

## The Customer as Variable Resource

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Demand Response Resource Center

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### A global company

\$28 billion sales in 2010  
 37% of sales in new economies  
 100,000+ people in 100+ countries

### with a strong US presence

+28,000 US employees  
 28 US manufacturing facilities

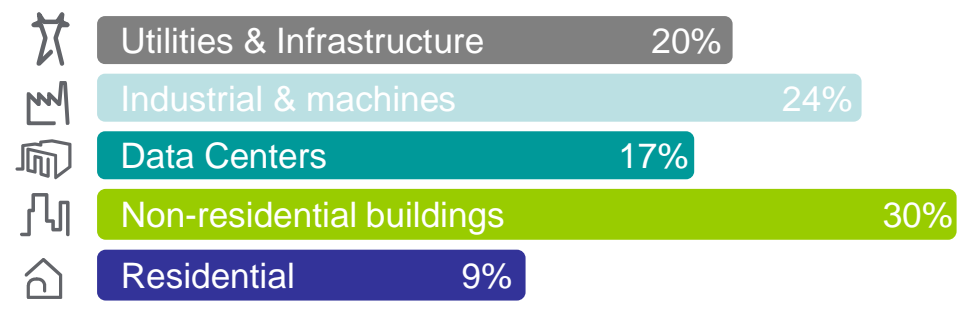
### committed to innovation

4-5% of sales devoted to R&D

### Some of our world class brands



### Delivering Solutions for End Users



# Project 1: Learning the Customer



## Commercial Building Facts:

- Historic McGraw Hill Building
- Location: Mid Manhattan NY
- Peak Load: 12.5+ MW
- Size: 49 stories plus 4 sub floors
- Tenants: Residential, Data Center, Restaurants, Commercial Offices
- Building Automation System – TAC Continuum
- DR – Initially enrolled for 600KW in NYISO ICAP demand response program through an aggregator

# Initial Project Goals

- Reduce Operation Expenses via reductions in Electric Energy spend
- Run experimental DR programs on their own to reap basic building efficiency benefits in addition to responding to NYISO programs and events
- To increase NYISO Demand Response Capacity from 600KW to 900KW through improved monitoring of energy systems and more reliable control strategies
- Prepare building for:
  - Real Time Pricing participation
  - Day Ahead, Emergency and Ancillary Services DR participation (in addition to the ICAP DR program)
- Apply strategy to other RGDC buildings throughout the US

- Upgrade Control System
- Recommissioned common area HVAC controls, drives and lighting systems
- BAS “scripts” developed to put building into 1 of 8 operation modes to balance comfort with the cost of energy & DR need
- BAS demand response controller installed to allow interface from BAS to DR price/settlement and event systems
- Add “energy loop” to BAS
- Continuous commissioning via analytics
- \$500K+

- Phase 1 (Q4, 2008)
  - Basic configuration, installation, upgrades to allow design goal with human operation
  - Successful test for NYSERDA grant
- Phase 2 (~Q2, 2009)
  - Semi-automated system scripts to achieve desired demand level
  - Increasingly automated response to DR event notices
  - Addition of RTP, Weather Data, and Billing Modules
  - Study tenant comfort perceptions to determine design goal
- Phase 3 (One year following Phase 2)
  - Use of operating parameters database to model automated building response to Real Time Pricing signals
  - Overall building operating strategy for maximum efficiency and lowered carbon emissions (“Let’s see what she’ll do!”)
  - LEED Gold + certification (USGBC Pilot)

- Initial:
  - Owner's capital funding
  - NYSERDA grant (\$180,000)
- Ongoing:
  - NYISO ICAP Demand Response (\$120K/MW/yr)
  - Energy usage savings (\*approx \$50K/mo)
  - Demand savings

- DR registration increased from 600KW to 900KW with another 500KW found to qualify for NYSERDA funding (total of 1.4MW)
- Use of DR techniques to reshape demand curve to avoid new demand charges and ultimately negotiate a better supply contract
- Provide positive cash flow in terms of:
  - Reduced KWHR (\*approx \$500K/yr)
  - Reduced KW demand
  - Improved DR load available which can be submitted
- New cash flow funded an upgraded BAS
- Process also made building more profitable, more efficient and more attractive to prospective tenants.
- **Results showed that building can take as easily as shed**



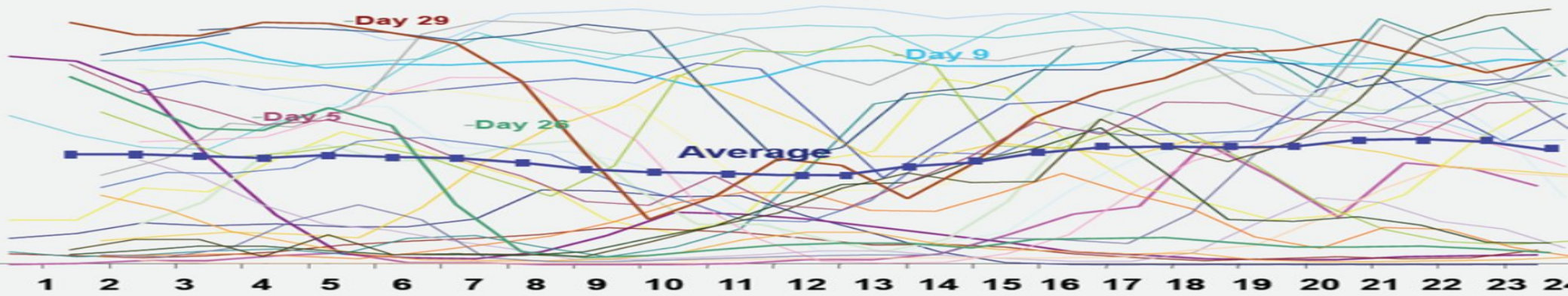


# Project 2: Bending Standards to Your Will

## Project Facts:

- Test DR role in mitigating effects of renewables for CEC and PG&E
- Participants: LBNL, SMCCCD, Schneider, Akuacom/Honeywell
- Participating Load: CSM campus of SMCCCD
  - Highly automated energy control system
  - Highly varied load attributes
- Automated shed/load strategies
- Push notices for rapid ramp up/down

Each Day is a different color.



## Pilot Parameters

- May-Oct, 2011, Mon-Sun, 24X7
- Auto DR Communications and Technology
- Real Time Telemetry
- Push Sequence for rapid ramp up/down
- Response in “Seconds”
- Ramp within 5 minutes
- Max of 5 calls, minimum duration 2 hours

- Load Shed during afternoon hours
- Load Take during Early Morning Hours
- Feedback and Adjustment Loop Based on Rock Center Model
- Rapid Response to Event Signaling



- Define “Push” messages
  - Firewall Issues
  - Rapid Polling Test
- Define initial and supplemental response scripts
- Global vs Local facility actions
  - Device control vs EMS control
  - Inherited programming but adjusted for local specifics
  - Maintain system integrity or allow local override
  - Critical zones excluded
  - Avoid ASHRAE Title 24 Violations
  - Conflict Lockout
- Rapid Response to Event Signaling
- Establish Feedback loop



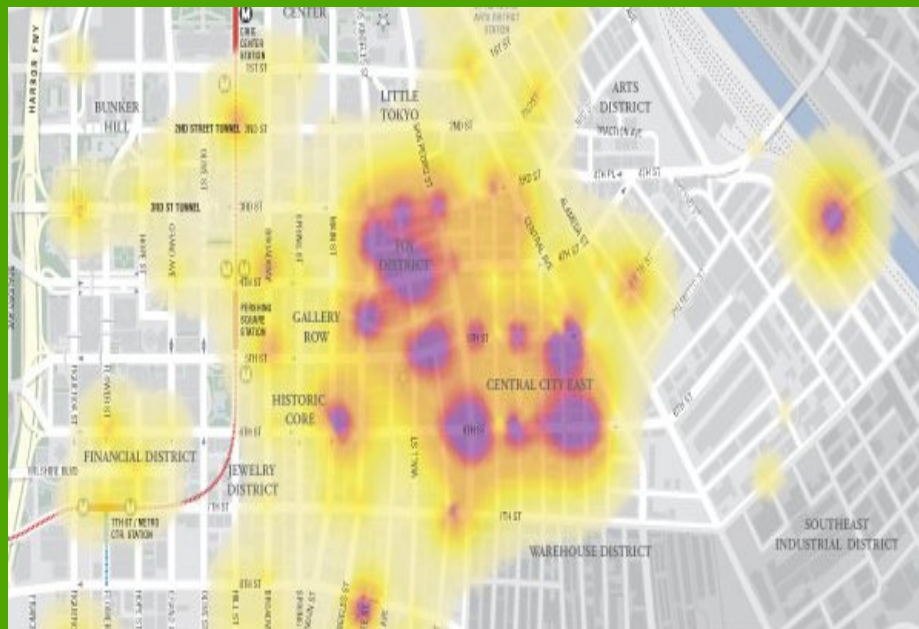
- Two months to commission
- Staff engagement and training
- Real vs. Coincident Issues
  - Noise
  - Hot spot complaints
  - Blown duct
  - “Say WHAT?!! Not with my firewall, you won’t!”
- Transference to Commercial enterprise
  - ROI
  - Staff disruption



- Rapid polling rates are a good proxy for Push signals
  - Overcomes firewall/security issues
- Latency from servers to EMS to controlled devices 1-2ms



- LBNL Full Report
- Add meter data loop to EMS for self correction
- Full Season Participation next summer
- Fine tune business processes
  - Diminished polling rates
  - Expanded customer segments
  - Targeted DR Program with ConEd



Thank you!



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**Schneider**  
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