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KALAMINK
WIND

Kalamink Project Team

Development	**Sean Stocker**	Director of Development
	Nick Alexander	Development Manager
Public Engagement	**Brian O'Shea**	Public Engagement Manager
	Colin Kummerfeldt	Public Engagement Organizer
Local Representatives	**Russell Shinevar**	Land Consultant
	Bill Klintworth	Land Consultant
	Jeff Gilroy	Land Consultant

Construction
Finance
Legal

Engineering
GIS (mapping)
Real Estate
Power Sales

Environmental
Interconnection/Transmission
Technology

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WIND

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Apex Is a Clean Energy Company

Apex Clean Energy is an independent renewable energy company with over 200 employees focused on building utility-scale generation facilities. Our team includes experts in all areas of clean energy development including environmental permitting, project engineering, construction, electricity transmission, utility market analysis, and project operations. We are committed to the responsible development of clean energy resources in order to ensure that our projects create economic and environmental value for all stakeholders.

Apex is headquartered in Charlottesville, Virginia, with regional offices throughout the United States to support project development activities.

We have three primary areas of activity:

Acquisition and Development

Financing and Construction

Asset Management

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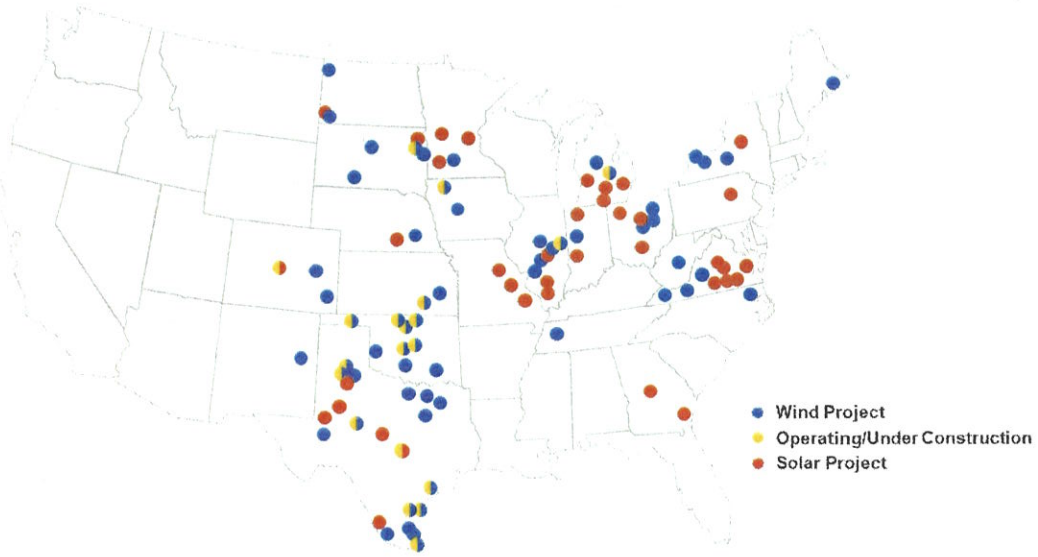
About Apex Clean Energy

Project Portfolio



Our Core Values

Safety

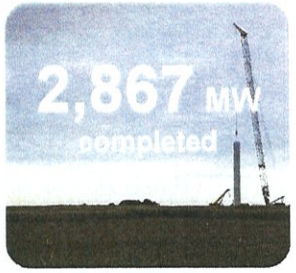
Professionalism

Integrity

Sustainability

Entrepreneurship

By the Numbers



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Energy Partners

Apex projects are supplying power to utilities, co-ops, government, and corporate entities under long-term power purchase agreements

Walmart

Sprint

wfec
western farmers electric cooperative

Steelcase

ebay

REsurety

AEP PUBLIC SERVICE COMPANY OF OKLAHOMA

ETEC
East Texas Electric Cooperative

Alliant Energy

Allianz

Westar Energy

NTEC

U.S.ARMY

Xcel Energy

AEP AMERICAN ELECTRIC POWER

NEW YORK STATE OF OPPORTUNITY. NYSERDA

NIPSCO

GRDA
Grand River Dam Authority

SAMSUNG

Smithfield

OMPA Oklahoma Municipal Power Authority

IPA
ILLINOIS POWER AGENCY

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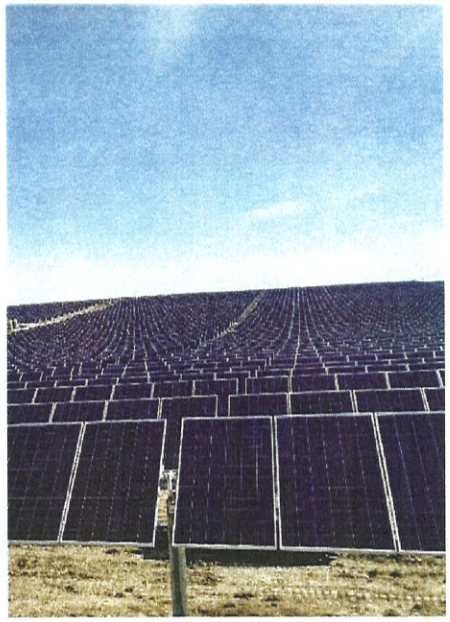
Completed Projects

A focus on long-term relationships with repeat customers

Year	Facility	MW	State	Sponsor Investor
2019	Aviator Wind	525	TX	ARES
	Isabella Wind	385	MI	DTE Energy
	Diamond Spring Wind	303	OK	ALLETE Clean Energy
	Neosho Ridge Wind	303	KS	Empire District
2018	Sugar Creek Wind	202	IL	Algonquin Power & Utilities Corp.
	Dakota Range Wind III	151	SD	ENGIE
	Midway Wind	163	TX	Sammons
2017	Upland Prairie Wind	300	IA	Alliant Energy
	Dakota Range Wind I & II	300	SD	Xcel Energy
	Patriot Wind	178	TX	nrg
2016	Chapman Ranch Wind	249	TX	Enbridge
	Grant Plains Wind	147	OK	Southern Company
	Cotton Plains Wind / Old Settler Wind / Phantom Solar	217	TX	Northleaf
2015	Grant Wind	152	OK	Southern Company
	Kay Wind	299	OK	Southern Company
	Kingfisher Wind	298	OK	BlackRock
2014	Balko Wind	300	OK	D.E. Shaw & Co.
	Cameron Wind	165	TX	IKEA
	Hoopeston Wind	98	IL	IKEA
2012	Canadian Hills Wind	300	OK	TerraForm



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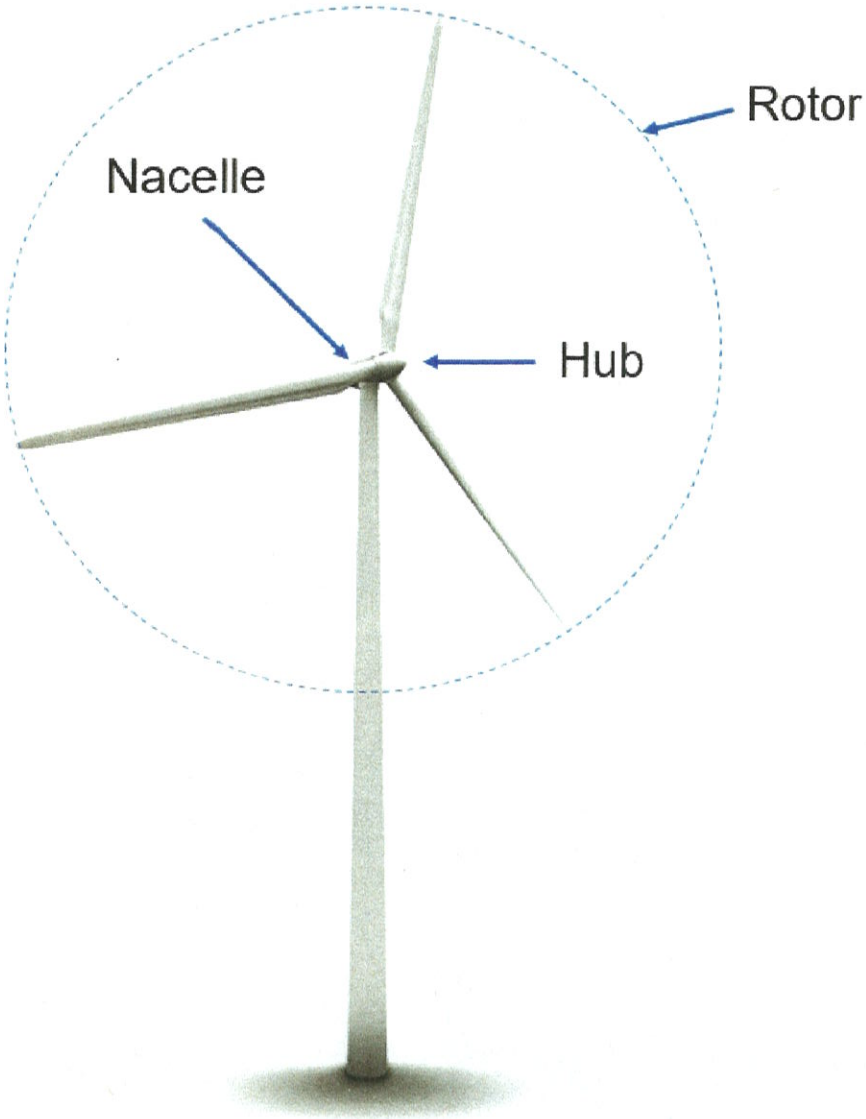
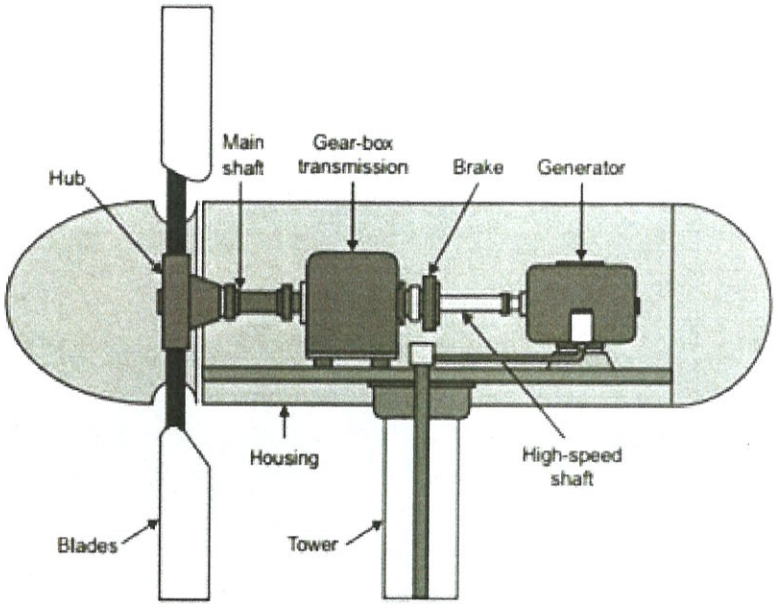
Anatomy of a Wind Turbine





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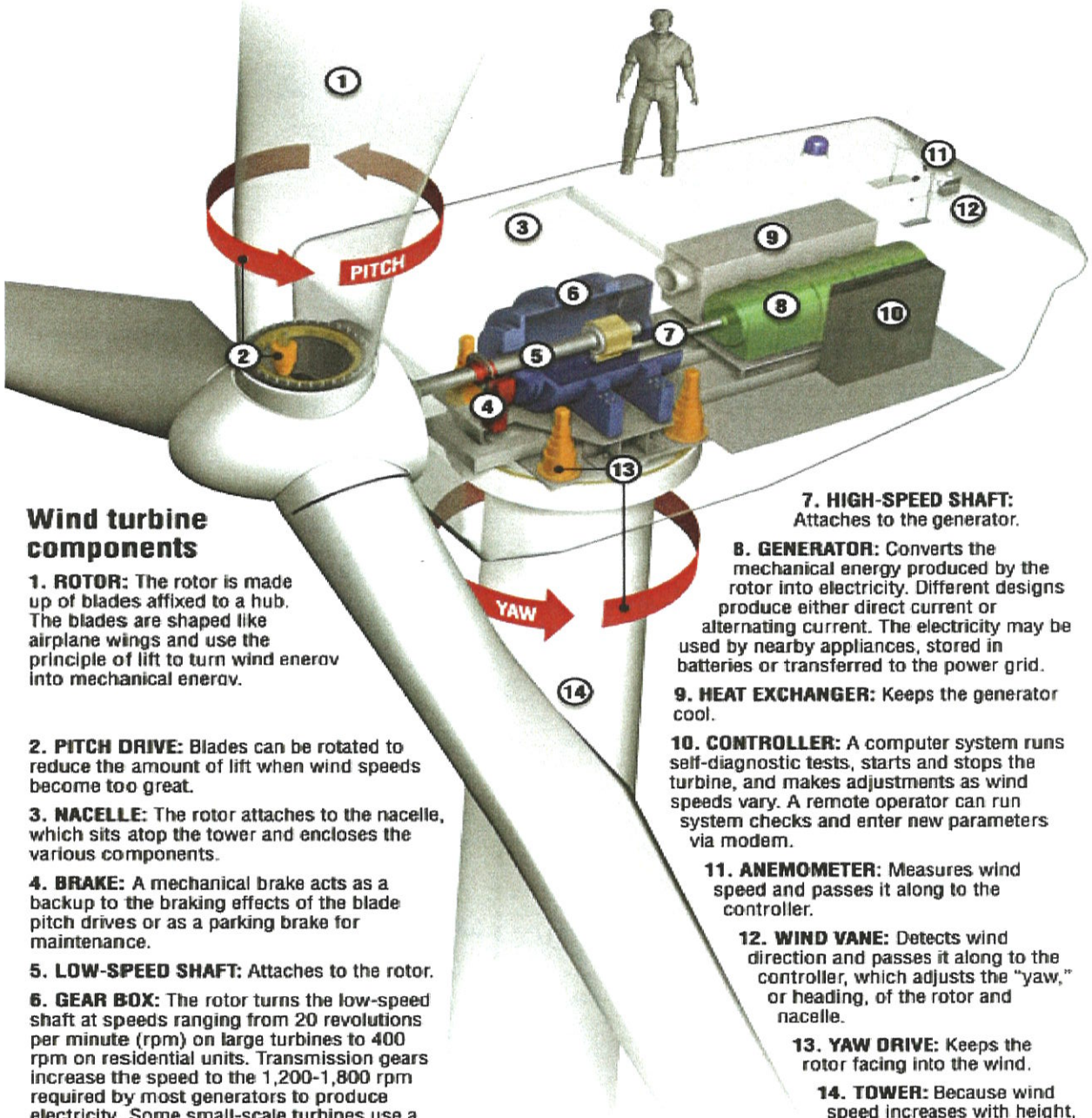

Wind turbine components

1. ROTOR: The rotor is made up of blades affixed to a hub. The blades are shaped like airplane wings and use the principle of lift to turn wind energy into mechanical energy.

2. PITCH DRIVE: Blades can be rotated to reduce the amount of lift when wind speeds become too great.

3. NACELLE: The rotor attaches to the nacelle, which sits atop the tower and encloses the various components.

4. BRAKE: A mechanical brake acts as a backup to the braking effects of the blade pitch drives or as a parking brake for maintenance.

5. LOW-SPEED SHAFT: Attaches to the rotor.

6. GEAR BOX: The rotor turns the low-speed shaft at speeds ranging from 20 revolutions per minute (rpm) on large turbines to 400 rpm on residential units. Transmission gears increase the speed to the 1,200-1,800 rpm required by most generators to produce electricity. Some small-scale turbines use a direct-drive system, eliminating the need for a gear box.

7. HIGH-SPEED SHAFT: Attaches to the generator.

8. GENERATOR: Converts the mechanical energy produced by the rotor into electricity. Different designs produce either direct current or alternating current. The electricity may be used by nearby appliances, stored in batteries or transferred to the power grid.

9. HEAT EXCHANGER: Keeps the generator cool.

10. CONTROLLER: A computer system runs self-diagnostic tests, starts and stops the turbine, and makes adjustments as wind speeds vary. A remote operator can run system checks and enter new parameters via modem.

11. ANEMOMETER: Measures wind speed and passes it along to the controller.

12. WIND VANE: Detects wind direction and passes it along to the controller, which adjusts the "yaw," or heading, of the rotor and nacelle.

13. YAW DRIVE: Keeps the rotor facing into the wind.

14. TOWER: Because wind speed increases with height, taller towers allow turbines to capture more energy.

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Developing a Wind Project:

- ✓ Community Engagement
- ✓ Land Leasing
- ✓ Meteorological Towers
- ✓ Wildlife and Environmental Studies
- ✓ Interconnection Studies
- ✓ Permitting (zoning, airspace, enviro)
- ✓ Electricity Sale Contract

Timeframe: 4 – 7 years

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Developing a Wind Project: Environmental

Environmental Studies to Inform Siting

- Early stage screening
- Site Characterization/Assessment Studies
- Site-specific Wildlife Studies
- Wetland desktop review and field delineations
- Archeological and Cultural Studies
- Visual Impact Studies
- Sound Studies
- Phase 1 ESA

Permitting

- Avoid, minimize, mitigate
- Obtain requisite permits when necessary

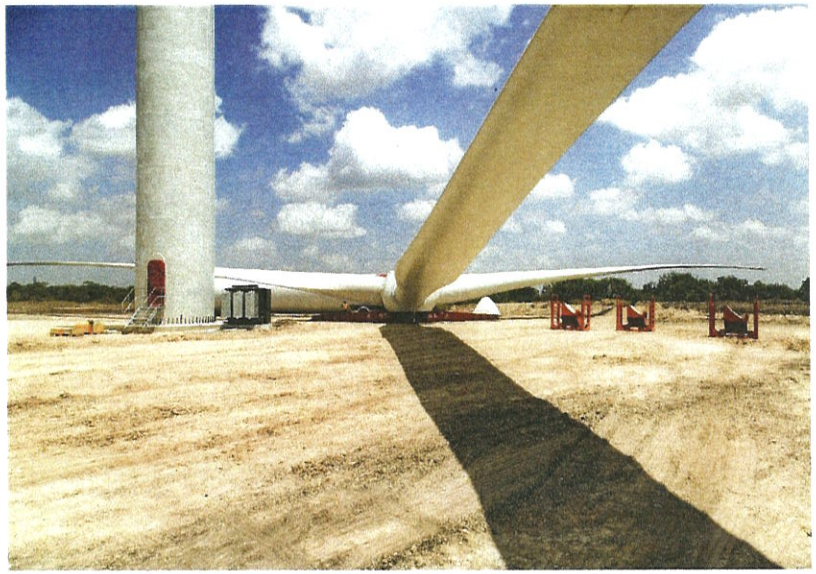
Constructing a Wind Project: Overview

- ✓ Construct laydown and office trailer yard
- ✓ Stake and build roads
- ✓ Install foundations
- ✓ Install electrical collection
- ✓ Construct substation
- ✓ Erect wind turbines
- ✓ Test and commission systems
- ✓ Energize turbines
- ✓ Site restoration

Constructing a Wind Project: Timeline

How long does it typically take to construct a wind farm?

Typically 12 to 18 months of construction. **For example,** Apex's Isabella Wind project where the construction team began in October of 2019 will be substantially complete in October of 2020 with site restoration completed in Spring 2021.



Construction Timeline **Example**

September '19	➡	Mobilization
Early/ Late Fall	➡	Roadwork ➡ Foundations ➡ Substation start
Early Winter	➡	Collection ➡ Foundations
Spring / Summer '20	➡	Turbine deliveries ➡ Turbine erection
Fall	➡	Substation Completion ➡ Commercial Operations
Spring '21	➡	Site Restoration

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Erecting Wind Turbines

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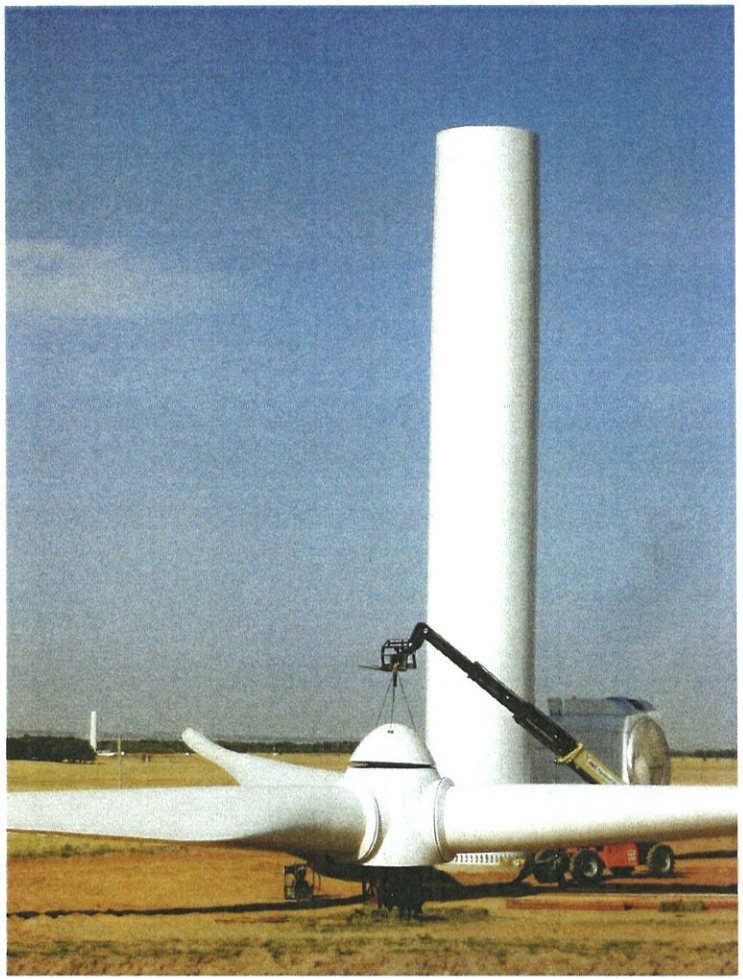
Building Rotor



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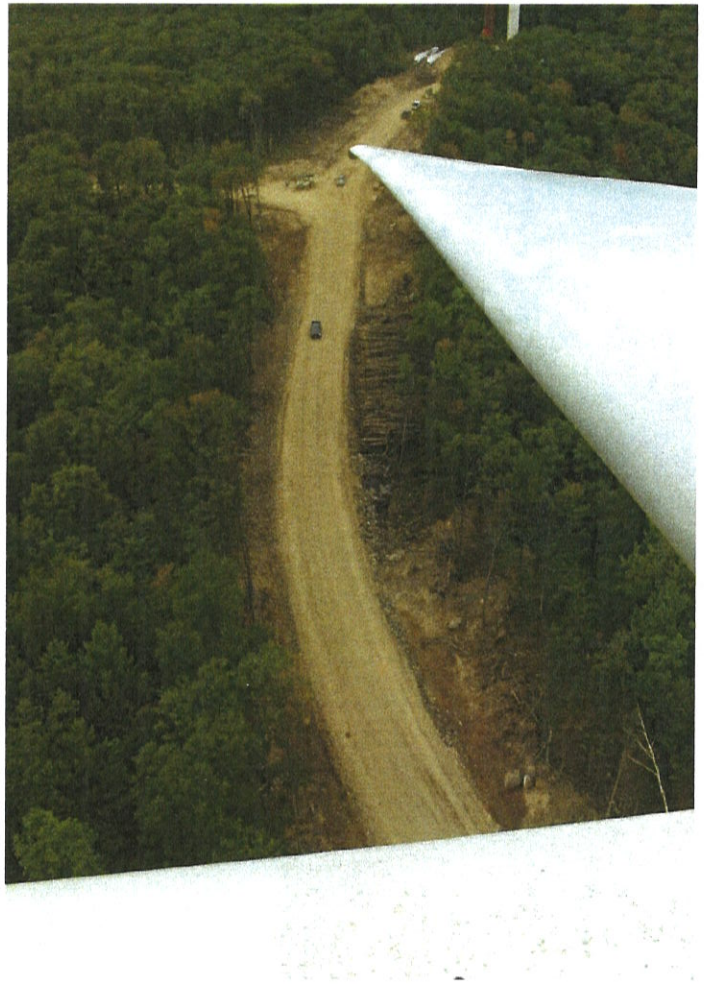
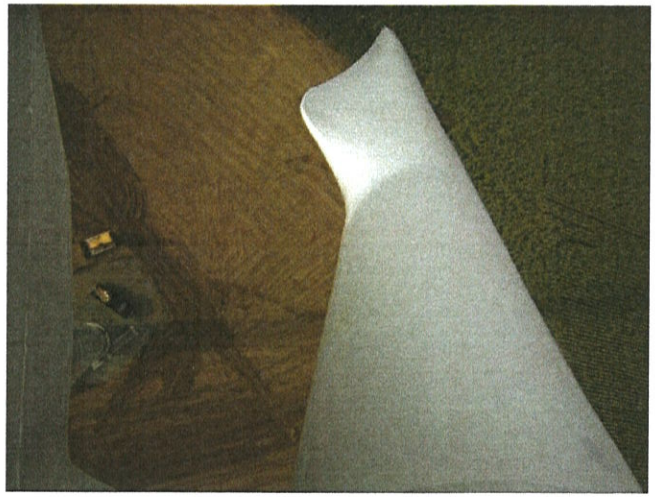
The View from the Top





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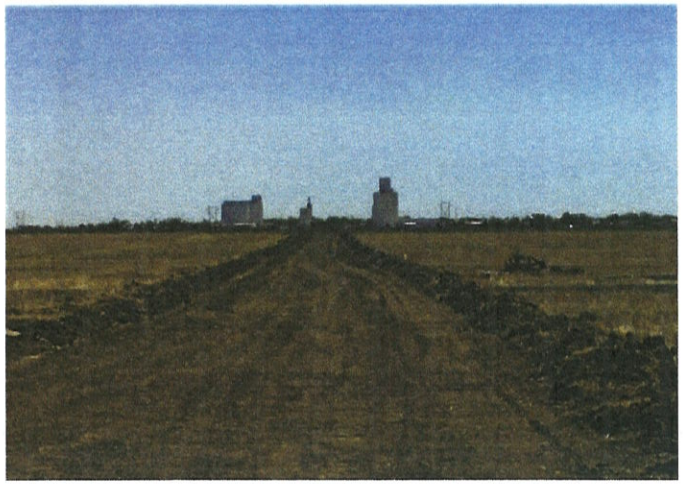
Roads

Prepare subgrade



Install drainage structures

Aggregate, Compact and Grade

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Foundation

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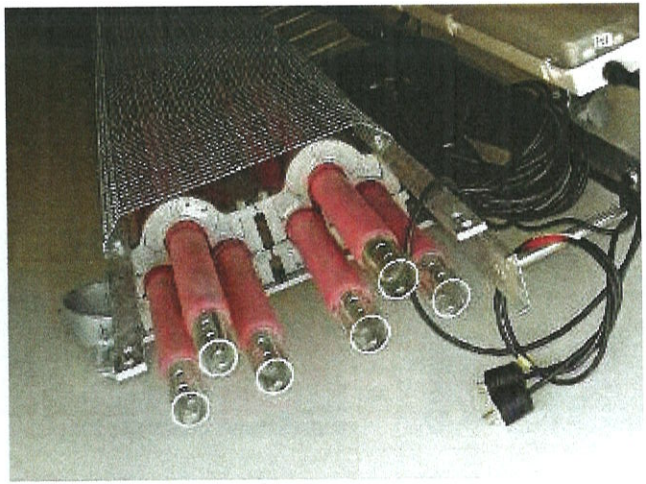

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Electrical Collection

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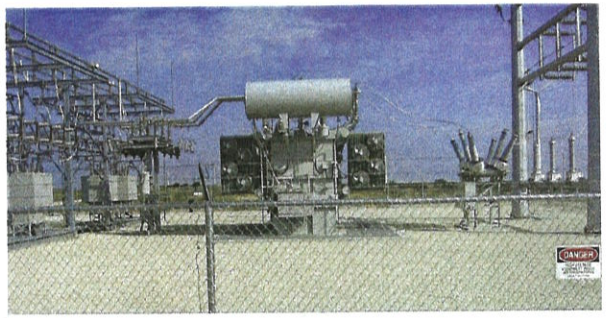
Substation



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Crane Travel

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Wind Energy in Michigan

Online Wind Project

Wind-related Manufacturing Facility

- **2,300 MW+** of installed wind power[1]
- **5%** of all in-state electricity production in 2019[1]
- **Ranks 13th** in nation for installed capacity[1]
- **$4.2 billion** capital investment in wind projects through 2019[1]
- **4,000+** direct wind industry jobs in MI in 2019[2]
- **27 companies** in MI currently produce parts and components for wind turbines[2]
- **$31 million** in annual state and local tax payments by wind projects in MI[2]

[1]AWEA Fact Sheet (https://www.awea.org/Awea/media/Resources/StateFactSheets/Michigan.pdf)
[2]Michigan American Wind Energy Association Fact Sheet Q1 2020

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Kalamink Wind: Project Overview

An Opportunity to diversify Michigan's Energy Portfolio while benefiting the economy and environment

Why Here

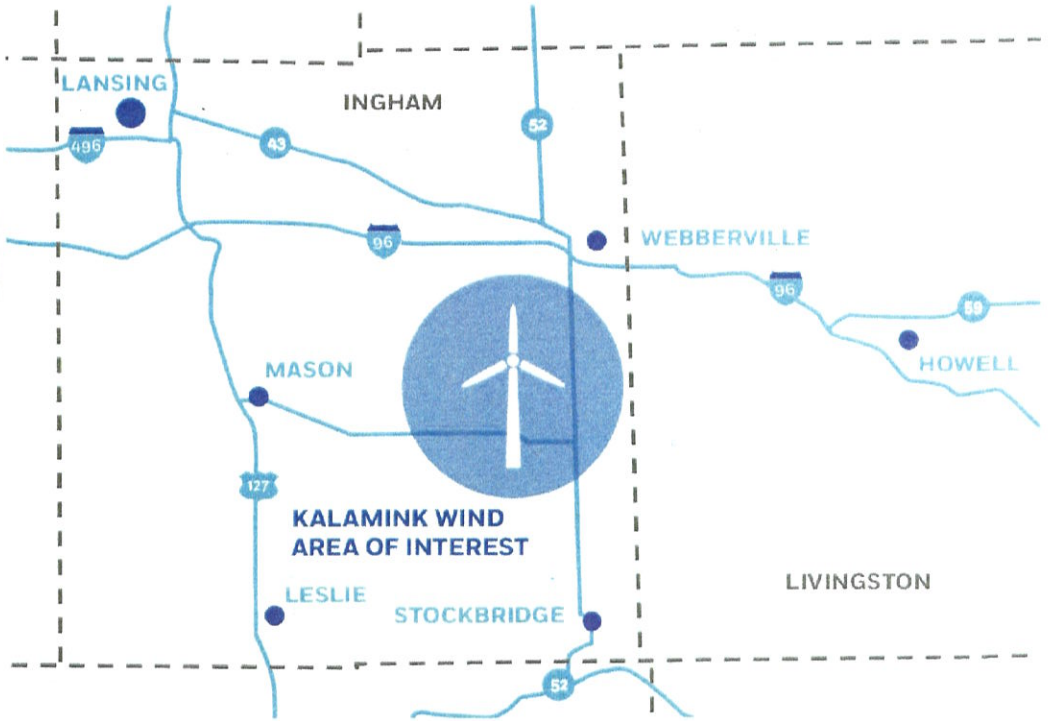
- ✓ **State demand** for renewable energy sources
- ✓ Economical **wind resource**
- ✓ Existing high-voltage **transmission** lines
- ✓ Minimal **environmental** impacts

Project Summary

- Up to **300MW** (~72,000 homes powered)
- Currently evaluating land in **5 Townships** – Ingham, Leroy, Stockbridge, Wheatfield, White Oak
- **Community-based** project with financial benefits spread among all participants, regardless of acreage.

Project Schedule

- Anticipated start of commercial operation in **2024**



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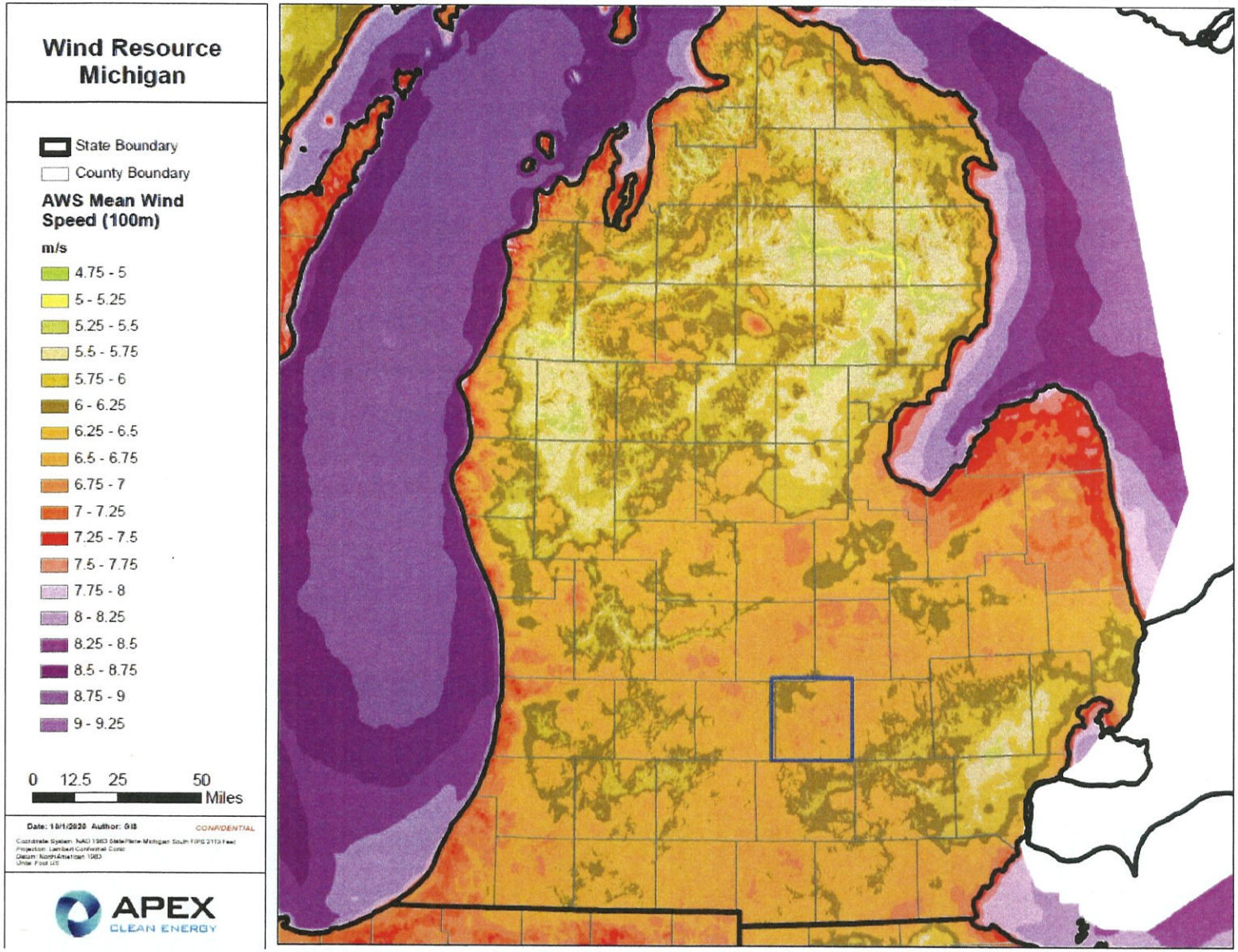
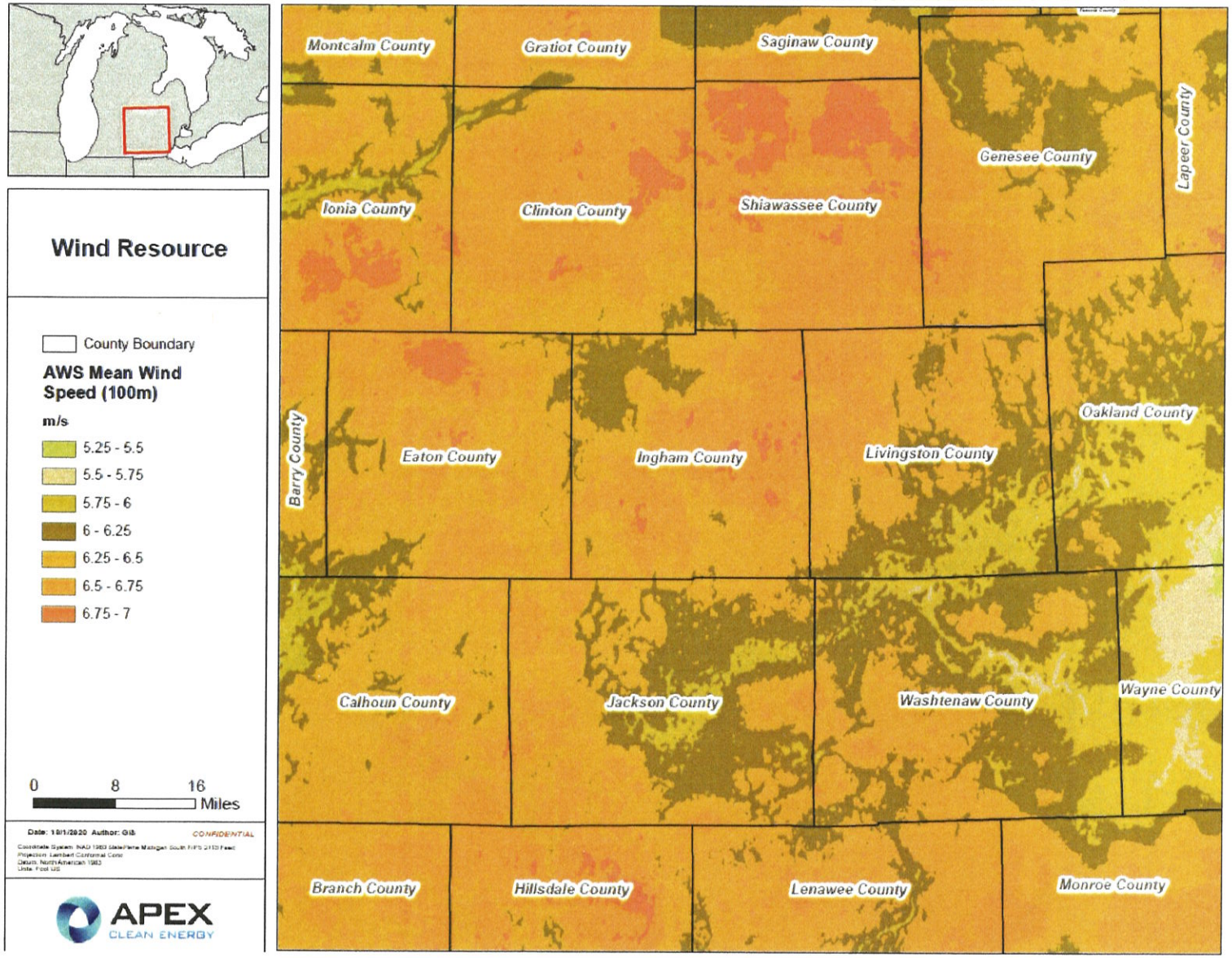
Michigan Wind Resource



Kalamink Wind: Wind Resource



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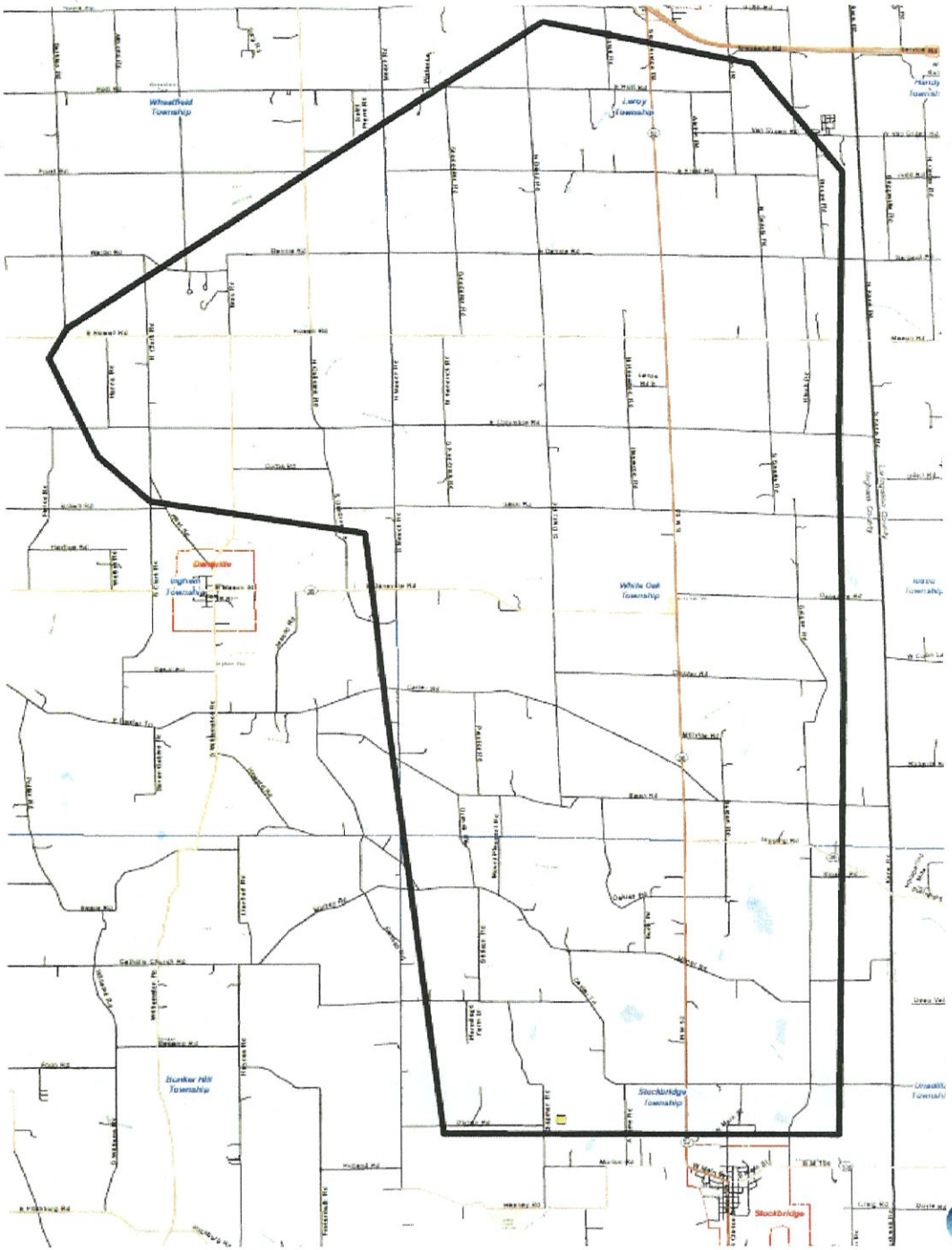
Kalamink

Area of Interest
(AOI)



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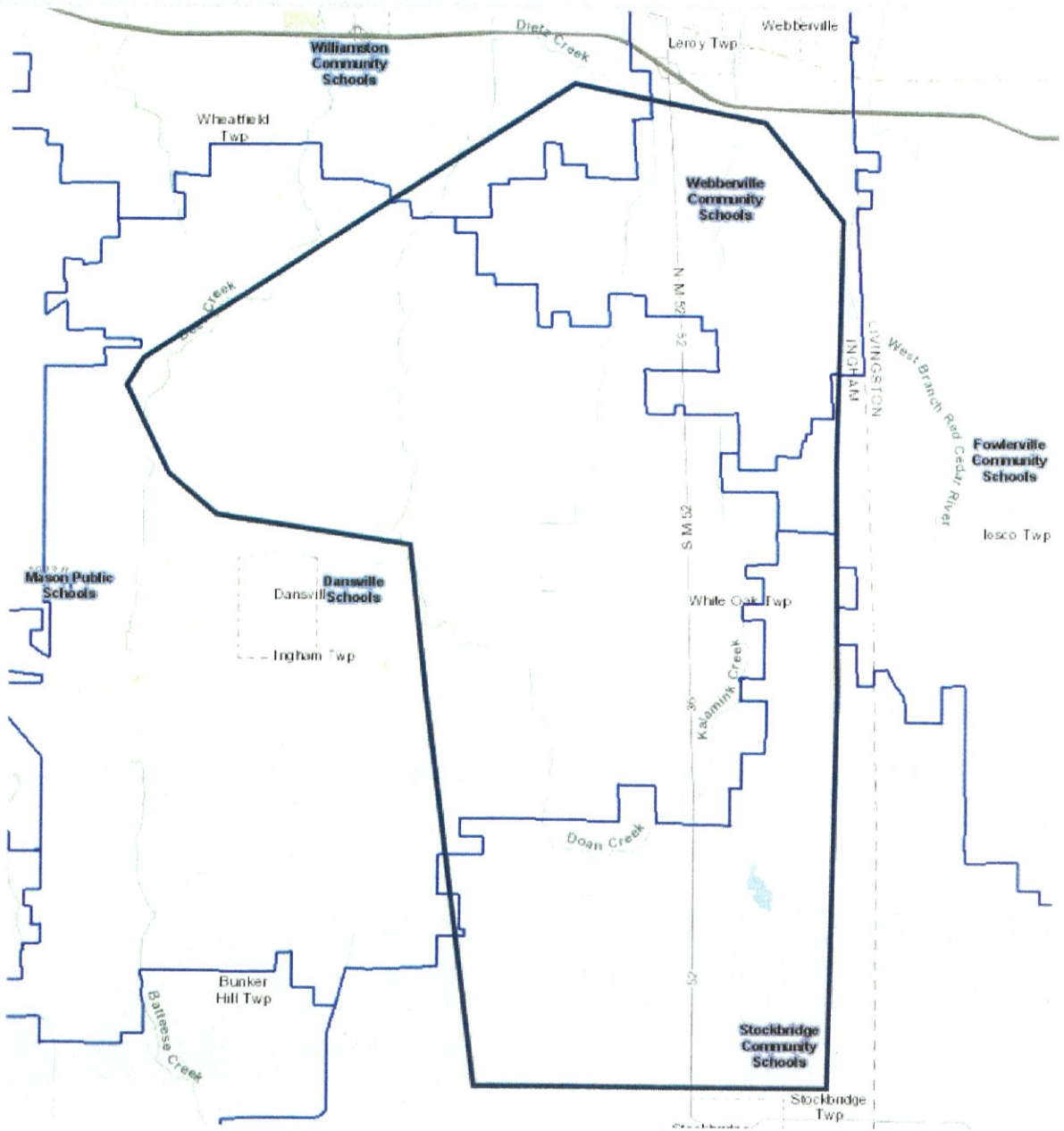
Kalamink Wind: School Districts



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Kalamink Wind: Benefits

- **Significant** economic development project for the region ($100s of millions in construction spending)
- **Hundred of jobs** and significant local spending during construction
- **Community-based approach**. All residences within project area offered opportunity to participate and receive financial benefit
- **$20+ M** estimated in local landowner, community participant payments 1st 10 years
  - $70+ M over 30-year life
- **$30+ M** estimated in new **tax revenues** expected in the 1st 10 years of operations
  - $70+ M over 30-year life
- Up to **12 full time local jobs** for operations and maintenance

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Kalamink Wind: Taxes

- Wind projects pay taxes as industrial personal property and utility personal property (transmission assets)
  - Taxable value is 50% of assessed value

- Industrial personal property:
  - Exempt from 6 mill state education fund
  - Exempt from 18 mill for school operating purposes (same as ag real estate)
  - Depreciated over 10 years down to 30% of original assessed value

- Utility personal property:
  - Not exempt from the state education fund or school operating
  - Depreciated over 15 years down to 50% of original assessed value

Kalamink Wind: Taxes

Countywide Impacts – Wind Farm taxes support general fund **and** local applied millages

Local and County services that would benefit from tax revenue generated by Kalamink Wind include:

- **Township Millages (General, Road, Fire, etc.)**
- **Ingham Intermediate School District**
- **School District Debt/Sinking Funds**
- **Northern Ingham Emergency Services Authority**
- **Stockbridge Area Emergency Services Authority**
- **Ingham County**
- **Ingham Farmland Preservation**
- **Library**
- **Community College**
- **Other County and Locally Applied Millages**

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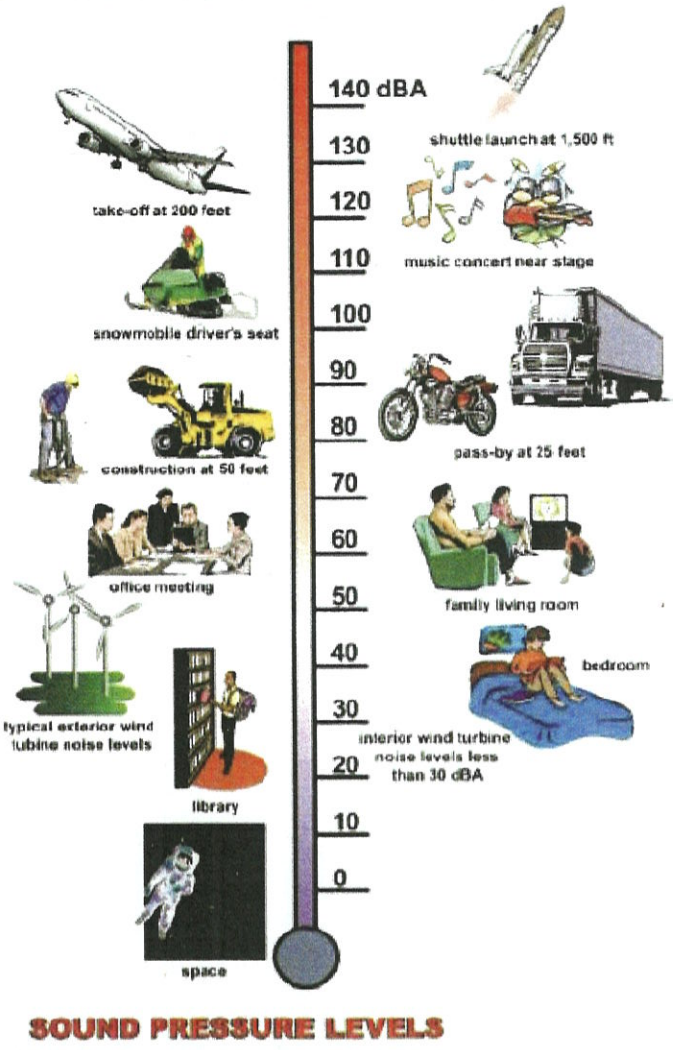
Kalamink Wind: Permitting

- Wind Ordinance Considerations
  - Important Definitions
    - Participating vs. Non-participating
  - Special Use Permit/Site Plan Review Process
  - Appropriate Setbacks *(structures, property lines, roads)*
    - Usually defined as a ratio of turbine height (i.e. 1.1 x tip height)
  - Shadow Flicker
    - Generally limited to no more than 30 hours per year (less that 1% of all daylight hours in a year) at a residence
  - Height
    - Modern turbines are more efficient and slightly larger. This means fewer turbines to generate the same amount of power.
    - Modern ordinances should not include height restrictions. Allow most efficient and advanced technology to be used. FAA requirements and setbacks will dictate what height is possible.

Kalamink Wind: Permitting

- Sound
  - Modern turbines are designed to generate under 45 dbA at 1,000-1,200 feet away.
  - About as much sound as a refrigerator or an air conditioner, depending on weather.
  - For reference, the sound from a tractor idling is about 80 dbA – 8 times louder than a wind turbine (sound levels double every 10 decibels)
  - Low Frequency Noise/Infrasound – Most below human hearing threshold. Comparable to ocean waves, wind itself, or driving in your car.
  - Ordinances typically limit sound to no more than 55 dbA (measured outdoors) at a residence.



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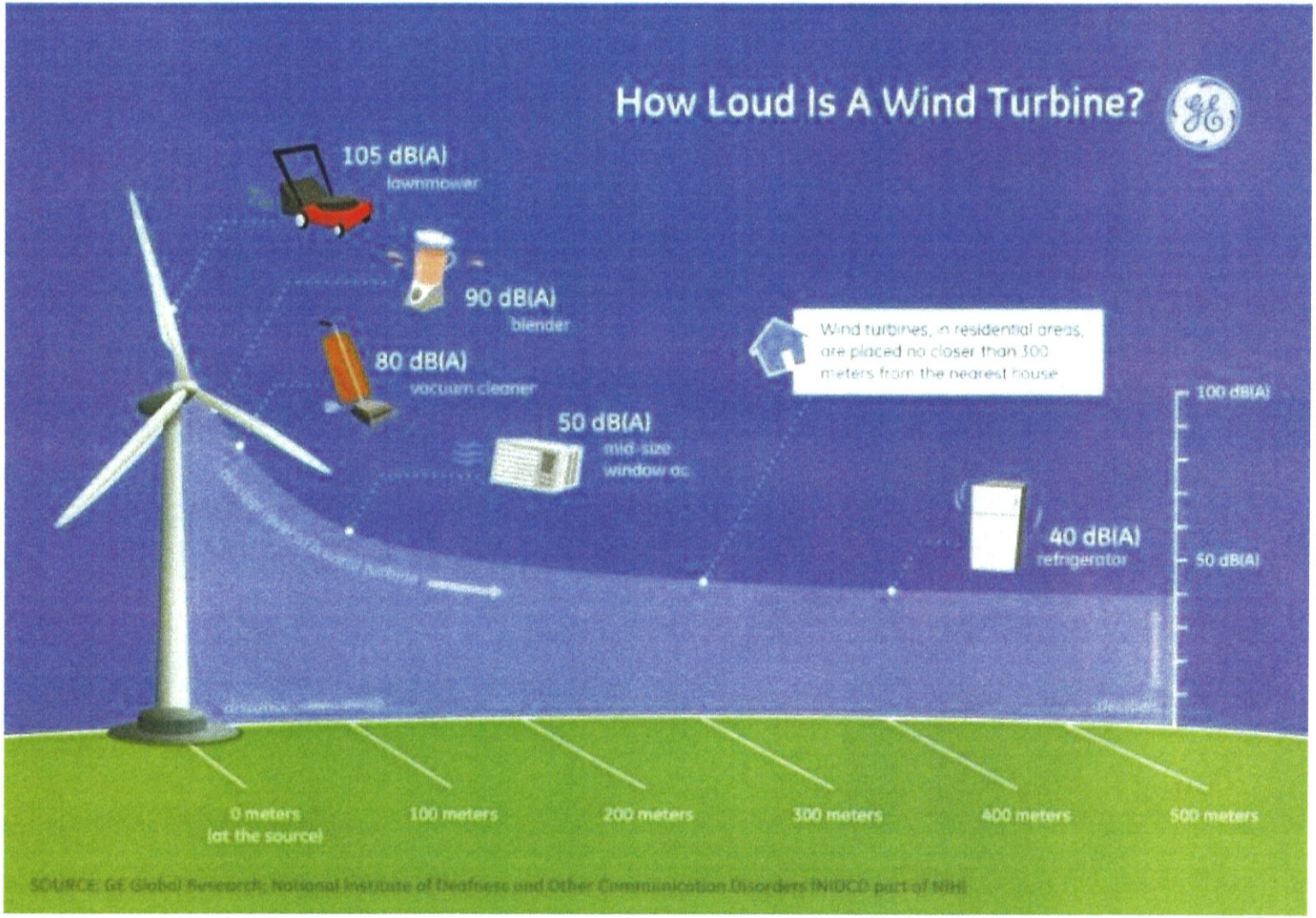
Kalamink Wind: Permitting



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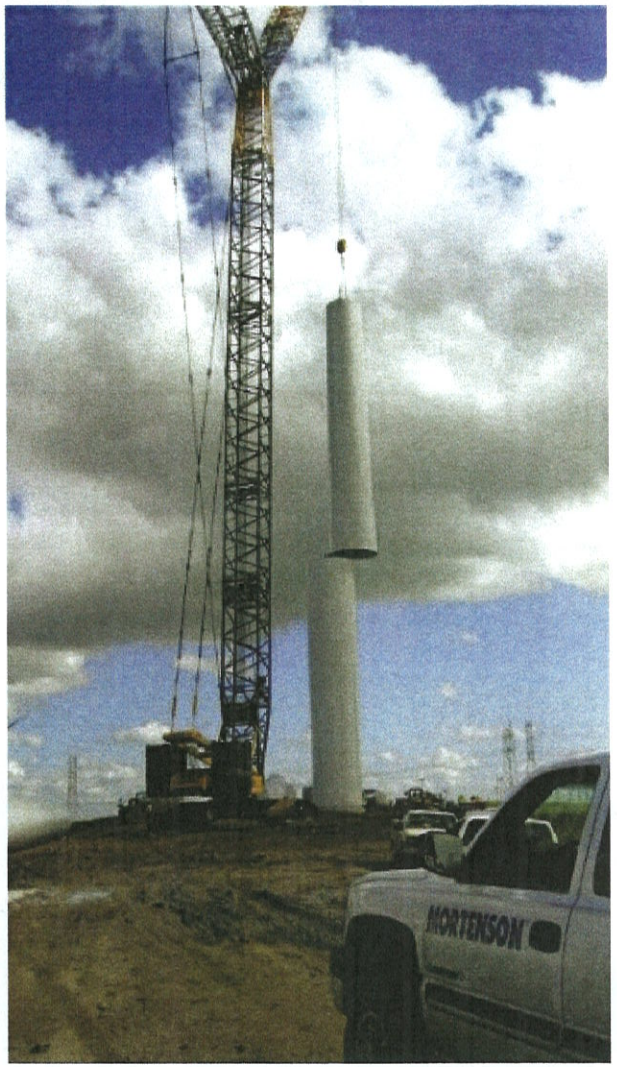
Kalamink Wind: Permitting

- Decommissioning
  - The removal of the turbine and related infrastructure at the end of the project's operating life.
  - Typical requirement – facility components removed up to 3 ½ ft below the surface.
  - Land restored to original condition for farming purposes
  - Should not cost the taxpayer any money. Project owner funds financial security to ensure funds are available. Flexible form of security.
  - Start date should reflect risk



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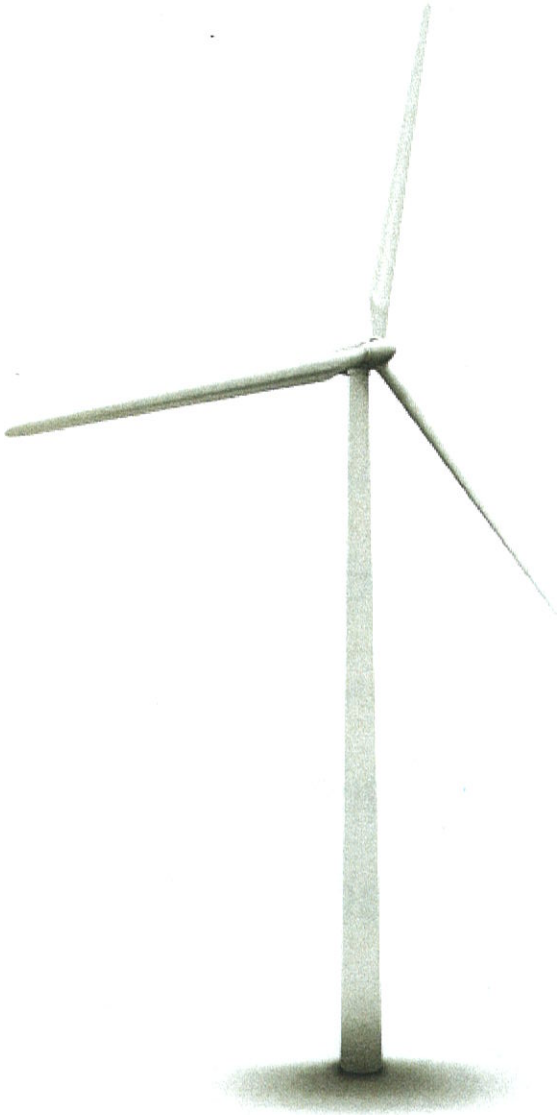
Kalamink Wind: Next Steps

- Land Leasing
- Community Engagement
- Zoning Ordinances
- Meteorological Towers
- Interconnection Studies
- Environmental Studies



Questions?

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