



AEInnova

Alternative Energy Innovations

Reactive Maintenance

Machine is **used** to its limits until it breaks.
Replaced only after machine failure.

- Expensive
- Inefficient
- Safety concerns

Preventive Maintenance

Prevent failure by performing regular checks.

- **Uncertain** optimal moment for maintenance
- Early maintenance **wastes machine life** that is still usable
 - Adds to **costs**

We **rely** on a wide range of **machines** that must be **maintained** if we do not want them to **break down**.



Predictive Maintenance

If you can **monitor** the performance and condition of equipment during normal operation and establish a series of parameters, it is possible to predict when failures are likely to occur. And thus, maintenance can be scheduled at the optimal point.

- Estimate time to failure
- Pinpoint problems in the machinery system
- Identify what parts need to be fixed
- Minimize downtime
- Maximize equipment lifespan

PROBLEM for IIoT massive deployment in the industry 4.0

Wired networks

- High **CAPEX** and lots of hardware required
- Not flexible in upgrading and maintaining



VS.

Wireless sensor networks (IIoT)

- **Rapid deployment and flexibility**
- **Low wireless coverage** due to energy limit
- **Need complex and costly** infrastructure
- **Hard to maintain** (frequent battery replacement, process stop, personnel costs)
- **Not sustainable** → Battery env. impact
- **Not suitable for explosive environments** and **heat-intensity facilities** (iron & steel & aluminum & copper, cement, paper, ceramics, etc)

The Massive Costs of Lithium-Ion Batteries

Batteries get drained and **need to be replaced periodically (in particular in heat-intense environments)**, which means a **high recurrent cost** for the companies and a huge maintenance problem.

Lithium-ion batteries are increasingly being preferred for energy storage solutions as we move from fossil fuels to more sustainable, yet unreliable, alternative sources of energy.

They have become an indispensable commodity of our modern lives. However, they have big **environmental, unethical, health and long-run implications** for businesses and the society.

The Future of IoT
Cannot be Powered
by Batteries

South America's "Lithium Triangle"

Takes about 65% of the region's
Huge negative impact on local farmers and communities

Toxic Lithium Leaks

2016 Tagong, China
Invasive production
landscape and destroying
pollutes the earth

Release of toxic gases when

overheated. Risk of explosion, e.g.

Samsung

Toxic and Hazardous Materials

Cobalt and Nickel extracted by child-miners

Expensive minerals (high demand) yet DRC

Is one of the

Cobalt Crisis in Congo

Linked to Heart Problems, Impaired

hearing, Eye Disturbances,

Hard-Metal Disease

Associated to Permanent DNA Damage

DNA damage

In a trillion-sensor world, we will need to

make about 913,242,009 battery

replacements every day, assuming a

conservative estimate of 5 years.

High replacement Costs

Explosive Environments,

difficult-access locations...

In Many Cases, it is NOT an Option

Introduction to the **energy harvesting** space technology principle



[Link to animation](#)

Heat conversion to energy

Indu-eye Battery-less Wireless Heat Powered IoT



[Link to animation](#)

AEInnova's Technology

- Vibrations & temperature monitoring for predictive maintenance
- Working from 50°C heat
- Batteryless
- Easy to install & free of maintenance
- Suitable for explosive environments (ATEX) and heat intensive facilities (aluminum & iron & steel & copper)
- Long-range coverage (NB-IOT & LoRa)
- Edge-computing capabilities
- Low data latency
- Tested in big industrial players in the EU

The wireless IIoT device:

- IP67
- CE Mark
- Wireless long range:
 - LoRaWAN (up to 14Km)
 - NB-IOT / LTE-M (up to 22km)
- No battery, no maintenance
- Digital sensor bus interface
- Edge computing (FFT, Filters...)
- *ATEX (ongoing)*



The thermoelectric generator:

- IP67
- CE Mark
- Working from 50°C - 150°C (at least 25°C Delta T between hot surface and ambient temperature)
- No battery, no maintenance
- *ATEX (ongoing)*

The sensor:

- 3 Axis vibration (TDK electronics)
 - Up to 4G / 0.01G sensibility
- Temperature (up to 1000°C)
- *Any industrial 4/20mA / Modbus sensor (in Q2-2022)*

Demonstration at ADIPEC 2021



[Link to demonstration](#)

Demonstration at MWC 2021



[Link to demonstration](#)

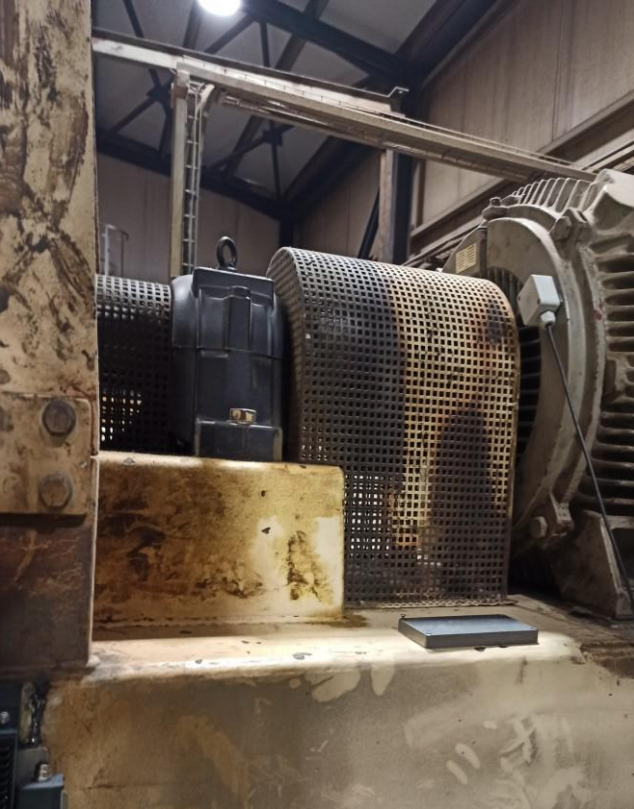
USE CASES

HEAT POWERED

PREDICTIVE MAINTENANCE & CONDITION MONITORING (Vibration / temperature)

- Pumps & Compressors
- Steam Traps
- Cranes
- Chimneys & Filters
- Motors & Engines





Vibration monitor

VIBRATION ON A DRYER IN A **PAPER PLANT**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 40 m
- Parameters:
 - One vibration device for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
- Heat source: 90°C .

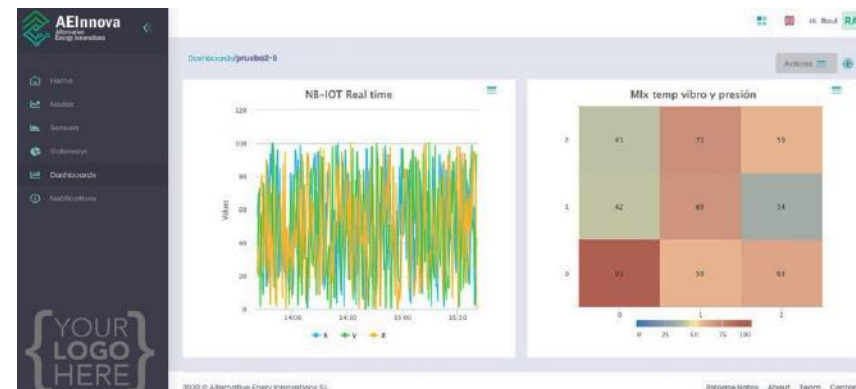


Vibration monitor

COMPRESSOR MONITORING TO PREVENT FAILURES IN AN **OIL REFINERY**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 900m
- Parameters:
 - Monitor: 3-axis vibration
 - Precision: 0.01g
 - Max vibration: $\pm 4g$
- Heat source: 60°C

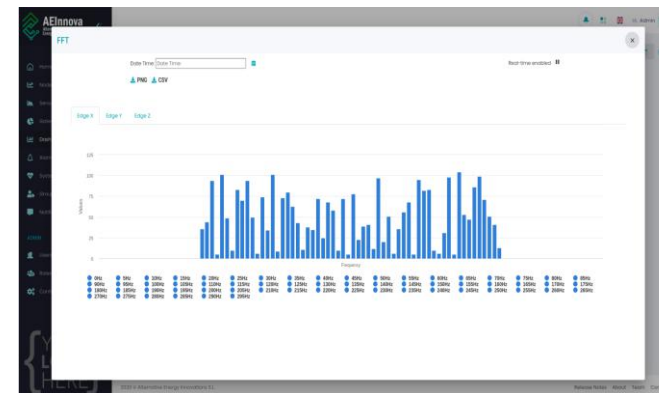


Vibration monitor

PUMP MONITORING TO PREVENT FAILURES IN AN OIL REFINERY

MAIN FEATURES

- Low infrastructure: INDU-EYE → NB-IOT Network → DAEVIS
- Long range coverage: Unlimited
- Parameters:
 - Monitor: 3-axis vibration
 - Precision: 0.01g
 - Max vibration: $\pm 4g$
- Heat source: 98°C
- Edge computing:
 - FFT spectral analysis (1,000 frequencies per every axis).



- 1 Thermal Battery
- 2 3 Axis accelerometer
- 3 Wireless node

Vibration & Temperature

VIBRATION AND TEMPERATURE IN A **BIOGAS PLANT**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 400m
- Parameters:
 - Two vibration devices for motors and pumps:
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
- Heat source: 60°C – 120°C





Vibration monitor

VIBRATION MONITORING ON COMBUSTION FANS IN A STEEL FACILITY

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN protocol → DAEVIS
- Long range coverage: Up to 2Km
- Heat source: 90°C
- Parameters: Vibrations
 - Monitor: 3-axis vibration
 - Precision: 0.01g
 - Max vibration: $\pm 4g$





Vibration monitor

VIBRATION MONITORING ON COMBUSTION FANS IN AN ALUMINIUM FACILITY

MAIN FEATURES

- Low infrastructure: INDU-EYE → NB-IOT protocol → DAEVIS
- Long range coverage: Up to 22 Km
- Heat source: 70°C
- Parameters: Vibrations
 - Monitor: 3-axis vibration
 - Precision: 0.01g
 - Max vibration: $\pm 4g$





Vibration Monitor

VIBRATION MONITORING ON RECIRCULATION TURBINE IN A **CHEMICAL FACILITY**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 30m
- Parameters:
 - One vibration device for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
- Heat source: 120°C.

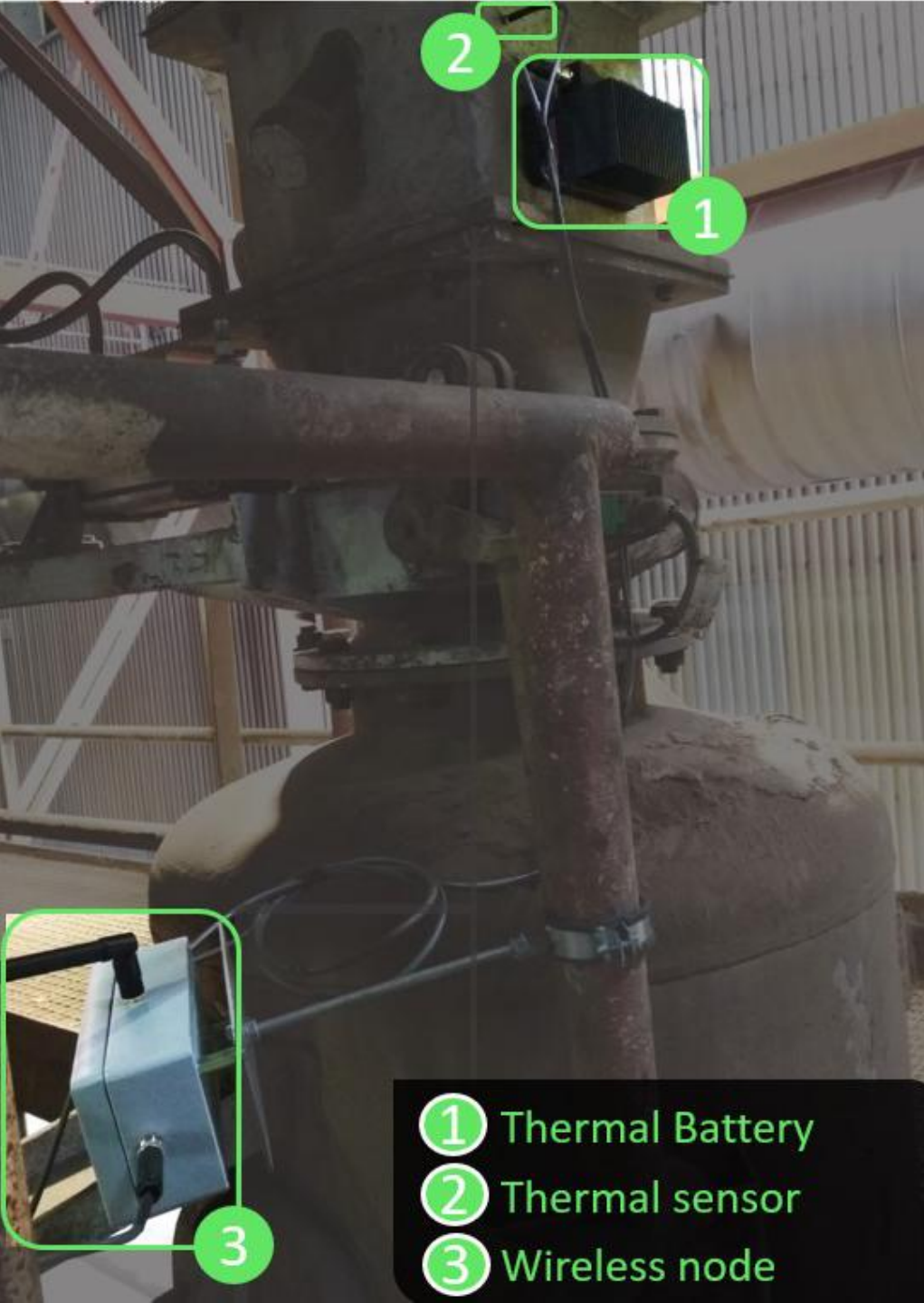


Vibration monitor

VIBRATION & TEMP MONITORING ON RASPERS IN A WHEEL RECYCLING PLANT

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 120-160 m
- Parameters:
 - One vibration device for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
 - One temperature device:
 - Temperature (up to 650°C)
- Heat source: 90°C -140°C (Furnace wall).



Ash clogging detection in collector

TEMPERATURE MONITORING ON ELECTROSTATIC FILTERS IN A THERMAL PLANT

MAIN FEATURES

- **Low infrastructure:** INDU-EYE → LoRaWAN → Siemens PLC
- Long range coverage: 0.9Km
- Heat source: 70°C
- Parameters:
 - Temperature (up to 650°C)

USE CASE

HEAT POWERED

STEAM LEAKS DETECTION in STEAM TRAPS





Stream trap monitor

STEAM LEAKS DETECTION IN A **SOYBEAN PROCESSING PLANT**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN → DAEVIS
- Long range coverage: Up to 2Km
- Parameters:
 - Delta T (2 temperature sensors)
 - *Ultrasound (Q1-2022)*
- Heat source: 90°C





Vibration monitor

VIBRATION ON A SLUDGE DRYER IN A WASTEWATER TREATMENT PLANT

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 90 m
- Parameters:
 - One vibration device for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
- Powered by electric grid (220VAC 50Hz).

Steam trap, & vibration detection

STEAM LEAKS DETECTION IN STEAM TRAPS AND VIBRATIONS ON A AUTOCLAVE IN A **TEXTILE PLANT**

- Low infrastructure: INDU-EYE 2.0 → LoRaWAN Gateway → DAEVIS
- Long range coverage: 490m
- Parameters:
 - Two vibration devices for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
 - Two steam leaks devices:
 - Delta T detection.
 - Ultrasound detection (Q2-2022).

Steam trap, & vibration detection

STEAM LEAKS DETECTION IN STEAM TRAP TREES AND VIBRATIONS ON A COMPRESSOR IN A **OIL REFINERY PLANT**

- Low infrastructure: INDU-EYE 2.0 → LoRaWAN Gateway → DAEVIS
- Long range coverage: 1420m
- Parameters:
 - Two vibration devices for :
 - Monitor: 3-axis vibration
 - Precision: 0.008g
 - Max vibration: $\pm 4g$
 - Two steam leaks devices:
 - Delta T detection in steam trap trees.
 - Ultrasound detection (Q2-2022).

New projects using micro wind turbines

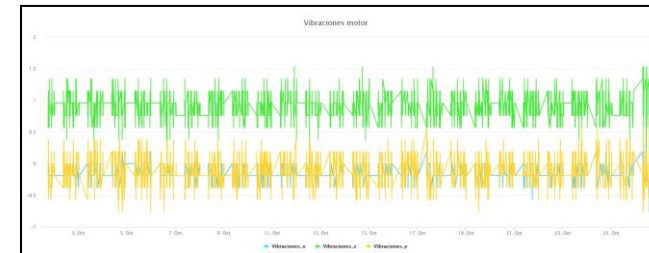


Vibration monitor in railways, highways & mining ventilators

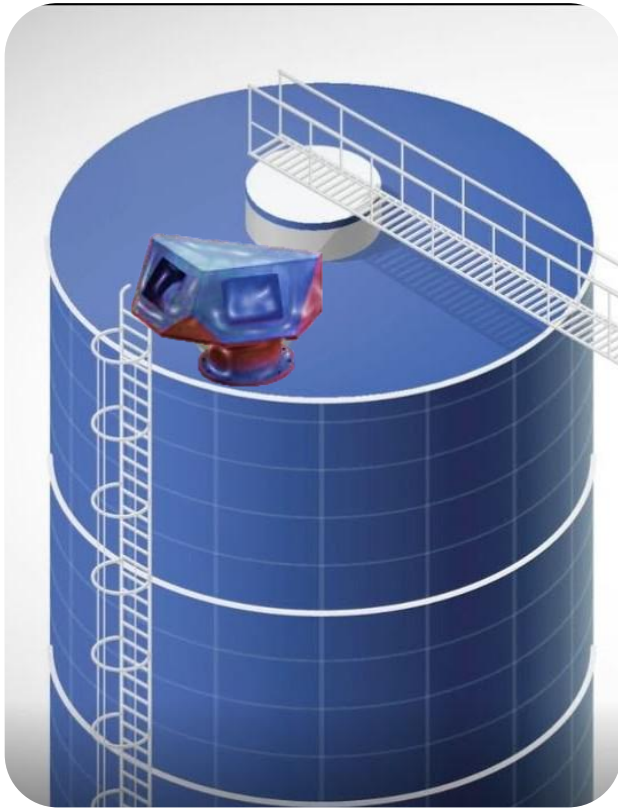
**VIBRATION MONITOR IN VENTILATION FANS FOR
TUNNELS TO AVOID ACCIDENTS & BAD QUALITY AIR**

MAIN FEATURES

- Low infrastructure: INDU-EYE → LoRaWAN Gateway → DAEVIS
- Long range coverage: 750m in this project
- Parameters:
 - Monitor: 3-axis vibration
 - Precision: 0.01g
 - Max vibration: $\pm 4g$
- Wind source from 10Km/h



New projects using solar power



Use case for silos

Cement / Sand / Grain - cereals

VOLUME MEASUREMENT FOR ROUTE PLANNING IN A CEMENT PLANT

MAIN FEATURES

- Low infrastructure: INDU-EYE → NB-IOT → DAEVIS
- Long range coverage: > 20Km
- Parameters:
 - Monitor: Distance / Lidar
- Fully powered by solar

INDU-EYE Main economic savings

Data compared to battery-powered IoT devices from (Emerson, ABB, Yokogawa...)

Savings in purchase:

- 50% lower.

Savings in wireless infrastructure:

- LoRaWAN > 80% compared to wireless solutions WirelessHart or ISA100
- NB-IOT / LTE-M >95% compared to previous wireless solutions.

Savings per device, in maintenance:

- > 200€ / yearly in battery replacement + personnel costs + process stop

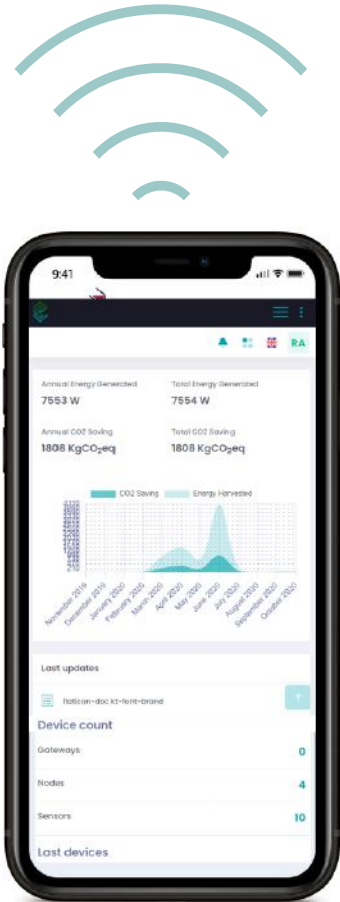
Savings for the environment:

- > 96% reduction in Carbon Emissions, Water usage, Heat and Energy consumption.



DAEVIS – The cloud Platform

DYNAMIC AEINNOVA VISUALIZER



SaaS PLATFORM FOR INDUSTRIAL SENSORS



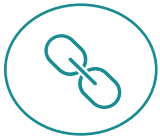
DYNAMIC REPORTING and ENVIRONMENTAL IMPACT GRAPH.



CUSTOMIZABLE ALARMS VIA SMS, EMAIL, POP-UP, TELEGRAM, etc.



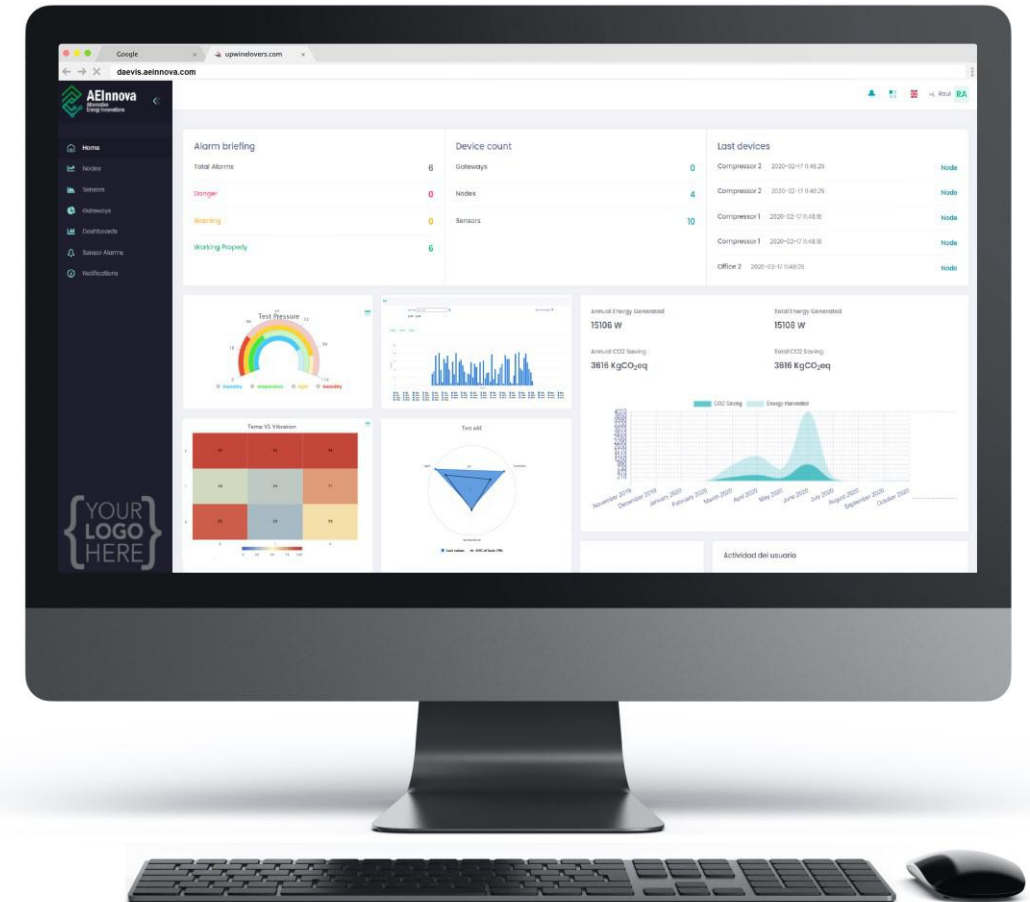
PREDICTIVE MAINTENANCE



INTEGRATION POSSIBILITIES WITH SCADA OR OTHER PLATFORMS



COST REDUCTION UP TO 60% COMPARED TO OTHER SIMILAR CLOUD PLATFORMS



Our customers



Shareholders & 8 European Union R&D Grants



29 INTERNATIONAL AWARDS



Premio
Emprendimiento



Membership



United Nations
Global Compact



Spin-Off
UAB



CEEC
Clúster d'Eficiència
Energètica de Catalunya



IoT CATALAN
ALLIANCE



IEEE

*Advancing Technology
for Humanity*



LoRa Alliance
Wide Area Networks for IoT



GREENPEACE



Press



[Link to AEInnova's COP26 Speech](#)

Premio a un proyecto para reciclar el calor residual en electricidad

BARCELONA El proyecto AEInnova para reciclar el calor residual en electricidad ha sido galardonado con el premio a la innovación en energía sostenible de la Unión Europea. Este premio reconoce el compromiso de AEInnova con la sostenibilidad y la innovación en el sector energético.

Los investigadores de AEInnova han desarrollado un sistema capaz de convertir el calor residual de la industria en electricidad. Este sistema es capaz de reducir las emisiones de CO2 y mejorar la eficiencia energética de la industria.



los ganadores Reciclar el calor como energía

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12th IoT/WT INNOVATION WORLD CUP®

Pitch and Award Ceremony
Hannover Messe

14 APRIL 2021 // 4:00 PM

www.innovationworldcup.com

THE TOP INTERNET OF THINGS TECHPRENEURS 2021

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UNEP UNECE AND THE SDGs MEETINGS AND EVENTS / SUSTAINABLE DEVELOPMENT / 2017 / WINNER AND FINALISTS OF THE 1ST IDEAS4CHANGE AWARD

Winner and Finalists of the 1st Ideas4Change Award

The first UNECE Ideas4Change Award competition was launched in 2015. The competition featured 150 ideas from 25 countries of the UNECE region. The finals were held at the 69th Session of the Economic Commission for Europe (ECE) in Geneva.

Awarded a coaching trajectory by Set Squared Partnership

AEInnova from Spain

AEInnova Waste Heat Recovery Unit (WHRU) is a system capable to convert waste heat from any hot surface into electricity. Only in Europe in 2012, the industry lost 140 TeraWatts per hour of energy due to their waste heat emissions, the equivalent energy generated by 30 nuclear power stations. Moreover, this waste heat, contributed in 1°C to the global warming, corresponding to a CO2 reduction of about 14 Million tons per year. Most WHRU use mechanical systems based on the steam machine, which increases maintenance requirements, complexity and costs. The AEInnova product combines thermoelectric devices with the latest microelectronic technologies and wireless sensor networks to increase performance and real time monitoring, without any mechanical component and need for maintenance. In 2014 AEInnova won the spanish EcoEmprendedorXXI award and other important national recognitions.

Website : [AEInnova](http://AEInnova.com)

DE LA CIENCIA AL MERCADO

Calor residual convertido en electricidad

AEInnova, 'spin-off' de la UAB, desarrolla y pone a prueba sus primeros prototipos de recuperadores de energía

Los investigadores de AEInnova han desarrollado un sistema capaz de convertir el calor residual de la industria en electricidad. Este sistema es capaz de reducir las emisiones de CO2 y mejorar la eficiencia energética de la industria.

Electricidad a partir de calor industrial

Los investigadores de AEInnova han desarrollado un sistema capaz de convertir el calor residual de la industria en electricidad. Este sistema es capaz de reducir las emisiones de CO2 y mejorar la eficiencia energética de la industria.

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Sections + 10 Emerging Technology

Climate change

AEInnova could convert up to 20% of industrial waste heat into electricity

This 'spin-off' is developing a recuperator that could reach an efficiency of 90% in optimal conditions

by Teresa Alameda 05 March, 2015

Caption : the first recuperator prototype with a thermal characterizer.
Credit : AEInnova.

The 2012 annual industrial electronics congress of the **Institute of Electrical and Electronic Engineering**, the IECON, reported on the potential market for energy recovery through *energy harvesting* techniques - a term commonly used in English and which in Spanish would translate as collection or harvesting energy. He also warned about the large amounts of energy that are lost daily in the form of waste heat from industrial processes. The data presented during the congress, coming from a study by the University of Ghent (Belgium), set this amount at more than 140 Terawatt-hours, only in Europe. This figure

EL CALOR DE LA FABRICA, BATERIA DEL TODO CONECTADO

La empresa AEInnova desarrolla un sistema de sensorización IoT inalámbrico y autónomo que funciona reutilizando la energía de la propia industria que hasta ahora se perdía

Powered by **dena** German Energy Agency

Berlin, March 2017

#GET100 for the #G20

The Top 100 Start-ups from a global initiative: "Start Up Energy Transition"

Global energy transition is one of the biggest challenges in human history. But it is also an amazing opportunity for combining innovative business and political will to create growth, jobs and a sustainable energy solution for the planet to prevent climate change. Tomorrow's energy system is already in the making - an endeavor in which established players and start-ups fight side by side. That's why the German Energy-Agency (dena) and its network initiated the Start Up Energy Transition Award along Germany's G20-presidency.

Connecting minds for a greater good.

Five categories and a special prize to support the 7th Sustainable Development Goal (SDG 7), more than 90 partners from over 30 countries and Ambassadors from all over the world: the first edition of our initiative was already a tremendous success. We received more than 500 applications from 66 different countries! Supported by "Ambassadors" from all over the world, a high-level expert jury defined the Top 100 Start-ups, from which 18 finalists and 6 winners were chosen. Meet the #GET100 here: some of the most innovative Start-ups driving innovation on energy and climate change!

"Join us, be part of the Start Up Energy Transition!"

Andreas Kuhlmann
Chief Executive
German Energy Agency (dena)

Powered by **dena** German Energy Agency

- AEInnova, <http://www.aeinnova.es>, Spain - FINALIST!

Industry: Energy Harvesting and Recovery, Founding year 2014, Employees: 7

HEAT-R Waste Heat Recovering Units (WHRU) are lightweight modules with different geometries, adaptable to any heat source and very easy to install and allow to recover waste heat into electricity. Internally, they can find the most innovative thermal and thermoelectric materials in conjunction with their patented microelectronic control system.

Certification & Patents

Certificado ES19/85464

El sistema de gestión de

ALTERNATIVE ENERGY INNOVATIONS, S.L.

C/ Pare Llaurador, 169
08224 Terrassa (Barcelona)

ha sido evaluado y certificado en cuanto al cumplimiento de los requisitos de

ISO 9001:2015

Para las siguientes actividades:

Diseño y desarrollo de equipos para la recuperación del calor residual de procesos industriales, IoT industrial y la comercialización de los mismos.

en/sede los siguientes emplazamientos:

C/ Pare Llaurador, 169 - 08224 Terrassa (Barcelona)

Este certificado es válido desde
3 de febrero de 2020 hasta 11 de febrero de 2022.
Edición 2. Certificada con SGS desde febrero de 2019.

Autorizado por

Dirección de Certificación

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Página 1 de 1

SGS

SYSTEM CERTIFICATION
ISO 9001
SGS

IAF
ENAC
CERTIFICACIÓN
N° 051/G - SC001

Este documento es válido por 12 meses desde la fecha de emisión, o sea, que se puede renovar en cualquier momento, y constituirá la responsabilidad de SGS de la validez en los términos establecidos en las cláusulas condiciones generales que rigen la aplicación de la prestación de los servicios. La validez del certificado puede ser suspendida o anulada en cualquier momento por incumplimiento de las condiciones de validez. El presente documento no podrá ser alterado ni modificado, ni en su contenido ni en su forma. En caso de cualquier modificación, SGS se reserva los derechos legales que corresponden para la defensa de sus legítimos intereses.

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www.applus.com

Applus⁺

CERTIFICADO DE EXAMEN UE DE TIPO
EU-TYPE EXAMINATION CERTIFICATE

ENAC
CERTIFICACIÓN
N° 1210 / PM049

No **0370-RED-3781**

EMITIDO POR / ISSUED BY	LGA1 TECHNOLOGICAL CENTER - No. 0370 (APPLUS)								
SOLICITANTE / APPLICANT	ALTERNATIVE ENERGY INNOVATIONS S.L.								
FABRICANTE (Nombre, Dirección) / MANUFACTURER (Name, Address)	ALTERNATIVE ENERGY INNOVATIONS S.L. C/ TELERS S - B, 2ND FLOOR, OFFICE 11 08221 TERRASSA (BARCELONA - ESPAÑA)								
COMERCIALIZADO POR (marca) / COMMERCIALIZED BY (Brand)	AEInnova (ALTERNATIVE ENERGY INNOVATIONS S.L.)								
PRODUCTO / PRODUCT	Heat-powered IoT vibration monitoring device using LoRa at 868 MHz protocol								
TIPOS / TYPES	Indu-Eye LoRa Vibro								
Versión HW / SW / HW / SW version	SW: v1.y.z HW: v1.y.z								
DIRECTIVA APLICABLE / APPLICABLE DIRECTIVE	DIRECTIVA 2014/53/UE DEL PARLAMENTO EUROPEO Y DEL CONSEJO, DE 16 DE ABRIL DE 2014, RELATIVA A LA ARMONIZACIÓN DE LAS LEGISLACIONES DE LOS ESTADOS MIEMBROS SOBRE LA COMERCIALIZACIÓN DE EQUIPOS RADIOELÉCTRICOS DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 16 APRIL 2014 ON THE HARMONISATION OF THE LAWS OF THE MEMBER STATES RELATING TO THE MAKING AVAILABLE ON THE MARKET OF RADIO EQUIPMENT								
DESCRIPCIÓN / DESCRIPTION	Sistema de monitorización IoT de vibraciones alimentado por calor, utilizando protocolo LoRa a 868MHz. Heat-powered IoT vibration monitoring device using LoRa at 868 MHz protocol.								
CUMPLE CON LOS REQUISITOS ESENCIALES / MEET ESSENTIAL REQUIREMENTS	<table border="0"> <tr> <td>Art. 3.1a Salud y Seguridad / Art. 3.1a Health & Safety</td> <td>☑</td> <td>Art. 3.2 Uso eficiente del espectro radioeléctrico / Art. 3.2 Efficient use of Radio spectrum</td> <td>☑</td> </tr> <tr> <td>Art. 3.1b EMC / Art. 3.1b EMC</td> <td>☑</td> <td>Art. 3.3 Características especiales / Art. 3.3 Special characteristics</td> <td>☐</td> </tr> </table>	Art. 3.1a Salud y Seguridad / Art. 3.1a Health & Safety	☑	Art. 3.2 Uso eficiente del espectro radioeléctrico / Art. 3.2 Efficient use of Radio spectrum	☑	Art. 3.1b EMC / Art. 3.1b EMC	☑	Art. 3.3 Características especiales / Art. 3.3 Special characteristics	☐
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Art. 3.1b EMC / Art. 3.1b EMC	☑	Art. 3.3 Características especiales / Art. 3.3 Special characteristics	☐						

Este documento carece de validez sin su anexo, cuyo número coincide con el del presente certificado. // This document is not valid without its technical annex, whose number coincides with the number of the certificate.

La evaluación de la documentación técnica entregada se encuentran recogidos en el expediente técnico número: 19/31702715
The evaluation of the technical documentation delivered is included in the technical file number: 19/31702715

Restricciones (si aplican) / Restrictions (if apply):

Bellaterra, 19 de Noviembre 2019 // 19th November 2019

Applus⁺

José Luis Medina
Director
Electrical & Electronics - Spain

Este Certificado es válido mientras no se produzcan cambios en el estado de la técnica que indiquen que el equipo radioeléctrico aprobado ya no puede cumplir los requisitos esenciales de la Directiva 2014/53/UE y no haya modificaciones en el tipo aprobado que puedan afectar a la conformidad con los requisitos esenciales de la Directiva 2014/53/UE.
This Certificate is valid as long as there are no changes in the prior art indicating that the approved radio equipment can no longer meet the essential requirements of Directive 2014/53/EU and there are no modifications of the approved type that may affect the conformity with the essential requirements of Directive 2014/53/EU

Página 1 de 4

LGA1 TECHNOLOGICAL CENTER, S.A. CP: 46100 BURJASSOT

United States of America

To Promote the Progress of Science and Useful Arts

The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

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Andres Ibanez

DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

US, CANADA and EU Patent accepted.

3 ongoing.



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