International Energy Agency

Modernising Energy Efficiency through Digitalisation

Webinar 5: the benefits of digital tools on an existing O&G field

IEA Webinar, 17 March, 2020

Overview

- Introduction
  - Tim Gould, Head Energy Supply Outlook Division, IEA
- Webinar 5: the benefits of digital tools on an existing O&G field
  - Luca Cadei, Deputy Field Manager of a giant onshore oilfield, Eni
- Questions and discussion

IEA Digitalisation & energy efficiency

How digitalisation can support & accelerate energy efficiency implementation:

- More effective policies and programmes
- Across end-use sectors (buildings, industry, transport)
- Supply side efficiency
- Systems efficiency

https://www.iea.org/articles/energy-efficiency-and-digitalisation

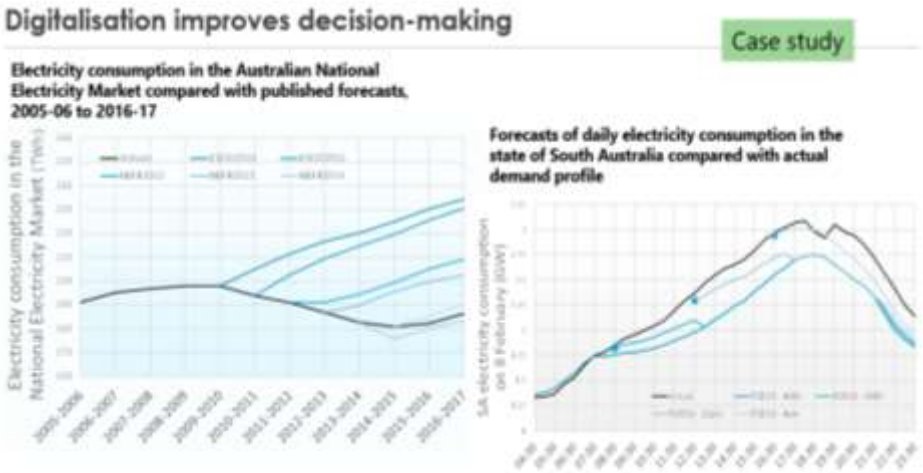
Online community

www.linkedin.com/groups/13700212/

Events

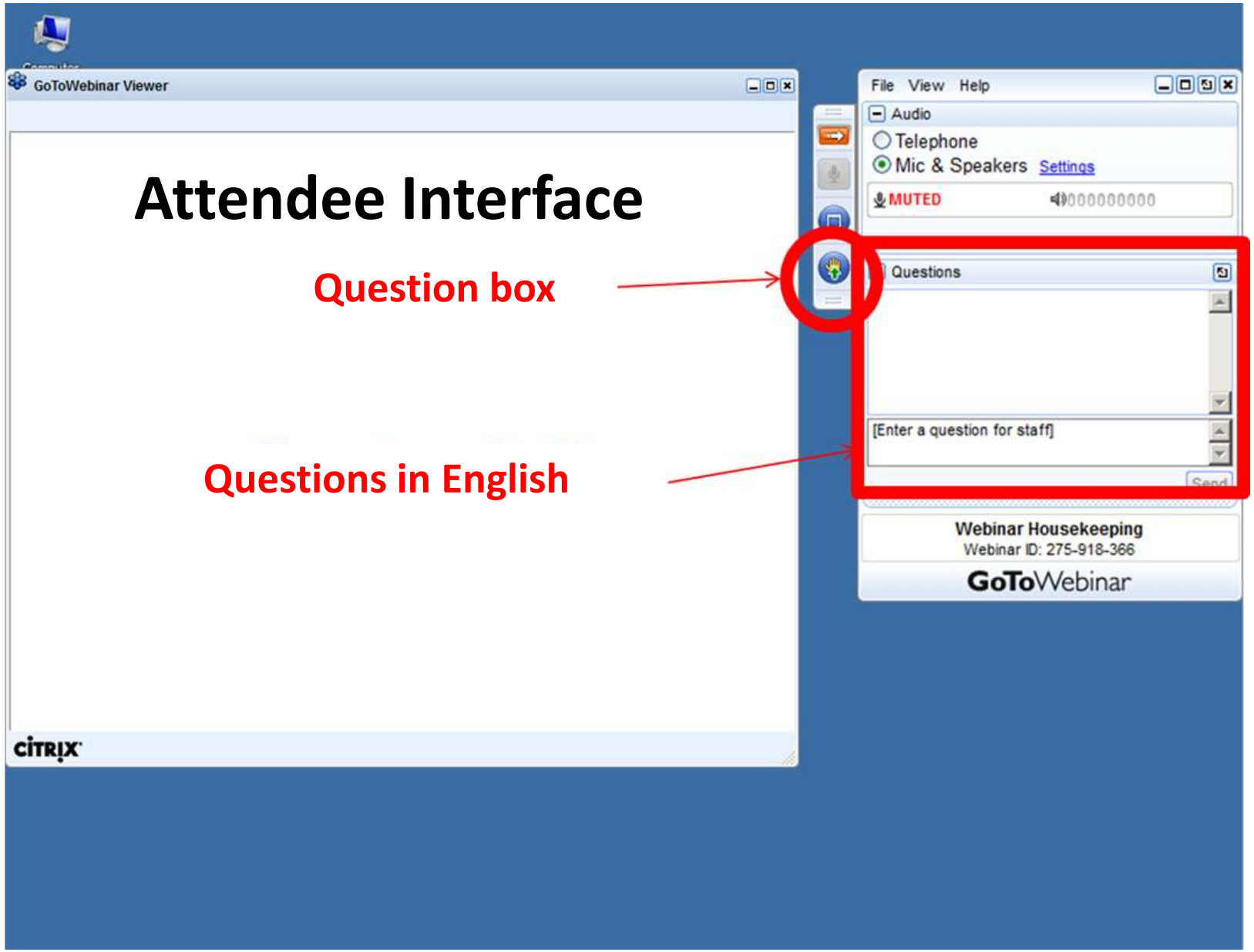
- Workshops
- Webinars

Case studies, lessons learned



Actionable policy guidance

How to ask questions



Decarbonization and Energy Efficiency in Eni Enabled by Digitalization

The Benefits of Deploying Advanced Digital Tools on an Existing O&G Giant Oil Field in Italy

IEA webinar series “Modernising Energy Efficiency through Digitalisation”

Paris – 17 March 2020

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About Eni

> 30 000 people

Active in 67 Countries

€ 7.9 bln capex

Innovation in renewables

Exploration and Production

Gas & Power

Decarbonisation: embedded in our strategy

Refining & Marketing and Chemicals

About the speaker

Luca Cadei

Education:

- BSc and MSc Energy in Engineering from Politecnico di Milano

Working experience:

- Process Engineer – *ExxonMobil*
- Production Engineer – *Eni HQ*
- Deputy Plant Manager – *Eni Upstream*
- Program Chairperson – *SPE Italian Section*

Contact:

- luca.cadei@eni.com

Digital Transformation at Eni

Energy Transition

Efficiency

Safety

Digital Transformation at Eni - Fundamentals

Data Availability

Computing Power

Integrated team

Giant Oilfield Considered – main features

Where? European Southern District

Operational since
1996

Max capacity
OIL:
≈104 kbbl/day
NATURAL GAS:
≈4,4 M Sm3/day
WATER:
≈ 4080 m3/day

What? processing oil & gas (acid gas)

OIL sent to Refinery by pipeline
NATURAL GAS:
- power generation at the plant
- sent into the Italian national grid

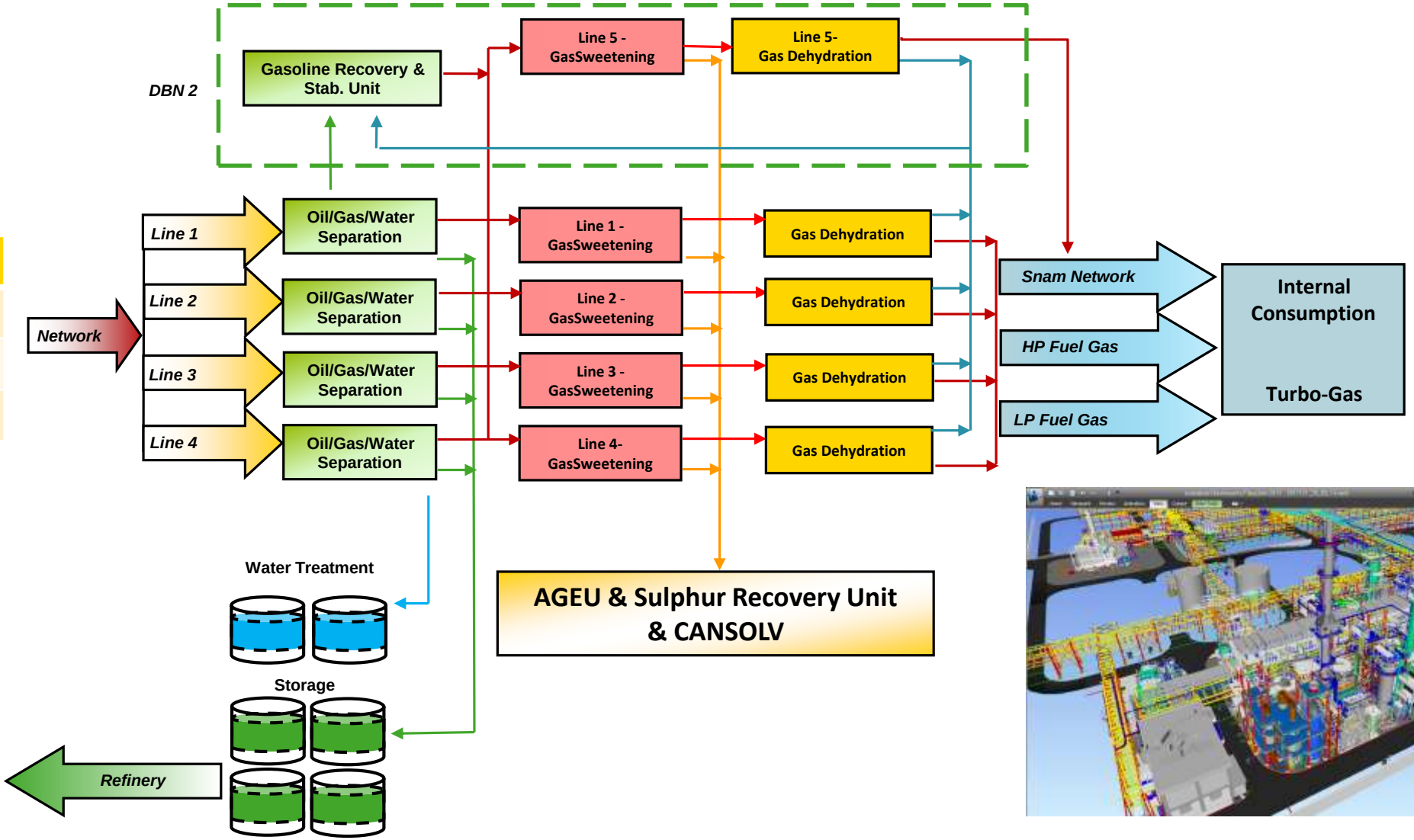
SULPHUR sold to private companies (≈40 ton/week)

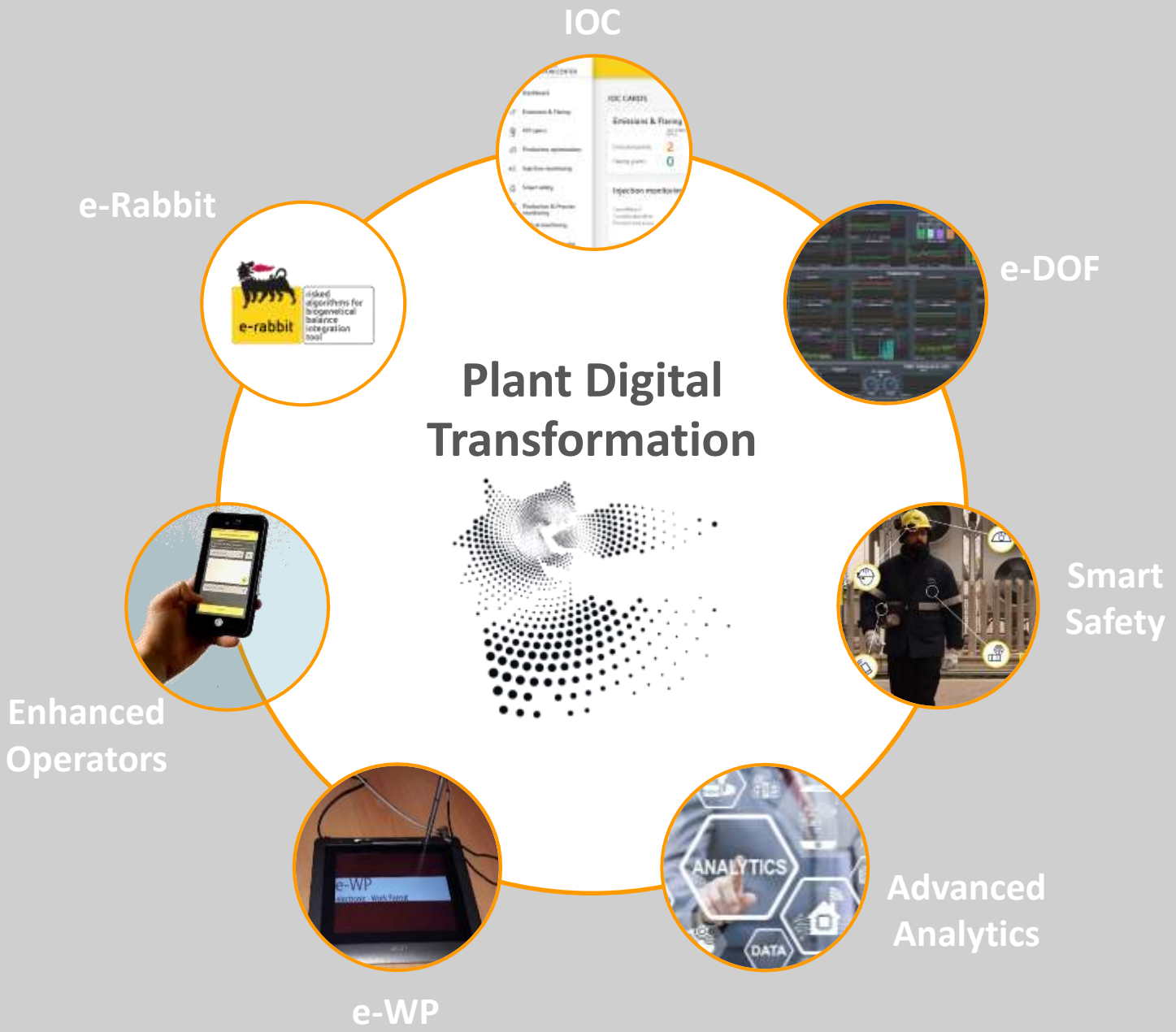
Average plant's gas daily consumption:
≈380 kSm3/day

Average plant's electricity daily consumption:
≈690 MWh

Giant Oilfield Considered – main features

Wells
35 active
25 producing
1 injector

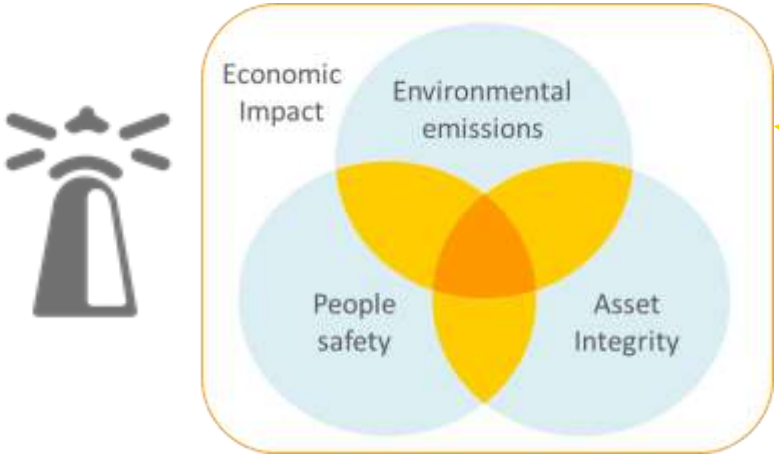


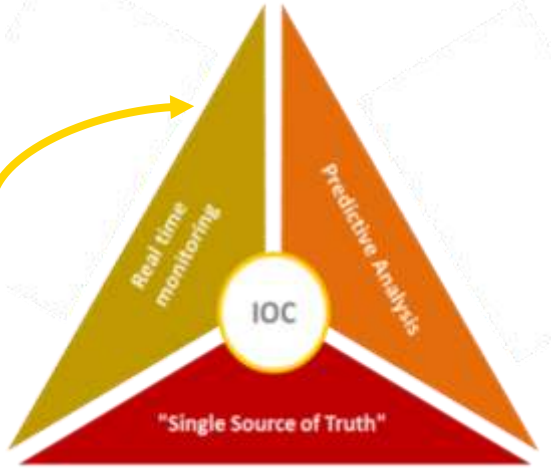


Increase the efficiency and maximize the asset potential

Focus IOC and Efficiency

How did we achieve our targets for the plant?





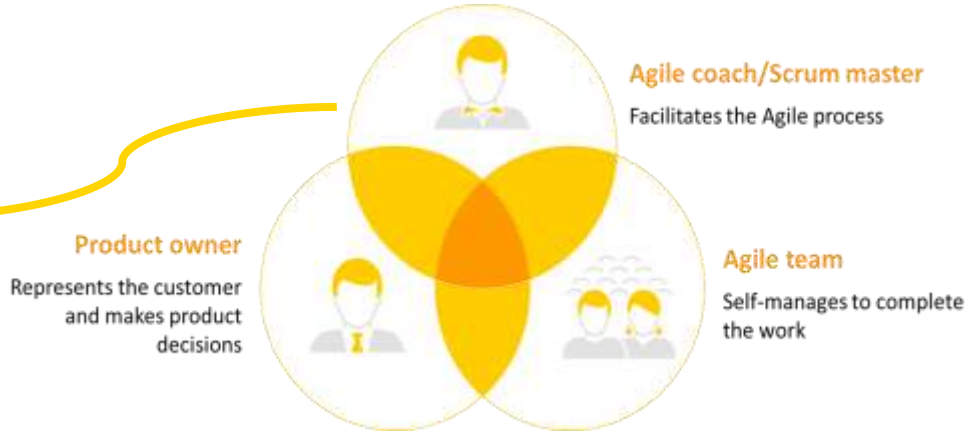
Operations

HSE

How did we achieve our targets for the plant?

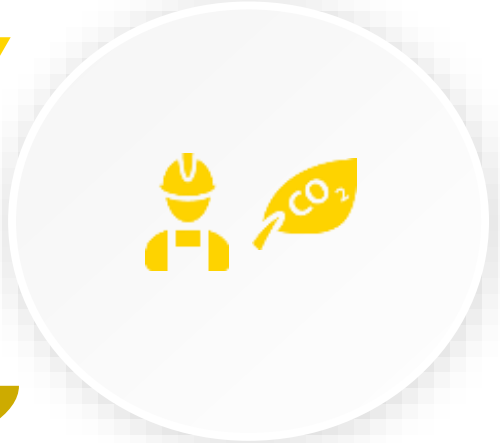
HQ & Site

Data & Algorithms



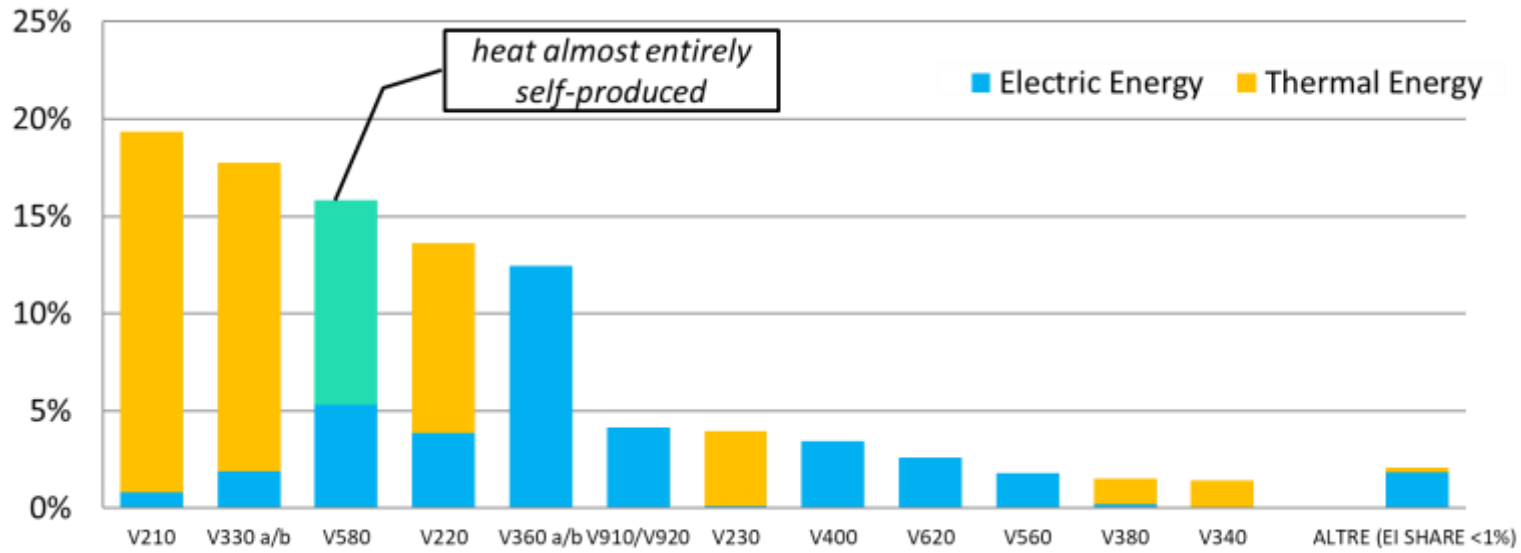
Operations

HSE



Methodologies Developed – Energy Efficiency

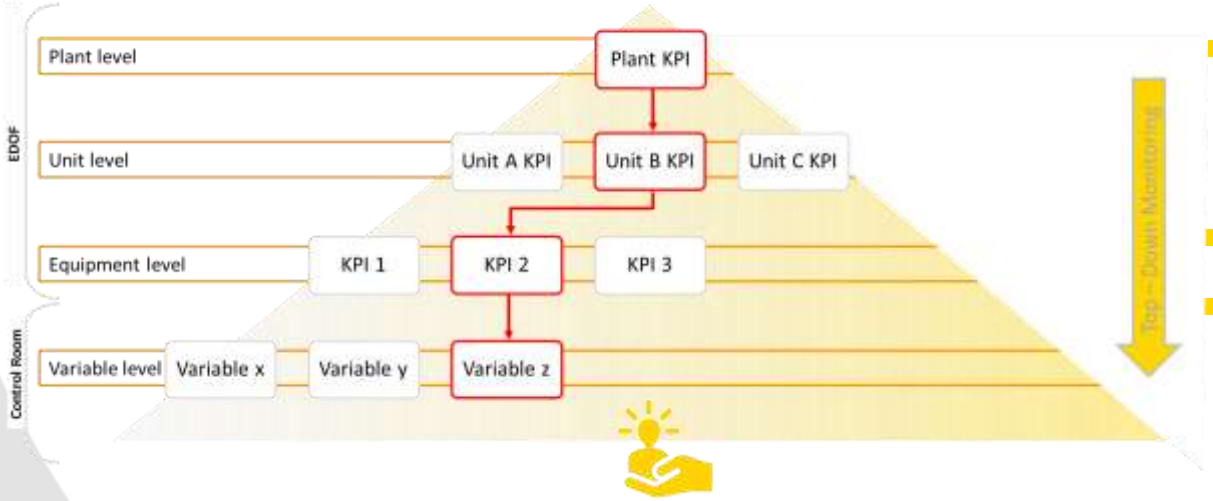
Energy Analysis & Balance



V210: Oil Stabilization
V330: Gas Sweetening
V580: Sulfur recovering
V220: Oil export & storage
V360: Gas Compression

80%

of total plant consumption



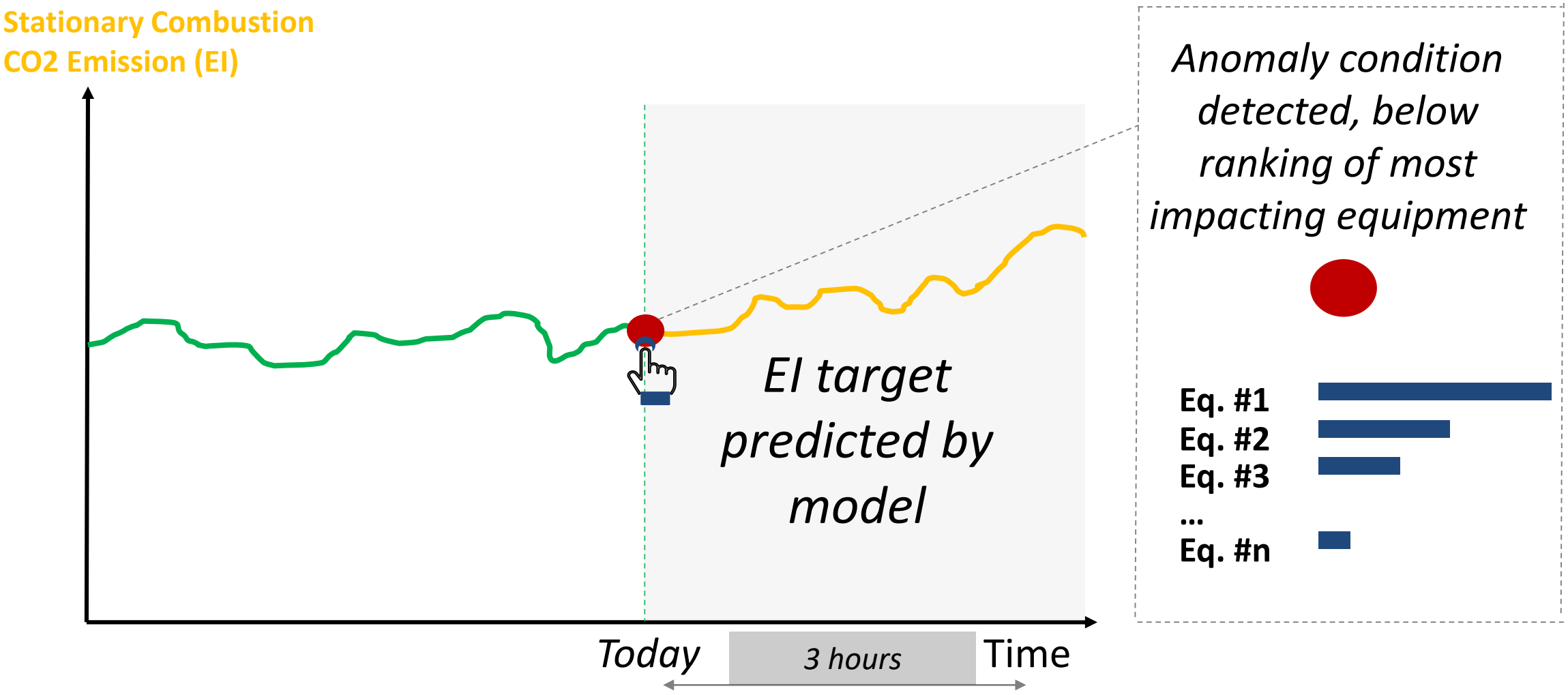
Main Parameters

- Asset KPI: *Stationary Combustion CO2 Emission (EI)*

$$EI = \frac{Fuel\ Gas\ \times Emission\ Factor}{Gross\ Hydrocarbon\ Production}\left[\frac{tCO_2}{kboe}\right]$$

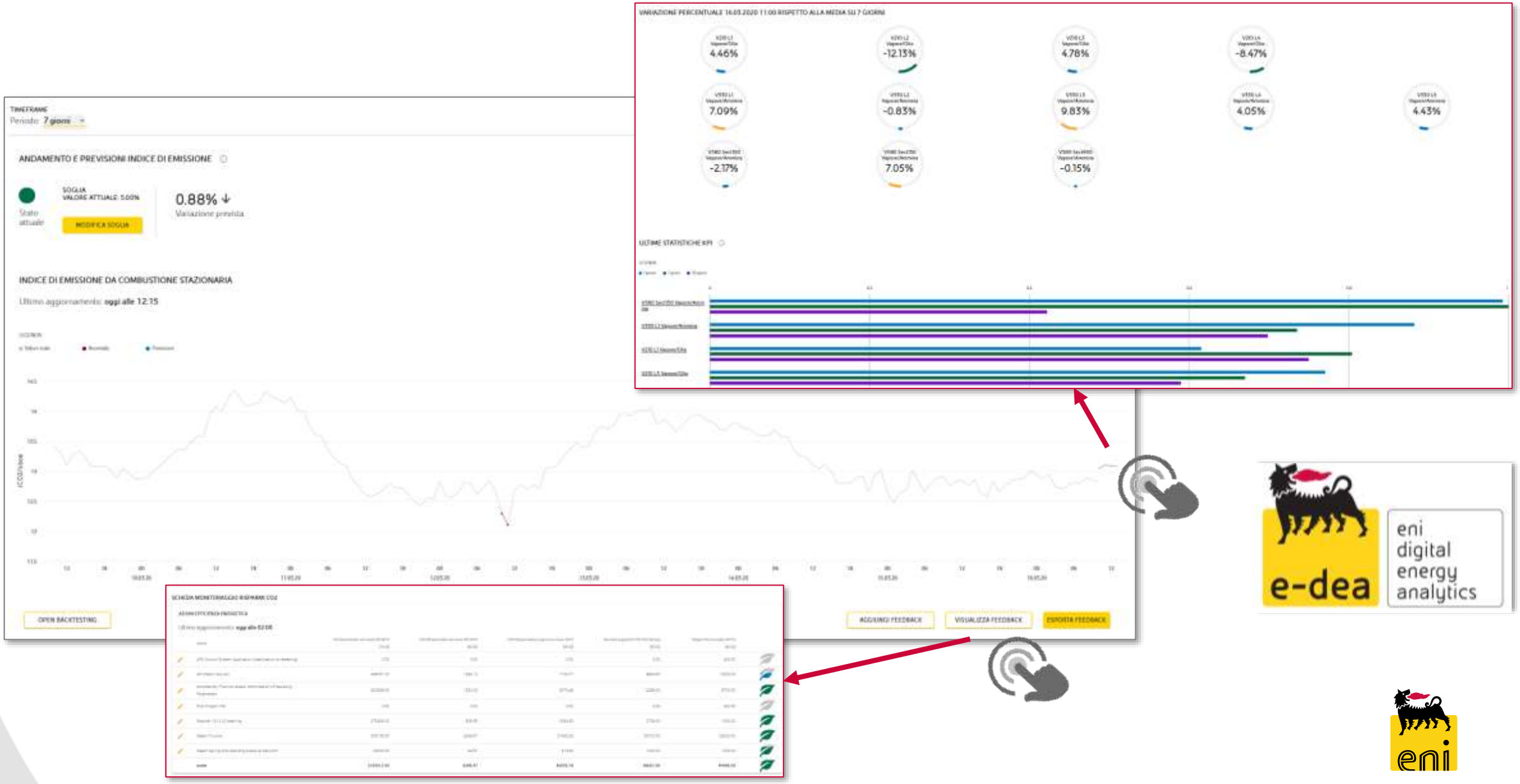
- Detailed KPI were defined for the main equipment
- Raw data, Aggregated stats and hybrid variables

Example of the advanced analytics tool developed

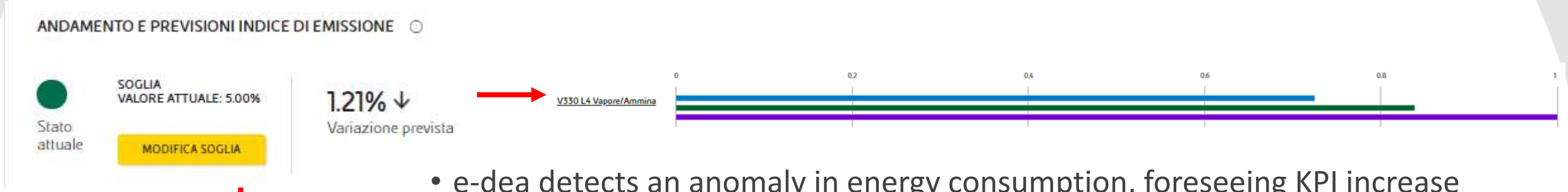


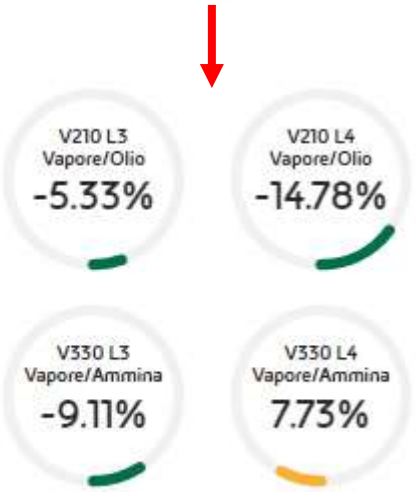
Gradient Boosting Regression algorithm

Example Energy Efficiency Model Output

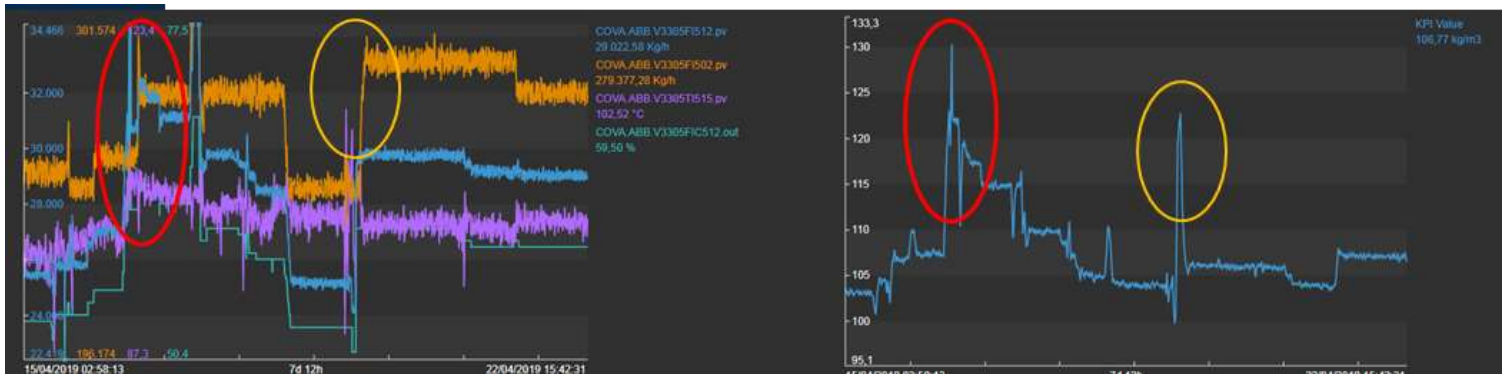


Example Energy Efficiency Model Output – Real Case





- e-dea detects an anomaly in energy consumption, foreseeing KPI increase
- drill down into the root causes, indicating the equipment with bad performance (positive variation %)
- Operation team easily checks parameters and trends, knowing in advantage on which unit to look.
- Action to reduce energy consumption are implemented and monitored.
- The tool is also very useful to restore the optimal condition after a variation in the operating conditions



Digitally-enabled benefits on EE and sustainability

Field Macro Results

Certification ISO 50001

KPI	Digital Solution
Emission Reduction CO_2[1]	IOC (e-DEA), e-DOF
Emission Events	IOC (Advanced Analytics, Monitoring), e-DOF
Emergency Flaring Mass[2]	IOC (Advanced Analytics, Monitoring), e-DOF
Unplanned Fac. Down Time	IOC, e-DOF, e-Rabbit

1 - CO2 from Stationary combustion – net of plant SD on 2016-2017
2 - Flaring Events > 5000kg/h

"The mix of production specialists know-how, together with the power and flexibility offered by the new digital tools allows to maximize processes efficiency.

It is now possible to anticipate process upsets, asset integrity issues or deviation from plant optimized parameters

The user friendly interface, the tools accuracy and the collaborative digital environment created are the key of the results achieved"

- Site Operation team -

It is fundamental to highlight that the **field macro trends** are a results of **several factors**: operators **sensibility** improvement, **digital tools**, reinforcement of **operators team**, **change** management

Conclusions

- *The brown oilfield considered has been a real «lighthouse»*
- *State-of-the-art software tools tailored locally by a diverse cross-functional team*
- *Benefits from digitalization are projected towards local communities and the environment*
- *Digitalization methods will improve as number of “lighthouses” increases*
- *The Digitalization and Digital transformation is still evolving on site and through the local community*
- *After more than 1 year of experience the transformation is tangible and is still based on the collaboration between operators, engineers, ICT a data scientists*

Q&A session