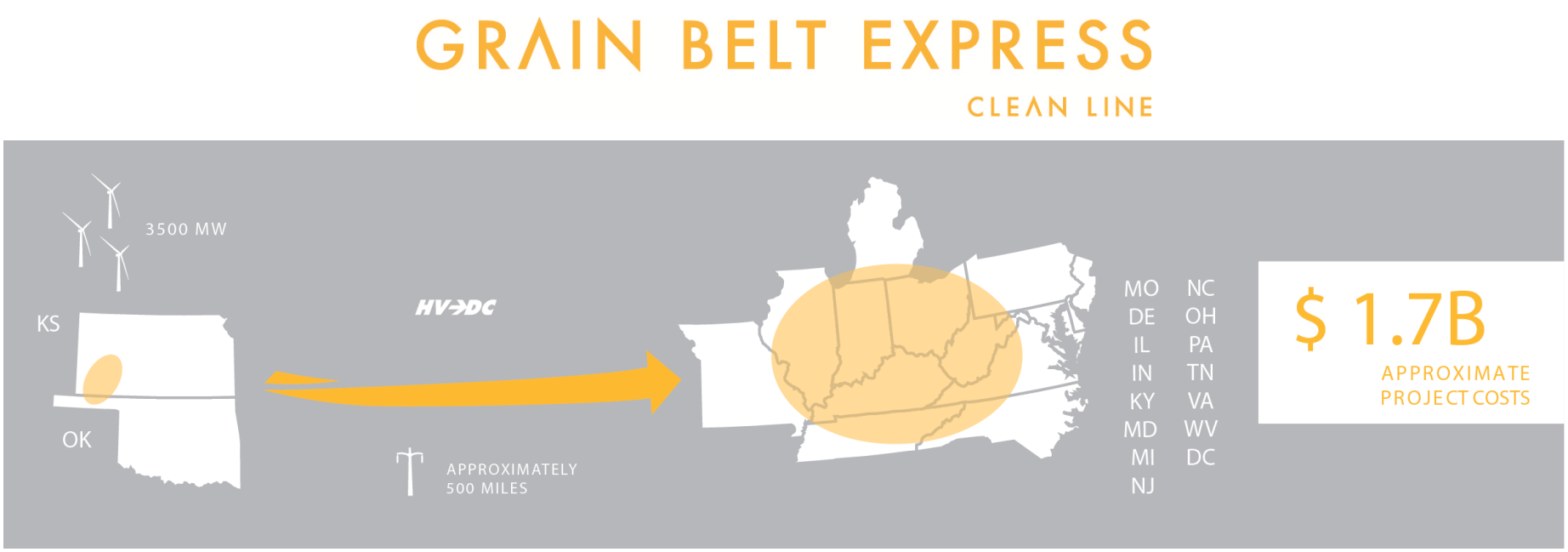
Rock Island Clean Line delivers wind energy from Iowa, Nebraska, and South Dakota to Illinois and states farther east

ROCK ISLAND
CLEAN LINE



Project Specifications	
Transmission Capacity	3,500 MW
Approximate Length	500 miles
Approximate Capital Cost	$1.7 billion

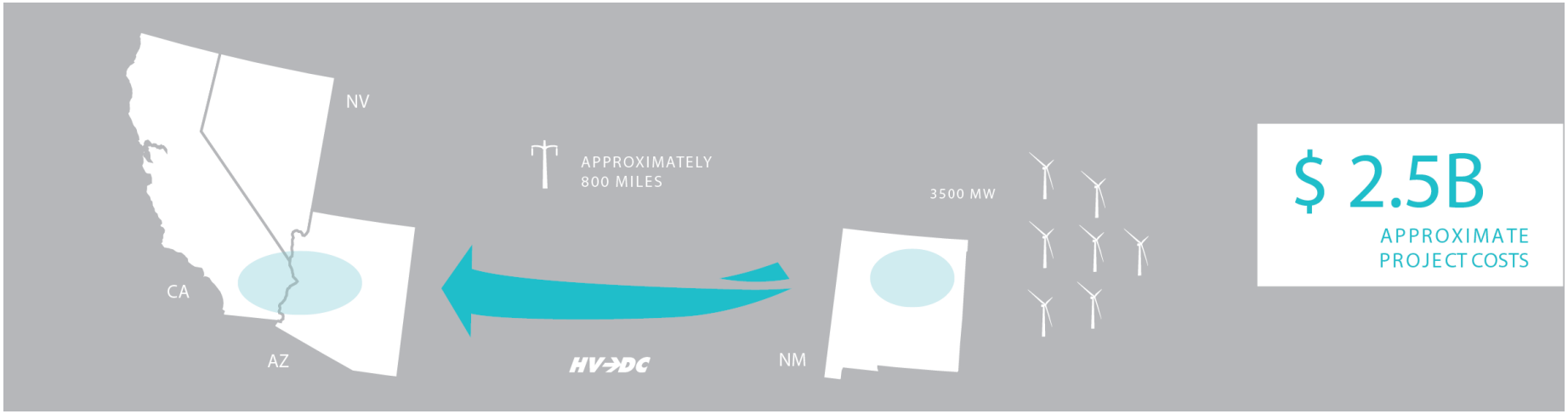
Grain Belt Express Clean Line delivers clean power from Western Kansas to Southeast Missouri and states farther east



Project Specifications	
Transmission Capacity	3,500 MW
Approximate Length	500 miles
Approximate Capital Cost	$1.7 billion

Centennial West Clean Line delivers renewable energy from Eastern New Mexico to the West Coast

CENTENNIAL WEST
CLEAN LINE



Project Specifications	
Transmission Capacity	3,500 MW
Approximate Length	800 miles
Approximate Capital Cost	$2.5 billion

Plains & Eastern Clean Line delivers wind energy from Kansas, Oklahoma and Texas to TVA and the Southeast

PLAINS & EASTERN
CLEAN LINE

Project Specifications	
Transmission Capacity	7,000 MW
Approximate Length	800 miles
Approximate Capital Cost	$3.5 billion

Plains & Eastern is pursuing permits and siting on State and Federal Levels

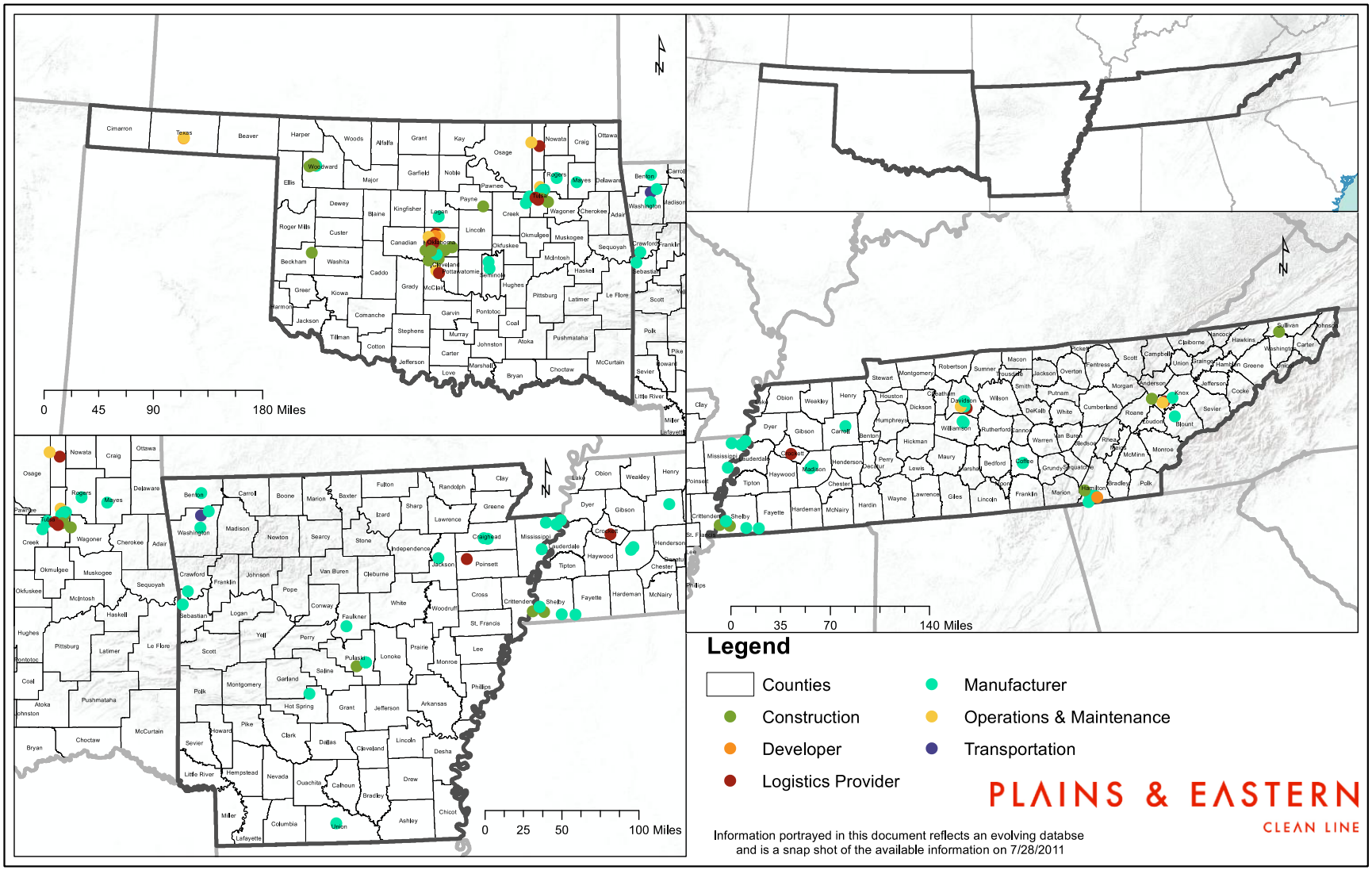
State

- Filed for utility certification in OK and AR
  - Corporation Commission's staff, Attorney General, and Administrative Law Judge are supporting Clean Line's application for utility status
  - Following established precedents, but outcome is not a given and support from wind generators and manufacturers is important
- Plan to obtain Certificate of Environmental Compliance and Public Necessity (CECPN) in Arkansas
- Plan to pursue certificate in Tennessee
- Contracted Ecology & Environment (E&E) as lead environmental consultant for work on routing, environmental assessment work, and National Environmental Policy Act (NEPA) (including public involvement)

Federal

- Will carry out NEPA Environmental Impact Statement
- Potential partnership with Southwestern Power Administration/DOE under Section 1222 of Energy Policy Act of 2005

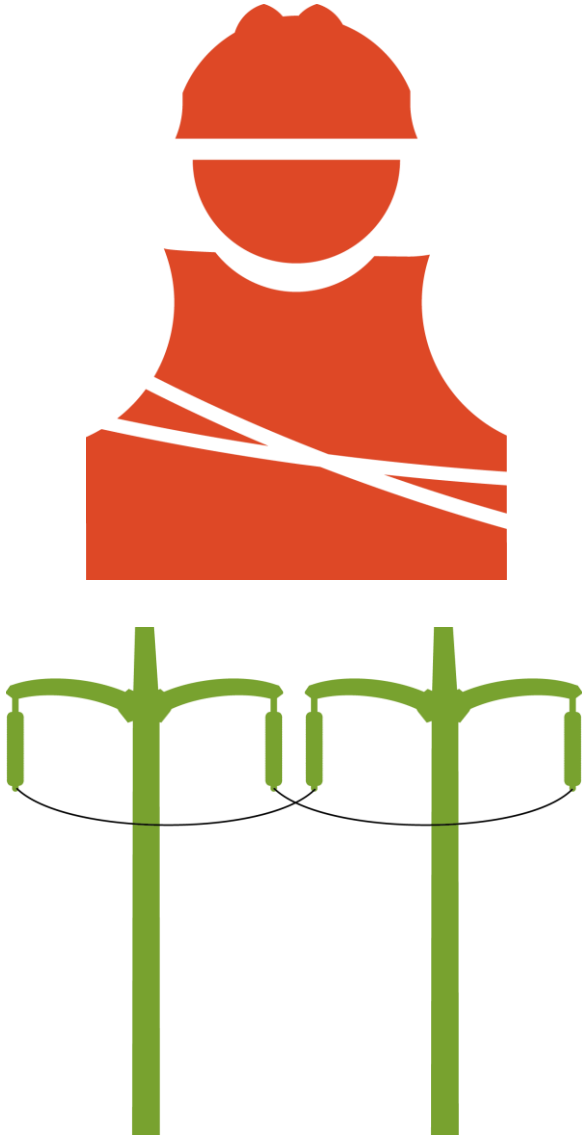
Oklahoma, Arkansas, and Tennessee companies positioned to see increase in jobs from Plains & Eastern Clean Line



Plains & Eastern Clean Line will open supply chain for wind energy in the Southeast

- Approximately **3,500 wind turbines** will be used to generate 7,000 MW of clean energy delivered by Plains & Eastern Clean Line.
  - **28,000,000 wind turbine components**
  - **1,050,000 tons of steel**
  - **10,500 blades**
- In addition to the turbine components, wind farms require:
  - Underground cable
  - Concrete for roads and foundations
  - Gravel for lay down yard
  - Steel for substation

Plains & Eastern Clean Line will open supply chain for HVDC Transmission in Southeast



- Approximately **4,693 steel monopole structures** with approximately **26.7 million feet of conductor** (+8.4 million feet for the metallic return) will be used for the Plains & Eastern Clean Line.
  - Around **35,000 – 40,000 pounds of steel** per transmission structure
  - Approximately **40 cubic yards of concrete** per structure with a larger foundation of **200 cubic yards of concrete** every 5 miles
- Plains & Eastern will create opportunity for:
  - **164,255,000 pounds of steel** for the structures
  - **219,200 cubic yards of concrete** for foundations
  - **11.2 million pounds of steel** and **67 million pounds of aluminum** for the conductor and metallic return

Clean Line Energy's Strategic Partnerships

Alliances with vendors stimulate development in states where we do business, commitment to local communities build long term relationships

SIEMENS

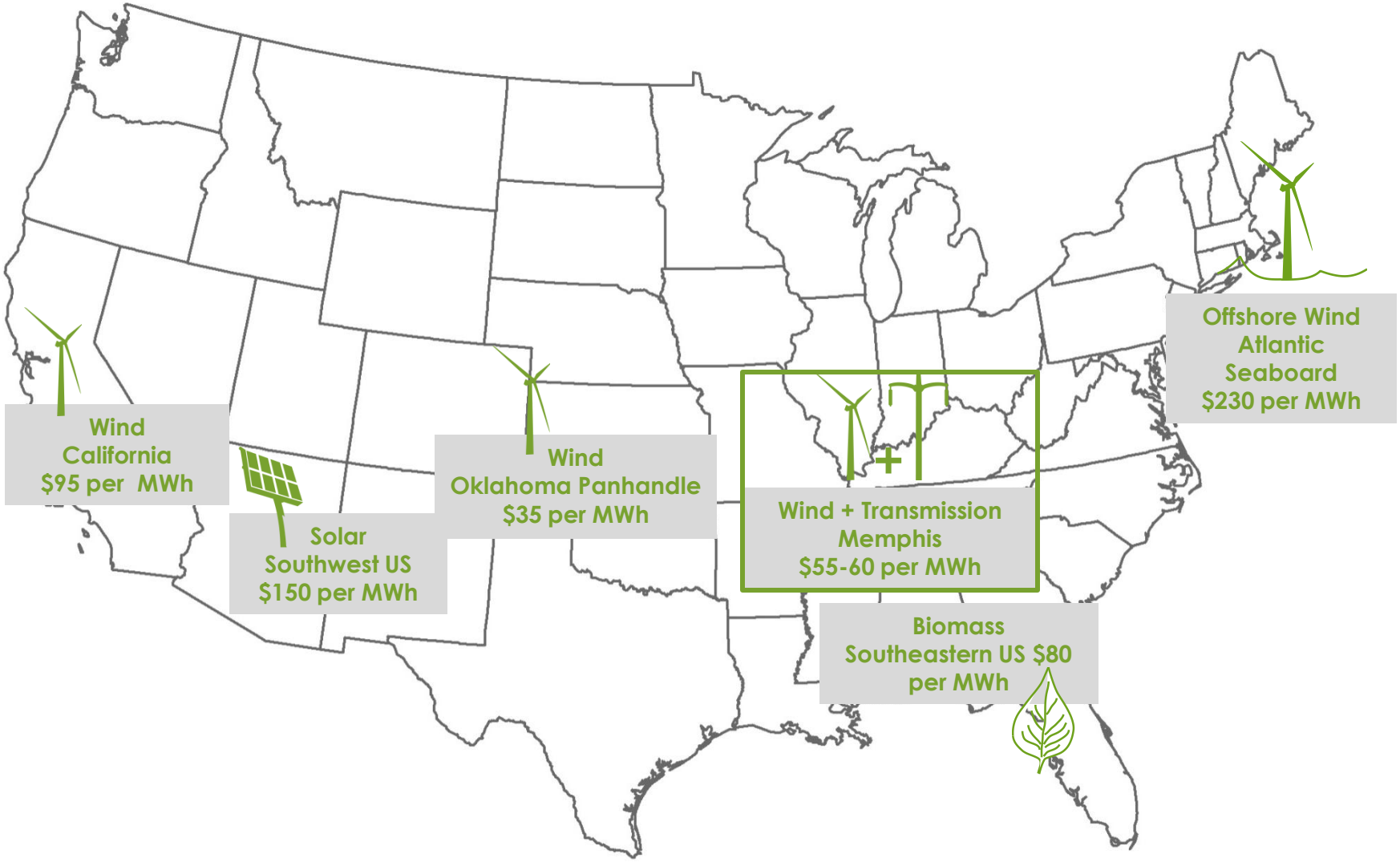
petco STRUCTURAL, LLC

Announcement of General Cable partnership in Little Rock, March 24, 2011

General Cable

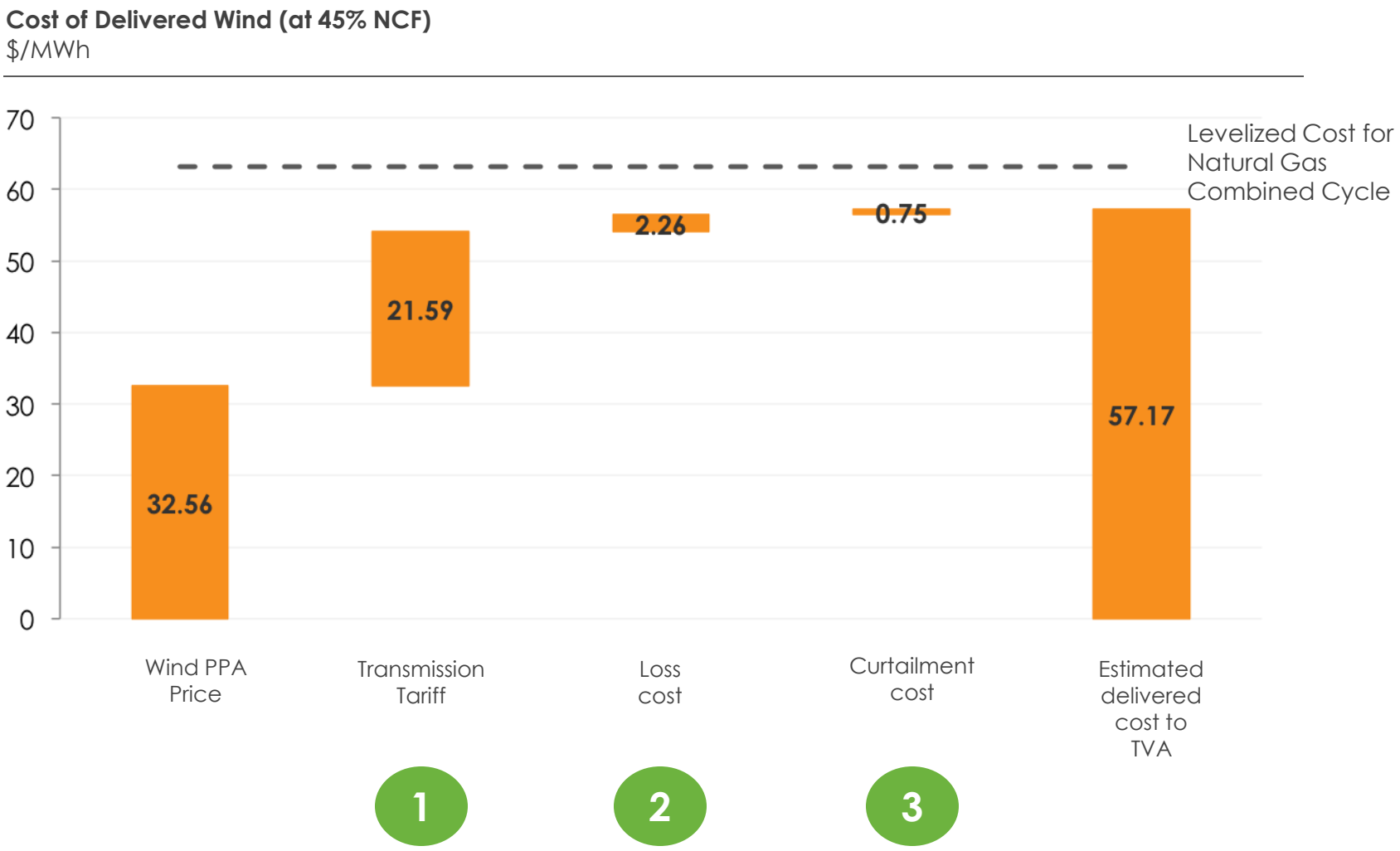
Clean Line was a major sponsor of the 2011 Guymon Pioneer Days Rodeo in Guymon, Oklahoma in May.

Wind Energy is most cost-effective renewable energy even when paired with transmission



Estimated Delivered Cost is Attractive

Less than the Energy Information Administration's levelized cost for a new natural gas-fired plant



Source: Clean Line Energy; Energy Information Administration

Cost competitiveness

Levelized Cost ($/MWh, nominal)

	Fixed Cost	*Fuel Cost*	*Total Cost*	*Comments*
Wind in high class II site	30-40	0	30-40	Typical resource in IA, OK, KS, TX, eastern NM
Wind in low class II site	50-60	0	50-60	Typical resource in IN, IL
Clean Line delivered product	55-70	0	55-70	Includes $25-30/MWh of transmission
Gas combined cycle	15	50	65	Based on 7,000 heat rate, $6/mmBTU real ($7 nominal)
Wind in class III site	65-75	0	70-80	Typical resource in OH, NY, CA
Nuclear	80-120	5	85-125	Costs are highly uncertain
Solar PV	110-130	0	110-130	Costs are declining, but have a long way to fall
Solar thermal	120-150	0	120-150	

Source: EIA, Clean Line

What's working in favor of Clean Line projects

- PROJECT ECONOMICS
- PUBLIC ACCEPTANCE AT THE LOCAL LEVEL
- PLENTY OF FINANCING
- PROVEN TECHNOLOGY
- ADEQUATE WIND RESOURCES
- FERC'S NEGOTIATED RATE STRUCTURE
- NO CURTAILMENT DUE TO CONGESTION

Challenges

- STATE SITING LAWS
- LIMITED FEDERAL SITING LAWS
- FEDERAL LEADERSHIP
- LACK OF RULES AROUND HVDC INTERCONNECTION
- INCUMBENTS SANDBOX
- INTEGRATION CONCERNS BY UTILITIES

www.cleanlineenergy.com