American Municipal Power Fremont Energy Center

Mike Perry
AMP Senior Vice President
Generation Operations
History of AMP

• American Municipal Power was founded in 1971 when a group of municipally owned electric systems joined forces to lower costs and increase reliability of their power supply to benefit their consumer-owners.
Who AMP is Today

• Public Power Agency with 129 members in 7 states
  – Members in Ohio (82), Pennsylvania (30), Michigan (6), Virginia (5), Kentucky (3), West Virginia (2), and the Delaware Municipal Electric Corporation
  – Members comprise of more than 625,000 customers
American Municipal Power, Inc.

- Owned and operated by the members
- Assists members in entering power supply agreements
- Provides a diverse power supply portfolio for the members
  - Hydro, Wind, Solar, Natural Gas, and Coal
AMP Generation Assets: Hydro

• Largest developer of new run of the river hydroelectric power
• Four plants under construction along the Ohio River
  – Cannelton – 88 MW
  – Smithland – 76 MW
  – Willow Island – 44 MW
  – Meldahl (along with City of Hamilton) – 105 MW
• AMP constructed and currently operates the Belleville Hydroelectric Plant since 1999 – 42 MW
Cannelton Hydroelectric Project
Belleville Hydroelectric Project
AMP Generation Assets: Wind

• AMP members own the first utility scale wind farm in Ohio as part of OMEGA JV6
• The four Vestas wind turbines have a capacity of 7.2 MW and are located in Bowling Green, Ohio
OMEGA JV6
AMP Generation Assets: Solar

• AMP members are installing solar arrays inside their communities
• Member communities see the benefits of solar power to offset some of their peak load
• The Napoleon Solar project is 3.2 MW and includes over 17,000 solar panels
Napoleon Solar Project
AMP Generation Assets: Coal

• AMP members are the largest equity owner of the Prairie State Energy Campus in Southern Illinois with a 23.3% ownership or 368 MW
  – Plant came online this year and is supplying members with base load energy

• Some members also own and operate their own coal generation facilities inside their communities
Prairie State
AMP Generation Assets: Diesel

- AMP operates and maintains 66 small diesel fired reciprocating engines behind members’ meters – 117.2 MW
- These assets are used to curve members peaking exposure to the wholesale energy market and to reduce transmission peaks
Diesel Peaking - CAT 3516B
AMP Generation Assets: Natural Gas

• AMP operates for the members nine simple cycle peaking gas turbines – 142 MW

• AMP Fremont Energy Center, with 87 owners, is the largest natural gas asset inside members’ portfolios at 685 MW
  – AFEC became commercial on January 20, 2012
JV2 - Hamilton
AMP Fremont Energy Center
Intermediate Power Resource

- AMP members’ portfolios for intermediate power were subject to the volatile wholesale market.
- Members who joined AFEC had a need for this resource.
- Rate Planning is very important for each member when considering ownership in a project like AFEC.
Natural Gas Combined Cycle

• Low Heat Rate – as low as 7,000 btu/kW
• Quick Starting – in a hot start condition, plant can reach base load in 2.5 hours
• AFEC is a 2x2x1 configuration with two gas turbines, two heat recovery steam generations, and one steam turbine
AFEC Gas Turbines

- 180 MW Siemens Westinghouse 501FD2
AFEC HRSG

- Manufactured by Nooter/Eriksen
- Three-drum boiler – HP, IP, LP
AFEC STG

• 363 MW Siemens three section – HP, RH, LP (42” titanium LP blades)
Fremont Energy Center

History of the Facility
Fremont Energy Center

- Project was originally developed by Calpine Corp. and broke ground in 2001
Construction Photo

East Side of Plant in 2003
Construction Photos

Plant Building Progress in 2004
Fremont Energy Center

Calpine to New Ownership
Calpine Bankruptcy

• In 2005, Calpine filed for bankruptcy and the Fremont Energy Center was auctioned off.

• AMP underwent extensive due diligence and was the stocking horse in the bankruptcy auction.

• However, FirstEnergy outbid AMP for the project and took ownership in 2007.
FirstEnergy

- FirstEnergy continued construction in 2008

Laydown Area and Plant Building
FirstEnergy Construction

Cooling Tower Construction
FirstEnergy Construction

Steam Piping Construction
FirstEnergy Construction

- Construction continued for two years, completing HRSG, cooling tower, and steam piping construction
- FirstEnergy contracted PIC in 2010 to begin commissioning activities
FirstEnergy Commissioning

• PIC performed gas blows and steam blows in October 2010
FirstEnergy Transition

• FirstEnergy slowed commissioning activities just after steam blows
• Construction activities were slowed down
• FirstEnergy and AMP began discussions in early 2011 about purchasing the facility
AMP Fremont Energy Center

AMP’s Purchase and Commissioning
AMP Due Diligence

• AMP and FE signed an MOU for the purchase of the facility in February 2011
• AMP staff arrived on site to perform due diligence
  – Plant was 99% mechanically complete
  – CTs ran for steam blows to approximately 65 MW
• SAIC performed a feasibility study projecting the plant within AMP members’ power supply portfolios
AFEC Closing

• FirstEnergy completed construction in June 2011
• PIC signed off on turnover packages
• AMP accepted the mechanically complete facility and closed on the purchase of the facility on July 28, 2011
AFEC Commissioning and Start-up

• AMP contracted PIC to complete commissioning activities
  – PIC was commissioning contractor under FE
• PIC began commissioning activities as soon as AMP took over the facility
AFEC Start-up: Condenser

- Condenser was opened up and cleaned and inspected for operation
AFEC Start-up: STG Commissioning

• The STG was not commissioned under FE
• Siemens prepared unit to be operated
AFEC Start-up: CT2 Damage

• Prior to operating the CTs in October 2011, Siemens inspected the units. CT2 was found to have compressor damage.
• Siemens did a boroscope inspection and there was extensive damage through the compressor section
• PSM was contracted to make repairs to the unit
Above view of CT2 package during dismantle
AFEC Start-up: CT2 Repairs

CT2 Compressor Section
AFEC Start-up: CT2 Repairs

- 22 blades had to be replaced by PSM
- An additional 48 blades were blended as shown in example below
AFEC Start-up: CT2 Repairs

• The W501FD2 have known issues in the compressor section that AMP decided to address while the machine was apart.
• AMP contracted with PSM to install their “Hook Fit” corrected compressor diaphragms in Rows 1-3.
AFEC Start-up: CT2 Repairs

• AMP also contracted with PSM to install 12k parts. The new transition pictured.
AFEC Start-up: 2x1 Base Load

• Once CT2 was repaired, the unit started up and ran to achieve steam purity
• CT1 and CT2 then had to operate together to achieve steam purity before emitting steam to the STG
• 2x1 base load operation was achieved on December 9, 2011
AFEC Start-up: 2x1 Full Load

• Each HRSG has approximately 80 MW of duct firing capacity to bring the plant to the 685 MW limit – achieved December 17, 2011
AFEC Commercial Operation

Commercial Operation Date, O&M Contractor, and LTA
AFEC Commercial Operation

• After achieving max load, the plant was put through tests to ensure correct operations’ abilities

• Tests included:
  – Cold Start/Warm Start/Hot Start
  – 1x1 to a 2x1
  – 2x1 full load to base load
  – 2x1 full load to offline
AFEC Commercial Operation

- SAIC was on site to witness tests
- SAIC signed a letter to AMP stating the plant is ready for commercial operations on January 20, 2012
AFEC Environmental

• 501FD2 equipped with Dry-Low NOx Combustors
• Each HRSG equipped with CO catalysts and SCRs
• We are in complete compliance with our environmental permits
NAES – O&M Contractor

• AMP contracted O&M activities at AFEC to NAES

• NAES is a leader in the industry and operates over 120 power plants across the world

• NAES brings experience and knowledge needed for AFEC to succeed
AMP contracted with PSM for a long term agreement for major maintenance on the Combustion Turbines and the Steam Turbine

PSM is quickly becoming a LTA industry leader, specializing in third-party parts manufacturing and major maintenance
2012 Operations

2012 Operational Statistics
2012 MW Generation

AFEC 2012 Total Net MWh

- STG
- CT2
- CT1

American Municipal Power, Inc.
2012 Capacity Factor

Capacity Factor 2012

- Actual Capacity Factor

Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

[Graph showing the actual capacity factor for each month in 2012, with the lowest point in April and the highest point in July.]
### 2012 Year to Date

<table>
<thead>
<tr>
<th>AMP Fremont Energy Center</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant Availability</strong></td>
<td>98.25%</td>
</tr>
<tr>
<td><strong>Capacity Factor</strong></td>
<td>59.88%</td>
</tr>
<tr>
<td><strong>Average Net Heat Rate</strong></td>
<td>7,293</td>
</tr>
<tr>
<td><strong>Gas Burned (MMBTU)</strong></td>
<td>11,706,038</td>
</tr>
<tr>
<td><strong>Total Net MWh</strong></td>
<td>1,605,032</td>
</tr>
</tbody>
</table>
Future Operations

• AMP is dedicated to the success of the facility
• NAES will always be striving for the highest possible availability
• Capacity factors will depend on gas price and wholesale energy market prices