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What is your Brand?





What is our Brand?





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Our Brand-Built around our 10-Year Marker

Strategic priorities for Johnson Controls future success

- Describes long-term priorities, adaptable to changing business conditions
- Provides ongoing 10-year outlook; most Markers do not have specific completion date
- Helps employees understand and help contribute to – the company's future





Smart Buildings for a Smart Grid A day in the life of a smart building... Wind Power Parking Dec Remote building Charles K. McGinnis connected by wireless transmission **Smart Enterprise** Management System Sr. Director-State Government and Power Distribution 10.00 Networks **Higher Education, North America** Sma Johnson Controls Inc. ub-station Grid Transformer Energy and emissions reporting · User-specific dashboards Portfolio-based analytics Automated workorder management Network Backbone Enhanced IT security **Energy Services Coalition** Water **Market Transformation Conference** Gas August 30th, 2015 Chillers Boilers Smart Building Management System **Charlotte, North Carolina** System integration Automated diagnostics Automated demand response Dynamic occupancy tracking · Energy savings measurement and verification Smart Grid integration





8:00 pm Smart planning for tomorrow

- System accesses tomorrow's weather forecast
- Real time price forecasts are received from the electric utility
- System schedules night time ice storage generation







4:00 am Chiller fault detected

- On-board diagnostics determines a chiller valve has failed
- System calculates costs associated with this fault based on real time price forecasts
- System auto-generates a work order and notifies facility manager by smart phone







7:00 am Chiller repaired

- Service technician arrives after being dispatched automatically
- Technician quickly fixes problem knowing the source and the new parts required
- Repair allows system to generate enough ice prior to spike in prices anticipated later in the afternoon







8:00 am

Employee plugs in vehicle at work

- Electric or plug-in hybrid vehicles recharge when real time price of electricity is low
- Smart charging supports voltage regulation for the local utility
- Purchase or sale of power to building is automatically factored into payroll system







9:00 am Meeting space is ready to go

- The building management system prepares the conference room for a meeting with 15 people
- Occupancy and CO₂ sensors provide an override in the case less or more people attend the meeting







10:00 am CFO calls for carbon reporting data

- A market analyst asks the CFO about the business' carbon management strategies
- Enterprise dashboard provides access to carbon emissions data for the most recent quarter and annual carbon reductions



Johnso

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11:00 am

Utility power price triggers automatic demand reduction for tenant

- The price for electricity from 12pm-2pm exceeds the threshold pre-defined by the tenant
- The following actions to reduce power demand are taken:
 - reset space temps by 2°F
 - slowly dim lighting 20% in occupant spaces
- Actions and impact reported back to utility







Power price triggers automated demand reduction for building owner

- The building management system also takes action in common areas:
 - dispatch ice storage cooling
 - increase chilled water set point
 - dim lighting in common areas by 20%
- Actions and impact are reported back to utility







Power price triggers more automated demand reduction for building owner

- Real Time Price from 2-5 PM from the utility well exceeds the thresholds for the tenant triggering more aggressive actions:
 - Temperature float to 4 degrees
 - Reduce lighting by 40%
 - Throttle non-production servers
- Actions and impact are reported back to utility







Automated demand reductions leverage IT system integration

- System alerts employees via email or text message to unplug their laptops and run on battery power from 2-4pm
- PC power management software agent automatically reduces desktop power consumption
- Computing load is reduced for non-production servers and non-critical tasks are deferred







Cloud cover causes solar photovoltaic generation to drop

- Building receives a demand limiting signal from utility during the 2pm -5pm period.
- When cloud cover causes solar production to drop, system uses on-site electric storage to meet demand reduction goal
- Combination of distributed generation, electric and thermal storage and vehicle charging is used to control the load profile







5:30 pm Leaving the office

- As employee badges out, the system automatically turns off the lights and puts the computer into stand-by
- When he arrives to parking deck, his plug-in electric vehicle has been charged just enough for him to get home







6:30 pm End of the workday

- System controls lighting and HVAC to follow the janitorial staff throughout the building
- Video surveillance system counts occupants remaining after hours and adjusts temperature setpoints and lighting







Case Study: Georgia Institute of Technology



- Georgia Tech buys electricity on dynamic hourly price from Georgia Power
- Each hour, building management system reads prices for for next 48 hours from utility's web service feed
- Facilities director sets price threshold for automated load shedding mode

Savings during initial summer 2006 single building pilot

Week	Number of RTP Events	Amp-Hours Saved	Energy Saved (kWh)	Cost Savings (\$)
July 16-21*	5	524	3772	438
Aug. 8–12	4	185	1335	155
Aug. 13–19	2	27	195	22
Aug. 20–26	1	60	431	50
Aug. 27-Sep. 2	3	150	1080	126
Total	15	946	6813	790

Observing a ~1MW peak load reduction, 7% of load for participating buildings



Case Study: Empire State Building



RESULTS

38% energy savings, guaranteed

Simple payback under 3 years

LEED Gold certification

Energy Star Top 10% of U.S. office buildings

33% reduction in cooling load

Savings of **\$4.4 million** annually







Stanford University Building & Plant Optimization







Great Brands



The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy

Martin Luther King



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Leadership is about making others better as a result of your presence and making sure that impact lasts in your absence." Sheryl Sandberg, COO of Facebook



Great Brands



The difference between a successful person and others is not a lack of strength, not a lack of knowledge, but rather in a lack of will

Leaders are made, they are not born. They are made by hard effort, which is the price which all of us must pay to achieve any goal that is worthwhile

Vince Lombardi



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Lets find it together







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