Energy Efficiency in Manufacturing Conference

Harnessing Industry 4.0 for energy efficiency, flexibility and resilience

Valia Iliopoulou
Energy and Resource Efficiency Unit Leader, CORE Group

Energy Efficiency in industry

- Reducing final energy demand
- Optimizing energy use

1986

20% **improvement by 1995**

1986 **20%** improvement by 1995

1998 **1%** improvement per year until 2010

1986 **20%** **improvement by 1995**

2006 9% **energy savings for all Member States until 2015**

1998 **1%** **improvement per year until 2010**

1986 **20%** improvement by 1995

2006 9% energy savings for all Member States until 2015

2012 20% energy savings for all Member States until 2020

1998 **1%** improvement per year until 2010

1986 **20%** improvement by 1995

2006 9% energy savings for all Member States until 2015

2018 32.5 % energy savings for all Member States until 2030

2012 20% energy savings for all Member States until 2020

1998 **1%** improvement per year until 2010

1986 **20%** improvement by 1995

2006 9% energy savings for all Member States until 2015

2018 32.5 % energy savings for all Member States until 2030

Save energy

2022 REPowerEU **Produce clean energy**

Diversify energy supplies

2012 20% energy savings for all Member States until 2020

1998 **1%** improvement per year until 2010

2022 REPowerEU

Save energy

Produce clean energy

Diversify energy supplies

2022 REPowerEU

Save energy

Produce clean energy

Diversify energy supplies

Energy Efficiency

Flexibility

Resilience

REPowerEU for industries

Energy Efficiency

Flexibility

Resilience

REPowerEU for industries

Energy Efficiency

Flexibility

Resilience

Reduce energy demand

REPowerEU for industries

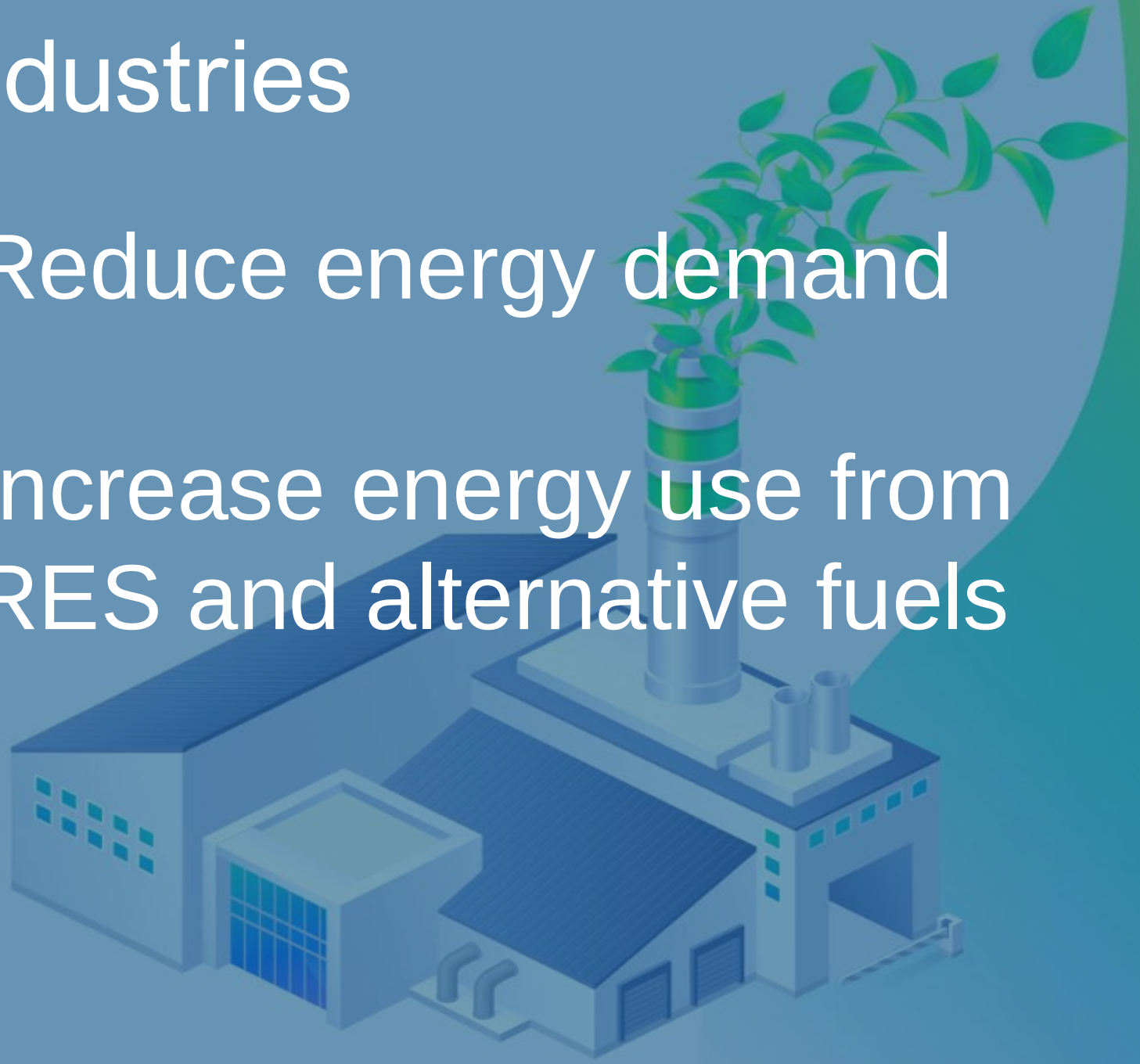
Energy Efficiency

Reduce energy demand

Flexibility

Increase energy use from RES and alternative fuels

Resilience



REPowerEU for industries

Energy Efficiency

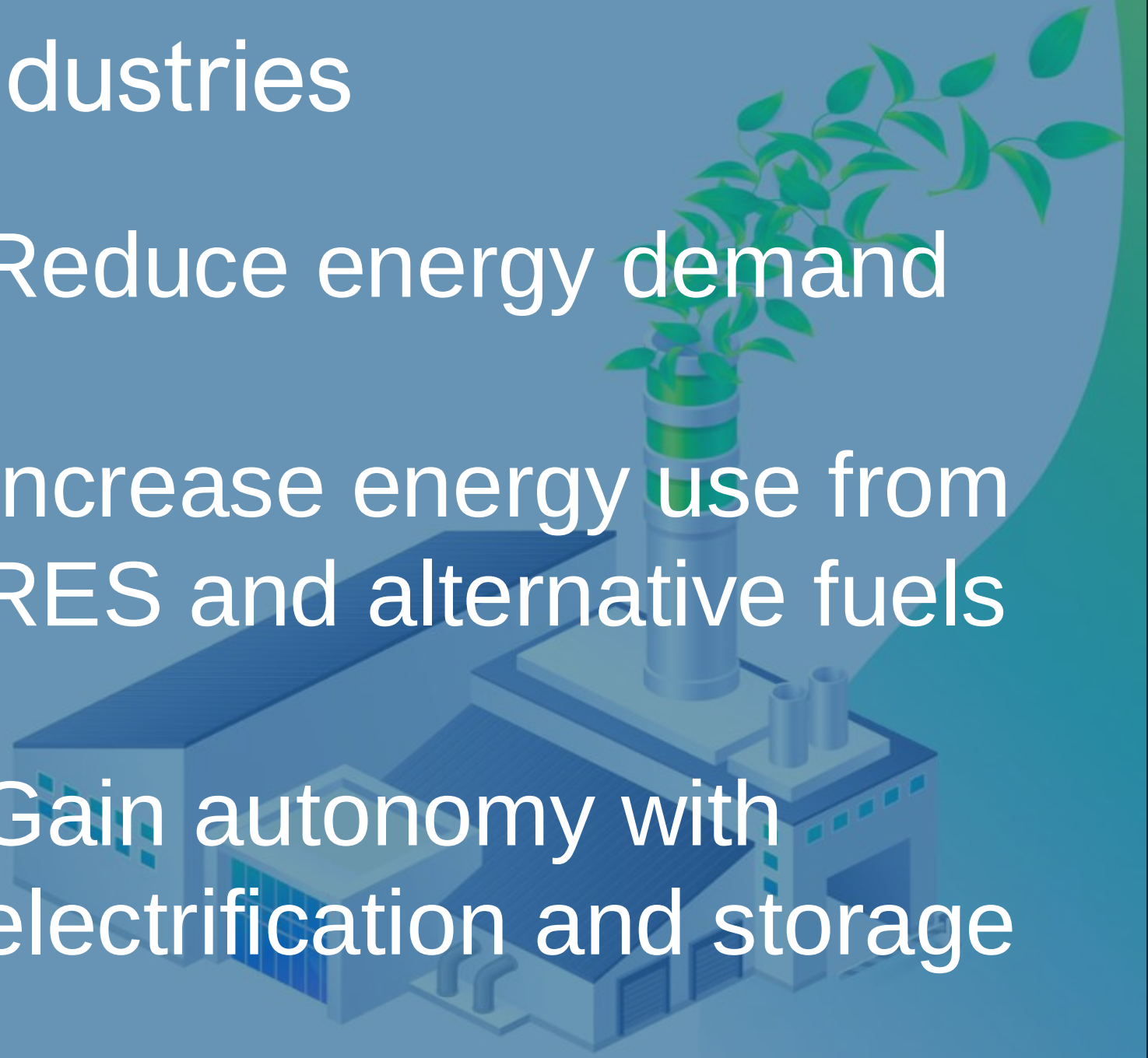
Reduce energy demand

Flexibility

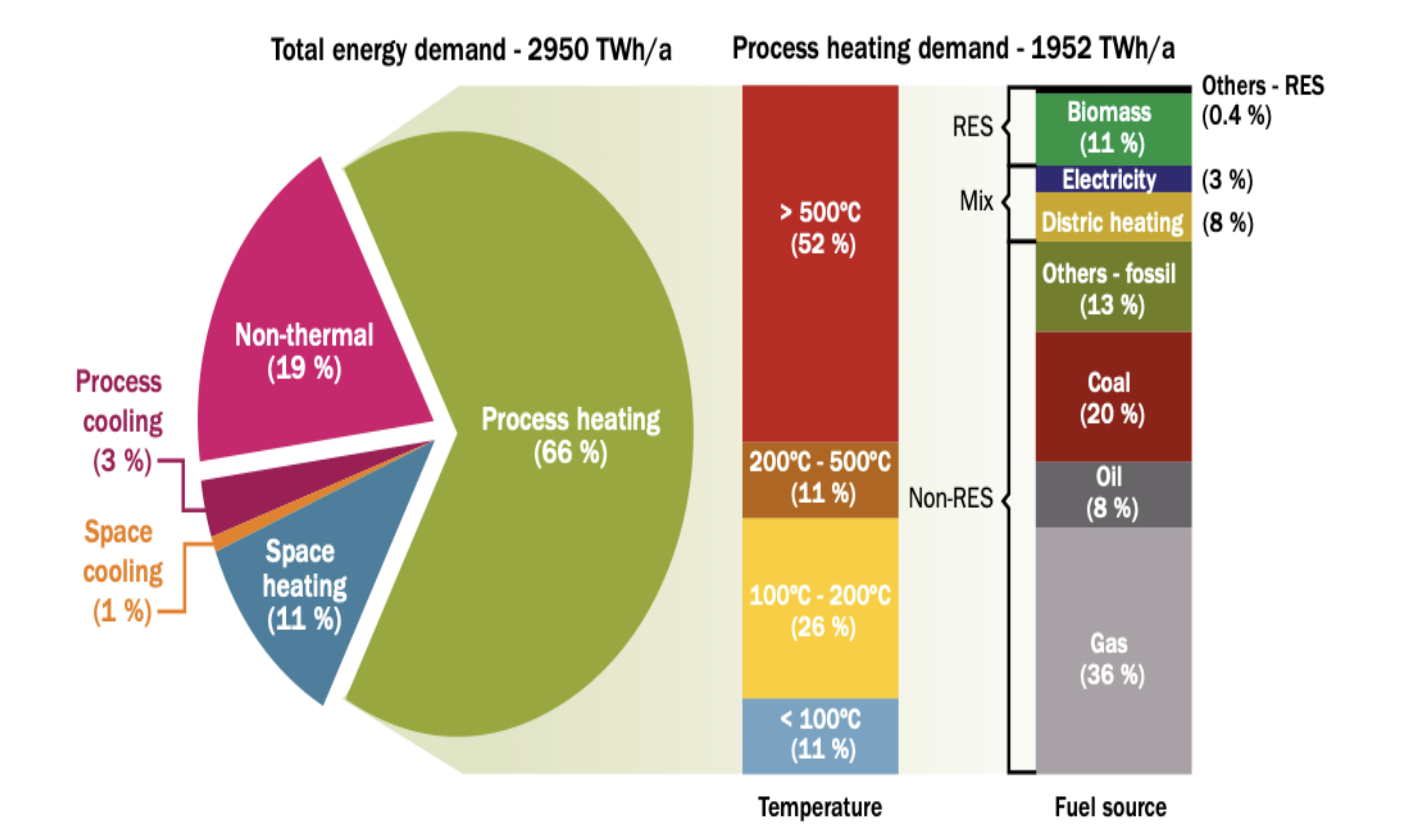
Increase energy use from RES and alternative fuels

Resilience

Gain autonomy with electrification and storage



Energy Intensive Industries



81 % of total energy demand is for thermal energy

66 % of the total energy demand is for process heating

78% of process heat demand is covered by fossil fuel sources

- Gas 36 %
- Coal 20%
- Oil 8%

Source: *Eurostat, Heat Roadmap Europe, Decarbonizing Industrial Heat*

The challenge is NOT one-dimensional

It is a very complex multidimensional question

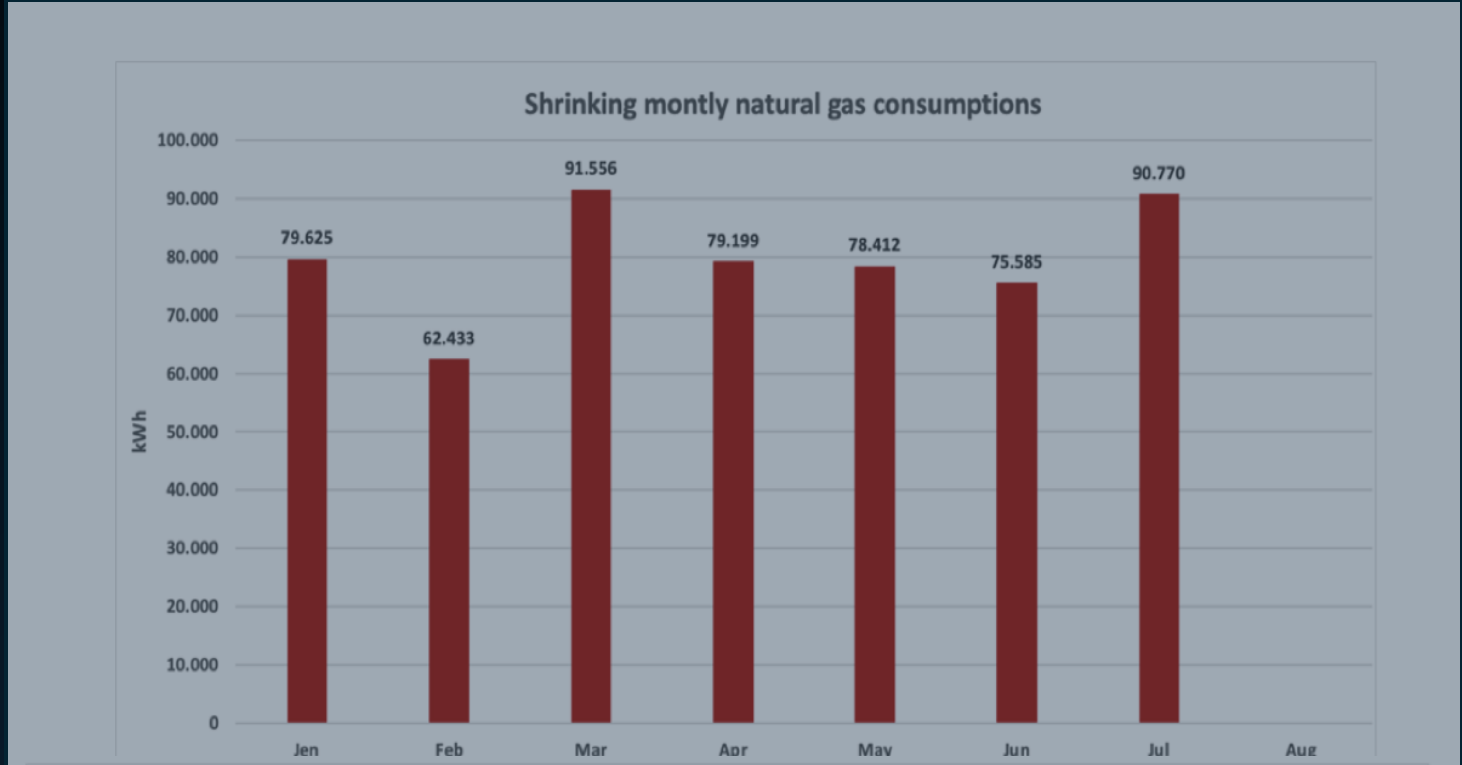
How to navigate such a landscape?

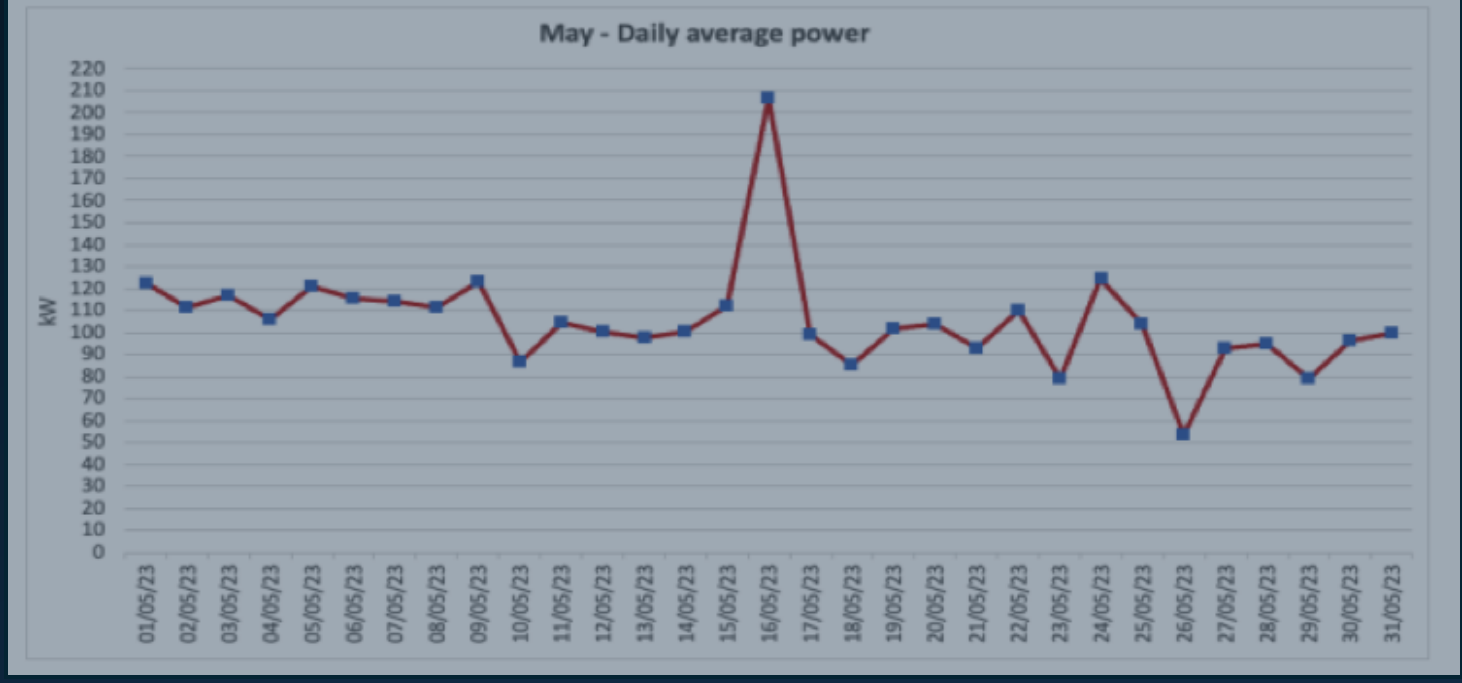
Industry 4.0

For energy efficiency, flexibility and resilience

Step 1

Assessing flexibility potential





Understanding process flexibility for:

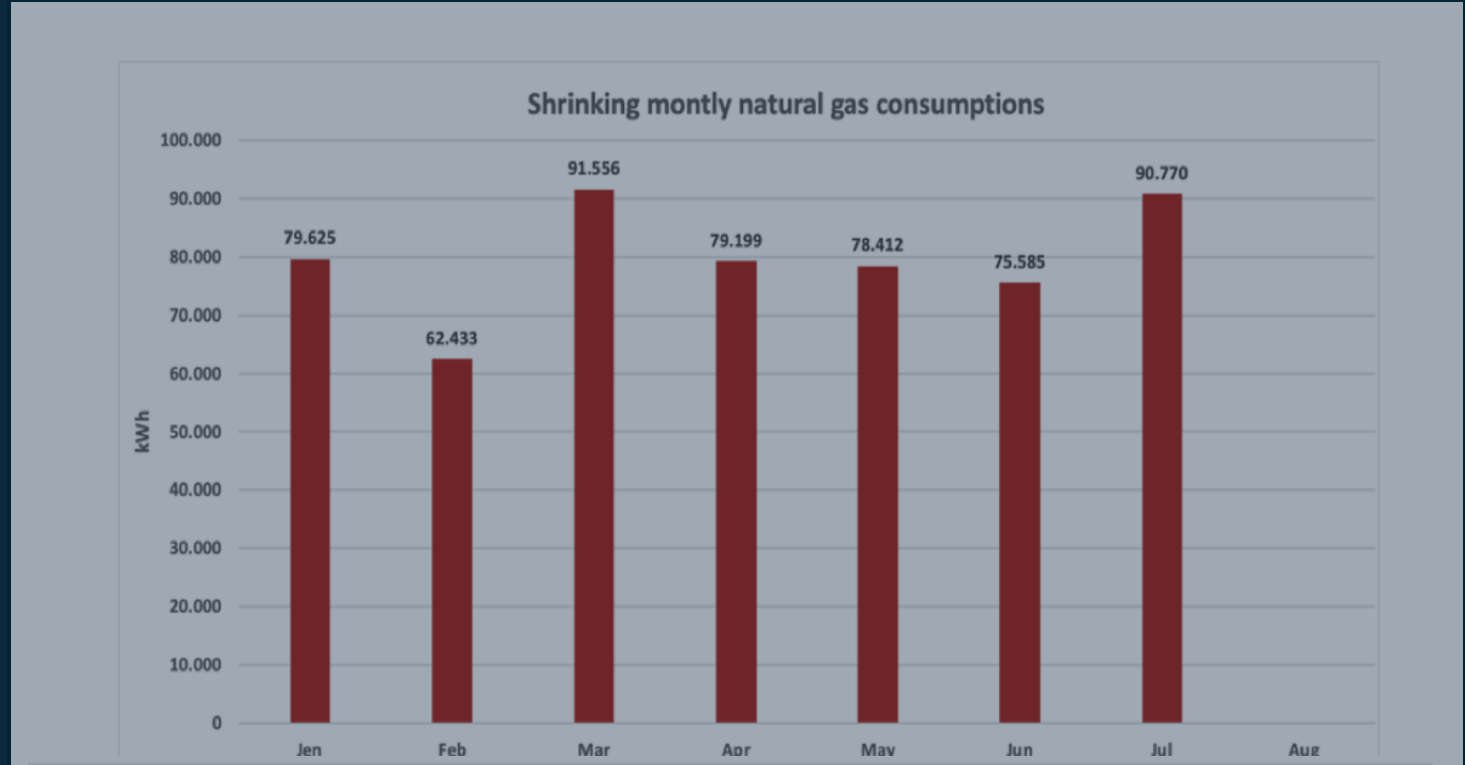
Demand Response

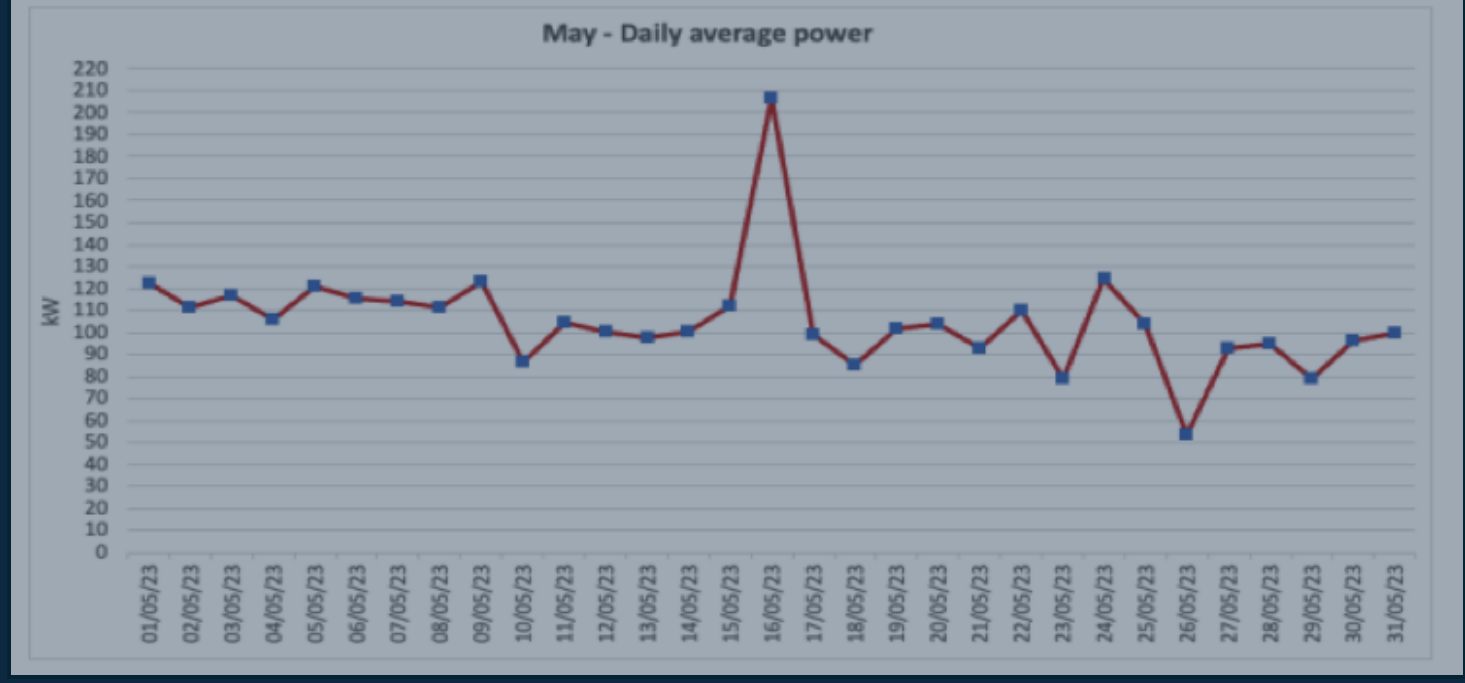
Programs

Energy storage

Self-consumption

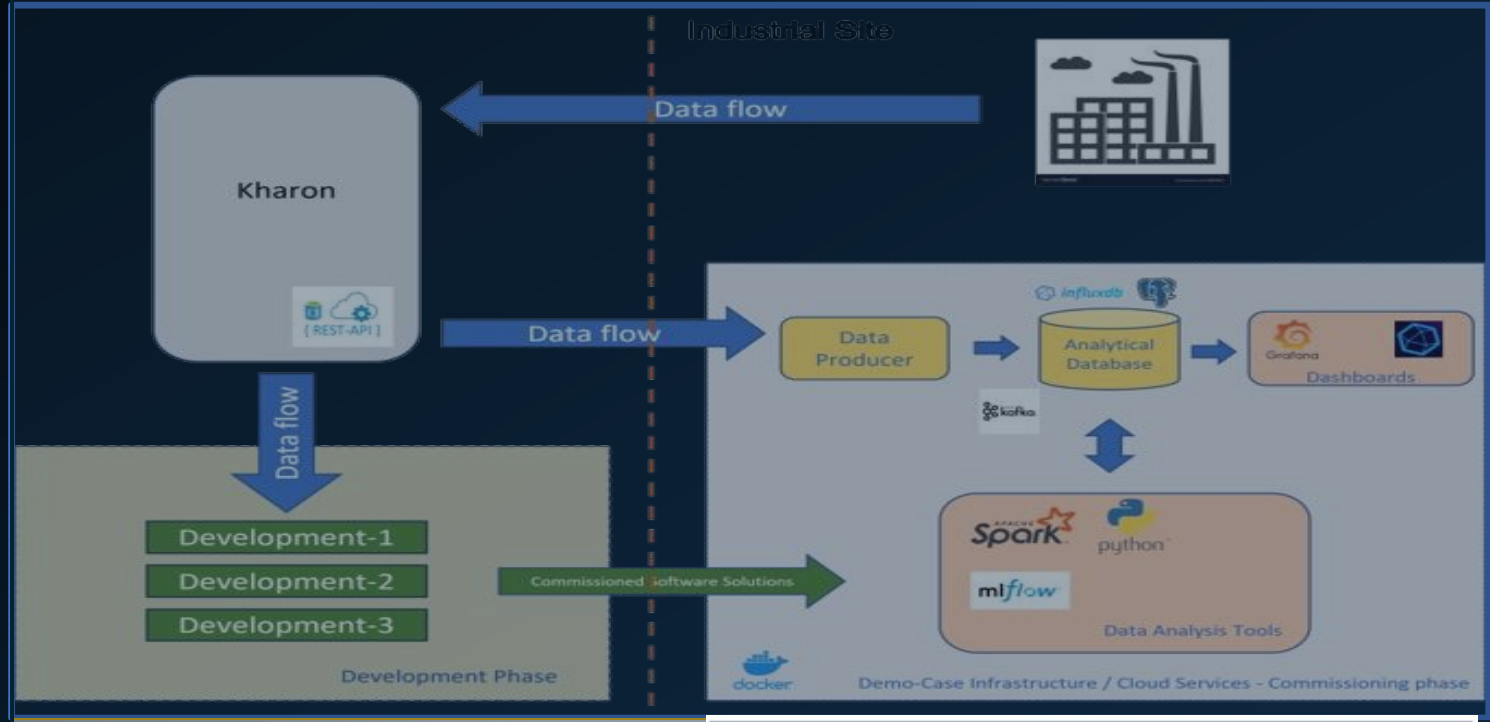
Virtual Power Plants

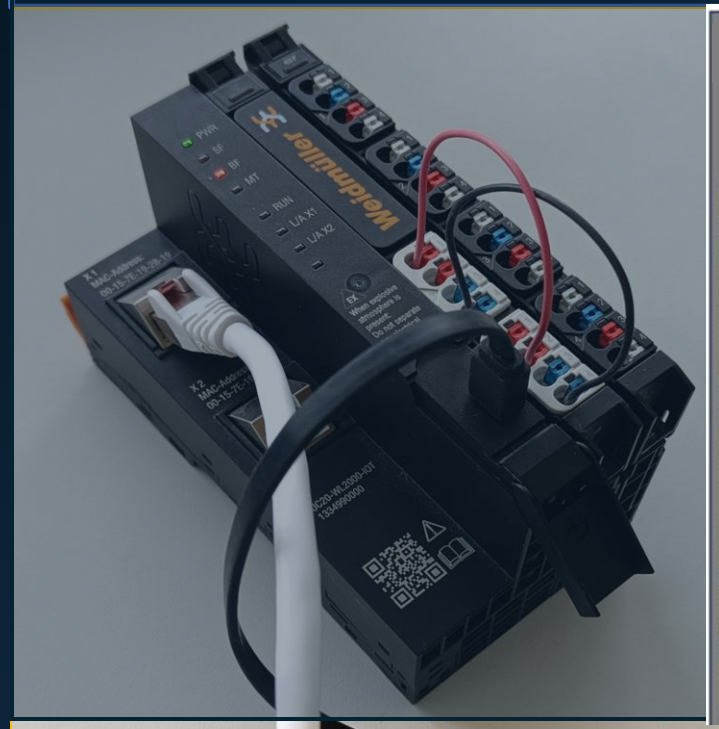


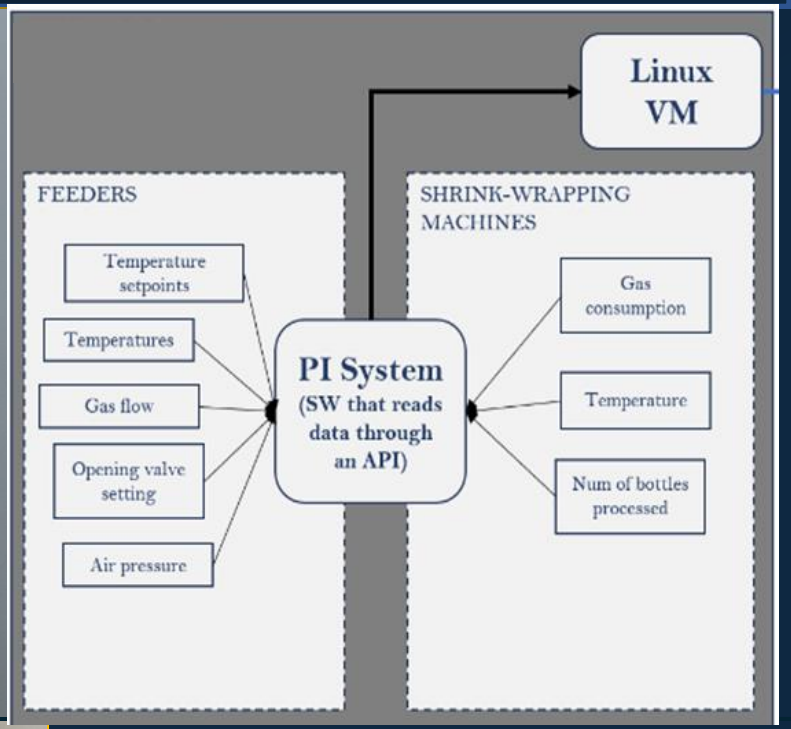


Step 2

Digital Transformation



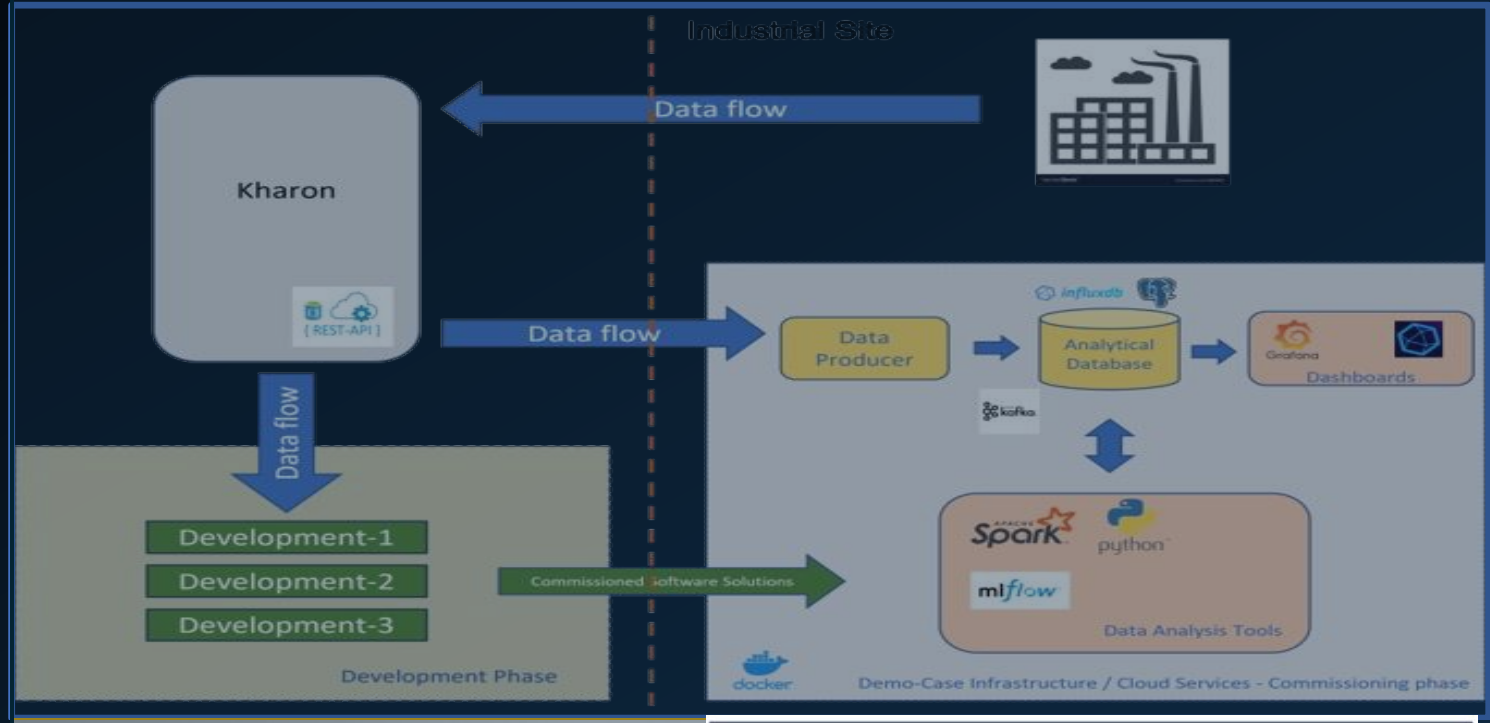


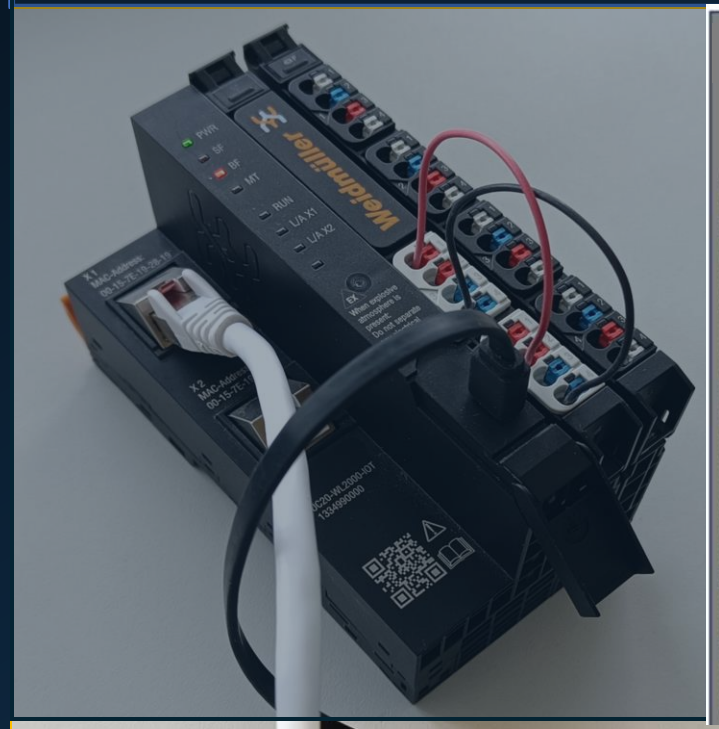


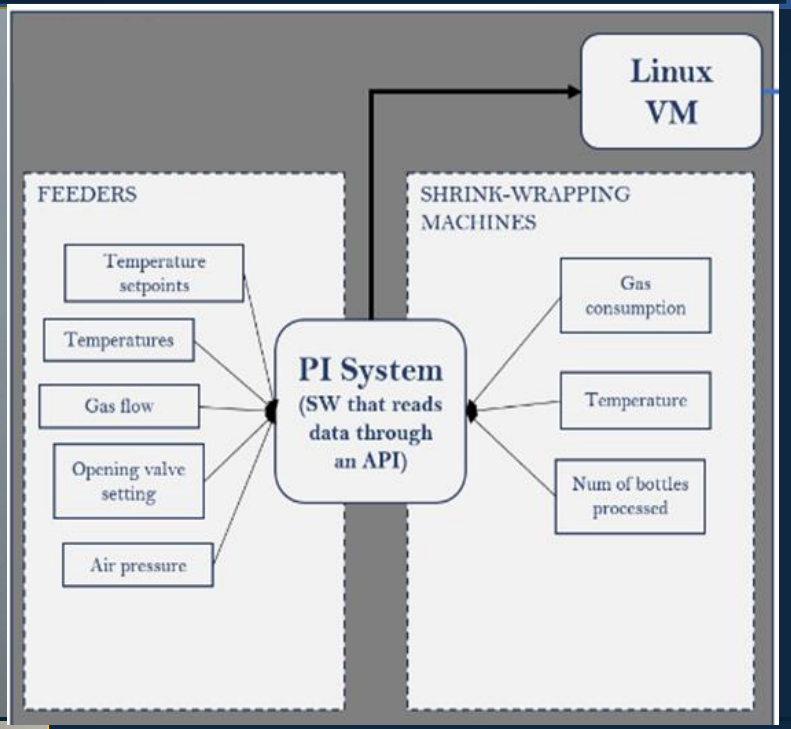
Identification of current digitization status

Installation of necessary sensors and edge devices

Provision of a secure and efficient solution for data storage/sharing

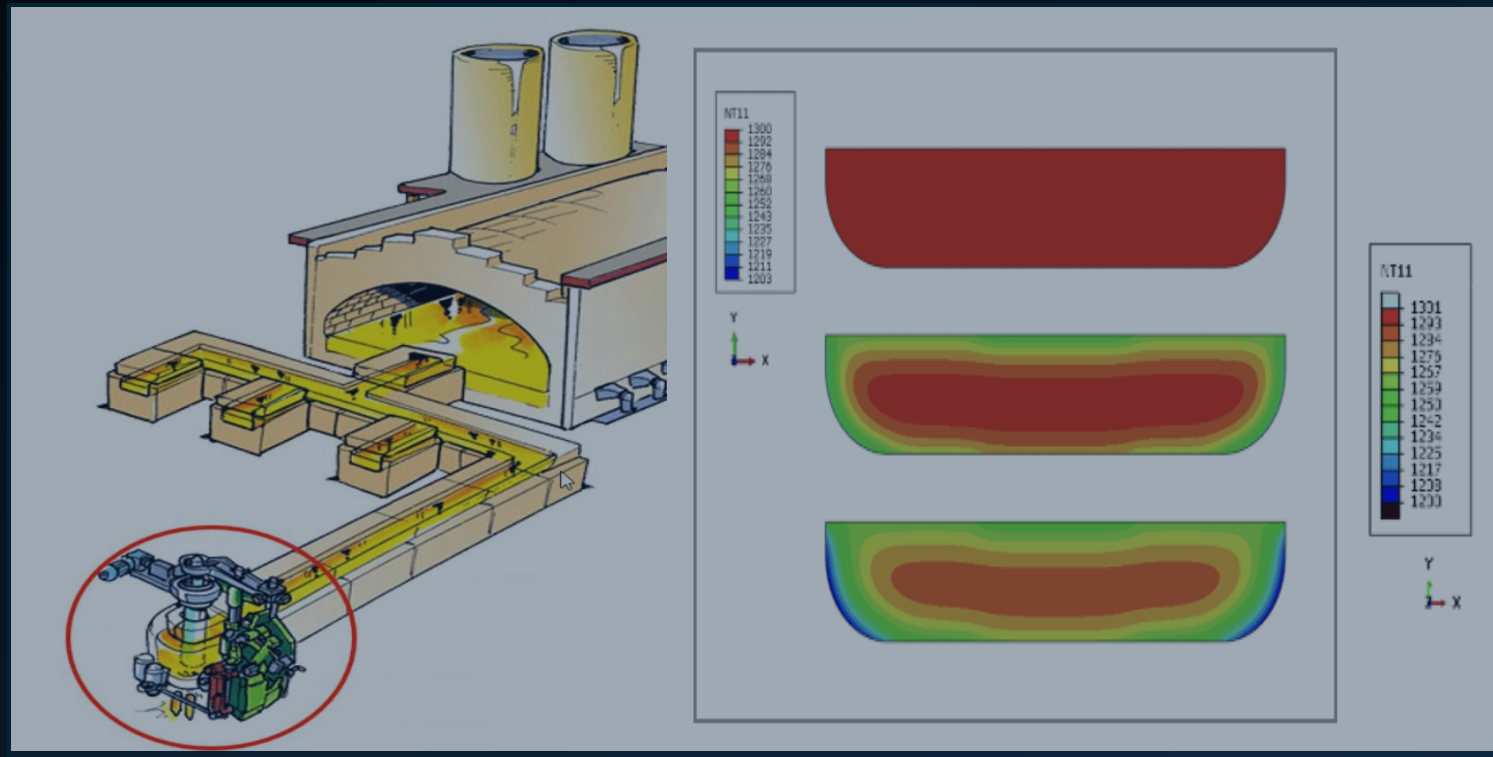


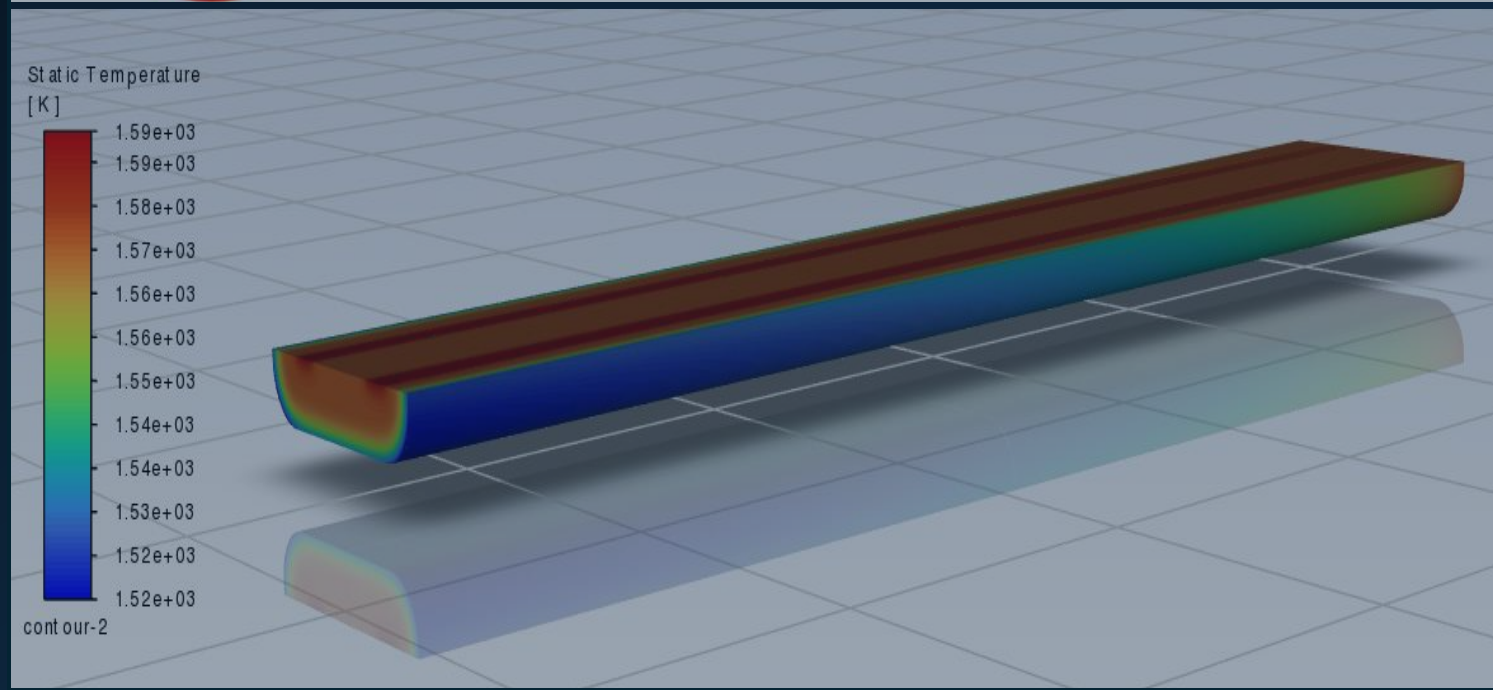




Step 3

Digital Twins

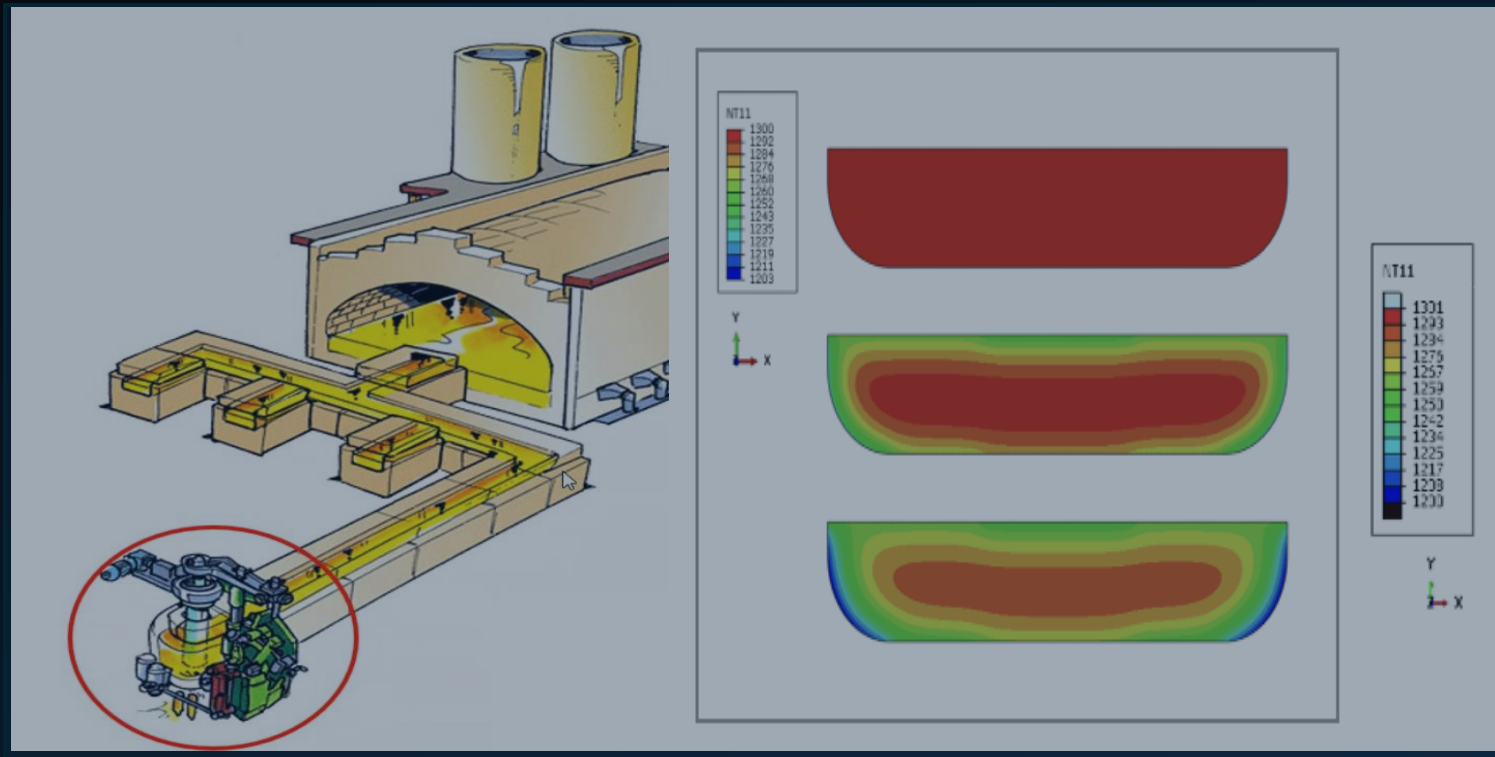


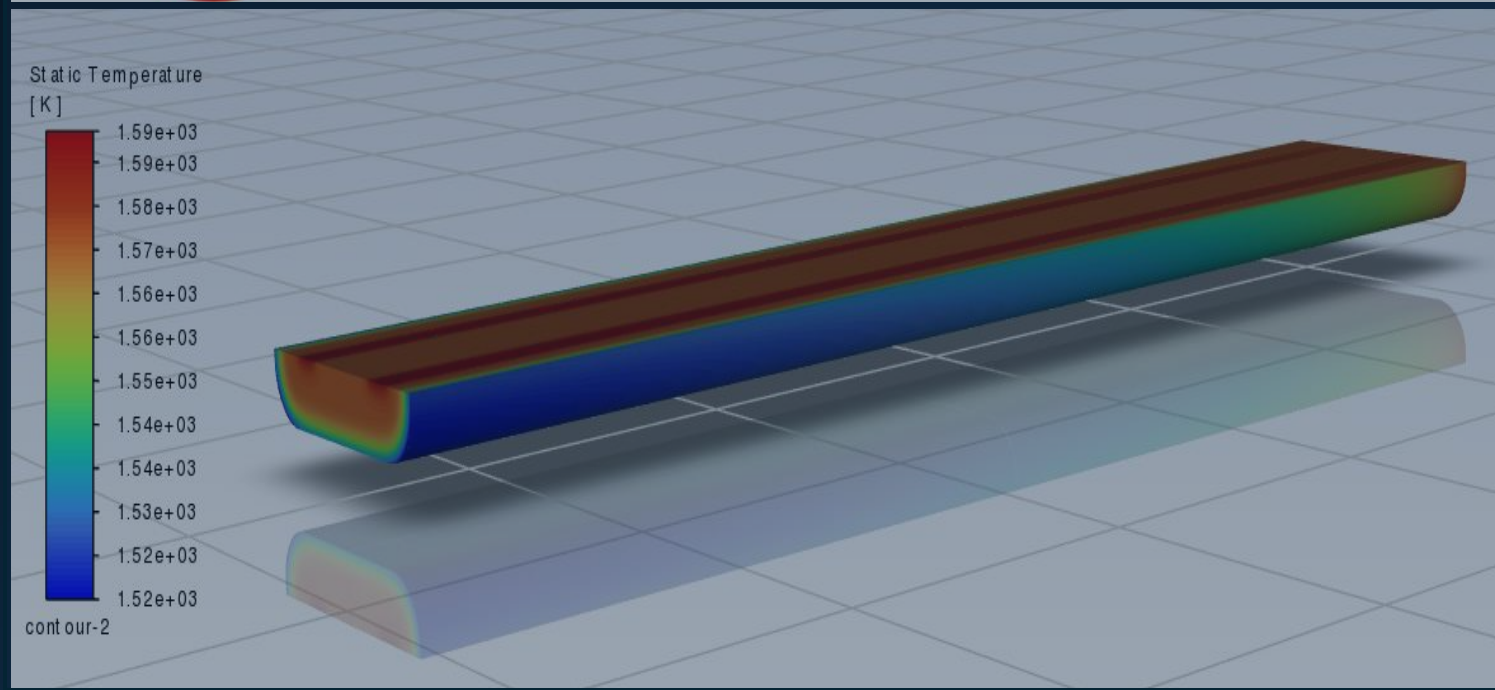


Physics-based and data-driven DTs

Virtual sensors and process simulation

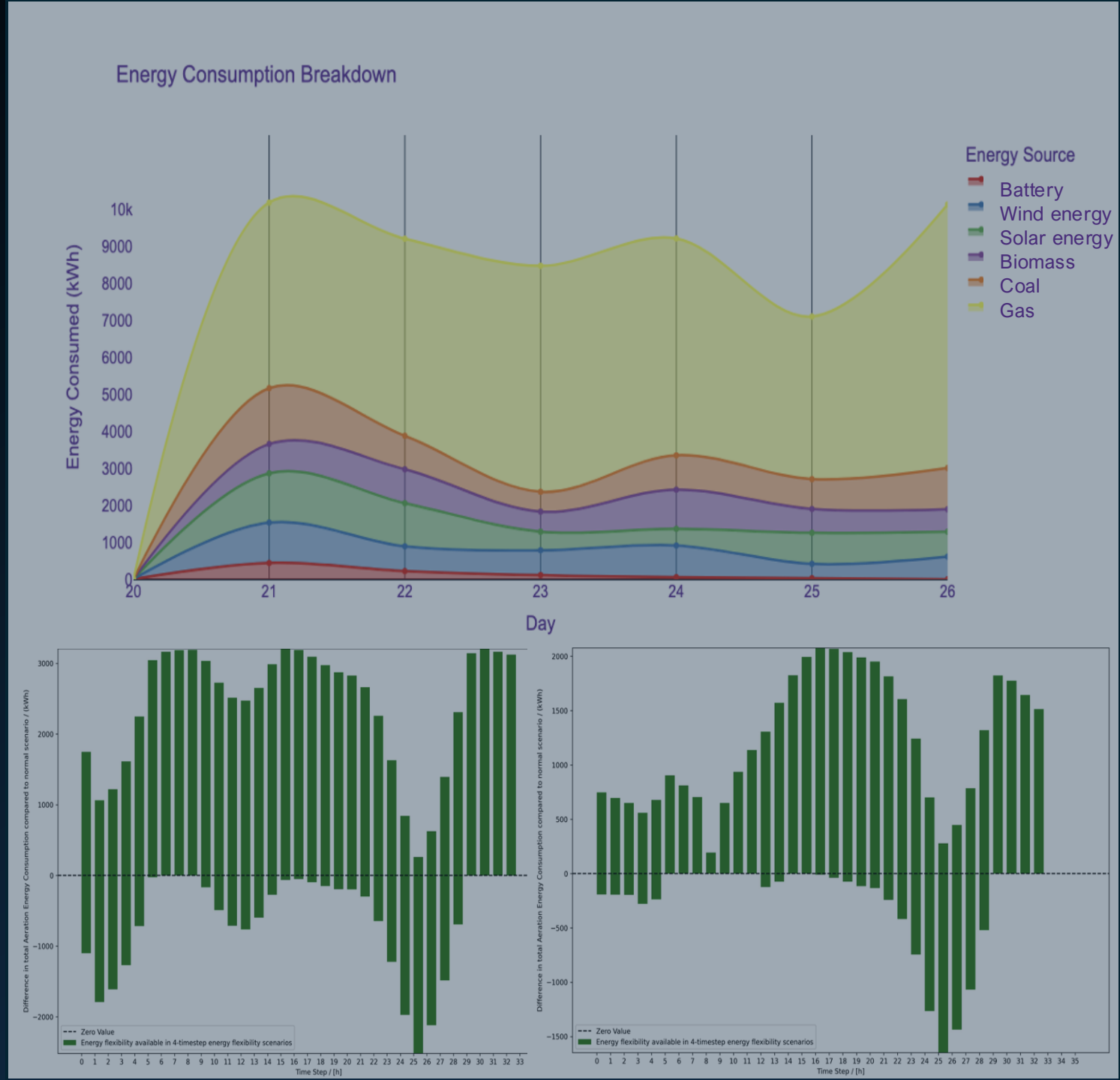
3D Process Visualization





Step 4

Machine and Deep Learning Algorithms

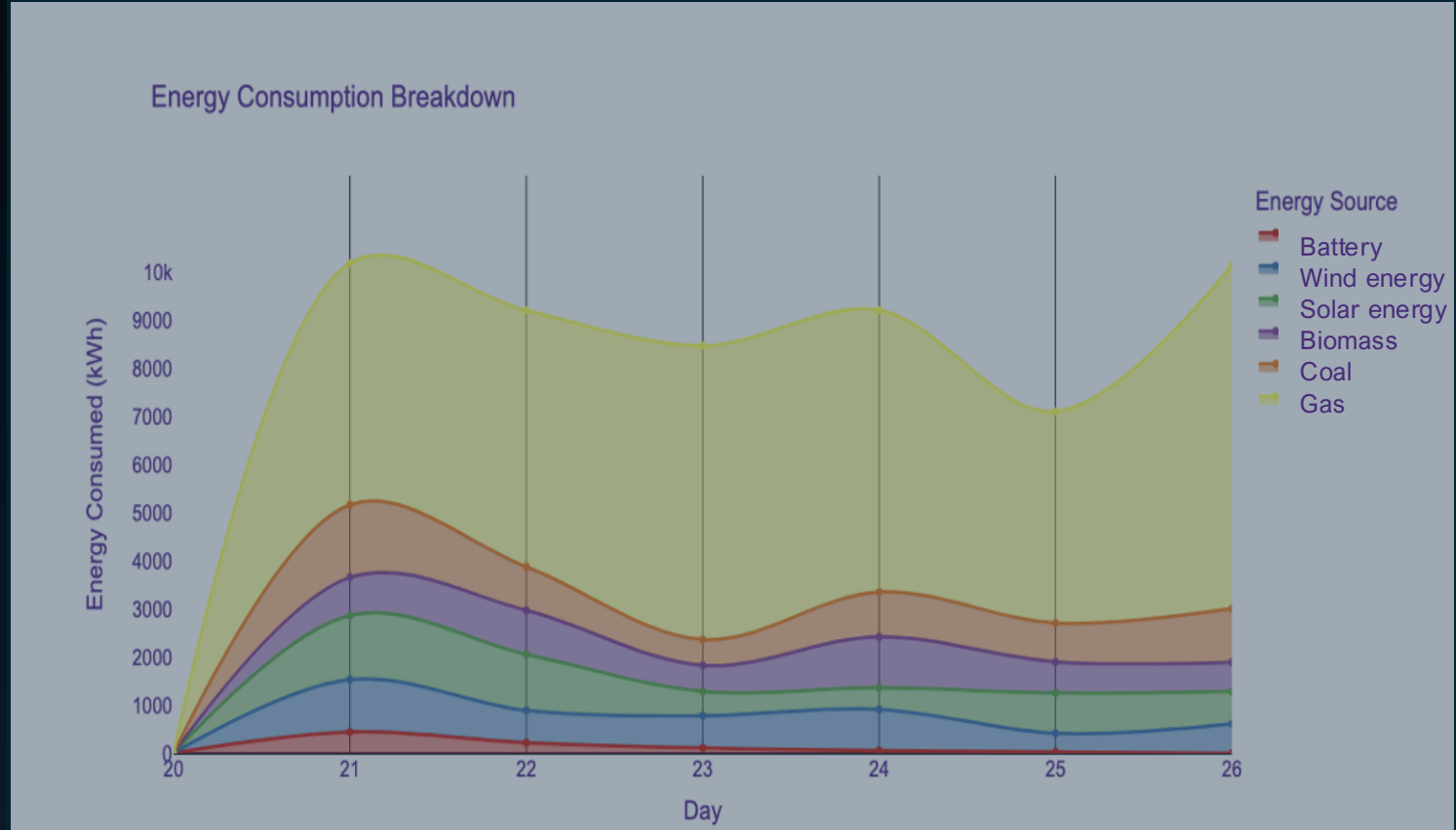


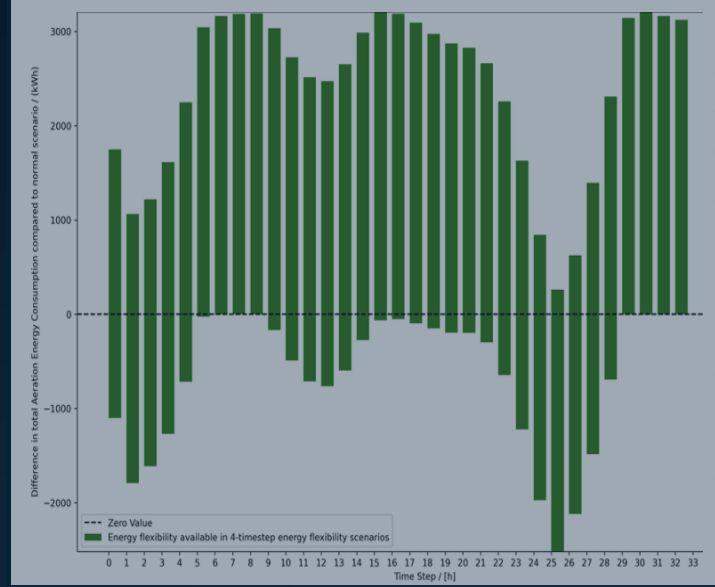
Data-driven algorithms for:

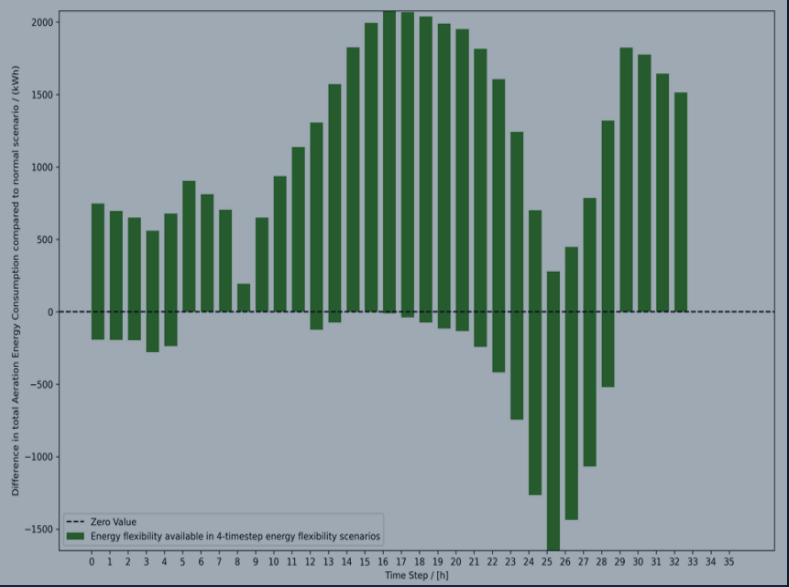
Energy mix optimisation

Energy storage integration

Flexibility integration







Applied Industry 4.0

TRINEFLEX project

€ 19.3 million, 4 years

29 partners, 5 industries

Transform energy intensive industries

2 x Wastewater

Copper

Aluminium

Glass

- 5-10% increase of energy efficiency
- >8% reduction of primary energy demand
- 30% reduction of process emissions
- >18% reduction of peak load

Other industrial projects we are working on…

METAWAVE project

€ 9.5 million, 4 years

19 partners, 3 industries

Electrification of industrial heating processes with advanced microwave systems and digital twins

Aluminium

Ceramics

Asphalt

STREAMSTEP project

€ 15 million, 4 years

31 partners, 5 industries

Sustainable heating energy with advanced heat exchangers, heat pumps and digital twins

Copper

Ceramics

Oil & Gas

Silicon

Plastics

About CORE

50+
EU-funded projects

20M €
EU funding

65
Team Members

300+
Partners

@coreinnovationtech

@coreinno2016

@CORE INNOVATION

www.core-innovation.com
44 Solomou str 17343, Ag. Dimitrios, Athens, Greece

secretary@core-nnovation.com
+30 2109246730

Valia Iliopoulou,
Energy and Resource Efficiency Unit Leader

viliopoulou@core-innovation.com