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octave
.energy

# Octave x Ipalle Project

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1. **Status Update**
2. **R&D Project**

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# About Octave

## Our Team


Jonas


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Loïc


Kelly


Abdul


Julien


Justin


Pieter


Melina

## Our Milestones

**+44**
MWh
battery fleet

**+25**
MW
flex assets

**89**
Tons of battery
reused

**2529**
Tons of
$CO_2$ avoided

## Our Investors

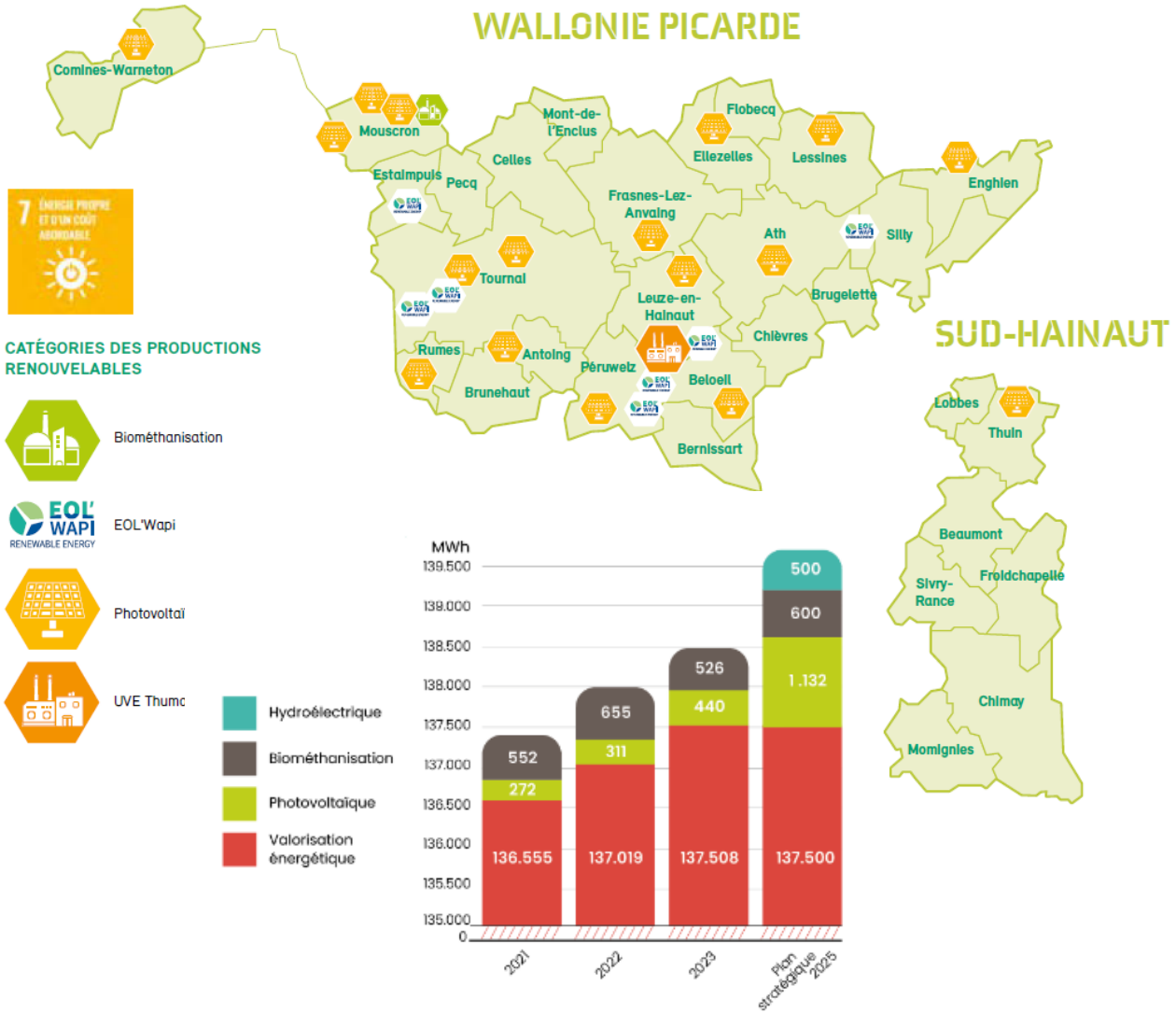
European Innovation Council

SPDG Ventures

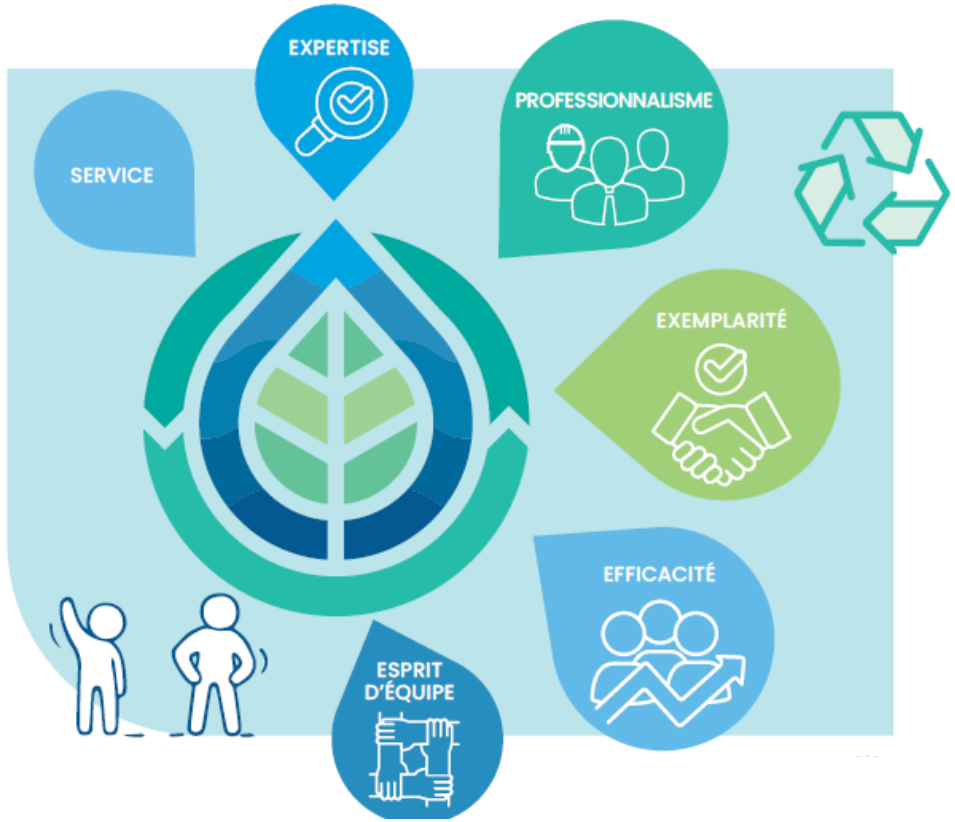
imec istart

# About Ipalle

## Mission & Climate transition




**Contribute to the sustainable development of the territory by offering integrated, effective, and efficient services.**

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# About Ipalle

## Circular Economy

LES CHIFFRES **CLÉS 2023**

- **Déchets Organiques :**
  **4.781** tonnes
- **Déchet valorisé** (matière) :
  **121.025** tonnes
  **297** kg/hab
- **Déchets Résiduels :**
  **55.723** tonnes
  **137** kg/hab
- **Prévention :**
  **5.569** personnes sensibilisées
  **69** séances infos écoles
  **346.986** gobelets loués
- **Réemploi :**
  **1.180** tonnes de biens réutilisables remis en circulation


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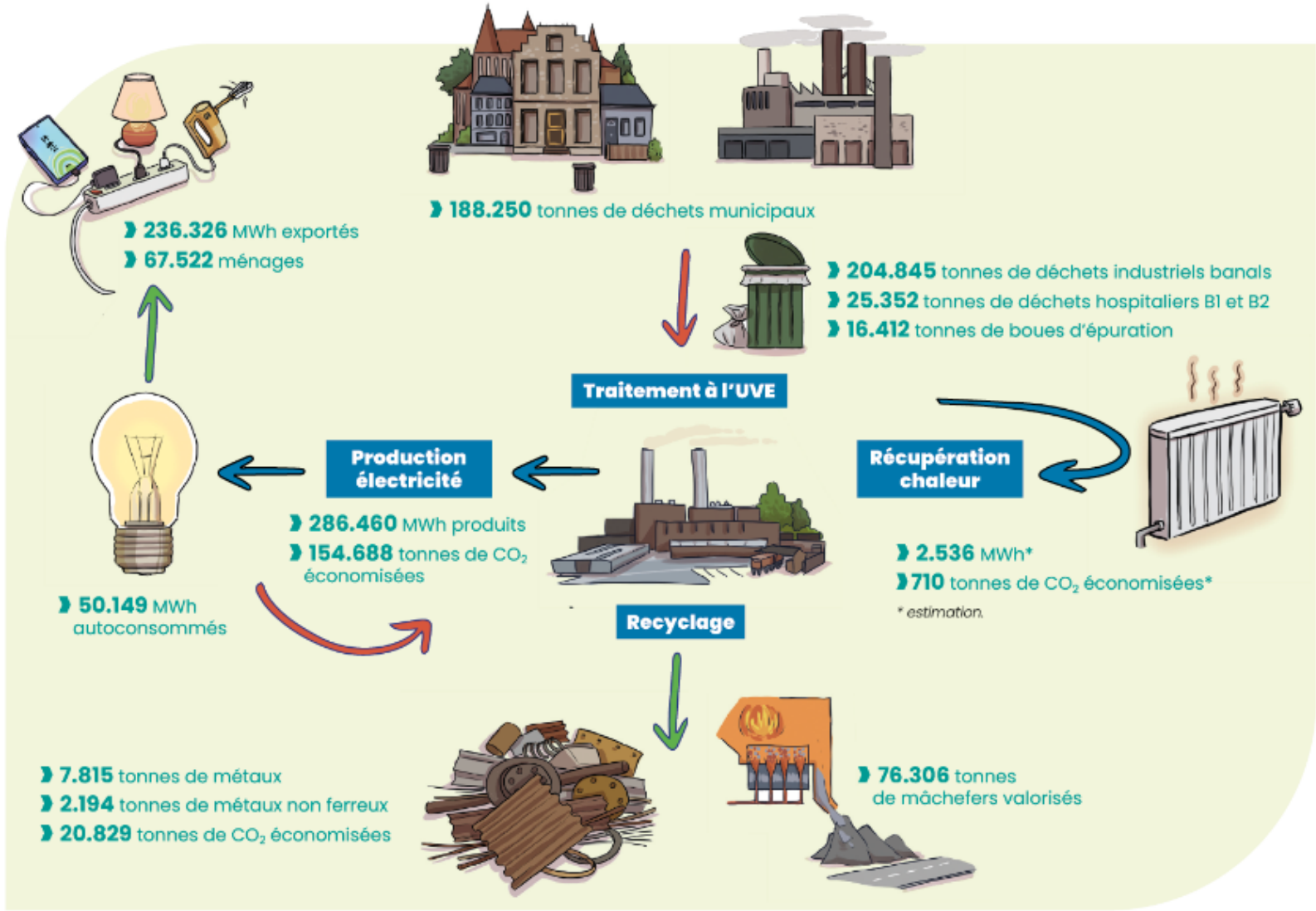
# About Ipalle

## Circular Economy



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2nd life NMC BESS

# Why Second Life?

## Environmental

**Avoid energy** and **water** use associated with **production** of **new batteries**

## Strategic

**Reduce reliance** on strategic **materials** mined **outside of EU**

## Regulatory

**EU Battery Regulation** framework for reuse EU 2023/1542

## Technical

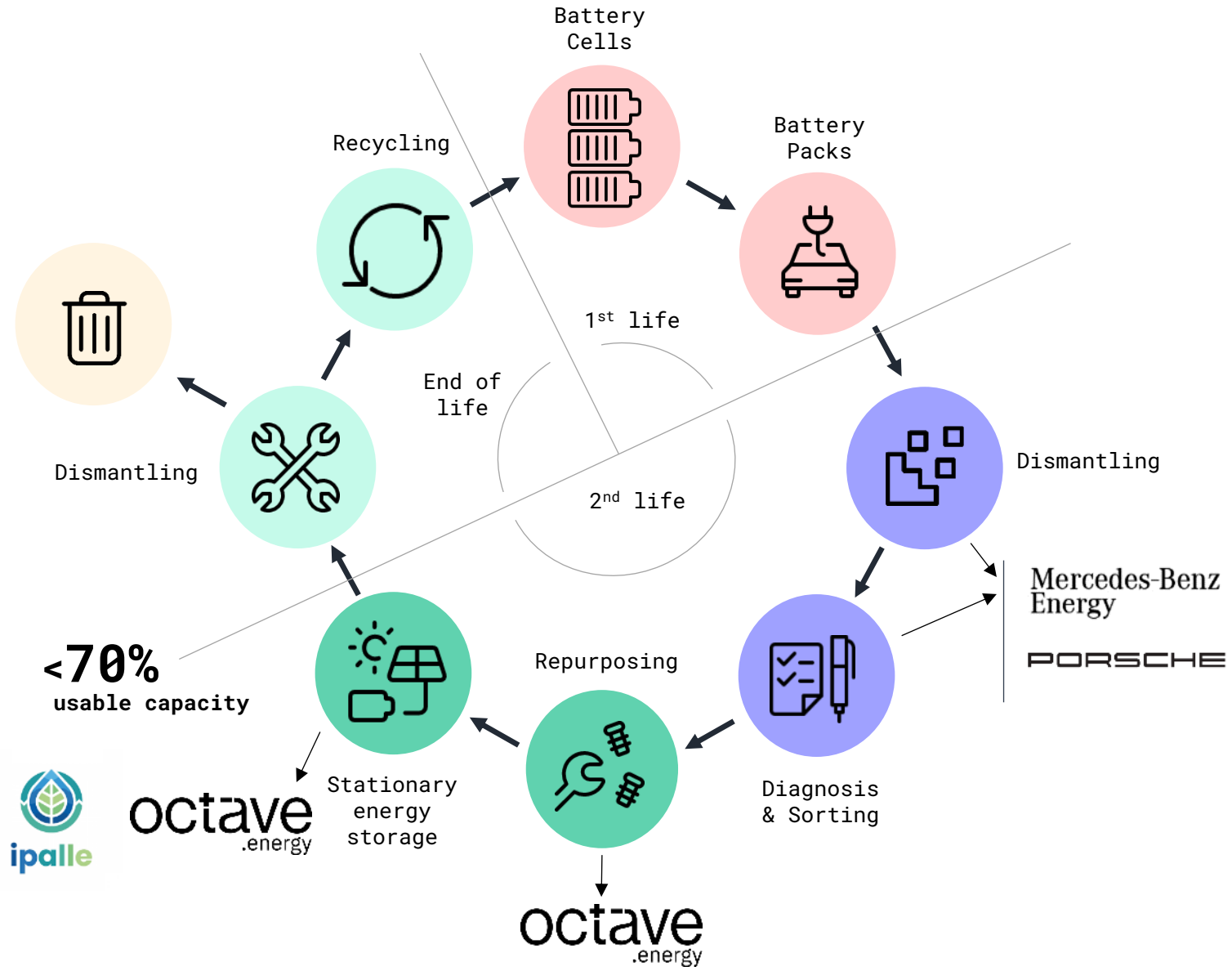
Leverage the **differences** in **requirements** for batteries in **automotive** vs. **stationary** applications

BACK to Octave Solution

**Octave Circular**
2nd life NMC BESS

# Towards a Sustainable Battery Lifecycle

- **Engage in a circular economy** by giving a second-life to batteries from EVs
- **Deploy batteries** for stationary applications to provide the grid with flexibility




- First life
- Dismantling & sorting
- **Second life**
- Recycling process
- Waste process

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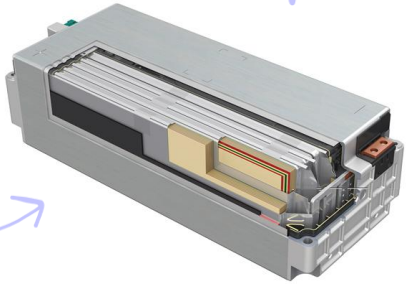
# Technology of Octave Circular

Mercedes-Benz Energy PORSCHE

**Battery pack**
containing modules



**Battery module**
containing cells


**Integrated Master Battery & Energy Management System**
(patent submitted)

**Octave Battery Cabinet**


**Octave Battery Cloud**

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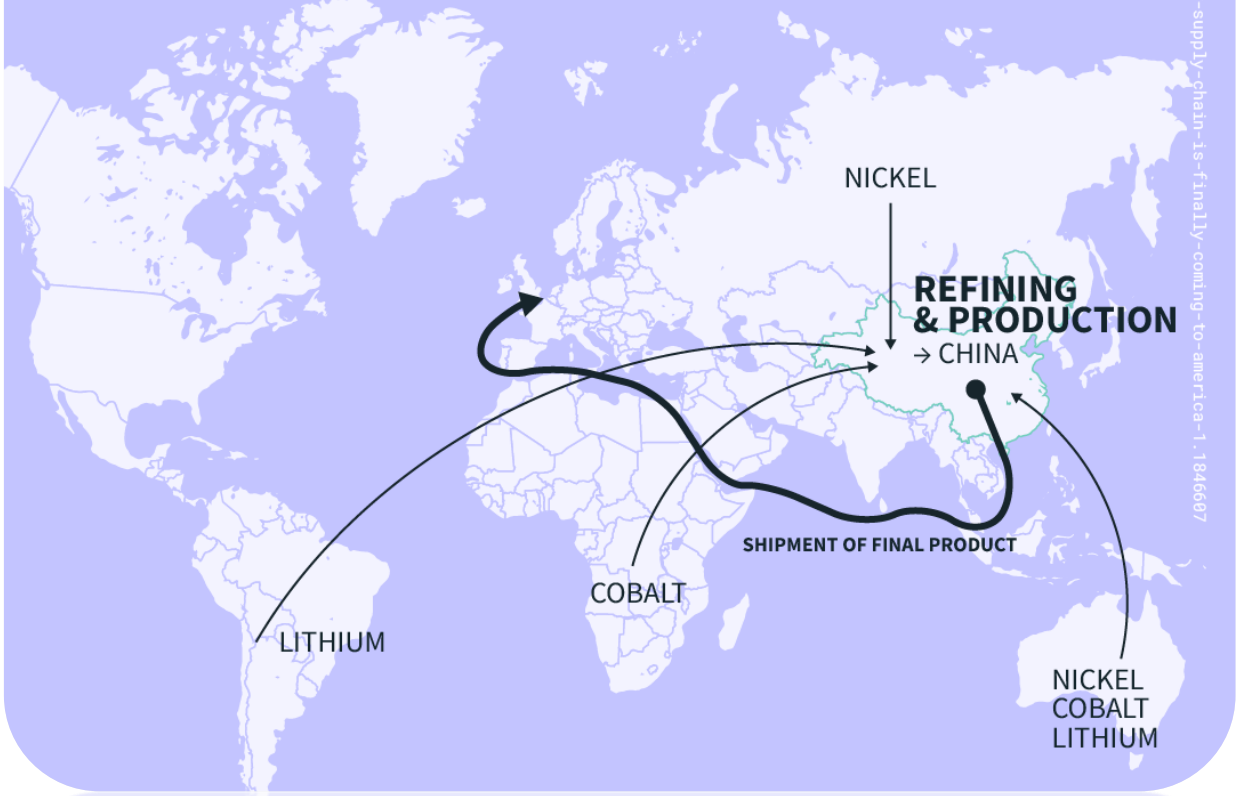
# Local supply chain

Environmental Strategic

## From a global 80 000 km battery supply chain...

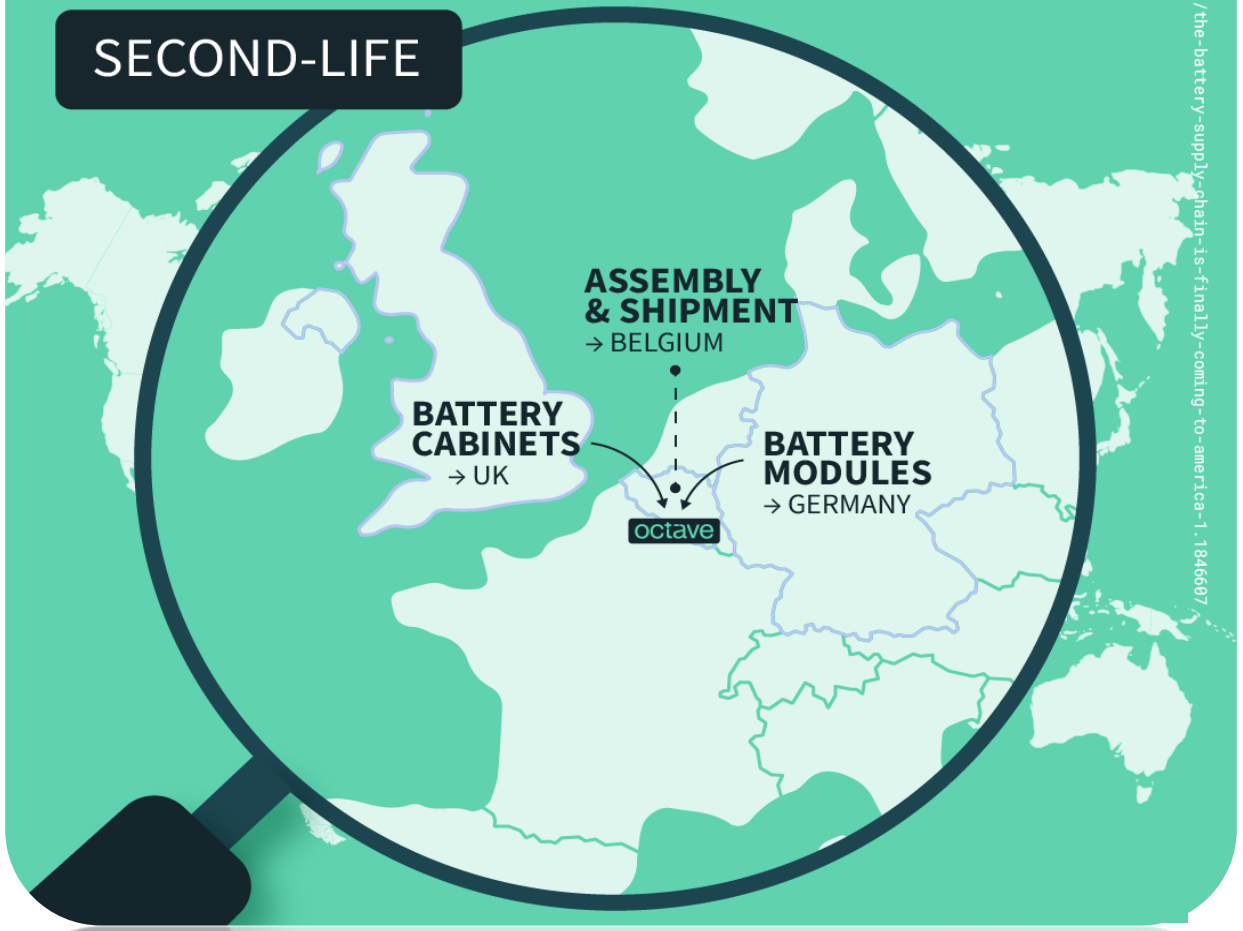
FIRST-LIFE




bnnbloomberg.ca/the-battery-supply-chain-is-finally-coming-to-america-1.1846607

## ...to a local European battery value chain.

SECOND-LIFE




bnnbloomberg.ca/the-battery-supply-chain-is-finally-coming-to-america-1.1846607

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# EU Battery Regulation Framework

Regulatory

Strategic

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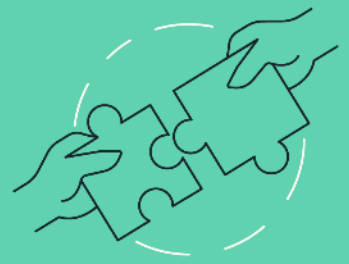
## EU Batteries Regulation
Towards a sustainable, circular battery supply chain

European Commission

ARTICLE 14

**Information on the state of health and expected lifetime of batteries**
Obligation for automotive OEMs to give (battery remanufacturers) access to BMS data

ARTICLE 56

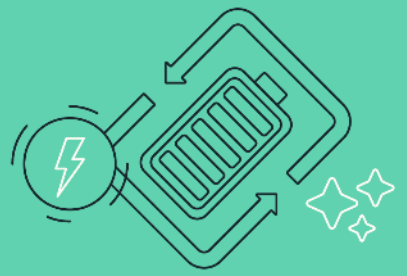


**Extended Producer Responsibility**
Shared producer responsibility for first life and second life battery suppliers (e.g. recycling cost)

ARTICLE 77 & 78

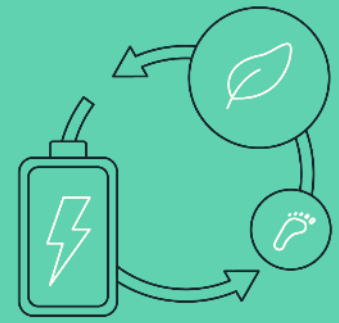
**Battery Passport**
Electronic record to track the entire lifecycle of the battery

ARTICLE 73



**Preparation for re-use**
Batteries prepared for second life purpose are not seen anymore as waste, but as a product

ARTICLE 7



**Carbon footprint**
The carbon footprint of the battery differentiated according to life cycle stage

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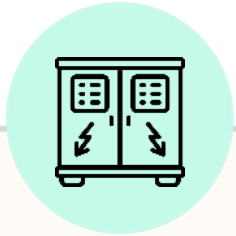
# Technical differences in specifications

Technical



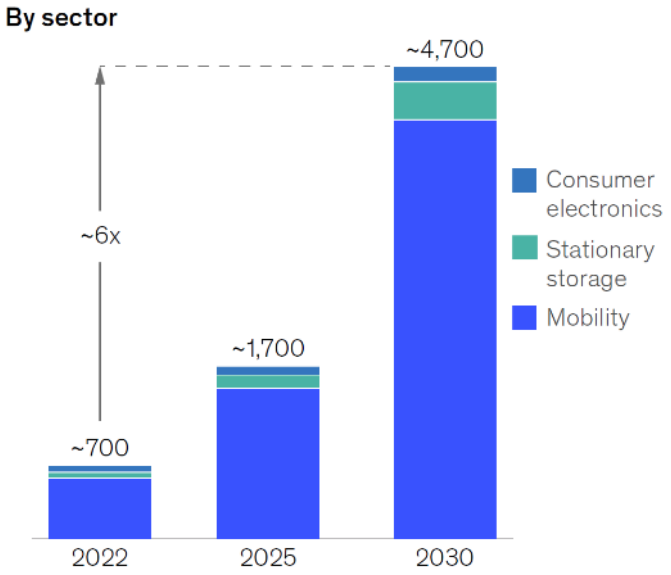
| | | |
|---|---|---|
| **Temperature** | -20°C to +50 °C | +15°C to +30 °C |
| **Power** | High peak power | No high peak power |
| **Weight & Space** | High energy density and specific energy | Less critical |

# Boom of e-mobility

- **Sales** of **ICE vehicles banned** in the European Union as of 2035

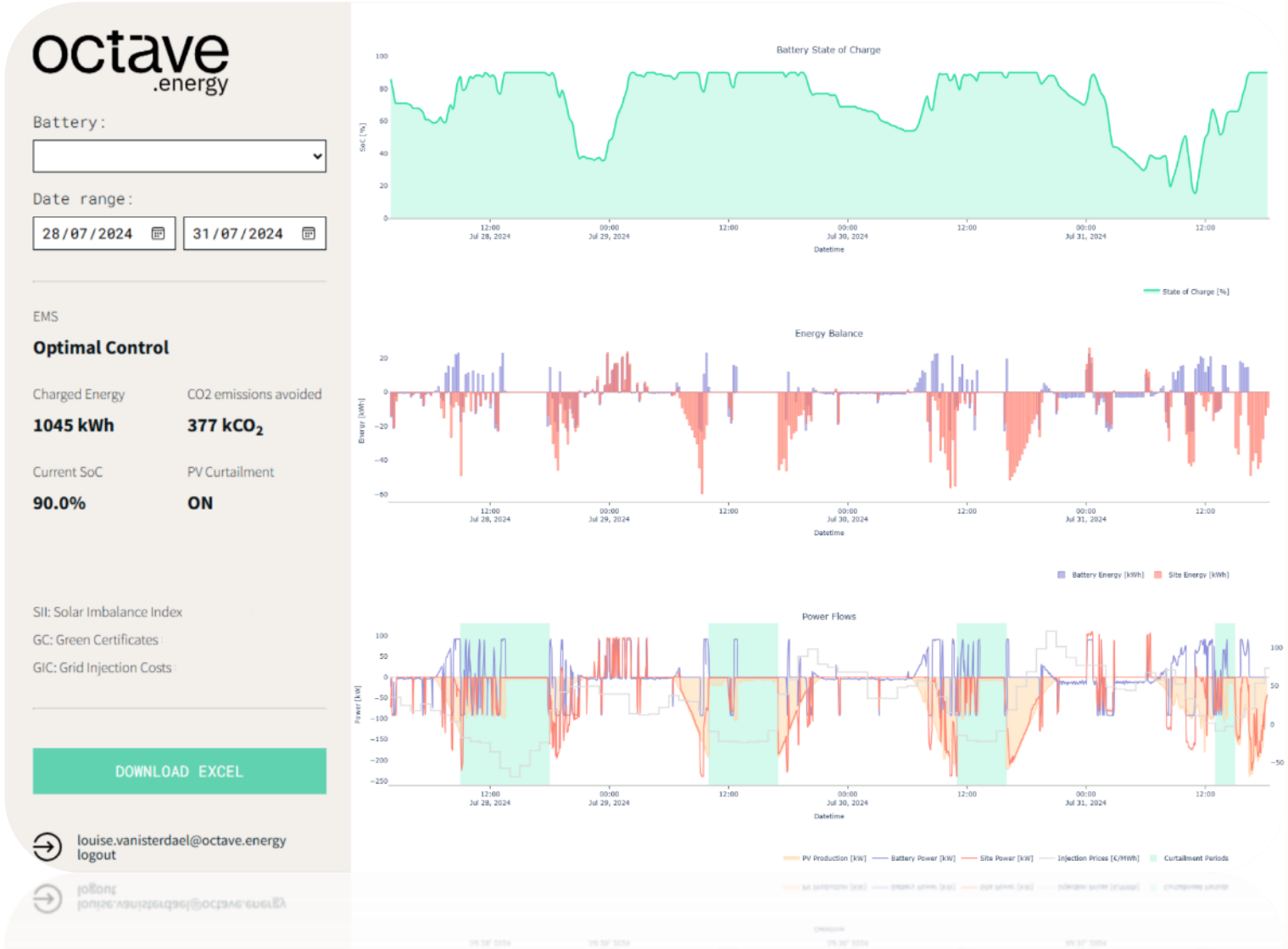
- **Li-ion battery cell** demand **x6** by 2030

**Global Li-ion battery cell demand,** GWh, Base case




[1]Including passenger cars, commercial vehicles, two-to-three wheelers, off-highway vehicles, and aviation.
Source: McKinsey Battery Insights Demand Model

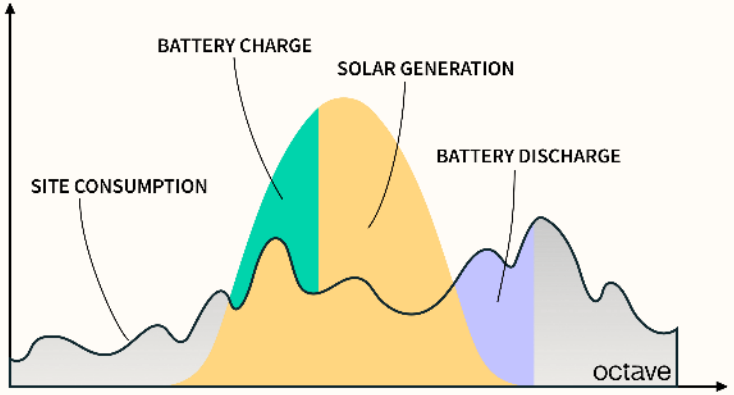
# Octave Monitoring



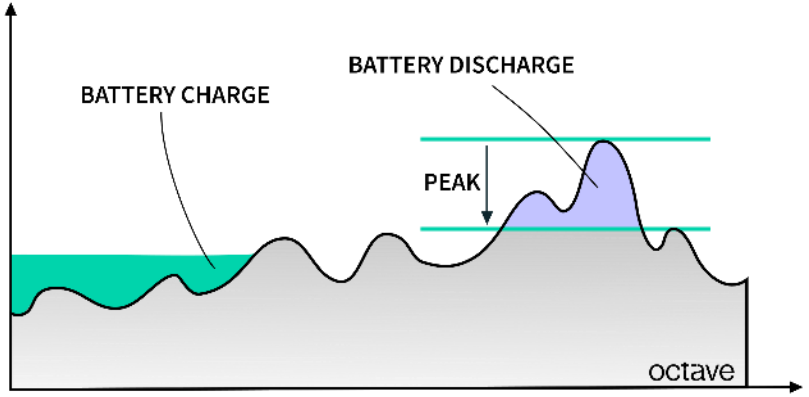

- **In-house developed Battery Cloud** technology to remotely & continuously collect extensive data on each battery cell
- **Real-time** monitoring to ensure **quality & safety**
- Web based **dashboard** available for the client with the high-level status of the battery system and its historical data

# Octave Optimal Control

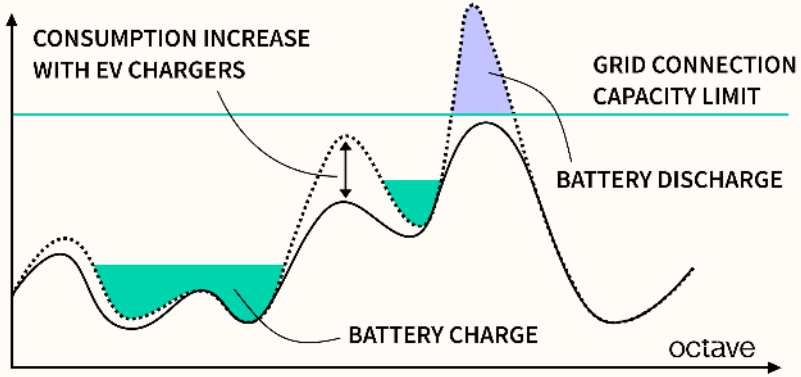
## Auto-Consumption



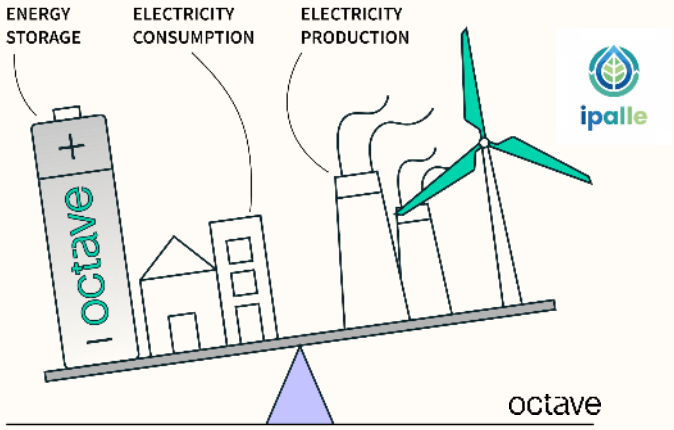

## Peak Shaving



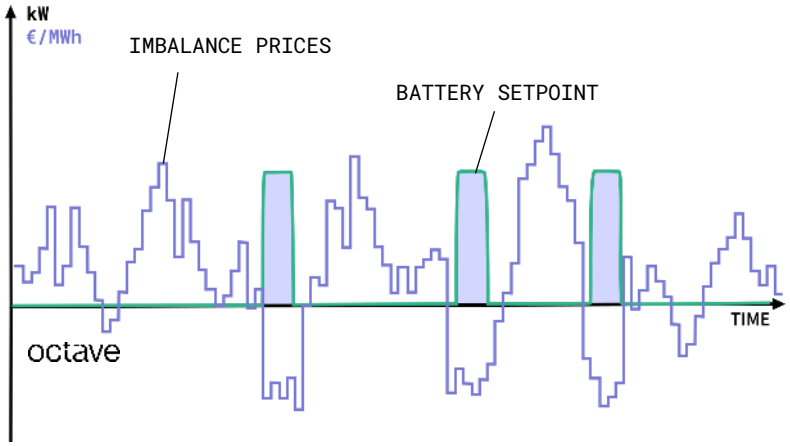

## EV Load Balancing



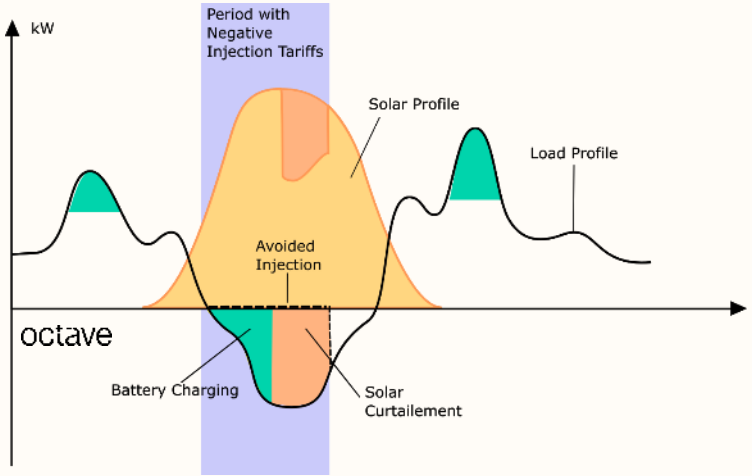

## Grid Services




## Market Arbitrage




## Solar Curtailment



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# A Modular Outdoor Solution

| | |
|---|---|
| Energy storage capacity | 195 kWh |
| Inverter capacity | 184 kW |
| Cabinet | Outdoor-rated cabinet IP55 with HVAC unit |
| Size (width x depth x height) without roof for inverters | 1600mm x 1300mm x 2351mm |
| Weight (without inverters) | 2300 kg |
| Battery cell chemistry | Li-ion NMC |

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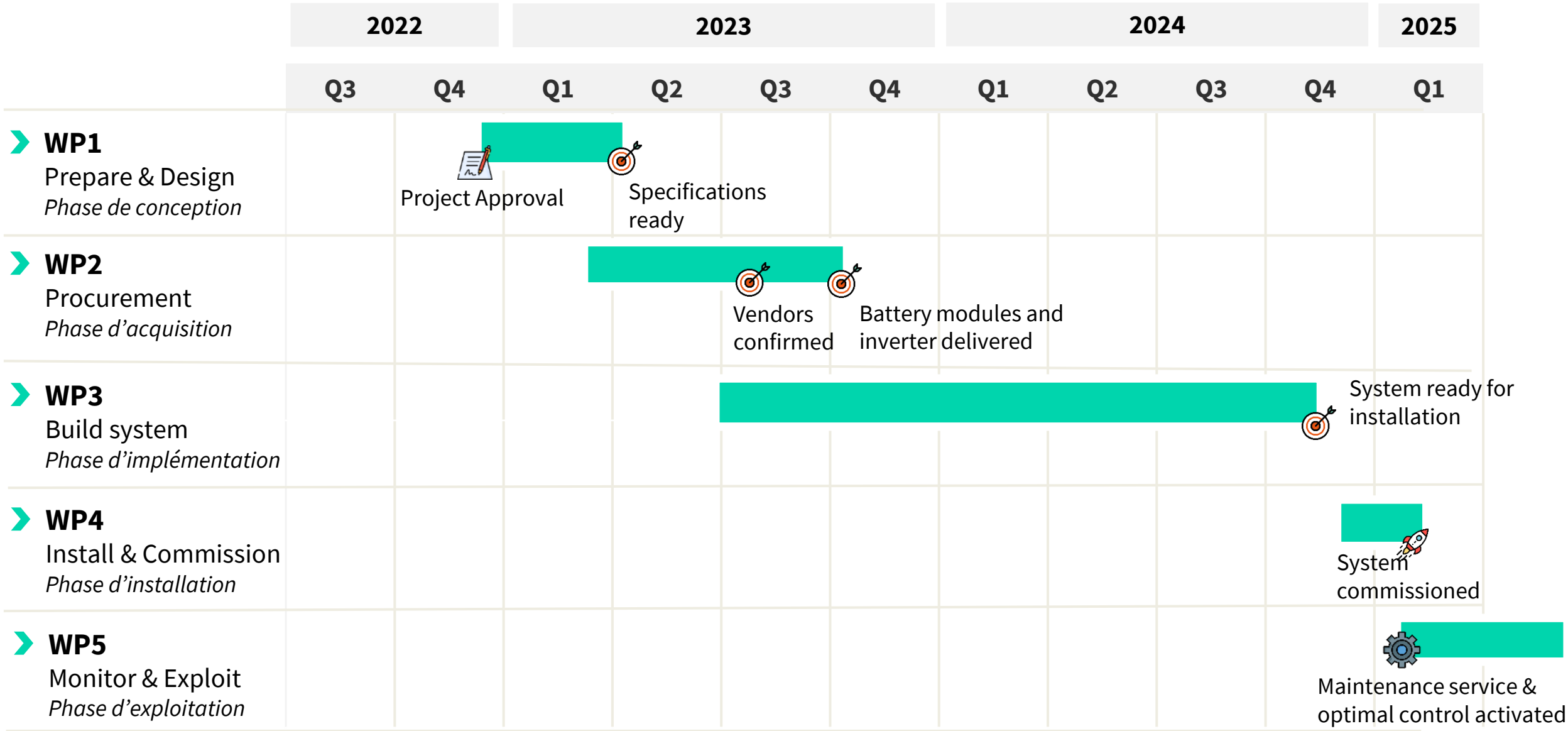
# R&D Project | Project Timeline

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