



BERKELEY LAB
LAWRENCE BERKELEY NATIONAL LABORATORY



U.S. DEPARTMENT OF
ENERGY

Using the Continuous Energy Improvement Process to Identify DR Opportunities in Industrial Facilities

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Energy Management

- Based on the idea of continual improvement
- Energy management system (EnMS) standards:
 - ANSI/MSE 2000 (2000)
 - EN 16001 (2009)
 - ISO 50001 (2011)
- Programs
 - Continuous Energy Improvement
 - Superior Energy Performance (based on ISO 50001)
 - Preliminary analysis of SEP demonstrations shows 4-6 month typical payback periods

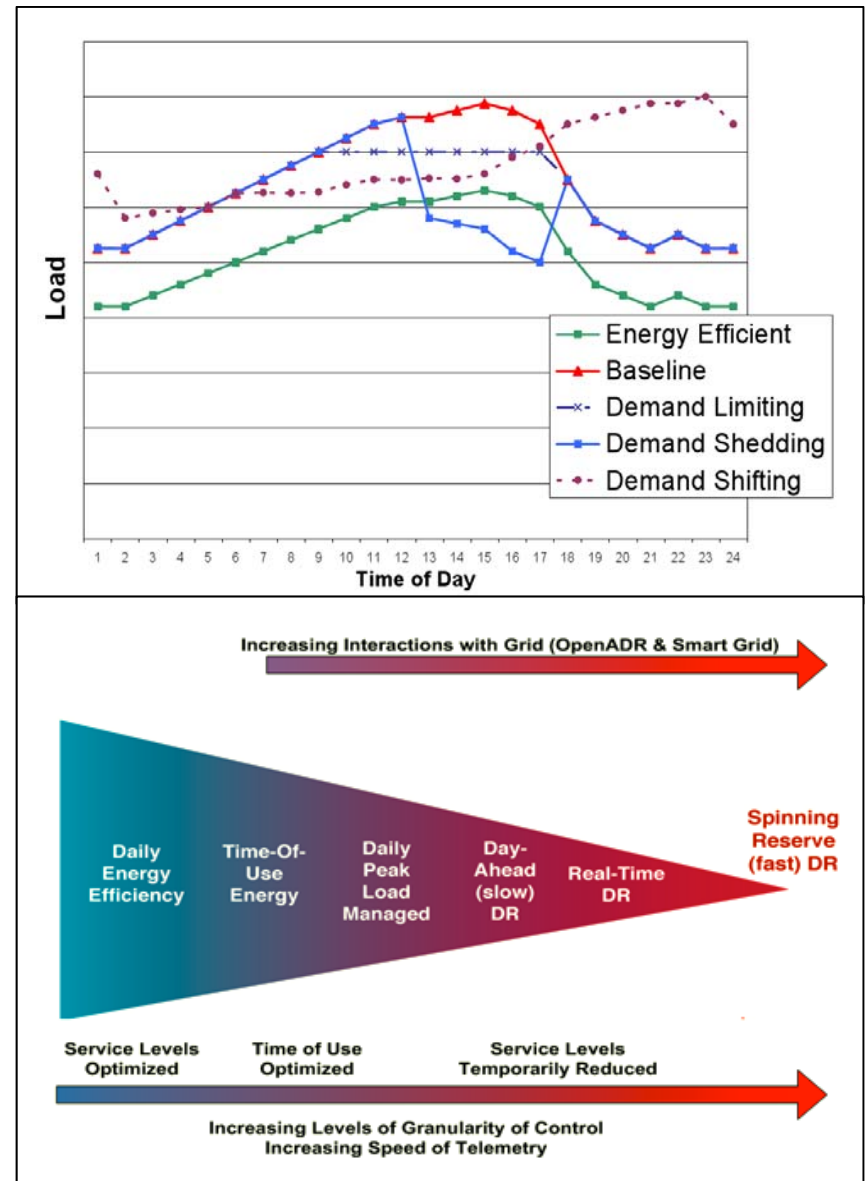


Demand Response

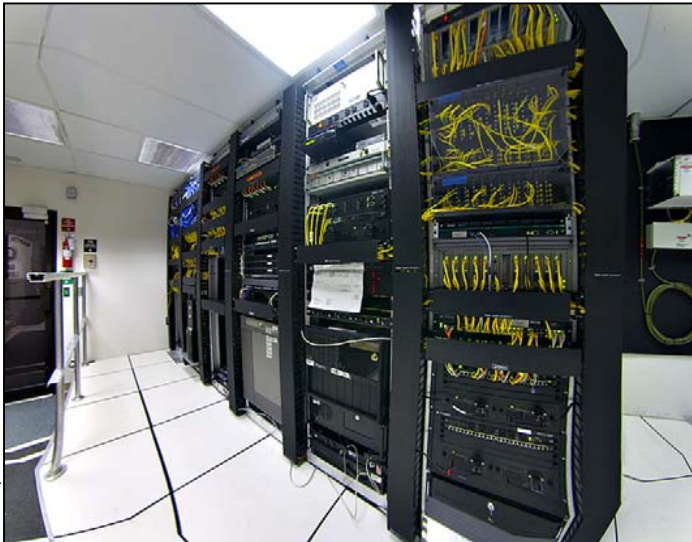
Demand response lowers total system cost during critical grid conditions

Demand response can be implemented in many ways:

- Load shed \longleftrightarrow load shift
- Manual \longleftrightarrow automated
- Day-ahead \longleftrightarrow short notice
- Voluntary \longleftrightarrow contractual
- Utility \longleftrightarrow third party



Industrial Demand Response



Interactions between EM and DR

- Effective energy management increases energy efficiency, potentially reducing baseline load
but
- Efficiency increases throughput, increasing flexibility
- If “energy cost” is a performance indicator, then effective DR will improve performance
- Load shed strategies for DR reduce total energy consumption. Some load shifts also reduce total energy consumption

Case Study Sites

Bentley Prince Street



Carpet manufacturing

Industry, CA

SEP Program (April 2011)

BIP tariff (30 minutes' notice)

J.R. Simplot



Fertilizer manufacturing

Helm, CA

CEI Program (early 2010)

Previous DR experience,
details unknown

Energy Management Activities

Bentley Prince Street

- Energy policy and energy manual developed
- Established baselines and EnPIs
- Held regular energy team meetings including discussion of DR
- Employees attended training session on DR tools and software

J.R. Simplot

- Energy policy developed, included in orientation
- Established baseline and KPIs
- Held regular energy team meetings
- Sent employees to DOE energy efficiency trainings
- Improved preventative maintenance and leak tagging programs

Capital Projects Implemented

Bentley Prince Street

- Installation of more efficient boilers (5 x 2 MMBTU replacing 1 x 36 MMBTU)
- CHP generation system rated at 455 kWe and 455 kBTU/hr
- Lighting retrofit for exterior and storage area
- 100 hp VFD-controlled air compressor
- Auto-DR system by Powerit

J.R. Simplot

- Replacement of maintenance shop heaters
- Lighting retrofit with automatic controls
- Steam and compressed air system surveys
 - Steam turbine rebuilt
- Improved combustion catalyst
- Seven pump projects with VFDs

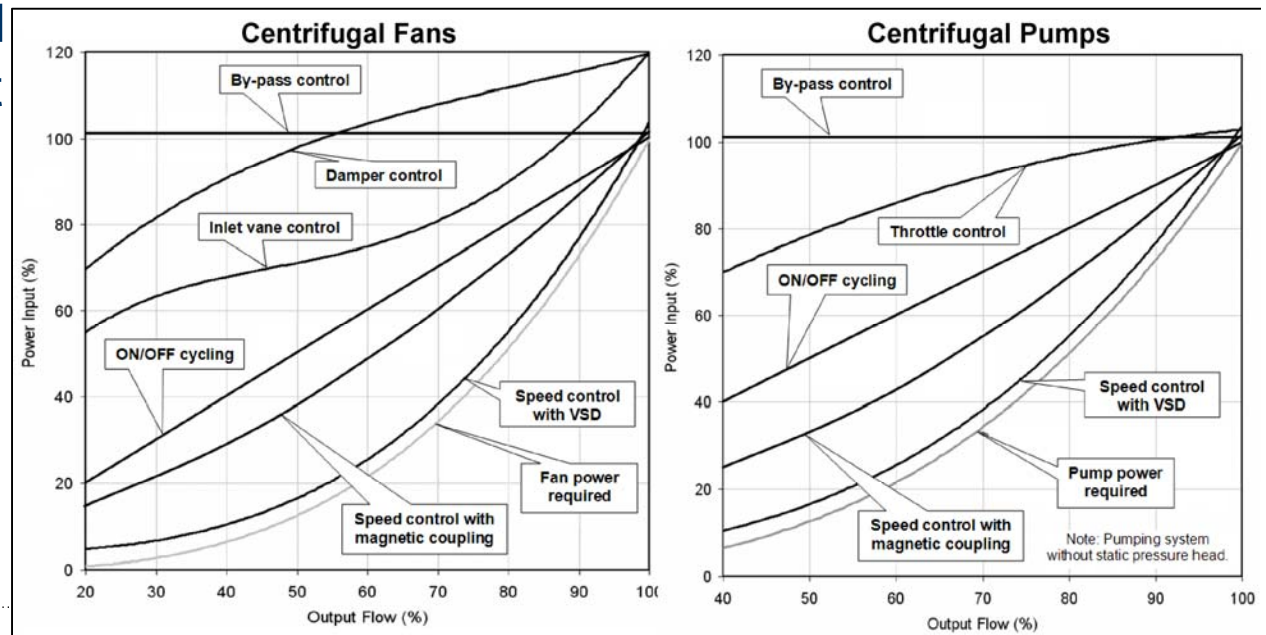
Improvements in DR Capabilities from EM

Technical Changes

- 100 hp VFD-powered air compressor at Bentley Prince Street
- Several VFD-powered pumps at J.R. Simplot
- JR Simplot has enrolled in a DR program with an aggregator
- Events are called at least 30 minutes in advance, and Simplot shuts down some production lines and intra-plant material transfers

Operational Changes

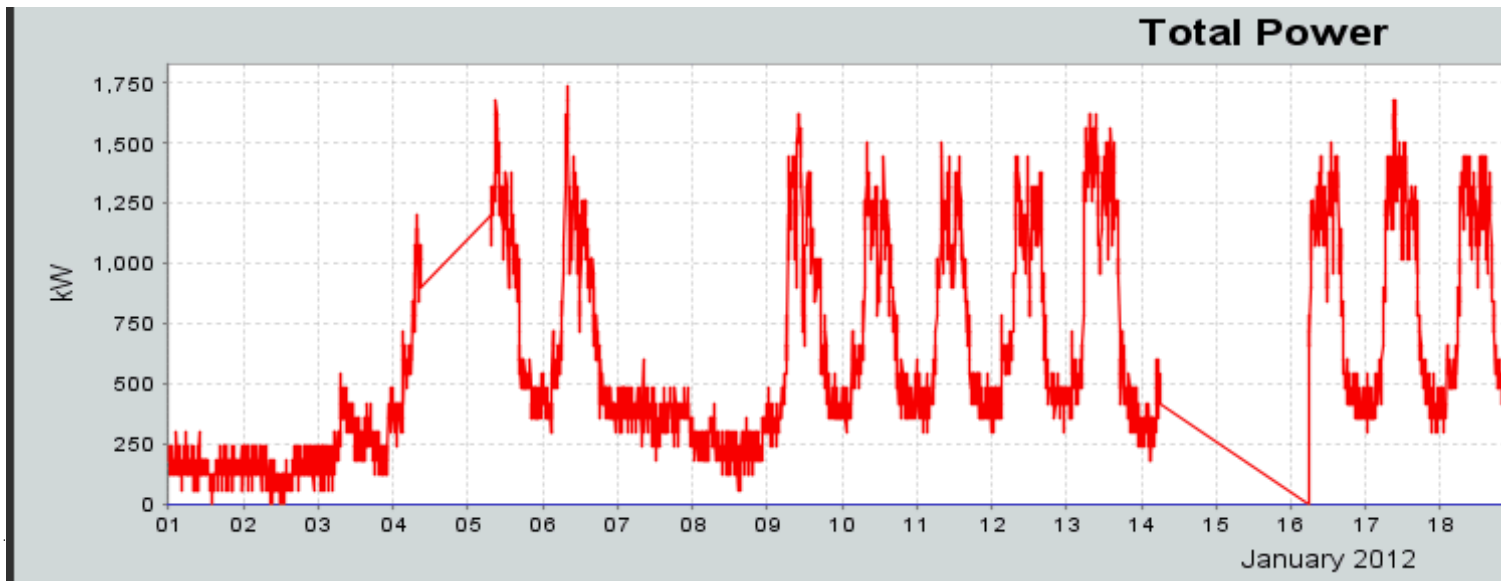
Energy meetings including DR at both facilities expanded awareness of DR strategies



Improvements in EM capabilities due to DR

Bentley Prince Street

Incentives received for Auto-DR implementation paid for the installation of real-time submeters, yielding additional information on equipment operation



Barriers to Further DR Implementation

Barriers

- Lack of controls
- Inadequate payback
- Perceived process inflexibility
- For Fast-DR, communication links must be upgraded to allow quicker communications

Potential Solutions

- Combined audits for energy efficiency, demand response, and energy management
- Integration of DR in building codes
- Market programs recognizing both energy management and demand response

**For more information, the full report can be found at
drrc.lbl.gov**

Questions?