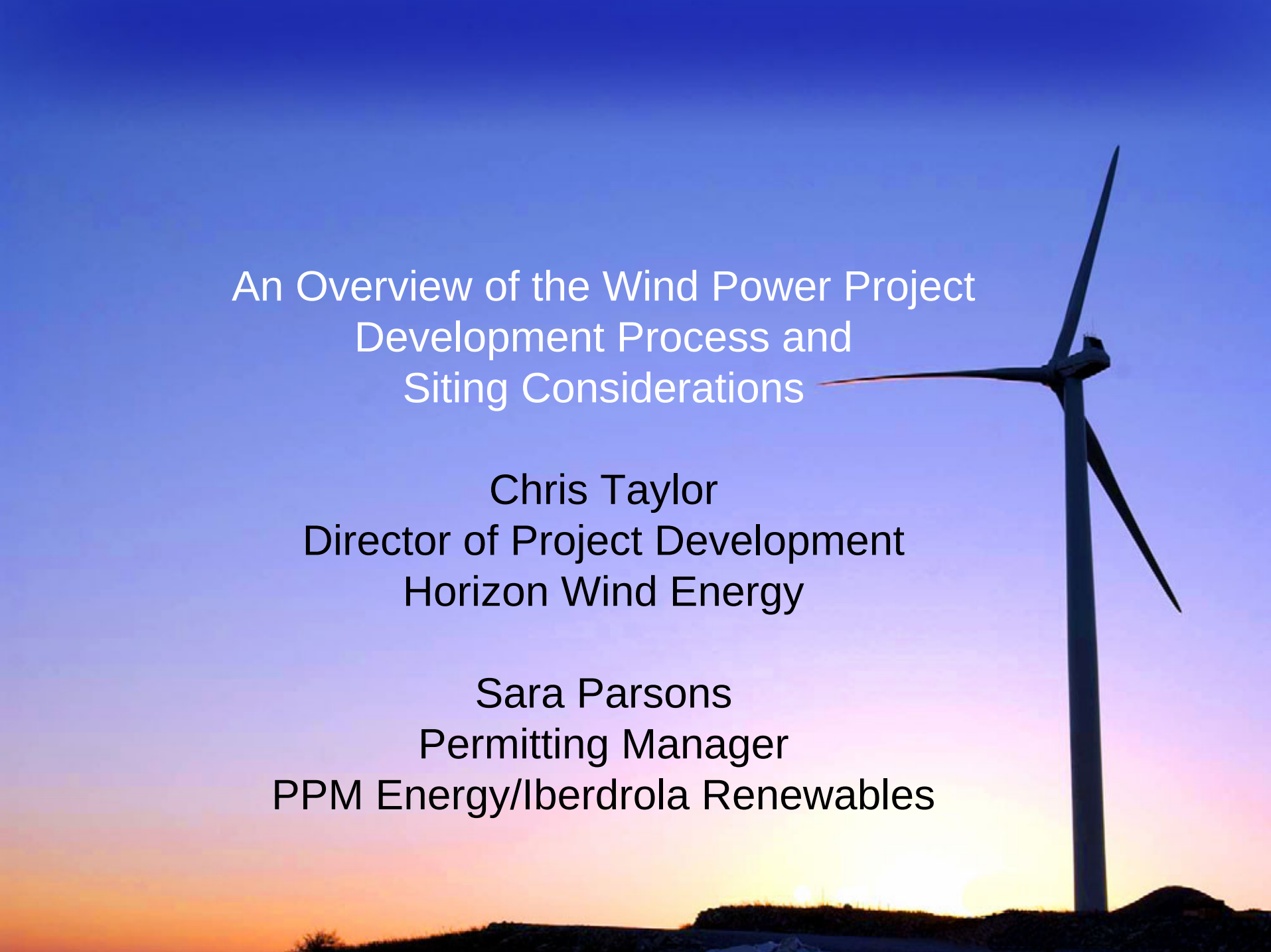

An Overview of the Wind Power Project Development Process and Siting Considerations

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The 6 Key Elements of a Successful Wind Project

- Wind – 1 mph difference is make or break
- Land – need willing landowners
- Permits –wildlife and NIMBY issues
- Transmission (capacity and proximity)
- Buyer (Power Purchase Agreement)
- Financing – need all 5 above to get it

6 Key Elements

- Need ALL 6 elements to build a project
- The lack of any one kills a project
- Unlike natural gas, coal or nuclear power plants, we can not transport our “fuel” (wind) to a desirable location – we have to go to where the resource is
- Rate of return is set by capital markets- it is not a question of “how much can we make?” but rather, “can this project get built?”

Sequence of Development Process

- The sequence of evaluating each element varies by site, but often the order is:
  - Wind – evaluate the resource
  - Land – are landowners interested?
  - Permits –initial review of permitting issues
  - Transmission –capacity; cost
  - Buyer – general market; specific buyer(s)
  - Financing- based on all of the above

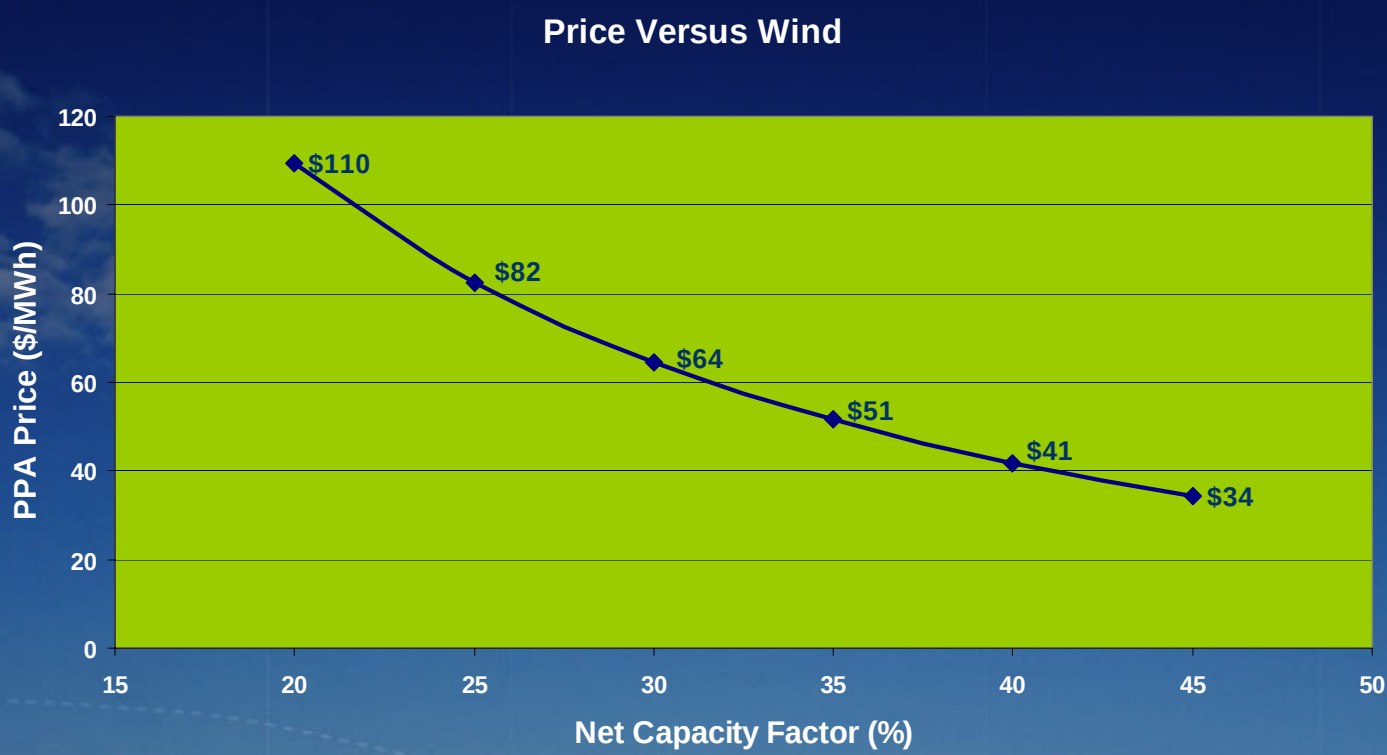
Developer Sensitivity re. Confidentiality

- At early stages of a project, confidentiality is a very real business issue for us
  - Agencies subject to FOIA/state sunshine laws
  - Fierce competition for best sites and land
  - Until you know you plan to proceed with developing a site, don't want to waste scarce time and resources debating potential impact questions
- Cause of great deal of miscommunication and mistrust between developers and wildlife agencies/advocates.
- The closer to actually applying for permits, developer should be willing to discuss details

Key Siting Considerations

- Wind - is the most absolute requirement –
  - Energy is function of cube of wind speed
  - Avg. wind speeds of 16-19 mph in most areas
  - At higher altitudes, air density drops- requires a higher wind speed for same output
  - Depends on region's market price for power
  - No mitigation for low wind speed!

Viability Very Sensitive to Wind Speed



Key Siting Considerations

- Land - Owners must be willing-
  - Can't build without land.
  - Need large, contiguous parcels.
  - Compatible land uses - e.g. ranching, dry land (un-irrigated) agriculture, open space
  - Developers do not have power of eminent domain.

Key Siting Considerations

- Transmission-
  - Typically connect to 115/230/345 kV lines
  - Must have capacity available
  - Feeder lines typically < 5 - 10 miles
  - Ability to finance feeder lines, upgrades depends on project size and economics. Bigger projects with better winds can afford longer feeder lines and more upgrades
  - Long feeder lines may be difficult and expensive to acquire and permit

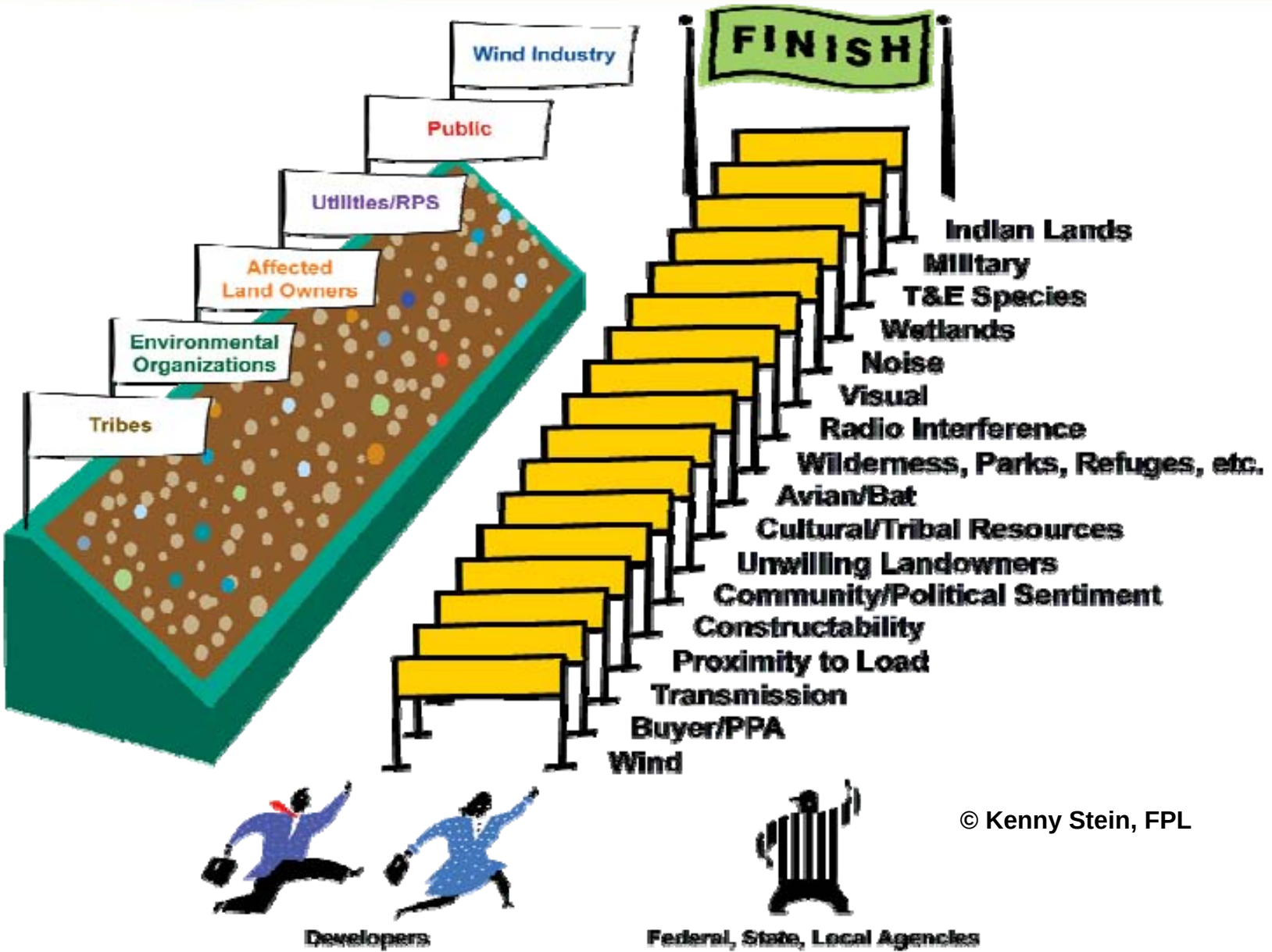
Key Siting Considerations

- Market - Must have a buyer for power
  - Most, but not all, areas of the country have growing need for power
  - RPS and other policies drive demand
  - This typically dictates the region more than the individual site (i.e. ND vs. NY)
  - Closely related to transmission – who owns the lines, where do they go, etc.

Key Siting Considerations

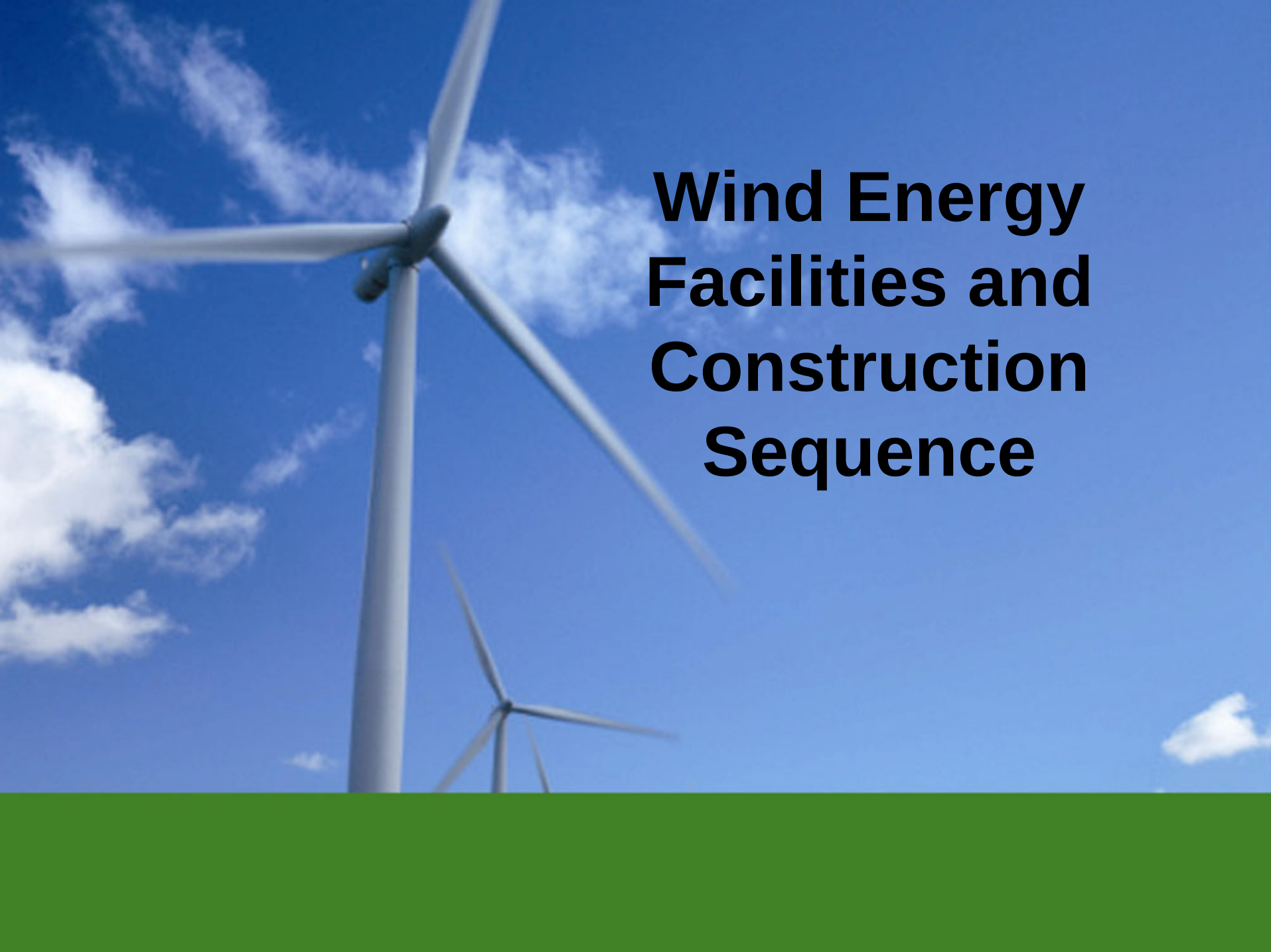
- Permits and Environmental-
  - Wildlife impacts is typically the top issue
  - But- many issues and stakeholders to address- potentially conflicting interests to reconcile (e.g. wildlife, NIMBY, archeological)
  - Different agencies and advocates have different agendas and concerns
  - Developer has to strike a balance among all

Wind Project Siting Challenges/Hurdles



What Else is Required?

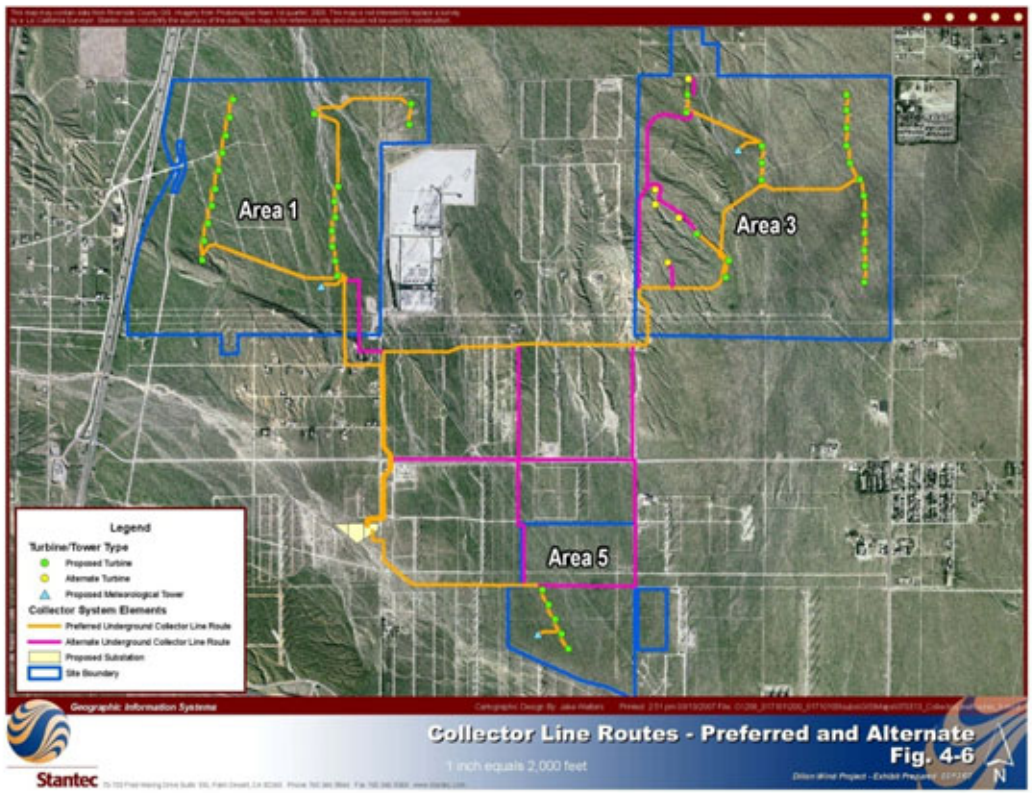
- Site must be accessible – must be able to deliver and erect turbines over 400’ tall
- Need adequate level ground around each turbine site – crane pads, laydown areas
- Need adequate spacing between rows of turbines – 1/3 to ½ mile



Wind Energy Facilities and Construction Sequence

Project Facilities

- Access Roads – Gravel roads linking wind turbine strings to existing roads.
- Electrical Collection System – Cables that electrically connect wind turbines to the project substation.
- Project Substation – Steps up project generation to interconnection voltage.
- Operations & Maintenance Building – Houses central office, computer systems for facility operations, equipment storage and maintenance areas.



Construction Sequence

- Roads
- Foundation
- Wind Turbine Generator
  - Tower
  - Setting the generator
  - Rotor assembly
- Electrical Collector System

Road Construction

Grading

- Prepare road for construction

Drainage

- Install culverts, fords at drainage areas

Road Construction (cont.)

Install Base Material:

- Place geo-fabric or Geo-Grid on top of compacted 16 to 20 foot wide road sub-grade.
- Place 6 to 8 inches of gravel over road surface.
- Finish road profile slightly above natural grade with a 2% crown in the center to promote drainage.
- Construct shoulders with a maximum of 2% side slope for crane travel (reclaimed after construction).

Turbine Foundations

Tower Pier Foundation with Spreadfooter

- Footing: 50-80 ft diameter, 4ft depth with taper.
- Pier: 16-20 ft diameter, 3ft height.
- Apron: Compacted area over footing diameter with 6 in rock surface.

Construction:

- Excavation depth to ~8ft and +50ft base elevation.
- Mud Mat – 2 to 4 inches lean concrete.
- Rebar cage and anchor bolts cage.
- Concrete (5000 psi) formed and poured in two lifts.
- Backfill with native soil

Turbine Foundations

Tower Erection

- The 80-meter turbine tower is composed of four cylindrical steel sections.
- The four tower sections are typically unloaded adjacent to each wind turbine foundation to minimize handling of these heavy steel components.
- Each tower section weighs between 35 and 50 tons.

Tower Erection

- The lower tower section is set first. A flange on the bottom of this 15’ diameter section allows it to be bolted to the top of the foundation pedestal.
- After the tower sections are set, the nacelle is raised and bolted to the top of the tower.
- A 2 megawatt class turbine nacelle weighs over 100 tons.

Tower Erection

- The rotor assembly is erected last.
- The rotor consists of three blades and a hub that mount on the front of the nacelle.
- Typically, the blades and hub are assembled on the ground and then raised as a single unit, called the rotor, and attached to the nacelle.

Collector Cable Construction

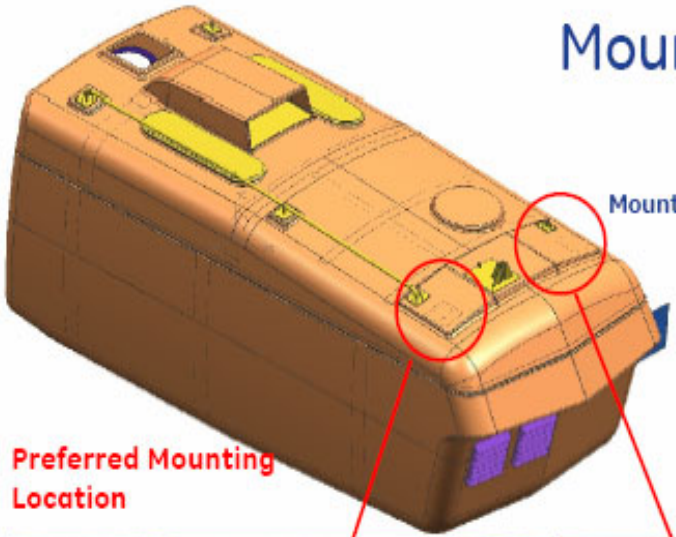
Collector Substation

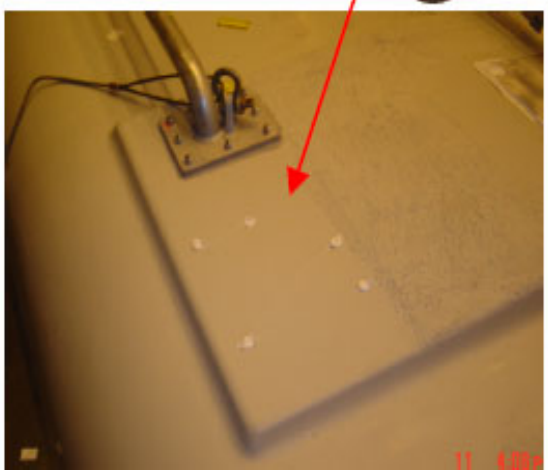
Collector Substation

O&M Building

FAA Lights

Mounting the FAA Light





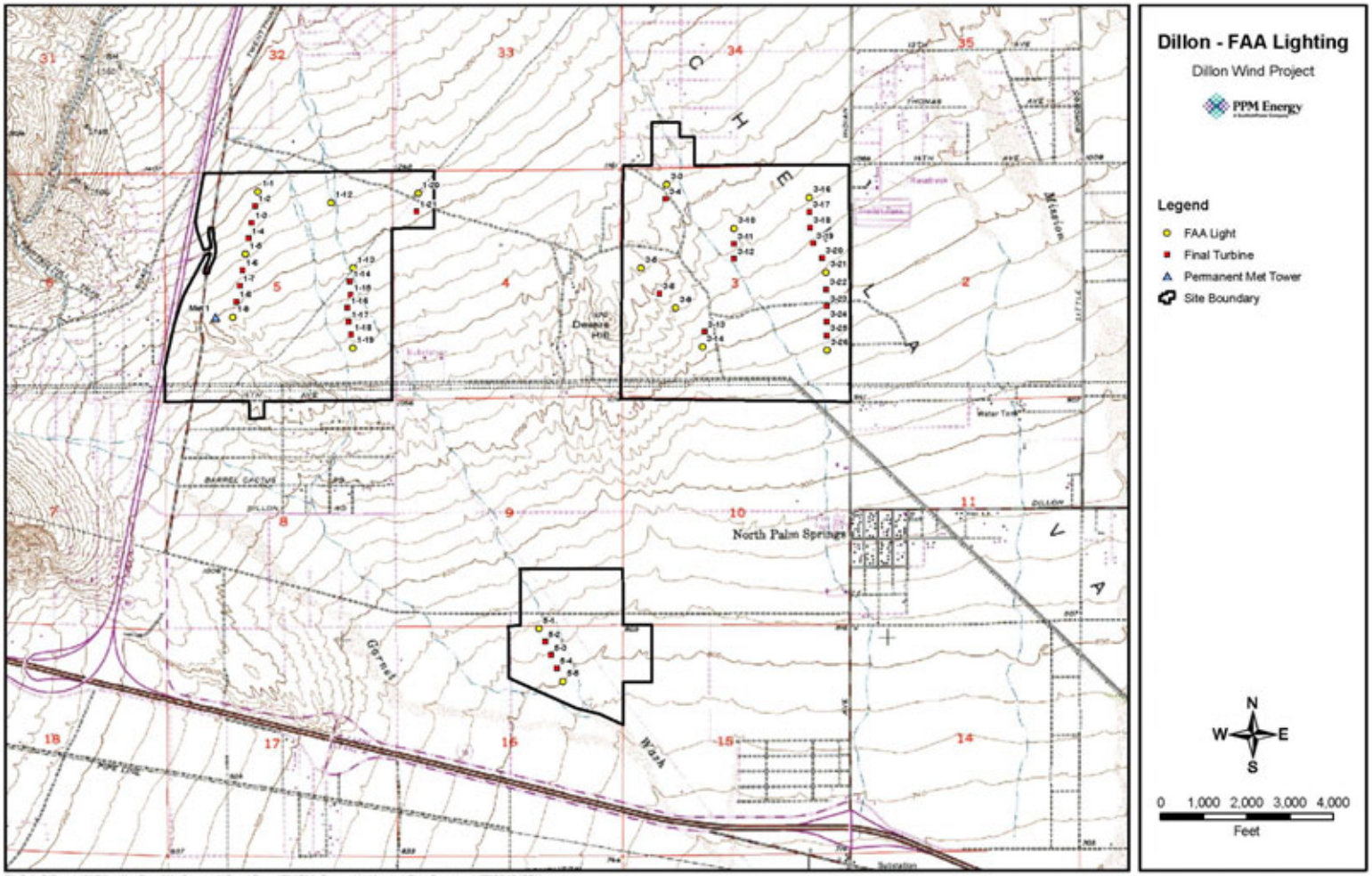
For illustrative purposes only

Bracket Assembly Schedule (Top->Down):

- *FAA Light*
- *Bolts, Nuts, Washers – Light to Bracket*
- *Bracket*
- *Sikaflex Bed*
- *Bolts, Washers – Bracket to Nacelle*

Installation Notes:

FAA Lights


Dillon - FAA Lighting
Dillon Wind Project
PPM Energy
Legend
FAA Light
Final Turbine
Permanent Met Tower
Site Boundary
N
W
E
S
0 1,000 2,000 3,000 4,000
Feet
North Palm Springs
Garnet
Wash