CELTIC-NEXT
Proposers Brokerage Day

25th September 2026,
IMEC
in Leuven, Belgium

Pitch of the Project Proposal

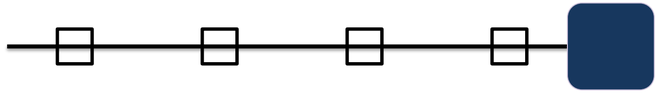
PHI-EDGE

Physics-Informed Edge Intelligence for Industrial IoT

Physics-informed optimisation on top of existing factory IoT and edge infrastructure

physical process signals

EntroMetrix



physics-informed optimisation layer

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Teaser

Main benefit	Factory-wide energy, material and throughput optimisation from industrial IoT data
Added value	Combine edge intelligence, interoperable industrial data and first principles physics with machine learning
Why join	Validate physics informed optimisation on real production lines and build the ICT pathway that takes it to market

CONNECT

Existing sensor, meter, SCADA, MES and energy data, connected once and kept in place

UNDERSTAND

Physics informed models describe how the process actually behaves, from heat and mass balances to equipment limits

OPTIMISE

Recommended operating conditions across production, energy, materials and asset performance

Organisation Profile

EntroMetrix

- Industrial optimisation company developed by engineers and researchers from the University of Cambridge and Imperial College London
- An engineering team spanning first principles process modelling, industrial systems and machine learning
- Physics informed models combine process conditions, kinetics, equilibrium, thermodynamics, physical constraints with machine learning to optimise complex industrial processes
- TRL 7 technology validated in operational industrial environments, patent pending
- More than £1m in UK Government funding and recognition through major international innovation awards

Development stage and industrial deployments

TRL 7

validated in operational environments

Manufacturing partners

5 UK + 2 global manufacturing sites

Textiles

energy and process optimisation on production lines

Oil and gas

downstream energy-intensive assets, pilot phase

Proposal Introduction

Physics-informed AI unlocking optimisation opportunities traditional models

The manufacturer's problem

Manufacturers have sensors, meters and SCADA, but still rely on manual interpretation and bespoke integration

Factory data is fragmented across sensors, PLCs, SCADA, historians, MES and ERP, with different protocols and sampling rates

Conventional machine learning finds correlations but does not understand physical operating constraints

What PHI-EDGE will build

Physics informed optimisation layer

Engineering physics

Heat balance $Q = \dot{m}\, c_p\, \Delta T$

Mass balance $\Sigma\, \dot{m}_{in} = \Sigma\, \dot{m}_{out}$

Physics constraints, equipment limits and product specification

Hybrid model

Engineering equations constrain machine learning trained on plant data streams

Physically consistent outputs from sparse, fragmented industrial data

Optimisation

Recommended operating conditions

Energy, materials, throughput and asset performance

operating set-points

Industrial IoT, edge and secure connectivity

Interoperability OPC UA, MQTT, historian, MES, ERP

Edge processing normalisation, features, local inference

Secure connectivity Ethernet, Wi-Fi, private 5G where appropriate

industrial data

Physical factory machines, processes, sensors, meters, PLCs

Proposal Introduction

From connected factory data to trusted optimisation

Expected project outcomes

- Interoperable Industrial IoT architecture connecting the factory systems manufacturers already run
- Distributed edge-to-cloud infrastructure for model inference and optimisation close to the plant
- Physics-informed models operating continuously over live industrial data streams
- Multi-site validation with manufacturers in at least three Eureka countries, showing the architecture transfers across industries

Demonstrated industrial impact

8-12% reduction in industrial energy intensity

up to 9% improvement in production throughput

up to 8% reduction in material and stock waste

Programme 36 months

Months 1-6
Architecture and requirements

Months 7–
Industrial IoT and edge infrastructure

Months 16–27
Physics-informed model integration and deployments

Months 28–33
Multi-site validation and interoperability

Months 34–36
Exploitation and standardisation

Partners

Manufacturers

We are looking for manufacturers with existing sensor, SCADA, MES, ERP or energy data and a clear optimisation challenge around energy, materials, throughput or asset performance.

What manufacturers gain

Optimisation on top of existing SCADA, MES and ERP, with validated energy, material and throughput gains on their own lines

UK manufacturing access already in place through existing EntroMetrix projects

Industrial IoT companies

Role Gateways, industrial protocols, device management and data acquisition from existing equipment

We need The interoperable path from factory equipment into the optimisation layer

Edge computing partners

Role Industrial edge runtime, distributed inference and edge-cloud orchestration

We need Deciding which models operate on the plant floor and which operate centrally

Research institutes

Role Industrial communications, interoperability, edge computing and distributed systems research

We need Scientific validation and advanced ICT research beyond the existing technology

Seeking partners from Belgium Finland Germany Spain Türkiye France

Contact Info

For more information and for interest to participate please contact:

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Seeking manufacturers and research partners

Presentation is available via

EntroMetrix