



# Enterprise Energy Management

Schneider Energy Action

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**Schneider**  
Electric

## 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/>

**12th most sustainable company**  
Corporate Knights 2016 "Global 100 Most Sustainable Corporations in the World" rankings

**"Climate A list" member**  
Climate Performance Leadership Index (CPLI)  
Fifth consecutive year on list of the best climate performers

**100/100 score**  
Climate Disclosure Leadership Index (CDLI)  
The CDP chooses companies for their understanding of climate change challenges

**Industry Leader**  
in Dow Jones Sustainability (DJSI)  
for the 3rd consecutive year and "Industry Mover" for biggest proportional improvement in its sustainability performance from last year

**Most sustainable company of the CAC 40**  
for the 2nd consecutive year  
by Enjeux Les Echos and Institut RSE

**SOLUTIONS COP21 PARIS**

# 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

Life Is On

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# 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



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



Life Is On

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# Create Energy Models

## 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

		Inputs			1000 Data Points Min			Extrapolated/Variable			
	Date	Electricity kWh	Natural Gas MMBtu	Water (GAL)	CH2O	1000 M	CO2	1001	OT - DGT	Fuel Perm	EMS Perm
1	01-01-12	0	0	0	0	40	27	125725			
2	02-01-12	25	200	0	0	40	27	125725			
3	03-01-12	150	20	0	0	40	27	125725			
4	04-01-12	225	15	0	0	40	27	125725			
5	05-01-12	170	10	0	0	40	27	125725			
6	06-01-12	600	0	0	0	40	27	125725			
7	07-01-12	0	0	0	0	40	27	125725			
8	08-01-12	600	0	0	0	40	27	125725			
9	09-01-12	600	0	0	0	40	27	125725			
10	10-01-12	225	0	0	0	40	27	125725			
11	11-01-12	75	0	0	0	40	27	125725			
12	12-01-12	0	0	0	0	40	27	125725			
13	01-01-14	1120796	227	0	0	200	100	251450	20.7%	60.000	120.000
14	02-01-14	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
15	03-01-14	1100000	220	0	0	200	100	251450	20.7%	60.000	120.000
16	04-01-14	1100000	220	0	0	200	100	251450	20.7%	60.000	120.000
17	05-01-14	1220000	220	0	0	200	100	251450	20.7%	60.000	120.000
18	06-01-14	1200000	220	0	0	200	100	251450	20.7%	60.000	120.000
19	07-01-14	1300000	1800	0	0	200	100	251450	20.7%	60.000	120.000
20	08-01-14	1420000	1400	0	0	200	100	251450	20.7%	60.000	120.000
21	09-01-14	1300000	1200	0	0	200	100	251450	20.7%	60.000	120.000
22	10-01-14	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
23	11-01-14	900000	220	0	0	200	100	251450	20.7%	60.000	120.000
24	12-01-14	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
25	01-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
26	02-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
27	03-01-15	900000	220	0	0	200	100	251450	20.7%	60.000	120.000
28	04-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
29	05-01-15	900000	220	0	0	200	100	251450	20.7%	60.000	120.000
30	06-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
31	07-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
32	08-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
33	09-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
34	10-01-15	1200000	220	0	0	200	100	251450	20.7%	60.000	120.000
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36	12-01-15	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
37	01-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
38	02-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
39	03-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
40	04-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
41	05-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
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43	07-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
44	08-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
45	09-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
46	10-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
47	11-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000
48	12-01-16	1000000	220	0	0	200	100	251450	20.7%	60.000	120.000



# 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

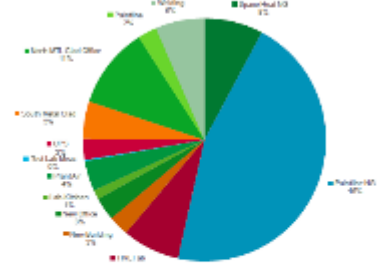
# Identify Projects

# Global Standard

## Schneider Electric uses the ISO 50001 Energy Review Process

**Total Energy Breakdown**

Figure 11 shows a breakdown of the facility's total energy consumption. The total energy consumption for the facility is shown in terms of megawatt-hours (MWh) in order to allow comparison to national energy costs. An additional Figure 11, the Power Line to the Customer Energy Use at the Customer Facility. The Total Line accounts for nearly 40% of the facility's energy use. For this reason, the following section shows a detailed look at the Power Line.



**Figure 11 – Total Energy Breakdown**

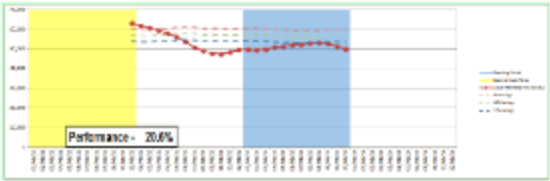
### Superior Energy Performance Indicator (SEnPI)

Stryker plant is SEP Platinum certified. The facility determined their SEnPI using the CT EnPI Tool V3.14. The SEnPI tool converts electricity and natural gas consumptions to source consumptions in MMBtu. Other energy sources are less than 5% and therefore excluded. The tool uses a linear regression model to compare actual energy consumption to a baseline.

The input variables analyzed include:

- Heating Degree Days
- Cooling Degree Days
- Safety Hours
- Paid Operator Hours
- Regular
- Overtime
- Double Overtime
- Overtime + Double Overtime

Figure 12 below shows the results of the analysis. The SEnPI for 2011-2013 was 20.6%. The SEnPI will be updated semi-annually.



**Figure 12 – Superior Energy Performance Indicator**

**Table 9 – EnPI Summary of Recommendations**

Item #	Project Name	Minimize Energy Spend	Reduce Cost	Pay	Payback (Months)	Total Cost Savings	Market Cost	Simple Payback	CO2 Savings
1	Upgrade the 480V motor control circuit (MCC) system	100,000	\$ 1,000,000	0	0	\$ 1,000,000	\$ 1,000,000	0	0
2	Commission an E-factor improvement	50,000	\$ 500,000	0	0	\$ 500,000	\$ 500,000	0	0
3	Implement energy audits and energy conservation measures	50,000	\$ 500,000	0	0	\$ 500,000	\$ 500,000	0	0
4	Install energy-efficient lighting and HVAC equipment	4,000	\$ 40,000	0	0	\$ 40,000	\$ 40,000	0	0
5	Upgrade the 480V motor control circuit (MCC) system	5,000	\$ 50,000	0	0	\$ 50,000	\$ 50,000	0	0
6	Implement energy audits and energy conservation measures	30,000	\$ 300,000	0	0	\$ 300,000	\$ 300,000	0	0
7	Upgrade the 480V motor control circuit (MCC) system	10,000	\$ 100,000	0	0	\$ 100,000	\$ 100,000	0	0
8	Implement energy audits and energy conservation measures	20,000	\$ 200,000	0	0	\$ 200,000	\$ 200,000	0	0
9	Upgrade the 480V motor control circuit (MCC) system	5,000	\$ 50,000	0	0	\$ 50,000	\$ 50,000	0	0
10	Implement energy audits and energy conservation measures	5,000	\$ 50,000	0	0	\$ 50,000	\$ 50,000	0	0
<b>Total</b>		<b>210,000</b>	<b>\$ 2,100,000</b>	<b>0</b>	<b>0</b>	<b>\$ 2,100,000</b>	<b>\$ 2,100,000</b>	<b>0</b>	<b>0</b>

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

ISO50001 and SEP Certification readiness

Energy conservation measures with cost savings and simple payback analysis





# 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

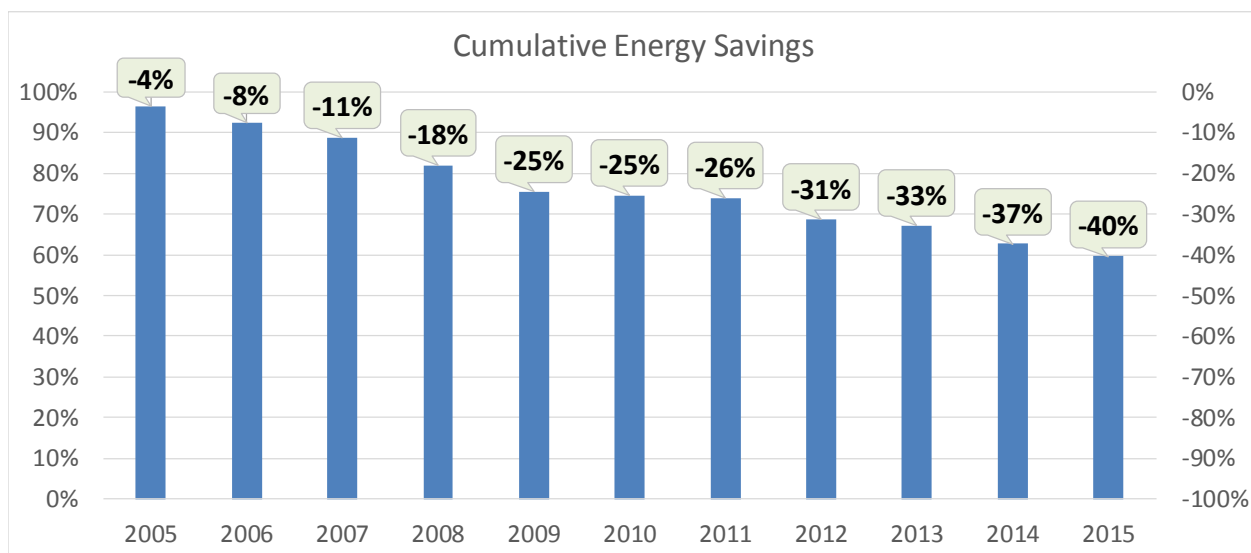
Track Projects

Location	Region	2012				2013				2014				3-year total		
		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)
	<b>Central 1 Total</b>	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%
	<b>Central 2 Total</b>	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%
	<b>Northeast Total</b>	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%
	<b>South Total</b>	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%
	<b>Southeast Total</b>	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%
	<b>West Total</b>	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%
	<b>Grand Total</b>	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

# 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?

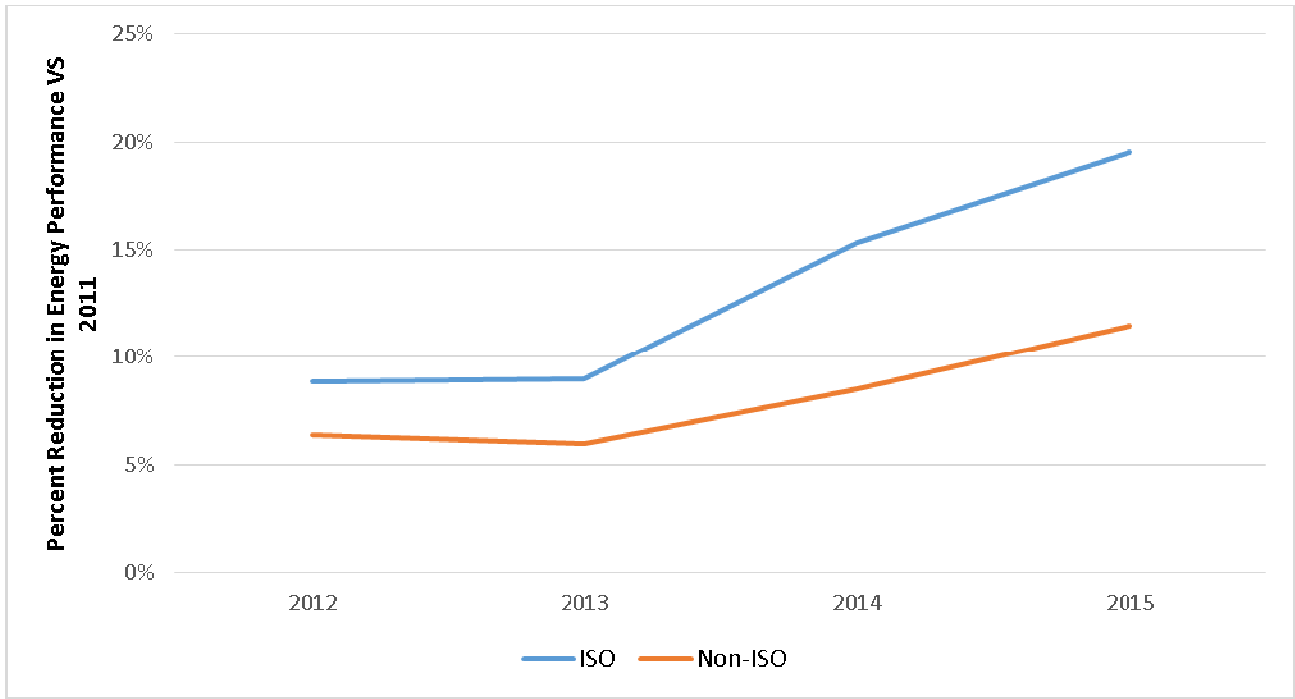
Share Best Practices

- > 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
  - 3<sup>rd</sup> 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



# Impact of ISO 50001 Implementation

Share Best Practices



# 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



# Energy University – MOOC\*

200 Free Courses

Share Best Practices



Energy University aims to be the leading source of innovative energy education in the world!

### The statistics speak for themselves

Over 350 data center and energy efficiency courses available in 13 languages.

English	English	Korean	French	German	Italian	Spanish
Russian	Dutch	Arabic	Brazilian Portuguese	Chinese	Turkish	Japanese

**670,000+** courses taken  
**400,000+** registered users from 180+ countries

Users from multiple industries take courses with Energy University!

Automotive	Food and Beverage	Food Safety	Healthcare	Oil & Gas	Tel. Data Center	Banking
Industry	Residential	Power	Water/Water	And many more...		

### What Makes Energy University An Award Winning Education Program?

FREE! Vendor neutral on the data center and energy efficiency courses available at no extra charge.

Courses developed by subject matter experts from around the world.

Two certification exam offers for course achievement: PDH & DOCA.

24/7 Support, available in multiple languages.

20+ Global industry environmental leaders take courses.

### Energy University

wins 1st place in the Learning Category for the 2014 Sustainable Energy Europe Award

The SEE Awards recognize and promote outstanding projects in energy efficiency, renewable energy and clean transport.

**342** award entries

**One** winner in each category

\*All Courses are Vendor Neutral

# 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



# 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

# 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

- > **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*

# Planned BOC PV Locations

Sustain Success



# BOC - PV Carports at BOC with EV

Sustain Success



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