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Renewable Energy Valleys to increase energy security while accelerating the green transition in Europe - Innovation action (IA)



REFORMERS
RENEWABLE ENERGY VALLEYS

REFORMERS

Regional Ecosystems FOR Multiple-Energy Resilient Systems

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D4.2: REVT1-3 IMPLEMENTATION AND OPERATION PLAN



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EXECUTIVE SUMMARY

The *REFORMERS* project, part of the Horizon Europe Programme, seeks to enhance energy security and accelerate the green transition through the creation of Renewable Energy Valleys (REVs). This deliverable, *D4.2 REVT1-3 Implementation and Operation Plan*, outlines the strategic roadmap for implementing and operating three core tracks (REVT1-3) of the Flagship Valley (FV) project.

REVT1-3 Scope and Objectives

Situated within the municipalities of Alkmaar and Heiloo, the Flagship Valley is Europe's first Renewable Energy Valley, aimed at demonstrating the deployment of innovative renewable energy technologies across the energy value chain. This document details the implementation of REVT1-3, which focuses on:

1. **REVT1:** Renewable electricity generation through solar, wind, biomass, and renewable gas.
2. **REVT2:** Energy storage, conversion, and grid infrastructure.
3. **REVT3:** Smart energy solutions for consumers across mobility, residential, and industrial sectors.

REVT1-3 aspect of the project will integrate approximately 30 energy innovations (consortium energy assets) and also a sizable number of non-consortium assets within the valley, fostering a self-sufficient, energy-positive ecosystem through innovative smart control technologies and local energy trading.

Overview of the REVT1-3 implementation and operation plan

The D4.2 REVT1-3 Implementation and Operation Plan sits as the overarching structure, with five key pillars or blocks that represent different components of the REVT1-3 plan. The plan is structured around five key building blocks which are:

1. FV Project Implementation Governance and Management
2. System Integration of Energy Innovation Projects (Consortium Assets)
3. Smart Control of FV
4. FV Stakeholder Management and Governance
5. FV Decision Support Models



Project Governance and Management Structure

A robust governance framework has been established to oversee the project's progress and ensure strategic alignment across partners. **A strategy group**, comprising key FV stakeholders from the consortium, guides decision-making and coordinates activities. The group ensures alignment with the Flagship Valley's long-term goals, facilitates asset integration, and oversees stakeholder collaboration.

System Integration of Energy Innovations (Consortium Assets)

The REVT1-3 plan revolves around demonstrating and integrating diverse renewable energy innovations, which include:

- **Hydrogen assets:** The HYNOCA plant will produce hydrogen from organic waste, while hybrid battery electrolyzers and hydrogen infrastructure will support storage and distribution.
- **Electricity Storage assets:** Large-scale batteries, flow battery and home batteries, will optimize energy usage and grid stability.
- **Carbon capture asset:** Biological carbon capture technologies, such as Sustenso's photobioreactor, will sequester CO₂ from biogas production, contributing to net-zero goals.
- **Heat assets:** District heating connections and heat storage solutions will balance energy demand and supply within the valley.

Smart Control Platforms and Local Energy Market

At the heart of REVT1-3 is the integration of smart control platforms to manage energy flows and facilitate local energy trading. Platforms such as the Repowered smart control platform, and ENTRNCE trading platform will optimize energy management across the valley, allowing for real-time adjustments, peak shaving, and efficient distribution. These platforms will coordinate energy exchanges between prosumers and businesses, enhancing grid flexibility and ensuring reliable operations at the node and sub-node levels.

Stakeholder Engagement and Collaborative Governance

Engaging both consortium and non-consortium stakeholders is critical to the project's success. A well-defined stakeholder engagement strategy ensures that external assets are smoothly integrated into the valley's energy system. Collaborative business models will promote partnership-driven innovation and sustainable market operations. Additionally, coordination with replication valleys will help scale successful approaches across Europe, ensuring wider application of the lessons learned from the Flagship Valley.



Model-Based Design and Digital Twin Implementation

A model-based design approach is integral to optimizing the system's design and operation. Digital twins—virtual replicas of energy assets—will simulate real-world energy scenarios, enabling data-driven decision-making for operating the FV. These simulations will help refine energy flow management, advise on asset performance, and ensure system efficiency across the entire valley.

Implementation Phases and Future Outlook

The project follows a three-phase implementation strategy:

1. **Planning and Preparation:** Involves detailed design, regulatory approvals, financial planning, and risk management (M1-M12).
2. **Implementation:** Includes the physical installation and integration of infrastructure, from renewable energy assets to grid connections (M13-M36).
3. **Operation and Maintenance:** Focuses on monitoring, optimizing, and maintaining energy systems to ensure safe, efficient, and high-performance operations (M37-M60).

Looking ahead, the project will continue refining energy innovations, advancing stakeholder engagement, and optimizing smart control systems. The final phase will prioritize ensuring long-term operational sustainability and replicability across other energy valleys in Europe.

D4.2 contains sensitive information; for this reason, only the Executive Summary is publishable.

