Intelligent Energy Management For Industrial and Commercial Facilities
OVERVIEW

• State of U.S. Power Industry
• Why Important for Industrial Engineers?
• Energy Management Methods for Industrials
  • Energy Efficiency
  • Demand Control
  • Demand Response
  • Real Time Pricing
• Case Study Example
THE AMERICAN POWER INDUSTRY: 20\textsuperscript{TH} vs. 21\textsuperscript{ST} CENTURY

\textbf{20th}:
- Economies of scale create ever-cheaper power
- Traditional fuels and sources
- Primarily supply-focused
- Passive “one-way” grid

\textbf{21st}:
- Cost of key materials and fuels increasing costs for all parts of the industry
- Cleaner supply technologies and greatly reduced carbon emissions
- Energy efficiency and demand response critical for customer value, reliability, and environment
- Transformation to “Smart” Power Grid

* Slide from The Brattle Group presentation "Transforming America’s Power Industry: The Investment Challenge" April 21, 2008
America’s electric utilities are facing the greatest challenge in their history:

- Fuel costs remain at record-setting levels
- Plant construction costs have soared in the past several years
- Combating global climate change requires
  - “decarbonization” of supply
  - enhanced energy efficiency
- New technologies require a larger, “smarter” grid

* Slide from The Brattle Group presentation “Transforming America’s Power Industry: The Investment Challenge” April 21, 2008
OVERALL POWER INDUSTRY OUTLOOK

Investment on the order of $1.5 trillion will be required over the 2010 – 2030 period

- Distribution - $675 billion
- Transmission - $233 billion
- Generation - $560 billion with no changes in carbon policy

* Slide from The Brattle Group presentation “Transforming America’s Power Industry: The Investment Challenge” April 21, 2008
"So we have a choice to make. We can remain one of the world's leading importers of foreign oil, or we can make the investments that would allow us to become the world's leading exporter of renewable energy. We can let climate change continue to go unchecked, or we can help stop it. We can let the jobs of tomorrow be created abroad, or we can create those jobs right here in America and lay the foundation for lasting prosperity."

– President Obama, March 19, 2009
WHY IMPORTANT FOR IE’s?

• Industrials consume 29% of U.S. electricity

• “Energy placed second in this year’s survey of biggest cost challenges, moving up from fifth place last year.” – (2005 Food Processing Magazine Survey)

• IE’s eliminate waste
POWERIT AT WORK

- E&J. Gallo: 4 sites
- Stockholm Arlanda Airport: 4 sites
- Frito Lay: 4 sites
- Cargill: 2 sites
- Amy's: 4 sites
- PAUL MASSON: 4 sites
- PCC: 4 sites
- park inn: 8 sites
- Kelloggs: 2 sites
- Wihlborgs: 8 sites
- Constellation: 2 sites
- DANNON: 2 sites
- MetalTek International: 2 sites
- The Buck Company: 2 sites
- Powerit Solutions: 2 sites

www.poweritsolutions.com
INTELLIGENT ENERGY MANAGEMENT
INTELLIGENCE

Powerit Solutions Product Line

Energy Director™
EMS System

Predikt™
GUI Software

Konnekt™
Wireless Radios

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TWO TYPES OF ELECTRICITY CHARGES

• Consumption
  • kWh
  • Example - $0.10/kWh

• Demand
  • kW
  • Example - $10/kW
Using advanced technology and smart program management to lower kWh spending while balancing the needs of production, safety, and comfort.
Intelligent Energy Efficiency Examples:

- Run-time Scheduling
- Temperature Setpoint Scheduling
- VFD Optimization
- Load Optimization
INTELLIGENT ENERGY EFFICIENCY

Predikt™ Energy Management Software for Refrigeration
INTELLIGENT DEMAND CONTROL

Using dedicated automation systems to predict and mitigate peak demand charges while maintaining strict control over operations.
Two Load Profiles: With and Without Energy Director

Facility Demand (kW)

Peak 5299kW

Setpoint 4295kW

Reduction of 1004kW @ $8.00 p/kW = $8,032.00 per month!

Demand Control Via Load Shedding

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By managing their peak demand, our client saves over $65,000 a month with no negative impact to production.
When a smart system implements sophisticated control schemes designed to tightly coordinate externally triggered curtailment events.
INTELLIGENT DEMAND RESPONSE

Accurate & Reliable Demand Response

- CURTAILMENT EVENT DURATION
- DR Baseline
- DR CURTAILMENT COMMITMENT
- DR Baseline - Curtailment Commitment = DR Setpoint
Intelligent Pricing Response

Automatically adjusting power usage based on real-time utility prices. Pre-defined curtailment strategies are implemented in response to changing price thresholds.
Savings via *Intelligent* Pricing Response

*Automated Response to Active Price Changes*

Hourly Price

- **MAXIMUM RESPONSE**
- **MAJOR RESPONSE**
- **MINIMUM RESPONSE**
- **NO RESPONSE**

RTP Curtailment

Time

- 12:00 am
- 1:00 am
- 2:00 am
- 3:00 am
- 4:00 am
- 5:00 am
- 6:00 am
- 7:00 am
- 8:00 am
- 9:00 am
- 10:00 am
- 11:00 am
- 12:00 pm
- 1:00 pm
- 2:00 pm
- 3:00 pm
- 4:00 pm
- 5:00 pm
- 6:00 pm
- 7:00 pm
- 8:00 pm
- 9:00 pm
- 10:00 pm
- 11:00 pm
- 12:00 am

$/MWh

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Case Study - WARCO

Facility Loads

- Mixers (2), Mills (18), Extruders (10), Microwaves (12), Steam Ovens (6), Injectors (3), Presses (9)
Case Study - WARCO

Implementation
- Auto Demand Response
  - Prevent additional batch processing
- Demand Control
  - Ensure shut down of some equipment during on-peak hours
- Monitoring
  - Real-time energy and load monitoring
Case Study - WARCO

Results
- Project Cost
  - $245,570
- Auto-DR Incentive
  - Verified kW Shed = 899kW
  - Incentive = $245,570
- Demand Control Savings
  - $56,910/yr
- Payback = 0 months
Demand more from the energy you use.

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