CHEM|E SHOW|23

november 28-30, 2023 | moody gardens, galveston, tx

SOUTH TEXAS SECTION OF THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Gulf Energy

ExxonMobil

Enterprise-wide Energy Efficiency Fleet Monitoring Tool

Energy lives here

Bill Hicks (EMTEC)

Presented: 2023 ChemE Show
Energy Efficiency & Decarbonization – Projects & Programs
Date: November 28-30, 2023

Contents of this presentation is based on “Enterprise-wide Energy efficiency fleet monitoring tool”, Hydrocarbon Processing, Sept. 2021; Enterprise-wide energy efficiency fleet monitoring tool (hydrocarbonprocessing.com)

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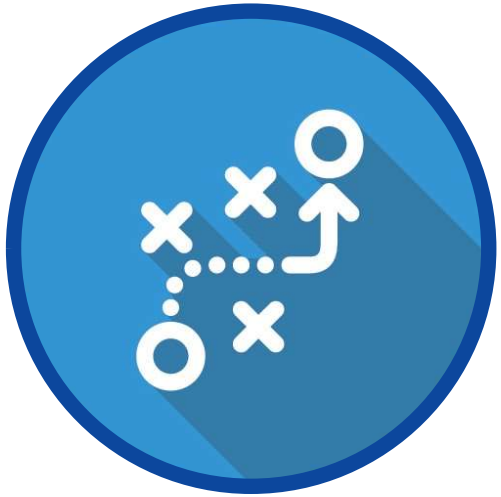
Disclaimer

Enterprise-wide Energy Efficiency Fleet Monitoring Tool

ExxonMobil | Fleet Management

- Plenary Talk by Kenny Warren at 2018 ARC Forum, Orlando, FL, 13 Feb 2018



Reduce CO_2 Emissions

Optimize Energy

Minimize Inefficiency

Fleet Management | Key to Efficiency Improvement

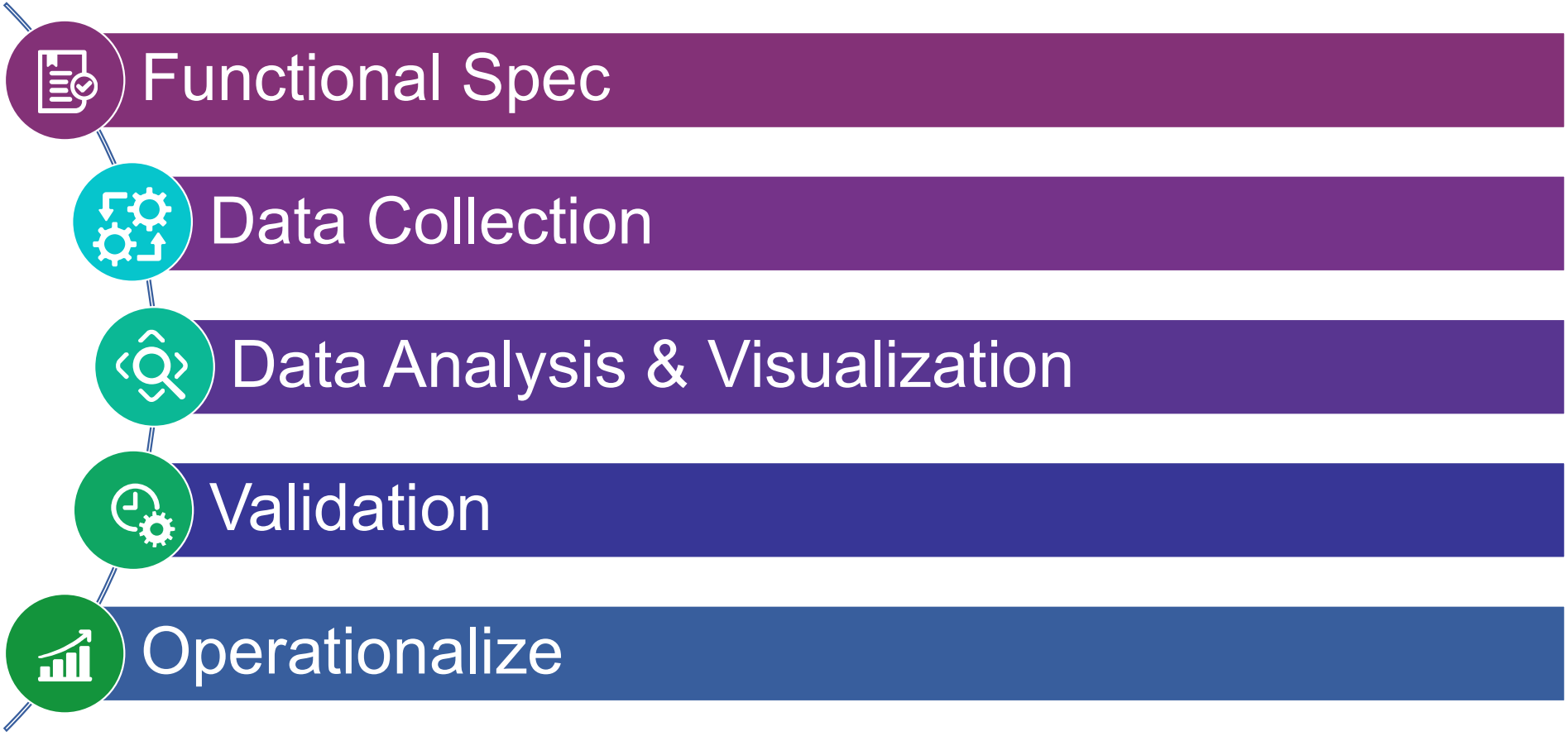
Case for Action

- Energy Efficiency
- Sustainability
- Green House Gas Emissions

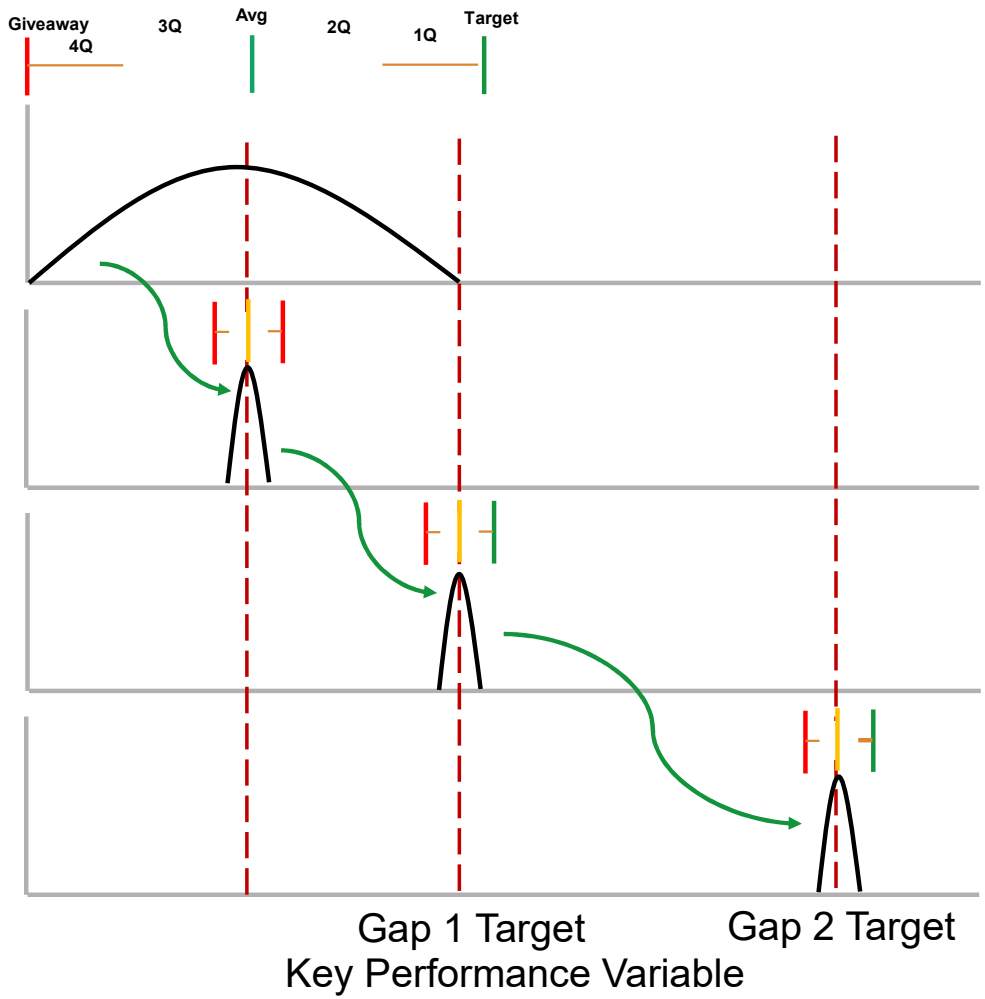
Objectives

- Identify/prioritize potential opportunities
- Gap estimate based on historical data and engineering benchmarks
- Identify long term trends
- Enterprise wide team for development and deployment

Development | Work Process



Journey | To Performance Excellence



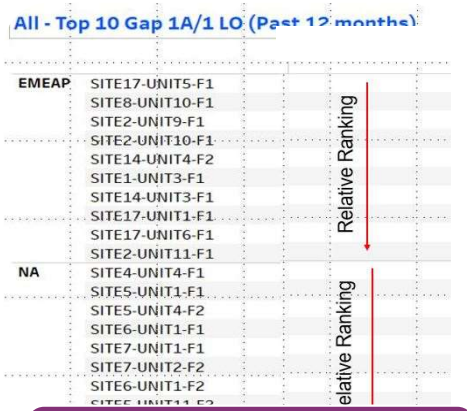
Current
- High Variability

Gap1A
- Reduce Variability
- Move towards G1 target

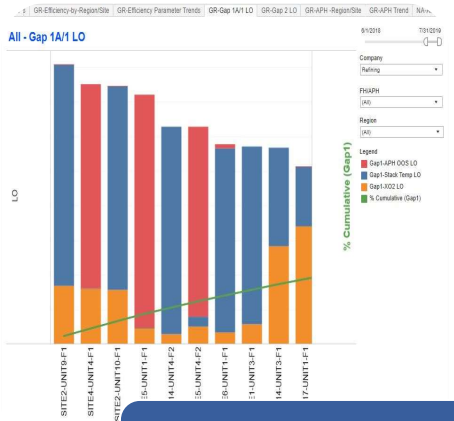
Gap 1
- Best Demonstrated

Gap 2
- Best Achievable
- Facility Changes

Fleet | Operationalize



Equipment Opportunities

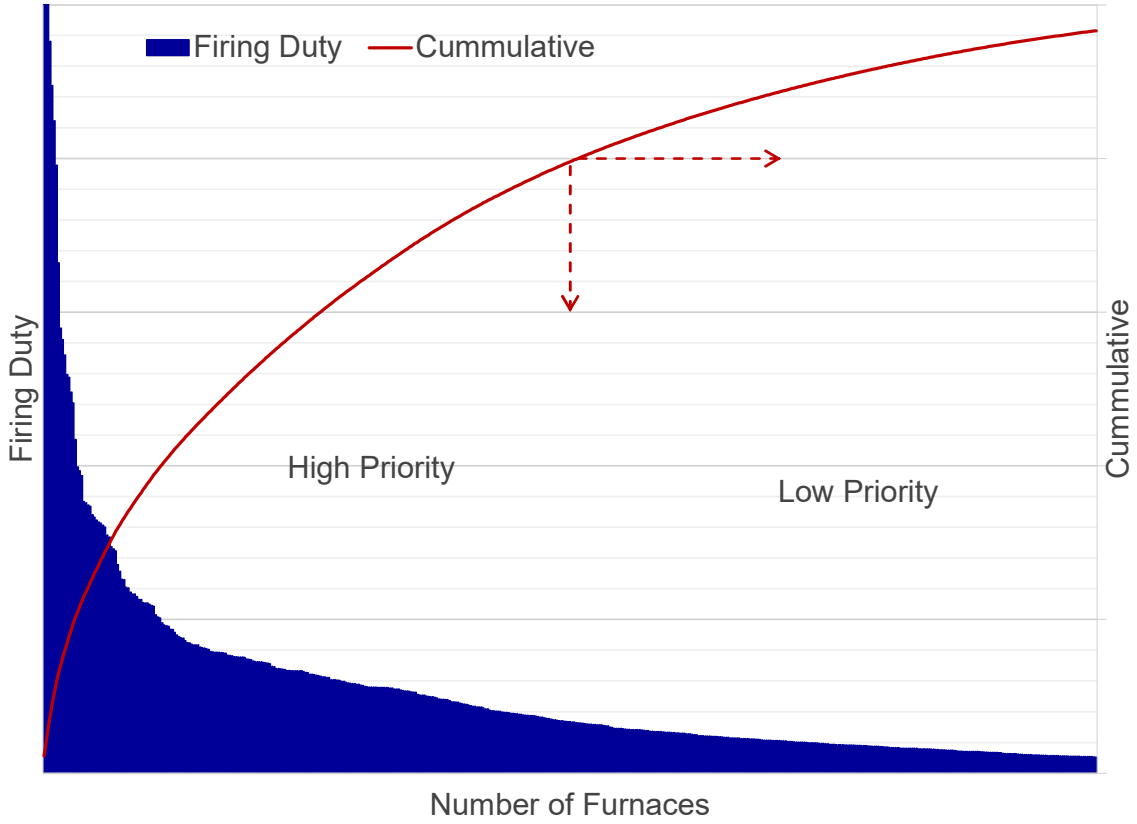


Dominant Cause

Gap Closure

- Site, Subject Matter Experts, Business Team

Fleet | Population & Development Scope

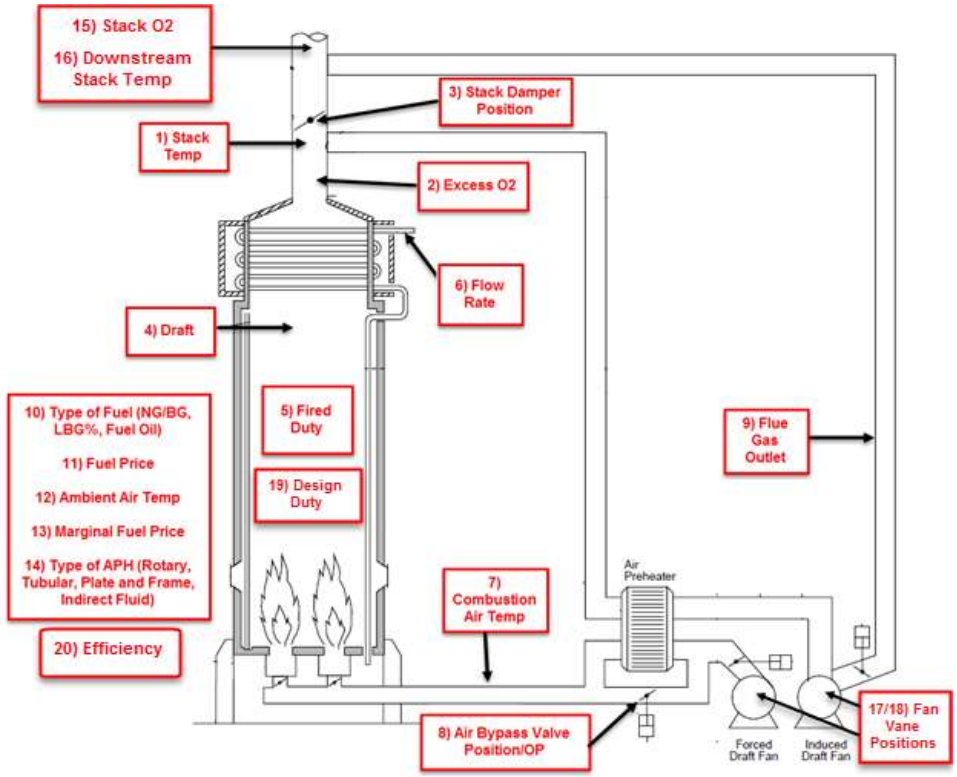


Source: Getty Images

- Fleet population is prioritized based on firing duty
- All types of FH and all FH having APH

Requirements | Process Data

- Equipment Information / tag collection
- Historical process information through data historian system
- Complete dataset uploaded into Tableau
- Validation exercise with sites and subject matter experts



Benchmarks | Target Definition

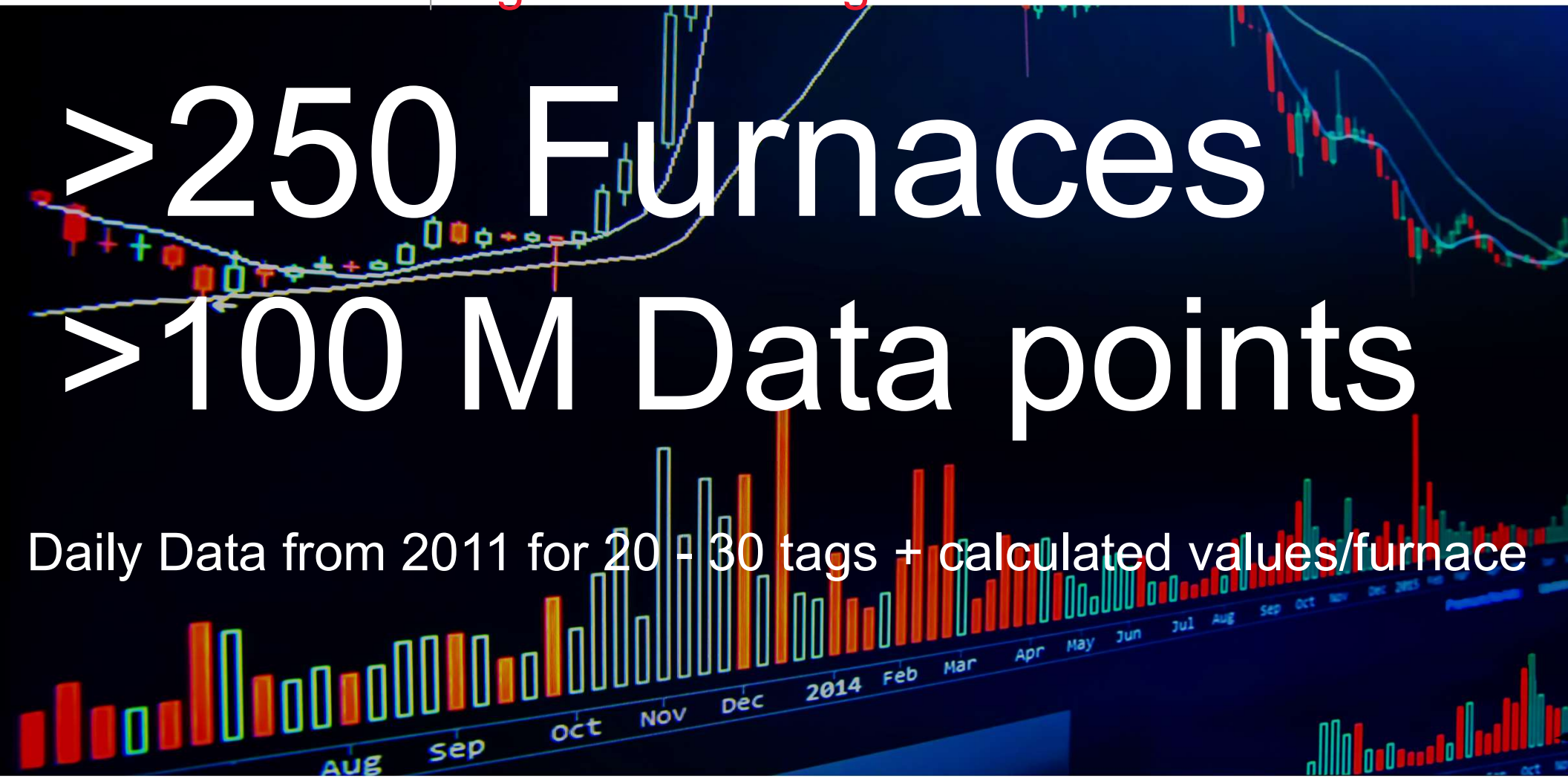
Gap 1

- Historical Performance
- 10 or 90 percentile of daily data

Gap 2

- Engineering benchmarks
- 300 - 350°F for stack temperature
- 1.5 - 2 % excess O2

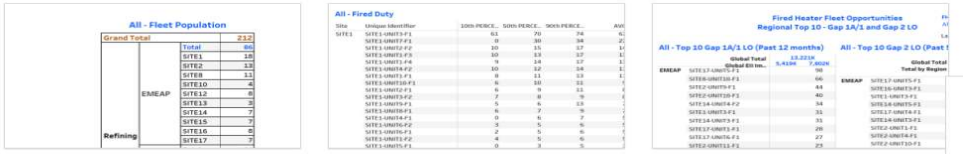
Tool Features | Big Data Handling



>250 Furnaces
>100 M Data points

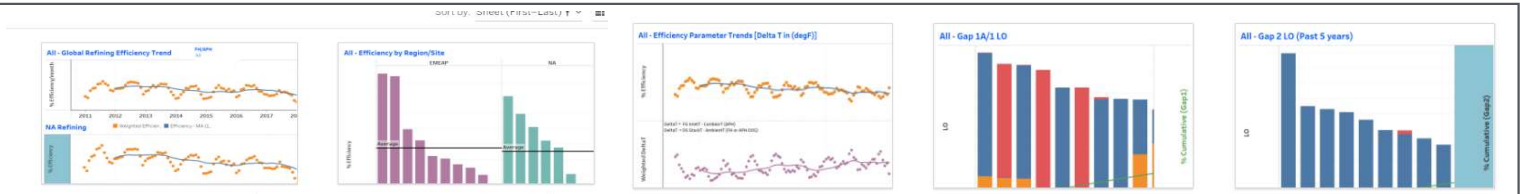
Daily Data from 2011 for 20 - 30 tags + calculated values/furnace

Dashboards | Fired Heater



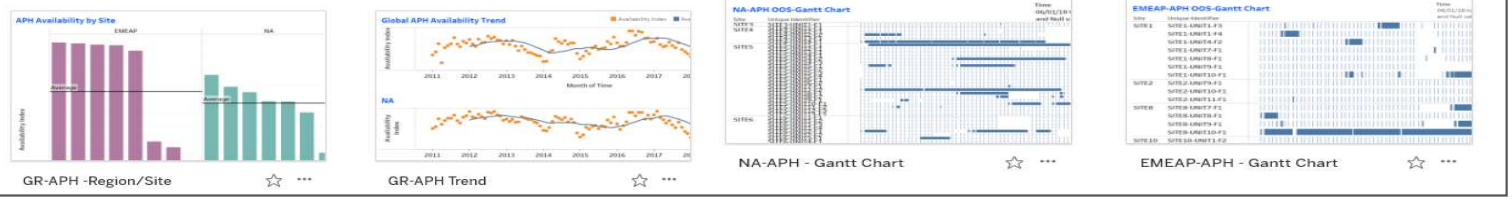
Fleet Population ☆ ··· Fleet-Fired Duty-Site ☆ ··· GR-Top10-G1-G2-LO ☆ ···

Fleet Population



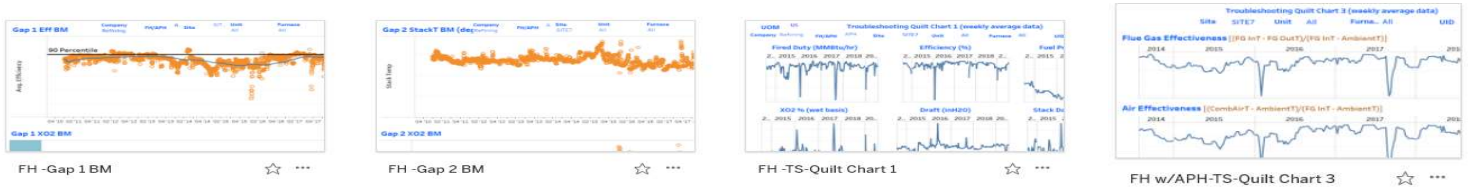
GR-Efficiency Trends ☆ ··· GR-Efficiency-by-Region/Site ☆ ··· GR-Efficiency Parameter Trends ☆ ··· GR-Gap 1A/1 LO ☆ ··· GR-Gap 2 LO ☆ ···

Global / Regional



GR-APH -Region/Site ☆ ··· GR-APH Trend ☆ ··· NA-APH - Gantt Chart ☆ ··· EMEAP-APH - Gantt Chart ☆ ···

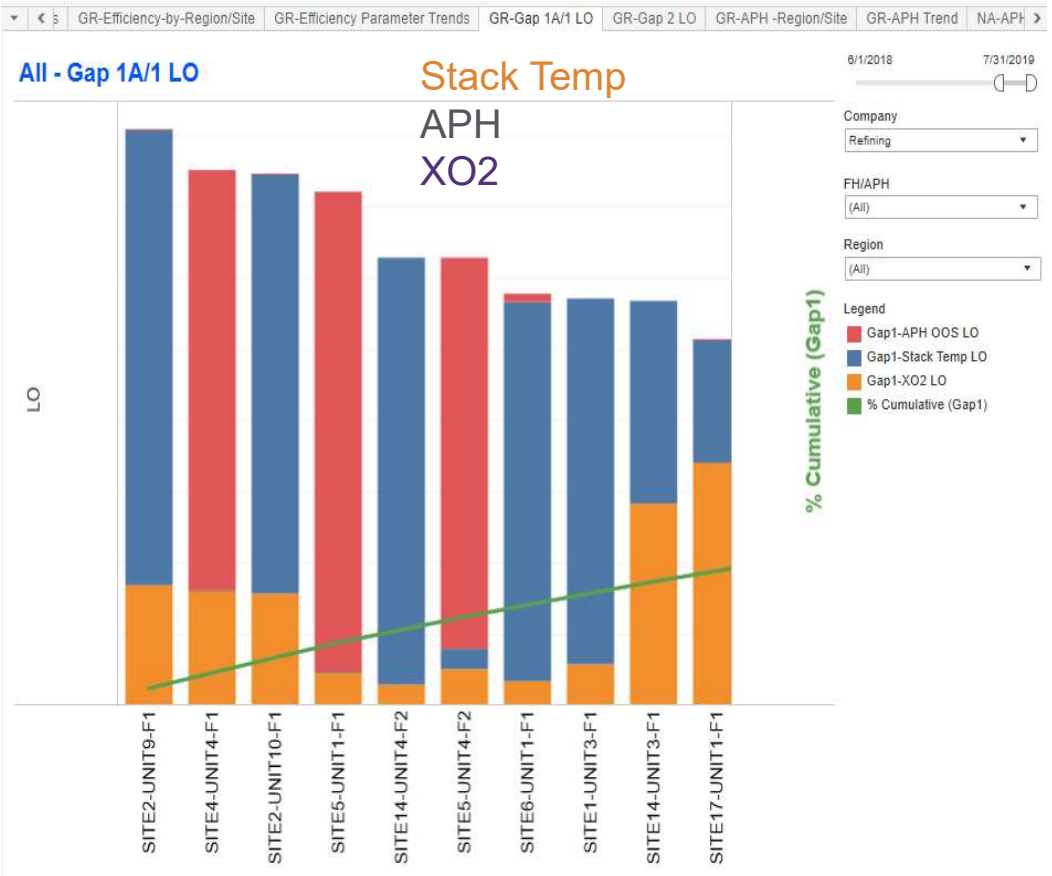
Site



FH -Gap 1 BM ☆ ··· FH -Gap 2 BM ☆ ··· FH -TS-Quilt Chart 1 ☆ ··· FH w/APH-TS-Quilt Chart 3 ☆ ···

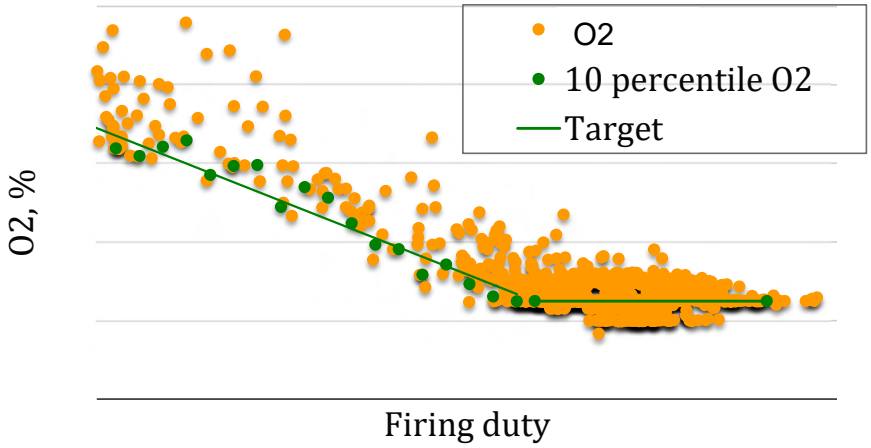
Equipment

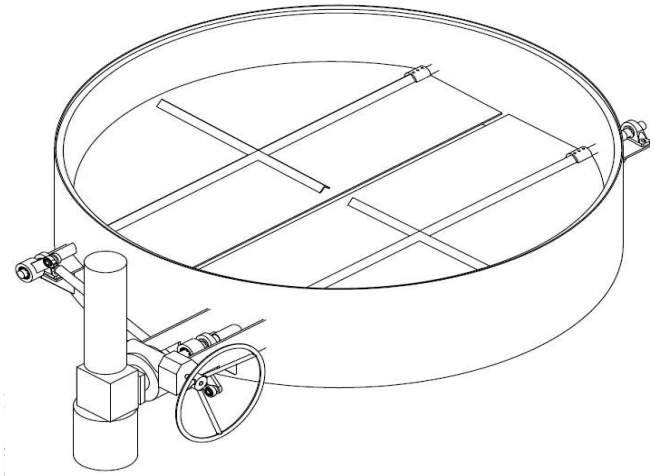
Opportunities | Areas for Improvement



Improve | Time For Action

Excess Air | Offer Technical solution for Gap Closure





Source: Getty Images

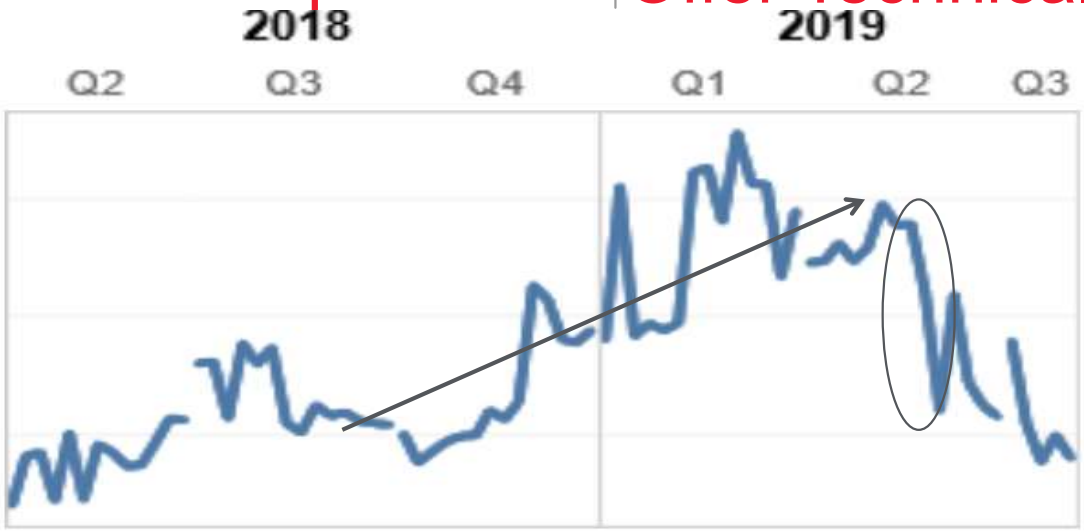
Establish best demonstrated performance under turndown conditions

Triggers root cause investigation to minimize gap

- Damper repairs
- Seal – Leaking furnaces
- CO breakthrough testing – for turndown operations

Source: Getty Images

Stack Temperature



Offer Technical solution for Gap Closure

Source: Getty Images

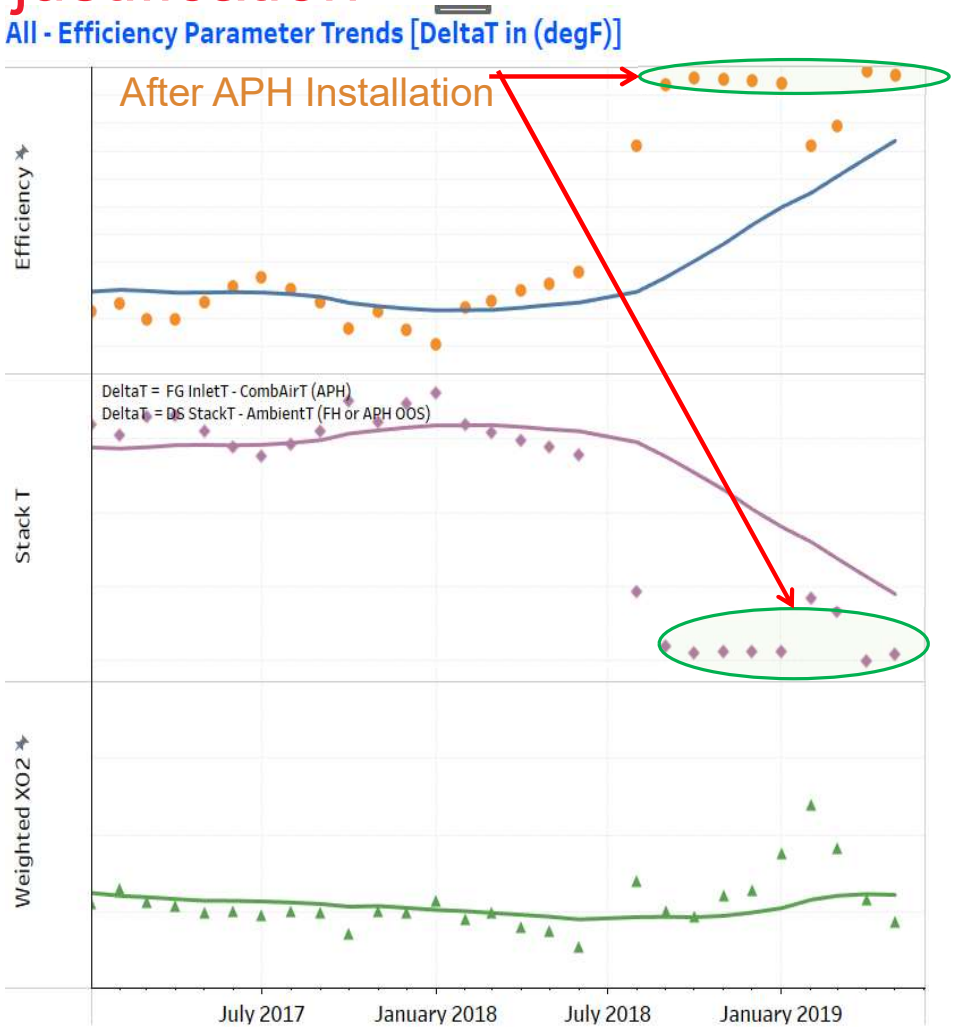
Gap Closure Solutions

- Convection/Radiant section fouling
  - Online cleaning – Chemical clean
  - Offline cleaning – Sand blast, hydroblast etc

Structural Improvements

Project justification

- Provides justification for potential structural improvements
  - APH reliability improvements
  - Revamp for improved metallurgy/technology
  - Preventive regular maintenance
- APH Installation
- Tool helps to convey actual monetary loss incurred vs typical project justification
- 10-15% improvement identified at few sites and included in site execution plans



Site Empowerment | Drives Energy Excellence


Thank
you!