100 MW Gas Turbine Power Barge

Eastern Energy Limited
United States
Gas Turbine Power Barges
Overview

• Over 1500 MWs power gas turbine power barges operating around the world
• New York City operates over 600 MWs of gas turbine power barges
• The largest gas turbine power barge is a 220MW LM6000 combined cycle plant
100 MW Power Barge Capabilities

- Rapid deployment of a fully operational 100 MW power plant
- Step up voltage to 69 kV with existing onboard substation
- Process and store distillate fuel
- Dedicated area for RO demineralization system for water injection
General Layout
Gas Turbine Technology

- Pratt & Whitney Aero-Derivative FT4 Gas Turbines
- PEPCO and Triconex PLC Based Controls
- Capable of Water Injection for Emission Control and Power Augmentation
Operational Specifications

- Flexible generation with 4 gas turbines
- Self contained, capable of operating pier side or anchored
- Designed to operate in rivers, harbors or sheltered bays
- Lightship draft requires only 5 feet of water
Operational Options

- Substation can be modified for other voltages
- Generators can easily be converted to 50 Hz
- Water injection system can be completed
- Gas turbines can be converted to operate on natural gas or dual fuel
Gas Turbines
Twin Pac

• The FT4C-3F Twin Pac consists of two Pratt & Whitney C-3F engines driving a 70 MVA Mitsubishi generator

• The baseload output is 58 MW at ISO conditions or about 48.5 MW at 90 degrees F.
Power Pac

- The FT4A-11 Power Pac consists of a P&W A-11 engine driving a 50.5 MVA Electric Machinery generator.
- The baseload output is 22.5 MW at ISO conditions or about 20.5 MW at 90 degrees F.
- Option for C-3F engine to increase output to 29MW at ISO conditions or about 24.5 MW at 90 degrees F.
Mobile Pac

- The FT4A-9 Mobile Pac consists of a P&W A-9 engine driving a 23.5 MVA Electric Machinery generator.
- The baseload output is 20 MW at ISO conditions or about 17 MW at 90 degrees F.
- Option for A-11 engine to increase output to 22.5 MW at ISO conditions or about 19 MW at 90 degrees F.
Control Systems

• The Twin Pac has an independent control room with upgraded PEPCO Controls (PLC based)
• Twin Pac Control Room contains the MCC for Twin Pac auxiliary systems
• Mobile and Power Pac have a central control room with auxiliary MCCs
  – Power Pac has the upgraded PEPCO controls
  – Mobile Pac has the Triconex controls
Substation

• Substation has 4 25/33.3/37.5 kVA generator step up transformers with blast walls
• There are mechanical and automatic circuit breakers/disconnects with PTs and CTs
Auxiliary Systems
Fuel Treatment System

- Westfalia centrifuge capable of 133% of the required flow
- 95,000 gallons of storage
- Designed for lightering from a tank barge or pier side supply
Demineralized Water System

- Designed for leased containerized RO demineralization system
- Water injection pumps installed
- On engine manifolds required
- 95,000 gallon storage tank
Firefighting Systems

- Firemain ring system powered by electric and diesel fire pumps
- 2 Foam stations for fuel handling areas
- Deluge system installed in substation
- Automatic CO2 protection in turbine/generator enclosures
- Portable CO2 extinguishers
Storm Water Treatment System

- Containment systems drain to storm tank
- Oily water separator treats storm water
- Designed to meet USCG requirements
- Internal sludge tank pumped to tank truck for disposal
Power Plant Maintenance

• Maintenance shop for onboard gas turbine and deck barge maintenance
• Shop tools for on-site gas turbine overhaul
• Storage areas for onboard spares
• Enclosure and high pole area lighting
• 250 kW emergency power system
• Receptacles through the power plant
Marine Systems
Mooring Systems

- Deck barge is designed for traditional mooring alongside piers with bitts and bollards with fairlead
- Can also be anchored out with 4 point adjustable anchoring system which is included
- Also has a stream anchor/windlass and towing wire
Ballast Systems

- Deck barge was designed to be fully ballastable
- Ballast pump
- Tank manifold with crossover
- Ventilated ballast tanks
Deck Barge

• Originally built in 1976 as a heavy North Sea ballastable transport, this stout deck barge has heavy steel decks and members
• Deck barge is in very good condition and well maintained
• Deck barge is classed with ABS but suspended class during lay-up
Transport Options

- The power barge can be dry-towed on either a semi-submersible ship or deck barge
- It can also be wet-towed to any port
Business Options

• For sale as is, where is $10.75M
• For sale operating at 60 Hz (with 69 kVA substation) on distillate fuel $12M and 46 days
• For sale operating at 50 Hz (without substation) on distillate fuel $12.5M and 60 days
• For lease with rates depending on lease period and scope of supply
• Options by others
  – ABS marine classification estimated at $600K
  – Natural gas conversion estimated at $1.5M
  – Dual Fuel conversion estimated at $1.85M
  – Water Injection estimated at $630K
  – 50 Hz Generator Step-up Transformers by Equisales
  – Performance or mechanical warrantees
Planning

• Schedule 45 days to commission power barge and convert to 50 Hz and up to 60 days for dual fuel/natural gas conversions
• Demineralized water RO system to be leased by client to suit water conditions or demineralized water piped to the power barge
• Spares ordered by client to suit application
• Transformer change out depends on voltage
• Transport can take from 1 to 2 months depending on site location
Advantages

- Completed power plant with fuel treatment and step up transformers priced out at approximately $100 per kW installed capacity
- Single shipment to site
- Limited installation cost at site
- Relocatable without disassembly costs
- High residual value
Ready for Deployment