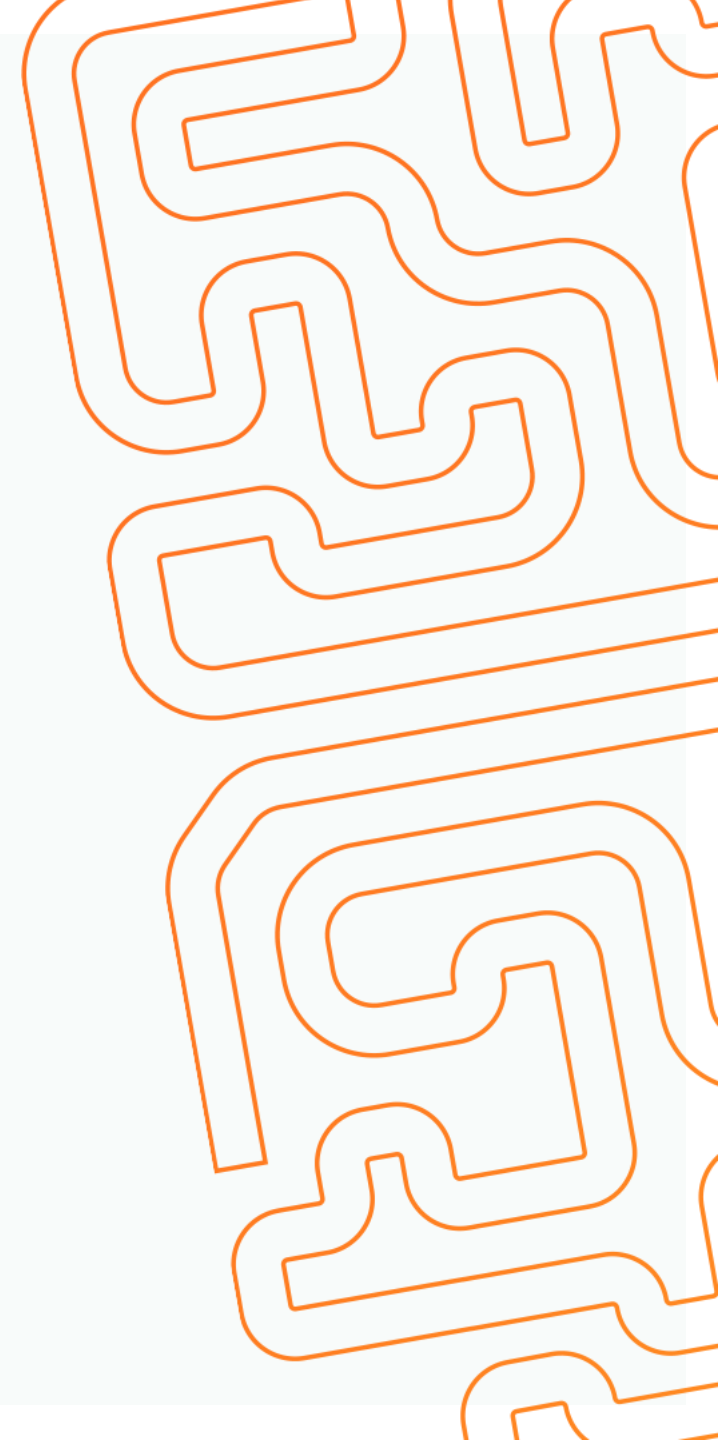




# Ecosystem that will shape the future of energy.

Presenter, title, topic, and other necessary info



# WISE

Wide &  
Intelligent  
Sustainable Energy

## 1 | The ecosystem in a nutshell

Introduction

## 2 | Work packages and opportunities

Wärtsilä R&D focus points

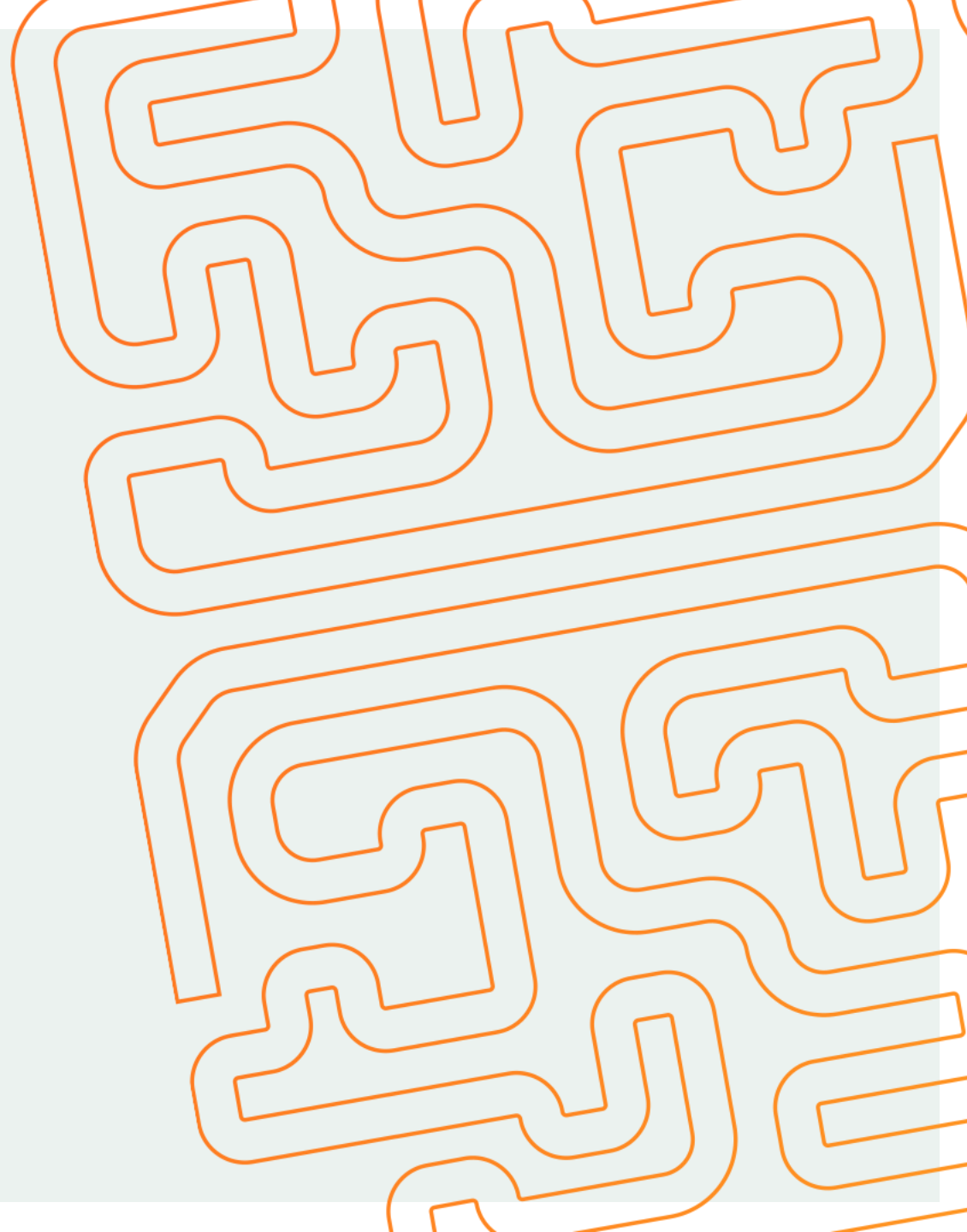
## 3 | Ecosystem and collaboration

Growing together



# The ecosystem in a nutshell

Introduction



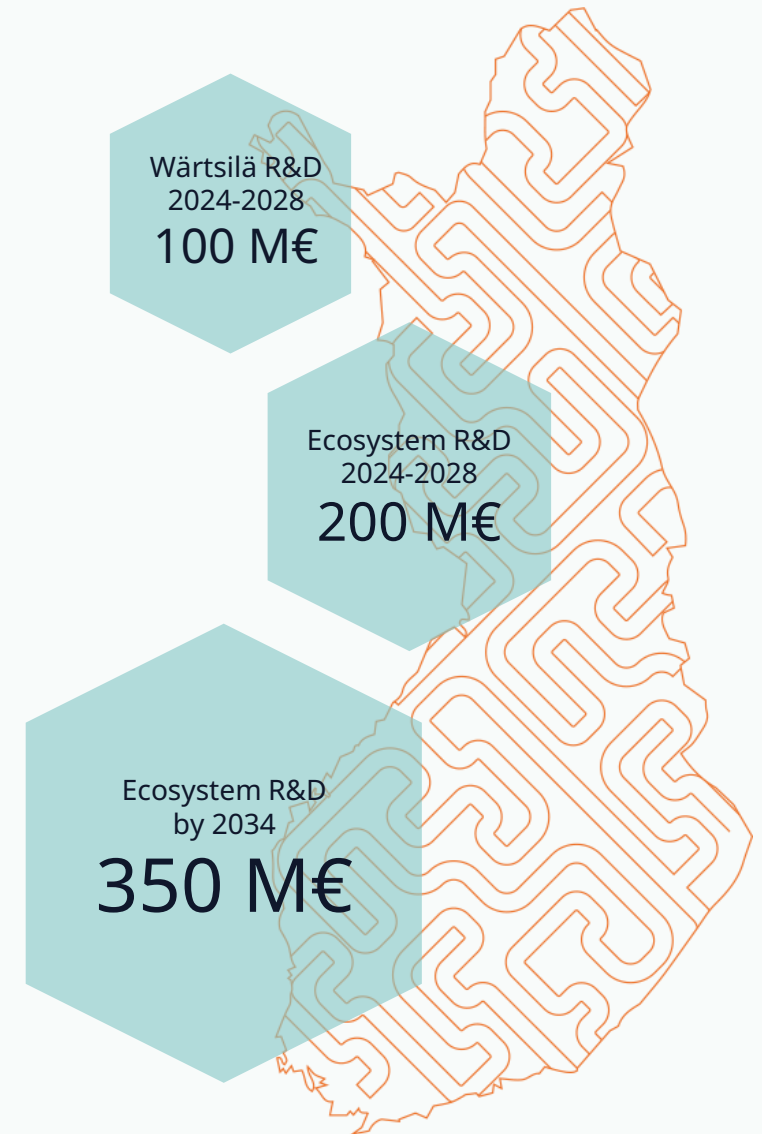
# Introduction

Wärtsilä and the Finnish industry are jointly investing **200 million euros** in autonomous zero-emission balancing energy production.

Our 50 million euro R&D project will enable a **350 million euro** R&D increase within our ecosystem.

The Wärtsilä-led Wide & Intelligent Sustainable Energy Ecosystem (WISE) is collaborating in the energy sector to enable **clean balancing energy** production concepts.

Our goal is to offer flexible autonomous power plant concepts with a **100% e-fuel** transition capability by the end of 2028.



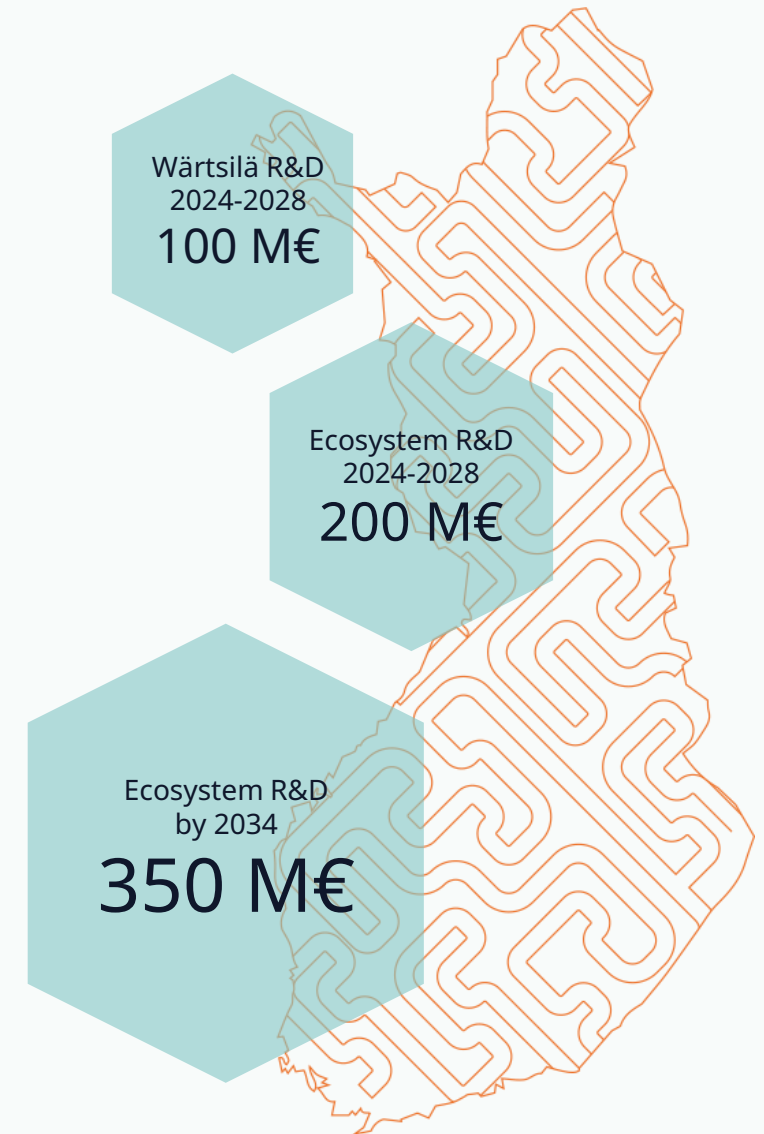
# Introduction

When bringing together the know-how of the industry and research, we have a unique opportunity to become the **leading powerhouse** for the energy transition.

The five-year WISE ecosystem is designed to strengthen the **Finnish energy sector** in becoming the leading energy innovation ecosystem in the world.

It is no longer a question of if we will make the journey, but when will we arrive at a **decarbonised** future.

It is designed to build scalable ecosystems and together introduce secure and autonomous **zero-emission** balancing energy production.

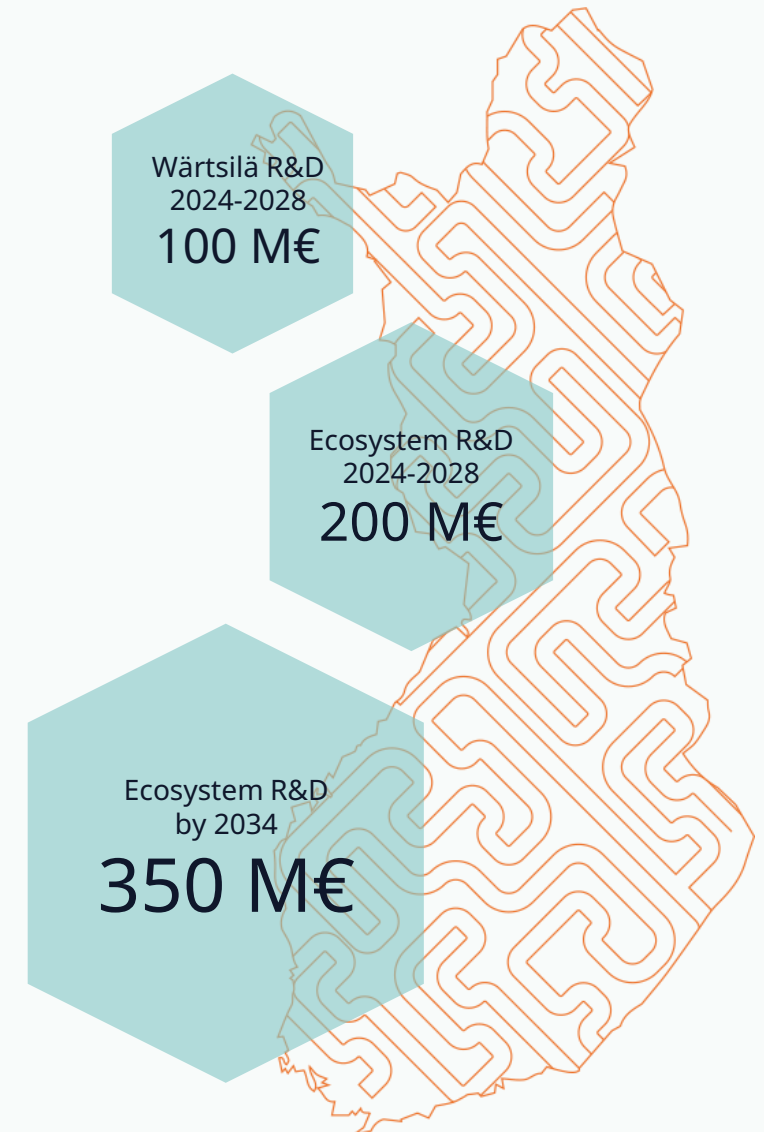


# Introduction

An **autonomously operated** balancing power generation system will be developed as a part of the entire **renewable power** generation and energy storage systems, including new service models for the new operating environment.

The key enablers, digital infrastructure, edge computing, energy management, and optimization are to be developed to work seamlessly together.

The ecosystem will evaluate commercial and delivery models and further technology options to create viable **business models**.





Towards autonomous zero emission balancing power

# R&D focus points and ecosystem opportunities

Data-driven maintenance and new services

Autonomous power plant

Clean energy production

Powertrain optimization

Digital infrastructure

## End-to-end digitalization

- Digital twins and advanced process controls
- Predictive maintenance
- Value-chain integration
- Connectivity solutions

## Energy advancement

- Renewable intermittent & thermal power production
- Sustainable fuels production
- Energy storage and recycling
- Technology suppliers for autonomous plants

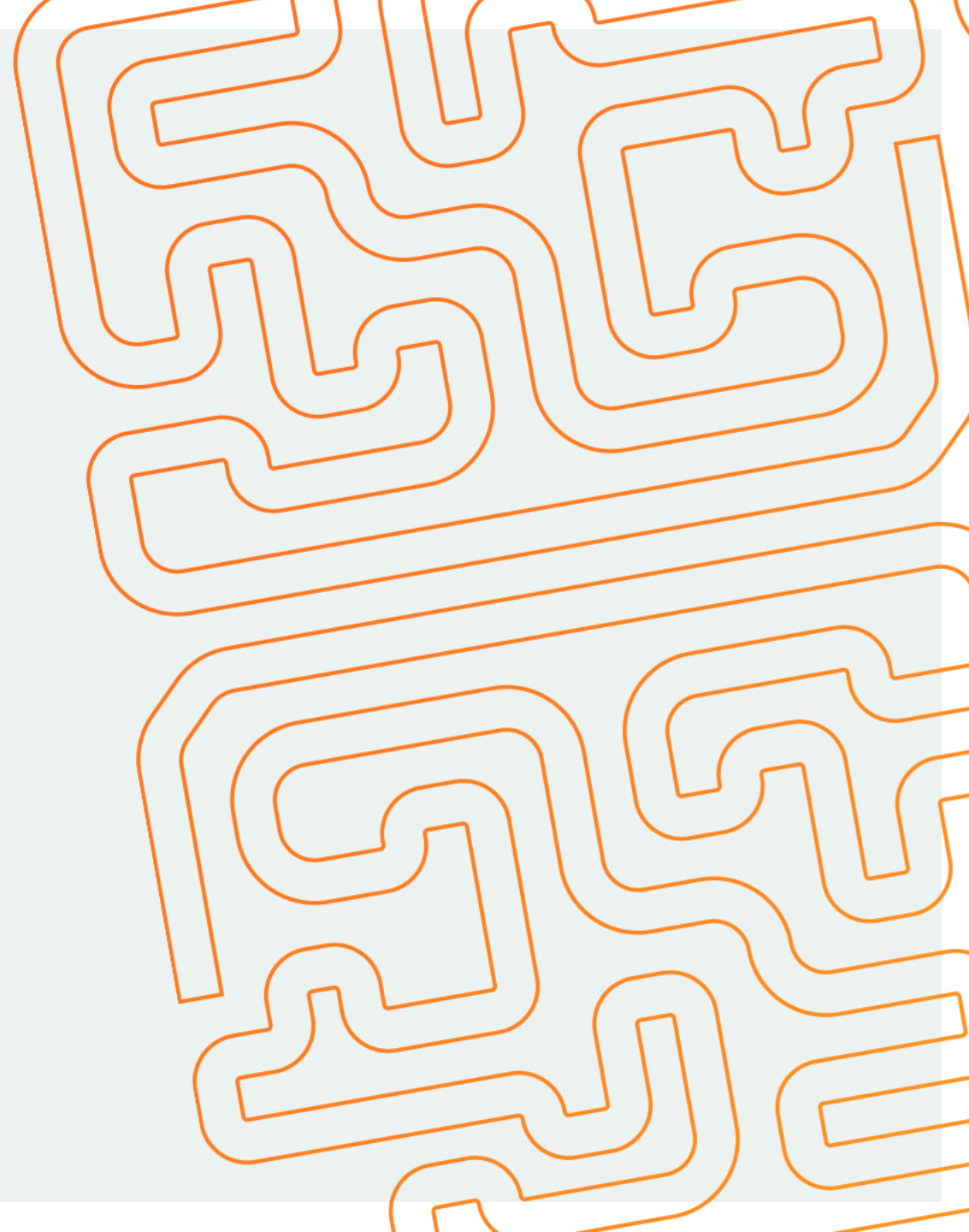
## Service operational excellence

- New recyclable materials
- Longer material lifecycles
- Continuous lifetime learning
- Safety advancements



# Work packages and opportunities

Wärtsilä R&D focus points



# WP 1A – Autonomous power plant

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## **Scope:**

Research and development of technical capabilities that enable autonomous power plant operation

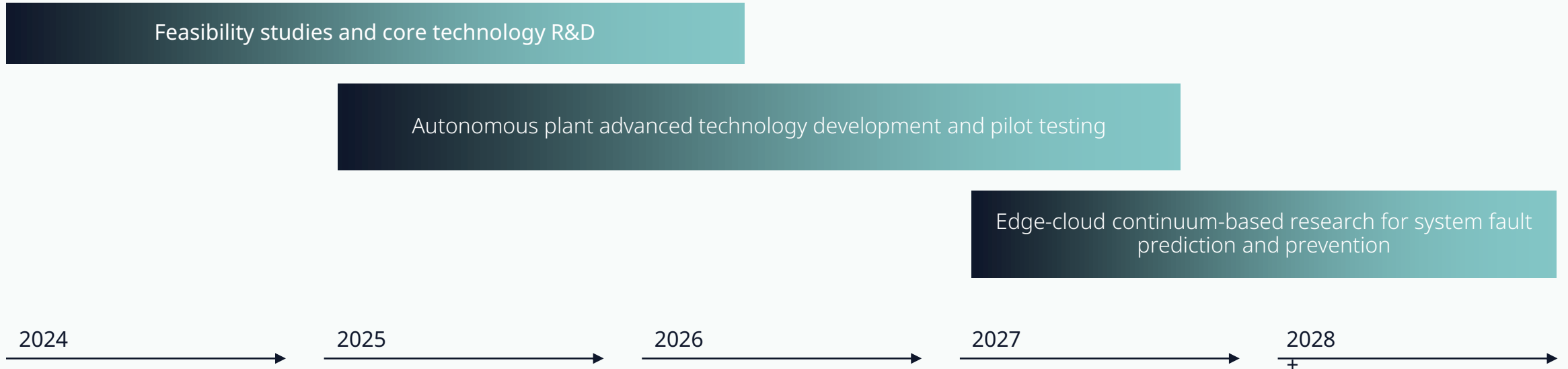
## **Impact on WISE mission:**


Enable autonomous operation in power plants through digital, automation and engine technologies.

- Cyber secure and reliable remote operation and monitoring 24/7
- Research and development of generating set and auxiliary sub-systems for autonomous operation
- Prognostic insights of a power plant by IoT data utilization and digital technologies



# WP 1A – Autonomous power plant



 = Dark estimates Wärtsilä's effort and light estimates the ecosystem effort over the period

**1st year:**  
Research and feasibility study of generating set and auxiliary sub-systems for autonomous operation, development of core digital and connectivity solution

**2nd and 3rd year:**  
Technology development of key areas enabling autonomous operation; energy management, plant automation, generating set, auxiliaries, digital twins. Power systems stability research and testing.

**4th year:**  
Edge-cloud continuum-based research for on-site generating set and auxiliary fault prediction and prevention

# WP 1B – Clean energy production

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## **Scope:**

Develop carbon neutral/e-fuel engine power plant solutions

## **Impact on WISE mission:**

Enable carbon neutral/e-fuel based power plants

- Design safe green e-fuel powerplant concepts
- Test and validate green e-fuel proof-of-concept demos
- Integrate e-fuel production value chain and autonomous features.



# WP 1B – Clean energy production


Intermittent clean power & clean thermal power production concepts

Research green e-fuels, material sciences research, integration of autonomous operation principles and safety and develop proof-of-concept demo

Simulate and develop sector-coupling, demand-side response and research of green e-fuel production and co-location potential

Research of advanced combustion concepts such as hydrogen-argon cycle and associated technologies, define requirements and architecture, develop prototypes and test



 = Dark estimates Wärtsilä's effort and light estimates the ecosystem effort over the period

**1st year:**  
Hydrogen concept

**2nd year:**  
Hydrogen pilot

**3rd year:**  
Ammonia and Fuel cell concept

**4th year:**  
Ammonia and Fuel cell pilots

## WP 2 – Power train optimization

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### **Scope:**

Develop software and hardware solutions that can optimize and support the operation of complex powertrains and power plants and are available both off-line (Edge) and on-line (Cloud).

### **Impact on WISE mission:**

Being able to optimize system and operation to achieve more significant emission reduction and to perform more efficient operation on site. Be at the forefront of technologies and digital solutions for the Marine and Energy segments.

- To develop software and hardware solutions to support the operation of the powertrain and plant for optimal efficiency in terms of installation, commissioning, operability, maintenance, fuel consumption, environmental footprint and emissions




# WP 2 – Power train optimization

Develop digital twin & system integration

Develop Next-generation Energy Management System



 = Dark estimates Wärtsilä's effort and light estimates the ecosystem effort over the period

**1st year:**  
Concept development  
for the power train.

**2nd year:**  
Digital Twin  
development for the  
power train.

**3rd year:**  
Detailed alternative  
solution for the power  
train development

**4th year:**  
Implementation of the  
MVP of the concept  
and validation of the  
digital twin.

**5th year:**  
Validation in  
laboratory and/or with  
customer.

**6th year:**  
Industrialisation of the  
product.

## WP 3 – Digital Infrastructure

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### **Scope:**

Build the underlying digital infrastructure that would make possible the lifecycle and digital products of tomorrow. We refer to this infrastructure as the Edge platform.

### **Impact on WISE mission:**

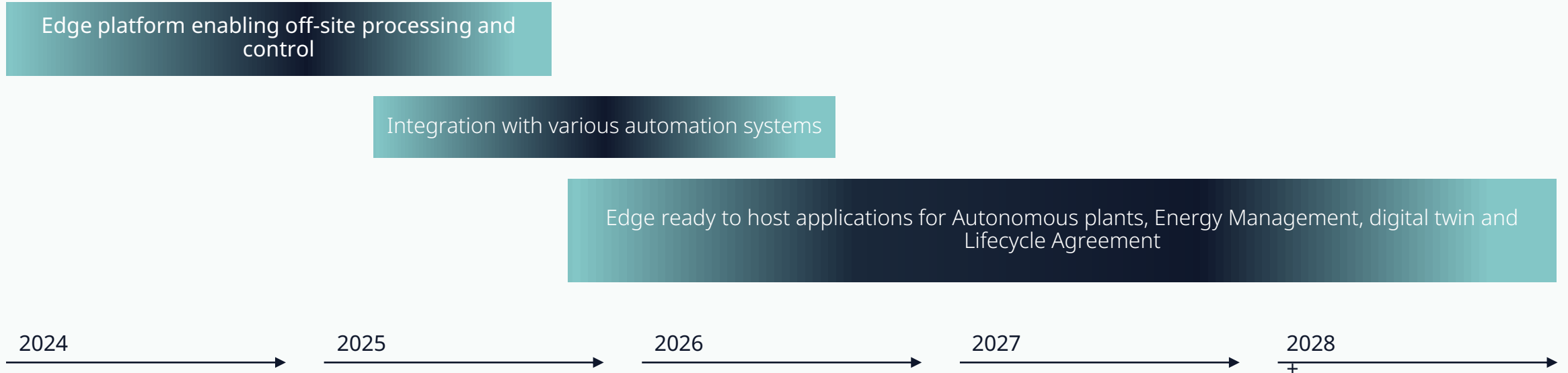
Provide the digital enabler for multiple future Energy initiatives revolving around efficiency, decarbonisation and autonomy that require on-site capabilities.


- Research and develop an integrated connectivity and analytic platform, enabling all business units to host digital services & offerings towards our customer base, e.g. Autonomous Balancing Power Plant, Energy Management & Optimization, Voyage Optimization, etc.





# WP 3 – Digital Infrastructure



 = Dark estimates Wärtsilä's effort and light estimates the ecosystem effort over the period

**1st year:**  
Collect & study business use cases, technical requirements and capabilities

**2nd year:**  
Develop all missing capabilities on top of a selected off-the-shelf Edge solution

**3rd year:**  
Embed MLOps to support AI/ML onsite. Research & development transforming the Edge platform from a connectivity platform into an analytics platform

**4th year:**  
Edge-cloud continuum-based research

## WP 4 – Data driven maintenance and new services

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### **Scope:**

Research and develop new services utilizing technologies that understand and predict power plant equipment health and useful remaining lifetime.

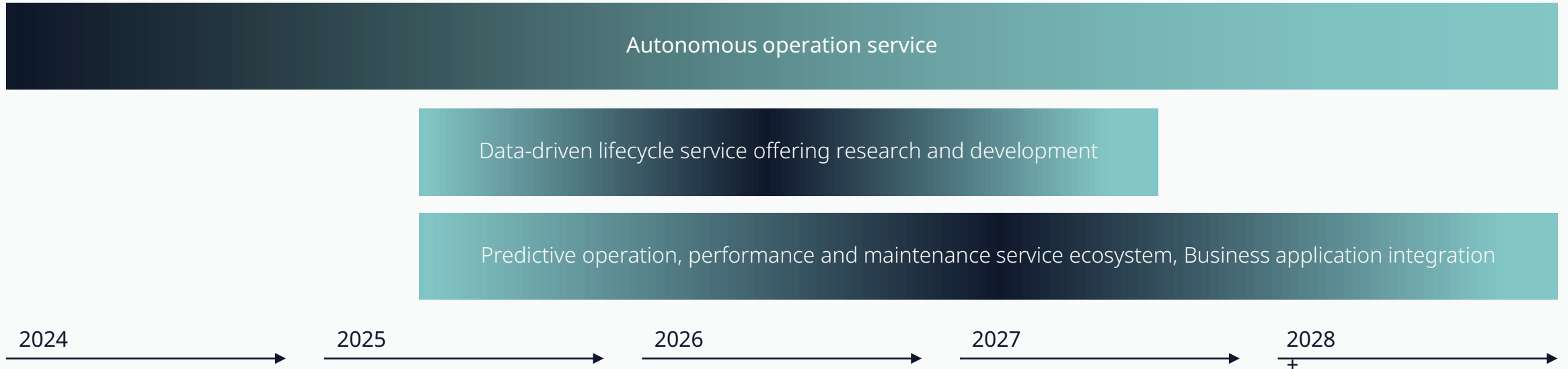
### **Impact on WISE mission:**


Enable autonomous operations by increasing predictability and reliability targeting zero forced outage.

- Identify and fill the gaps in how we remotely monitor, analyze and operate installations
- Enable autonomous operations through holistic power plant condition understanding
- Enable predictive operation, performance and maintenance service ecosystem



# WP 4 – Data driven maintenance and new services



 = Dark estimates Wärtsilä's effort and light estimates the ecosystem effort over the period

**1st year:**  
Standardised critical monitoring points

**2nd year:**  
Automated diagnostics and real-time alerts

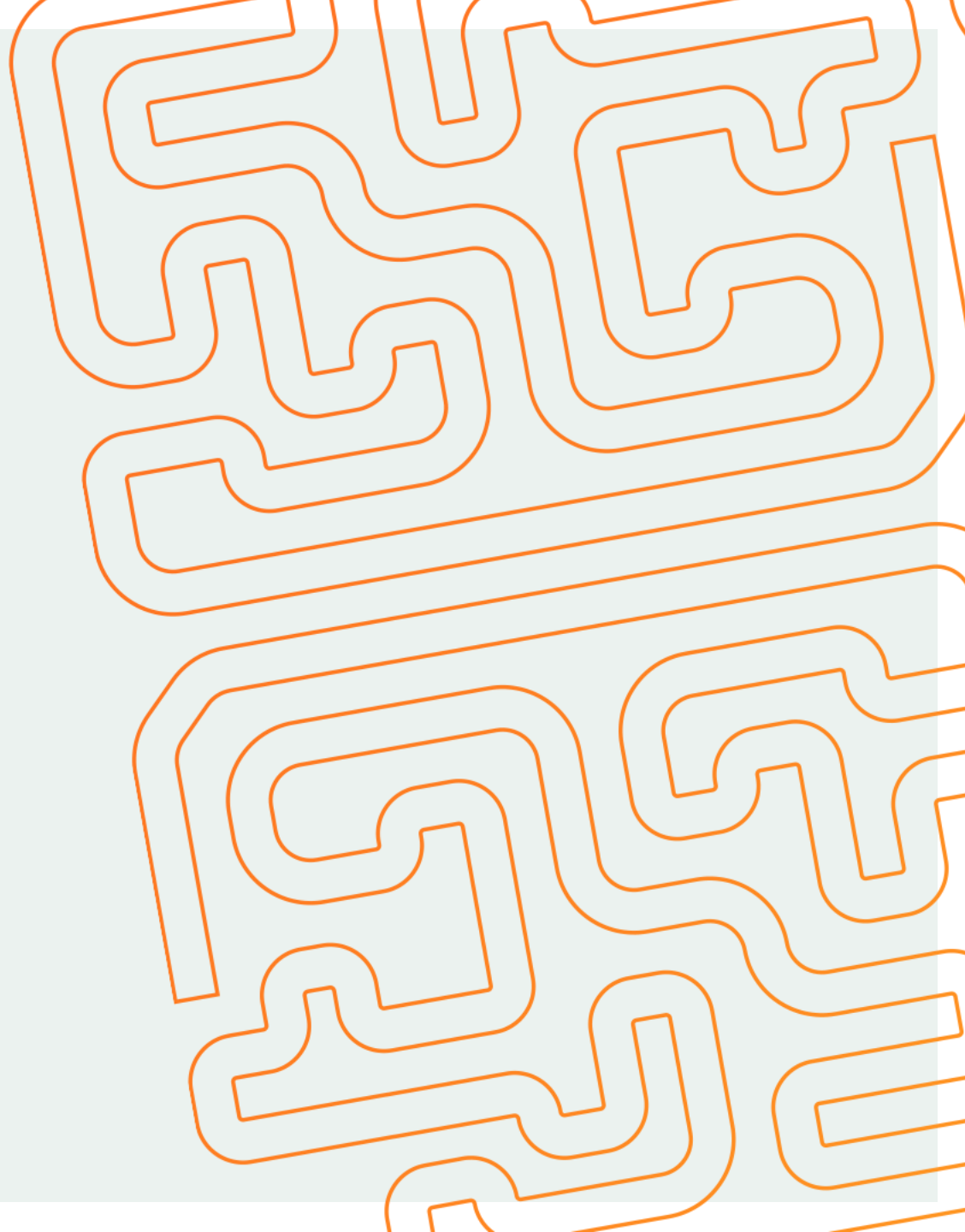
**3rd year:**  
Fault prediction and remaining useful lifetime

**4th year:**  
Autonomous operations pilot

WISE / Name / Title

# Ecosystem and collaboration

Growing together



# Ecosystem deliverables

## Venture collaboration

WISE targets to support the ventures in the ecosystem by:

- Conducting Proof of Concept (POC) project e.g., a demo or feasibility studies
- Sharing expert insights e.g., industry and R&D knowhow
- Creating compelling use and business cases

## Events and communication

WISE will create awareness, facilitate match-making and build thought leadership:

- Actively meeting with ecosystem members and creating new links between them
- Arranging theme-related workshops, ecosystem events and webinars
- Co-operating and coordinating initiatives with other ecosystems e.g., other Business Finland Veturi ecosystems

## R&D focus points

WISE offers R&D, partnership, and academic research opportunities together with Wärtsilä and the ecosystem:

- Targeting to enable end-to-end digitalization, energy advancement, and operational excellence
- Wärtsilä offers Partner Campus facilities i.e., office spaces and ProtoZone (garages) for shared projects

# Why should you join the ecosystem?

1 **Partnering**  
Finding innovation and collaboration partners – incl. access to exclusive member events

4 **Sparring**  
Sharing thoughts and ideas with those who share the same vision for a decarbonised future

2 **Business**  
Finding new business opportunities

5 **Funding**  
Connection to the Business Finland Veturi ecosystem funding scheme

3 **Cooperation**  
Cross-discipline and end-to-end value chain cooperation

6 **Go-to-market**  
Being a part of a large-scale go-to-market vehicle

# Why should non-Finnish members join the ecosystem?

- 1 Partnering**  
Networking and collaborating with the Finnish innovation value chains
- 2 Visibility**  
Gaining overall visibility of and to the Finnish R&D landscape
- 3 Cooperation**  
Cross-discipline and end-to-end value chain cooperation
- 4 Insights**  
Better insights and connections to existing and upcoming project
- 5 Sparring**  
Sharing thoughts and ideas with those who share the same vision for a decarbonised future
- 6 Go-to-market**  
Being a part of a large-scale go-to-market vehicle

**WISE** Wide & Intelligent Sustainable Energy

# Join the WISE ecosystem today!

