Enterprise Energy Management

Schneider Energy Action

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The global specialist in energy management

- Energy Efficiency is in our DNA – 180,000 Employees
- Schneider's Global Headquarters was first ever ISO 50001 certified EnMS
- Offer many energy efficiency products and services
  - Square D (VFDs and Automated Controls)
  - APC (Data Center Power and Cooling)
  - Energy and Sustainability Services
- Committed to education and outreach
  - http://www.schneideruniversities.com/energy-university/

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Key Elements of Schneider Energy Action

- Identify Goals
- Develop a Team
- Create Energy Models
- Track Energy Performance
- Identify Projects
- Share Best Practices
- Track Projects
- Sustain Success

Energy Policy

Make the Most of Your Energy

Schneider Electric is committed to continuous improvement in the efficiency with which energy is used and the avoidance of energy waste.

Our objective is to reduce our total energy consumption each year after normalizing for significant changes in levels of activity, weather, and other relevant factors.

We are committed to conserving natural resources so future generations can prosper

We set annual objectives and targets for energy performance improvement to drive continual improvement. Schneider Electric is committed to providing the necessary resources and information in order to achieve our objectives and targets.

We want to limit our risks related to energy

We will comply with all legal requirements related to our energy use, consumption, and efficiency. In addition, we will meet all other requirements that we choose to pledge to including ISO 50001 and Superior Energy Performance.

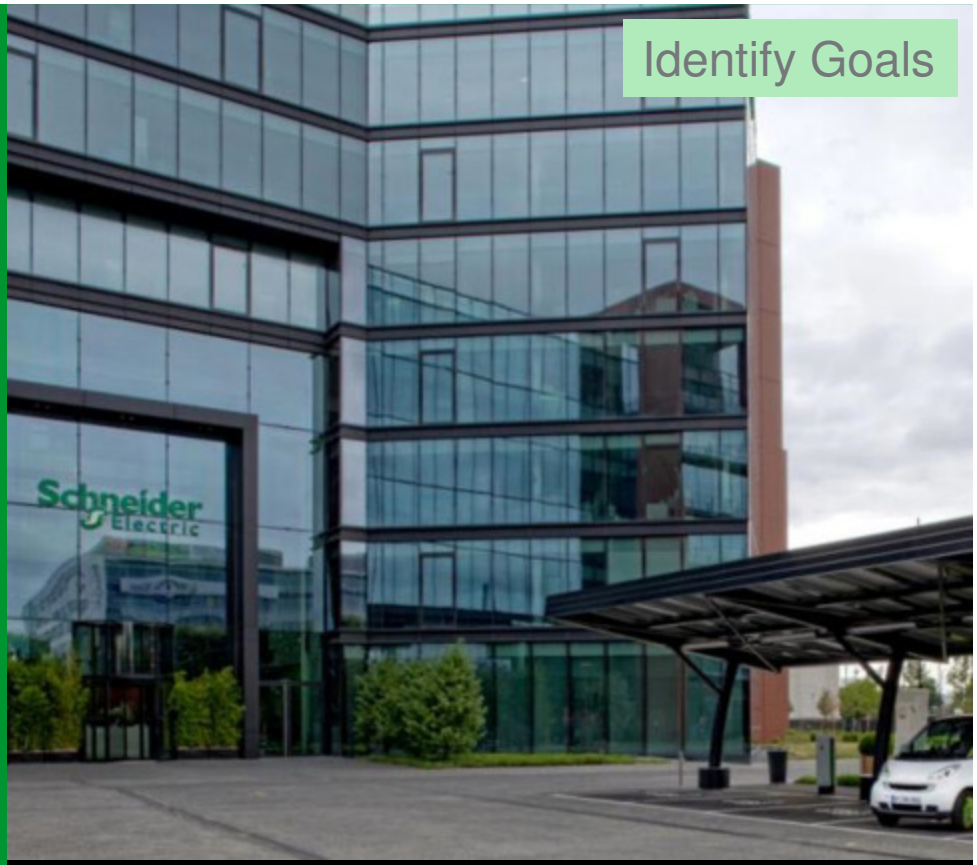
We want to be an example for our customers through Schneider Energy Action

Schneider Energy Action provides a platform for sharing best practices enabling improved process design for energy efficiency and the purchase of energy-efficient product and services.

Jean-Pascal Tricoire
Chairman and CEO

March 2015

Schneider Electric



Identify Goals

3.5% Annual Reduction Goal

Schneider Energy Action Team

Develop a Team

Corporate Energy Team

- Drive Performance Targets
- Prioritize Projects based on:
  - Payback
  - Schneider Electric Products
- Capital Planning
- Return on Investment

Energy Experts

- Create Energy Models
- Provide technical expertise for quantifying
- Verify Energy Performance

Local Energy Champions

- BOC Green Team
- Propose projects
  - Coordinate with others
  - Obtain Quotes
  - Review Contractors
  - Employee Visibility

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Modeling Techniques

Remove Bias and aim to Quantify

Use Standard Model

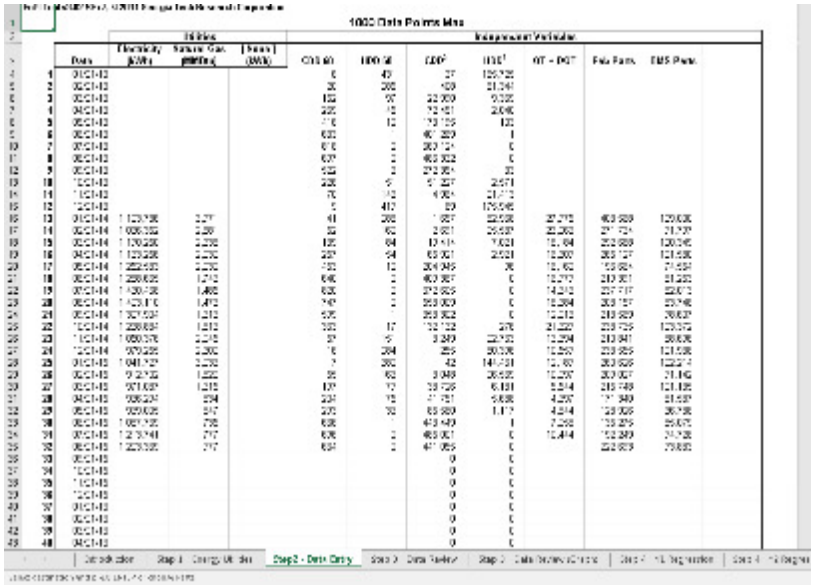
- Utilize free DOE EnPI tool

Normalize Energy Consumption

- Weather
- Production/Occupancy

Regularly Review Model vs. Reality

Create Energy Models



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Energy Performance – North America

Track Energy Performance

Region	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	'15 vs '14 Baseline
Central I Total	5%	-6%	7%	3%	0%	-5%	0%	2%	-7%	-4%	-2%	-7%	-1%
Central II Total	-1%	-6%	6%	-5%	-5%	-11%	-9%	-1%	-7%	-13%	-8%	8%	-4%
Northeast Total	-10%	-18%	4%	19%	-5%	-9%	-15%	-13%	-15%	6%	8%	19%	-3%
South Total	3%	-6%	-5%	-17%	-16%	-16%	-13%	-15%	-13%	-13%	-13%	-18%	-12%
Southeast Total	2%	-5%	13%	1%	-1%	-4%	-1%	-3%	-4%	2%	1%	5%	0%
West Total	-2%	-7%	-3%	-9%	-6%	-6%	-9%	-7%	-12%	-10%	-13%	-9%	-8%
Grand Total	-1%	-9%	4%	-2%	-6%	-9%	-8%	-6%	-10%	-7%	-5%	0%	-5%

> 4.9% reduction in total energy consumption (‘15 vs.‘14)

- 3.9% savings in electrical energy
- 6.5% savings in natural gas

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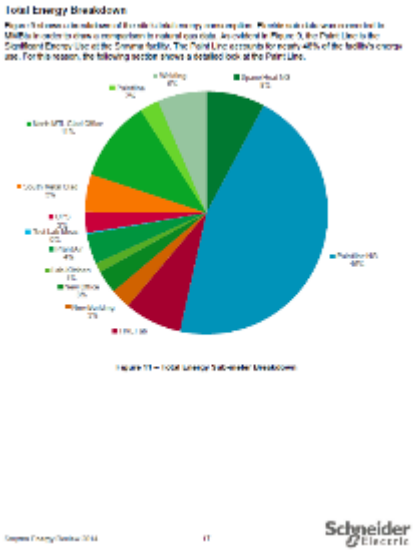
Global Standard

Identify Projects

Schneider Electric uses the ISO 50001 Energy Review Process



Comprehensive energy assessment of the facility including detailed utility analysis and energy load breakdown

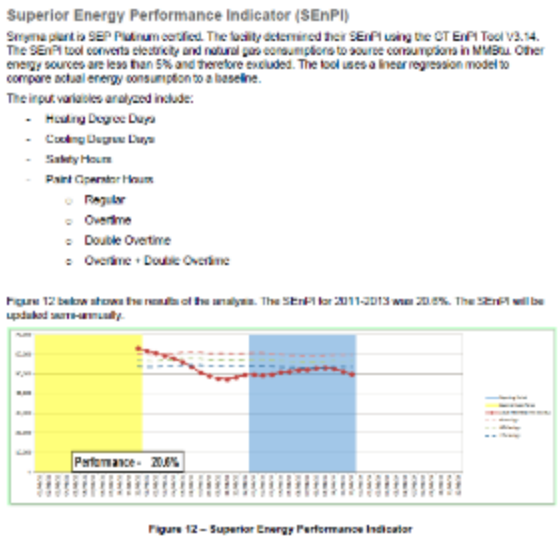
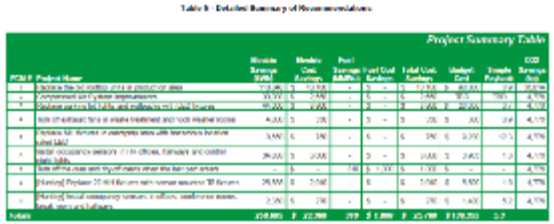


Figure 12 – Superior Energy Performance Indicator

ISO50001 and SEP Certification readiness



Energy conservation measures with cost savings and simple payback analysis

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Boston ONE Campus

Green Energy Team

Team Leader:
Chris LaFleur – Engineer Building Management Systems Development

Sponsor:
Barry Coflan – CTO EcoBuilding

Frequency of Meetings:
~ 6 Per Year

Mission:
Voluntary initiative to investigate, plan and enable And communicate energy optimization solutions for Boston Campus, in collaboration with BOC site management and in consultation with Schneider Subject Matter Experts.

2016 Objectives:
Support for ISO 50001 Certification
Support improvements from 2015 energy audit
Support BOC to DSP (meter data to the cloud)
Support LED Parking Lights & Micro Grid

Project Tracking – North America

Track Projects

		2012				2013				2014				3-year total		
Location	*Region*	*Projected Savings (kWh)*	*2011 Total Energy Usage (kWh)*	*Projected % Difference*	*Actual % Difference (YoY Model)*	*Projected Savings (kWh)*	*2012 Total Energy Usage (kWh)*	*Projected % Difference*	*Actual % Difference (YoY Model)*	*Projected Savings (kWh)*	*2013 Total Energy Usage (kWh)*	*Projected % Difference*	*Actual % Difference (YoY Model)*	*Projected Savings (kWh)*	*% Diff. vs. 2011*	*Actual % Difference (Connect Model)*
	Central 1 Total	**3,099,715**	**83,844,217**	**-3.7%**	**-7.3%**	**3,885,887**	**76,336,281**	**-5.1%**	**-3.8%**	**2,885,934**	**78,119,982**	**-3.7%**	**-7.5%**	**9,871,536**	**-11.8%**	**-12.3%**
	Central 2 Total	**2,475,323**	**77,114,822**	**-3.2%**	**-4.0%**	**1,501,422**	**76,171,307**	**-2.0%**	**1.4%**	**3,519,113**	**81,018,115**	**-4.3%**	**-3.1%**	**7,495,858**	**-9.7%**	**-7.8%**
	Northeast Total	**1,856,691**	**40,794,230**	**-4.6%**	**-5.4%**	**1,402,063**	**36,602,252**	**-3.8%**	**-1.9%**	**1,194,576**	**35,385,949**	**-3.4%**	**-4.2%**	**4,453,329**	**-10.9%**	**-12.4%**
	South Total	**1,892,839**	**39,386,045**	**-4.8%**	**-8.5%**	**1,886,318**	**47,716,458**	**-4.0%**	**-3.5%**	**1,462,265**	**48,884,705**	**-3.0%**	**-1.3%**	**5,241,421**	**-13.3%**	**-7.5%**
Columbia	Southeast	1,073,765	13,649,517	-7.9%	-5.5%	831,379	12,867,554	-6.5%	3.2%	858,145	13,571,923	-6.3%	-14.6%	2,763,289	-20.2%	-17.1%
Greensboro	Southeast	7,985	1,559,886	-0.5%	-3.0%	114,059	1,486,695	-7.7%	-4.6%	56,051	1,534,710	-3.7%	-6.0%	178,094	-11.4%	-10.1%
LaVergne LifeSpace	Southeast	907	737,744	-0.1%	-3.1%	24,732	775,063	-3.2%	-0.8%	4,768	861,028	-0.6%	-26.8%	30,407	-4.1%	-18.1%
LaVergne PMO	Southeast	3,487	2,950,107	-0.1%	-16.5%	-	2,394,750	0.0%	-6.1%	-	2,302,164	0.0%	9.0%	3,487	-0.1%	-0.6%
Nashville	Southeast	21,283	1,575,840	-1.4%	1.4%	-	1,546,562	0.0%	-5.3%	-	1,587,509	0.0%	-7.8%	21,283	-1.4%	-1.7%
Raleigh	Southeast	974,763	5,834,079	-16.7%	-1.4%	156,684	5,563,471	-2.8%	-5.3%	50,196	5,511,077	-0.9%	-11.8%	1,181,643	-20.3%	-12.9%
Salisbury	Southeast	206,095	1,252,991	-16.4%	-6.6%	43,320	1,074,221	-4.0%	8.0%	7,054	1,316,392	-0.5%	-14.4%	256,468	-20.5%	-14.5%
Seneca	Southeast	2,064,116	17,536,193	-11.8%	-11.0%	999,944	15,172,337	-6.6%	-7.0%	855,158	14,957,818	-5.7%	-10.4%	3,919,218	-22.3%	-22.2%
Smyrna	Southeast	2,508,783	9,658,729	-26.0%	-25.7%	435,670	8,802,758	-4.9%	-11.2%	1,203,360	8,007,993	-15.0%	-22.7%	4,147,813	-42.9%	-37.4%
	Southeast Total	**6,861,184**	**54,755,087**	**-12.5%**	**-9.1%**	**2,605,788**	**49,683,411**	**-5.2%**	**-4.3%**	**3,034,731**	**49,650,613**	**-6.1%**	**-13.1%**	**12,501,703**	**-22.8%**	**-20.5%**
	West Total	**3,535,724**	**55,724,409**	**-6.3%**	**-7.5%**	**1,212,235**	**49,724,099**	**-2.4%**	**-2.8%**	**3,028,904**	**51,018,044**	**-5.9%**	**-13.4%**	**7,776,862**	**-14.0%**	**-27.3%**
	Grand Total	**19,721,475**	**351,618,810**	**-5.6%**	**-7.1%**	**12,493,713**	**336,233,808**	**-3.7%**	**-2.2%**	**15,125,523**	**344,077,408**	**-4.4%**	**-7.0%**	**47,340,710**	**-13.5%**	**-14.6%**

> Reconciliation of projected savings versus actual energy reduction (from energy model)

> Monthly discussions with all regions/sites

> Clear visibility to current performance on regional and site level, by GSC Cluster and Business Unit

> Tool to determine significant deviation for ISO 50001 certified sites

- Easily done with conditional formatting

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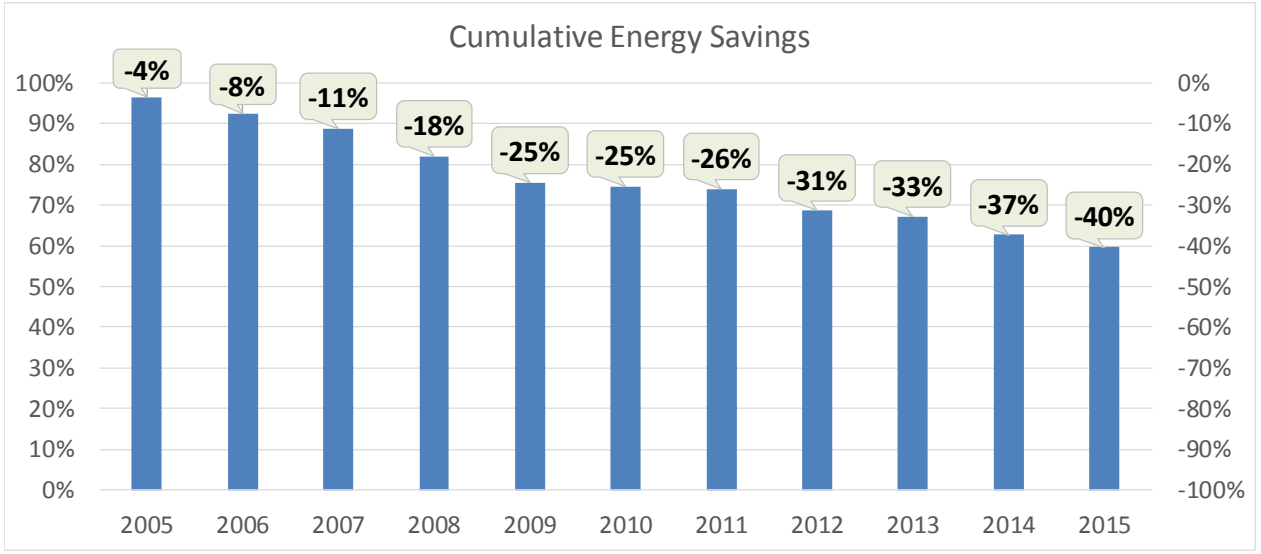
North American Historical Performance

Track Projects



- Achieved and exceeded corporate energy goals by reducing the total energy consumption by over 14% from 2011 to 2014 (10% Goal), and by using Schneider Electric products & services
- Increased scope from 26 facilities to 64 by 2015
- More than 850 million kWh of cumulative energy (electricity & natural gas) saved through the end of 2015
- Equivalent cost savings of over $85 million
- Over 40% reduction in greenhouse gas emissions since 2004

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Why Implement ISO 50001?

Share Best Practices

> ISO 50001 Builds on Existing Energy Program

- Schneider North America reduced consumption by 40% over last 10 years
- Goal is to reduce by another 10 % from 2015-2017

> Superior Energy Performance

- External recognition for energy reduction
- 3rd party validation of Schneider Energy Action
- Improves internal recognition of energy performance

> Verify Results with Enterprise-wide Action Plan

- Consistent method for tracking projects
- Allows for best practice sharing and ROI lookup for similar projects

ISO 50001
ENERGY MANAGEMENT

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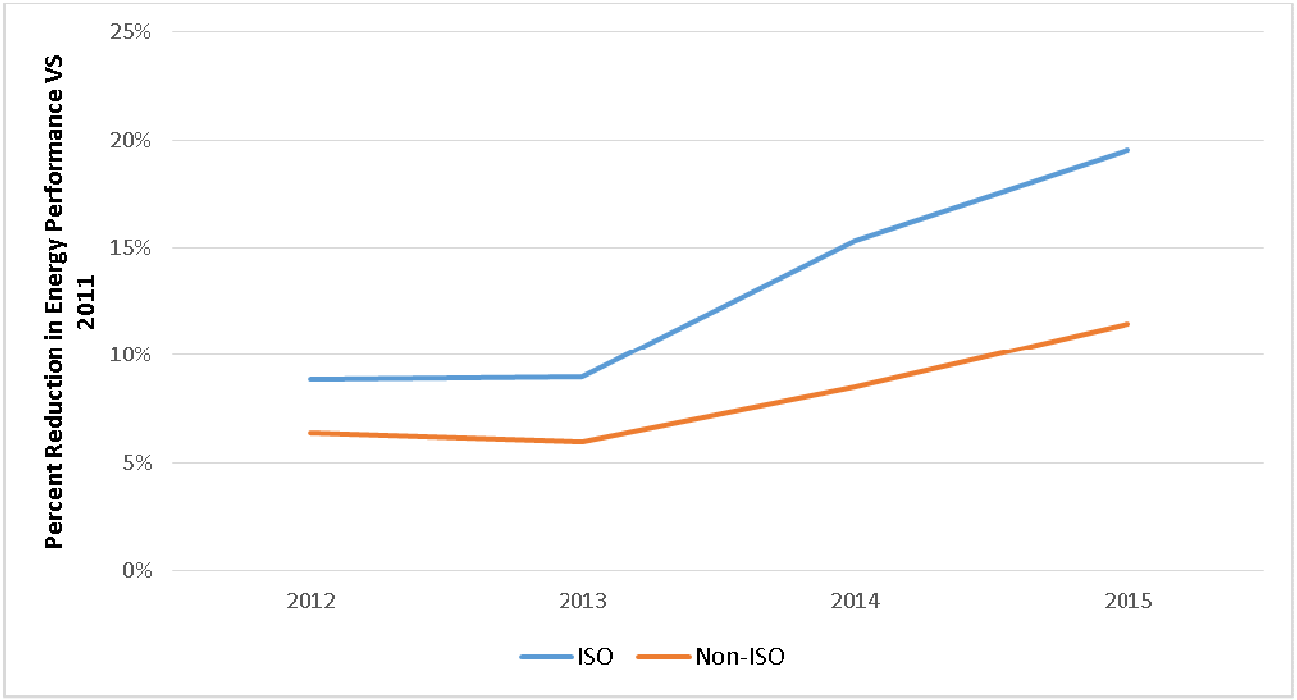
Impact of ISO 50001 Implementation

Share Best Practices



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Make Better - Products and Services

Share Best Practices

> Automation and Control

- Building Management System
- Industrial Process Control
- Variable Frequency Drives
- Power and Energy Monitoring
- Telemetry and Remote SCADA Systems

> Data Center Cooling Systems

> Solar and Micro Grid

> Energy and Sustainability Services

- Energy Consulting
- Strategic Energy Sourcing Services

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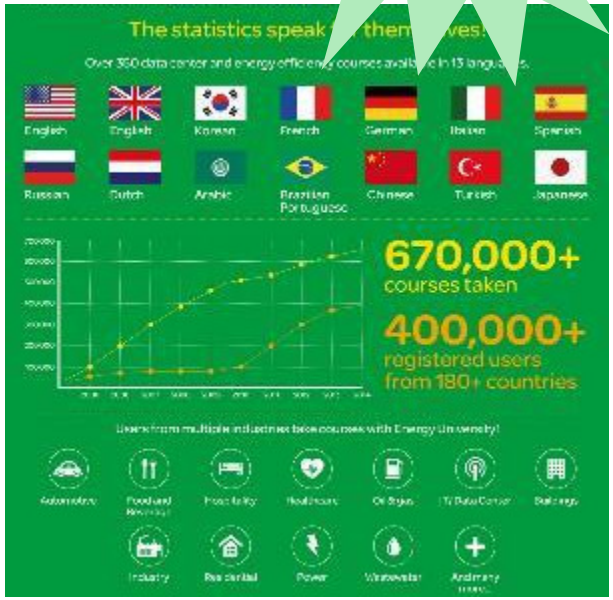
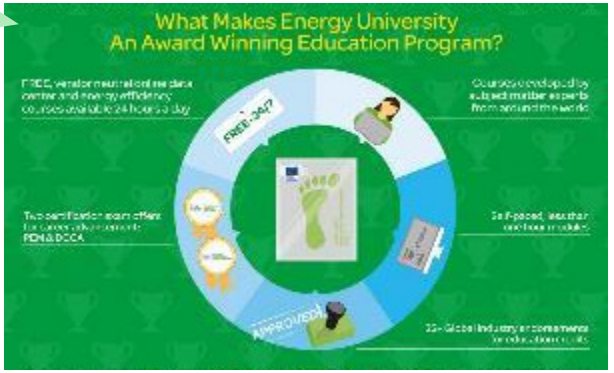
Energy University – MOOC*

200 Free Courses

Share Best Practices





*All Courses are Vendor Neutral

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Energy Efficient Solutions in use at BOC

Sustain Success

Smart Struxure
Cooling/Energy management

Server Room:
Eco Aisle - In Row Cooling

EV charge

EcoBreeze

HVAC Controls

Lighting controls & lighting sensors

StruxureWare for Building Management/Operations (BMS)

StruxureWare Resource Advisor

Altivar 212 variable speed drives for HVAC

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Energy Efficient Solutions in use at BOC

Sustain Success

Surveillance and Access Control

LED Lighting

Racks

Data Center UPS
Symmetra PX - PDUs

PC and Server UPS

StruxureWare Data Center Expert

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Power Distribution and Protection in use at BOC

Sustain Success

Switchgear

Power Meters

Bus Controls

Building Entrance Surge

StruxureWare
Power Monitoring Expert

Panel boards & Breakers

Example of a microgrid at BOC

Sustain Success

> **Pilot Project** – Schneider and Duke are partnering for growth and success in the emerging market for microgrids

- *BOC is an opportunity to "test drive" our approach by working together – reliability, safety, and economics at scale are critical to success.*

> **Solution Showcase** – Schneider and Duke will give customer tours of BOC to showcase the benefits of our microgrid solutions

- *400 kW of PV utilizing Schneider inverters*
- *Schneider's microgrid controller and StruxureWare DSO will optimize use of PV, storage, and BOC's existing natural gas genset during grid-connected and islanded operation*

> **Innovation** – Schneider engineers will advance the state of the art using BOC as a "living laboratory"

- *Schneider is incorporating a microgrid innovation "sandbox" that minimizes risk to essential BOC functions during microgrid R&D and customer demonstrations*

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Planned BOC PV Locations

Sustain Success

BOC - PV Carports at BOC with EV

Sustain Success


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