

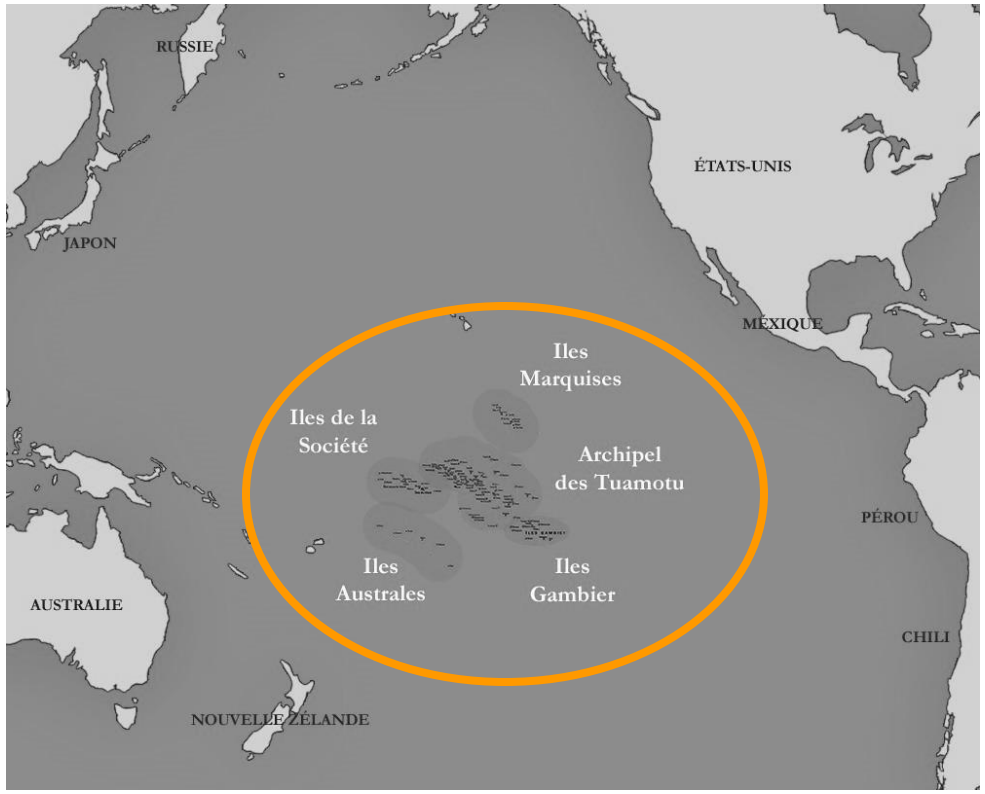

2025 PPA CONFERENCE IN PALAU

DIGITIZING ISLANDED GRIDS: Lessons from French Polynesia


EXTERNAL
CONFIDENTIALITY LEVEL

FRENCH POLYNESIA CONTEXT

KEY FIGURES



~280,000 inhabitants

118 islands & atolls

65 isolated distribution networks

Target: 75% renewables by 2030 (*law*)
Current reality: 93% imported diesel

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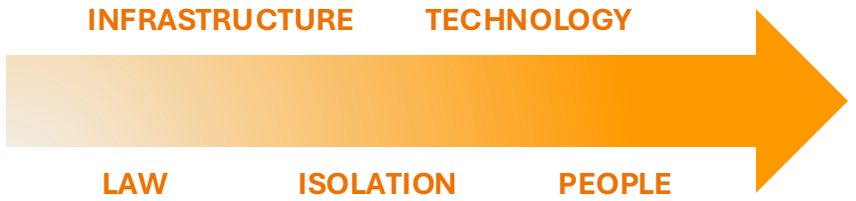
FRENCH POLYNESIA CONTEXT

AN URGENT NEED OF STRUCTURAL TRANSFORMATION

OLD MODEL (BEFORE)

SINGLE UTILITY
(*Generation, Distribution*)



NEW MODEL (NOW)

MULTIPLE ACTORS:
(New grid operators, IPPs, Self-consumption projects)

NEW CHALLENGES

- **Fragmented grids, no automation, unmanaged assets**
- **Aging infrastructure**
- Ambitious renewable energy targets
- New operational responsibilities but lack of hybrid management skills
- **Grids not adapted to new needs** (sizing, operations, protections..)
- **Need to evolve the laws** (grid code)

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FRENCH POLYNESIA CONTEXT

FROM A SINGLE VERTICALLY INTEGRATED UTILITY…

BEFORE

ONE SINGLE UTILITY - EDT

Responsible for **production & distribution**, **balance supply/ demand**

TSO - TEP

Measurement and **verification** only

BALANCE SUPPLY/DEMAND

Ensured by EDT mostly with diesel and hydro

SOFTWARE TOOLS

SCADA

MICROGRID MANAGEMENT

Reactive mode, real-time monitoring and control

PEOPLE *(operational dispatch)*

Diesel operations mode only, robust but « easy » black start procedures

FRENCH POLYNESIA CONTEXT

... TO SILOED MICROGRIDS & FRAGMENTED INFRASTRUCTURES

NOW

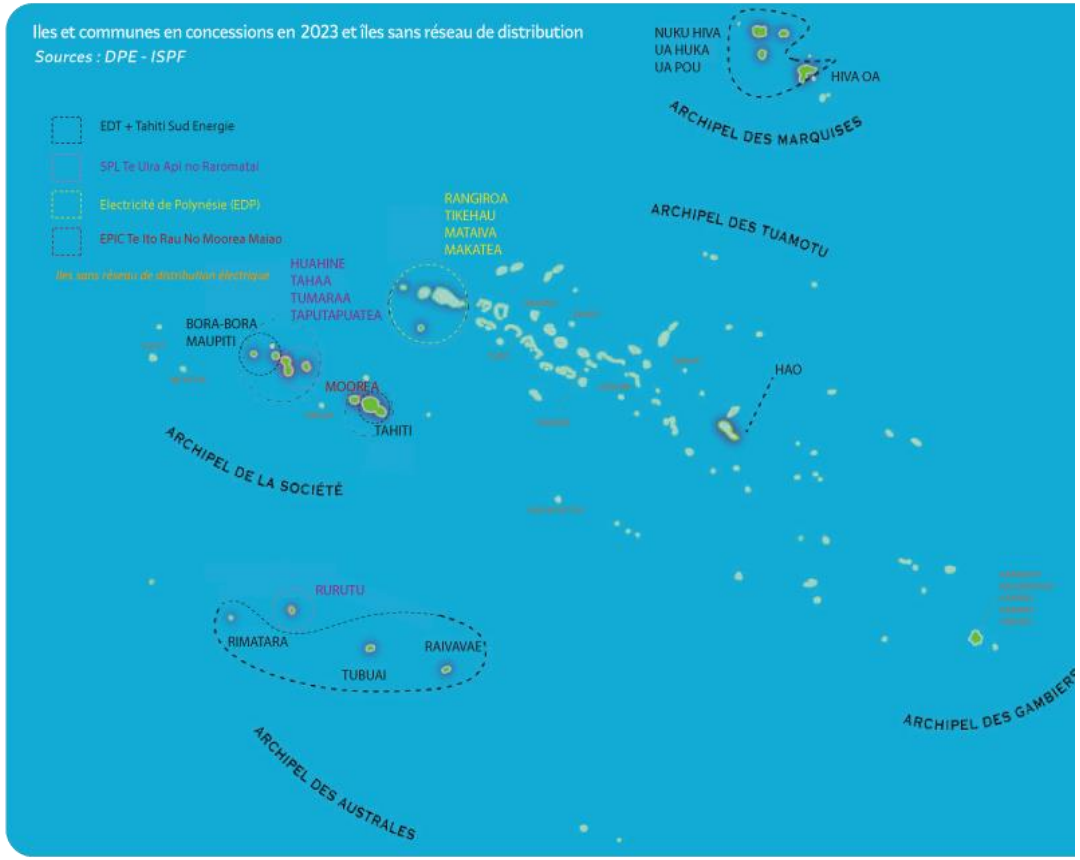
MULTIPLE UTILITIES / LOCAL OPERATORS

SPL Te Uira Api No Te Mau Motu, EPIC Te Ito Rau No Moorea Maiao, CODIM...

Responsible for **production & distribution, balance in the grid**

TSO - TEP

Responsible for **measurement and verification,**
+ balance in the grid in Tahiti



FRENCH POLYNESIA CONTEXT

... TO SILOED MICROGRIDS & FRAGMENTED INFRASTRUCTURES

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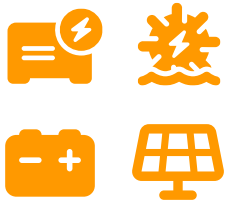


Responsible for **production & distribution, balance in the grid**

TSO - TEP

Responsible for **measurement and verification,**
+ balance in the grid in Tahiti

BALANCE SUPPLY/DEMAND
Operators' responsibility
(with BESS/diesel gensets)

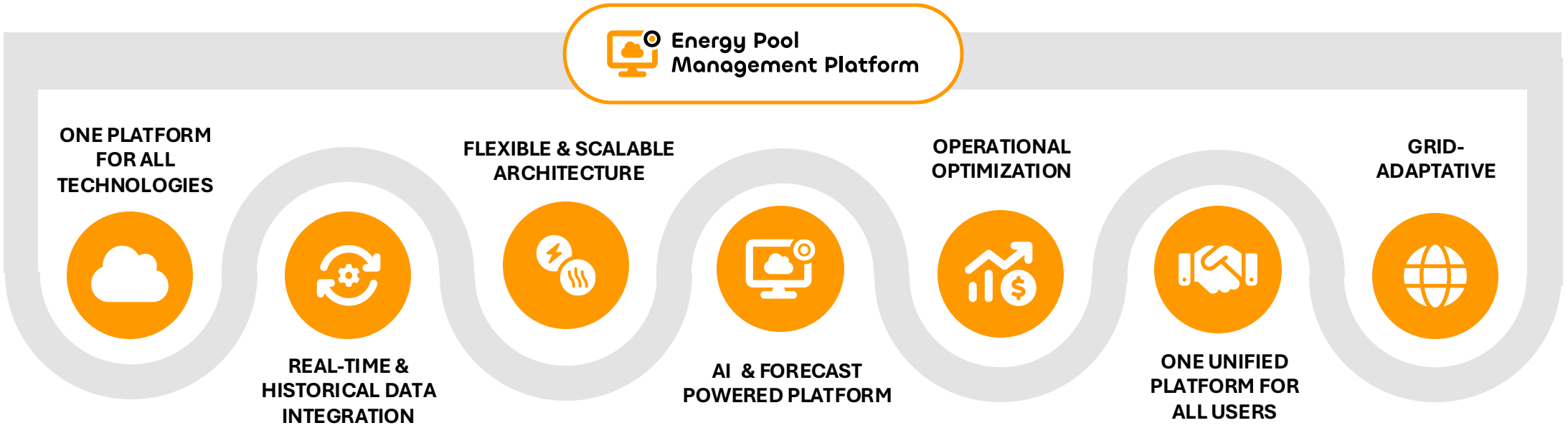
SOFTWARE TOOLS
Need of advanced solutions: SCADA+ EMS

MICROGRID MANAGEMENT
Forward-looking mode: forecasting consumption, generation and weather to optimize the use of renewables and provide grid stability

PEOPLE *(operational dispatch)*
Need of new skills improvement: hybrid management

WHY IT WORKS

FROM DEMAND RESPONSE TO HYBRID MANAGEMENT



- BASED ON YEARS OF EXPERTISE
- ADAPTIVE FOR EVERY ASSET & CONSTRAINT
- 24/7 MONITORING & CUSTOMER SUPPORT
- CYBER-SECURE BY DESIGN

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ENERGY MANAGEMENT PLATFORM: UNIQUE & SCALABLE SOLUTION

LEVERAGING FORECASTING FOR ENERGY FLOW WHILE ADJUSTING DECISIONS FOR STABILITY

Energy Pool Management Platform

CLOUD - ENERGY OPTIMISER (EMS)

- Uses **advanced forecasting and AI** to maximize site profitability and manage renewables uncertainties
- **Steers the system** toward the customer's defined objective with precision and efficiency.
- **Optimizes operations** based on weather, production, consumption forecasts, through machine learning and advanced optimization models

REAL-TIME POWER CONTROLLER (PMS)

- Adjusts **energy decisions in real time** , addressing discrepancies between forecasts and actual conditions
- Enhances **system stability and reliability**
- Dynamically adapts energy management and **respects predefined site constraints**
- Ensures **continued operation** even if communication is lost

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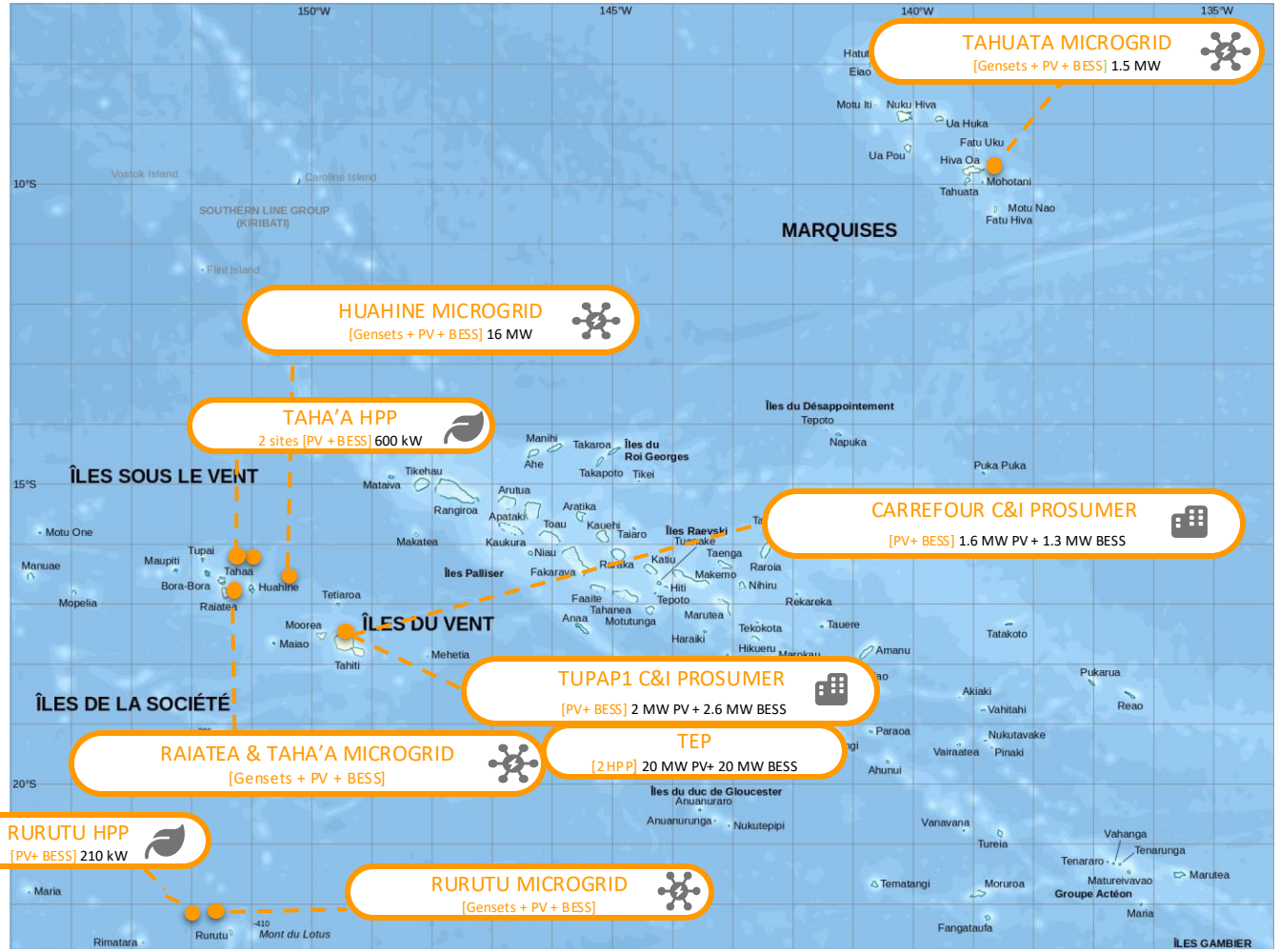
FRENCH POLYNESIA PROJECTS

SMART GRID TRANSFORMATION



- Microgrid off-grid projects
- Grid-connected prosumer projects
- Renewable developer projects (HPP = Hybrid Power Plant)

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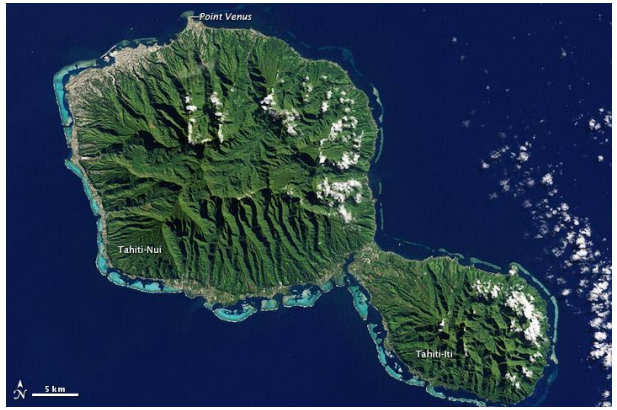
TEP

TEP - TAHITI'S TRANSMISSION SYSTEM OPERATOR (TSO)

CONTEXT AND CHALLENGES



~200,000 inhabitants

100 MW peak demand

300 km of lines
24 substations

A STRUCTURAL CHANGE

Emergence of IPPs

- EDT no longer as both producer and neutral system operator
- TEP becomes the responsible for grid balancing

THAT BRINGS NEW CHALLENGES FOR TEP

- **Fragmented assets** & limited visibility (no control on IPPs' PV+BESS)
- **Lack of centralized control** over generation assets
- **SCADA**: manual and complex operations, real-time data only
- **Risk of future congestions** (generation concentrated on one side of island)
- **Lack of forecasting & centralized reserve management** (storage needed for stability)
- Need advanced, tailor-made solutions & experienced partners for strategic support
- **Grid code**: complex & misaligned with TSO/IPPs needs

TEP - TAHITI'S TRANSMISSION SYSTEM OPERATOR (TSO)

STEP BY STEP SUPPORT

PHASE 1

DASHBOARD AND ALARMS :

- Monitoring with measurement and verification

GRID CODE AND PPA COMPLIANCE

SCENARIO - PHASE 2

PROGRESSIVE AUTOMATION:

- Automating exchanges between the TSO and IPPs
- Dynamic optimization and automatic threshold management
- New assets integration

REDUCING GAPS

- Balancing Supply and Demand

AUTOMATION OF OPERATIONS

SCENARIO - PHASE 3

DYNAMIC OPTIMIZATION OF THE ENTIRE NETWORK:

- Knowledge of the consumption and production of all network assets
- **PV production forecast**
- **Centralized reserve management via BESS**
- Dynamic optimization and automatic threshold management

REDUCING GAPS

- Balancing Supply and Demand

ALL PROBLEMS SOLVED

TE UIRA API NO TE MAU MOTU

TE UIRA API NO TE MAU MOTU: LOCAL OPERATOR

CONTEXT AND CHALLENGES

A local public operator managing concessions on several remote islands:
Huahine, Raiatea, Taha'a, Rurutu, Tubuai

MAIN CHALLENGES

- Inherited a fragmented system of ageing diesel gensets
- **No SCADA** - no visibility of the generation/distribution grid.
- **Manual operations** tedious and troubleshooting complicated
- **High diesel costs**
- **Financial pressure to make renewables viable**
  (ensuring that the cost per kWh is cheaper than operating solely on diesel)
- **Limited operational expertise** on hybrid systems

URGENT NEED TO:

- **Standardize the software** (SCADA as first step)
- **Centralize multi-island operations**
- **Enable remote control & monitoring**

TE UIRA API NO TE MAU MOTU - LOCAL OPERATOR IN HUAHINE

FROM DIESEL GENSETS TO A HYBRID SYSTEM: A PHASED ENERGY TRANSITION

The energy transition has been launched on Huahine. By combining solar and BESS, the island will **cut fuel use by nearly 50%.**

PHASE 1: Laying the Foundations
>Technical audit of the existing thermal plant and network assets
>Recommendations for equipment and network upgrades (grid connection point, diesel controllers, optical fiber, circuit breakers..)

PHASE 2: PMS/SCADA deployment
>Deployment of PMS/SCADA to automatically and remotely manage the thermal power plant and prepare for hybrid integration

PHASE 3 : Smart Integration + EMS
>Upcoming: Installation of EMS to orchestrate the **full hybrid system (PV + BESS + diesel gensets)** for optimal performance and grid stability

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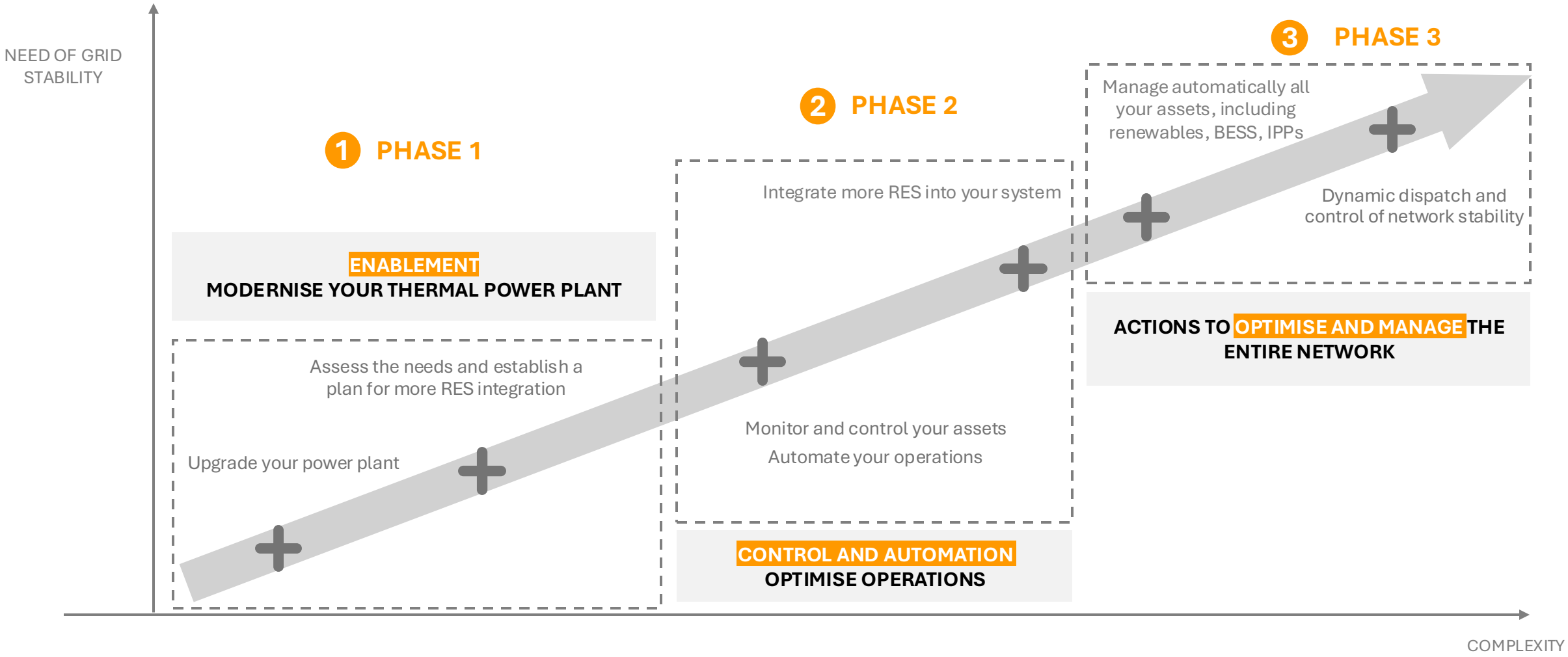
METHODOLOGY



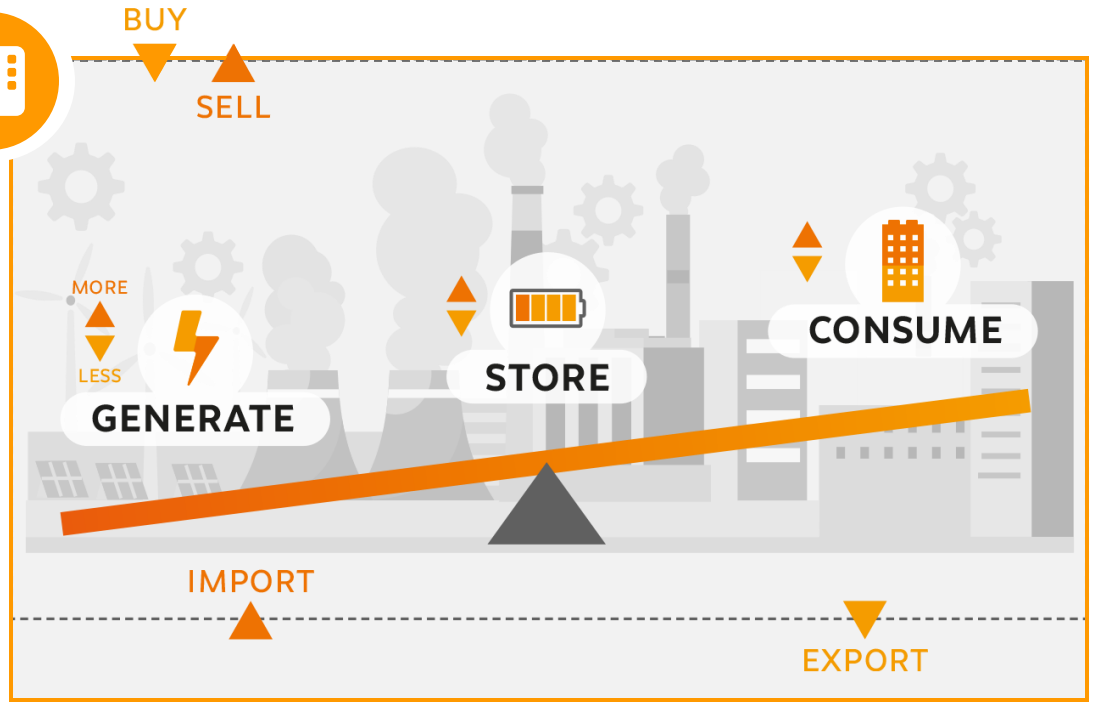
EXPERTISE FROM CONSULTING TO OPERATIONS

FOR PRODUCERS, GRID OPERATORS AND CONSUMERS

DESIGN > CONSULTING & ENGINEERING & AUDIT

OPTIMISE > ENERGY MANAGEMENT & OPTIMISATION SOLUTIONS

OPERATE > O&M AUTOMATED OPERATIONS TECHNICAL SUPPORT



All assets	Tailor made
All contexts	Agnostic
Scalable	Automated

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CONCLUSION

- **Digital transformation in power systems is not an optional add-on for improving efficiency, sustainability, and especially resilience: it's a must.**
- **Traditional models are no longer sufficient:** reactive management cannot effectively address the challenges posed by intermittent renewables.
- Embracing digital transformation enables long-term cost reductions through decreased maintenance and reduced reliance on diesel fuel.

CONCLUSION

FRENCH POLYNESIA LESSONS:

- **Start with a holistic understanding of the technical, operational, and human landscape.**
- Deploy **flexible, scalable** platforms that can evolve with changing needs and market structures.
- Build local capacity so operators can own and sustain their transformation journey.

> SMART GRIDS ARE NOT ONLY ABOUT TECHNOLOGY - **THEY ARE ALSO ABOUT BUILDING SYSTEMS THAT CAN LEARN, ADAPT AND EVOLVE TOGETHER WITH THE PEOPLE WHO OPERATE IT.**

A GLOBAL INDEPENDANT PLAYER

CONTACT@ENERGY-POOL.EU

THANK YOU !

Agnieszka RYCHLICKA

BUSINESS DEVELOPMENT MANAGER
APAC
(Software & Microgrids)

agnieszka.rychlicka@energy-pool.eu

+33 789 214 162

JAPAN TÜRKIYE NETHERLANDS GERMANY KSA SPAIN MOROCCO IVORY COAST ITALY