Smarter Physical Infrastructure

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Business without **LIMITS 2012**   [**13th September 2012, Mumbai**]

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Power outage on 31st July 2012

- **3 out of 5 Indian Regional Grids collapsed**

- **Impact**

  - **600 million people in 22 states without power**

  - **200 coal miners got trapped**

  - **300 trains came to a grinding halt**

  - **Presumptive losses in Crores**

[1] http://www.indianexpress.com/news/power-grid-fails-again;-blackout-blankets-half-of-india/981887/0
Credits: IBM India Research.

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In India, IBM is engaged with clients to build

- Smarter Buildings

- Smarter Telecom Infrastructures

- Smarter Power Generation

- Smarter Water Utilities

- Smarter airports

- And so on ...

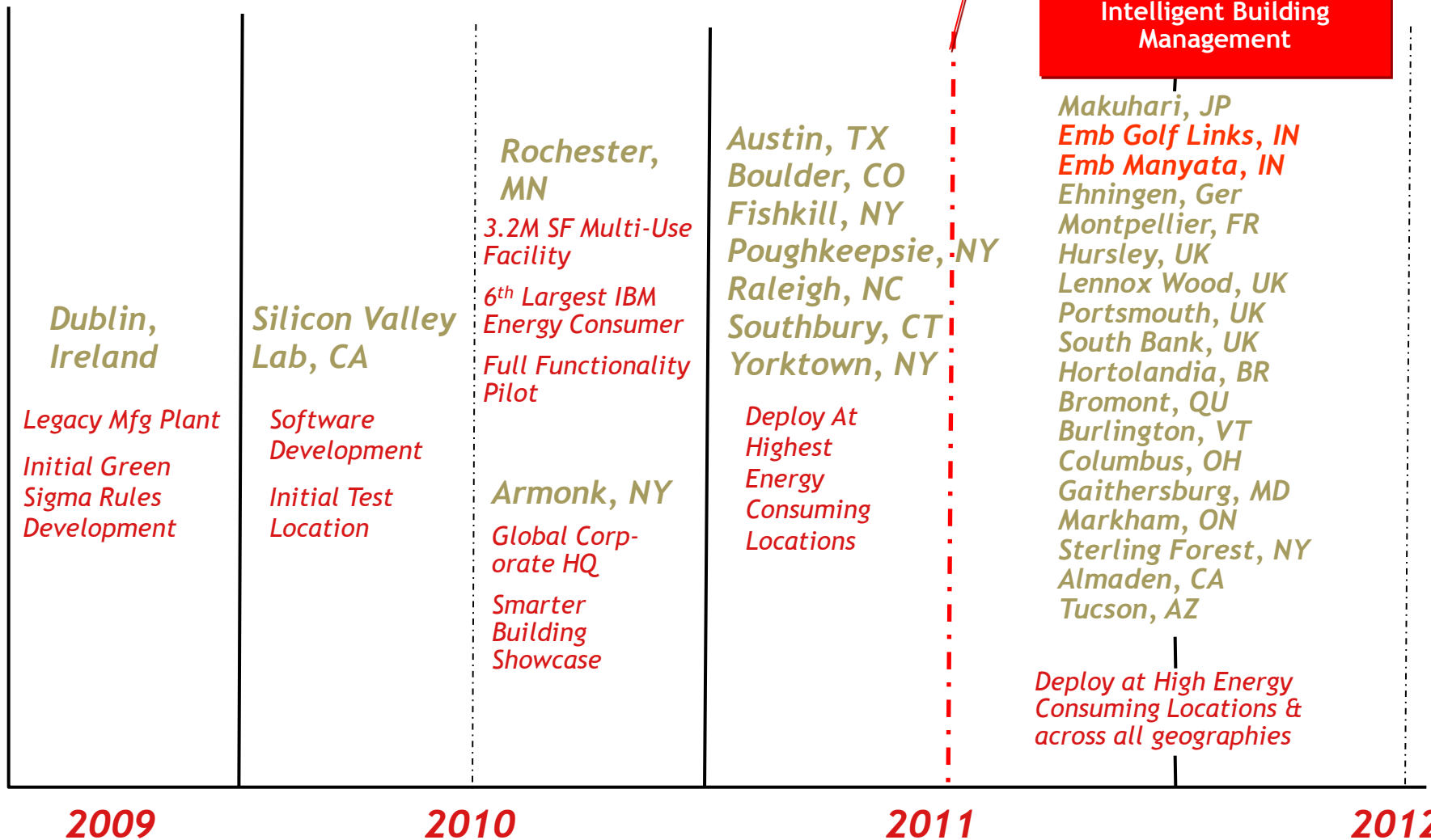Business without **LIMITS 2012**

Smarter Buildings

In built Analytics

Analytical Rules shipped with the product and added with every release. Clients can add new rules

- AH00001 - AHU simultaneously heating and cooling - Based on valve positions
- AH00003 - AHU cooling control alert - High building zone temp, rolling 2 hrs
- AH00004 - AHU heating control alert - Low building zone temp, rolling 2 hrs
- AH00005 - AHU temperature sensor drift detected
- AH00006 - AHU operating in override mode, rolling 2 hrs
- AH00007 - AHU operating outside of weekday office hour schedule, rolling 2 hrs
- AH00008 - AHU operating outside of weekend office hour schedule, rolling 2 hrs
- AH00009 - AHU excessive loading of variable frequency drives, rolling 2 hrs
- AH00013 - AHU cooling valve passing - Leakage detection, rolling 3 hrs
- AH00014 - AHU heating valve passing - Leakage detection, rolling 3 hrs
- AHSR00001 - AHU heating coil for multi-zone unit in operation where OAT > SAT
- AHSR00002 - AHU heating control alert - Heating valve open where OAT > supply air temp, rolling 2 hrs
- AHSR00003 - AHU cooling control alert - Cooling valve open where OAT < min threshold temp, rolling 4 hrs
- AHSR00004 - AHU cooling control alert - AHU cooling when in free cooling mode, rolling 2 hrs
- AHSR00005 - AHU economiser mode alert - Not in free cooling mode
- AHSR00006 - AHU economiser mode alert - Not in optimal mechanical cooling mode (With CO2 sensing)
- AHSR00007 - AHU economiser mode alert - Not in optimal mechanical cooling mode (Without CO2 sensing)
- CR00003 - Chiller low supply temperature
- CR00004 - Chiller cooling substance temperature delta
- CR00005 - Chiller efficiency
- CR00012 - Chiller cooling substance temperature setpoint comparison
- CRSR00001 - Chiller free cooling not being utilized
- HXSR00001 - Perimeter heater detected operational where OAT > min threshold temp
- And so on ...

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IBM Smarter Building Rollout

2009

Dublin, Ireland

Legacy Mfg Plant

Initial Green Sigma Rules Development

2010

Silicon Valley Lab, CA

Software Development

Initial Test Location

Rochester, MN

3.2M SF Multi-Use Facility

6th Largest IBM Energy Consumer

Full Functionality Pilot

Armonk, NY

Global Corporate HQ

Smarter Building Showcase

2011

**Austin, TX
Boulder, CO
Fishkill, NY
Poughkeepsie, NY
Raleigh, NC
Southbury, CT
Yorktown, NY**

Deploy At Highest Energy Consuming Locations

**Makuhari, JP
Emb Golf Links, IN
Emb Manyata, IN
Ehningen, Ger
Montpellier, FR
Hursley, UK
Lennox Wood, UK
Portsmouth, UK
South Bank, UK
Hortolandia, BR
Bromont, QU
Burlington, VT
Columbus, OH
Gaithersburg, MD
Markham, ON
Sterling Forest, NY
Almaden, CA
Tucson, AZ**

Deploy at High Energy Consuming Locations & across all geographies

2012

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Smarter Buildings Implementations at Armonk and Rochester

Developed and Implemented with Smarter Building Alliance Partner Johnson Controls

Armonk, NY

- **Property Characteristics**
  - 280,000 sq. feet
  - Opened in September, 1997

- **Scope:**
  - Metering
  - PLC – BMS integration
  - Advanced analytics
  - Fault detection & diagnostics
  - Dashboard for energy, carbon, maintenance, space, etc.

Rochester, MN

- **Property Characteristics:**
  - 3.3M sq ft multi-building mixed use light industrial campus
  - Facilities date to the 1950s
- **Scope:**
  - BMS/metering integration
  - HVAC sensors/metering point integration
  - Lighting management
  - Perimeter pre-heat
  - Chiller optimization
  - Advanced analytics/FDD.
  - Dashboard for energy, carbon, maintenance, space, etc.

First IBM implementation

5+% energy cost reduction in already efficient buildings that have seen 7% reductions/year for the last 10 years.

8% annual savings from Operational cost reductions expected from condition-based maintenance and prioritization of preventive maintenance.

IBM
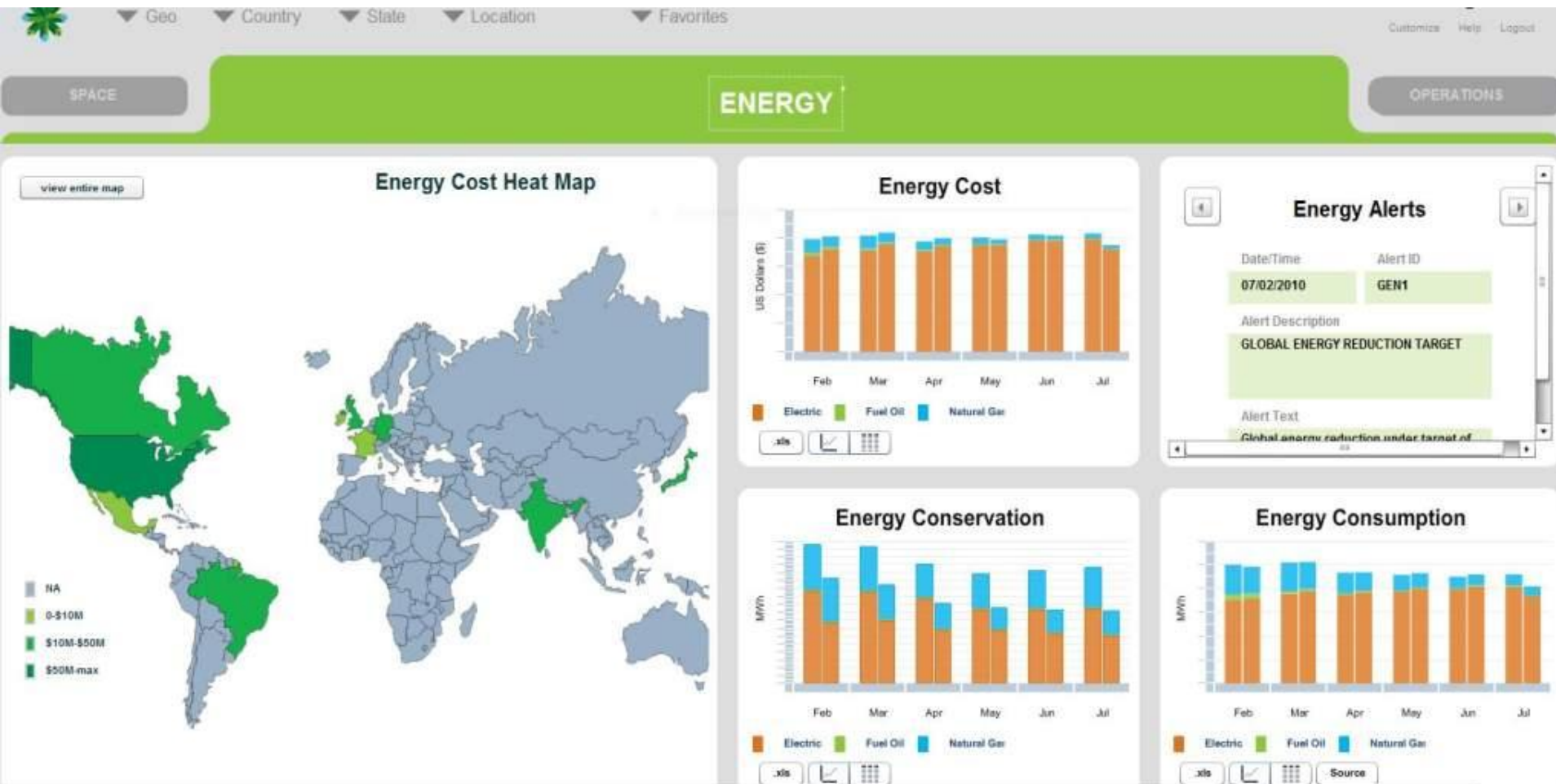
Johnson Controls

Developed with Smarter Buildings Alliance Partner, Johnson Controls

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IBM Rochester, 3.3M sq ft multi-building mixed use light industrial campus. Facilities date to the 1950s. Consistently achieved year on year energy reductions of 5% to 7% over the last 10 years.

- Reactive maintenance decreased by 16%
- Hours per work order reduced by 34%
- Total number of work order hours decreased by 49%
- Energy cost reduction on equipment monitored of between 10-15%

IBM Rochester Campus

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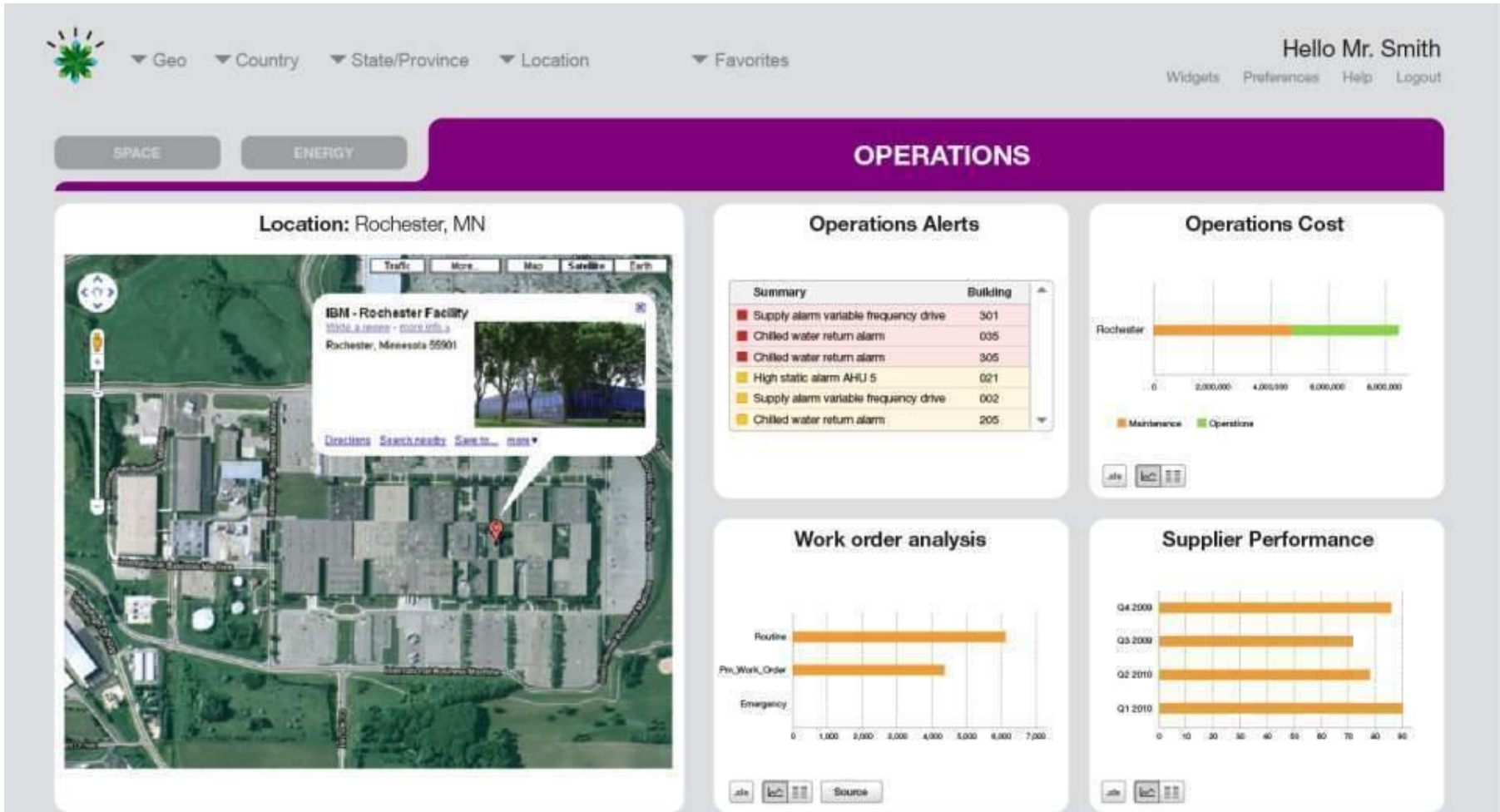
Interactive Charting hosted within LMC showing Building Health

Total Consumption

Total Consumption

Consumption
- Equipment
- Lighting
- UPS
- HVAC

50.0%
10.0%
10.0%
30.0%

HVAC Consumption

HVAC Consumption

Consumption
- Chilled Pump
- AHU
- Chiller
- Condenser Pump
- CoolingTower

20.0%
20.0%
20.0%
20.0%

Chiller Plant

Chiller Plant Performance

Chiller Plant Performance

IRData Viewer

Ticket_Id	Description	Asset_Id	Asset_Type	Status	Reported_Date
111	Chiller Down	CM_001	Chiller	Open	11/10/2012
111	Chiller Down	CM_001	Chiller	Open	11/10/2012
111	Chiller Down	CM_001	AHU	Open	11/10/2012

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Target	Static Value	Curr Val	Deviation
BEE Building Energy Star Rating	100 kWh/m2/year		-10
GRIHA EUI	2000 kWh/m2/year		20
Targeted EUI	100 kWh/m2/year		10

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Internet | Protected Mode: On

Trouble Tickets and Work Orders generated by the System or Manually

Deviation from Star ratings and Energy Benhcmarks

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IBM smarter buildings case studies & benefits

SMART IS
Solving building systems shortcomings with the most appropriate, effective & energy efficient approaches.

Tulane University:
Connecting to existing building systems to collect metered data; incorporating advanced analytics to uncover sub optimal conditions; bringing disparate data together to drive better decision making and measurably reduce overall energy costs.
.

SMART IS
Integration of energy and asset management to lower operating cost.

IBM Rochester, MN:
Incremental energy savings of approximately 5% yearly through various improvements and programs; after the installation of IBM Intelligent Building Management, the team achieved an incremental 8% savings.

SMART IS
Optimizing energy consumption lowers operating costs and reduces carbon emissions.

Bryant University:
An IT initiative to create an energy-efficient data center shifted to a partnership between IT & Facilities to construct smarter buildings. A 15% reduction in energy use and 50% reduction in floor space in the data center are helping to reduce Bryant's carbon footprint..

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How can we engage? – The ROI Tool is a good starter

IBM Intelligent Building Management Solution
One of IBM's Smarter Buildings initiatives

Setup and administration: click a tile to continue

CASES
Add or select a situation to analyze

ADMIN PANELS
Customize settings or norms
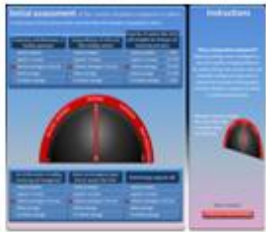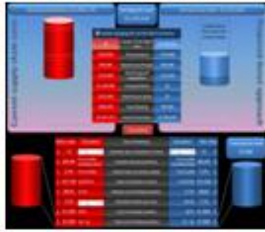
Case: Sample Case — Click a tile: to load a different case click the "cases" tile above — 1,800,000 sqft/6 buildings

INITIAL ASSESSMENT
compared to others

VALUE
calculate the savings

PAYBACK
5-year costs/benefits flow

EMISSIONS
benefits to the planet

PRESENTATIONS
show off your results

Current Capabilities	
Energy Management	✔
Facilities Operations	✔
Emissions reductions	✔
Single and Multiple-similar building scenarios	✔
Investment Payback Period	✔

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