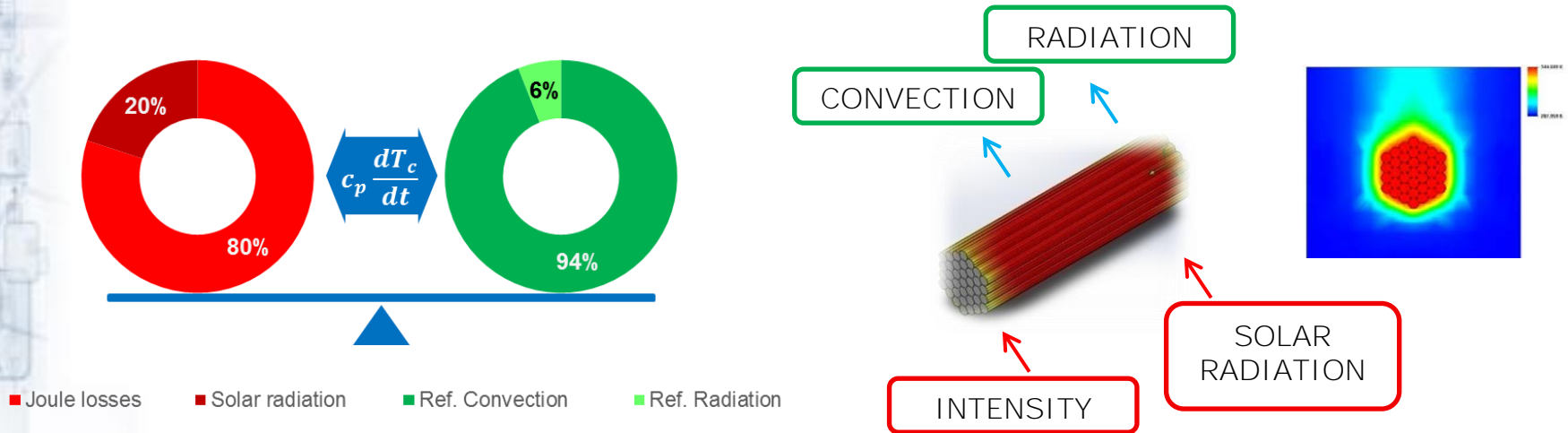


Most promising disruptive technologies on smart grids and technology transfer success stories

DYNELEC. Dynamic line rating technology

26th October, Madrid

Concept of dynamic rating



Accumulated heat in the conductive wire = **gained heat** – **wasted heat**

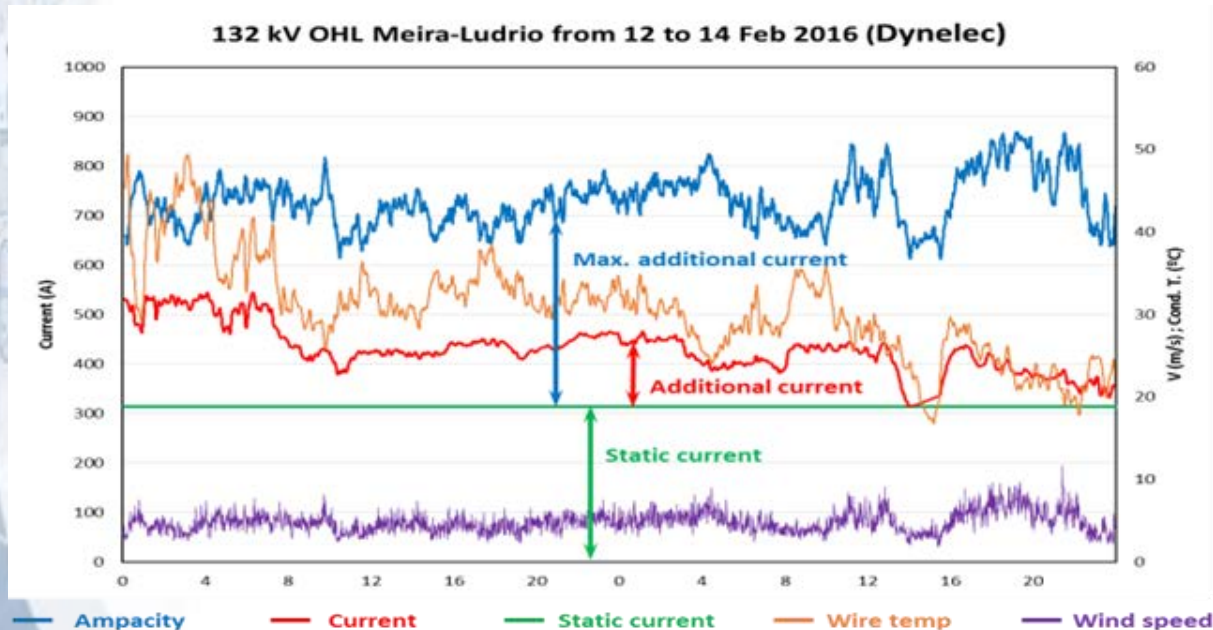
Variation of temperature

Elongation conductors and
decrease of security distances

Technical limit
of the conductor

Real case

A model of use about Dynamic Line Rating (DLR) jointly developed by Viesgo y UC.



The use of favorable climatic conditions to transport more energy in the High voltage lines.

DYNELEC technology permits to operate the electric lines beyond static capacity.

Increase in the peak capacity with dynamic operation is cheaper than obtained by conventional approach.

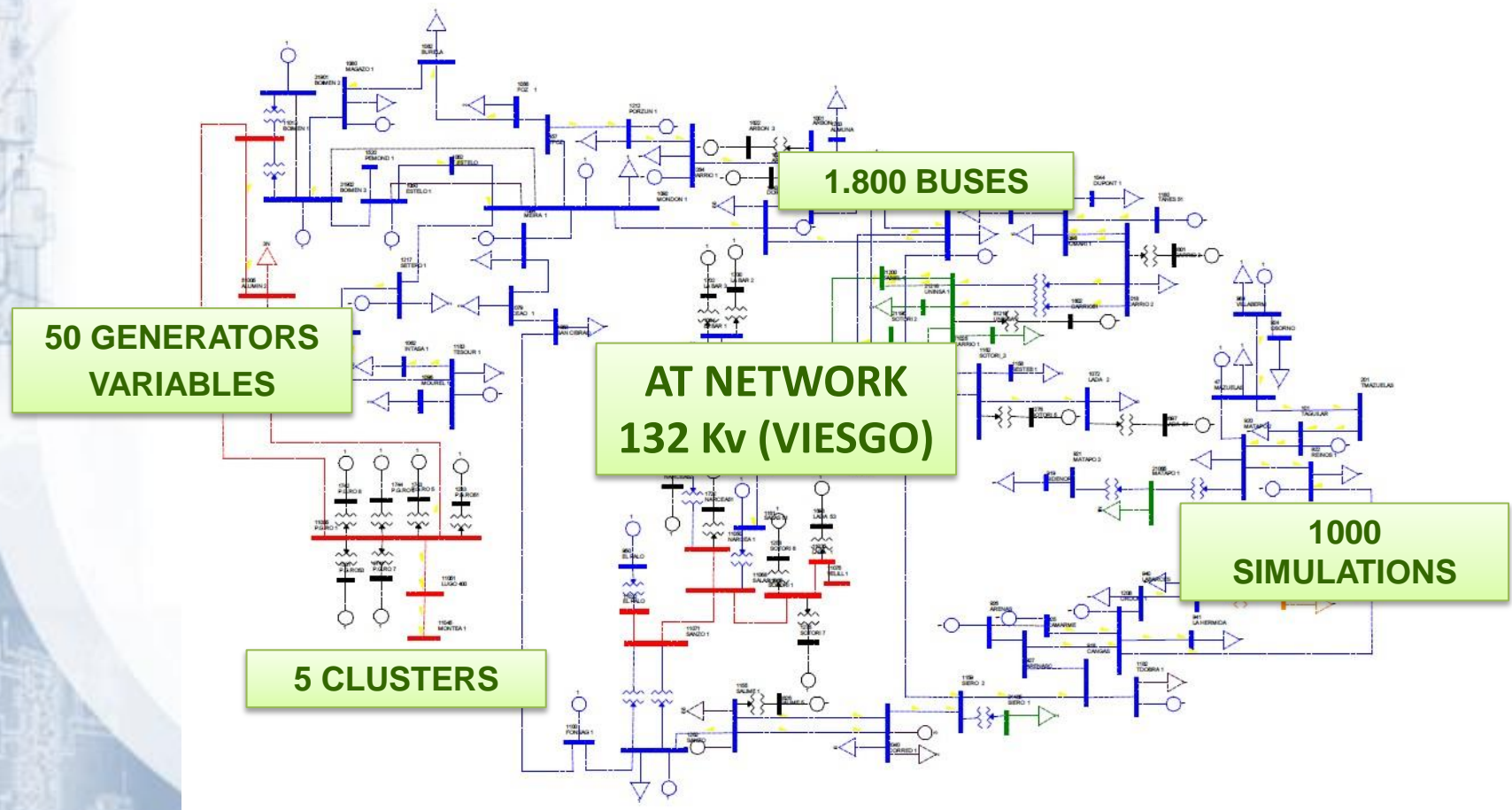
thermal model
(IEEE 738 & CIGRE TB601)

Low technology investment

Smart grids versus “copper and iron”

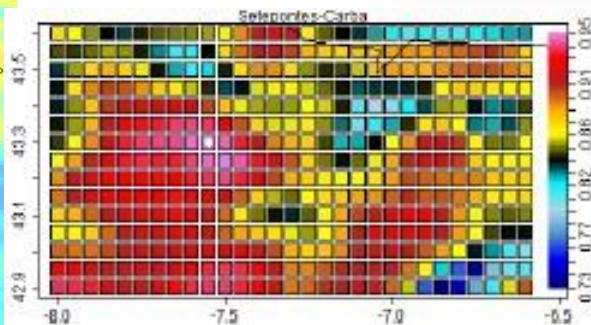
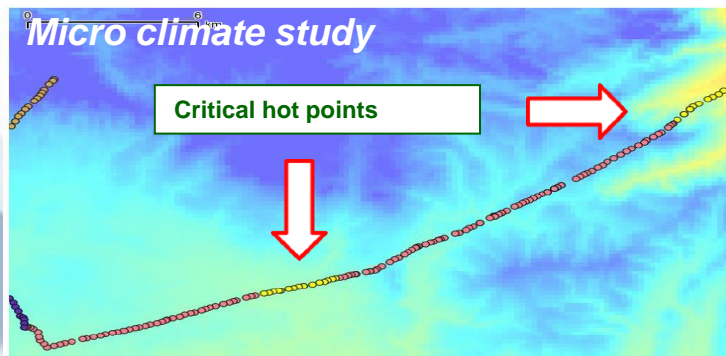
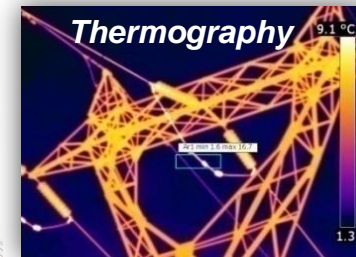
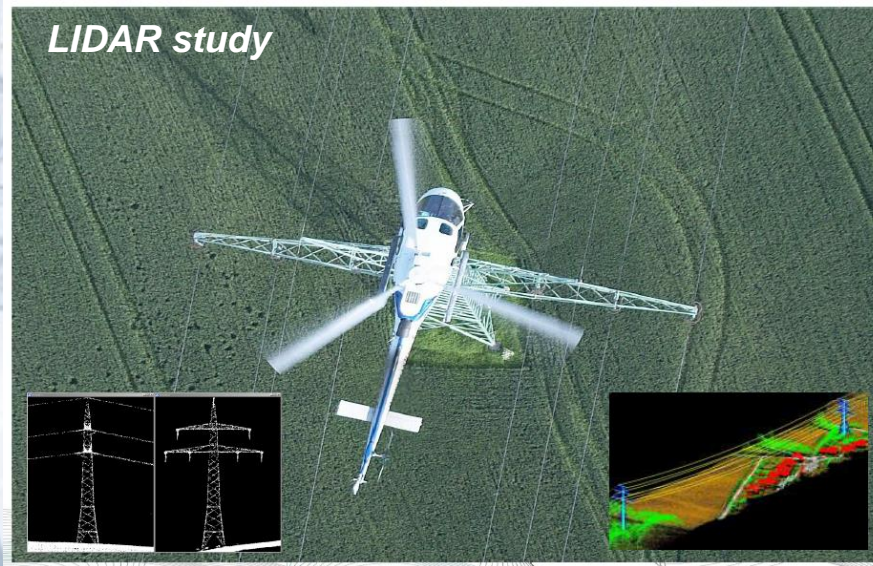
Assets management improvements

Industrialization factors



Industrialization factors

Technical study of each line



Industrialization factors

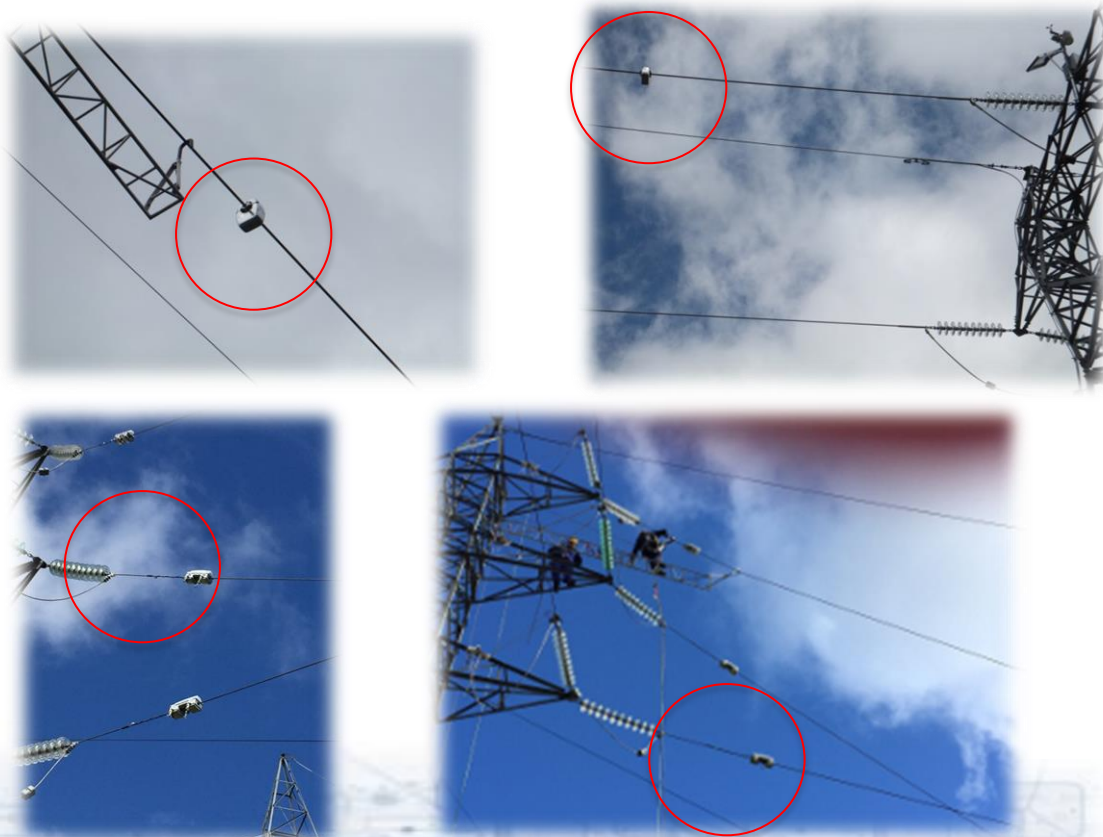
Dynamic line rating official project. Installation of climate variable sensors

- **Ultrasonic anemometer**
- **Thermal hygrometer**
- **Pyrometer**
- **Pressure sensor**
- **Pluviometer**



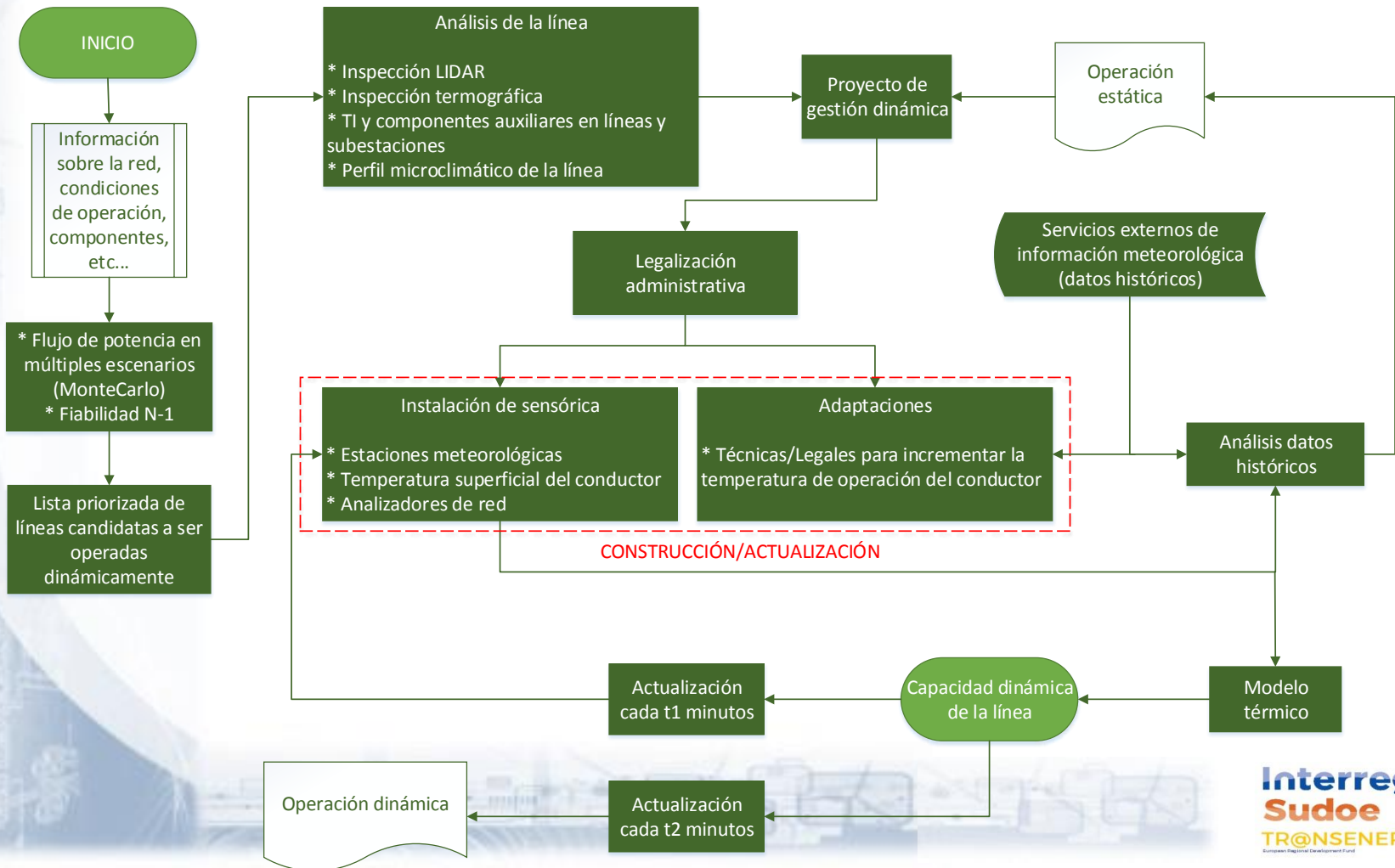
Industrialization factors

Dynamic line rating official project. Installation of temp sensors and network analysers



Industrialization factors

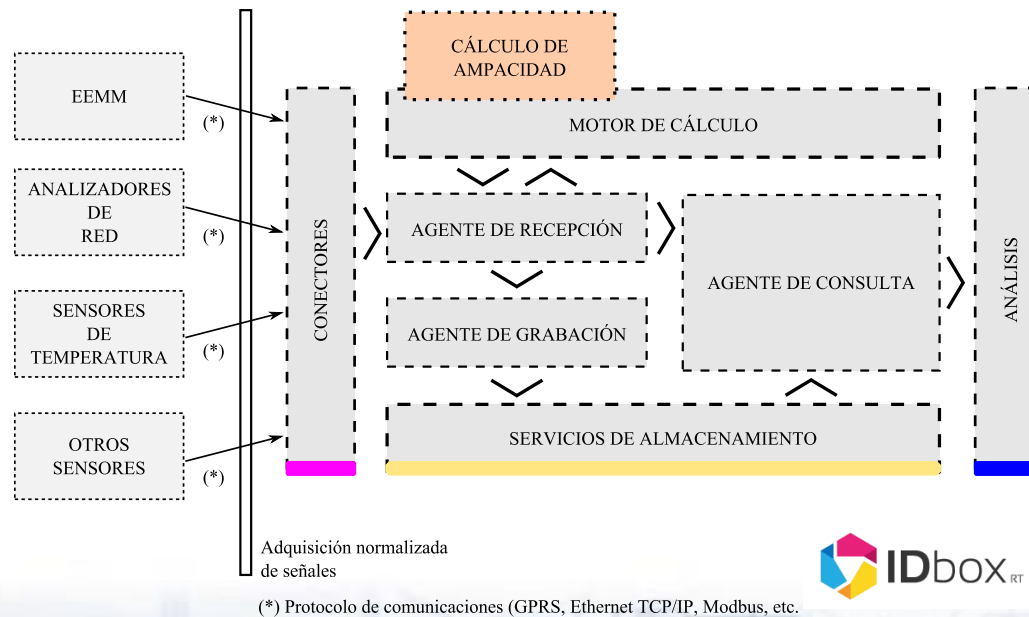
Dynamic line rating official project



Industrialization factors

Dynamic line rating official project. Integration IT

- Scale system to reach the production requirements
- Security
- ADMS integration



The top row contains three photographs illustrating different types of electrical work:

- Left:** A worker on a ground-level utility pole, circled in red.
- Middle:** A worker on a high-voltage transmission tower, circled in red.
- Right:** A worker on a distribution cabinet, circled in red.



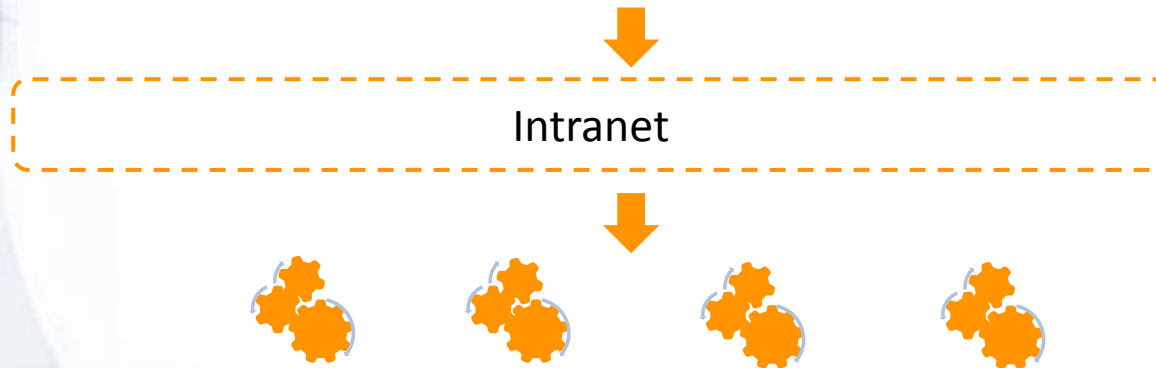
A Smart Grid and Big Data paradigm

55M data to calculate ampacity algorithm

93M data to calculate temperature of conductor

97M meteorological data

113M data from network analyzers



215M data managed and persisted in IdBox

Period: 10 months

Lines: 26



Implementation and Results



Implementation
plan and results

Viesgo will completely manage the 132 kV network in 2019

Transport of 6,96 GWh in 2015, and 9,36 GWh in 2016

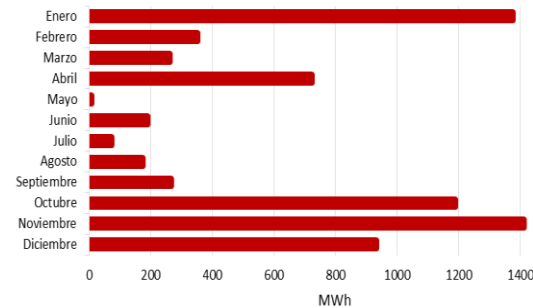
Annual hours of dynamic rating 523 h in 2015 and 601 in 2016

Reduction up to 1,7% of restriction hours to wind powers

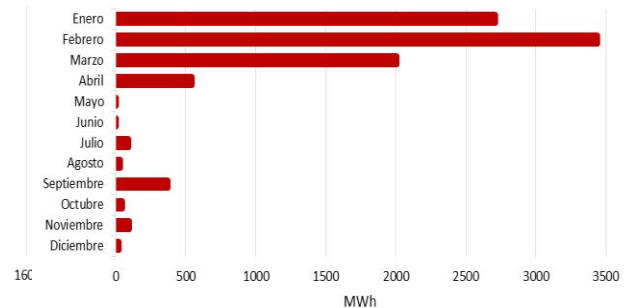
LAT 132 kV Meira-Ludrio
ENERO 2016



Energía Aprovechada en 2015 utilizando Dynelec



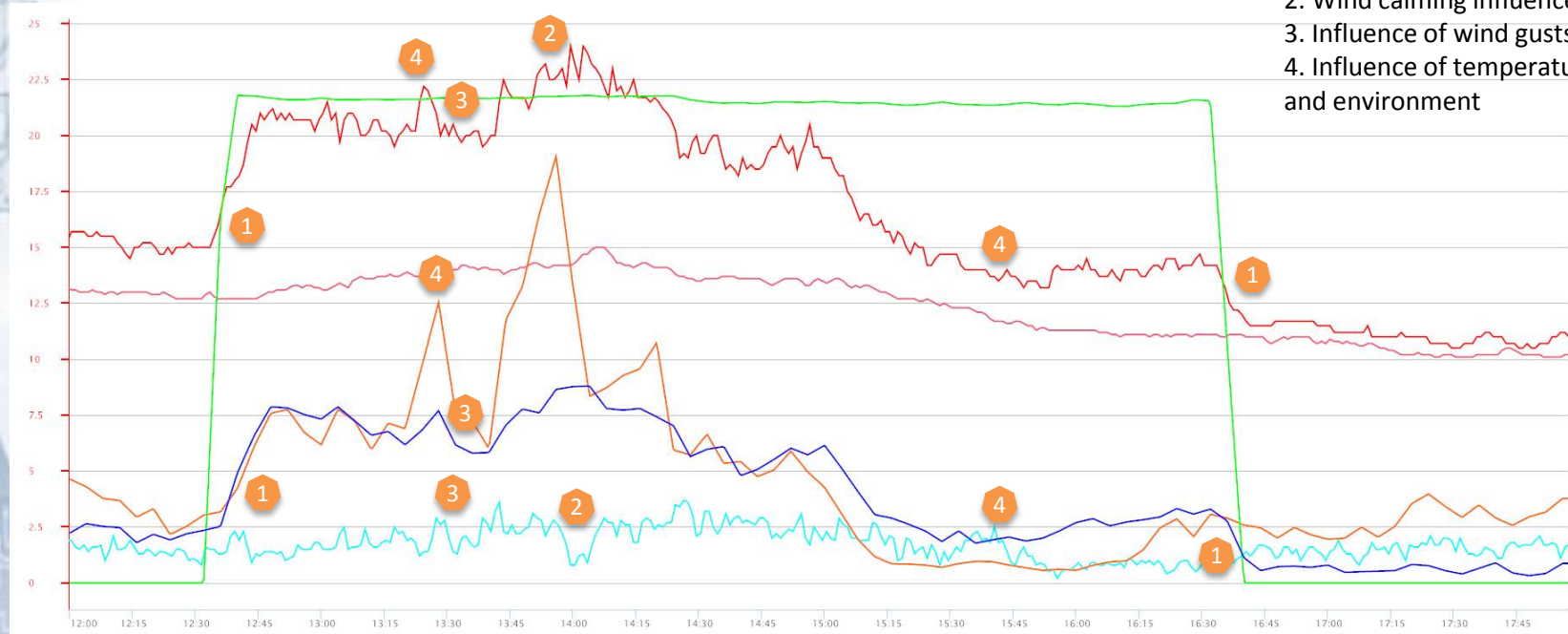
Energía Aprovechada en 2016 utilizando Dynelec



Influence of primary variables

Conductor aéreo LA-110 Corriente 200 A

— Radiation — T^a Conductor — Wind speed
— Current — T^a environment — T^a Conductor- T^a environment



Muchas gracias Thank you

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26th October, Madrid