


# Unit #4 Overhaul

## April 2016

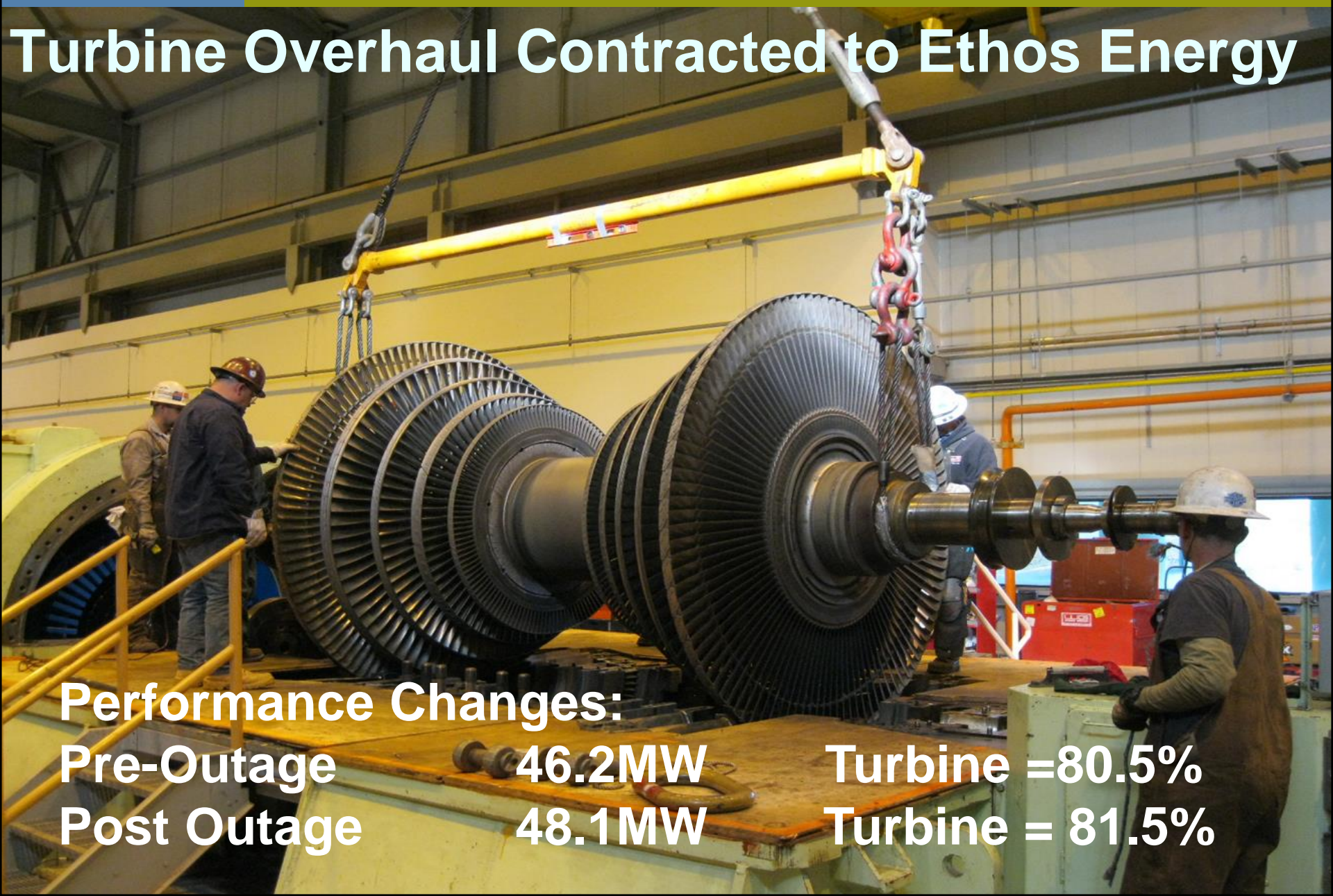


The background image shows a close-up of a large industrial turbine during an overhaul. The central part of the image is dominated by a large, circular, blue-painted component, likely a stator or part of the turbine housing, which has a series of radial fins or blades. In the foreground, there are various mechanical parts, including a large, light-colored cylindrical component and a dark, metallic flange. The overall scene is industrial and technical.

**Unit #4 Overhaul**  
**Project Budget \$1.871 million**  
**Spent (estimated) \$1,719 million**  
**Scheduled out**  
**March 24-April 30**  
**Actual**  
**March 24 – May 4**



# Turbine Overhaul Contracted to Ethos Energy



**Performance Changes:**

**Pre-Outage**

**46.2MW**

**Turbine = 80.5%**

**Post Outage**

**48.1MW**

**Turbine = 81.5%**



# Unit #4 Main Steam Pipeline



**Est. Total Project Cost - \$950,000**  
**Phase 1 done during the Overhaul**

## Siemens T3000 Upgrade

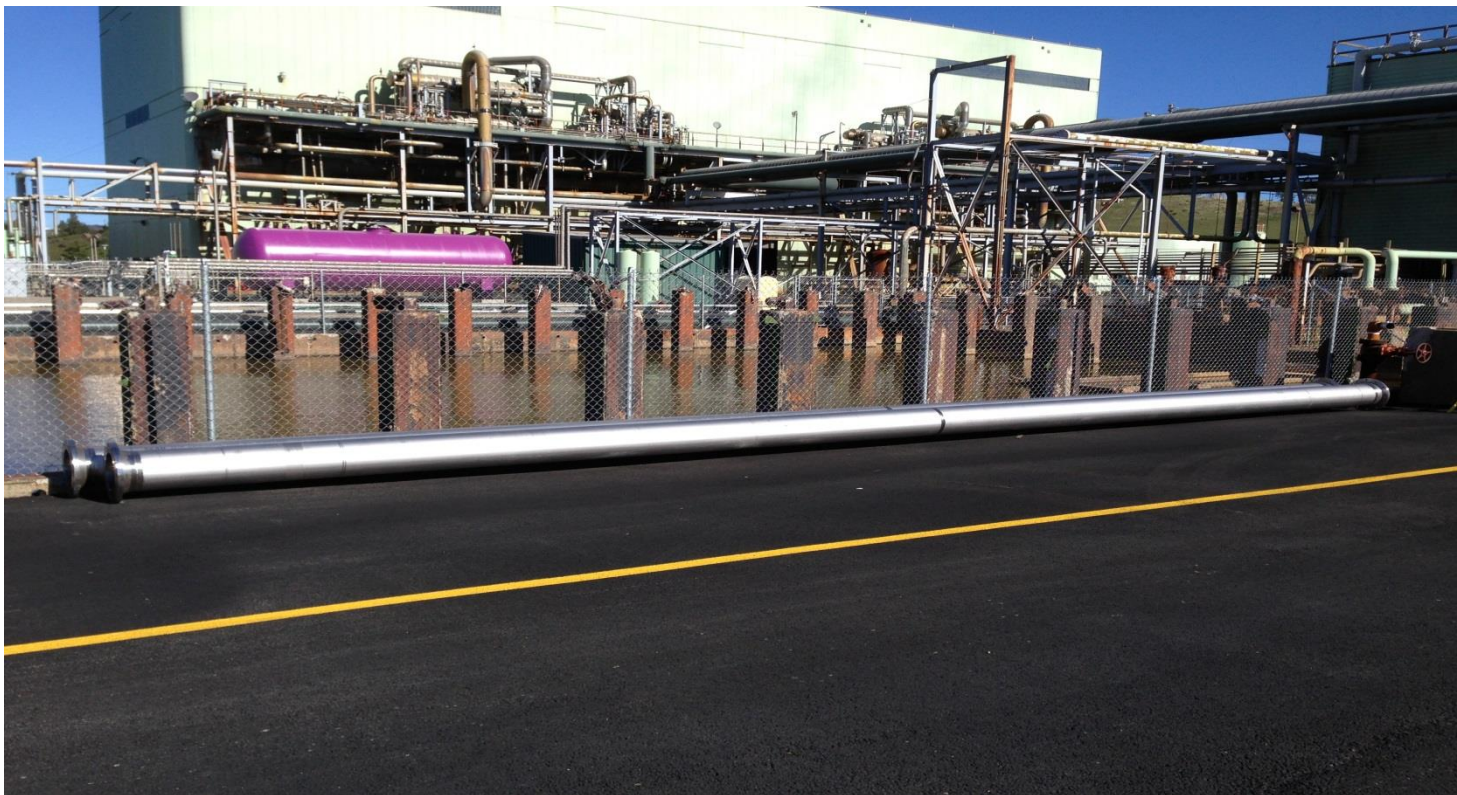
- Upgrade allows for more flexible operation of the plant with a reduced workforce





## Unit 4 Condensate Re-Route

- Condensate line was re-routed to more evenly distribute the water in the Cooling Tower Basin
- Reduces the amount of chemicals that need to be used



## Unit 4 Circulating Pumps Rebuild



NCPA GEO Team pulling the top off the pump

- NCPA GEO Team Machining the Pump Shaft before reassembly





# Unit 4 Cooling Tower Gearbox replacement





# Unit 4 GRS Vacuum Pump Bypass

Allows unit to continue to generate if Vacuum Pump Trips





# General Overhaul Work List

- Cleaned the Stretford
- Cleaned the cooling tower basin
- Shot the condenser tubes
- Pulled and cleaned all the Breakers 480v and up
- Pulled all of the major pumps and motors for inspection

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# **Knockout Pot Repair / Replacement**

- **Project Bid Amount - \$146,014**
- **Actual Project Cost - \$132,252**
- **Repaired or Replaced – 40 KOP's (~ 20% of Steam Field)**
  - **25 KOP's Cleaned Out and Repaired**
  - **15 KOP's Replaced With New Design**



## Overhaul Summary

- Budget: \$1,871M                      Estimated expenditure:\$1,719M
- Scheduled: March 24-April 30              Actual: March 24-May 4
- Completed work:
  - Spare Turbine was installed, Generator/Field inspected
  - Siemens T3K Upgraded
  - Unit 4 Main Steam Piping project, Phase 1 completed
  - Condensate Piping to Tower re-routed
  - GRS Vacuum Pump re-route completed
  - Gland Steam System re-routed
  - New Cooling Tower Gear Boxes installed for worn out ones
  - 20% Steamfield Knockout pots cleaned and repaired as necessary
  - Stretford, Cooling Tower Basin cleaned, Main Condenser Tubes shot
  - All major pumps/motors pulled, inspected and repaired as necessary





# Questions?