Wind Power Development on Port of Corpus Christi Authority Property

Prepared for American Association of Port Authorities

Harbors, Navigation and Environment Committees Seminar

May 1, 2012
San Francisco, California
• Not a large consumer compared to refineries and manufacturing. We have privatized several operations. Our largest remaining operating facility with the highest energy demand is the Bulk Terminal.

• Overall PCCA annual electrical use is about 8.1 Million Megawatts.

• PCCA recently entered into a 60 month contract with Reliant Energy at a rate of 5.246 cents per KWH.

• By PCCA policy 10% of power is provided from renewable sources. The premium for renewable is less than 1 %.
HARBOR WIND
Harbor Wind - General Information

Location: Port of Corpus Christi, TX

Wind Resource: 3 years of onsite data collected @ 60 meters

Permitting: Local zoning approval (granted by the Port)
Area zoned for heavy industrial use
No wetland/jurisdictional constraint
FAA approvals

Environmental: Voluntary Avian & Bat studies
Pre and Post construction
Ongoing for 3 yrs

Project Size: 9MW (6 wind turbines)

Project Cost: Est. $20M (6 units)
Timeline

**June 2006**
Initial contact with Port

**March 2007**
Cooperation Agreement signed
Meteorological tower installed
Multiple studies started

**July 2008**
Long term (30 year) Lease Agreement signed

**June 2011**
Construction starts

**February 2012**
Construction completed
Commercial operations begin
HEIGHT: 414 feet

DEPTH: 95 feet (length of concrete piles in foundation)

WEIGHT: 233.6 tons = wind turbine
         88.0 tons = reinforcing steel in each foundation
         +1073.4 tons = concrete in each foundation
         1395.0 tons TOTAL

ROTATION: 19 revolutions per minute at full power

ENERGY PRODUCTION: 30,000,000 kilowatt-hours annually; enough to power 2600 homes.
Annual Emissions Offset by Harbor Wind (6 Turbines)

19,200 tons of carbon dioxide (CO2).

38.25 tons of sulfur dioxide (SO2).

76.5 tons nitrogen oxide (NOx).

22,500,000 gallons of water saved. Equivalent to the water consumed in 175 households every year.
Site & Development Considerations
Developer and Port Perspectives

Public Perception/Protection
• Viewshed

Ground Easements/Leasing – Construction/O&M Access

• Proximity to USACE DMPA/Safety
  • Center of tower offset from levee toe
  • Underground high voltage lines parallel to levee and deep
  • Temp access road likely not there in future (DMPA Ops)
  • Cessation per DMPA operations (present and future)

• Wind Easements
  • 10 X Diameter
  • Height restrictions on adjacent structures

• The Avies ---- Avifauna and Aviation
  • Commercial/Military/Weather Service
  • Birds/Birds/Birds

• Revenue
  • Royalties based on generation w/minimum throughput
The Texas “Port” Advantage
Developer Perspective

Favorable Coastal Wind Resource
• Strong Class 3
• High coincidence with peak demand

Zoning/Permitting Simple
• No height restrictions
• Only need “Landowner” approval
• Existing “smokestack” viewshed

Energy Intensive Area
• Refineries
• Other Large Industrial Customers
• Transmission & Substations at Site
• Energy Development Culture

Reduced Transportation Costs
• From Ship to Site

Reduced Construction Costs
• Raw Material in Port (concrete, steel, aggregate)
• Fabrication (offshore substructures)
• Crane availability

One Landowner
• Adjacent to DMPA
• Limited commercial value
Site & Development Considerations
Port Perspectives

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Comparison To Existing Inner Harbor Structures

470' Wind Turbine

440' Grain Elevator

315' Refinery Stacks
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Approx. 112' to 117' from the top of levee to lowest point in the wind turbine rotor's swept area.

Existing levee top road
Approx. 10' wide

Wind turbine foundation: up to 5' above grade elevation.

262' tall wind turbine tower

Min. 4' buried fiber optic and electric cable capped or encased in red dye concrete (min. 3000 psi strength - Additional details attached).

Access Road: 10" thick, 3" X 1" crushed limestone cap on top of Tesar T160 Geo Grid.

Access Road:

10' minimum offset from toe of levee to wind turbine foundation. Increased accordingly for foundation diameter less than 35'.

10' between wind turbine foundation and road.

16' to 20' wide road

Varies 10' - 25'

Mean High Tide line

Levee height: 15'

15' levee height

Dredge Material Placement Area

Toe of levee

PROPRIETARY

Wind turbines & Improvements

NORTH
Site & Development Considerations

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Levee height varies 15' to 20'.

Existing levee material (Cell A or B) depth varies. 

Electric cable plowed to depth of 6', with a 4'8" deep by 2' wide trench dug on top of the buried cable. A min. 6" thick by 2' wide red dye concrete cap is place 4' below the existing levee top. All backfill procedures shall be professional design, and constructed and compacted in lifts to better insure levee's stability and integrity and prevent breaches or failures.

Cross-Section:
Electric Cable Routing (Outside Levee)

Cross-Section:
Electric Cable Routing (Levee Top)

Native soil or Sand

12.5 Kv rated electric cables

Ground cable

Fiber optic cable

Native soil or Sand

6' (as measured from top of levee) buried fiber optic and electric cable capped in red dye concrete (min. 3000 psi strength). C/L levee.

4' buried fiber optic and electric cable capped in red dye concrete (min. 3000 psi strength)

Toe of levee

4' min. below grade (outside levee)

6', min. below grade (levee top)

Varies:
1' outside levee and levee top

2' levee top

6"

2"

Magnetic marking tap

Red dye concrete (min. 3000 psi strength)

“Danger High Voltage” warning tape (plastic)

Native soil

Exist dredge Material (Cell A or B) Depth varies

Toe of levee

FROM LEVEE TOE TO - 45'
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**Proposed Levee Top Road (west edge) with improved turning radius**

- **Approx. 80’ inner turning radius.**
- **Approx. 100’ outer turning radius.**

**South Shore Dredge Material Placement Area Cell A**

- Depth varies
- **15’ to 20’ levee height varies**

**South Shore Dredge Material Placement Area Cell B**

- Depth varies

**Existing Levee**

- Width varies; approx. 10’
- Height varies 15’ to 20’

**Cross-Section: Improved Radius Access Road (Levee Top)**

- **Place rock fill / recycled concrete to form stable base before placing fill for road widening.**
- **10” thick, 3” X 1” crushed limestone cap on top of Tesar T160 Geo Grid.**

**Widen existing levee top road as needed to achieve required turning radius:**

- Minimum **80’ wide road width.**

**Access Road:**

- **10” thick, 3” X 1” crushed limestone cap on top of Tesar T160 Geo Grid.**

**Proposed Levee Top Road**

- **NORTH**

**Improved Radius: Levee Top Road**
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Projected Reduced Premises

- **Ground Easement** (500' from center of Wind turbine foundation)
- **Ground Easement** (25' from center of Road)
- **Ground Easement** (10' from center of electric cable)
- **Ground Easement** (to be coordinated with property owner)

**Legend**
- Wind turbine (Outside Levee)
- Easement area (Port property)
- Easement area (non-Port property)
Proposed Preliminary Retained Wind Easement Area

Wind Easement
(40’ north from c/l of levee along south boundary)

Wind Easement
(10 X diameter of wind turbine generator blades equals radius of wind easement)
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DISCUSSION