IDEA2022

Building Connections

June 6-9 | Sheraton Centre Toronto Hotel | Toronto, ON

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Staying Connected to Asset Health

TRACK, DRIVE & ACHIEVE YOUR NET ZERO GOALS

Ken Daycock

EtaPRO®

A Toshiba Group Company

Achieve What You Measure

Asset Health, like Human Health Requires:

Data

- Accurate Data (Big Data)
- Multiple Data Sources
- Various Technologies

Analytics

- Ability to Tracking, Trend & Report
- Anomaly Detection
- Diagnostics
- Prognostics
- Forecasting

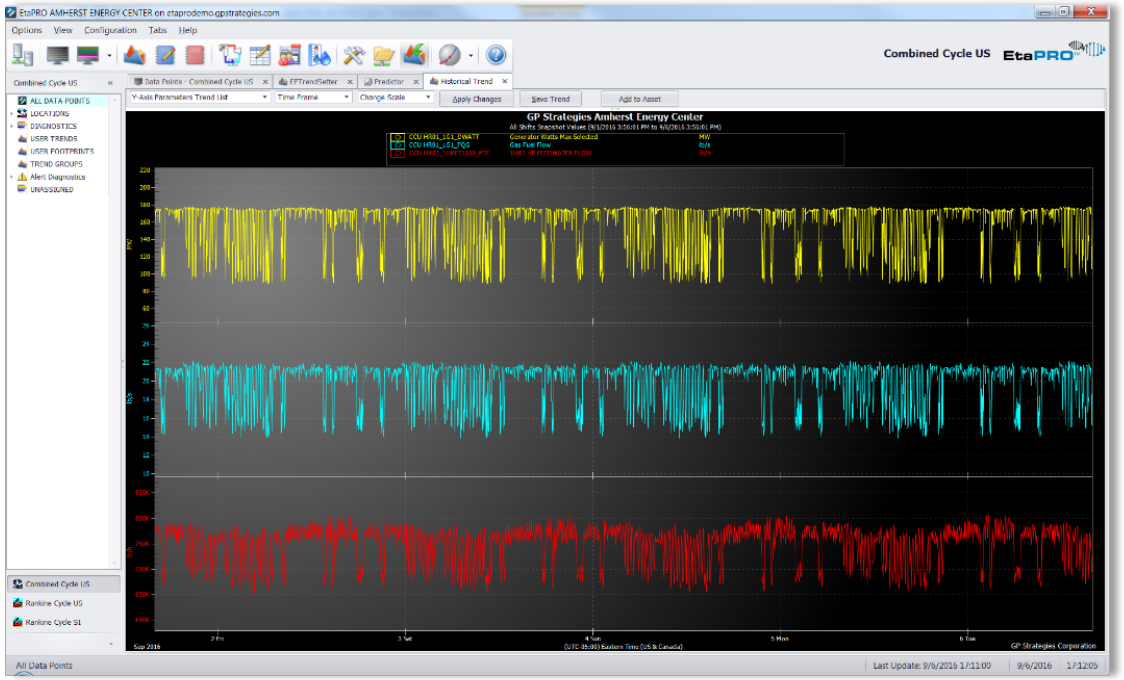
Energy
Temperatures
Pressures
Flows
Emissions
Efficiency
Sampling
Energy Sources
Inspection
UT
Thermography

People
Temperatures
B/P
Weight
EKG/ECG
CBC
CT Scan
MRI
X-Ray
Biopsy
Examination

Process DATA MANAGEMENT

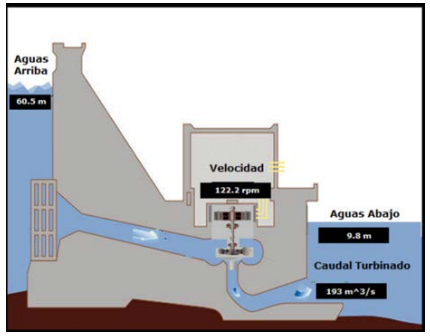
Data Sources

EtaPRO® archive™



Anomaly Detection (Empirical TWIN)

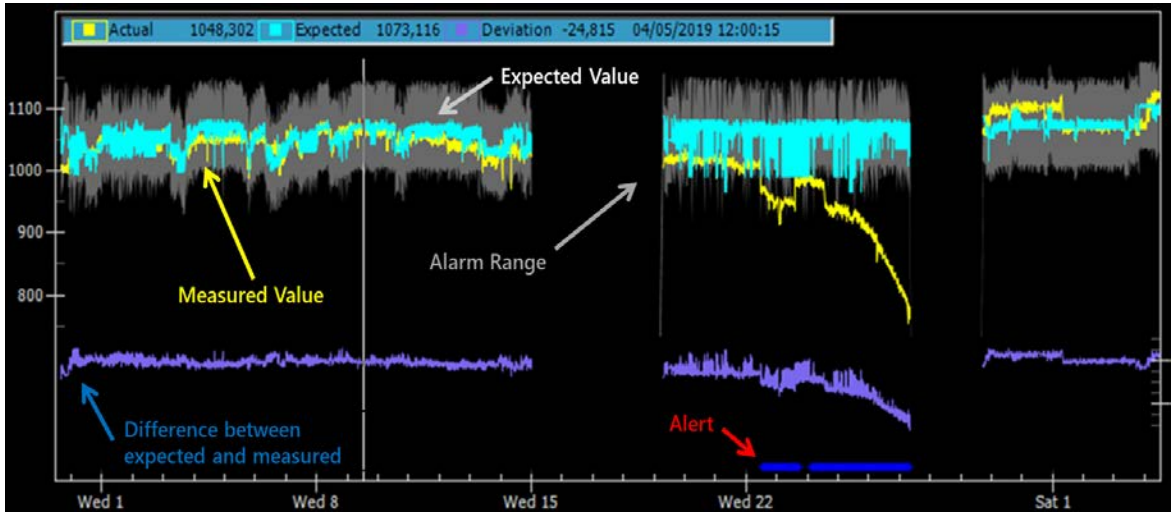
Sensors



- Power Output
- Reactive Load
- Gate Position
- Voltage
- Current
- Flows
- Stator Temps
- Bearing Vibration

APR Model

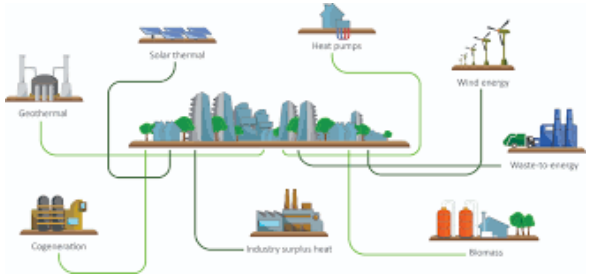
EtaPRO® APR



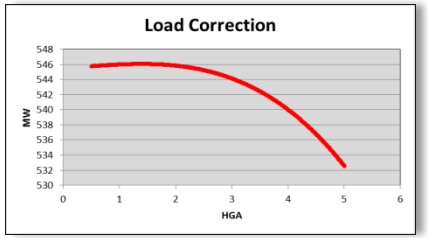
Identified a drop in thrust bearing outlet cooling flow on one of the six hydro units. Faulty valve identified as causing flow drop off.

Thermodynamic Model (Physics-based TWIN)

Design Data

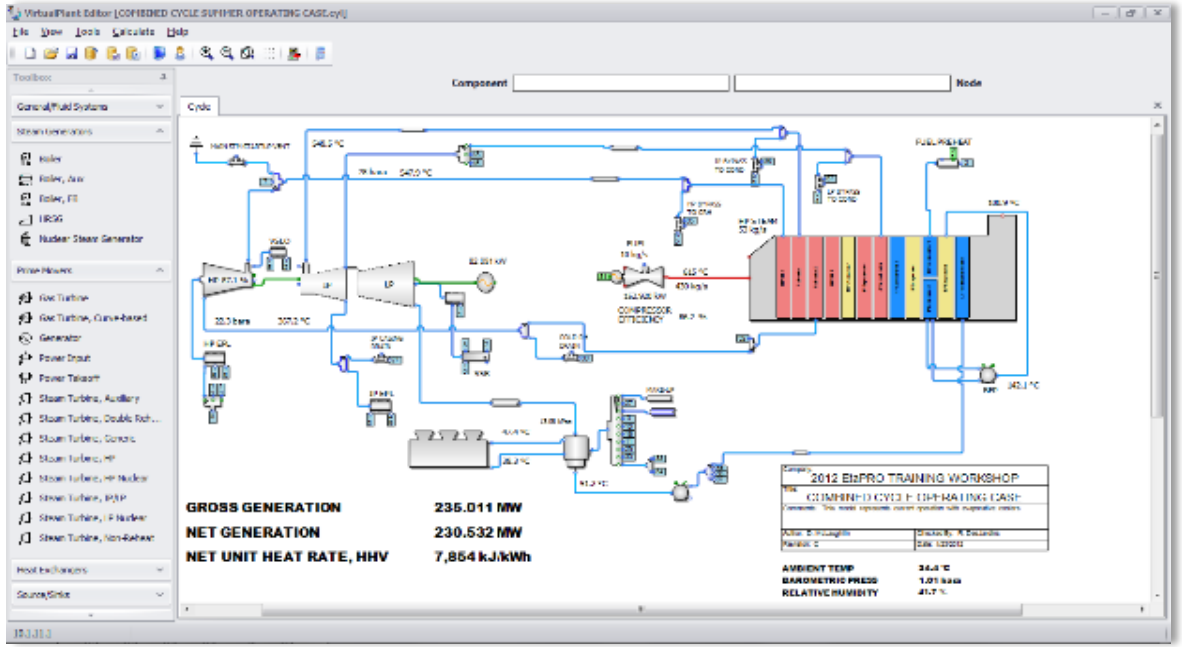


Engineering Principles



EtaPRO® VIRTUALPLANT™

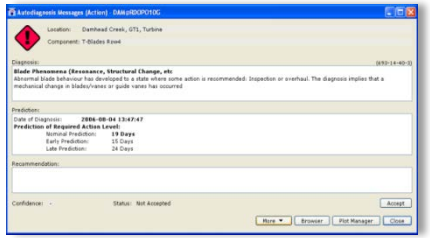
- Steam Generator
- Turbines
- Heaters
- Condenser
- Cooling
- Pumps
- Power Inputs
- Power Users
- Emissions



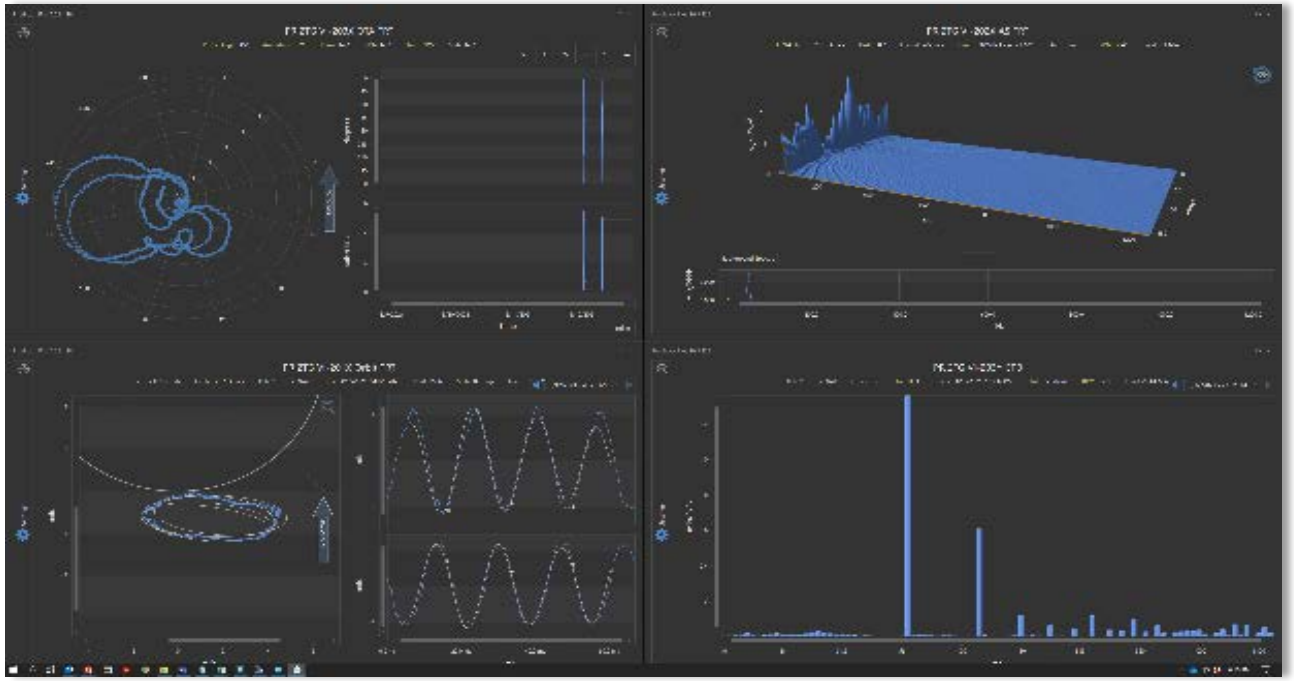
Machinery Dynamics (Frequency domain)

Vibration Signature History

AutoDiagnosis™



EtaPRO® predictor™

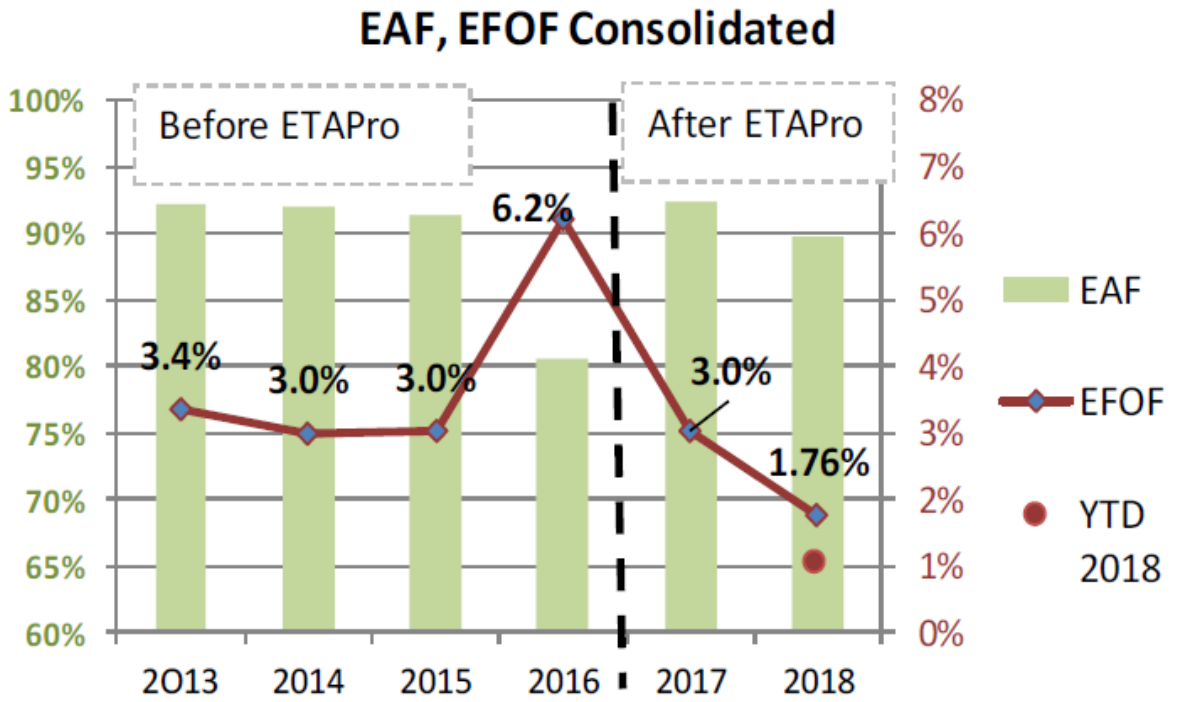


Representative Case Study

Thermal Plant Improvement Case

At one of many AES thermal power plants, EtaPRO has helped to improve efficiency and to reduce forced outage factor (EFOF). It is now integrated into their ISO 55001 certification.

- Efficiency (Heat Rate) → 87 BTU/kWh plant HR, $626,000/year savings
- EFOF → 0.3% budget reduction, $739,000/year (1.2% 2017 – 2018)
- ROI <1 year (few months)
- NPV > $2.3MM (5 years / 10%)
- ISO 55001 certification
- Safety (15% man-hour reduction for 2017/2018)
- Environment (32,000 tons of CO2 reduced 2017/2018)



Platform Demonstration

Lessons Learned and Best Practices

1. District Energy systems are complex, expansive and diverse. Having a fully integrated real-time platform makes it possible to balance off-sets, monitor efficient operations and ensure reliable delivery of critical services.

2. Digital Twins provide the ability to forecast and perform What-If scenarios, in support of real-time and day-ahead dispatching.

3. Digital Twins can also be used for evaluating process and technology changes needed to meet emissions expectations.

4. Advanced data driven tools for machinery diagnostics and anomaly detection are essential for ensuring the availability and reliability of CHP assets.

Q&A

Thank You!

Ken Daycock
Business Development Manager
Ken.Daycock@EtaPRO.com
716-766-1958

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