

Energy Efficiency Solutions and Best practices

How EnOcean helps schools save energy and reduce CO2 emission.

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Sept. 16, 2026

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Technology for intelligent buildings



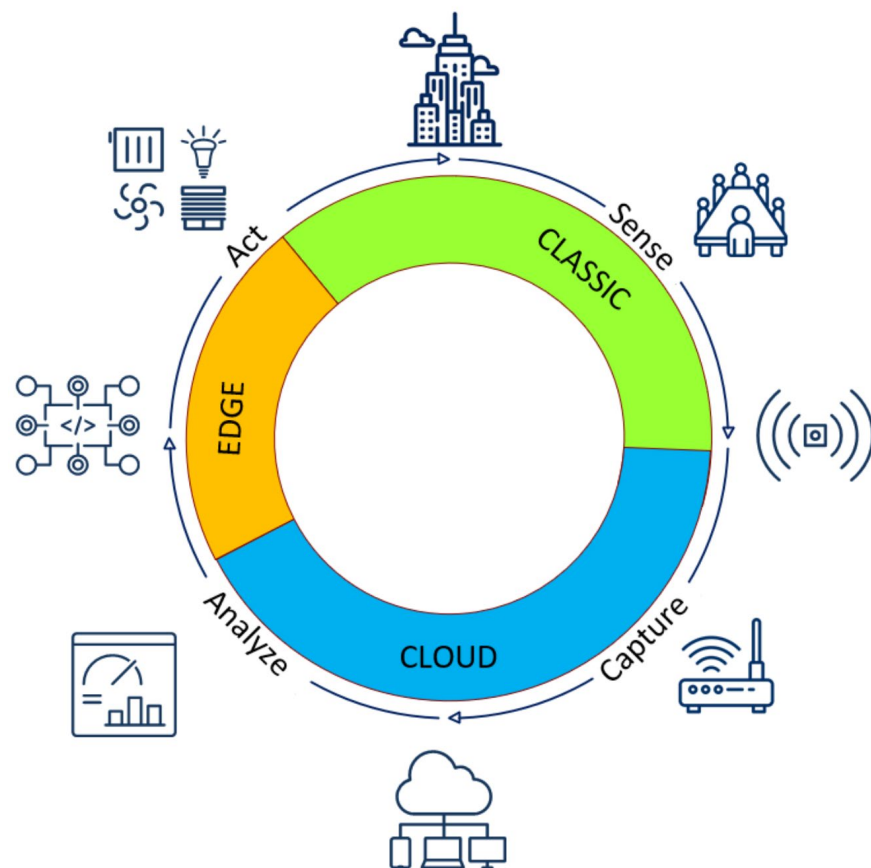
EnOcean is the pioneer of energy harvesting and sensor-to-cloud solutions for sustainable Internet of Things (IoT) applications.

For more than 20 years, EnOcean has been producing maintenance-free wireless switches and sensors, which gain their energy from the surroundings – from movement, light, or temperature changes.

The combination of miniaturized energy converters, ultra-low power electronics, robust radio technology, and open multi-protocol connectivity solutions based on open standards (EnOcean, Zigbee, Bluetooth®, BACnet, Modbus, LON, and IAP) forms the foundation for smart buildings, services, and production processes in the IoT.

The sustainable EnOcean solutions are used in building automation, smart homes, LED lighting control, industrial applications as well as for logistics and aviation to optimize the carbon footprint of buildings and spaces. Hardware and software solutions from EnOcean are successfully deployed by leading partners worldwide.

EnOcean Business Areas

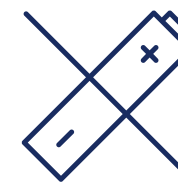
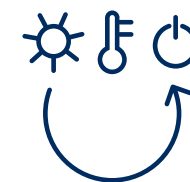


EnOcean business areas

- EnOcean Classic Products
 - Modules
 - Finished products
- EnOcean Cloud Solutions
 - Device management
 - Data collection and analysis
 - Undagrid applications
- EnOcean Edge
 - Connectivity to building networks
 - Data exchange and condition monitoring

How Energy Harvesting Works

Kinetic, Solar and Thermal



Kinetic Energy

Electro-dynamic generator

Solar Energy

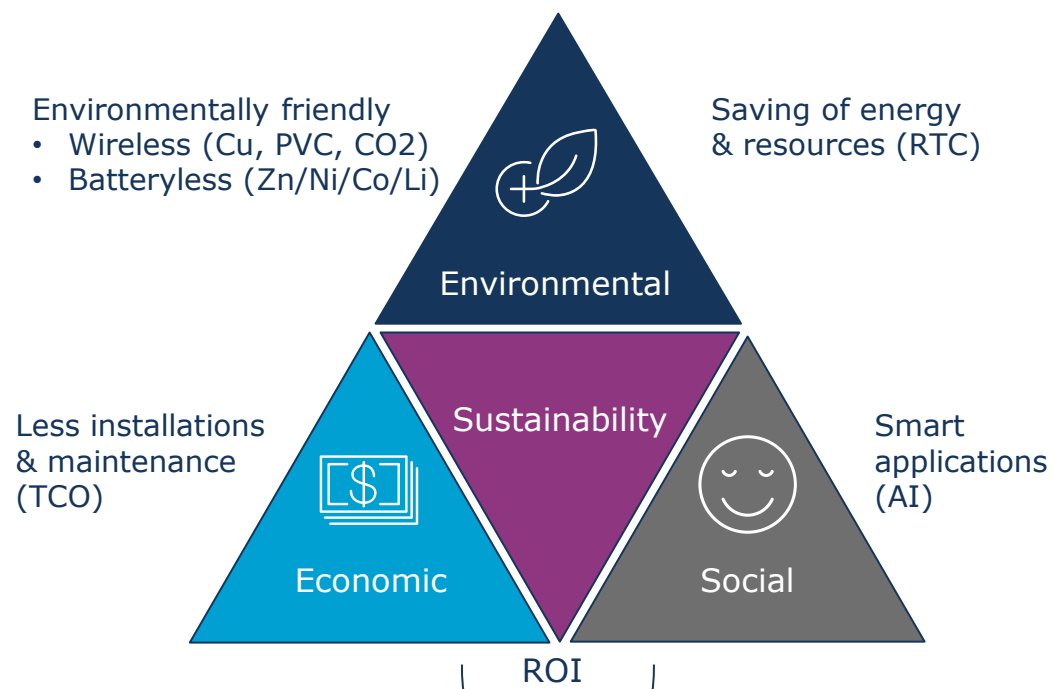
Module with energy storage

Thermal Energy

Energy generation through temperature differences

Sustainable IoT – Key Features

Sustainability Triangle



- Batteryless Wireless
- Sensors & Actuators
- Low Connectivity Cost
- Large Ecosystem of companies, products & services
- Standardized, interoperable, open, modular
- Worldwide available



Digitization

How Energy Harvesting Benefits K-12 & Universities



No Batteries, No Problem



Energy harvesting technology eliminates batteries in switches and sensors, meaning:

- No cost of replacing batteries in every individual switch
- Lower maintenance time and costs
- Less waste
- Compliance with 2023 NEC electrical safety regulations

Battery-less – For sustainability and your pocket!

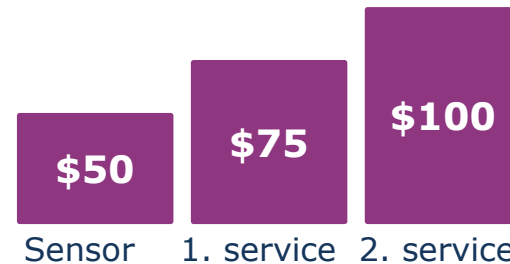
Cost of Battery Service

\$260 if a single battery has to be replaced

www.mouser.com/pdfDocs/Xidas_WP.pdf

\$25 per sensor, if all system batteries are replaced

10 min/sensor (access, replace, test, docu) + battery + service margin



Time for Battery Service

Typical Office Building (10.000 sensors):

- **1 man-year**
- 10 min/sensor, 223 working days * 8h

Service Interval

1-2 years is the standard precautionary replacement cycle by specialist service companies (www.tcsecurity.co.uk/index.php/faqs)

10 years is theory (www.linemetrics.com/de/bis-zu-10-jahre-batterielaufzeit-bei-lora-sensoren-so-schaut-es-in-der-praxis-aus)

Ecology

Environmental Harm (Zn, Ni, Li, Co)

Smart technology and not just for lights



Energy harvesting devices can integrate with numerous building management systems, such as BACnet, Modbus, HP Aruba:

- Works with open-source control platforms for maximum flexibility and operational life
- School operations can control devices remotely
- Teachers and other users can customize classroom environments to track with daylight or provide alternate lighting for different activities
- Works with smart building systems to turn HVAC systems on or off when windows or doors are opened or closed

Ideal for renovation and new construction



Wireless switches can be installed in the location most convenient for teachers, students and other users.

- Install multiple switches in spaces with numerous entryways
- Not constrained by current wiring schemes
- Room can also be controlled from classroom control panel

Technology Proven Over 10 Years at LAUSD



Benefits for

■ Architects

- Maintenance-free, interoperable wireless sensors
- Flexible room configuration

■ Specifiers

- Switches can be placed on almost any surface
- Interoperable products
- Compatibility with other building automation systems (KNX, LON, BACnet, TCP/IP)

■ System integrators / Contractors

- Speedy, flexible installation & system start-up
- No wiring, no drilling, no noise/dust/dirt
- Simple retrofit during undisturbed operation

■ Investors / School Authorities

- Reduced cost of installation and operation
- High energy savings
- Interoperable and scalable standard solutions

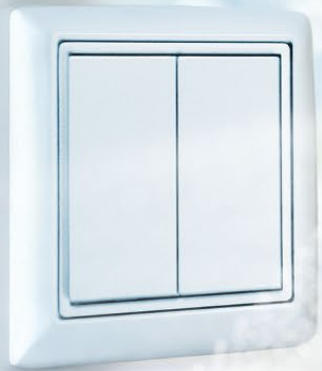
■ Facility Managers

- Flexibility, no maintenance needed
- Increased safety levels
- Faster reaction to system faults
- Reduced noise/dust/dirt
- Interoperable and scalable standard solutions

■ Facility users

- Enhanced comfort
- Pleasant learning environment with good air quality

Typical Energy Savings Use Cases



Basic Solution



EOSWU
Wall-mounted
Occupancy Sensor



LEDRU
LED Relay Zone
Controller 0-10V
(110 - 277 VAC)

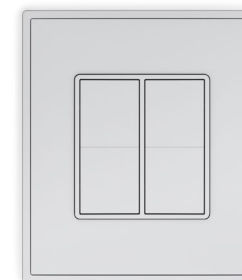


ESRPU
Single Rocker
Wireless Switch



Meet local codes with simple, cost-effective sensors, switches & controllers
[Also satisfies CA Title 24 requirements]

Battery-free
by EnOcean



- Meet local codes with simple, cost-effective sensors, switches and controllers.
- Wireless, energy-harvesting wall-mounted occupancy sensors.
- Wireless, energy-harvesting single rocker switches.
- Wireless LED Relay Zone Controller.

Advanced solution



-  Batteryless wireless switches control lighting and shading
-  Batteryless wireless temperature and humidity sensors govern HVAC systems
-  CO2 sensors monitor indoor airquality
-  Occupancy sensors trigger lighting and climate control systems
-  Networked smoke sensors set off fire alarms to trigger emergency response
-  Batteryless wireless window contacts monitor window status
-  Batteryless wireless door/window handles monitor door/window status
-  Actuators control heating, ventilation and shading
-  Wireless actuators control radiators
-  Batteryless wireless control units allow for optimal climate conditions and maximum operating comfort

EnOcean Alliance – Ensures Sustainability

- 400+ companies worldwide
- 5,000+ wireless products
- 1,000,000+ buildings installed worldwide
- Interoperable products, standardized interfaces

PROMOTERS	PARTICIPANTS
	
	
	
	
	
	

Some References:

- Energy Service Provider - **ENGIE**
 - 10,000 smart heating valves in 250 schools in France
 - Result: 30% cut of heating costs
- Sporting goods manufacturer - **ADIDAS**
 - 10,000 desk sensors (flex desks), passing counters (meeting rooms) and occupancy sensors (quiet rooms)
 - Locations: DEU, NLD, USA, COL, JPN, PAN, ESP, FRA, ...
 - Result: 15% reduction in office space requirement
- Semiconductor industry - **ASML**
 - 20,000 desk and room occupancy sensors
 - Locations: NLD, USA, JPN, SGP, IRL, TWN, KOR, CHN, ...
- Global Real Estate - **IBM**
 - EnOcean is official IBM partner for sensors
 - Locations: USA, DEU, GBR, CAN, CHN, UAE, ESP, FIN, SWE, DNK, SVK, HUN, ZAF, ...

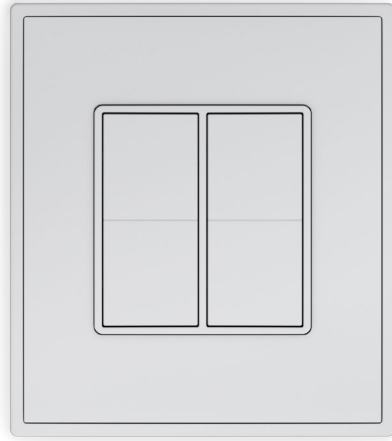
How to obtain utility rebates with DLC products



What is DLC listing and why bother?

- DesignLights Consortium (DLC) approves and lists lighting products (primarily LEDs) that meet high-performance, energy-efficiency, and quality standards defined by them.
- Many US/CA utilities rely on DLC listing to offer incentives/30% rebate programs.
- Using DLC listed products therefore **opens the door to said rebate programs**
- Obtaining the utility rebates is not straight forward and varies from one state and even county to another. Therefore, key to success is finding out where and how to obtain the rebates and which products qualify, see e.g. https://www.enocean.com/wp-content/uploads/eo_Flyer_US_DLC.pdf

DLC Listed Products



Best Practices for Rebate Applications

Best Practices for Customers

The strongest closeout package is the one that mirrors the installed Easyfit zones rather than treating the controls system as a single undifferentiated upgrade.

The most successful projects usually follow the same pattern. They are specific, documented, and aligned with the way utilities think about savings.

Customers generally improve their chances of success when they:

- describe the project by room and zone,
- explain the control sequence in each space,
- document high-end trim, occupancy, and daylight settings,
- preserve product eligibility documents early,
- confirm state and utility rules before purchase,
- use pre-approval when available,
- treat commissioning records as part of the rebate evidence.

Suggested steps to go through the application process.

1. Start with the local program, not the equipment list
2. Position the project as a room-based controls solution
3. Verify eligibility and save documentation early
4. Describe the control strategies not the parts
5. Decide whether the project should go through a prescription or custom path
6. Build the savings case room by room
7. Treat commissioning as part of the rebate, not just part of installation
8. Understand the state-specific issues that can change the process
9. Seek pre-approval whenever possible
10. Prepare a closeout package that matches the as-built-project

For more info, see https://www.enocean.com/wp-content/uploads/eo_Flyer_US_DLC.pdf

Thank you for your attention

Time for Q&A

Would you like to learn more? Simply contact us.

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