

### AFCEE:

- Manages the Installation Restoration Program at the MMR.
- Constructed nine pump and treat plants to remediate groundwater contamination
- Has implemented a robust optimization program to reduce the carbon footprint and utility cost associated with the treatment systems

### FOR MORE INFORMATION:

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### ACRONYMS

DOD - Department of Defense

EA - environmental assessment

FAA - Federal Aviation Admin.

FONSI - Finding of No  
Significant Impact

ft - feet

GE - General Electric

M - million

MW - Megawatt

MWhr - Megawatt-hours

O&M - Operations and  
Maintenance

### WHAT IS WIND II AND WHERE IS IT LOCATED?

Wind II includes two GE 1.5 MW wind turbines and a new substation. The two turbines are located in the northern area of the MMR, over 3000 (ft) from the nearest resident. They are each approximately 390 ft tall. The project is jointly funded by the Air Force and the Army.



### WHY DID AFCEE BUILD WIND TURBINE II AND HOW MUCH DID IT COST?

Wind II was constructed to further reduce the electricity costs and environmental impacts associated with the pump and treat systems constructed by AFCEE to remediate the contaminated groundwater at MMR. The two GE wind turbines were built after the success of Wind I, the first wind turbine constructed by AFCEE in the southwestern area of the MMR. The three wind turbines are expected to offset the AFCEE cleanup program's electricity costs and air emissions by 100% for the next 25 years. The cleanup program's cost savings are estimated at \$26M; an additional \$42M of renewable electricity are estimated for other DOD uses.

Based on the following costs, the return on investment is anticipated in eight to ten years:

- \$462,284 for a constructability assessment
- \$9.4M for construction of two 1.5 MW wind turbines and a new 7.5 MVA substation, and one year of operations and maintenance (O&M)
- \$341,000 for Title II/Oversight and Environmental Surveys
- \$272,000 for interconnection/witness test

### WHAT WAS INVOLVED IN THE APPROVAL PROCESS?

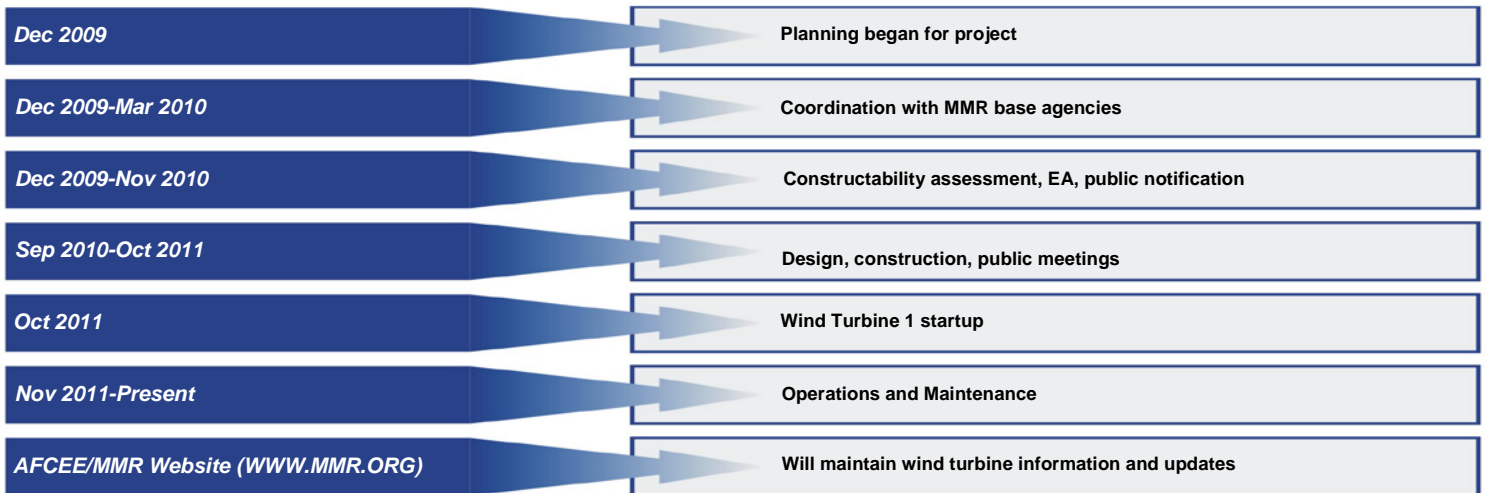
The approval process for Wind II was very similar to that of Wind I (refer to Wind I fact sheet); however, the timeline was streamlined based on lessons learned from the first project. In addition, Wind II is sited in the MMR reserve which required additional environmental coordination. The project was submitted to the FAA and received a determination of no hazard. After receiving approval from the base agencies, AFCEE awarded a constructability contract to CH2M Hill in Dec 2009. The work included a basis of design, a wind resource assessment, and an environmental assessment (EA). Several local, state, and federal agencies were consulted during the EA process. The EA was submitted for public comment; a public meeting was held during the comment period. The EA resulted in a Finding of No Significant Impact for the project.

### WHAT WAS INVOLVED IN THE CONSTRUCTION PROCESS AND HOW LONG DID IT TAKE?

The construction contract was awarded to Environmental Chemical Corporation in Sep 2010. The wind turbines started operating in Oct 2011. Compared to Wind I, which took five years from concept to operation, Wind II only took approximately two years (Dec 2009-Oct 2011).

### HOW MUCH ENERGY WILL WIND II PRODUCE?

Wind II is anticipated to produce between 6833 MWhrs, based on a capacity factor of 26%, and 7621 MWhrs based on a 29% capacity factor. The project will be net metered.



### SPECIFICATIONS (per turbine):

- Hub Height - 80 m (262 ft)
- Total Height - 119 m (390 ft)
- Rotor Diameter - 77 m (253 ft)
- Speeds:
  - Rotational speed: 10-20 rpm
  - Avg site wind speed ~ 6.5-7.0 m/s (14.5 - 15.7 mph) at 80 m hub height
  - Rated output @ 14.5 m/s (~32 mph)
  - Start wind @ 3.5 m/s (7.8 mph)
  - Stop wind @ 25 m/s (~56 mph)
  - Survival speed @ 55 m/s (123 mph)
- Foundation:
  - Spread form type: ~ 470 yd<sup>3</sup> 5000 psi concrete
  - 54 ft diameter
  - 7 ft high in center tapering to 3'8" ft high at edges
- Blades:
  - Manufactured by MFG in Gainsville, Texas
  - Length - ~37 m (121 ft)
  - Weight - 6305 kg (6.9 tons)
  - Material - fiberglass/epoxy
- Nacelle/Generator (Machine Head):
  - Manufactured by GE in Pensacola, Florida
  - Width - 3.8 m (12.5 ft)
  - Height - 3.8 m (12.5 ft)
  - Length - 8.8 m (29 ft)
  - Weight - 63 tons
- Tower:
  - Manufactured by Trinity Structural Towers in Iowa
  - Section lengths varied from 22-30 m (72-97 ft)
  - Section weights varied from 31.3-55.7 tons
- Crane:
  - Manitowoc 16000
  - 440 ton crane
  - 315 ft mast height
  - Delivered to site on 21 flatbed trailers
  - Required 4 days to assemble

### COORDINATION/CONSULTATION:

- Base Agencies, MMR Energy Committee, Joint Oversight Group (MMR)
- Bourne Historical Commission
- Environmental Management Commission, Community Advisory Council, Science Advisory Council
- Environmental Protection Agency/MassDEP (program regulators)
- FAA
- Mashpee Wampanoag Indian Tribal Council Board
- Massachusetts Aeronautics Commission
- Massachusetts Historical Commission
- Massachusetts State Division of Fisheries and Wildlife
- Massachusetts Clean Energy Center - Grant
- Media
- Natural Heritage and Endangered Species Program (NHESP)
- NSTAR
- MMR Plume Cleanup Team
- Sandwich Historical Commission
- Senior Management Board
- US Fisheries and Wildlife Service
- Wampanoag Tribe of Gay Head (Aquinnah), Tribal Historic Preservation Officer

