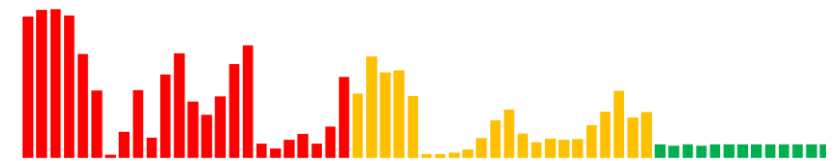


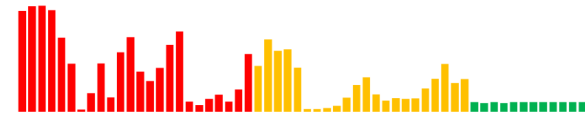


***Excellence and Leadership in Implementation of Large-Scale Wireless Applications to Improve Reliability and Energy Efficiency***

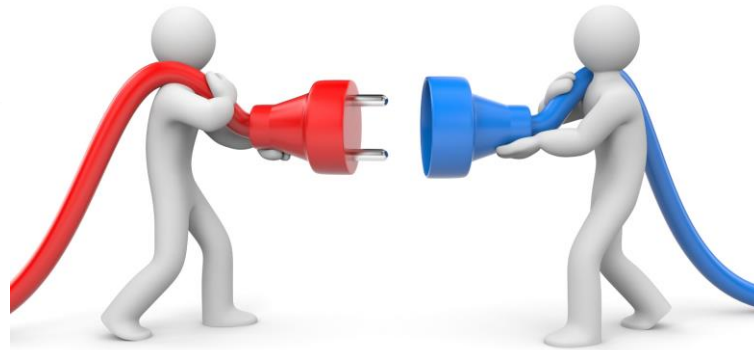
*This project has won the “2019 ISA100 Wireless Excellence in Automation” award granted by the Wireless Compliance Institute (USA)”*



**Luis Sancho**  
**February 2020**



The Iberian Lube Base Oils Company, SA (ILBOC) is a company incorporated in 2012, 30% owned by Repsol Petróleo and 70% by SK Lubricants, for the production of state-of-the-art Lubricants (LBOs) (group II and III) at its plant in the Escombreras Valley in Cartagena.



70%

30%

2017 data



3 The third largest South Korean Company by Sales Revenue

90,000 employees

Business: Energy and chemistry: 46%, IT and semiconductors: 29% and Marketing and Services: 25%

12.0 USD billion of Net income

Significant part of Korean Economy: 9,2% of Korean GDP and 11,2% of Korean export

1 Ranked 1<sup>st</sup> in Oil&Gas Sector and Telecommunication sector

1 **SK lubricants**, SK Innovation subsidiary, is World Leader in Group 3 Base Oils production and commercialization.

1 First Refining Company in Spain and Peru.

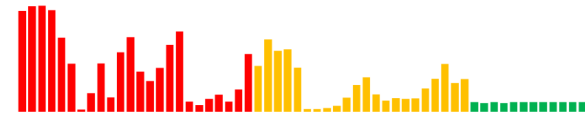
2 Second Company in Spain by Sales Revenue.

25,085 employees

2,397 USDM of Net Income

2,718 USDM of Adjusted Net Income

5 Repsol Petróleo, subsidiary of GRUPO REPSOL, operates 5 refineries in Spain



**ILBOC produces 630,000 tons per year of high-quality base oils becoming the biggest production plant of new generation lube base oils in Europe to manufacture high-tech lubricating oils with significant advantages over conventional oils.**

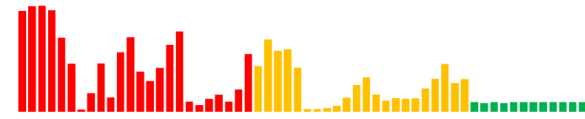
**ILBOC satisfies much of the European demand for state-of-the-art lubricant bases**

**The EU's drive for energy efficiency and reduction of CO2 emissions has led to an increasingly efficient use of energy, which requires new technological challenges.**

**Committed to the Environment**



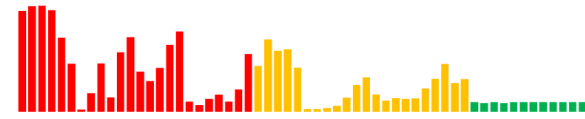




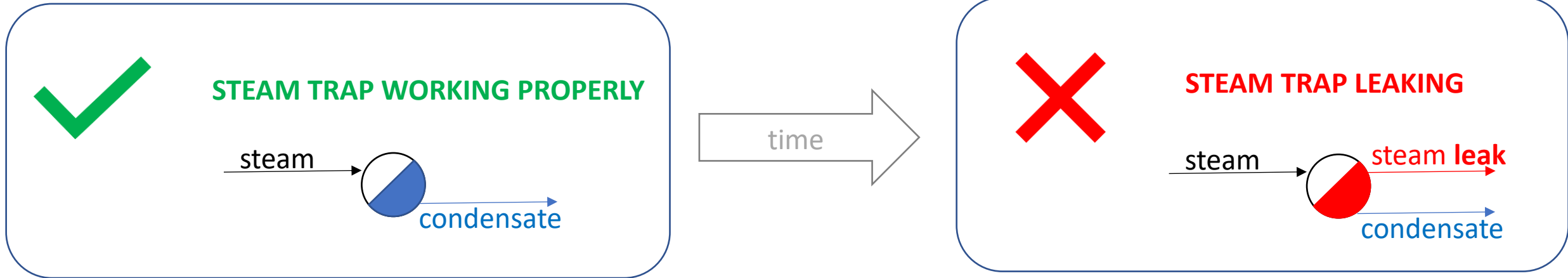
## THE CHALLENGE

**This project emerges in ILBOC as a challenge to achieve the following objectives:**

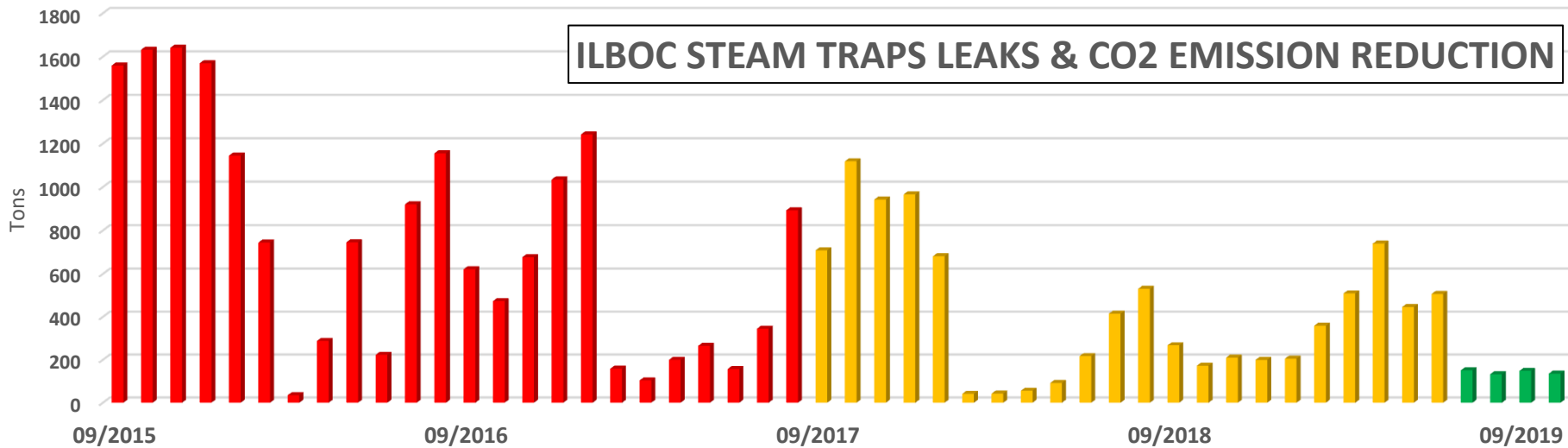
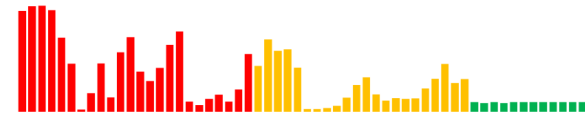
- 1. Reliability: Minimize failure rate in its large population of steam traps**
- 2. Energy Efficiency: Reduce steam leaks rate in steam traps below 0.5% permanently**
- 3. Fight against Climate Change: Reduce atmospheric CO2 emissions**
- 4. Safety: Detect dangerous internal / external gas leaks in safety & relief valves**
- 5. Employee Health and Safety. Detect toxic gas (H2S) in the environment**
- 6. Prevention of Catastrophic Risks Detect of explosive gas (hydrocarbons) in the environment**
- 7. Safety & Reliability. Monitoring tightening torque on flange bolts & nuts (experimental)**



## HOW – THE OPPORTUNITY



- ❑ Due to operation **time**, steam traps degradate and **leak steam**
- ❑ Leaking steam traps damages surrounding elements → **exponential grow degradation**
- ❑ **One by one steam leak is small but there are hundreds or thousands of steam traps** in a plant unit (ILBOC has 900 steam traps)
- ❑ Leaking steam traps cannot be always removed and steam leaks are treated as waste



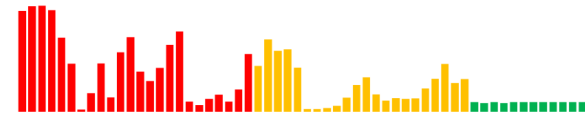
**Traditional Steam Traps Maintenance**

42% waste reduction

**Intensive Steam Traps Maintenance**

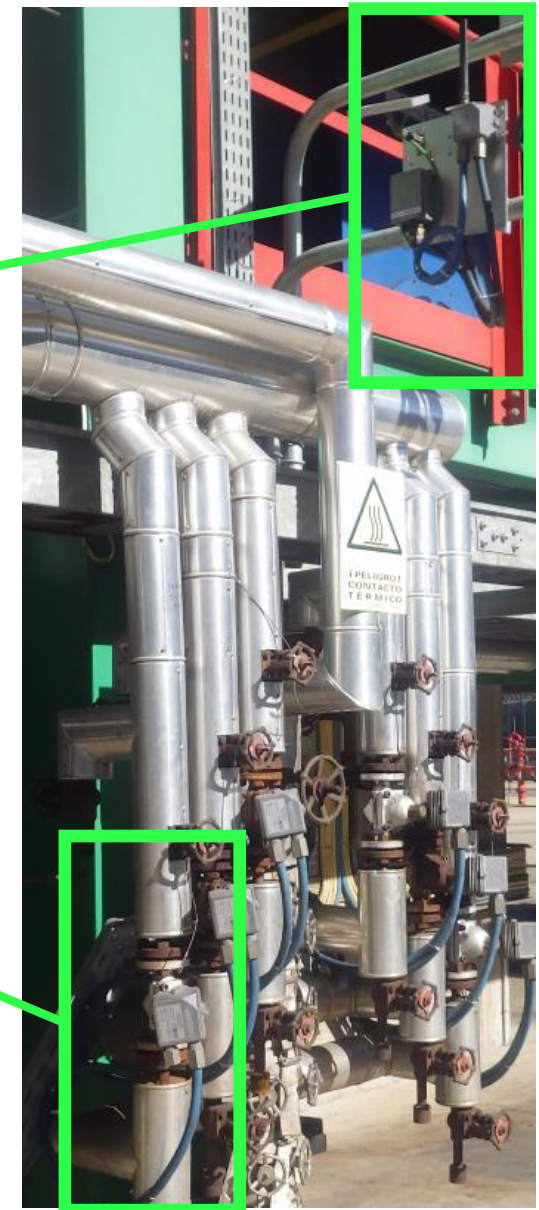
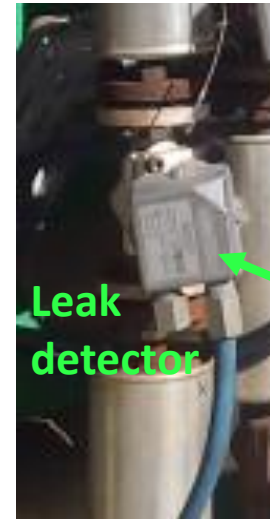
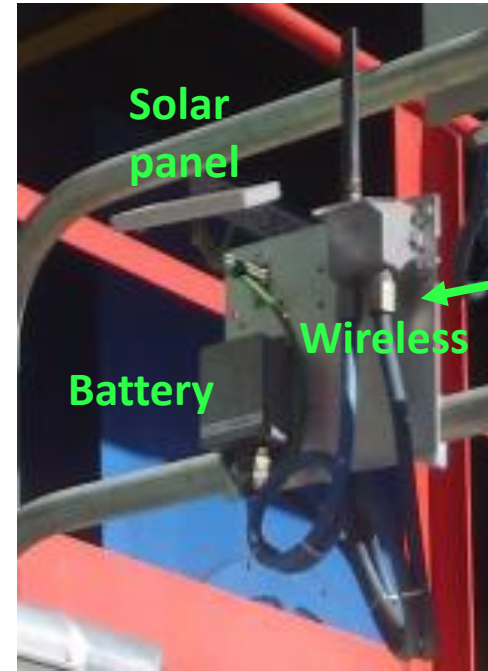
81% waste reduction

**Monitoring + Intensive Steam Traps Maintenance**

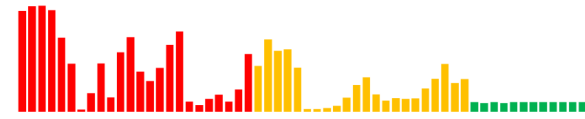


## HOW – THE SOLUTION

- ❑ Long term contract with steam traps manufacturer, maintenance services and condition monitoring specialist company
- ❑ Leak and temperature sensor installed in EACH steam trap
- ❑ Solar powered wireless communications (the biggest known steam traps monitoring wireless network, 900 monitoring points)
- ❑ The monitoring system sends an alarm in case of the steam trap starts leaking or any other fail
- ❑ The contractor removes the leak inline / in-service in less than 24 hours (steam traps are equipped with an external adjustment mechanism that allows quick repair without spare parts).
- ❑ The contractor has a malus if more than 0,5% of steam traps leak

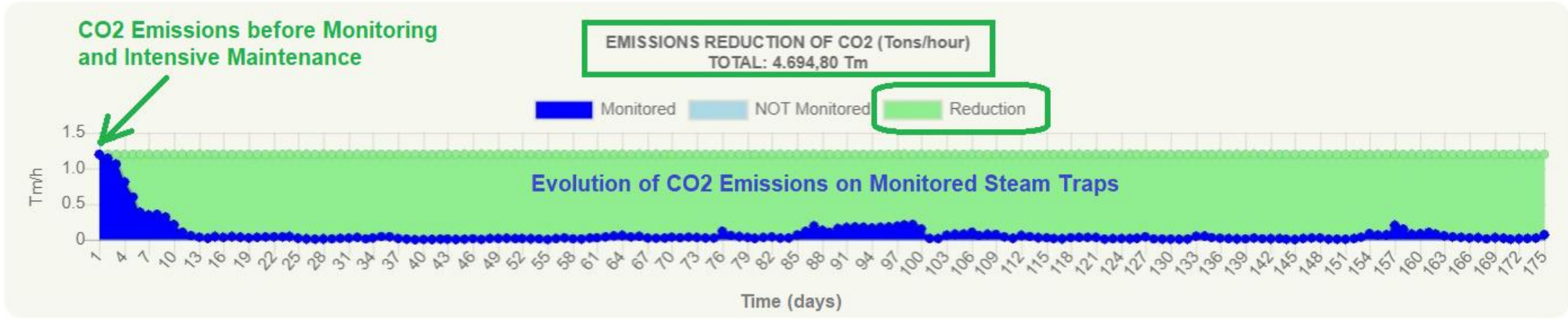
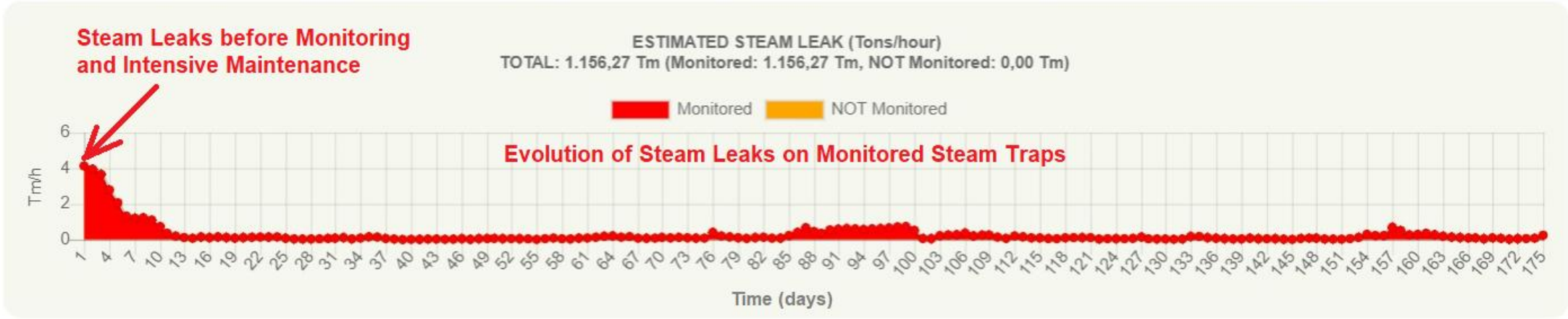




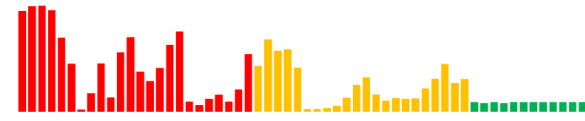


**HOW – THE SOLUTION**

**ENERGY**



**Steam leaks and CO2 emissions are minimized because contractor keeps steam traps leaks rate below 0,5%**

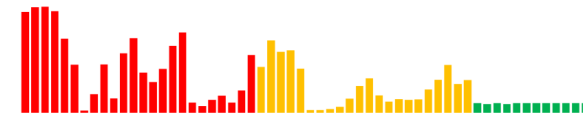


## HOW – THE SOLUTION

Petrochemical Complexes have a wide network of gas sensors to detect dangerous gases in the atmosphere. However, on exceptional occasions accidents, fires and explosions occur due to unforeseen presence of dangerous gases in low points, wells, ...

- ❑ This project required to deploy a wide scalable wireless infrastructure because there were steam traps everywhere, as usual in Petrochemical Complexes.
- ❑ Detection of explosive gases (hydrocarbons) and toxic gases (S2H) uses the common SmartWatchWeb™ steam trap monitoring platform.
- ❑ All alarms generated by gas sensors are automatically sent to the ILBOC Security Department for immediate management of timely actions.





- The solution has been carried out as **turnkey project** by BITHERM.
- **ISA100 Wireless' flexible network topology** has reduced costs and simplified implementation of this large-scale project.

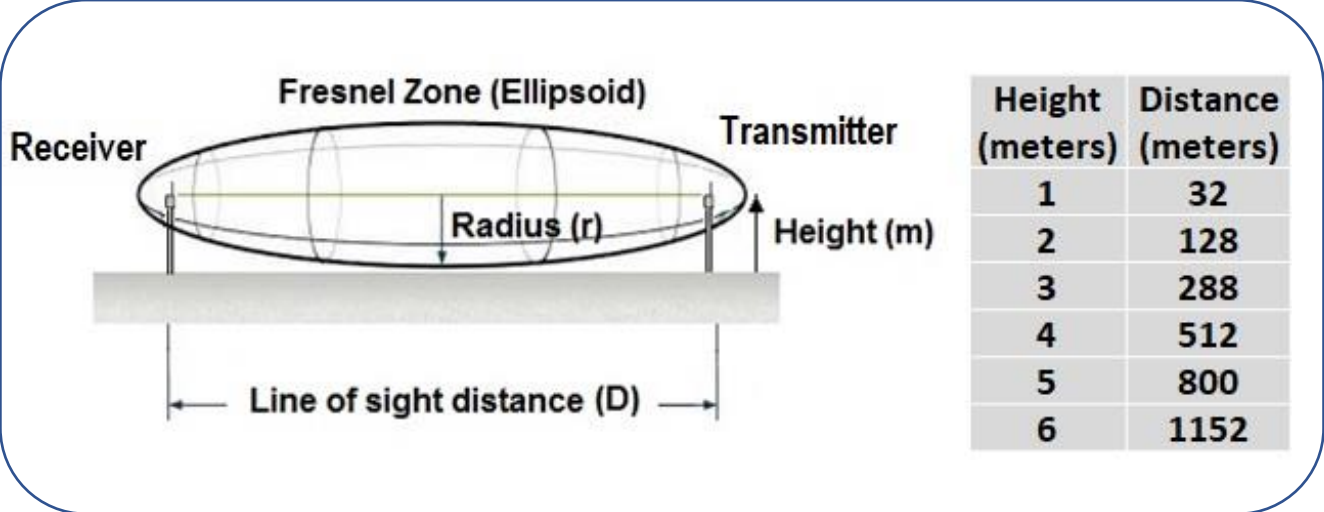
Steam traps wireless monitoring is always a major challenge due to several critical factors affecting the wireless transmission distance:

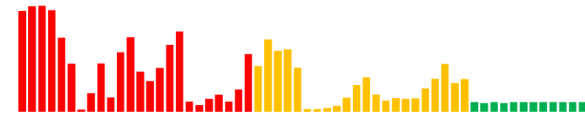


- Proximity of steam traps to the ground (it affects Fresnel Zone and absorbs about 50% transmitted power).
- Obstructed line-of-sight antennas (high obstacle density)
- Limitation of wireless transmitted power in classified areas.

**Therefore, the effective transmission distance in steam trap wireless monitoring does not usually exceed 50 meters, forcing to use multiple wireless Access Points. To avoid it independent sensors and transmitters are used.**

- Sensors are connected to steam traps
  - **Wireless transmitters are installed 5-10 m. high**
- Main Advantages:**
- *Improved line-of-sight antennas*
  - *Antenna far from the ground (without cable extender)*
- Result: Maximum wireless transmission distance**





The installation of transmitter and antenna in height has allowed to power all ISA100 Wireless Transmitters by rechargeable batteries with solar panels, tripling the life of their batteries.

**Monitor BiTherm SWW11**



**BiTherm Steam Trap**

**Solar Panel**



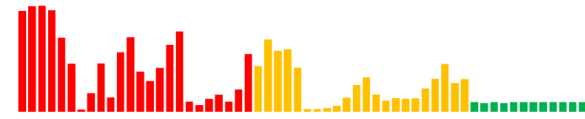
**Rechargeable Battery & Charger**



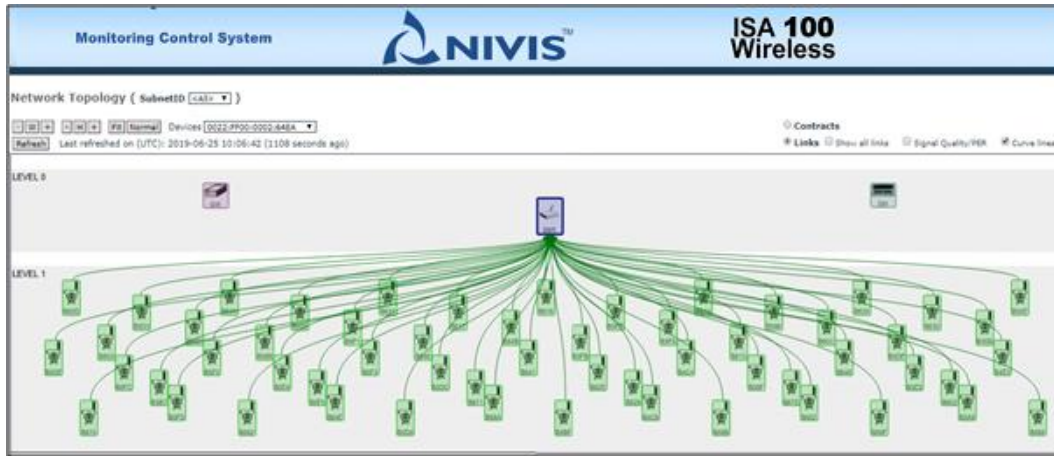
**ISA100 Wireless Transmitter SWWRF40**

**Mounting Plate**

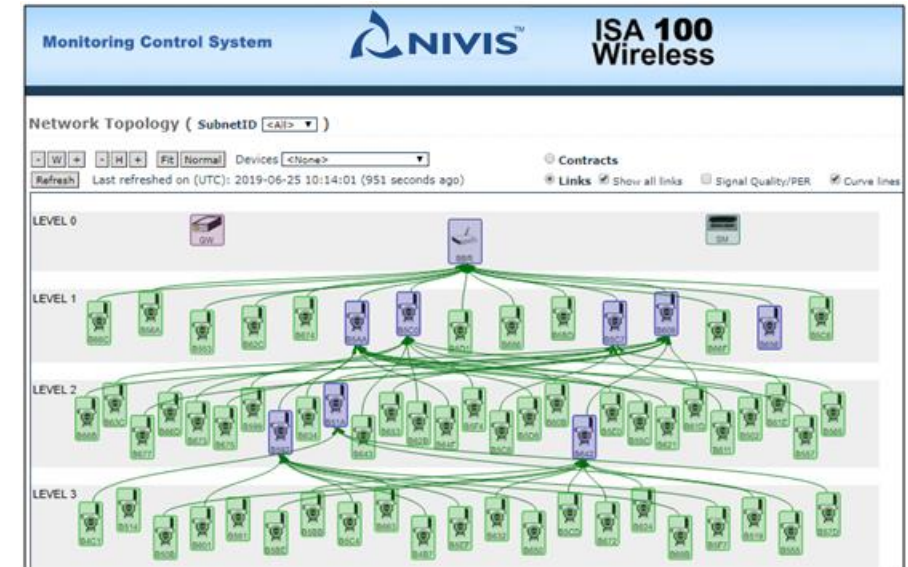




The ISA100 wireless infrastructure has been designed by combining star and mesh topologies to provide flexibility and foundation necessary to handle a large number of sensors and applications characteristic of this large-scale project.

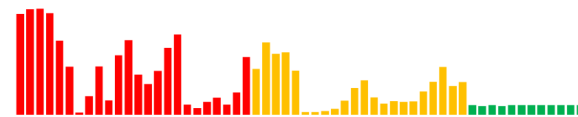


**Wireless Star Topology**



**Wireless Mesh Topology**

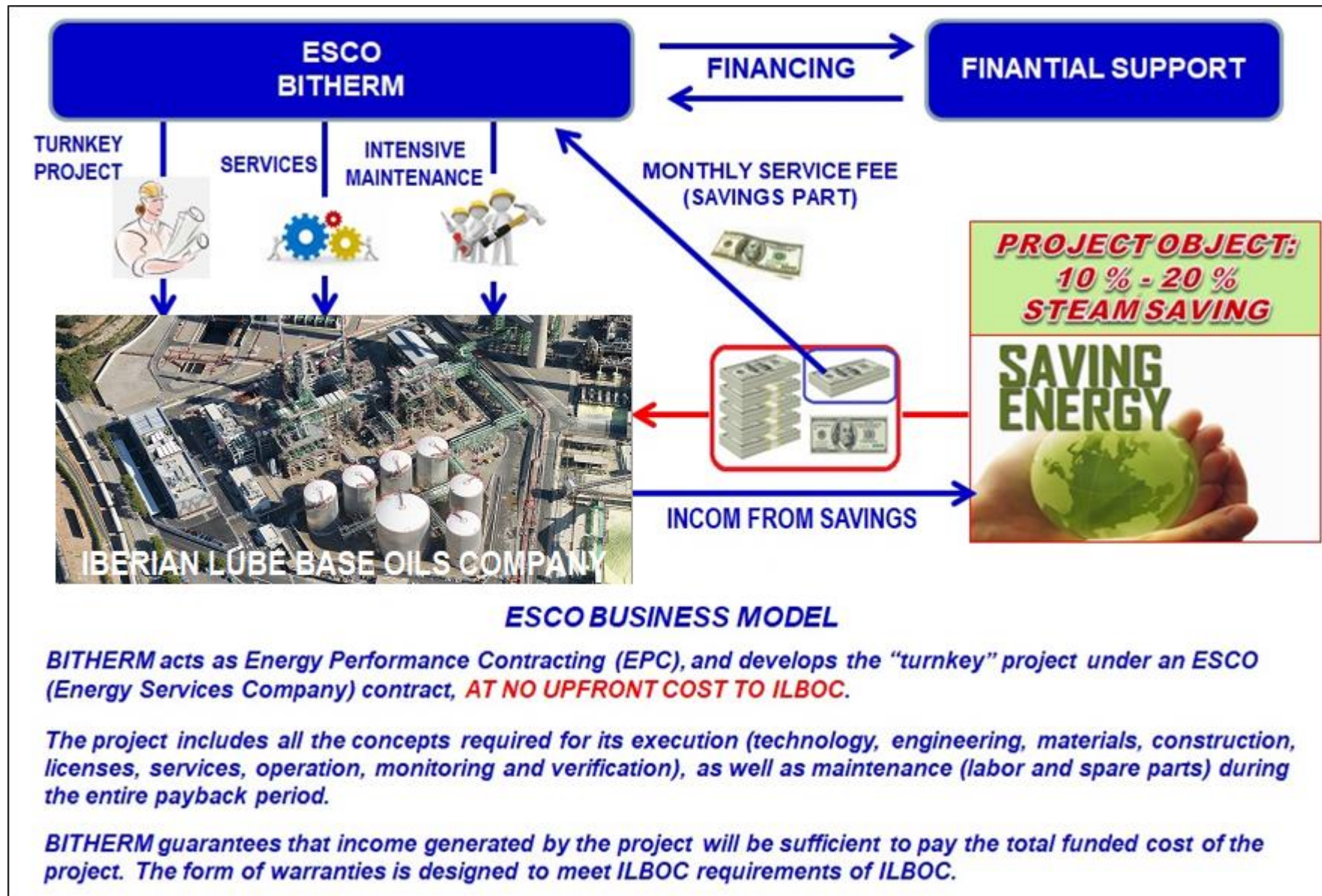
*The ISA100 wireless network has been deployed by the powerful all-in-one CDS VR950 Gateway, which contains all the necessary components for network management. This has strengthened the ISA100 wireless network, simplifying installation and commissioning while reducing costs.*

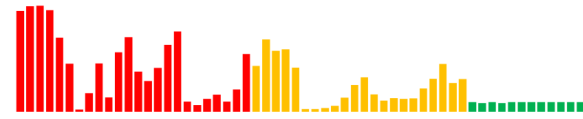


This project has been carried out under the ESCO business model

**BENEFITS:**

- ✓ NO UP FRONT COSTS
- ✓ Revenue sharing model based on energy savings.
- ✓ No additional workload to facility operations staff.
- ✓ Null maintenance costs during payback period.
- ✓ Internationally awarded and proven technology.
- ✓ Zero risks.





**This large-scale turnkey project based on wireless sensors deployment, monitoring, and Intensive Maintenance at ILBOC Complex has demonstrated:**

- ❑ ISA100 Wireless' flexible network topology, star, mesh, or a mix. Other protocols cannot do this.**
- ❑ Scalability, ISA100 Wireless has the ability to scale to thousands of devices in a single network easily, without the need for complicated architecture. Other protocols cannot do this.**
- ❑ ISA100 Wireless improved reliability, energy efficiency, safety, environment, operations, and maintenance.**
- ❑ ISA100 can be applied in critical applications, high density of elements, poor line-of-sight, and large-scale projects.**
- ❑ ISA100 wireless device meshing repeater configurable as I/O and router as needed (coverage redundancy).**
- ❑ Partnership with Energy Services Companies (ESCOs) can improve performance and generate great benefits to the user in multiple subjects with no upfront costs and very short payback periods.**
- ❑ Use of a common platform to manage a wide variety of sensors, monitoring, maintenance, reliability, energy efficiency, environmental protection, and more.**