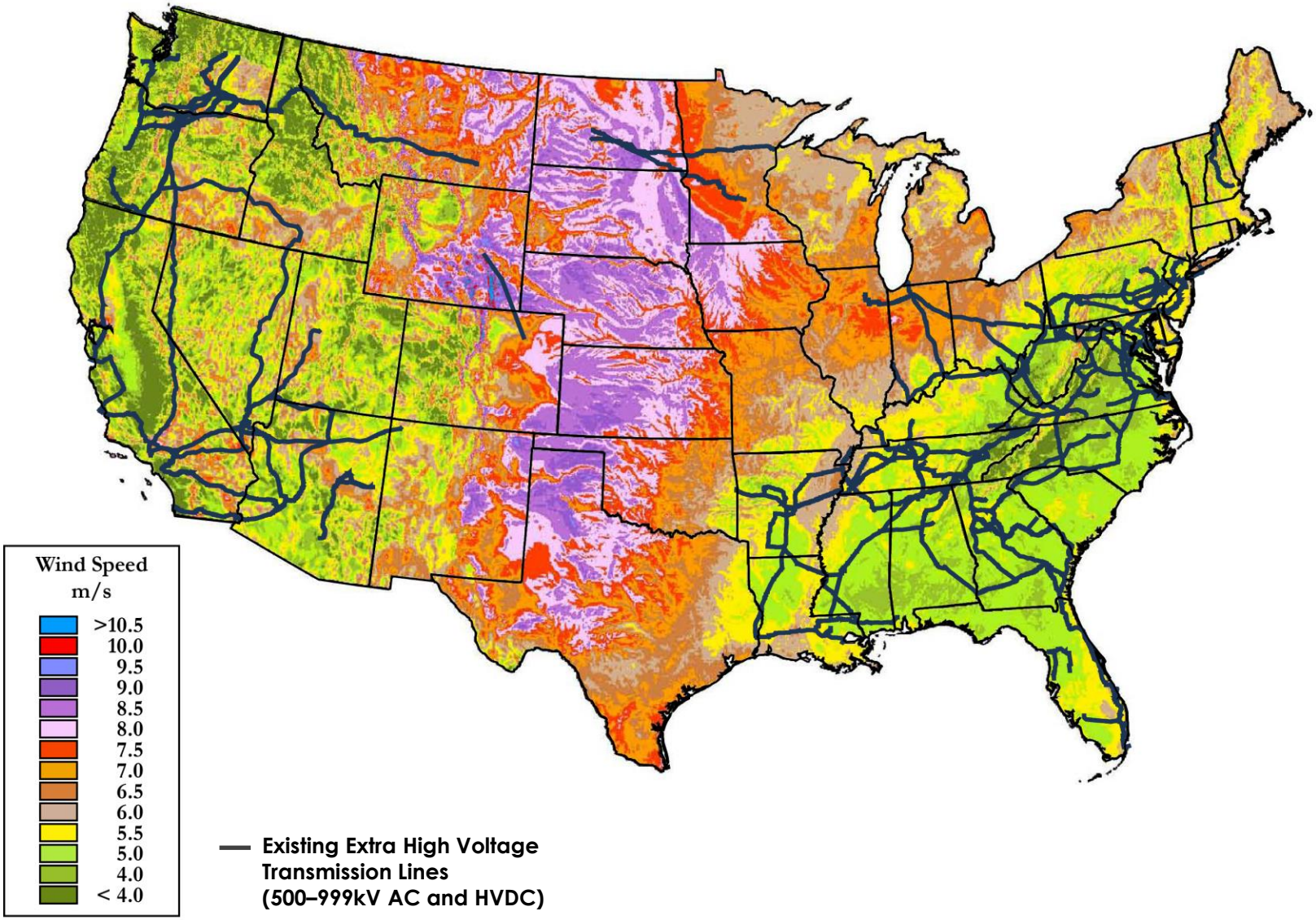
Grain Belt Express Clean Line

Clean Energy. Delivered.

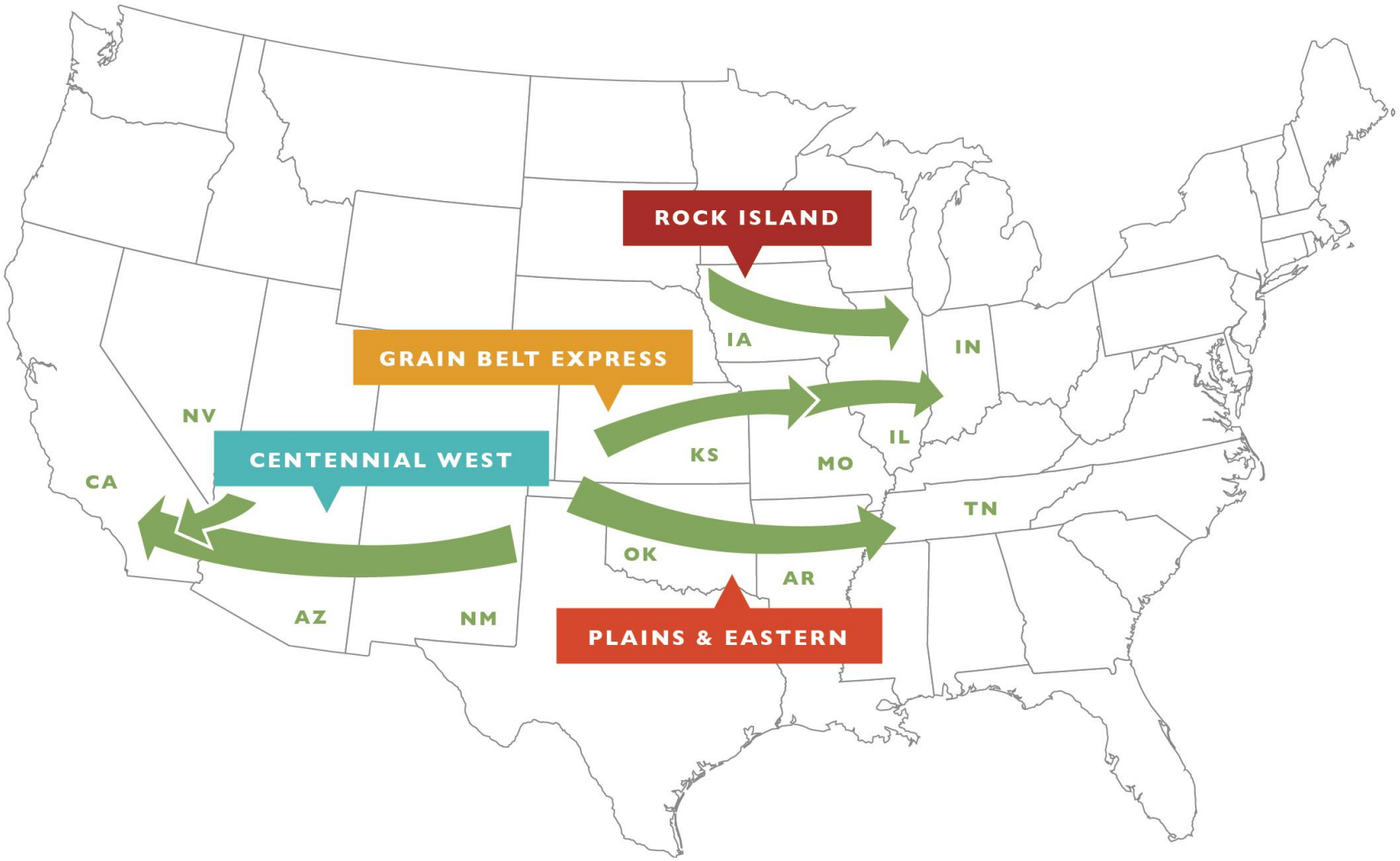
CLEAN LINE
ENERGY PARTNERS

Kansas

The best wind resources are distant from population centers and extra high voltage transmission lines



Clean Line Energy is developing HVDC transmission lines to bring low-cost renewable energy to market



Clean Line Energy Partners

Focus, team and capital to connect renewable energy to demand

- Clean Line Energy develops long-haul, high-voltage direct current ("HVDC") transmission lines to connect the best wind resources in North America to communities that lack access to low-cost renewable power
- HVDC is the lowest cost, least land intensive, most reliable transmission technology to integrate large amounts of renewable energy
- Clean Line's management team brings a track record of success in energy project development
- Supported by investors who bring long-term perspective, patient capital and an understanding of siting and building interstate infrastructure projects

Strong wind resources

Large demand centers

National Grid is a key investor in Clean Line Energy

On November 27, National Grid and Clean Line announced that National Grid will make a **$40 million** equity investment in Clean Line.

nationalgrid

CLEAN LINE ENERGY PARTNERS

- Capital will be used to advance the development of Clean Line's four HVDC transmission projects
- National Grid brings extensive experience in building, owning and operating large HVDC projects

HVDC is the ideal technology to move large amounts of power over long distances

More efficient – Over long distances, DC transfers more power with lower line losses than comparable AC lines

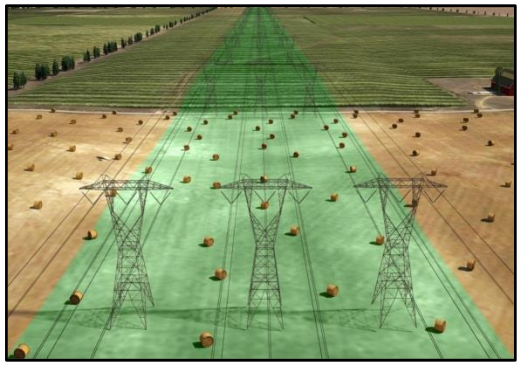
Smaller footprint – DC requires a narrower right of way to move an equivalent amount of power over AC lines

Lower cost – Less infrastructure and lower line losses result in lower cost transmission and lower prices for renewable energy

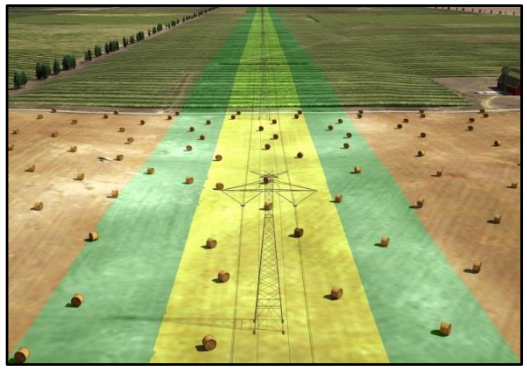
Improved reliability – DC gives power operators complete control over energy flow

Merchant model – Clean Line will fund the costs of the transmission projects and sell transmission capacity to wind generators and load serving entities

AC **3000-4000 MW Capacity** **DC**



Three 500 kV lines
600 foot ROW

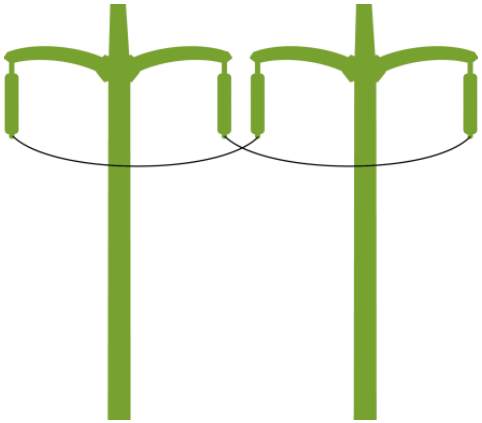


One ± 500 kV bipole
150-200 foot ROW

Grain Belt Express will deliver wind energy from Kansas to Missouri, Illinois, Indiana, and states farther east

- 700-mile overhead, high-voltage direct current (HVDC) transmission line
- $2 billion project that will enable $7 billion investment in new wind farms
- 1.4 million homes powered per year

The Grain Belt Express Clean Line will result in 5,000 construction jobs for wind farms and transmission line



New Transmission Facilitates

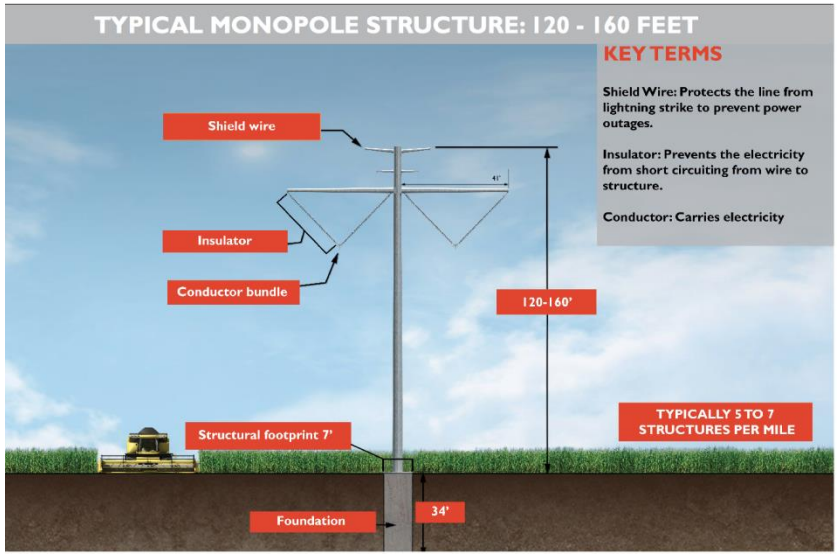
Wind Industry
Investments and Jobs

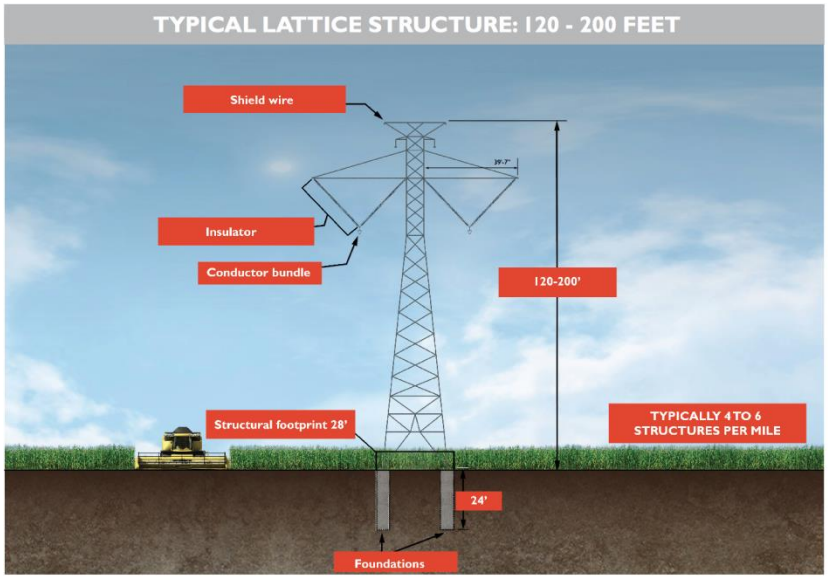
Direct Transmission and Wind Energy Jobs

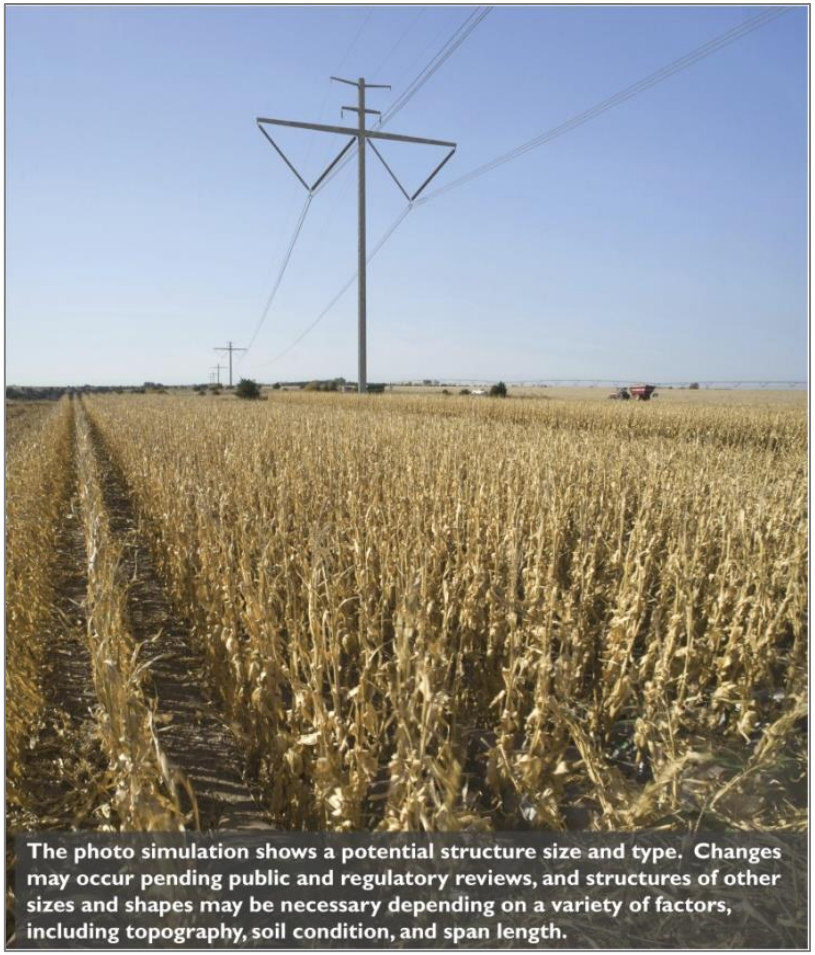
5,000+
Construction Jobs

500+
Operations Jobs

The Grain Belt Express transmission line will require more than 4,000 structures over 700 miles






The photo simulation shows a potential structure size and type. Changes may occur pending public and regulatory reviews, and structures of other sizes and shapes may be necessary depending on a variety of factors, including topography, soil condition, and span length.

Grain Belt Express Clean Line transmission line will boost the HVDC transmission supply chain

Engineering
- Geotechnical companies
- Utility potholing
- Survey companies (lidar, staking)
- Survey equipment

Equipment Rentals
- Vehicles, excavators, dozers, cranes

Trucking and Hauling Service

Equipment Fueling

Environmental
- Silt fence
- Dewatering
- Environmental controls ST&S

Local Services
- Housing / appt. rentals / hotels
- Restaurants
- Office space

Access
- Clearing of right away
- Stone purchasing
- Matting installation and material
- Geo fabric material
- Culvert material and installation

Foundations
- Drilled pier contractors
- Concrete supplier
- Rebar suppliers and installers
- Foundation casings

Towers / Structures
- Steel and conductor manufacturers
- Rigging materials

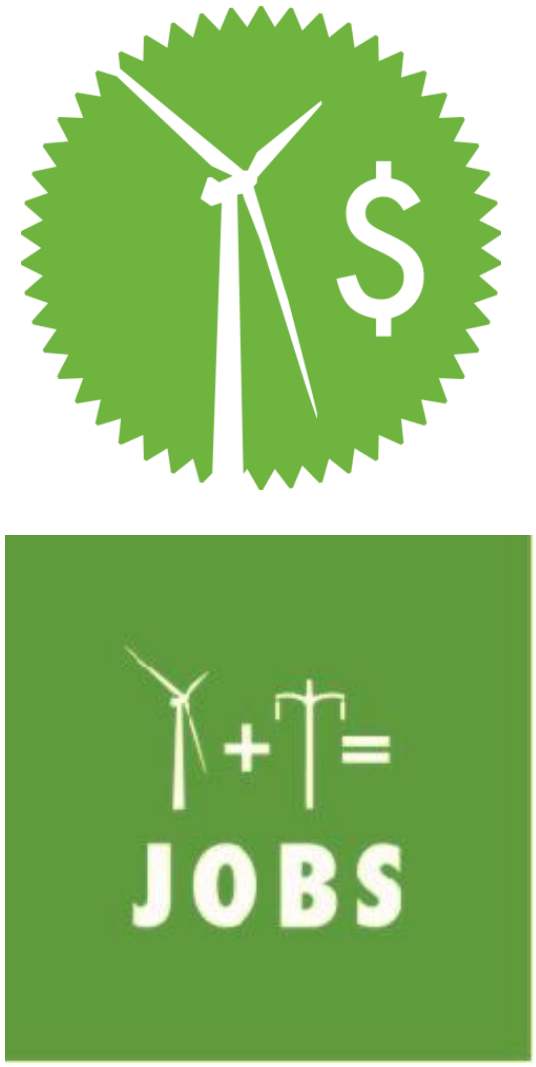
Restoration
- Site grading
- Hydro or broadcast seeding
- Grass matting

Major components of the Grain Belt Express Clean Line transmission line include steel, aluminum and concrete

- More than **4,000 steel structures** with approximately **23.38 million feet of conductor** (+5.3 million feet for the metallic return) will be used for the Grain Belt Express Clean Line.
  - Around **49,000 pounds of steel** per transmission structure
  - Approximately **56 cubic yards of concrete** per structure with a larger foundation of **280 cubic yards of concrete** every 5 miles

- Grain Belt Express will create opportunity for:
  - **143,717,000 pounds of steel** for the structures
  - **192, 080 cubic yards of concrete** for foundations
  - **10 million pounds of steel** and **58 million pounds of aluminum** for the conductor and metallic return

Kansas companies are positioned to benefit from the new wind farms that will connect to the transmission line



Job Sector	Specific Demand
Component Manufacturing	Electrical, Mechanical, Fabrications, Other Sub-components
Commodity Manufacturing	Fasteners, Lubricants, Wiring, Connectors, Other Electrical & Mechanical
Base Industry Component Manufacturing	Castings, Forgings, Rolled Steel, Resins, Woven Glass, Seals
Turbine Manufacturing	Component, Composite, General Assembly, Tower Manufacturing, Site Infrastructure
Transportation and Construction	Cranes, Specialized Transport, Housings, Concrete and Steel Foundations
Power Equipment	Power Transmission Equipment, Printed Circuits, Motors and Generators, Measuring Devices
Operation and Maintenance (O&M)	Operations and Monitoring, Maintenance and Repair, Asset Management
Off-take/ Transmission	Grid Management, Transmission Services, Utility Services

Source: AWEA

The Types of Jobs That Will Be Created

A typical 2.0 MW turbine uses 8,000 individual components

Tower
- Tower
- Ladder
- Lift

Rotor
- Hub
- Nose Cone
- Blades
  - Composites
  - Blade Core
- Pitch Mechanisms
- Drives
- Brakes
- Rotary Union

Nacelle
- Nacelle Cover
- Nacelle Base
- Heat exchanger
- Controllers
- Generator Power Electronics
- Lubricants
- Filtration
- Insulation
- Gearbox
- Pump
- Drivetrain
- Ceramics
- Shaft

Foundation
- Rebar
- Cement/Concrete
- Castings

Other
- Transformers
- Bolts/Fasteners
- Wire
- Paints and Coatings
- Lighting
- Steel Working/Machining
- Communication Devices
- Monitoring Equipment
- Electrical Interface
- Electrical Connection
- Batteries
- Bearings

The wind farms facilitated by Grain Belt Express Clean Line will also increase demand for concrete…

Concrete required for 2MW turbine foundations range between 400 to 600 cubic yards

Grain Belt Express Clean Line will have capacity for **3,500 MW of wind power**

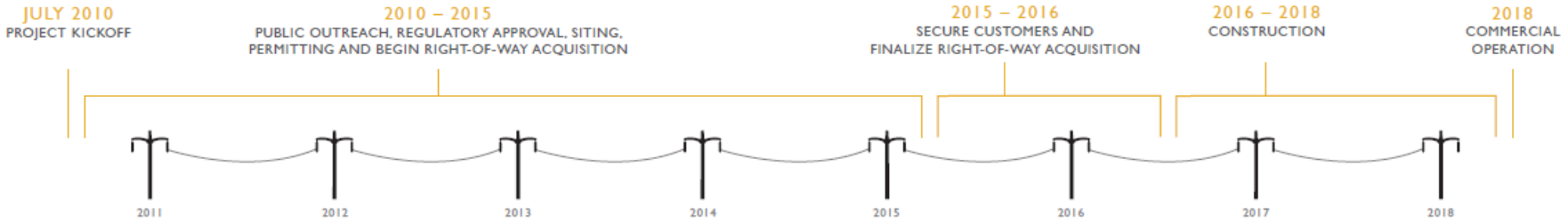
That's **1,750 wind turbines** at 2MW per turbine

700,000 to 1,050,000 yd^3 of concrete will be needed for the foundations of these turbines

Creating **more demand and increasing business opportunities**

A methodical and transparent development process is underway

GRAIN BELT EXPRESS CLEAN LINE SCHEDULE



Progress to date

- Gathered routing input from hundreds of local residents in study area
- Refined route study area based on routing criteria and stakeholder input
- Certified as public utility by the Kansas Corporation Commission
- Filed for utility status in Indiana
- Received hundreds of letters of support

Grain Belt Express Clean Line will result in significant economic benefits

5,000+

CONSTRUCTION JOBS

INCOME FOR COMMUNITIES

PROPERTY TAX REVENUE

500+

OPERATIONS JOBS

INCREASED MARKET COMPETITION

CONSUMER BENEFITS

LOCAL PARTNERSHIPS

LOCAL CONTRACTORS

MANUFACTURING JOBS

LOCAL VENDORS

What's next?

- Conduct public meetings across project study and identify proposed route
- File line siting application to Kansas Corporation Commission (KCC)
- Seek route approval and authority to construct in Missouri, Illinois and Indiana
- Continue reliability and interconnection studies
- Obtain permits from federal and state agencies
- Advance discussions of transmission capacity agreements with potential customers

To RSVP, please email rsvp@grainbeltexpresscleanline.com or call 1(855)358–4340

Monday, Jan 28	Tuesday, Jan 29	Wednesday, Jan 30	Thursday, Jan 31	Friday, Feb 1
	7 – 9 am Elks Lodge 1120 Kansas Ave. Great Bend, KS 67530	7 – 9 am Elks Lodge 510 S. Front St. Russell, KS 67665	7 – 9 am Beloit Municipal Building 119 N. Hersey Ave. Beloit, KS 67420	7 – 9 am Christian Church (Fellowship Hall) 402 W. 6th St. Concordia, KS 66901
5 – 7 pm Magouirk Conference Center 4100 W. Comanche Dodge City, KS 67801	5 – 7 pm Haas Building 400 E. 18th St. Larned, KS 67550	5 - 7 pm American Legion Post 49 123 W. Main St. Osborne, KS 67473	5 – 7 pm Lincoln Park Manor 922 N. 5th St. Lincoln, KS 67455	

Monday, Feb 11	Tuesday, Feb 12	Wednesday, Feb 13
	7 – 9 am Seneca Community Building 1500 Community Dr. Seneca, KS 66538	7 – 9 am Leonard L. Clary Community Center 1225 Last Chance Rd. Troy, KS 66087
5 – 7 pm Mayberry's Restaurant 307 C St. Washington, KS 66968	5 – 7 pm American Legion 310 N. 19th St. Marysville, KS 66508	5 – 7 pm Fisher Center 201 E. Iowa St. Hiawatha, KS 66434

GRAIN BELT EXPRESS

CLEAN LINE

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