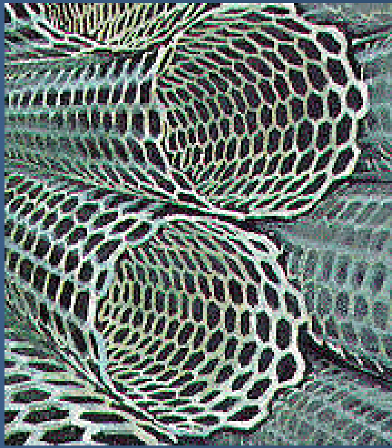
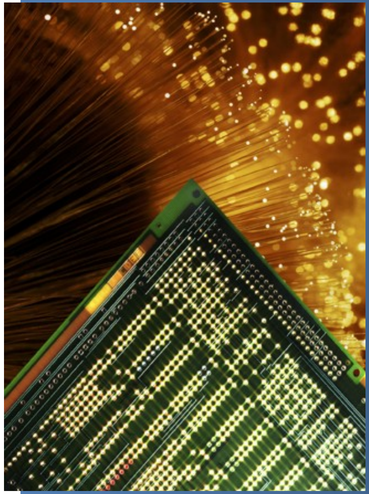
U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



Transformational Energy Action Management (TEAM) Wireless Energy Efficiency Keys Initiative

- Ways of Using Wireless Technology to Help You Reduce Energy Usage at your Facility



Save ENERGY Now Webcast Series

Presented by

Department of Energy · United States of America

Oak Ridge National Laboratory

ISA

WINA Wireless Industrial Networking Alliance

What Is the Industrial Technologies Program ?

The Industrial Technologies Program (ITP) is the lead federal agency responsible for improving energy efficiency in the largest energy-using sector of the country.

Together with our industry partners, we strive to:

- Accelerate adoption of the many energy-efficient technologies and practices available today
- Conduct vigorous technology innovation to radically improve future energy diversity, resource efficiency, and carbon mitigation
- Promote a corporate culture of energy efficiency and carbon management

Industrial Sector National Initiative

Goal:

Drive a 25% reduction in industrial energy intensity by 2017.

Save ENERGY Now

Introduction of Presenters and Contributors

- Wayne Manges, Oak Ridge National Laboratories
- Elliott Levine, DOE
- Teja Kuruganti, Oak Ridge National Laboratories
- Brian Kaldenbach, Oak Ridge National Laboratories
- Peter Fuhr, Apprion
- Anoop Mathur, Terrafore
- Sterling Rooke, DoD/Sanguine Systems
- Jose Gutierrez, Emerson
- Eric Starosky, Eaton
- Doug Hicks, Honeywell
- Jerry Martocci, Johnson Controls
- Tom Sudman, Digital AV
- Randal Bowense, GE

Key Benefits of Seminar

- Re-examine the Federal Mandate to reduce energy consumption
- A side-by-side cost/install time comparison of wired and wireless systems
- Review a few types of wireless
- Examine ease of deployment of wireless systems
- Discuss spectrum licensing (NTIA/FCC)
- Examine IT-security concerns/questions
- Case Studies: Solar farms, generate power onsite.
- Review Return on Investment (ROI) for a wireless system used in energy management.

Section 1

- Welcome/Intro/Logistics

- Seminar length (60 minutes)
  - 40 minute presentation
  - Two 10-minute question and answer sessions

Section 2 ❑ Quick Review: The White House Mandate

THE WHITE HOUSE

THE WHITE HOUSE WASHINGTON

PRESIDENT GEORGE W. BUSH

For Immediate Release
Office of the Press Secretary
January 24, 2007

Executive Order: Strengthening Federal Environmental, Energy, and Transportation Management

By the authority vested in me as President by the Constitution and the laws of the United States of America, and to strengthen the environmental, energy, and transportation management of Federal agencies, it is hereby ordered as follows:

White House News

Section 1. Policy. It is the policy of the United States that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.

Sec. 2. Goals for Agencies. In implementing the policy set forth in section 1 of this order, the head of each agency shall:

(a) improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003;

Remarks from govenergy 2007

News Media Contact(s):
Megan Barnett, (202) 586-4940

For Immediate Release
August 8, 2007

GovEnergy 2007 Conference

Prepared Remarks for Secretary Bodman

Thanks very much, Andy, and thank you all. I want to congratulate you --- both the organizers and the participants of GovEnergy 2007. In no small feat, we have drawn a record crowd of over 1,800 to this 10th GovEnergy conference. I am proud to be a part of this remarkable event.

● ● ●

Building upon the already ambitious goals laid out in the President's Executive Order, my specific requirements for the TEAM Initiative are as follows:

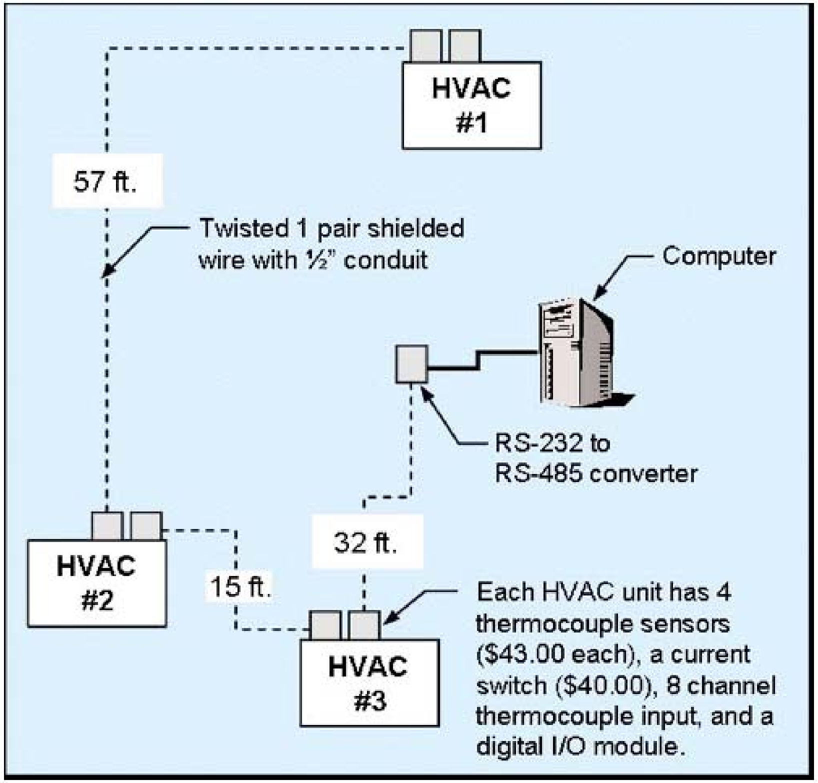
- Achieve no less than 30% energy intensity reduction across the agency. The path to achieving this goal will be outlined in a binding plan to be put in place for all DOE sites by 2008;
- Maximize installation of secure, on-site renewable energy projects at all DOE sites;
- Require that DOE's entire fleet operate their Alternative Fuel Vehicles exclusively on alternative fuels;
- Baseline, implement and monitor a Department-wide plan by FY 2008 to reduce water consumption at least 16%;
- Strive to achieve a LEED Gold standard for all new construction, and major renovations; and
- Ensure the implementation of an enhanced and widely applied Environmental Management System to manage the environmental energy and transportation components of all our activities.

Section 3

- Review wire vs. wireless cost
- Features, Applications, Benefits

Wired vs Wireless costs

- (based on a report from Pacific Northwest National Labs (PNNL)):



- Situation considered: HVAC
- 12 temp sensors. Short distance.

Cost Component	Cost	Cost
	Wired Design	**Wireless Design**
Sensors	$636	$752
Wiring	$168 [1]	-
Communication and Signal Conditioning Hardware	$1903	$805
Labor	$2179 [2]	$450
Total Cost	$4886	$2007
Average Cost per Sensor	$407	$167

- [1] Including conduit
- [2] Including installation of conduit

From the report: "Greater numbers of HVAC units will generally increase the cost-effectiveness of wireless data acquisition because distances to the units will decrease on average. "

Wired vs Wireless costs: in-building

- **In-Building Systems: temperature sensors, in-plenum wiring. The cumulative wiring distance for all temperature sensors is about 3000 feet with the majority loose in-plenum wiring. Eighteen AWG cable is assumed for sensor connections at an approximate cost of $0.07/ft. and a labor cost of $1.53 per linear foot of wiring (RS Means 2001). The cost for the wireless system includes an assumed installer mark-up of 50%. For the radio frequency (RF) surveying and RF installation we estimated the labor rate of $100 per hour for an engineer. For simplicity, the labor cost for battery change-out, expected to occur every 5 years, is not included. This activity can be estimated at about $300, assuming a battery cost of $3 per battery and 2 hours of labor for replacing 30 batteries.**

Cost Component	Cost	Cost
	Wired Design	**Wireless Design**
Sensors	$1800	$2152 [1]
Wiring	$4800 [2]	-
Communication and Signal Conditioning Hardware	-	$1475
Labor	--- [3]	$800
Total Cost	$6600	$4427
Average Cost per Sensor	$220	$148

- [1] Temperature sensors each with an integrated transmitter. [2] Including labor for installation.
- [3] Included in cost of wiring

Wired vs Wireless costs: retrofit

- Constant length of 3000 ft for the wiring. For the retrofit example, we establish a wiring cost of $6,600, assuming a cost per linear foot of $2.20 including wires. For new construction, we assume a reduced wiring cost (because of easier access) in the amount of $2,010 for a cost of $0.67 per linear foot. In each case we assumed that wiring conduits already exist and thus, the wiring cost excludes the cost associated with installing conduits.

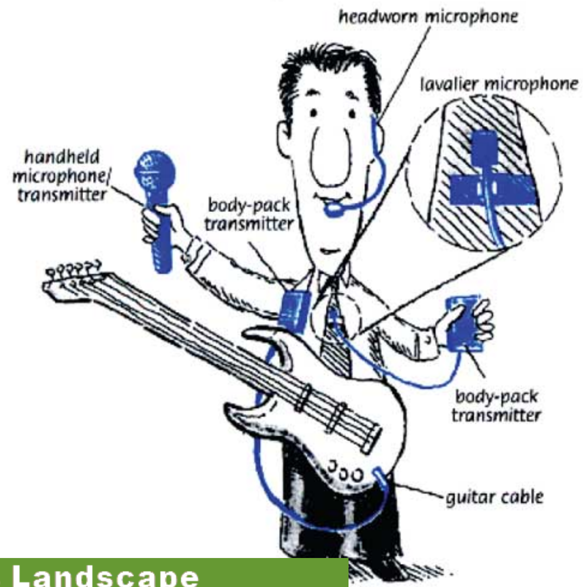
- In the situations examined, the wireless systems are ~25% cheaper than wired.

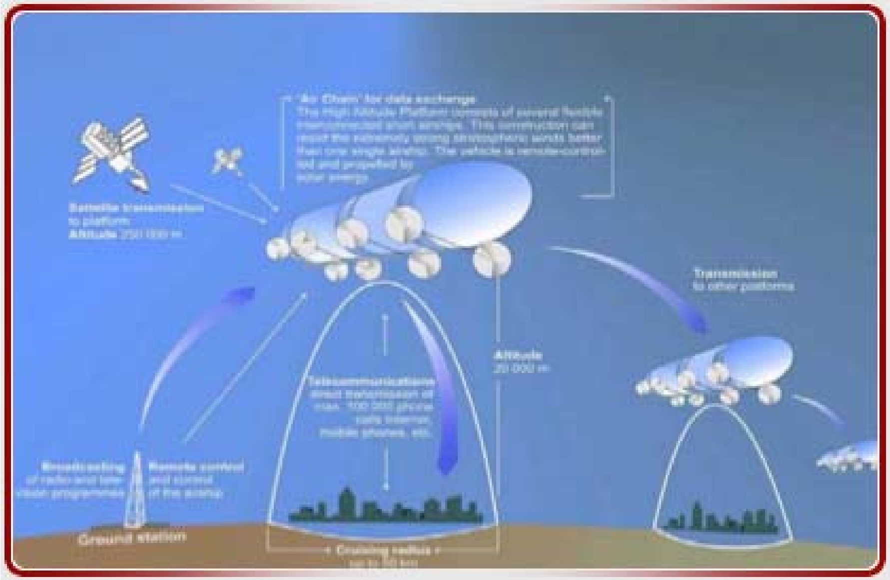
- In cases where retrofit conduit would have to be installed, the cost of the wireless systems are ~90% cheaper than wired.

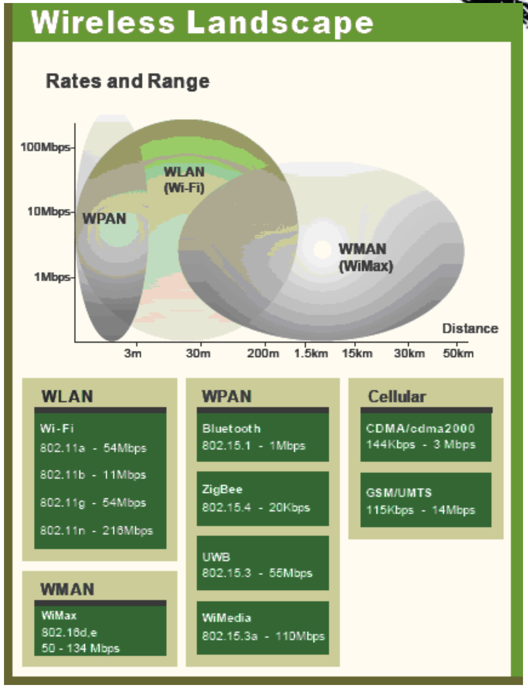
- In certain historic buildings instances, building codes and restrictions will simply make it prohibitively expensive to use a wired solution; wireless is the only option.

Section 4

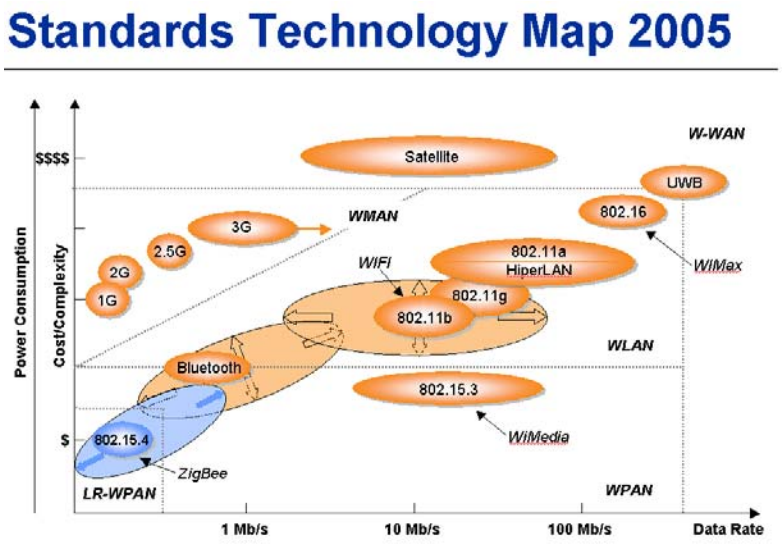
- A Review of Various Types of Wireless
- A Review of Leading Edge Applications







What "Type" of Wireless is Needed…



- In Standards Land, you'll use*
  802.11 (WiFi) and
  802.15.4 (Sensors)

IEEE Standard	"Common" Name	Operational Frequency	Typical Application
802.11	WiFi	2.4GHz, 5.7 GHz	wireless local area network
802.15.1	Bluetooth	2.4GHz	wireless personal area network
802.15.3	UWB, WiMedia	~ 5 GHz	short distance, high data rate
802.15.4	Zigbee	868/915 MHz, 2.4 GHz	low rate build-ing automation
802.16	WiMAX	2-11 GHz 10-60 GHz	broadband wireless access
802.20	MBWA, Mobile Broad-band Wireless Access	licensed <3.5 GHz	IP-based Data Transport

Are there any examples of wireless already being used for energy savings?

- Show me some examples.....

Matrix of current Energy Savings/Reduction Activities that already use wireless (lots of details)

TEAM Wireless Energy Efficiency Keys Initiative Workshop Projects Matrix

Application Areas

	Who (developer? user?)	What (describe the technology)	When (ready now? emerging?)	Where (industrial? buildings? transportation? people?)	How (how does it work?)	Ubiquity (wide-spread?)	Benefit of Using Wireless (energy savings?)
Building Energy Management	Digital AV (Scott Sudman); user is a state government	50M sq ft of building space, correlated energy usage w/environment (turned sensed energy 'data' into 'information'; wireless filled gaps in infrastructure and allowed effective data gathering	in-use now, being upgraded to include automated light dimming and other energy savings features/etc...	currently used in various sorts of buildings, mostly office buildings, warehouses etc...	information provides opportunities to make mechanical improvements and adjustments to infrastructure which saves energy; allows proactive maintenance and demand awareness of energy procurement, which allows cost savings	50 M sq ft building space distributed state-wide	wireless filled in gaps of information contributes to 15-20% savings prior to automation of controls
Wireless Temperature Monitoring of Kilns	Honeywell (Tim Lefevre and Cindy Bloodgood); Several users, e.g. GE Plastics, Englehard, etc...	temperature monitoring/ temp profile of kiln operation to optimize natural gas usage and improve process efficiency and product quality	in use, dozens of applications	industrial	4 - 5 wireless temperature transmitters mounted to kiln wall... Use of inexpensive wireless sensors allow more sensors which together allow tighter control and an improved process; wireless allows sensors in otherwise impossible places, also simplifies temp probe installation and saves installation costs and minimizes kiln down-time	localized application, crosses several industries (cement, grain, auto, others)	rotating kiln, wired sensor is not effective, new application enabled by wireless; $8K/year savings per kiln ease of installation and low cost of wireless sensors increase likelihood of application
Data center	GE (Randal Bouwense); typical data center	power monitoring (power usage anomalies, allocation of costs, integration of 3rd party power management equipment), distributed energy management, wireless alignment of cooling capacity to data processing load	available	data centers	wireless used to fill in gaps where wires for sensors not available, wireless for power distribution sub-circuit monitoring, helps clarify prime power per ft sq. and prime power per device usage	throughout the data center	wireless fills in gaps in usage information, (e.g. wireless sensor on power distribution panel sub-circuits), wireless allows improved efficiency in energy usage
Steam trap	Honeywell (Tim Lefevre and Cindy Bloodgood); several users	wireless monitors allow better monitoring and control of steam distribution, instant notification of steam release locations, saves energy by allowing timely maintenance	now	industrial	wireless sensors measure temperature, vibration, acoustic properties of steam trap with alarms; dead bands; e.g. 1-2 plants (10-20 traps per plant); done in phases: Phase 1 – 10 pts to prove work and reflect customer savings; Phase 2 - 50-100 pts; Phase 3 - 200-300 pts; scalable case study	widespread	wireless enables ability to save energy through quicker repairs etc.; reduced down time
Motors	GE (Randal Bouwense)	wireless sensing of temperature, vibration, and prime power analyzed to indicate motor health, maintenance dispatched to address issues, saving motor failure, system downtime, and energy	now	industrial, buildings, transportation	wireless monitoring of motor health allows better control of motors and the processes they run, healthy motors consume less energy and result in a better product	widespread	wireless sensors enable monitoring spinning motor components not possible with wires, ubiquitous, low-cost wireless sensors allow more complete data, monitoring allows proper sizing of motors and processes
Wireless Monitoring and Metering Subsystems	GE (Randal Bouwense)	Wireless monitors deployed at power distribution panels allow monitoring of sub-circuits, which in turn allows tighter control of energy usage	now	industrial, buildings, transportation, specifically buildings	wireless monitors allow data from sub-circuit usage to be mapped to other data, such as external environment, time of day, building occupancy, etc... which enables control of energy resources	deployed by early adopters	Low-cost wireless allows ubiquitous sensing that would not be pursued otherwise; when combined with controls, provides 30% energy cost savings of lighting and climate control systems
Foundry electrode monitoring	Honeywell (Tim Lefevre and Cindy Bloodgood); several users, e.g., Nucor Steel	wireless temperature measurements in furnace areas improved furnace reliability and efficiency	now	industrial, steel mill furnace	wireless sensors provide real-time temperature measurements in areas previously not possible; knowledge of temperature allowed furnace upgrade, improved efficiency, and increase in production;	deployed by early adopters	wireless provides sensing in areas not possible with wired system 15% furnace efficiency improvements yield increased production, also reduced maintenance and increase in personal safety
Wireless light Control	Eaton (Eric Starosky); several users	control at the sub-circuit level based on time of day, also wireless dimming ballasts that dim lights based on room occupancy, ambient light entering a room etc...	now	buildings	wireless monitors allow data from sub-circuit usage to be mapped to other data, such as external environment, time of day, building occupancy, etc... which enables control of energy resources; wireless light control (wireless control on dimmable ballasts etc.) allows fine control of building lighting, which saves energy	widespread	wireless contributes to up to 40% energy savings
Ship borne rotating equipment monitoring	Honeywell (Tim Lefevre and Cindy Bloodgood); many potential users e.g., Honeywell ACS division working with US Navy	wireless monitoring of rotating equipment allows increases in efficiency and decreases in maintenance issues	emerging	industrial	wireless sensors monitor rotational parameters such as vibration which enables prognostic analysis that predicts failures and losses in efficiency	under development	wireless sensors will allow increases in efficiency, reduction in failures and the ability to schedule maintenance before failures occur
Data Center temperature monitoring	SynapSense (Peter Vandeventer)	Wireless monitoring of temperature, humidity and pressure differential maps, allows changes in cooling capacity to meet demands real-time	New product (additional PUE and DCiE monitoring currently under development)	data centers	multiple wireless sensors allow high resolution monitoring of environmental parameters, this data, when turned into information, can lead to more efficient use of cooling capacity	early adopters	30% energy cost savings possible

Matrix of Wireless in current Energy Savings/Reduction (legible!)

TEAM Wireless Energy Efficiency Keys Initiative Workshop Projects Matrix

	Customer/ Supplier	Application	Status	Energy Efficiency Category	Attributes	Benefits
energy management	Tennessee State Building/ Digital AV	50M ft^2 correleates energy usage w/ environment	in-use now, adding lighting…	buildings	enables proactive maintenance and demand awareness	15-20% savings (out of the box) - low cost installation
kiln monitoring	Manufacturing Site/ Honeywell	temperature monitoring for optimizing energy and process	in use, dozens of applications	industrial	4 - 5 wireless sensors on each kiln	rotating kiln, wireless gave $5K/year savings per kiln
data center	Computing/ GE	power monitoring, distributed energy management, temperature	In use	data centers	wireless augments wired sensors for power per ft sq, and power per unit	improved efficiency
steam trap	Manufacturing Site/ Honeywell	monitoring and control plus instant notification of steam release location	In Use	industrial	measure temperature, vibration, acoustic properties	ability to save energy through quicker repairs etc…
motors	Numerous Sites/ GE	temperature, vibration, current sensing for motor health	In Use	industrial, buildings, transportation	control of motor and the process it runs	wireless sensors for matching motors and processes
wireless light control	Numerous Sites/ Eaton	control based on time of day, room occupancy, ambient light	In Use	buildings	Wireless Ballast Control	wireless contributes to up to 40% energy savings

SECTION 5 - LIVE QUESTION AND ANSWER SESSION

Section 6 – Ease of Deployment

- Ease of deployment
  - example of wireless deployed focus on cost vs wire

- Wire vs wireless installation time
  - disruption to occupants
  - ease for crew+manager

Wired vs Wireless deployment time

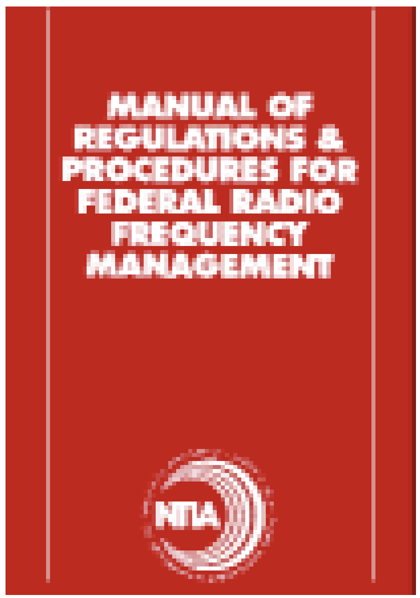
- Study by Ingersoll-Rand:
- "Installation time for a wireless versus wired system was 5-10 times less. Restated, it took, on average, 7.2 times longer to install the wireless system than the comparable wired system. Connection to the control system for each was approximately the same."

- "As the number of sensors and the complexity of the installation location (refinery, office building, historic structure) increased the time savings associated with the wireless system increased to, on average, 13 times quicker when a 50+ sensor/transmitter system was installed across multiple floors of a downtown Chicago office building."

- Conclusion: "Installing wireless systems is considerably faster than wired systems and caused significantly less disruption to the occupants."

Section 7 – Do I have to Worry about the Frequencies?

- DOE & Spectrum Licensing (NTIA/FCC)



DOE Frequency utilization –

National Telecommunications and Information Administration (NTIA) Office of Spectrum Management, Federal Long-Range Spectrum PlanII. Current Federal Spectrum Use (Operational and Spectrum Requirements)

- ***From the NTIA: A Summary of DOE Spectrum Use***
- ***The DOE, at an investment of almost $1 billion, has about 9,600 frequency authorizations supporting mission, programmatic, and operational requirements. These systems include HF, land mobile, aeronautical and maritime mobile, microwave, satellites, radar, navigation, telemetry, and surveillance systems. In addition, DOE uses more than 1,000 power line carrier systems to manage and control the distribution of electrical energy.***
- ***The DOE's current radio systems operate at specific frequencies between 200 kHz and 35 GHz. About 60 percent of the Department's spectrum resources are used for land mobile systems followed by 25 percent for microwave systems and 10 percent for HF systems for emergency purposes. The remaining 5 percent is for radar, telemetry, and satellite services. DOE's power line carrier systems operate at selected frequencies between 8 kHz and 496 kHz.***

- It's simple!

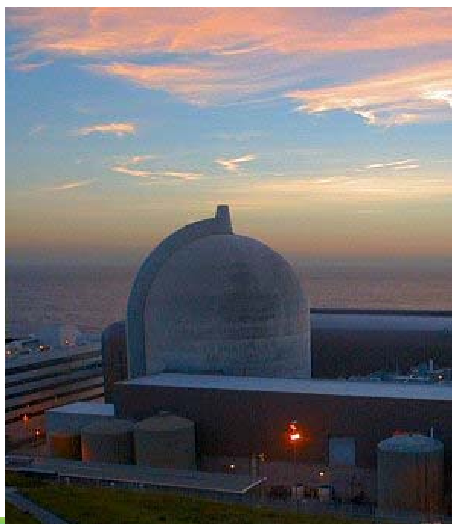
- Conclusion: Use wireless devices in the 900, 2400 MHz ISM bands – license free.

FCC Frequency Allocation

ISM (license-free) bands @ 900 MHz and 2.4 GHz

Section 8 – Do I have to Worry About IT?

- Addressing IT-security concerns/questions



- Integrated wireless systems for Offshore and Nuclear Plants

Just Follow the Government Guidance & Recommended Practices

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-82
FINAL PUBLIC DRAFT

Guide to Industrial Control Systems (ICS) Security

Supervisory Control and Data Acquisition (SCADA) systems, Distributed Control Systems (DCS), and other control system configurations such as Programmable Logic Controllers (PLC)

Recommendations of the National Institute of Standards and Technology

Keith Stouffer
Joe Falco
Karen Scarfone

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Special Publication 800-115
(Draft)

Technical Guide to Information Security Testing (Draft)

Recommendations of the National Institute of Standards and Technology

Murugiah Souppaya
Karen Scarfone
Amanda Cody
Angela Orebaugh

There's even Federal Guidance for Procurement Officers

Cyber Security Procurement Language for Control Systems
Version 1.6

Authors: Gary Finco, Kathleen Lee, Greg Miller, Jeffrey Tebbe, Rita Well
Contributors: Dirck Copeland, Edward Gorski, David Kuipers, Jerry Littee
Will Pelgrin, May Permann, Heather Rohrbaugh

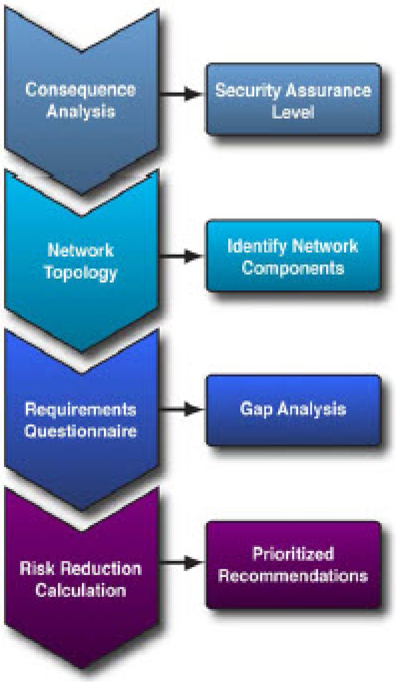
June 2007

INL Critical Infrastructure Protection/Resilience Center
Idaho Falls, Idaho 83415

Prepared by
Idaho National Laboratory
for the
U.S. Department of Homeland Security, National Cyber Security Division
Under DOE Idaho Operations Office Contract DE-AC07-051D14517

CS²SAT
Control System Cyber Security Self-Assessment tool

Homeland Security



Risk Reduction Calculation provides a prioritized list of control systems security recommendations from the results of the questionnaire. The recommendations provide the user with a systematic approach to address control systems security improvements based on the greatest potential to reduce the risk of a successful cyber attack.

Section 9 – Additional Application Areas: Using Wireless to Reduce Costs in Power Generation: Case Studies

•12 acre PV farm

•Solar concentrator farm

- Use your real estate: Generate power.

•CASE STUDY #1

•Presenter: Anoop Mathur

650 KW RENEWABLE ENERGY AND ENERGY MANAGEMENT PROJECT- TERRAFORE INC.

- Customer: Lithographix Inc. , Los Angeles, CA
  - 270,000 sq ft industrial building, 24h /365 day operation
  - 2700kW peak power consumption, 10Million kWh annual energy use
  - 4 X 60 Tons roof tops, 300 Tons process chiller, 3 X 100hp air compressors, several T-8 and T-12 fluorescent lamps throughout the industrial complex
- Project PV
  - 650 kW PV Installation – ballast mounted PV no roof penetrations (in progress, expect completion December 10, 2008)
  - Provides 20% of peak power, 19% of day time energy and 950,000kWh (9.5%) annual energy; net energy metering
  - 15.1% ROI over 20 years (does not include carbon credit)
  - Intangible "green energy user" benefit – a competitive differentiator
  - Eliminate 630 tons of CO_2 emission

•CASE STUDY #1 (CONT.)

650 KW RENEWABLE ENERGY AND ENERGY MANAGEMENT PROJECT- TERRAFORE INC.

- Project Wireless Energy Monitoring
  - Energy monitoring system monitors power and energy use using wireless sensors installed throughout the plant (in progress)
  - Expect 6% power demand reduction with rescheduling and active demand control (not implemented)
  - Expected ROI = 29%

- Project Energy Efficiency (So Cal Edison energy audit)
  - 5% energy reduction with simple Energy Conservation Measures
    - Retrofit T-12 lamps – 32kW reduction, 277,300 kWh energy decrease
    - Occupancy sensors – 118,500 kWh energy reduction
    - Replace aging roof top ACs with efficient chillers – 50kW and 90,000 kWh reduction

•CASE STUDY #2

•Presenter: Sterling Rooke

Energy Generation – Air Base (NE of Baltimore)

- 15MW solar farm at Nellis AFB.
- Saves $1M/year in utility bill.
- 70,000 PV panels on 140 acres

DoD Energy Management

Military Base

Sanguine Systems LLC

- 1 MW PV System
  - Offsets grid usage during the day
    - Supplies 20% of the Base energy needs during peak conditions (we peak at about 5MW during the day)
    - On low activity days, spills extra power to the grid
  - Supports the *strategic approach to assured power* outlined by the Defense Science Board Task Force on DoD Energy Strategy; FEB2008 (Section 5.1)
  - Supports Presidential Executive Order 13423

    (i) 3 percent annually through the end of fiscal year 2015,

    OR

    (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003.

DoD Energy Management

Military Base

Sanguine Systems LLC

- Intelligent building control system
  - Automated HVAC and access control system
    - Base’s energy management core
  - Card and Biometric access
  - Added security and accountability

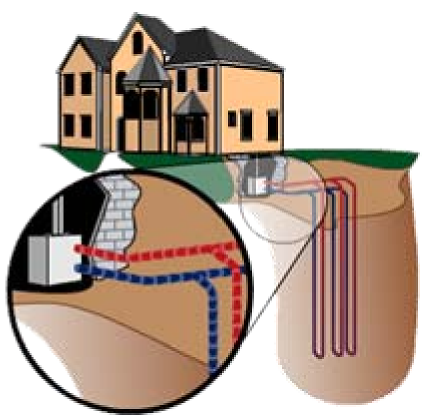
System will modernize a 20th century base!

DoD Energy Management

Military Base

Sanguine Systems LLC

- $8MM LEEDs Silver rated firehouse
  - MILCON funding to help the base realize energy savings
  - Will modernize fire protection at a joint Civilian- Military airfield
- Geothermal systems; *funding and scale* TBD



Section 10 – Return on Your Investment

- ROI

ROI CALCULATOR | RESULTS

Network Requirements

Your Custom Network Requirements

Desired Bi-Directional Data Capacity?
Desired total bi-directional bandwidth needed for your network's data requirements. — 15 Mbps

Desired Voice Capacity?
Desired number of simultaneous circuits needed for your network's voice requirements. — 24 Circuits

Distance Between Locations?
Distance between the two locations you would like to network together. More Information — 1 Miles

Is There A Clear Line Of Sight Between Locations?
A clear, unobstructed line of sight between both locations is needed in order to use a wireless bridge More Information — (•) Yes ( ) No

Point-to-Point or Point-to-Multipoint?
Is the application between 2 buildings (point-point) or more than 2 buildings (point-multipoint). More Information — (•) Point-to-Point ( ) Point-to-Multipoint

Type of Leased Line You Are Considering? — (•) T1 ( ) E1

Mode Selection

Please select a technology solution option with which to compare a wireless bridge solution
Please select the technology solution you wish to compare to a wireless bridge solution More Information — ( ) Private Line ( ) Leased Line (•) Both

Please select mode
Please select either Quick View or the Detailed View More Information — (•) Quick View ( ) Detailed View

Back | Next

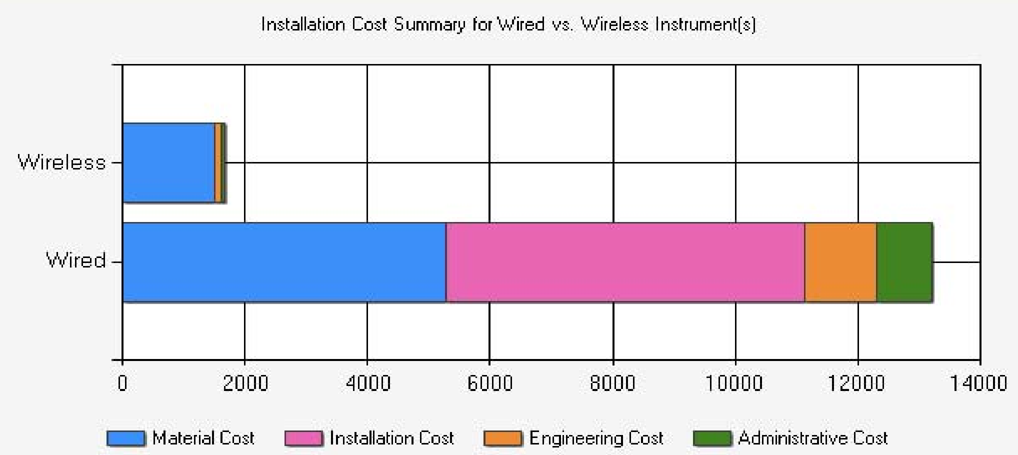
Not sure of your answer? Ask an expert.

More on ROI

Johnson Controls Municipal Wireless Solution ROI tool

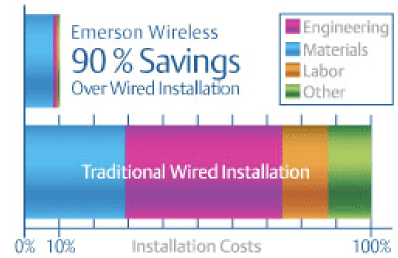
ROI Tools

October 2007 - Report H64



Save up to 90% on installation!

The cost of wire, additional hardware and labor drives up the cost of any project, large or small. Wireless solutions enable cost-effective implementation of new measurement points.



Print

Update

Reset

Version 1.2.2

USER INPUTS

Number Of Measurement Points:	1.00
Average Distance to Control Room:	1000.00
Distance from Transmitter to Junction Box (ft):	100.00
Amount of Trenching Required (ft):	0.00
Incremental Cost of Wireless per Device $:	1500.00

	Wired	Wireless
Material Cost ($):	5280.50	1500.00
Installation Cost ($):	5842.80	0.00
Engineering Cost ($):	1200.00	120.00
Administrative ($):	900.00	40.00
Total ($):	13223.30	1660.00

% Savings Compared to Wired: 88%

Edit Wired Costs

Edit Wireless Costs

INSTALLATION REQUIREMENTS

	Yes	No
Conduit Used (YES/NO):	⦿	○
Intrinsic Safety Barriers (YES/NO):	⦿	○
Junction Box Used? (YES/NO):	⦿	○
Trenching Required? (YES/NO):	○	⦿

More on ROI – steam traps

- Benchmarking demonstration is underway at ORNL. Multiple vendors, standards based.

- Tangible Results:

  Economics and operability

  Ease of Use

  ROI analysis

Energy Efficiency Improvement Program News

Vol. 1, Issue 4 • December 2007

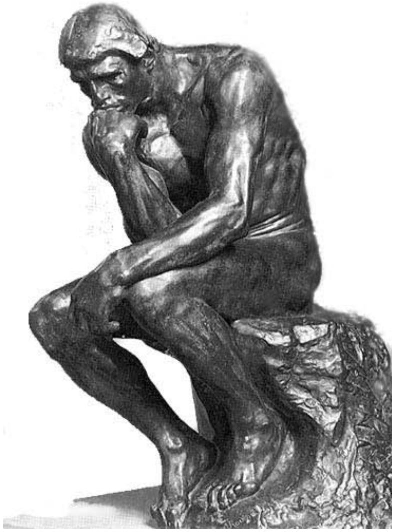
ENERGY CASE STUDY

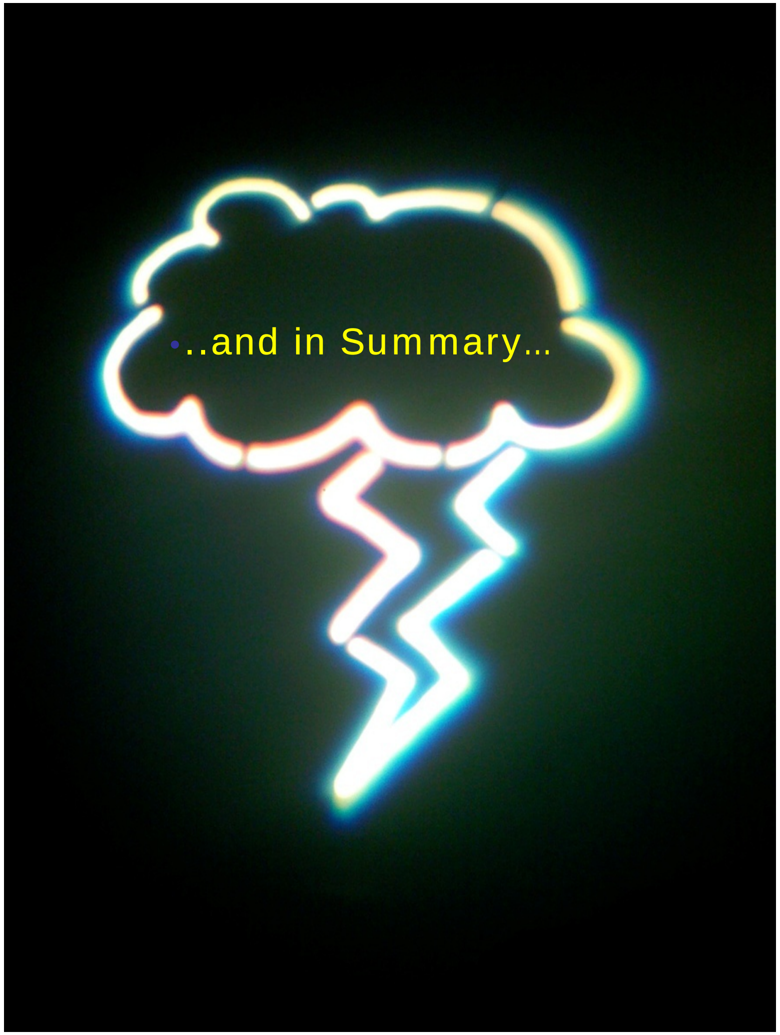
Steam Trap Maintenance Yields Savings

Steam traps are a type of automatic valve that open, close or modulate automatically to discharge condensate and non-condensate gases without permitting the escape of steam. Failing steam traps are commonplace; a 15 percent to 30 percent failure rate is typical in a steam trap system that hasn't been maintained for three to five years. Even well-maintained systems can experience a failure rate of 10 percent. (1)

Failed open steam traps allow steam to escape into the condensate return system; consequently, malfunctioning steam traps can cost hospitals more than $1,400 per trap annually or tens of thousands of dollars each year, depending on the size of the steam system.(2) The U.S. Department of Energy recommends an annual steam trap survey for low-pressure steam systems (less than 30 psig) to identify failing steam traps within a steam trap networ

Section 11 - Summary





The impetus

❑ DOE

United States Department of Energy

Office of Public Affairs

Washington, D.C. 20585

News Media Contact(s):
Julie Lynn Ruggiero, (202) 586-4940

For Immediate Release
August 8, 2007

Department of Energy Launches Major Initiative to Increase Energy Savings Across the Nationwide DOE Complex by 30 Percent

NEW ORLEANS, LA – U.S. Department of Energy (DOE) Secretary Samuel W. Bodman today launched the Transformational Energy Action Management (TEAM) Initiative, a Department-wide effort aimed at reducing energy intensity across the nationwide DOE complex by 30 percent. The TEAM Initiative aims to meet or exceed the aggressive goals for increasing energy efficiency throughout the federal government already laid out by President Bush. Reducing energy intensity by 30 percent across the DOE complex will save approximately $90 million in taxpayer dollars per year, after projects are paid for.

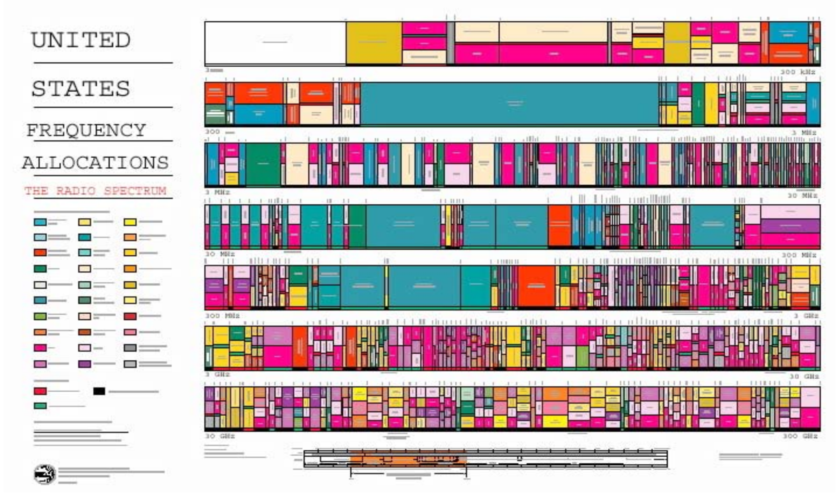
Wired vs Wireless costs & Time

Cost Component	Cost	Cost
	Wired Design	**Wireless Design**
Sensors	$636	$752
Wiring	$168 [1]	-
Communication and Signal Conditioning Hardware	$1903	$805
Labor	$2179 [2]	$450
Total Cost	$4886	$2007
Average Cost per Sensor	$407	$167

Cost Component	Cost	Cost
	Wired Design	**Wireless Design**
Sensors	$1800	$2152 [1]
Wiring	$4800 [2]	-
Communication and Signal Conditioning Hardware	-	$1475
Labor	--- [3]	$800
Total Cost	$6600	$4427
Average Cost per Sensor	$220	$148

- Time/Disruption of Installation:
  - Conclusion: “Installing wireless systems is considerably faster than wired systems and caused significantly less disruption to the occupants.”

Summary



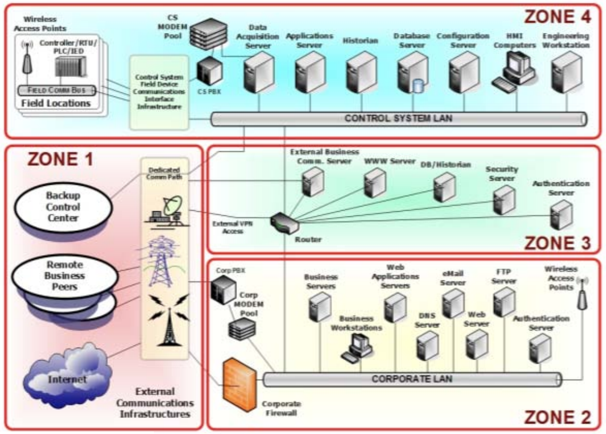


Figure 4 – Common architecture zones

Special Publication 800-82
FINAL PUBLIC DRAFT

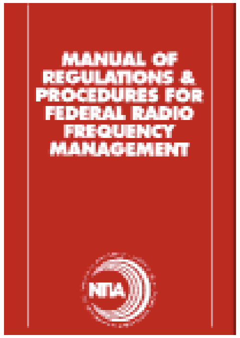
NIST
National Institute of Standards and Technology
U.S. Department of Commerce

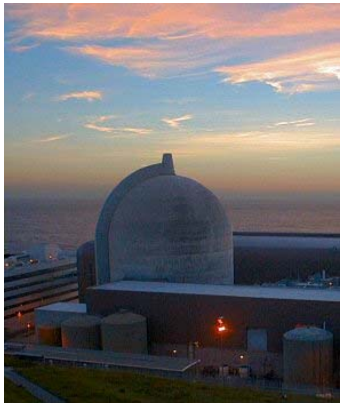
Guide to Industrial Control Systems (ICS) Security

Supervisory Control and Data Acquisition (SCADA) systems, Distributed Control Systems (DCS), and other control system configurations such as Programmable Logic Controllers (PLC)

Recommendations of the National Institute of Standards and Technology

Keith Stouffer
Joe Falco
Karen Scarfone





- Wireless devices ease deployment issues.
- ISM (license-free) bands.
- Reference architectures. Fed guidelines.
- Secure for critical facilities.
- Generate power for site use and sale to grid.

Final Question and Answer Session

Resources

- Please visit the following websites for specific information (including availability of devices and systems) on topics that have been discussed in this seminar:

- www.honeywell.com/onewireless
- www.emerson.com/wireless
- www.hartcomm.org
- www.apprion.com
- www.terrafore.com
- www.johnsoncontrols.com/wireless
- www.isa.org/isa100

Links and Resources

ITP webcasts by clicking the links below:

October 30, 2008: Quick PEP Tool Demonstration and Results

November 6, 2008: Energy Assessments: What are the Benefits to Small and Medium Facilities?

November 13, 2008: Assessing Data Center Energy Use

November 20, 2008: Super Boiler Technology

Learn More

To learn more about the Save Energy Now program, including information about no-cost energy assessments, software tools, and additional

resources, training, tip-sheets, and sourcebooks, please visit ITP's Save Energy Now Web site: http://www1.eere.energy.gov/industry/saveenergynow/.

Stay Informed

Sign up to receive ITP's free monthly e-newsletter, *E-Bulletin*, BestPractices quarterly journal e-magazine, *Energy Matters*, and partner with ITP to Save Energy Now:

http://apps1.eere.energy.gov/industry/saveenergynow/partners/

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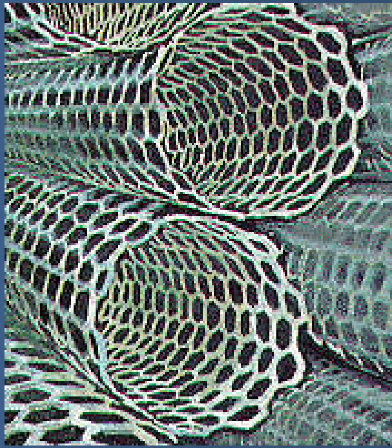
U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Transformational Energy Action Management (TEAM)
Wireless Energy Efficiency Keys Initiative

- Ways of Using Wireless Technology to Help You Reduce Energy Usage at your Facility


Save ENERGY Now Webcast Series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