VisualMesa™

Energy Performance Real-Time Optimization

Energy intensive manufacturers around the world are highly interested in, and have a strong need for, energy management systems (EMS) that will help them consume less energy and reduce their operational costs. Additionally, there is an increasing trend to optimize the mix of conventional and alternative energy sources used by facilities, which can help to protect the environment by reducing the emissions of gases such as CO_2 and NOx.

Tradeoffs between the electrical, steam, and chilled water systems are determined by complex relationships that present an overwhelming 24/7/365 challenge to operators in their effort to provide stable and reliable service while at the same time trying to minimize cost and greenhouse gas emissions.

VisualMesa™ Energy Performance Real-Time Optimization (EP-RTO), using best in class technology, determines how to manage your steam, chilled water, electrical and fuel efficiently and reliably, and provides significant cost savings through the economic optimization.

EP-RTO is an online and real-time implementation with an engineering model, which considers plant control strategies and system reaction to changes in the utilities. EP-RTO gives operators actionable advice on how best to operate complex, interactive utility systems to minimize utility cost. For example, operators receive directives on how to set cogeneration and boiler steam production, swapping steam/electric drives, chilled water supply, the export of steam, and how to manage real-time power purchase and sale.

Benefits

Reducing Energy Cost against Greenhouse Gas Emissions to help meet Environmental Sustainability Goals

Managing Facility* Steam, Chilled Water, Electricity & Fuel

Optimizing Energy Cost within Emissions† Constraints

Actionable Advice that Reduces Energy Spend

Facility planning through “What-If” case study capability

Attractive ROI (typical payback less than 1 year)

Reducing Carbon Tax and Improve Cap & Trade (local laws)

Technology Advantages

Online Engineering Model and Real-Time Optimization

Rigorous Combustion and Emissions Model

Mixed Integer, Non-linear Optimizer

Robust Integration with Utility Systems & Facility IT Systems

Easy to Use, Export to Excel

Familiar Microsoft Visio Based User Interface

Representative Reduction in Energy Spend and Greenhouse Gas Emissions

3% to 6% Energy Savings in Open-loop Optimization Advisory Mode

5% to 12% Energy Savings in Closed-loop Optimization

1% to 3% Energy Savings from KPIs

Typical Savings in 100,000 bbl/d US Refinery

$1MM to $2MM/Year Steam Imbalance resolution

Greater than $2MM/Year of integrated Steam/Power/Fuels/Hydrogen systems management

$2MM to $5MM/Year Carbon Tax or Trading (jurisdiction dependent; i.e., California’s Cap-and-Trade Program)

Reduced CAPEX through accurate and efficient case study analysis

Operational Excellence & Collaboration

Empowering Stakeholder Collaboration

Visibility into Steam, Electric, Chilled Water & Fuel Systems

Recommendations for Minimum Cost Utility Supply Operation

“What If” Studies: Predict the Impact of Proposed Changes

Auditing, Accounting & Data Validation

Industry Experience

Refining & Petrochemicals

Campus & District Energy

Sugar & Ethanol

Pulp & Paper

Representative Case Histories

ExxonMobil
Phillips 66
Chevron
Usacucar
Repsol
KNPC
Total
Thermal Energy Storage
DOW (Rohm & Hass)
Cepsa Quimica
Air Liquide
LOTOS
INEOS
YPF

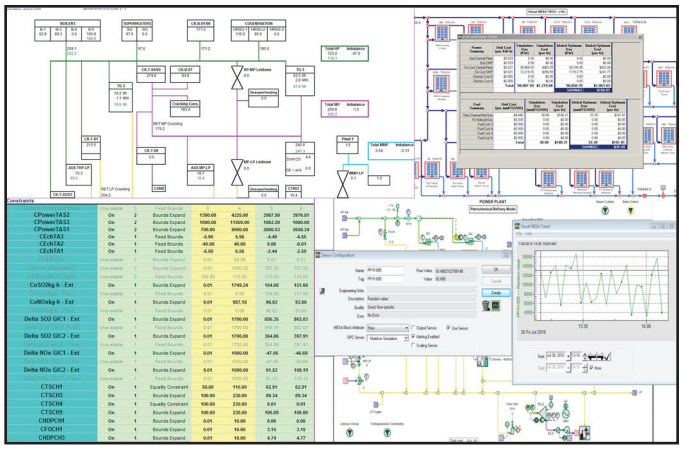
Powerful Energy Management User Interface

Schematic Flow Modeling of Utility System

Equipment Details & Trend Charts

Summary View of Optimized Solution

Detailed Report of Recommended Operational Changes

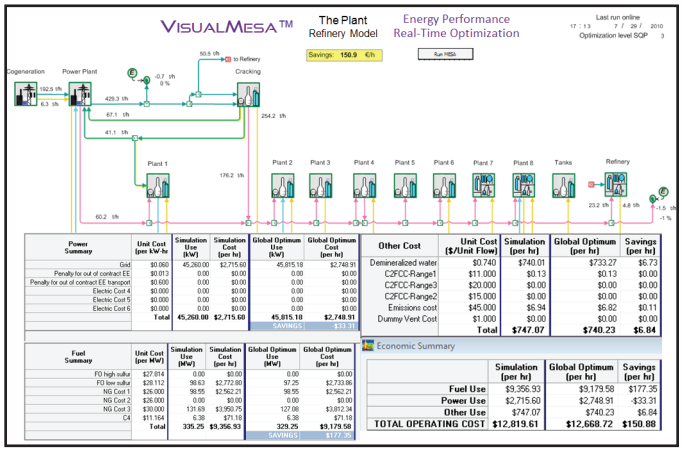


Optimization

EP-RTO has mathematical models and discrete, non-linear, optimization routines (SQP) built in to predict how to run the steam and electrical systems at the minimum cost while meeting required plant steam demands and other critical plant constraints.

EP-RTO also determines where to make incremental steam and electricity as well as identifying which turbines or valves will most efficiently let down the steam between process levels.

Refinery Model and Energy Cost Example

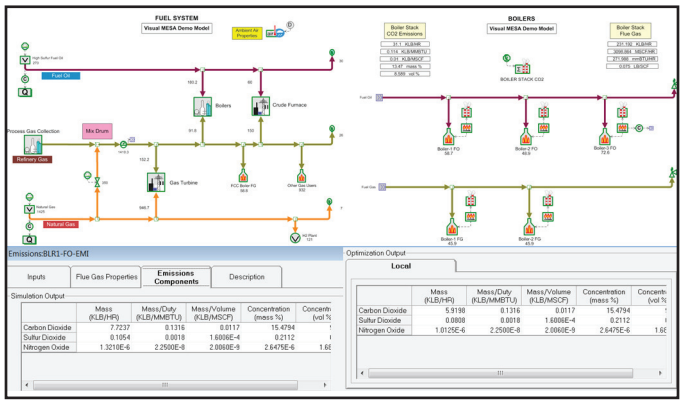


Objective: Optimize the Utility System,Total Operating Cost:

Total Operating Cost = Total Fuel Cost + Total Electric Purchase Cost + Other Costs (water, etc.)

Constraints such as: Total Energy Required & Emissions

Fuel Choices & Greenhouse Gas Emissions



EP-RTO chooses the most economic fuel to burn in the boilers and/or process heaters. The fuel system can be modeled in great depth to include emissions limits, CO_2 trading and contractual issues, such as fuel oil grades, natural gas suppliers, quotas and penalties if the former are exceeded. When cogeneration options are available the fuel/steam tradeoff can yield economic benefits.

Why Choose EP-RTO

Energy and emissions solution that maximizes today's opportunities and addresses tomorrow's challenges

Proven solution driving cost reduction, reliability improvement and environmental compliance

Easily accessed monitoring of the site-wide utilities systems from management to operator

Future operation and investment planning through "What-If" case study capability

Facilitates collaboration between plant management and operators from whole site perspective

Framework for alignment with ISO 50001 requirements

Unequaled installed base at 70^{+} sites including global majors

Sustained performance coaching and a proven ability to support customers worldwide.

Solution development that is driven by a culture of continuous improvement for over 30 years.

* Facility such as: oil refinery, petrochemical complex, pulp and paper plant, sugar mills with cogeneration, sugar refinery with ethanol production, medical center with cogeneration, hospital complex, corporate research buildings, university campus utility systems, military base with microgrid architecture, municipal central heat & power, city, county & state / provincial government offices with combined heat & power.

† Emissions from combustion such as: carbon dioxide (CO_2), hydrogen sulfide (H_2S) & oxides of sulfur (SOx), nitrous oxide (N_2O), other oxides of nitrogen (NOx) greenhouse gas (GHG), smog-ozone forming, acid rain gas components i.e. sulfuric acid, carbon footprint coefficient.

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