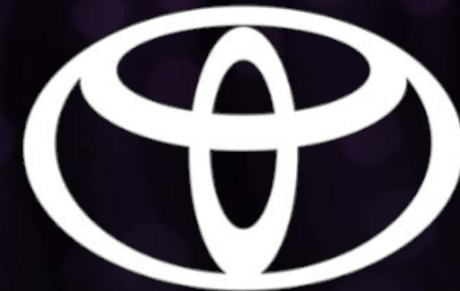


AVEVA PI WORLD – 18/05/2022

Energy abnormality elimination with the PI System

The path to carbon zero

Matteo Biasciutti – Kevin Rosati



AVEVA

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Energy abnormality elimination with
the PI System

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Elimination of energy waste with PI System

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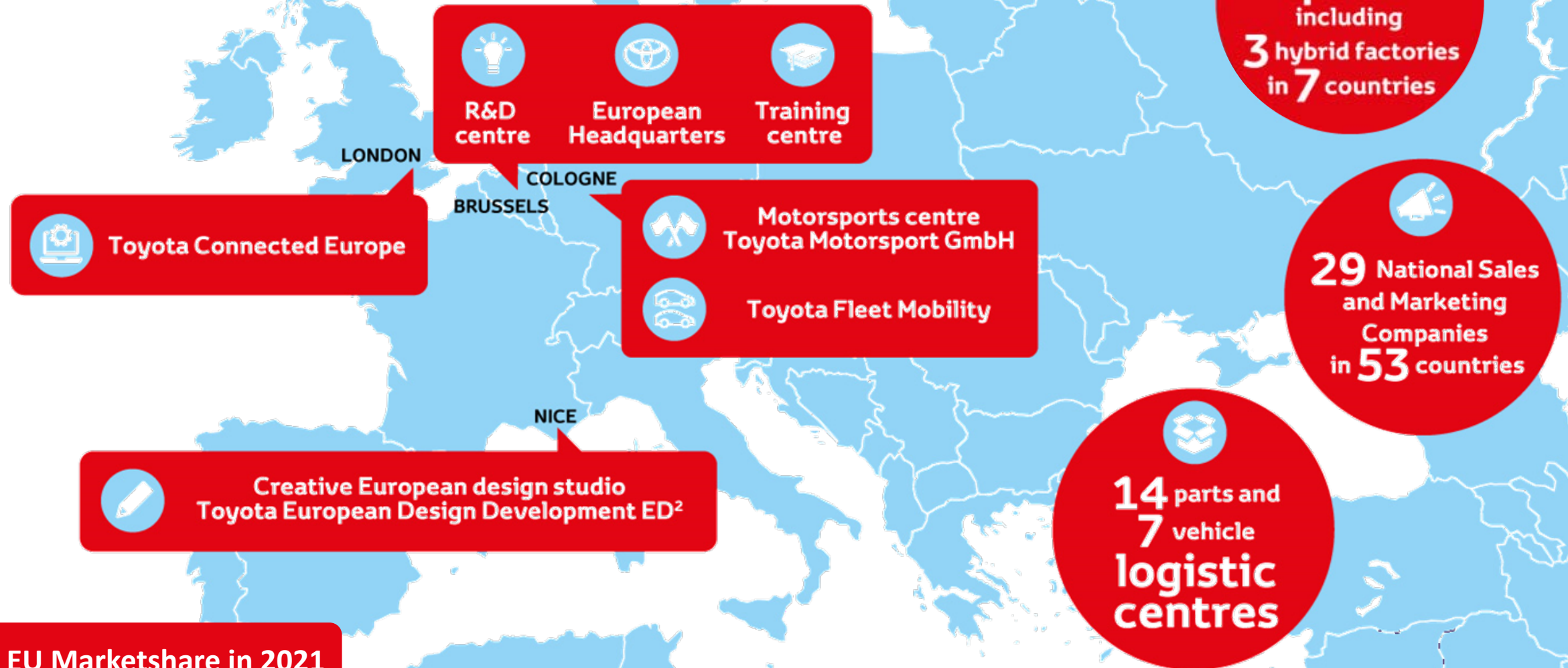
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About our company

Toyota Motor Europe



6.4 % EU Marketshare in 2021

About our company

Toyota Motor Europe



TOYOTA ENVIRONMENTAL CHALLENGE 2050



CHALLENGE 1

New Vehicle
Zero CO₂
Emissions Challenge



CHALLENGE 2

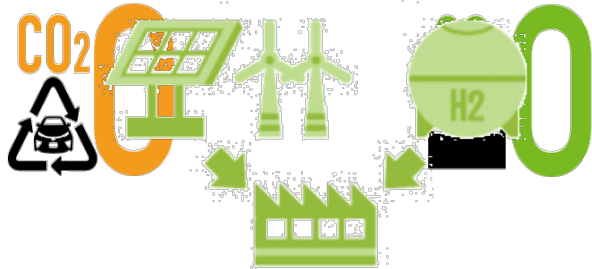
Challenge of
Achieving
Zero CO₂
Emissions

MEASURE:1

CHALLENGE 3

Challenge of
Plant Zero CO₂
Emissions

MEASURE:2



CHALLENGE 4

Challenge of
Optimizing and
Reducing CO₂
Emissions for
Usage

CHALLENGE 5

Challenge of
Establishing a
Recycling-based
Society and
Sustainable
Energy

CHALLENGE 6

Challenge of
Establishing a
Future Society
in Harmony
with Nature

MEASURE:1

MEASURE:2



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Business challenge adressed

CO2 breakdown

Energy distribution

(source : Energy monitoring system)

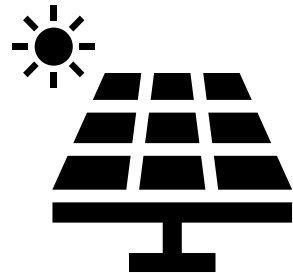
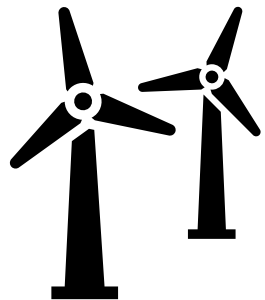
Energy consumption :



CO2 impact :

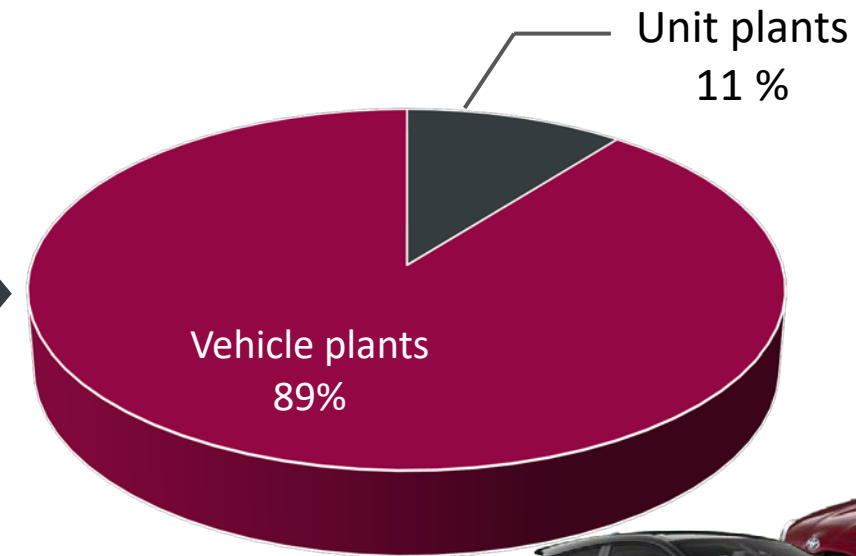


100 % of our electricity usage is **carbon-free**



CO2 generation per plant

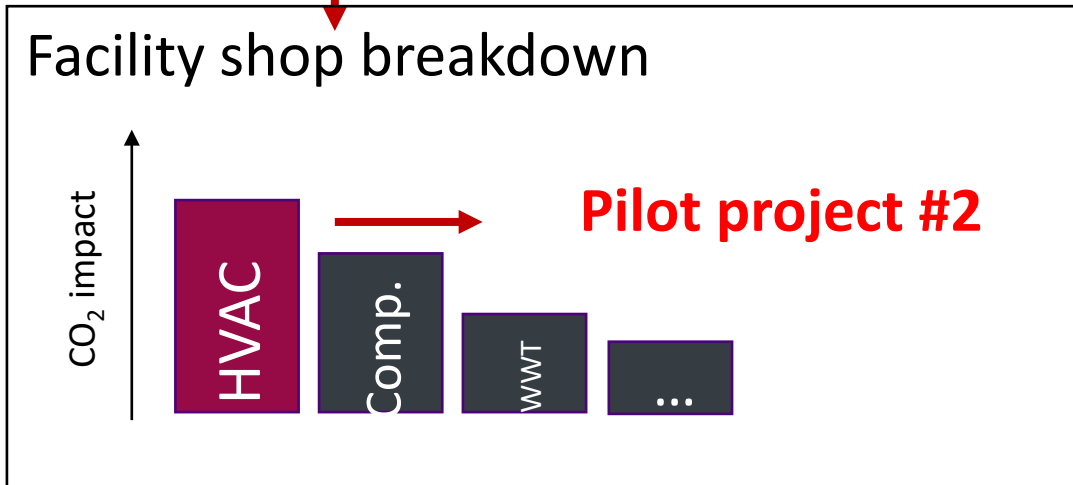
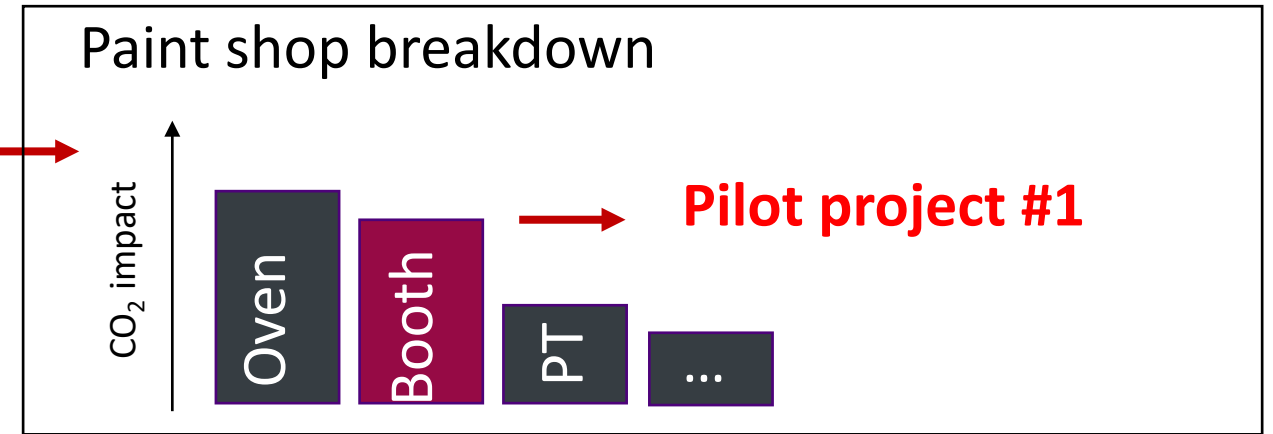
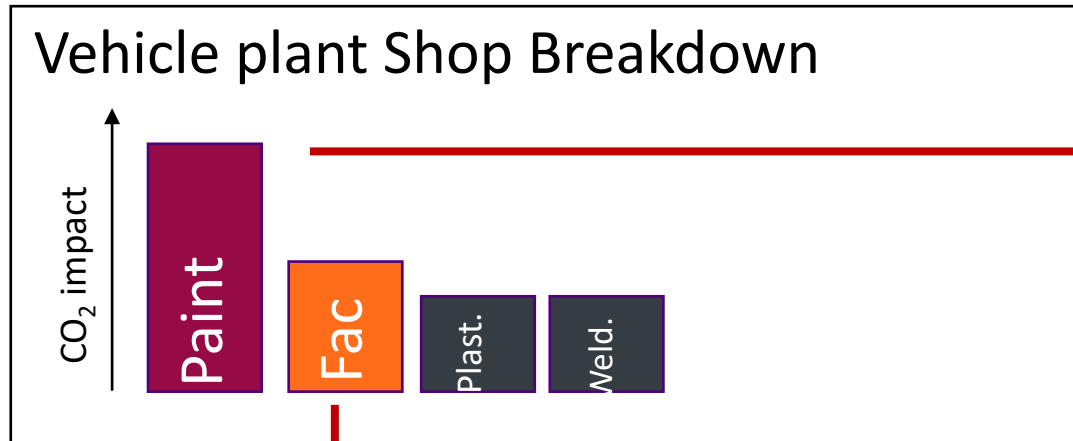
(source : Energy monitoring system)



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Business challenge addressed

CO2 breakdown



Presentation main topic

We want to reduce Muda*

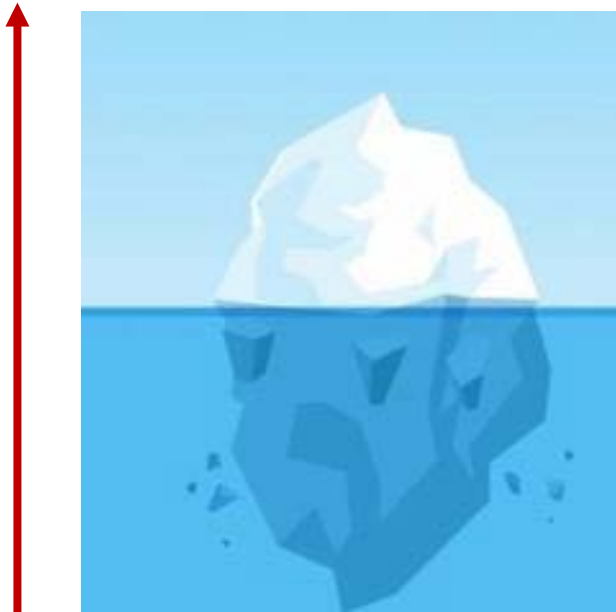
*MUDA = Japanese word for waste

AVEVA

Business challenge adressed

Using PI System capabilities to reduce abnormal consumption

Energy consumption



Visible

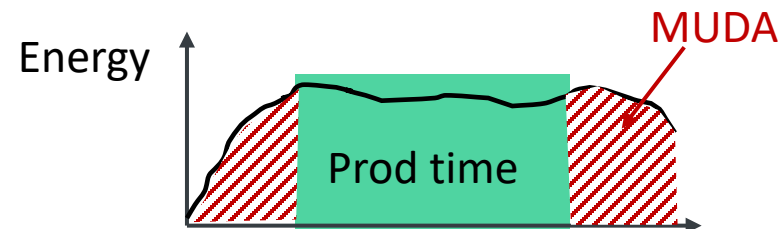
Energy usage that we can understand
What we are expecting from our standards , what we see

EX :  Temperature  Equipment ON

Non-Visible

Influencing factors not visible to operators

EX : Ramp-up time requirement

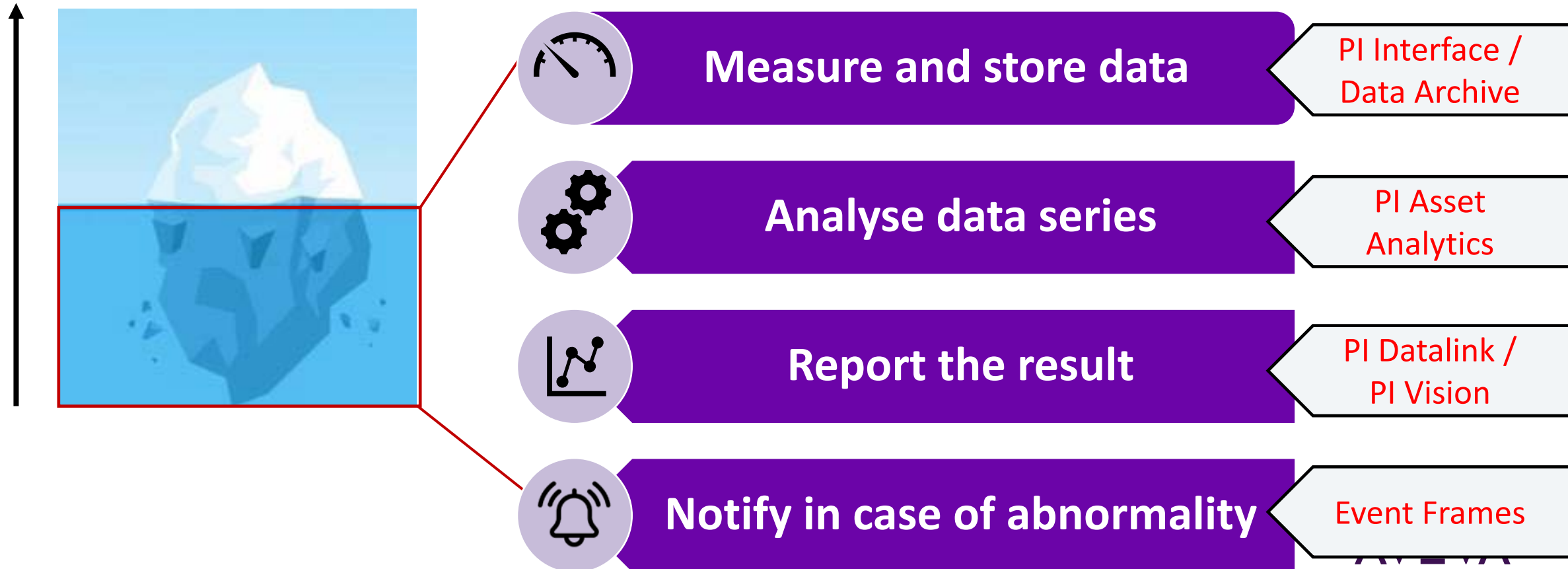


Business challenge addressed

Using PI System capabilities to reduce abnormal consumption

How to reduce it ? Make it visible !

Energy consumption



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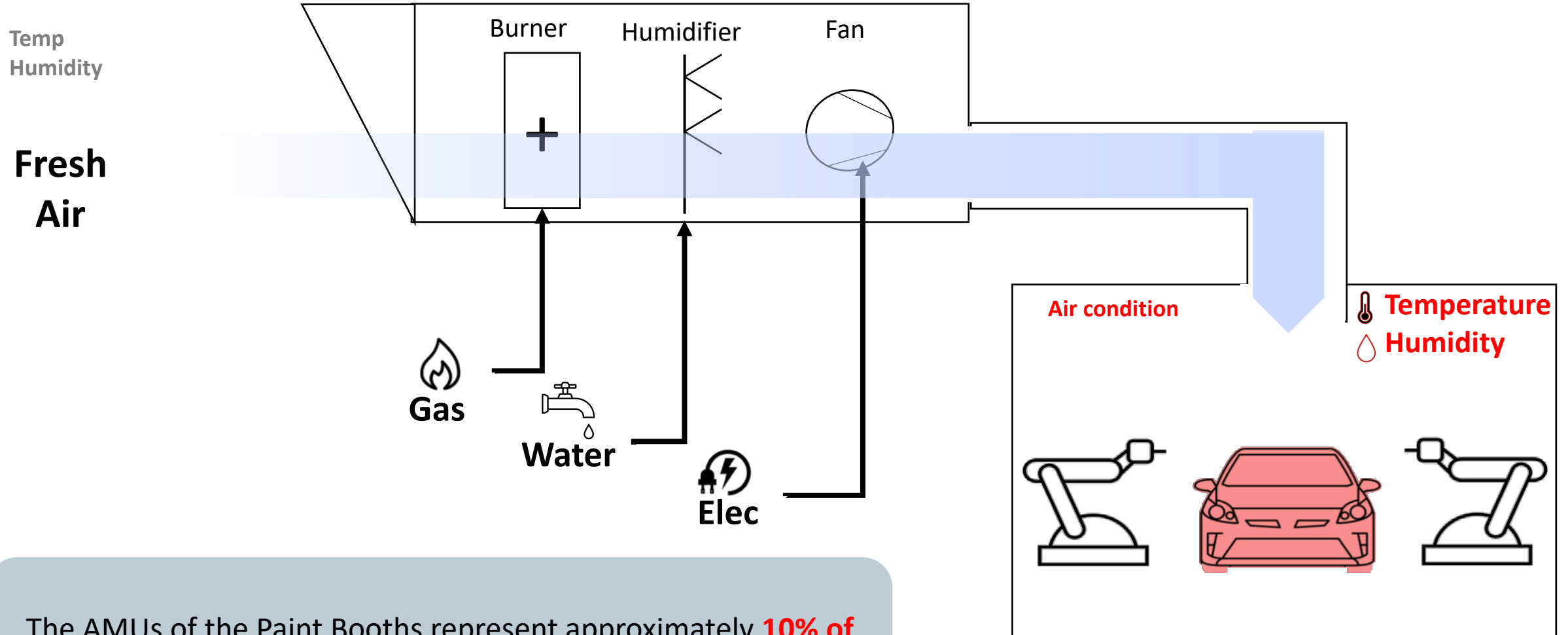
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Principles of Paint Booths

Air Make Up Unit



The AMUs of the Paint Booths represent approximately **10% of the energy consumption** of a site

Objectives

Ultimate goal : eliminate Energy MUDA*

Production time

Guarantee quality using the minimum amount of energy

Non-Production time

Use Energy only when necessary



Definition of indicators



Data visualization and improvements



Field involvement

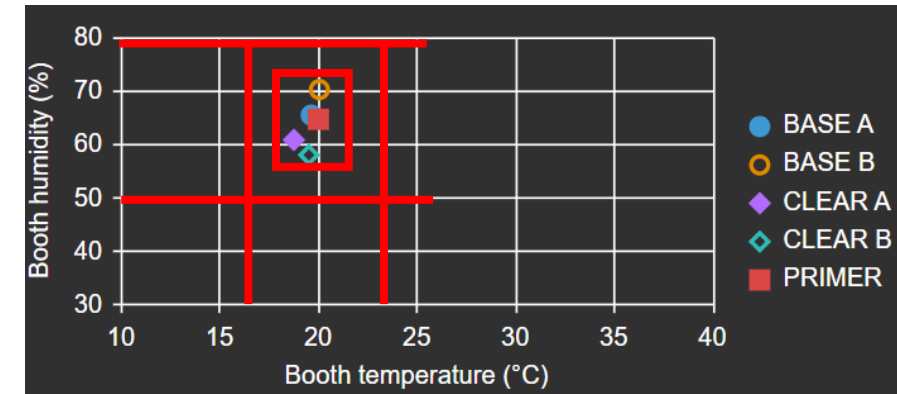
Objectives

Ultimate goal : eliminate Energy MUDA*

Production time

Guarantee quality using the minimum amount of energy

- Ensure that the parameters (T°C/H%) remain within tolerance ranges
- Avoid overshooting
- Detect and inform in the event of abnormality



Definition of indicators



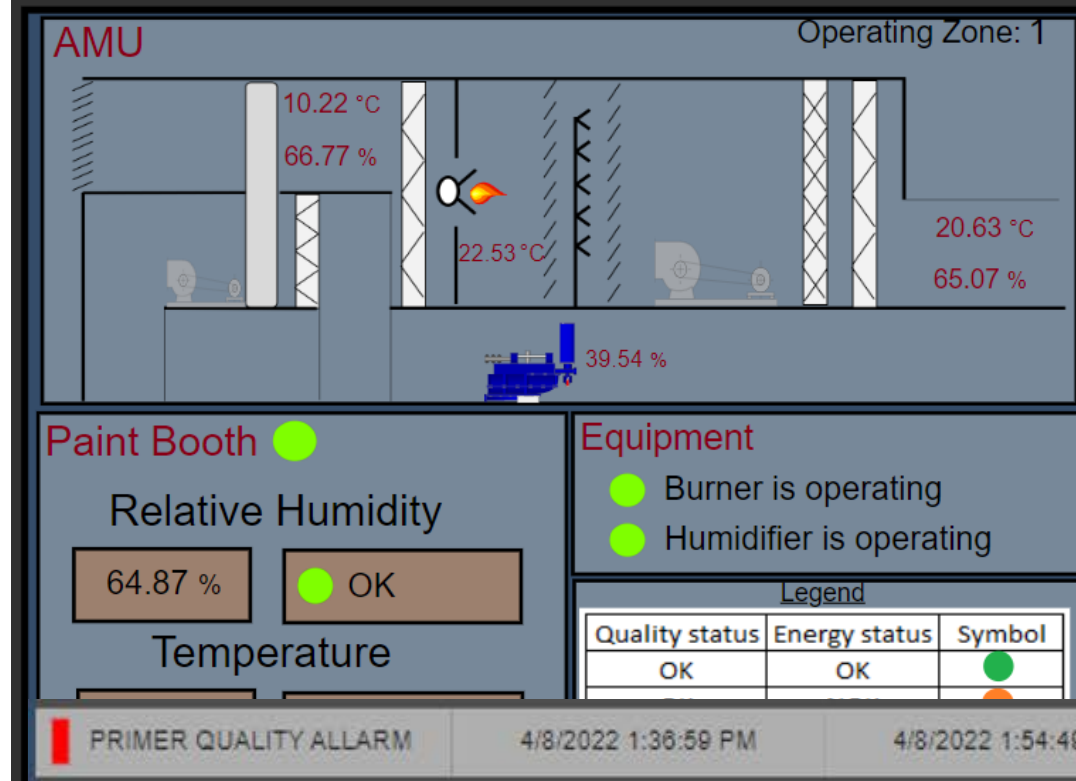
Data visualization and improvements



Field involvement

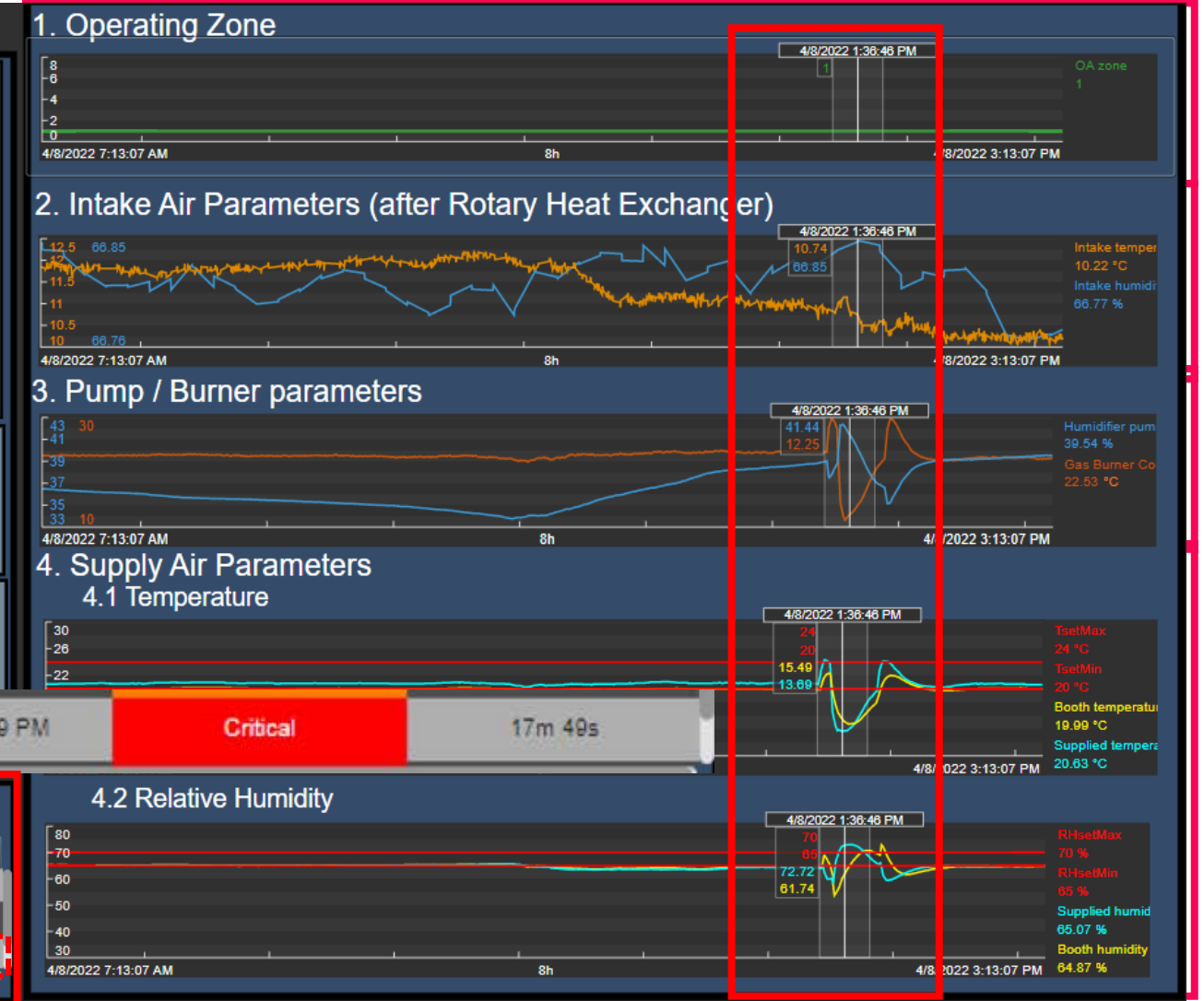
Paint Booth – Production Time Display

PRIMER Monitoring AMU cabins



Abnormality Table

Event Name	Start Time	End Time	Severity	Duration
PRIMER QUALITY ALLARM	4/8/2022 2:04:49 PM	4/8/2022 2:09:59 PM	Critical	5m 10s
PRIMER ENERGY ALLARM	4/8/2022 1:55:59 PM	4/8/2022 2:11:40 PM	Major	15m 40s
PRIMER QUALITY ALLARM	4/8/2022 1:36:59 PM	4/8/2022 1:54:49 PM	Critical	17m 49s



Objectives

Ultimate goal : eliminate Energy MUDA*

Production time

Non-Production time

Guarantee quality using the minimum amount of energy

- Ensure that the parameters (T°C/H%) remain within tolerance ranges
- Avoid overshooting
- Detect and inform in the event of abnormality

Use Energy only when necessary

- Follow start / stop operations vs planning
- Detect and inform in the event of an abnormality
- Set up a PDCA cycle



Definition of indicators



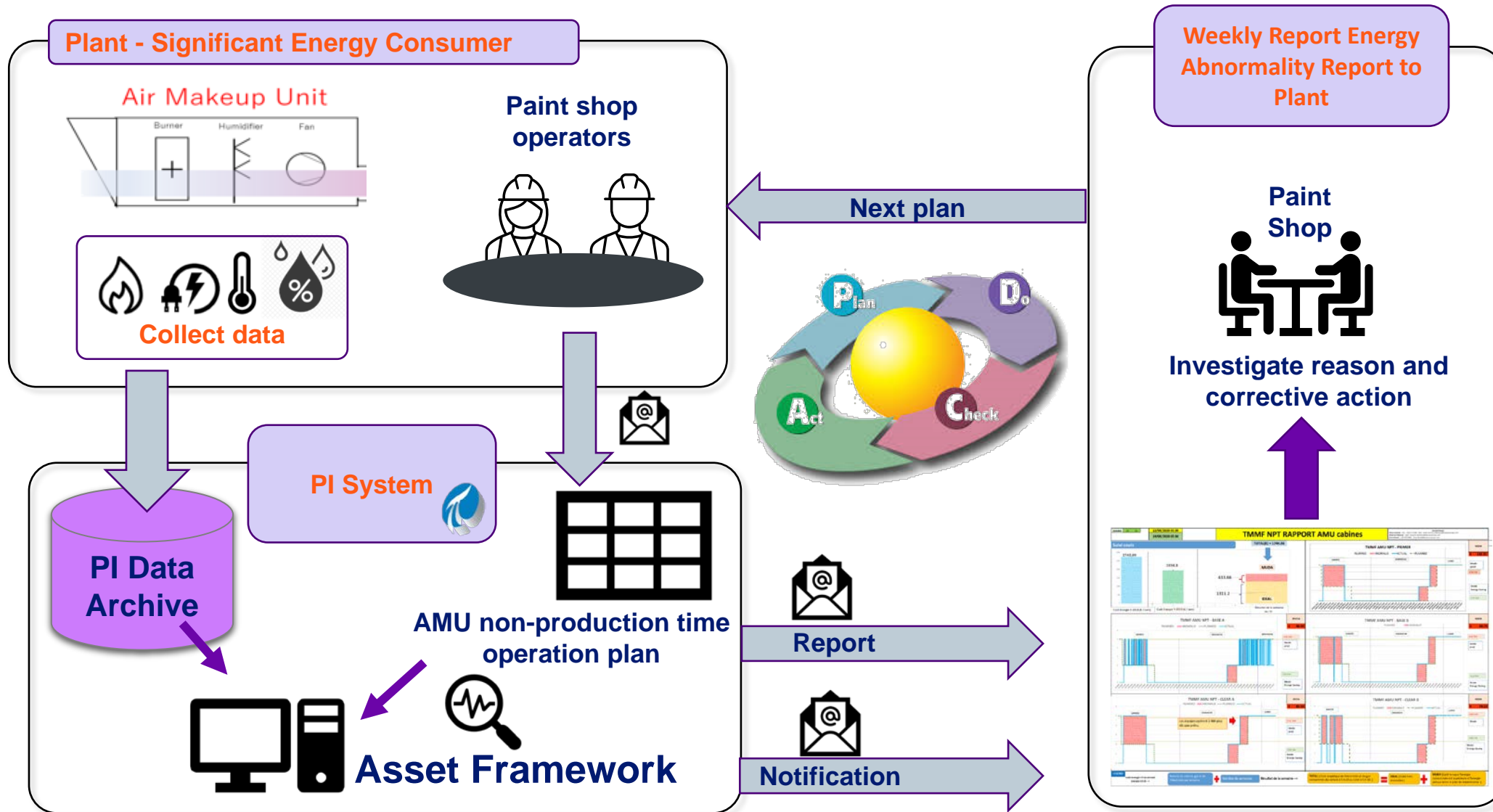
Data visualization and improvements



Field involvement

AVEVA

Paint Booth – Non Production Time Report Concept



Paint Booth – Non Production Time Display

Paint Booth AMU - Non Production Time

PRIMER

Event Name

PRIMER Abnorm

PRIMER Abnorm

PRIMER Abnorm

Prod

Energy saving

11/2/2021

Reason Code Editor

PRIMER Abnormality

Reason

- Cleaning Company MUDA
- Early start of production MUDA
- Late stop of production MUDA
- Mis operation MUDA
- Other
- Rescheduling of maintenance plan NOT MUDA
- Trials NOT MUDA
- Unexpected maintenance NOT MUDA
- Wrong planning MUDA

Clear Apply Cancel

Reason Acknowledgment

Acknowledge

Acknowledge

Acknowledge

Plan

Actual

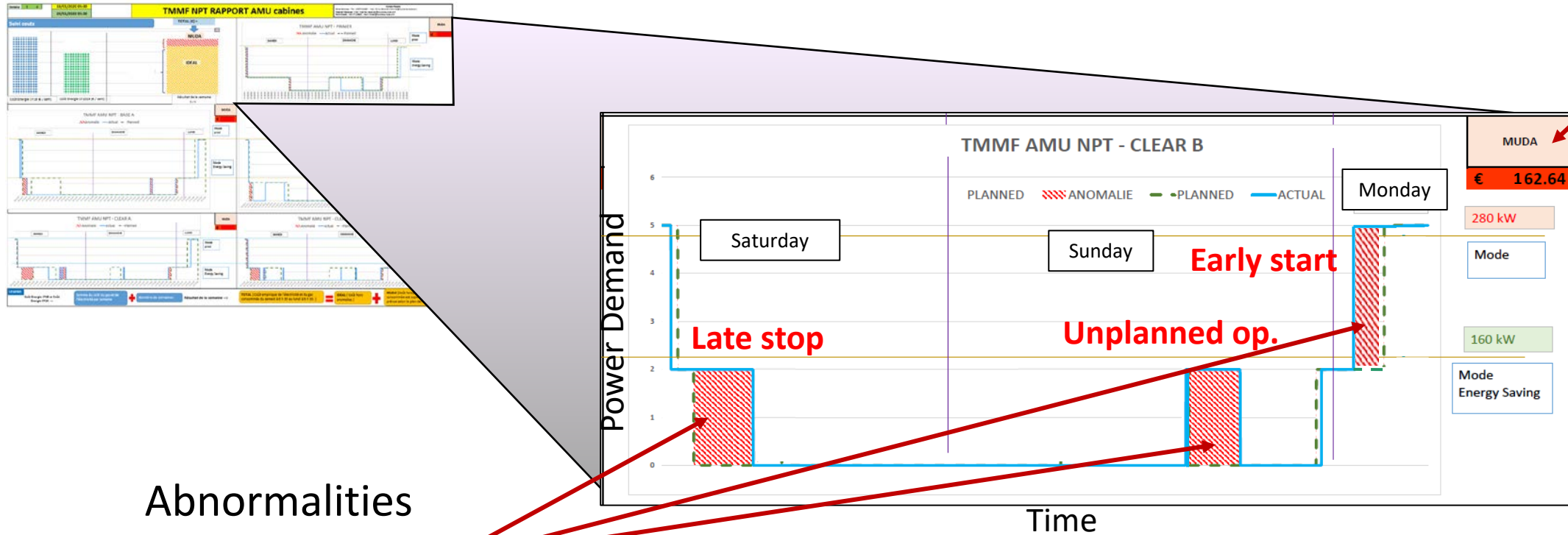
11/9/2021 12:24:14 PM

BASE A

Event Name Start Time End Time Duration Reason Acknowledgment

BASE A Abnormality 11/6/2021 6:55:36 AM 11/6/2021 10:08:00 AM 3h 12m Acknowledge

Paint Booth – Non Production Time Report



MUDA cost
(gas + elec)

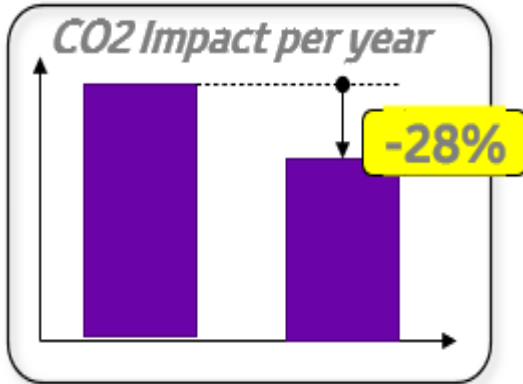
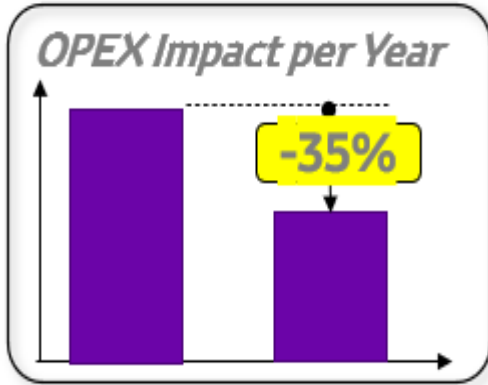
Abnormalities
shown in red

Report principles :

abnormalities and results should be **immediately visible**. On the other hand, the report should make **deeper discussion** possible

Results and Next Steps

Non Production Time

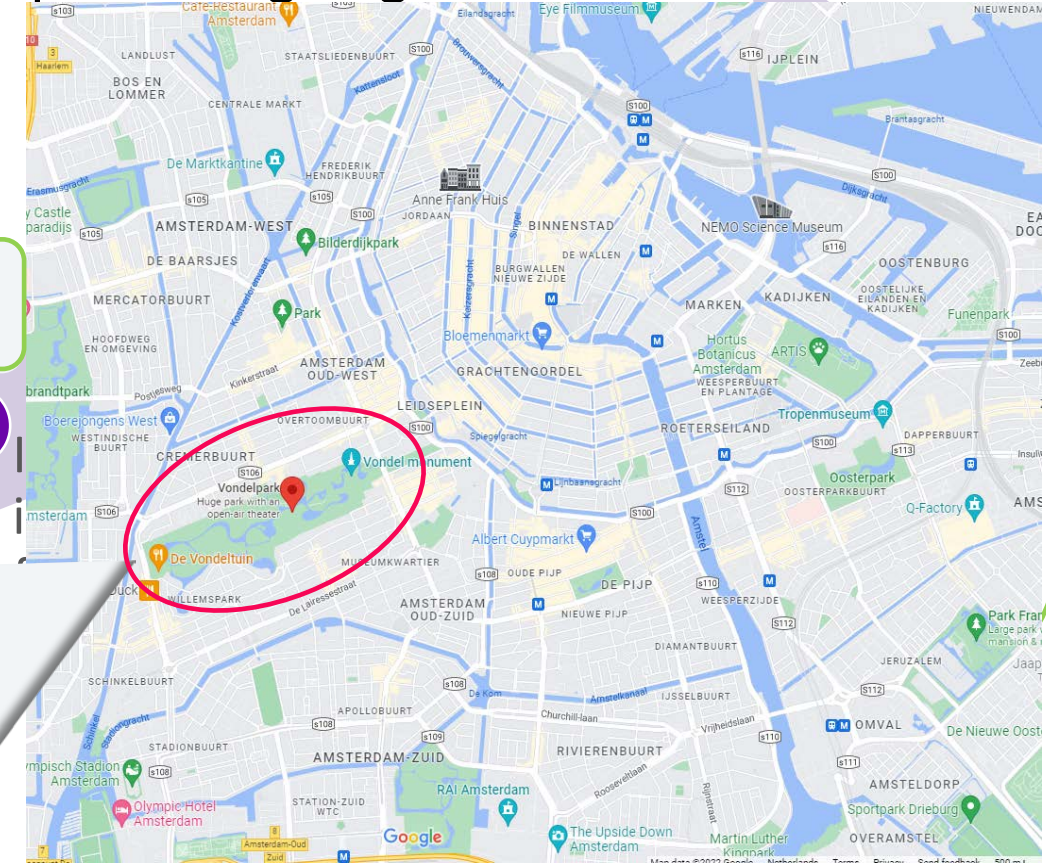


Investment : 0 €

YOKOTEN* phase ongoing

Standardize

Monitor and



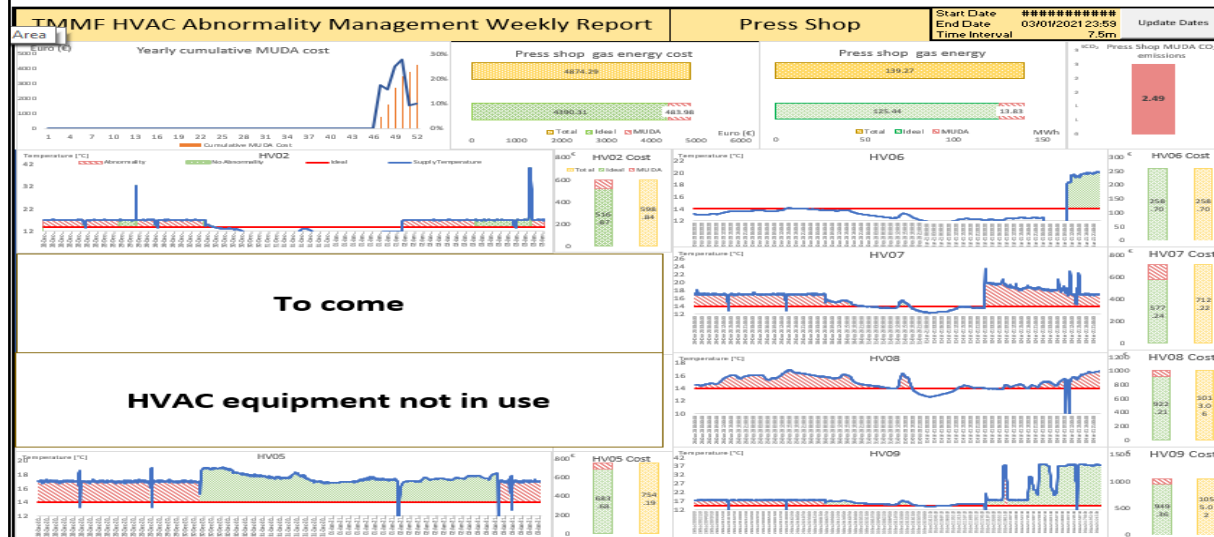
We can reduce **CO₂ emissions** equivalent to a forest the size of **2.5 times Vondelpark**

*YOKOTEN= Japanese word for “Roll-Out”

Other projects

Implementation for different aspects

Building ventilation abnormality reporting



- Track and report unnecessary consumption
- Implement continuous improvement cycle

Transformer management panel



- Easy follow-up of load, power factor, temperature
- Quicker investigation in case of failure

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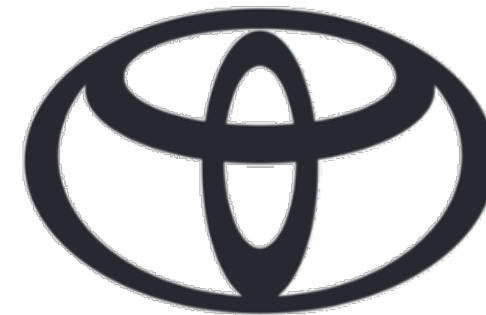
3

Elimination of energy waste with PI System

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Reduce Energy Abnormality towards 0 CO2



Challenge

- Allow operators to **optimize the energy** consumption of paint booths
- Implement a **sustainable** continuous improvement approach
- Demonstrate the possibilities of the system

Solution

- Connection of process and energy data in an **AF data model**
- Setting up automatic **analysis** and generating **events** and **notifications**
- Establishment of weekly **reporting** and **PI Vision** dashboard

Benefits

- **35% reduction** in energy consumption and **28 % reduction** of CO₂ impact during non-production time
- Better control of equipment
- Awareness of the energy impacts of processes

Thanks to the PI System, we are able to deliver the relevant information to the relevant person at the relevant time.

Therefore, we can use the relevant amount of energy at the relevant place in the relevant time



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