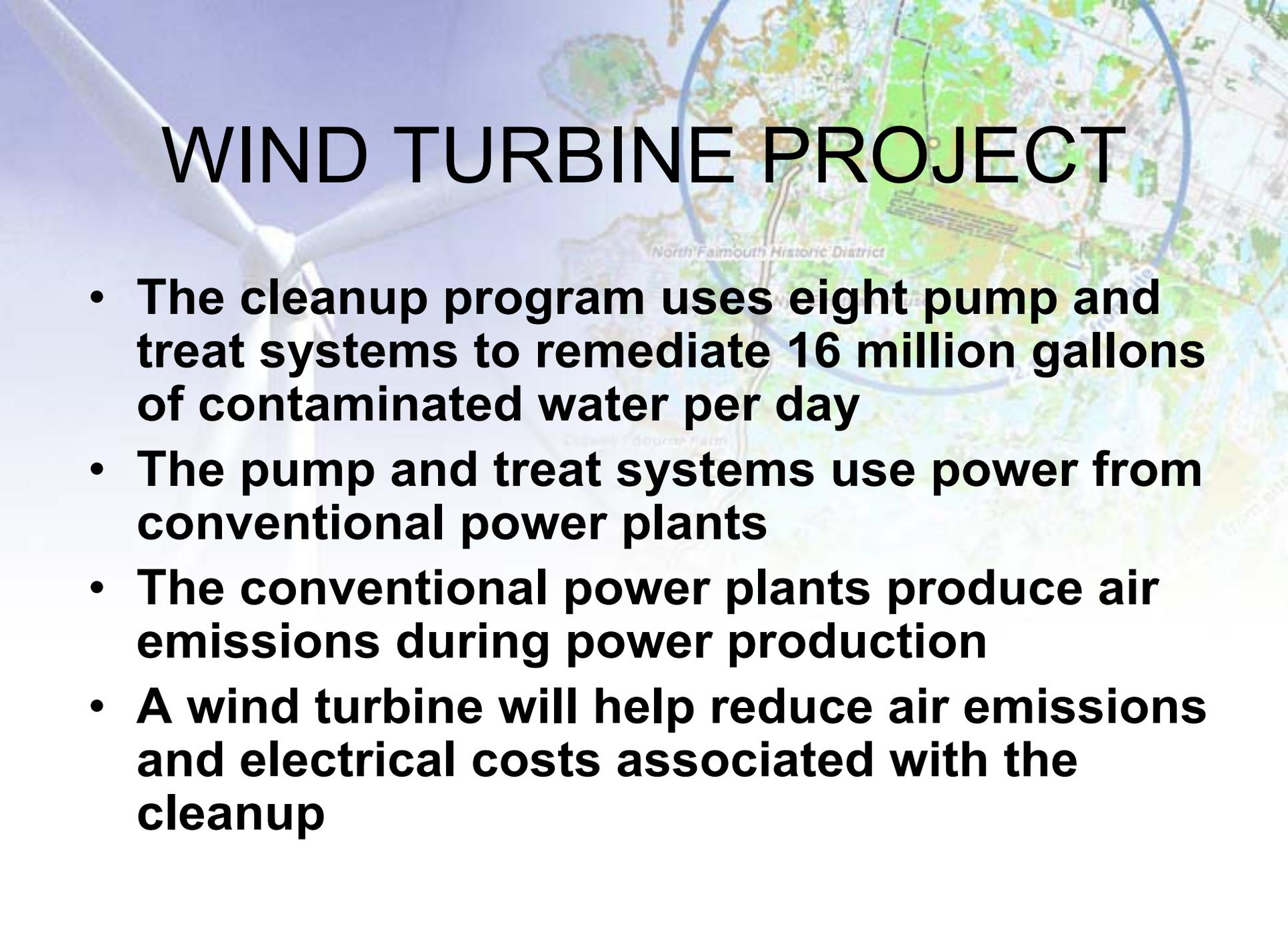


AFCEE WIND TURBINE PROJECT

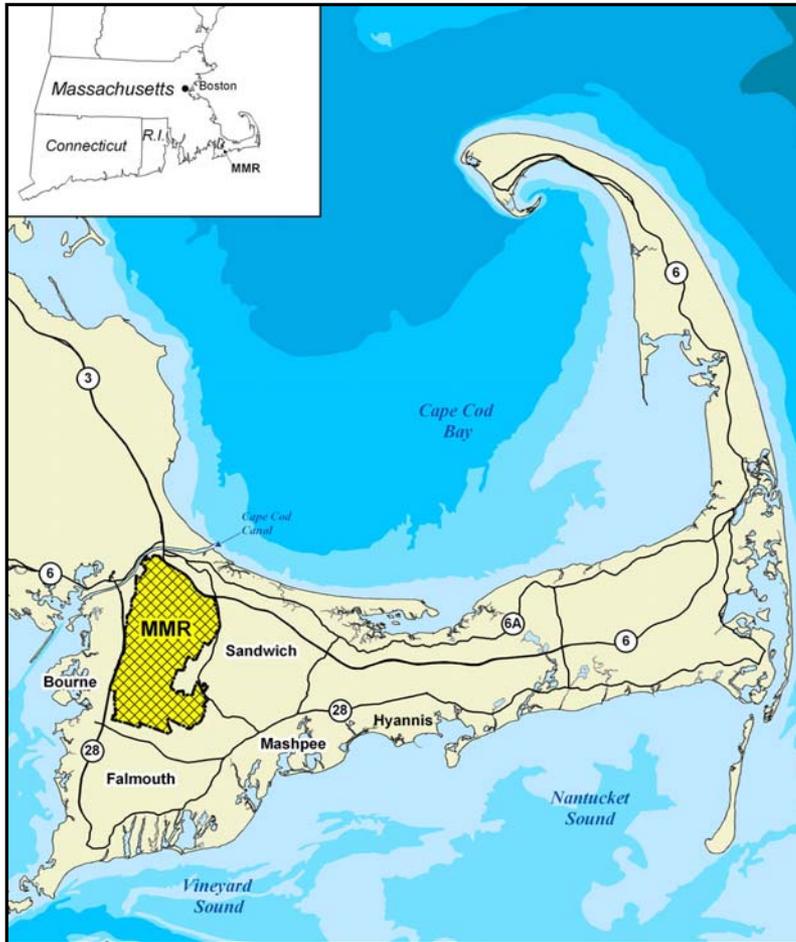
**Rose Forbes, P.E.
DOE Wind Workshop
21 May 08**



WIND TURBINE PROJECT

- **The cleanup program uses eight pump and treat systems to remediate 16 million gallons of contaminated water per day**
- **The pump and treat systems use power from conventional power plants**
- **The conventional power plants produce air emissions during power production**
- **A wind turbine will help reduce air emissions and electrical costs associated with the cleanup**

MMR Site Overview

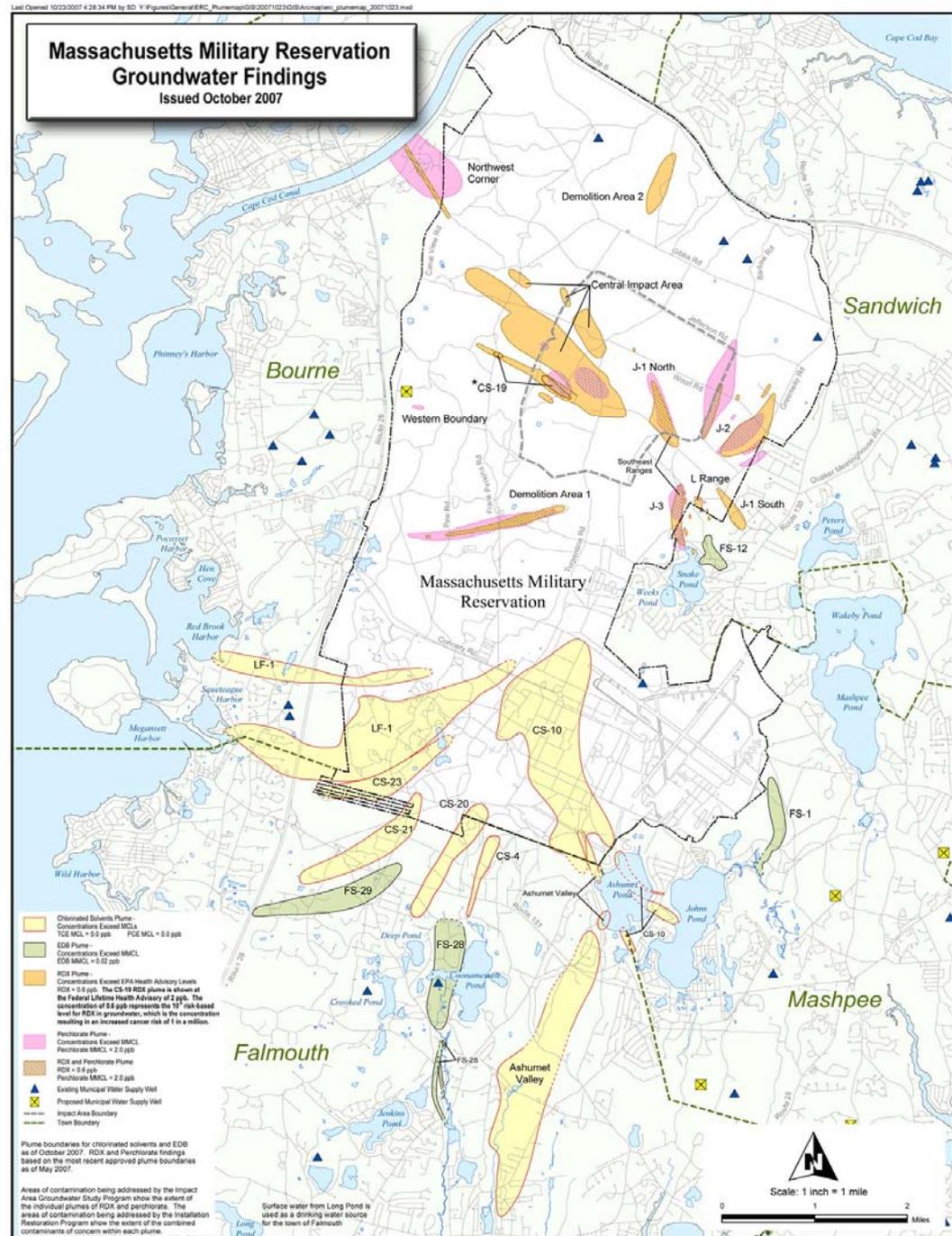


- Located on Cape Cod
- Multi-military and tenant installation
 - 6th Space Warning Squadron (PAVE PAWS)
 - USCG (Air Station Cape Cod)
 - Camp Edwards ARNG
 - Otis ANG
 - USDA, VA Cemetery
 - AFCEE, IAGWSP
- Otis – Superfund Site in 1989
- Cleanup On-going by AFCEE and IAGWSP

MMR Site Overview

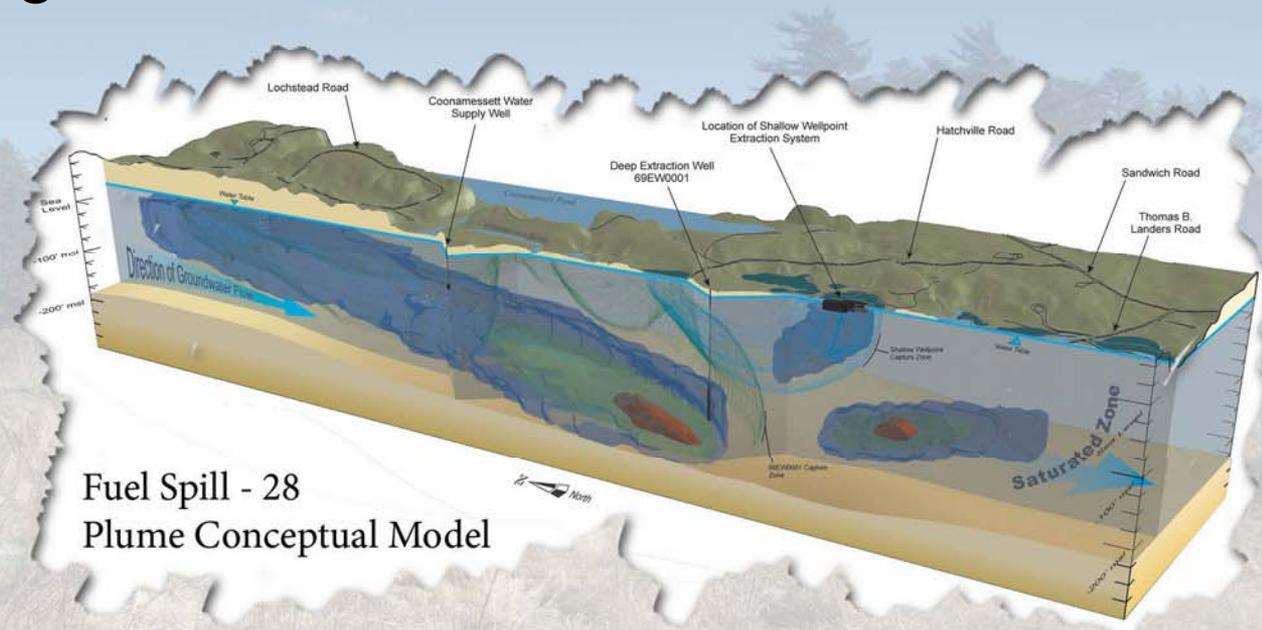
(continued)

- Site Sits Over Largest Recharge Area of the Sole Source Aquifer
- High Permeability Aquifer; Groundwater Flow Rates of Roughly 1 ft/day
- AFCEE: 11 plumes (primarily TCE, PCE and EDB)
- IAGWSP: 8 plumes (primarily explosives and perchlorate)



MMR Site Overview (continued)

- Relatively low concentrations
- Deep (>100 ft) and Thick (>100ft)
- Large (>3 miles); 20 Billion Gallons
- Several migrating off-base
- Rivers, Cranberry Bogs, Ponds, Residential Wells, and PWS Wells in Area



MMR Site Overview (continued)



- AFCEE: 8 Groundwater Treatment Plants
 - ~100 EWs/RWs
 - Systems on and off-base
 - 16 MGD (GAC)
- IAGWSP: 5 plants
 - ~20 EWs/RWs
 - 2 MGD (IX/GAC)
- High Level of Regulatory Oversight

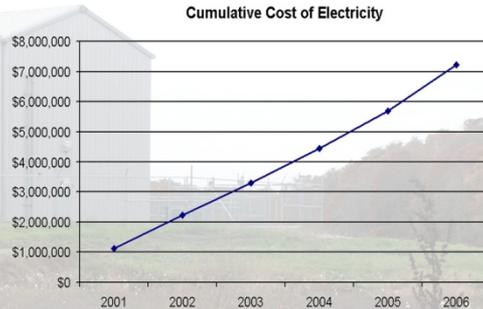
Program Energy Use and Impacts

Program Electricity Consumption

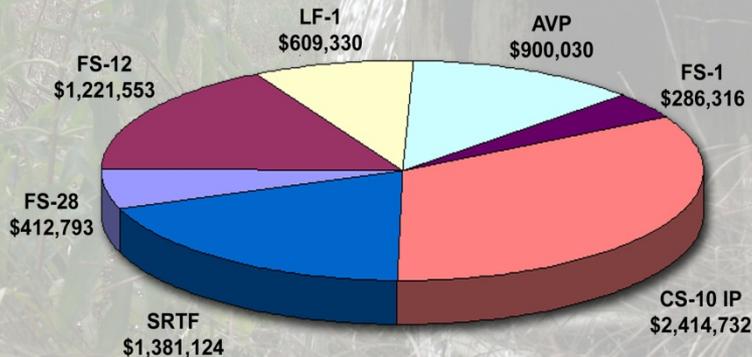
IRP Remedial System (2001-2006)

Electric Consumption:

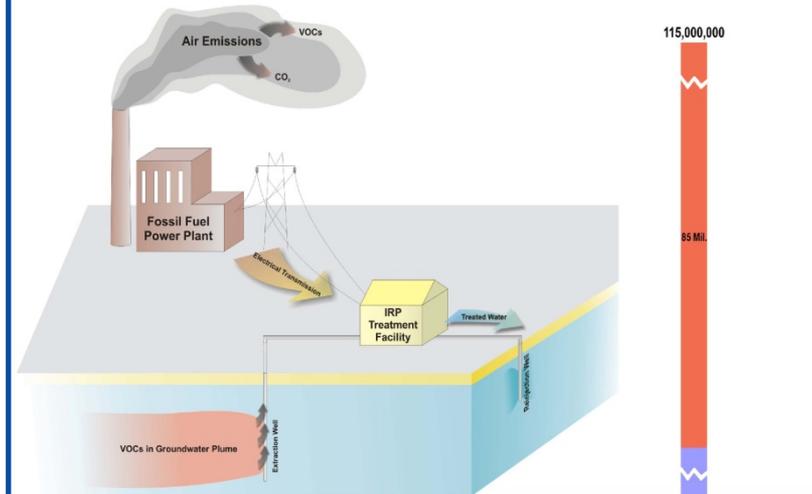
- 61 Million kW - hrs
- Electricity cost from 2001-2006: \$7.2 Million
- Electricity 2006: \$1.5 Million
- Program annual consumption equivalent to providing power to approximately 1,000 average American homes



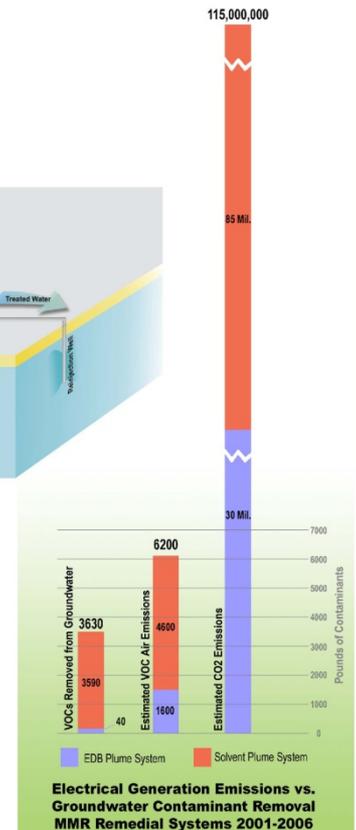
IRP Program Electricity Costs by Treatment System



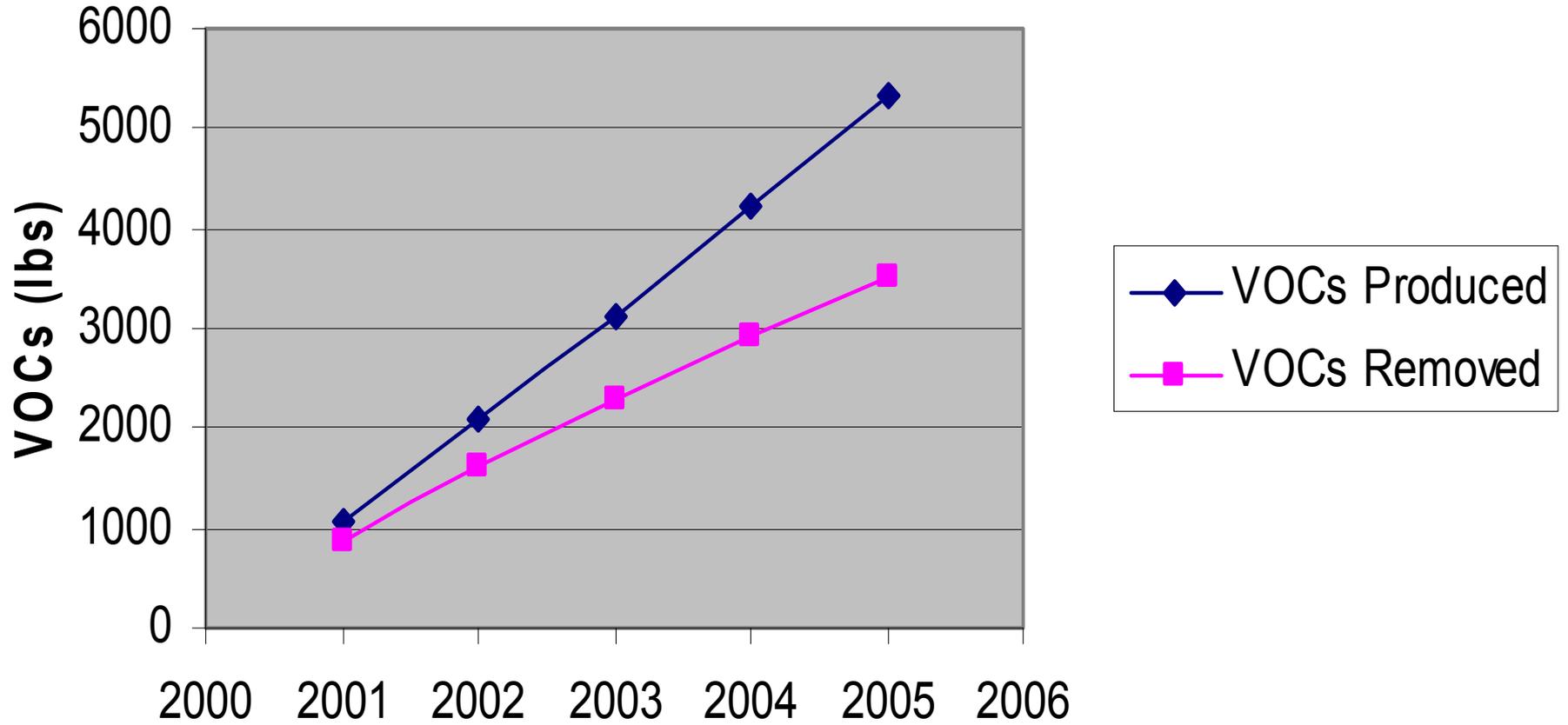
Impacts of Electricity Generation



Electricity Generation to Power IRP Remedial Systems Results in Air Emissions Including Greenhouse Gases



Cumulative VOC Data



Green Power: Wind Turbine Coming Soon !

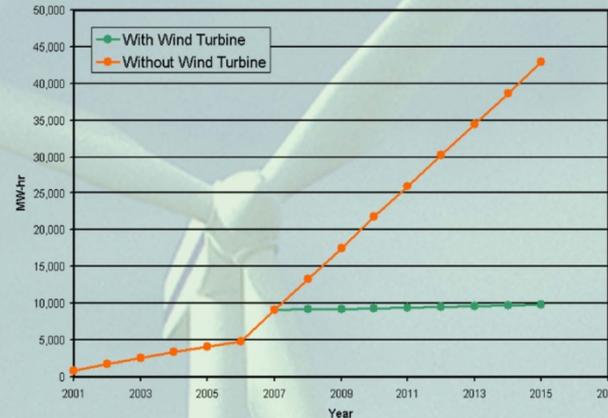
Purpose of Project:

- Generate electricity using renewable energy to reduce cost
- Offset air emissions from commercial plants
- Expected to provide 25% of Program electrical needs



Artist rendering - not to scale

LF-1 & Hunter Avenue Treatment Facility Net Electricity Purchase Projections



Air Emission Reductions (Pounds Per Year)

- CO₂: 6,741,300
- NO_x: 11,833
- SO₂: 11,443
- CO: 1,112
- VOCs: 442
- PM₁₀: 418

Fuhrländer FL-1500

- Rating: 1.5 MW
- 80 m (~260 ft) hub height
- ~ 118 m (~390 ft) high from ground to tip of rotor blade
- Produce ~ 3,810 MWh yearly (29% capacity factor)
- Annual load from treatment systems ~ 4,230 MWh
- Anticipated return on investment: 6-8 years



How the Project Started - 2005

- 2005: DERA funding applicable
- May 2005: Received preliminary approval from USCG (landowner)
- Jun 2005: Presented to 102 FW and E&RC



How It Progressed - 2006

- Feb 2006: Presented to base agencies
- Mar 2006: Plume Cleanup Team (PCT) presentation
- Jun 2006: Wind turbine constructability assessment awarded to CH2M Hill
 - Economic analyses
 - Basis of Design
 - Environmental Assessment



Upper Cape Codder - 16 Mar 06

Base plans to construct turbine

Environmental officials overseeing the long-term cleanup of 12 pollution plumes emanating from Otis Air National Guard Base and Camp Edwards told selectmen Tuesday night that a wind turbine will be built in the hilly terrain at the installation's southern section.

The 268-foot high wind turbine would be constructed on the Massachusetts Military Reservation north of Route 151 and east of Route 28 above the Babcock line.

"It's a high windy spot in a terrain filled with some keule holes," said Douglas Karson of the Air Force Center for Environmental Excellence. "It could generate \$100,000 in [electrical] cost savings."

Karson said the renewable project over five years would likely recoup initial capital construction costs.

A Work In Progress - 2007

- Jan 2007 – PCT and Senior Management Board (SMB) presentations
- Feb 2007 – Prepared Form 813 for EA
- 13 Mar 2007: News Release - Public comment period on MMR wind turbine project environmental assessment (EA)
- 13 Mar 2007: Paid Advertisements on 30-day public comment period for the EA in the Cape Cod Times and 4-town Enterprise Newspapers
- 19 Mar – 17 Apr 2007: EA comment period
- 2 April 2007: News Release – PCT meeting with EA presentation (The EA and directions for comment submissions placed on the IRP website).



MMR Wind Turbine Project Comment Period

Mashpee Enterprise (16 Mar 07)



Officials from the Air Force Center for Environmental Excellence are holding a 30-day public comment period, from Monday, March 19, to Tuesday, April 17, on the "MMR Wind Turbine Project Environmental Assessment, March 2007."

The environmental assessment describes AFCEE's plans to construct a wind turbine in the southwestern portion of the Massachusetts Military Reservation up to 400 feet in height.

A copy of the assessment will be available for 30-day review at the main libraries in all four Upper Cape towns. A copy is also available at AFCEE's website www.mmr.org under "Public Comment Periods."

All comments must be submitted in writing and, if mailed, post-marked no later than April 17. Only comments received during the 30-day public comment period will be considered. Comments will be responded to by letter or telephone, or in a summary document.

Those wishing to express their

view may mail written comments to HQ AFCEE/MMR, Douglas Karson, Attn.: Wind Turbine E, 322 East Inner Road, Otis ANG Base, MA 02540-5028; or send their comments by fax to 508-968-4678 or by email to doug.karson@brooks.af.mil.

A public presentation on AFCEE's MMR Wind Turbine Project Environmental Assessment will be given at 6 PM on Wednesday, April 11, at Bourne Best Western, 100 Trowbridge Road, Bourne, in the downstairs function room. The presentation will be the first main agenda item of the Plume Cleanup Team's meeting. That team is a citizen advisory group to AFCEE on matters related to environmental cleanup activities under AFCEE's Installation Restoration Program.

For more information or to request a CD of the environmental assessment, contact Mr. Karson at 508-968-4678, extension 2, or at the mailing/email addresses above.

Further information about the cleanup program is available by visiting www.mmr.org.

Bourne Enterprise - 16 Mar 07

PAGE ADVERTISEMENT

Public Comment Period on MMR Wind Turbine Project Environmental Assessment

Officials from the Air Force Center for Environmental Excellence (AFCEE) at the Wingsubjects Military Reservation (MMR) are holding a 30-day public comment period on the "MMR Wind Turbine Project Environmental Assessment, March 2007." The 30-day public comment period will be held from March 19 to April 17, 2007. The Environmental Assessment describes AFCEE's plans to construct one wind turbine, up to 400 feet in height, in the southwestern portion of the MMR.

AFCEE is soliciting public review and comments on the MMR Wind Turbine Project Environmental Assessment. A copy of the document will be available for 30-day review at the main libraries in the towns of Bourne, Edinboro, Mashpee, and Sandwich. A copy is also available at AFCEE's website www.mmr.org under "Public Comment Periods." All comments submitted must be in writing and post-marked no later than April 17, 2007. To submit comments:

By mail to:
HQ AFCEE/MMR
Doug Karson
Attn: Wind Turbine EA
322 East Inlet Road
Otis ANU Base, MA 02540-5028

By fax to: 508 968 4673

By e-mail to: doug.karson@brooks.af.mil

NOTE: Only comments received during the 30-day comment period will be considered. Responses to comments will be provided by letter, telephone, or in a summary document.

A public presentation on AFCEE's MMR Wind Turbine Project Environmental Assessment will be given on April 11, 2007, at 6:00 p.m., at the Best Western Hotel, 100 Trowbridge Road, Bourne, in the downstairs function room as part of AFCEE's Plastic Cleanup Team public meeting. For more information or to request a CD of the Environmental Assessment, please contact Doug Karson at 508 968 4678 extension 3 or at the mailing address above. To learn more about the cleanup program, visit www.mmr.org.

Notification and/or Approvals

- Base Agencies
- Bourne Historical Commission
- Bourne Town Planning Board
- Bourne Conservation Commission
- Bourne Police Department
- EPA/MassDEP (program regulators)
- Falmouth Historical Commission
- Federal Aviation Administration (FAA)
- Mashpee Wampanoag Indian Tribal Council Board
- Massachusetts Historical Commission
- Massachusetts State Division of Fisheries and Wildlife
- Massachusetts Technology Collaborative - Grant
- Media
- Natural Heritage and Endangered Species Program (NHESP)
- NSTAR
- Plume Cleanup Team
- Senior Management Board
- US Fisheries and Wildlife Service
- Wampanoag Tribe of Gay Head (Aquinnah), Tribal Historic Preservation Officer



A Work in Progress (cont) - 2007

- 21 Mar 2007: RFP for construction issued
- Sep 2007: Construction contract awarded to ECC
- 26 Sep 2007: News Release - contract awarded for wind turbine
- Sep 2007: PCT and SMB presentations

** Note.... All presentations/meeting minutes can be found on AFCEE's website www.mmr.org



The Rest of the Project

- May 2008: Pre-construction meeting
- Summer 2008: Installation of foundation
- Fall 2008: Delivery of tower
- Summer/Fall 2009: Delivery of turbine/nacelle and blades
- Fall 2009: Installation of turbine and startup



QUESTIONS/COMMENTS?

rose.forbes@brooks.af.mil

