

# Energy Efficient Manufacturing System Management

Manufacturing Partnership Day, EFFRA  
BluePoint, Brussels  
26th September

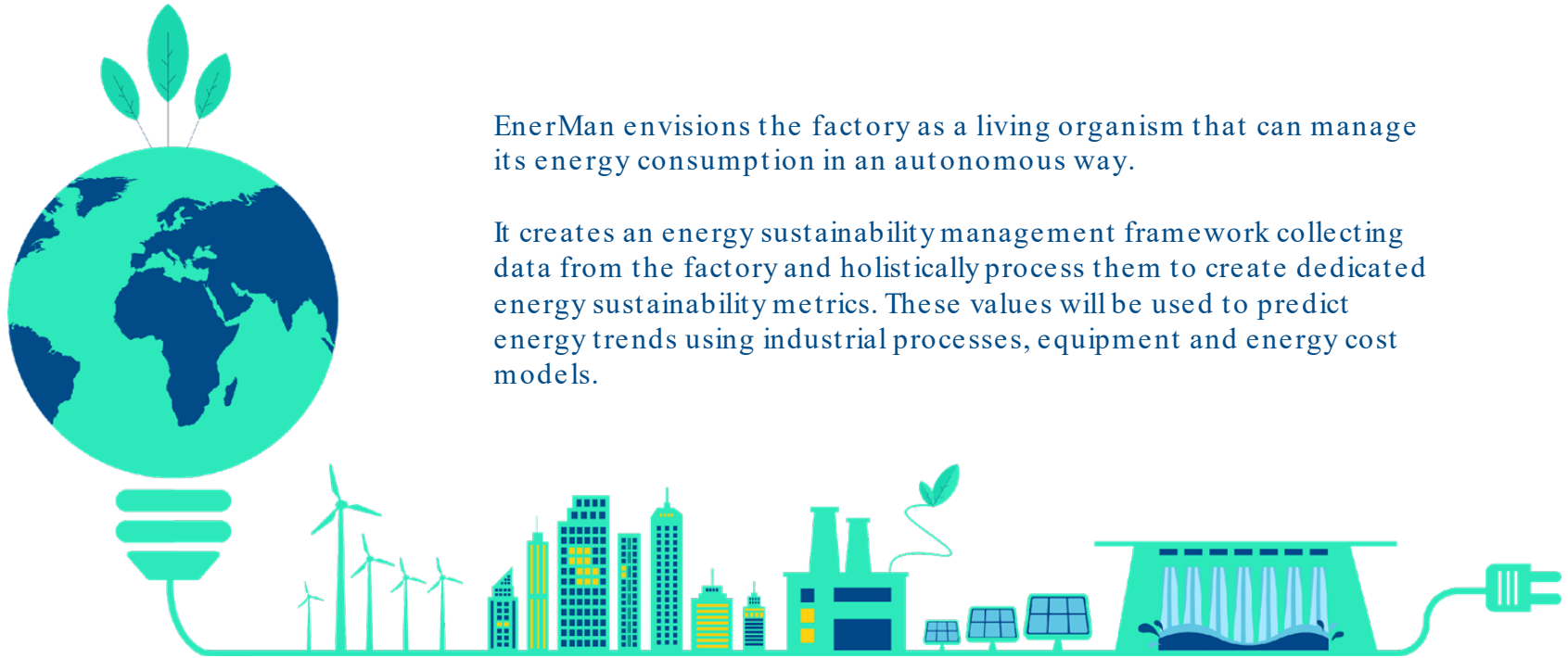
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958478





EnerMan envisions the factory as a living organism that can manage its energy consumption in an autonomous way.

It creates an energy sustainability management framework collecting data from the factory and holistically process them to create dedicated energy sustainability metrics. These values will be used to predict energy trends using industrial processes, equipment and energy cost models.

The EnerMan project explores the energy sustainability concept as a three-aspect combination:

(1) Energy Consumption of the industries

(2) Energy Cost Due To The Power Grid Electricity Price

(3) The Environmental Impact Due To The Production Process Of The Consumed Energy

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By introducing an energy sustainability management system, the project aims to achieve a holistic and data-based view of the energy efficiency, energy use and consumption within the factory.

The evaluation and demonstration of the EnerMan solution will take place across Europe in three different pilot categories with eight different use cases that focus on different, energy consuming industrial manufacturing sectors (food, metal processing, automotive manufacturing).

## End-Users



## Technology Providers



## Research & Universities





## USE CASES PILOTS OVERVIEW AND CLUSTERING IN THE 3 MAIN REFERENCE INDUSTRIAL SECTORS

### Food Industry



#### YIOTIS

- Greece (EL)
- Food and beverage
- Chocolate process line

### Appliances and industrial components manufacturing industry



#### INFINEON

- Germany (DE)
- Semiconductor
- Silicon chip clean room



#### AVL

- Austria (AT)
- Automotive
- Vehicle test bed TB403



#### Centro Ricerche Fiat (CRF)

- Italy (IT)
- Automotive
- 1: Paintshop process
- 2: Bodyshop building

### Metal manufacturing and processing industry



#### 3DNT (Prima Additive)

- Italy (IT)
- Additive manufacturing
- Laser printing



#### STOMANA (STN)

- Bulgaria (BG)
- Iron and steel
- Meltshop Process



#### DEPUY (DPS)

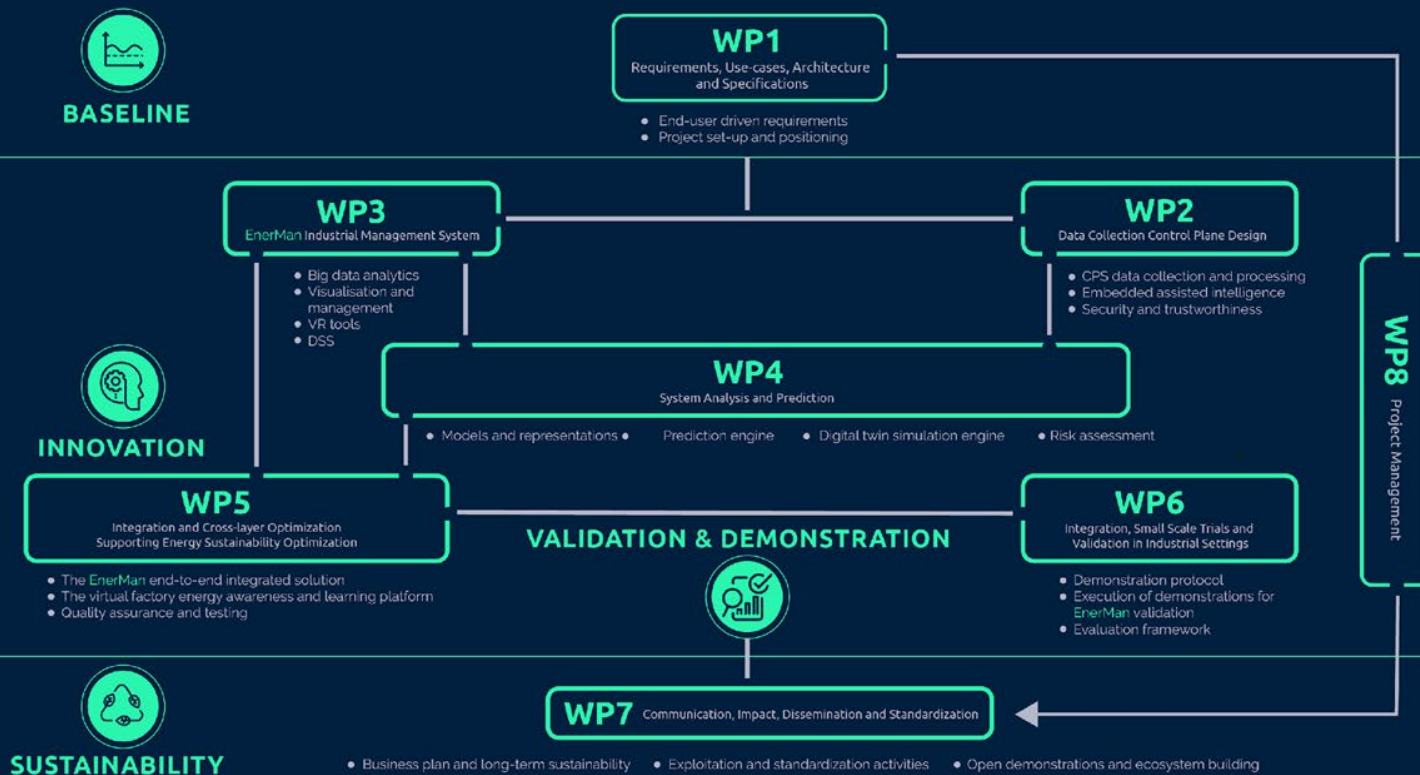
- Ireland (IE)
- Medical devices process
- 1: Dust Extraction
- 2: Compressed Air



#### ASAS

- Turkey (TR)
- Aluminium industry
- Trigeration System

# EnerMan WPs Overview



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## Definition of Experiments for Individual Modules

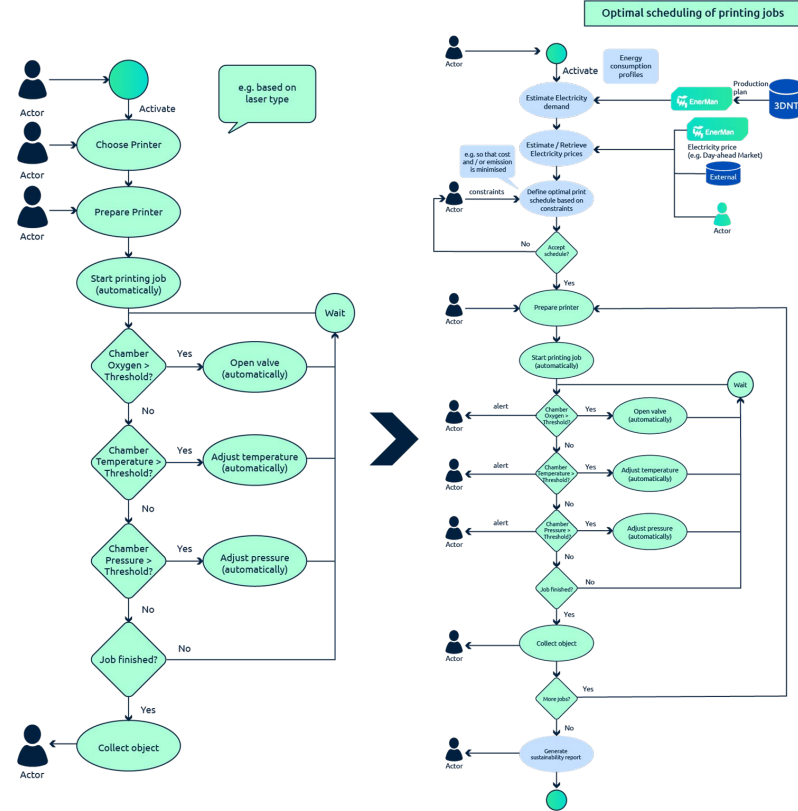
Evaluation information regarding the individual technologies that will be incorporated into the EnerMan framework. The information pertains to success/fail criteria and technical prerequisites

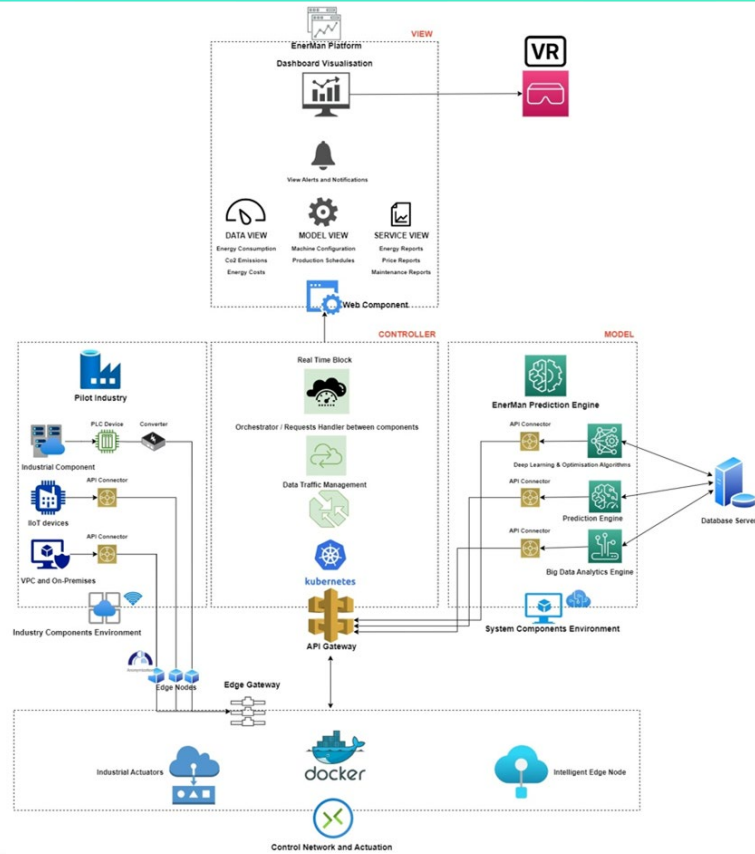
## Definition of Pilots' Proof-of-Concept Scenarios

Includes up-to-date information as to the use case scenarios that will be implemented for framework validation

## Definition of Trials' Goals

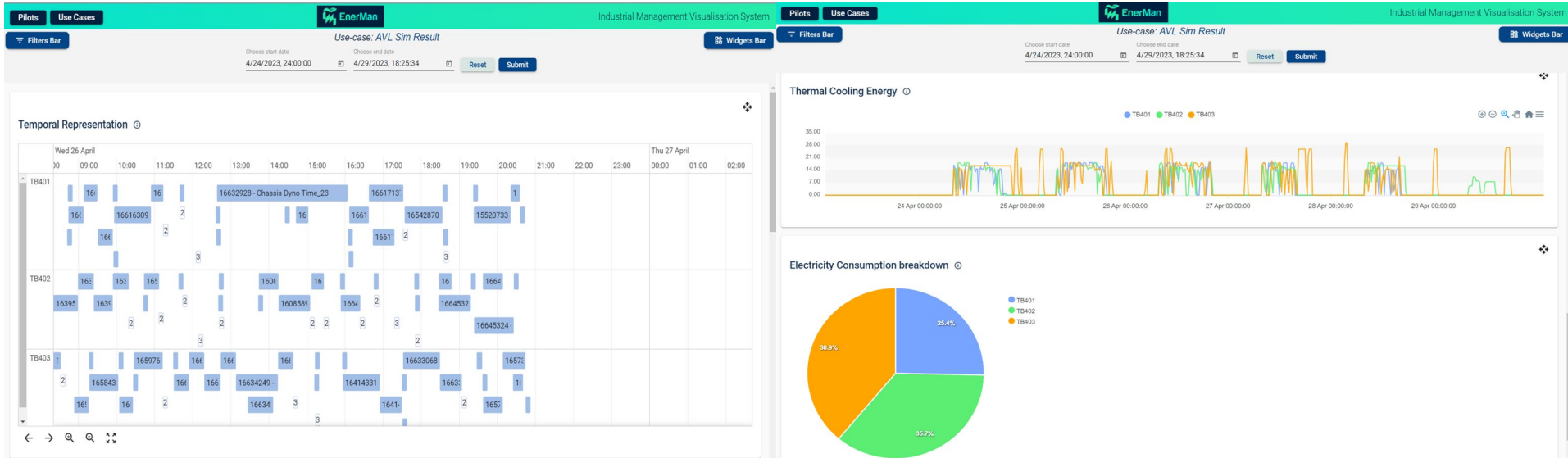
Summarises the high-level objectives KPIs for each pilot use-case.







# Simulation & Scheduling Aspect



## VR/xR toolbox

Using different VR/xR tools, users can receive:

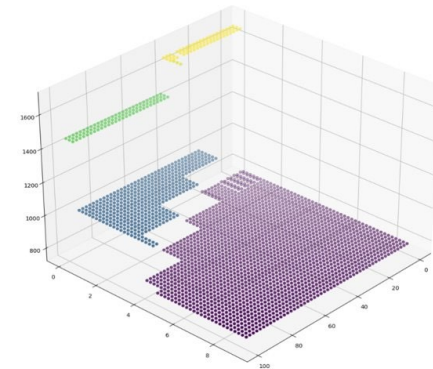
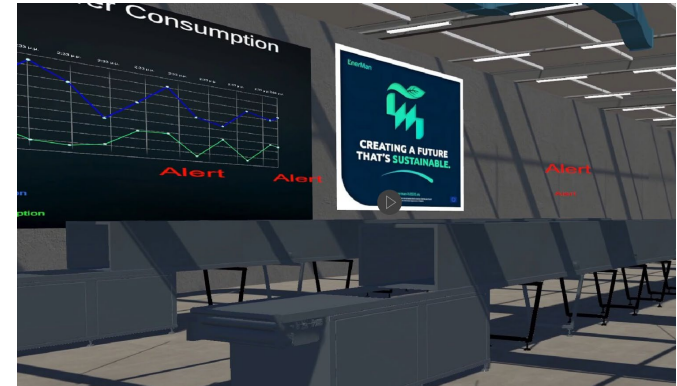
- a) information streams regarding the task underway,
- b) reminders regarding parallel or scheduled tasks,
- c) notifications and visual aids

## Intelligent Decision Support System

An ontology for the description as a knowledge graph of an industrial processes and its control component. Automated reasoning on the knowledge graph for optimizing the energy consumption of an industrial process through:

- i) control loop reconfiguration;
- ii) actuator operation optimization;
- iii) actuator replacement.

A task scheduling algorithm that optimizes the execution of tasks at the target process in an order that minimizes energy consumption. Scheduling is done using advance algorithms from constrain solving programming.



# Key Exploitable Results (KERs)

CPS-Based Industrial  
Data Collection System

**CPS**

Big Data  
Analytics Engine

**BDAE**

Intelligent Decision  
Support System

**IDSS**



**VF**

Virtual Factory

**SPE**

Simulation and  
Prediction Engine

**IMVS**

Industrial Management  
Visualization System

Subsystem/ Module

Input Variables



Output Variables



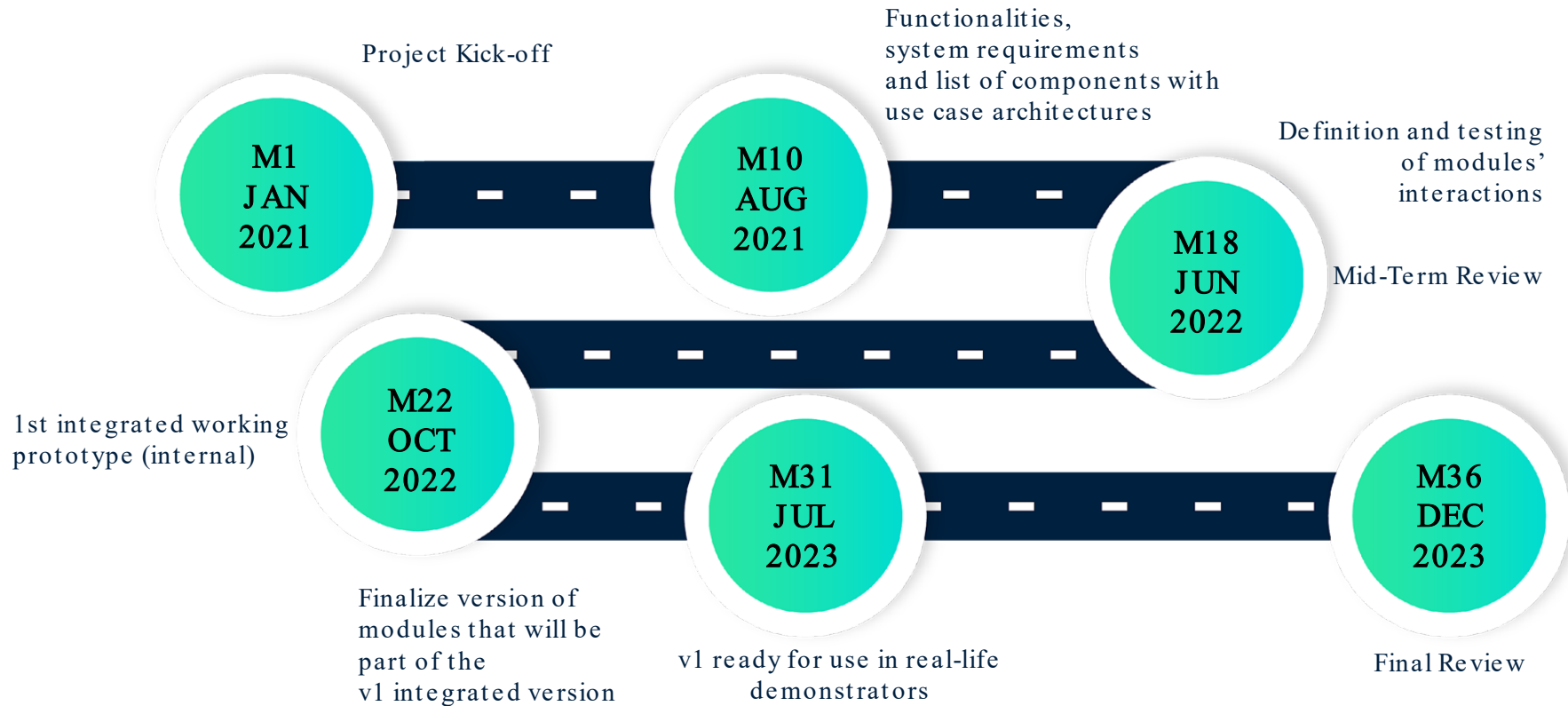
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# Timeline



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Thanks for your attention.



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