Heightened social engagement and acceptability of energy flexibility in urban areas

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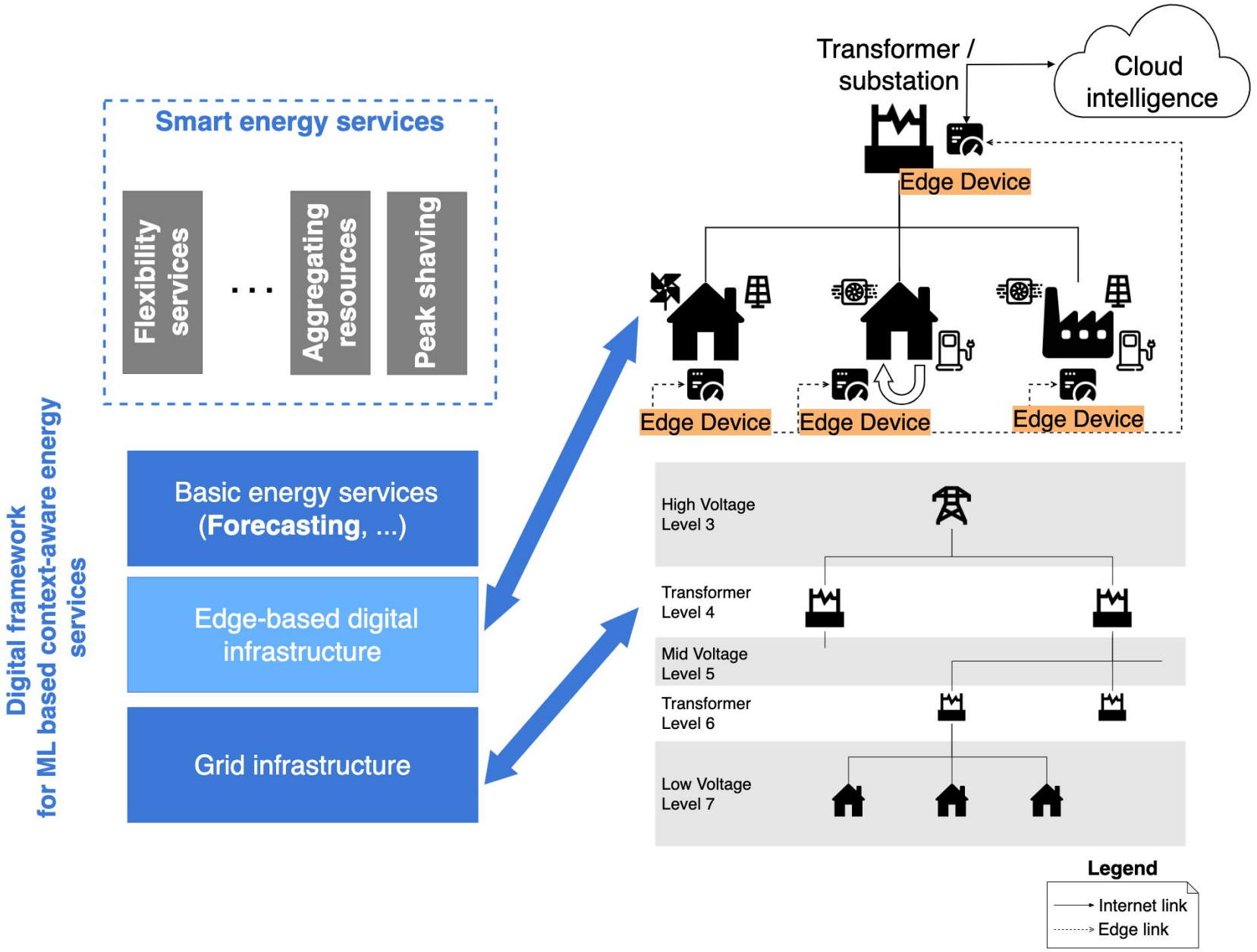
o-cei.eu

Open Cloud-Edge-IoT Platform Uptake in Large-Scale Cross-Domain Pilots (O-CEI)

The context: the transformation of electricity systems

- Decentralized renewable energy
- New forms of consumptions
- Energy market liberalisation
- The maturity of IT technologies
- The emergence of the concept of Local Energy Communities

Our dream...


Smart energy services
Flexibility services
...
Aggregating resources
Peak shaving
Digital framework for ML based context-aware energy services
Basic energy services (Forecasting, ...)
Edge-based digital infrastructure
Grid infrastructure
Transformer / substation
Cloud intelligence
Edge Device
Edge Device
Edge Device
Edge Device
High Voltage Level 3
Transformer Level 4
Mid Voltage Level 5
Transformer Level 6
Low Voltage Level 7
Legend
Internet link
Edge link

The O-CEI project

Open Cloud-Edge-IoT Platform Uptake in Large Scale Cross-Domain Pilot (O-CEI)

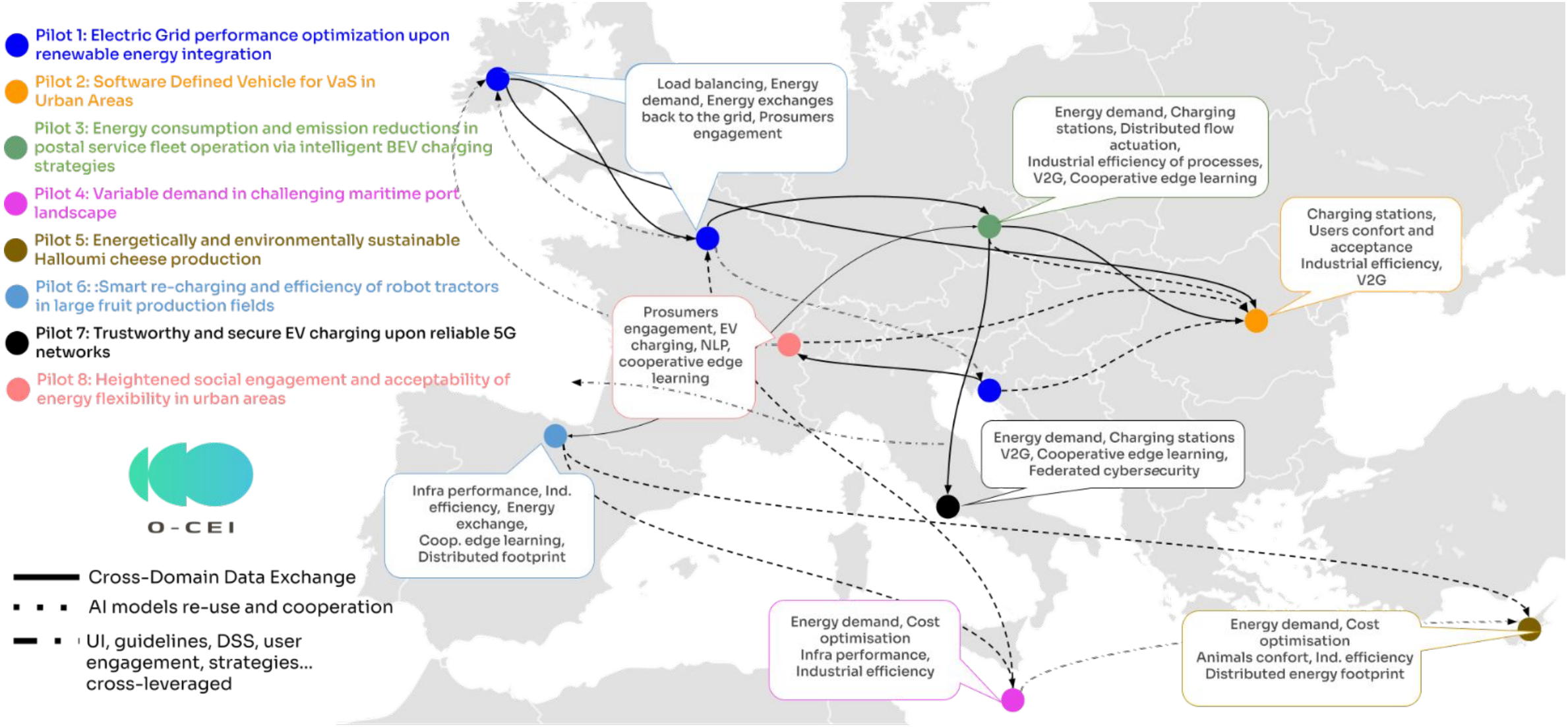
Budget : ~ 31 M €

01.01.2025 - 30.06.2028

63 partners (58 + 5). 19 countries:

- 18 Large Industrial
- 10 DSOs
- 26 innovative SMEs
- 9 non-profit

The O-CEI pilots



The Swiss Pilot

Basel

Zurich

St Gallen

CLEMAP

Berne

Lucerne

Fribourg

groupe E

Davos

Lausanne

St Moritz

Sierre

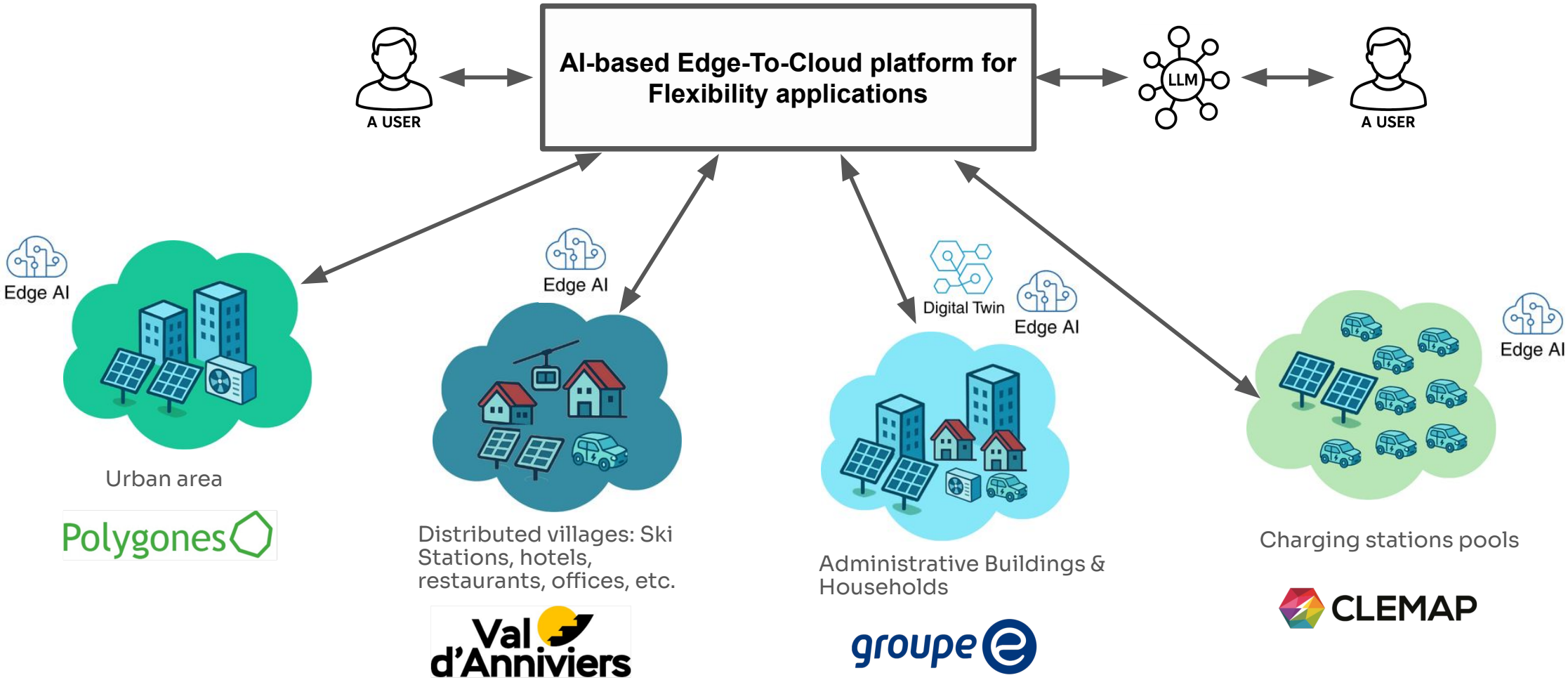
Geneva

Val d'Anniviers

Polygones

Lugano

The Swiss pilot: 4 deployments



In O-CEI, social acceptability is part of the design

WHY IT MATTERS

- Public acceptance can accelerate or delay the energy transition.
- Trust, participation and understandable benefits matter.
- User engagement must therefore start before deployment.

→

O-CEI RESPONSE

SOCIAL ACCEPTANCE BY DESIGN

Qualitative research
+ conjoint analysis
+ discrete choice experiments

→

SWISS PILOT EXAMPLE

AI forecasts a peak

↓

Flexibility request respects user preferences

↓

Test → feedback → learn

Citizen at the center of the project

It's not just about technology: people matter too.

For smart DSOs to work, we need to combine:

- AI-based systems
- Social buy-in from users

In this context, prosumers interact with AI to shape the energy future.

The ambition

- **The policies** of Switzerland and the EU **promote renewable energy** and support the creation of energy communities.
- Citizens are called upon to become **prosumers**, meaning both producers and consumers of energy.
-

Photo by Jonah Townsley on Unsplash

The Challenge

- Despite regulation, implementation on the ground is slow to materialize.
- Among the obstacles are:
  - Complex administration,
  - Limited incentives,
  - and low public engagement

What we need

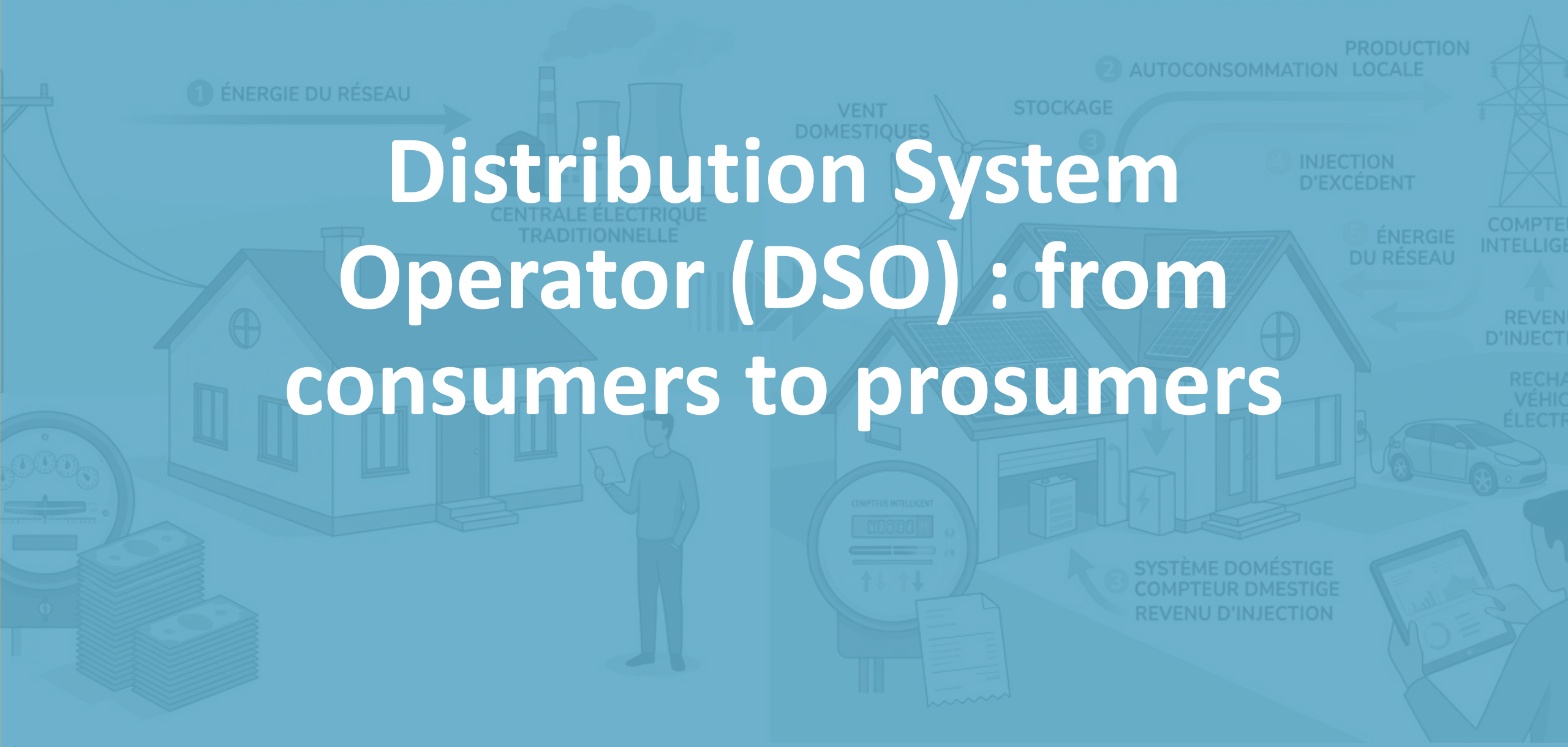
- Simplified procedures
- Strengthened local support
- Empowered citizens, equipped with tools for self-regulation and demand management

Citizens then become active players in the renewable energy mix, by adopting two new attitudes:

⇒ a participatory role in self-regulation

⇒ an active contribution to demand management

Distribution System Operator (DSO) : from consumers to prosumers



A new way to do it

The energy transition is changing the way we produce and use electricity.

- We are moving from a "push" system (producing as much as possible) to a "pull" system (producing based on demand).
- Citizens are no longer just users: they are now prosumers, who produce and consume energy.
- Prosumers help manage energy more actively.
- This shift works better within energy communities, where people collaborate and adapt together.

DSO and AI

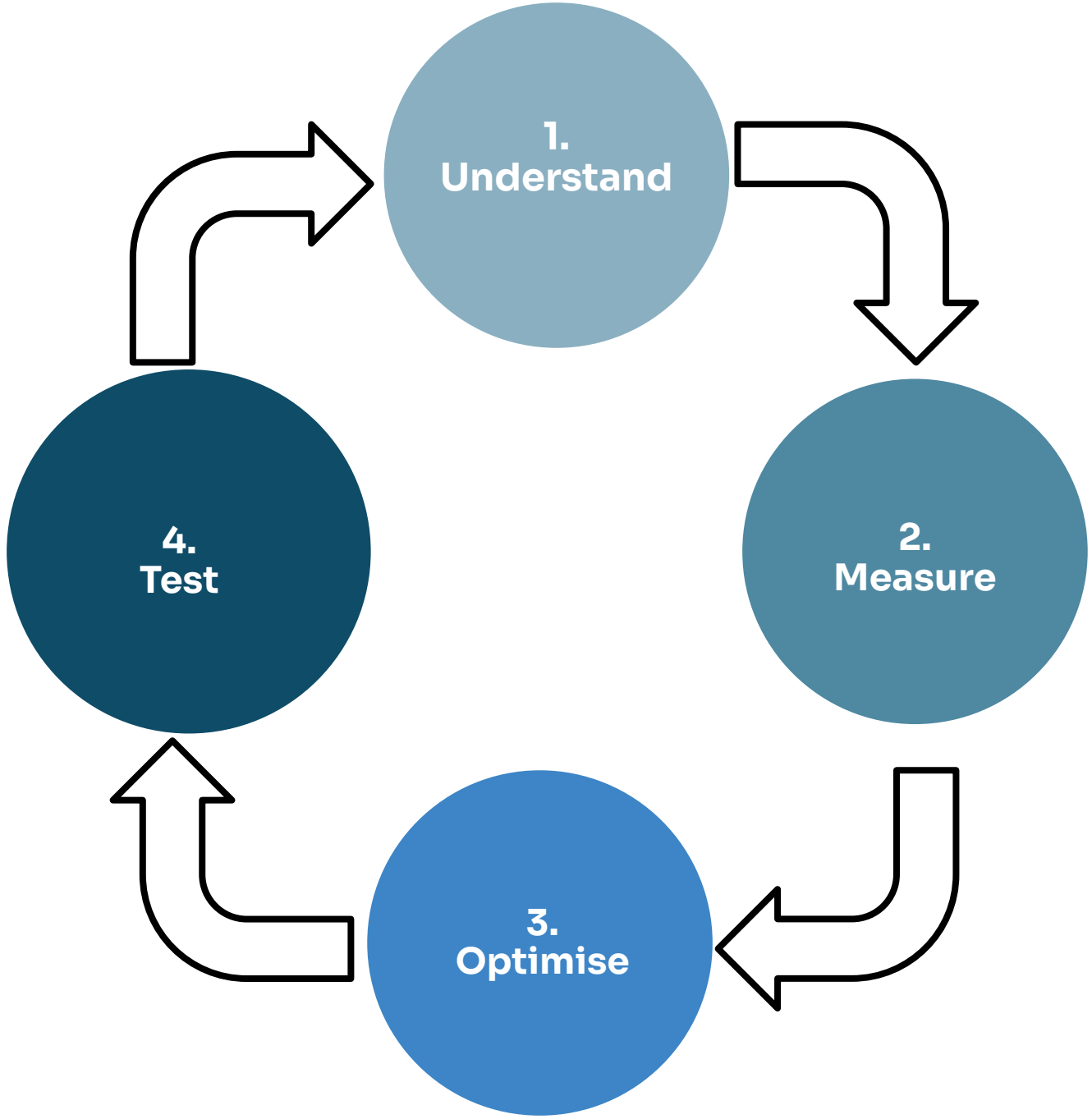
A powerful alliance

IA contribution

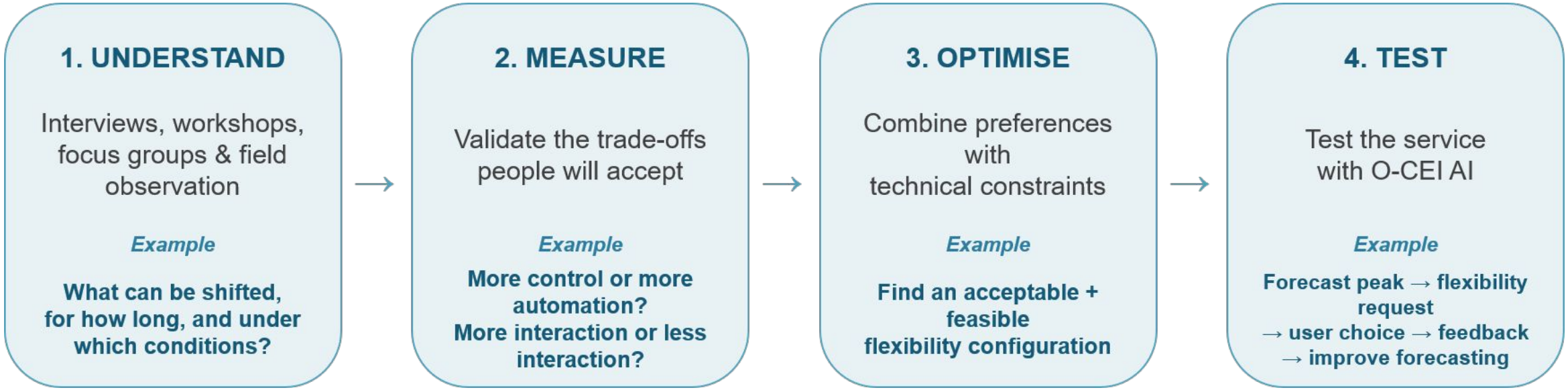
AI helps to:

- Integrate renewable energy
- Balance supply and demand

Our Method


1.
Understand
2.
Measure
3.
Optimise
4.
Test

Social acceptability: from understanding to real-life testing



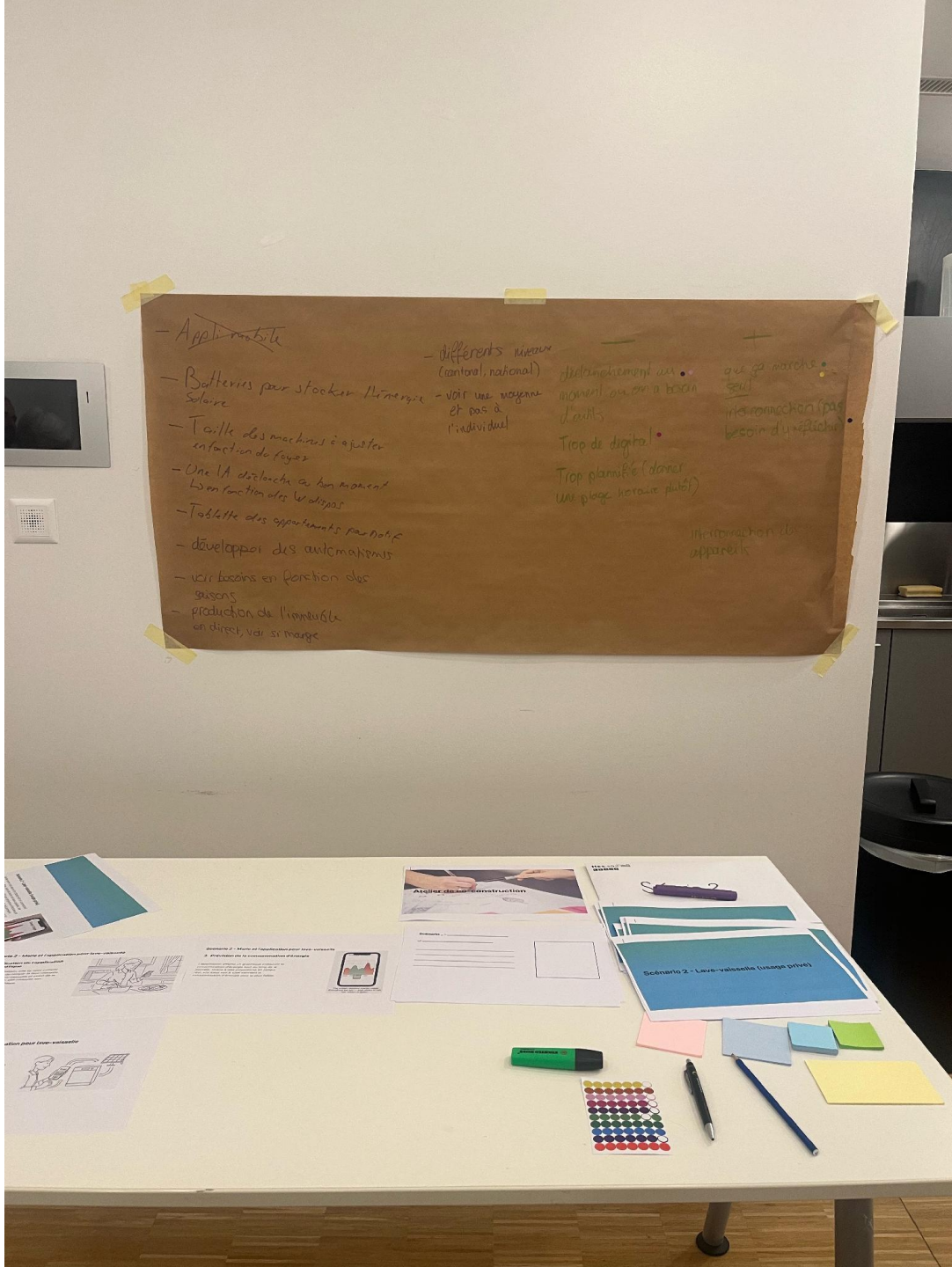
Understand behaviour → Measure preferences → Optimise → Test change → Learn → Start again

1. UNDERSTAND: Field observation

Qualitative studies

- Interviews, workshops, focus groups and field observation.
- Ask what can be changed in terms of behaviour, for how long and under which conditions.
- Identify motivations, concerns, routines and non-negotiable constraints.

Results: list of attributes + hypotheses

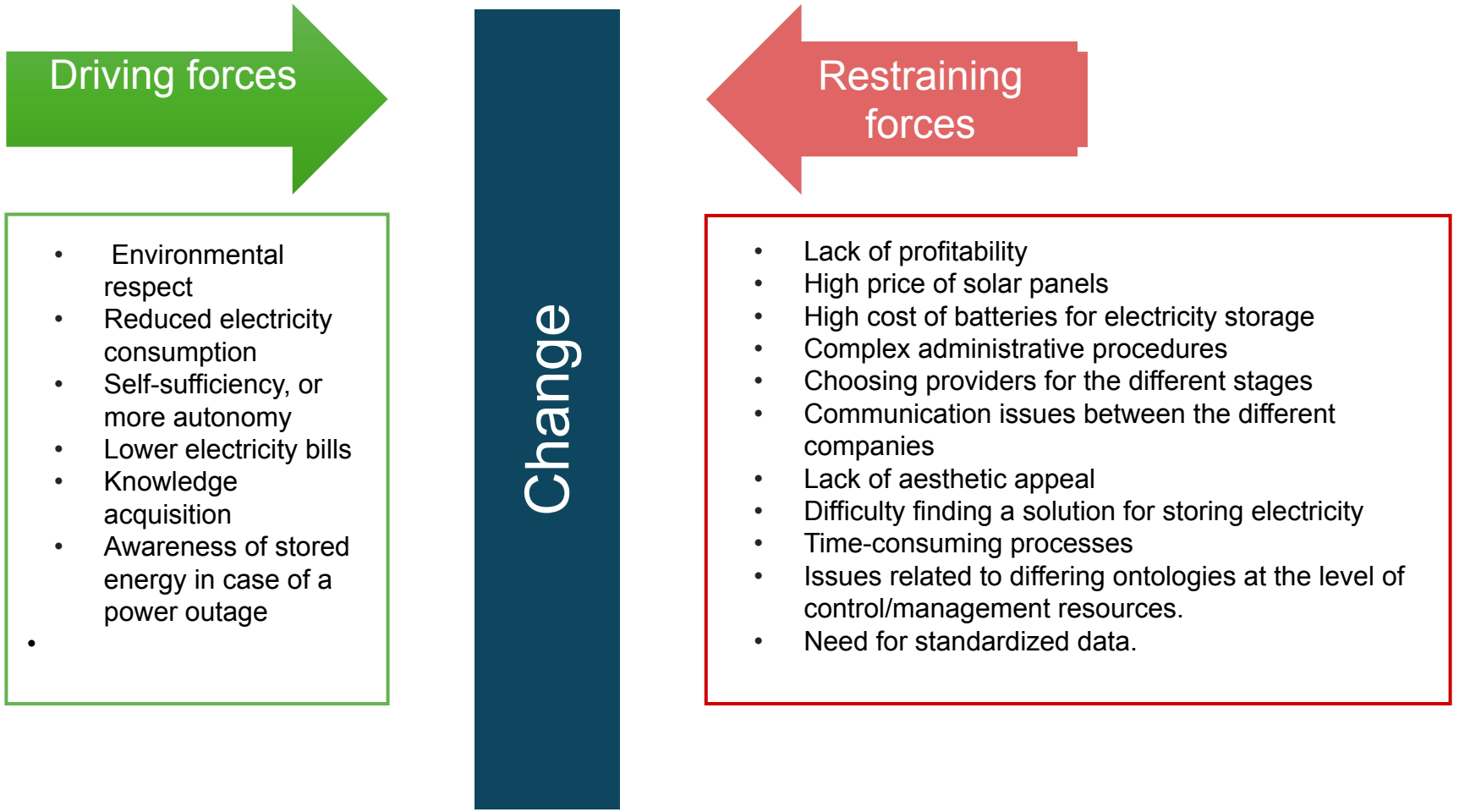



Calculement de Jaballer


Val d'Anniviers
MAUGUIO
MOTOREX
J84040

1. Planning
programme éco
Machine intelligente
taille machine
sa consommation

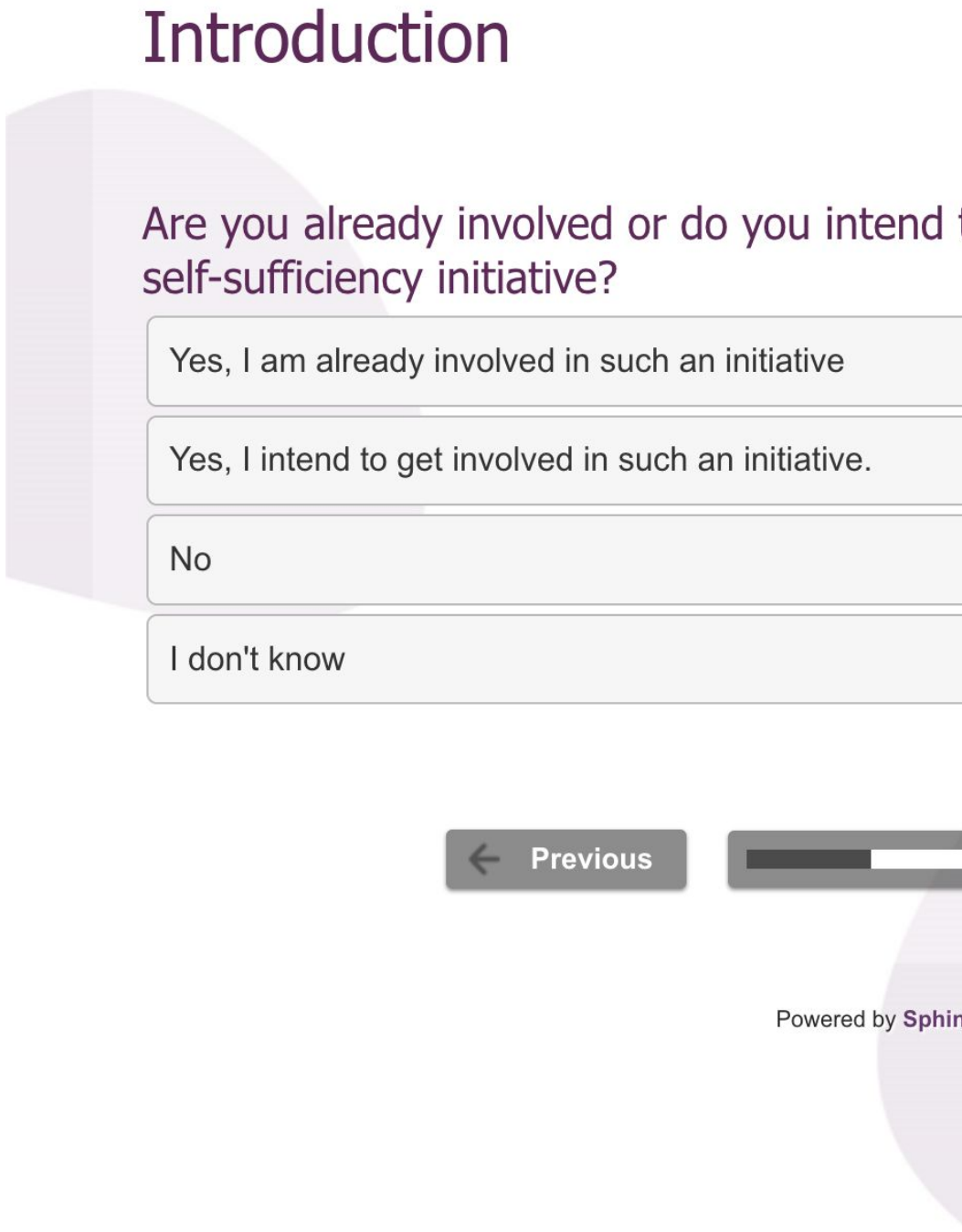
Understanding the change in the energy community



2. MEASURE: quantitative research

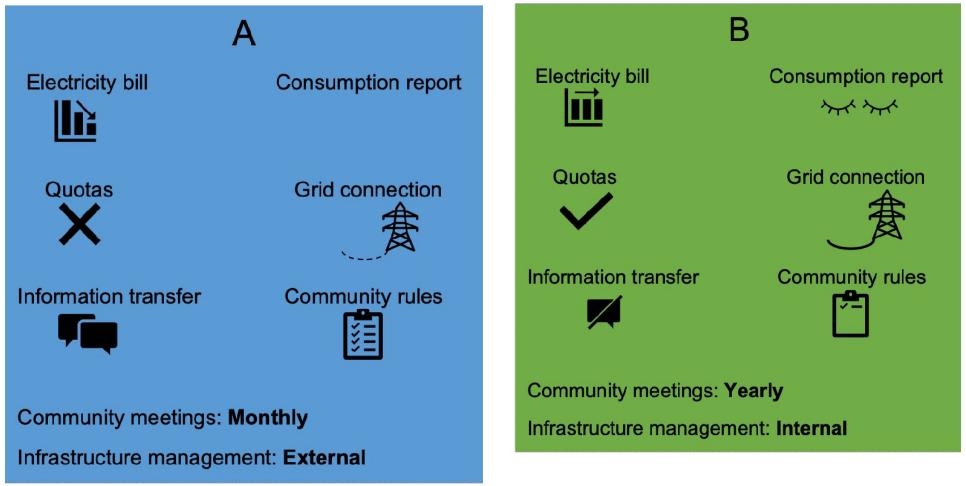
Quantitative research

- Identify attributes and levels based on prior qualitative analyses
- Use stratified sampling across key segments and geographic areas
- Provide multilingual questionnaires
- Ensure compliance with ethical principles and data protection
- Estimate individual utilities and differences between segments
-



Card survey

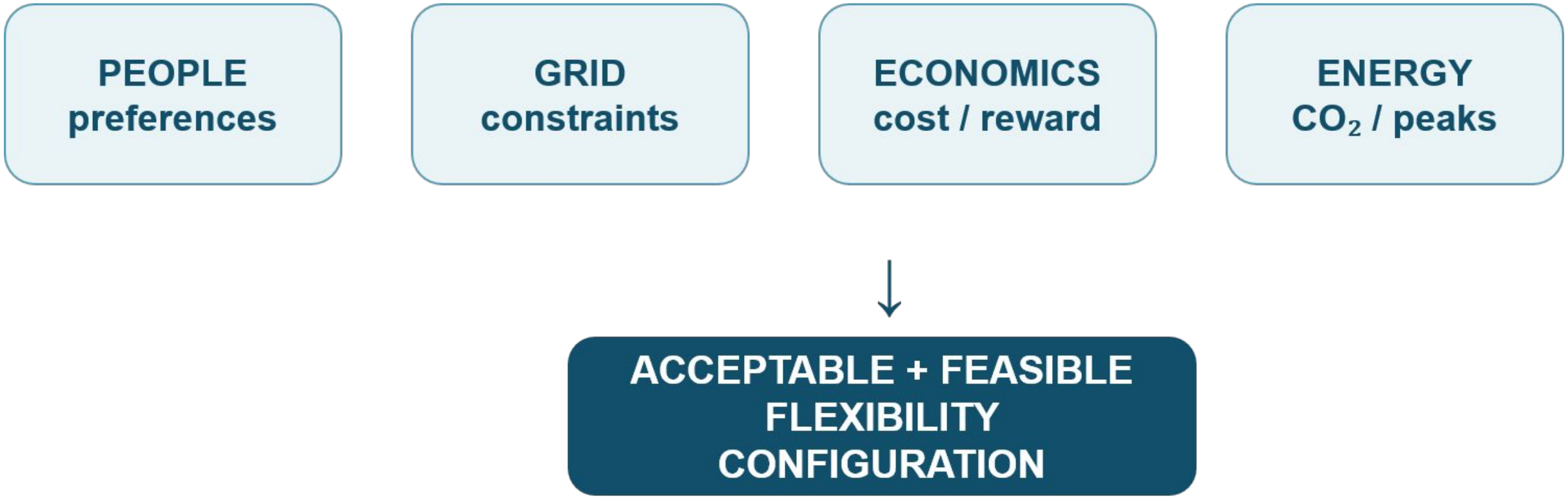
- Turn attributes into realistic service configurations.
- Ask participants to choose between cards or scenarios.
- Vary conditions such as reward, data sharing, control and community rules.
- Estimate utilities and differences between user segments.



3. Optimization

Optimise an acceptable flexibility service

Not the technical optimum, but the best feasible compromise



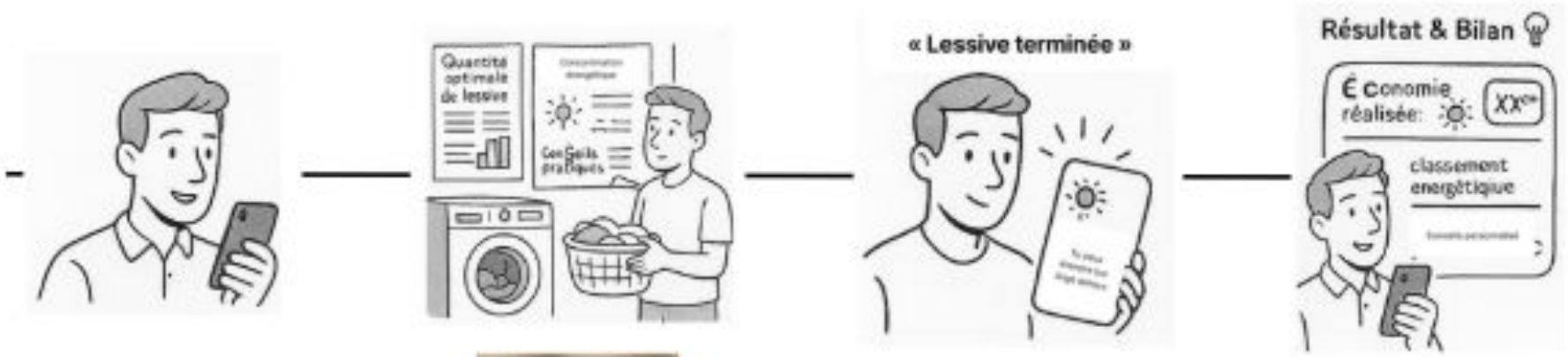
Hes·so

4. Test

Test the new service

- Create service prototypes: notification, choice, action and feedback
- Test incentives, timing, language, control and override options
- Observe real behaviour alongside energy measurements
- Compare expected acceptance

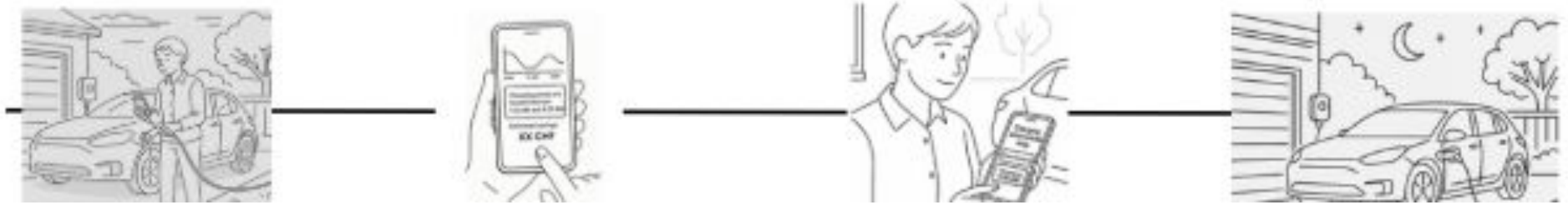
Scénario 1



Scénario 2

Scénario 3

Scénario 4



Scénario 3 - Flexibilité des pompes à chaleur

3. Le système abaisse automatiquement la température.

Le système abaisse automatiquement la température de son domicile de quelques degrés, maintenant ainsi son confort tout en réduisant sa consommation.

À l'échelle du réseau, de nombreux petits changements comme celui de John font une grande différence.

Scénario 3 - Flexibilité des pompes à chaleur

4. Rétablissement de la température de confort

Quelques heures plus tard, lorsque la demande diminue, l'application rétablit sa température préférée.

John reçoit une notification confirmant sa participation et indiquant ses économies.
« Vous avez contribué à stabiliser le réseau énergétique et gagné XX CHF en crédits. »

Val d'Anniviers


EM-425-WX


Medium Demand


Polygônes
FlexWash
Laver maintenant
Laver intelligemment
3
Laver collectivement

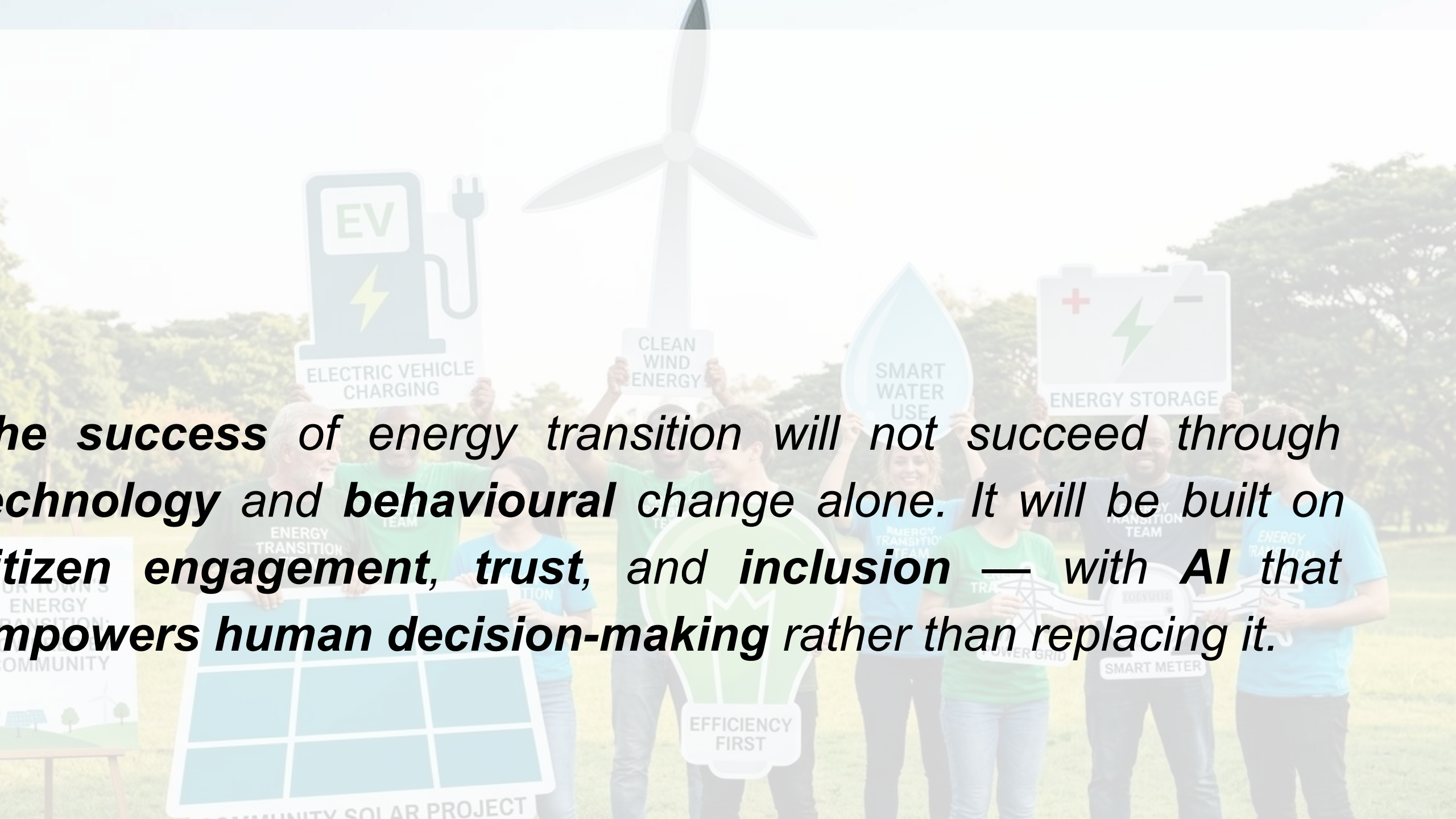
BRIDGE initiative

BRIDGE

European initiative on smart grids, storage, islands and digitalization

2016
Launched by the European Commission

183
Projects in 38 countries



he success *of energy transition will not succeed through* ***echnology*** *and* ***behavioural*** *change alone. It will be built on* ***itizen engagement***, ***trust***, *and* ***inclusion*** *— with* ***AI*** *that* ***mpowers human decision-making*** *rather than replacing it.*

Learn more about O-CEI:

o-cei.eu

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Thank you !

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