

AMP FREMONT
ENERGY CENTER



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The AMP Fremont Energy Center (AFEC) continues to provide value to members through lower energy costs and PJM installed capacity credits.



2016
SUMMARY

While 2016 saw some challenges, the year finished with no environmental violations, and a number of improvement projects were implemented and completed. The investments made in these improvements will provide members with a reliable and affordable energy resource for years to come.

Continuing the emphasis on the importance of safety, the facility finished the year without a single Lost Time Accident or Recordable Incident, a milestone that stands more than five years.

Although the plant's net generation was down from the previous year – 2,683,617 net megawatt hours (MWh), compared to 3,429,684 net MWh in 2015 (decreased capacity factor of 45.39 percent versus 57.98 percent in 2015) – the plant continues to be a valuable resource for participating members with a strong environmental record.

Plant availability was down to 64.44 percent in 2016 compared to 88.25 percent in 2015 due to a mechanical failure on Combustion Turbine 2 (CT2) and an unplanned outage on the steam turbine.

The long-term agreement with Power Systems Manufacturing (PSM) for major maintenance on the turbines was used during the spring outage to complete the Hot Gas Path Inspection on CT2. Work included repairs following the mechanical failure on CT2 and repairs the steam turbine during the fall outage.



ABOUT:

AFEC is a nominal 700-megawatt (MW) natural gas combined cycle facility located in Fremont, Ohio. Commercial operation began in January 2012 and the facility supplies power to 87 AMP member communities as well as the Delaware Municipal Electric Corporation and the Central Virginia Electric Cooperative.

AFEC is currently staffed by 24 NAES and two AMP fulltime personnel that support maintenance and operations. The partnership between NAES and AMP continues to be positive and AFEC was awarded the NAES Zero Recordable Accidents Award for no Lost Time Accidents or Recordable Incidents this year.

Figure 1 below, provides a summary of the operating data for 2016:

2016 TOTALS	CT1	CT2	STG	Facility
Days Dispatched	273	204	273	273
Gross MW Produced	994,792	667,148	1,084,479	2,746,419.00
Auxiliary Load Consumption	36,236	26,566	-	62,802.00
Net MW Produced	958,556	640,582	1,084,479	2,683,617
Equivalent FOH				797.00
MWs Lost				537,975
Scheduled Outage Hours				1,892.49
Maintenance Outage Hours				2,453.31
Available Generation (MG)				5,375,025
Capacity Factor - Based on 675 net MWs				45.39%
NERC Availability - Based on 685 net MWs				58.40%
MMBTU's				19,620,597
Heat Rate				7,311

PLANT OPERATIONS:

In 2016, AFEC staff successfully managed the operation and maintenance of the facility while working through several outages.

A winter Demonstrated Maximum Net Capacity (DMNC) test was performed on Jan. 19, 2016, to meet the interconnection agreement limit of 703 MW. A summer DMNC test was performed on July 27, which resulted in a corrected summer capacity of 671.9 MW.

MAINTENANCE:

Combustion Turbines (CT):

The CT2 hot gas path inspection and exhaust cylinder upgrade was completed in the spring of 2016 by PSM. After returning to service, a mechanical failure occurred in the turbine section due to a liberated seal pin. This forced the unit offline until repairs were made. CT1 had Row 4 blades with oversized seal pins installed during the fall outage.

Heat Recovery Steam Generators (HRSG) and High Energy Piping:

HRST, an industry expert service company, performed steam drum crawl through inspections on Unit 1 and Unit 2 during the spring outage, and performed the inspections during the fall outage. Unit 1 and the catalysts were cleaned due to increases in back pressure on the combustion turbine.

Steam Turbine:

PSM performed an inspection on the L-0 blades on the steam turbine with no findings. Prior to the fall outage, the steam turbine did not go on turning gear during a test and was unable to be rotated due to liberated seals that bound the rotor. The plant was granted a planned outage extension to perform the repairs. These included replacing liberated seals, straightening the high pressure/intermediate pressure rotor, removing deposits and a high speed balance. The unit returned to normal service in December.

AFEC SAFETY DATA:

AFEC completed the year with 1,951 days (more than five years) with no Lost Time Accidents or Recordable Incidents. Each near miss incident was investigated and findings were shared with all personnel. To avoid reoccurrence, corrective actions were developed and implemented for each incident.

Continuing the incorporation of NAES SAFE process with strong safety culture at AFEC, personnel completed nearly double the safety observations required throughout the year, completed required facility inspections and attended annually required training. Additionally, the AFEC Safety Committee met monthly to emphasize safety and other concerns, while focusing on the following NAES SAFE Core Elements: Employee Engagement in Safety, Pre-Work Planning for Safety, Contractor Safety Management, and Incident Reporting & Investigation.

Figure below provides additional data for a number of safety leading indicators, inspection results and completed tasks for 2016:

2016 AFEC SAFETY LEADING INDICATORS

Indicator	Target	Completed	%
Safety Observations	271	493	182%
Housekeeping Inspections	48	58	121%
Safety Training	307	307	100%

Days Worked with No Lost Time or Recordable Accidents: 1951



ENVIRONMENTAL:

AFEC had no notice of violations during 2016. Compliance with the AFEC Storm Water Permit (NPDES) was accomplished through appropriate storage of hazardous chemicals, prompt response to minor spills and thorough inspections to protect the environment. Requirements set forth in the Waste Water Permit were met and compliance was achieved. This included extensive waste water monitoring and partnering with the City of Fremont Water Reclamation Center (formerly the Fremont Water Pollution Control Center). The parameters of the AFEC Title V Air Permit were met with no excess emissions reported. All quarterly, semi-annual reports, Linearities, and Relative Accuracy Test Audits were submitted accurately and on time.

2016 AFEC Environmental Factor Leading Indicators

Notices of Violations: 0

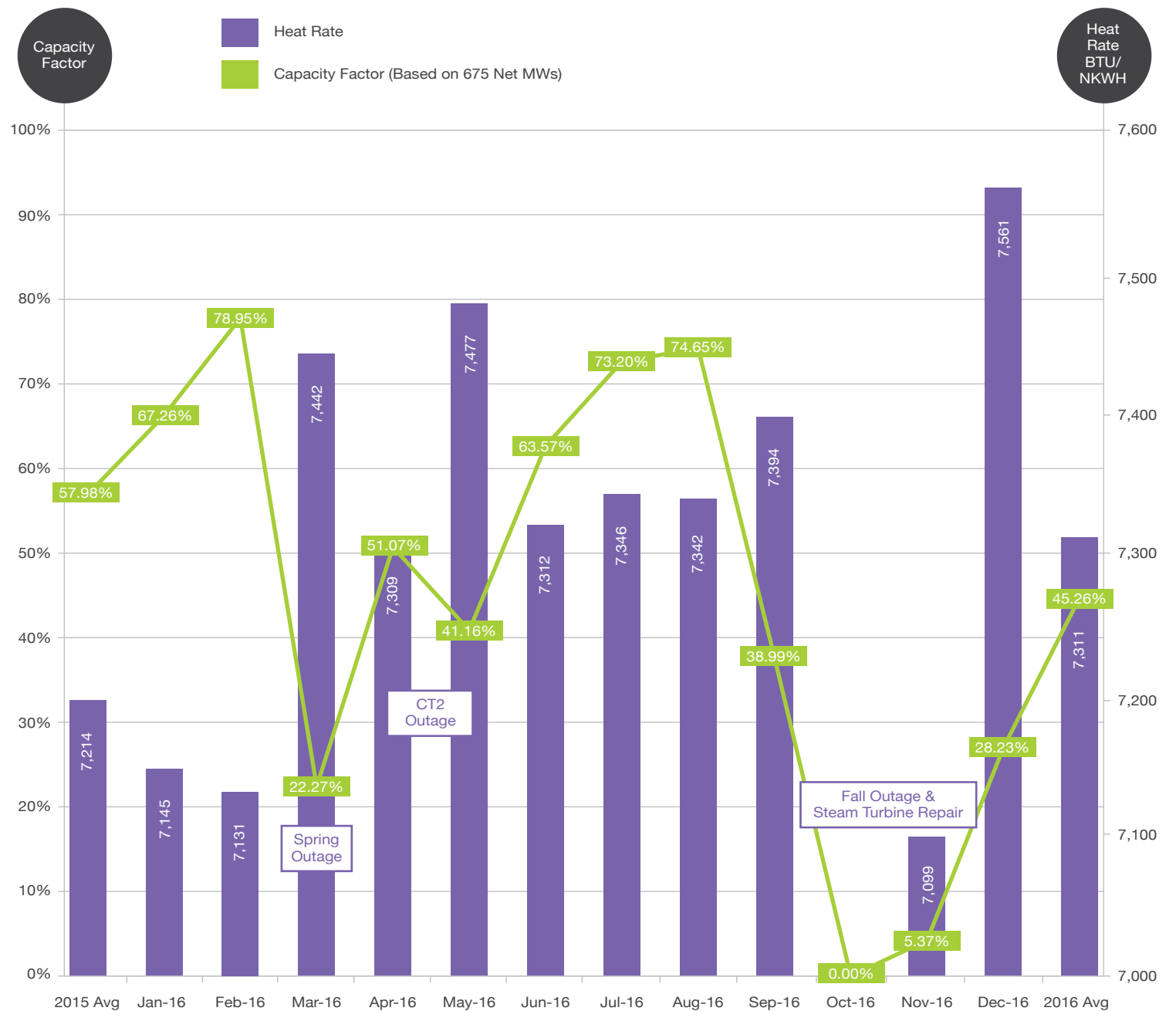
NOx Hours Exceeding Limits:

Q1	Q2	Q3	Q4
0/3063	0/2905	0/3729	0/754

Total 0/10451 total operating hours excluding SU/SD/calibration/maintenance

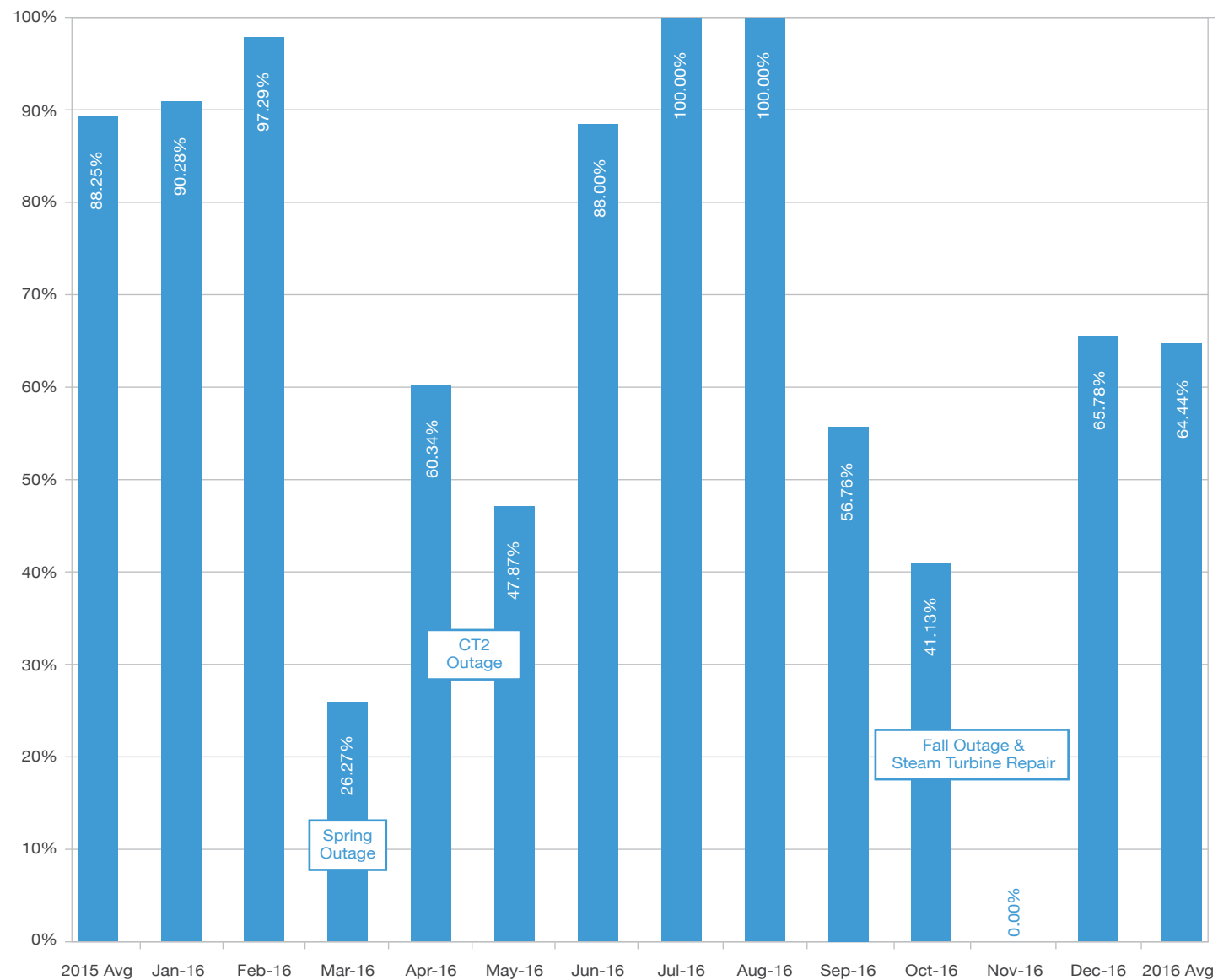
Total minutes operated without exceeding NOx limits – 627,060

FREMONT ENERGY CENTER 2016 HEAT RATE AND CAPACITY FACTOR

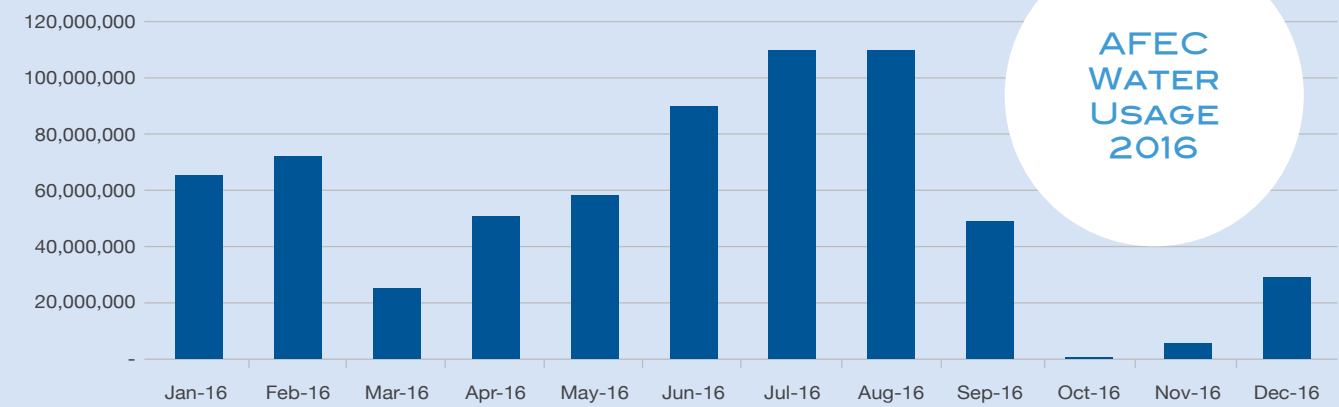


FREMONT ENERGY CENTER 2016 NERC AVAILABILITY

BASED ON A RATING OF 685 NET MWS



AFEC WATER USAGE 2016



Variable operating costs of the plant for the year averaged \$20.24/MWh.

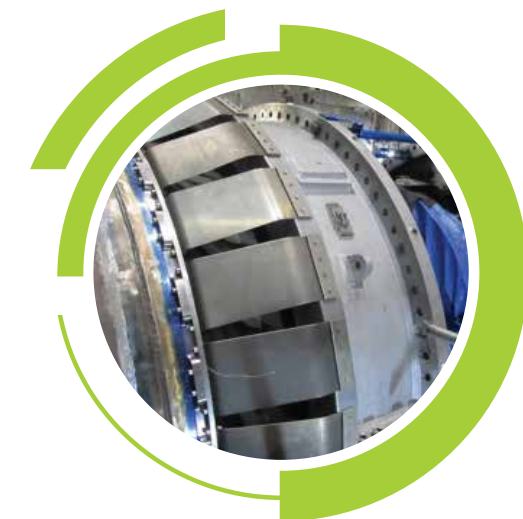
During the hours AFEC operated and delivered energy to members, energy costs from the plant (including natural gas hedge benefits) were a cumulative \$20.6 million lower than the PJM energy market.

AFEC continued to provide PJM Installed Capacity (RPM) benefits to the participants this year. More than \$54 million of capacity benefits for 2016 was credited to participants on a monthly basis; proportional to each participant's contractual allocation in the AFEC project. Participating AMP members benefited from the plant's location in the FirstEnergy zone. RPM capacity auction credits to members increased for the June 2015 to May 2016 planning year due to the high clearing price of the FirstEnergy zone.

PLANT IMPROVEMENTS

Several projects were completed and others were kicked off in 2016 to improve the performance and reliability of the plant, including:

- **HRSG 1 Cleaning** – Performed a cleaning of HRSG 1 due to increasing back pressure on the combustion turbine. The cleaning will also increase the thermal efficiency of the HRSG.
- **Cooling Tower Blowdown Reuse Study** – TetraTech performed a technology assessment and return on investment for several options to clean and reuse cooling tower blowdown to reduce the amount of wastewater discharge from the plant. While the economics do not currently favor a project, the information will be tracked in the future for possible benefits.
- **HRSG Isolation** – Installed the low pressure valves for the HRSG isolation project. The high pressure valves will be installed in 2017. The project will provide complete steam isolation between the two HRSGs to be able to perform maintenance on one unit while the other is in operation.
- **Spare Direct Current (DC) Motors** – Purchased long lead time emergency DC motors for all critical systems in the plant including lube oil and seal oil.
- **Neutralization Tank Containment** – Completed engineering for a new concrete containment around the neutralization tank. Installation of the containment is scheduled for the summer of 2017.
- **CT2 Exhaust Cylinder Upgrade** – CT2 exhaust cylinder was replaced with the upgraded PSM design to correct issues with the original design including cracking, material loss and bearing bore drop.





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