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

REFORMERS

Regional **E**cosystems **FOR** **M**ultiple-**E**nergy **R**esilient **S**ystems

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D6.4

Stakeholder engagement and social assessment

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EXECUTIVE SUMMARY

This deliverable, *D6.4 Stakeholder engagement and social assessment*, presents a comprehensive framework for stakeholder engagement and socio-economic impact assessment (SEIA) in the context of developing Renewable Energy Valleys (REVs). As part of Work Package 6 (WP6), the Energy Valleys Toolbox, this deliverable provides practical tools, methodologies, and implementation guidance to ensure that the energy transition is not only technically and economically viable, but also socially inclusive, participatory, and widely accepted.

The document outlines a **seven-step stakeholder engagement methodology**, beginning with stakeholder mapping and frontrunner identification, and progressing through awareness raising, data collection, engagement activities, co-design of solutions, and iterative involvement of broader stakeholder groups, with specific attention to social inclusiveness. The approach emphasizes continuous, two-way interaction and the integration of social dimensions into technical planning.

A key component of the deliverable is the **Socio-Economic Impact Assessment (SEIA)** framework, which supports the evaluation of social, cultural, and economic impacts of energy initiatives. This includes standardized surveys and interviews to capture stakeholder motivations, barriers, and preferences, ensuring that solutions are aligned with local needs and values.

The deliverable also provides **tailored engagement tools and strategies** based on stakeholder influence and interest levels, using the Influence vs. Interest Grid. It includes illustrative examples from the Flagship Valley (FV) in Alkmaar-Heiloo, where some of the proposed engagement activities (such as World Café events, surveys, and co-creation workshops) have already been implemented.

D6.4 is closely interlinked with other REFORMERS deliverables and work packages, contributing to the co-development of sustainable, resilient, and replicable energy systems across Europe. It lays the foundation for inclusive energy transitions by embedding stakeholder voices into every phase of the REV development process.

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FIGURES

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TABLES

Acronyms	
AMPI	Adjusted Mazziotta–Pareto Index
ESG	Environmental, Social, and Governance
FV	Flagship Valley
HDI	Human Development Index
HRES	Hybrid Renewable Energy Systems
IAIA	International Association for Impact Assessment
JRC	Joint Research Center
KPI	Key Performance Indicator
LES	Local Energy System
NEETS	"Not in Education, Employment, or Training," referring to individuals, typically young people, who are not engaged in any form of education, work, or vocational training.
NGO	Non-Governmental Organisation
RET	renewable energy technologies
REV	Renewable Energy Valley
ROI	Return On Investment
RV	Replication Valley
SEIA	Socio-Economic Impact Assessment
SME	Small and medium enterprises
SO	Specific Objective
SSH	Social Sciences and Humanities
SSI	Semi-structured interview
ToC	Theory of Change
WP	Work Package

1. INTRODUCTION

REFORMERS (Regional Ecosystems FOR Multiple-Energy Resilient Systems) is a Horizon Europe-funded project that addresses one of the most pressing challenges of our time: transitioning to a decentralized, carbon-neutral, and resilient energy system across Europe. Involving a consortium of 28 partners across 10 countries, the project aims to demonstrate and replicate Renewable Energy Valleys (REVs) that can meet local energy needs entirely through renewable sources, through the development of tools and methodologies that support REV implementation.

Deliverable D6.4, part of Work Package 6 (WP6): Energy Valleys Toolbox, focuses on the development of tools and methods for stakeholder engagement and socio-economic impact assessment. This deliverable plays a pivotal role in ensuring that the transformation of local energy systems (LES) into REVs is not only technically and economically viable, but also socially inclusive, participatory, and widely accepted.

1.1. Purpose and scope of the deliverable

The purpose of D6.4 is to provide a structured approach to engage stakeholders -citizens, businesses, municipalities, energy communities, and other actors- in the co-creation and implementation of REVs. It also aims to assess the social and economic impacts of the proposed energy transitions, ensuring that the solutions are equitable, culturally sensitive, and aligned with local needs and values.

The deliverable includes:

- A multi-step stakeholder engagement methodology
- Various tools, instruments and methodologies for various forms of stakeholder engagement
- A co-creation methodology
- A Socio-Economic Impact Assessment (SEIA) framework tailored to REVs

1.2. Relation to other WPs and Tasks

Deliverable D6.4 is a central component of WP6: Energy Valleys Toolbox, and its development is deeply interlinked with several other Work Packages (WPs) and tasks across the REFORMERS project.

First of all, the different Toolbox tools are interlinked and provide mutual input to strengthen each other. In this deliverable, only the engagement tool and SEIA tool are discussed, but they provide input to and receive valuable input from the other three, being the energy planning tool (D6.1), the environmental assessment tool (D6.2) and the governance, legal & business model tool (D6.3). Figure 1 shows the identified interlinks between the tools discussed in this deliverable, and the other three.

	ENERGY SYSTEM DESIGN TOOL	ENVIRONMENTAL IMPACT ASSESSMENT TOOL	GOVERNANCE, LEGAL & BUSINESS MODEL ASSESSMENT TOOL	STAKEHOLDER ENGAGEMENT TOOL	SEIA TOOL
ENERGY TOOL				• Insight into positive and negative externalities • Input for information sessions/awareness & knowledge creation	• The technical KPIs to be considered to define Impact Flow, KPIs, baseline and trends
ENVIRONMENTAL TOOL				• Insight into positive and negative externalities • Input for information sessions/awareness & knowledge creation	• The environmental KPIs to be considered as input for the socio economic impact assessment
GOVERNANCE, LEGAL & BUSINESS MODEL TOOL				• Input for information sessions/awareness & knowledge creation	• Look for business cases behind the impact assessment to enhance the business model
ENGAGEMENT TOOL	• Support discussion on selection and importance of KPIs	• Support discussion on selection and importance of KPIs in environmental analysis.	• Stakeholder analysis for models • Support feedback activities • Identify stakeholders' needs and barriers to deployment support for governance and business models		• Stakeholder mapping for the context analysis • Structured connection with engaged stakeholders useful for SEIA data collection
SEIA TOOL	• Assessment of the socio-economic impact of the chosen technologies and designed energy system	• Assessment and evaluation of mutual interactions among environmental KPIs and socio-economic KPIs	• Assessment of the socio-economic impact of the chosen governance, legal and business model • Supporting decision making process, through a wider assessment of the socio-economic impact of the project	• Data set (baseline, trends and monitoring) to strengthen key stakeholder engagement	

Figure 1 REFORMERS Toolbox interlinks of the stakeholder engagement tool and the SEIA tool

WP2 – Communication, Dissemination, and Exploitation

WP2 supports D6.4 by providing communication channels and dissemination strategies to inform and engage stakeholders effectively. The training materials and outreach activities developed in Task 2.2 and Task 2.3 are aligned with the engagement framework of D6.4, ensuring consistent messaging and broad, representative participation.

WP3 – Setting up the Flagship Valley

D6.4 provides input to the stakeholder mapping and engagement activities initiated in WP3, particularly Task 3.2, which includes stakeholder analysis and engagement in the Flagship Valley. The insights gathered during the early phases of the flagship setup also directly inform the design of the stakeholder engagement methodology and co-creation process in D6.4. Furthermore, the social objectives and preferences identified in WP3 are integrated into the technical design processes supported by the tools developed in WP6.

WP4 – Implementation and Operation of the Flagship

WP4 provides the real-life context in which the stakeholder engagement strategies and social impact assessment tools are validated. Task 4.4, which addresses the social, financial, and legal dimensions of the Flagship Valley and their fundamental interdependencies, is of particular relevance. The feedback loops between WP4 and WP6 ensure that the stakeholder engagement framework is grounded in practical implementation realities and that social acceptance and behavioural insights are continuously fed into the operational strategies.

WP5 – Digital Twin for Energy Valleys

The digital twin developed in WP5 benefits from the stakeholder engagement insights provided by D6.4. Understanding user behaviour, preferences, and social dynamics enhances the accuracy and relevance of the digital twin's forecasting and scenario analysis capabilities. In turn, WP5 provides data and simulation outputs that can be used to inform stakeholder discussions and participatory decision-making processes.

WP7 – Replication Assessment with Replication Valleys

D6.4 plays a foundational role in WP7 by providing the stakeholder engagement and social assessment tools that can be applied and validated across the seven RVs. Tasks 7.4 and 7.5, which focus on social impact assessment and community capacity building, directly utilize the methodologies developed in D6.4. The feedback from the replication sites is essential for refining and generalizing the tools for broader applicability.

WP8 – Replication Potential and Pathways

D6.4 contributes to WP8 by laying out the groundwork for socially inclusive replication strategies. The tools and frameworks developed here, such as the Influence vs. Interest Grid, the SEIA indicators, and the co-design methodology, are designed to be adaptable and scalable. They provide a foundation for WP8 by:

- Informing the development of inclusive governance models for future REVs
- Supporting policy recommendations based on observed stakeholder motivations and barriers
- Offering replicable engagement formats tailored to different socio-cultural contexts
- Contributing to the definition of SSH-informed KPIs for replication success

These elements will be further validated and refined through WP7, and the insights gained will feed directly into WP8's long-term vision and replication pathways.

D6.4 contributes directly to several **Specific Objectives** (SOs) of the project, notably:

- **SO2**: Understanding and valuing cumulative socio-economic and environmental impacts.
- **SO3**: Co-developing sustainable quadruple helix ecosystems.
- **SO5**: Understanding user behaviour to reach high levels of user acceptance.
- **SO7**: Providing tools and methods for regions to transform into energy valleys.

1.3. Structure of the deliverable

This deliverable is structured as follows:

1. **Stakeholder engagement**

    a. **Methodological framework:** Description of the general engagement process approach

    b. **Stakeholder mapping:** Identification and profiling of relevant stakeholders

c. **Awareness raising & first engagement step:** Getting stakeholders informed and involved

d. **Stakeholder motivation identification analysis:** Identifying the needs and barriers that (de)motivate actors in joining a collective energy initiative

e. **Engagement tools and activities for trust and interest building:** Overview of potential general as well as tailored engagement tools and activities

f. **Co-design of solutions:** Overview of steps and tools for the co-design of collective energy initiatives

2. **Socio-Economic Impact Assessment (SEIA):** Evaluation of social, cultural, and economic impacts of the designed energy solution

   a. **Introduction to the tool** with objective and structure

   b. **Framework and methodology**, including a state-of-the-art review and matching with international indicators

   c. **Stakeholder engagement in SEIA** detailing activities, phases and alignment with overall strategy for engagement

   d. **Step-by-step guidelines** to run a SEIA for REVs

   e. **SEIA KPI list** and categorisation

   f. **Monitoring, evaluation and reporting**, including annexes with examples and templates

This deliverable focuses specifically on describing and providing tools, methods, instruments, etc. for integrated stakeholder engagement and socio-economic impact assessment. The related training materials, as well as the description of implementation results in the FV and RVs are part of other, later, deliverables (e.g., D7.4 and D7.5). Here, only a **few illustrative examples of FV implementation** are presented, intended to make the described tools more tangible and insightful. It should be noted that this Deliverable D6.4 does not provide a detailed explanation of the rationale and contextual factors behind the selection of these specific FV tools, as these elements are addressed in dedicated deliverables that focus specifically on the rollout and implementation of the FV.

1.4. Embedding Social Sciences and Humanities (SSH) perspectives

The REFORMERS project recognizes that the energy transition is not only a technical challenge but also a deeply social one. To ensure that REVs are inclusive, resilient, and widely accepted, the integration of Social Sciences and Humanities (SSH) perspectives is essential throughout the stakeholder engagement and co-design process, and is to be placed at the forefront.

SSH disciplines, such as sociology, anthropology, political science, ethics, and behavioural economics, offer critical insights into how people perceive, interact with, and respond to energy systems. These perspectives help uncover power dynamics, cultural narratives, trust relationships, and behavioural patterns that influence stakeholder participation and decision-making.

In REFORMERS, SSH integration is reflected in several ways:

- **Behavioural insights** inform the design of engagement tools and communication strategies, ensuring they resonate with diverse stakeholder motivations and values.
- **Ethical considerations** guide data collection and consent processes, ensuring transparency, privacy, and respect for autonomy.
- **Social impact indicators** are embedded in the SEIA framework, capturing dimensions such as equity, community cohesion, and perceived fairness.
- **Participatory formats** are designed to foster dialogue, mutual learning, and empowerment, rather than one-way consultation. Social inclusiveness is an important focus point
- **Reflexive learning loops** are built into the engagement process, allowing for continuous adaptation based on stakeholder feedback and evolving social dynamics.

By embedding SSH perspectives into the core of the engagement methodology, REFORMERS ensures that the energy transition is not only technically sound but also socially just, culturally sensitive, and democratically grounded.

2. STAKEHOLDER ENGAGEMENT

From a methodological perspective, the actor, whether a citizen, business, public authority, or knowledge institution, should be positioned at the center of the process of setting up REVs, from the start. Stakeholder engagement is not a separate or secondary activity, but a parallel and integral process that evolves alongside the technical development of the energy systems. This dual-track approach ensures that social, institutional, and behavioral dimensions are embedded into the design and implementation of technical solutions from the outset. Without the support of the actors responsible for implementation, even the most technically advanced solutions are of little use. Throughout the project lifecycle, the actor remains a red thread, continuously involved in shaping, testing, and refining solutions.

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The multi-actor approach, embodied in the quadruple helix model that fosters collaboration between citizens, industry, government, and academia, is essential as it enables the co-creation of resilient, scalable, and locally embedded energy solutions, while also establishing the foundation for lasting governance structures and replication across Europe. Additionally, social inclusiveness must be a guiding principle. Engagement efforts must actively involve diverse stakeholder groups, including those who are often underrepresented in energy planning processes. This inclusivity strengthens legitimacy, fosters equity, and ensures that the transition reflects the needs and aspirations of the entire community. These needs are often path dependent, so the history and context of the situation must be taken into account.

Within this ongoing engagement, learning and commitment are not isolated outcomes but essential, iterative components that reinforce trust, ownership, and long-term sustainability.

2.1. Methodological framework

Within the REFORMERS project, we developed a structured stakeholder engagement methodology designed to ensure meaningful participation, co-creation, and long-term commitment across diverse actors and throughout the different project phases. The framework is built around a phased approach that balances strategic planning with iterative engagement, ensuring that all stakeholder groups are effectively involved throughout the project lifecycle.

The engagement methodology is structured around seven steps, with specific tools and instruments identified for most of them in the following sections. It is informed by principles of **Action Research**, which emphasize iterative cycles of planning, acting, observing, and reflecting. This approach positions stakeholders not only as participants but as co-researchers who help shape the process and outcomes.

Step 1: Stakeholder mapping

The process begins with a comprehensive mapping of stakeholders relevant to each REV. This includes, e.g., public authorities, energy providers, technology developers, research institutions, citizen groups, and other local actors. The mapping identifies roles, interests, influence levels, and potential contributions, forming the basis for targeted engagement strategies. These stakeholders mustn't be just identified according to their potential technical role in the system, but also to achieve a socially inclusive classification with distinctions between, for example, homeowners with investment power and citizens with less socio-economic strengths.

Step 2: Identification of potential frontrunners

From the mapped stakeholders, frontrunners are identified: within various stakeholder groups a select set of representatives that demonstrates high interest and capacity to drive innovation and adoption, is chosen to form a ‘frontrunner group’. These frontrunners act as a test bed for engagement activities and the co-design of energy solutions, allowing lessons learned to inform broader roll-out to all stakeholders. Serving as pioneer collaborators and a showcase, they help catalyze wider community involvement.

Step 3: Awareness raising & first engagement step

Initial engagement activities focus on raising awareness about the general project, its goals, and the opportunities for participation. Tailored communication materials and events are used to build trust and stimulate interest among both the frontrunners and the wider stakeholder community. A Citizens' Assembly initiative can also be set up at this stage, to run alongside the frontrunner approach in the next steps.

Step 4: Technical and social data collection and analysis

Engaged stakeholders contribute to the collection of both technical and social data. This includes energy consumption patterns, infrastructure characteristics, community needs, unemployment, energy poverty, stakeholder motivations, and behavioural insights. The data informs the design of context-specific solutions and the assessment planning through developed tools, and it provides input to decide on further relevant engagement activities.

Step 5: Identification and implementation of relevant engagement tools and activities for trust and interest building

Based on the data collected and the role and position of a stakeholder group, appropriate engagement tools and activities are selected that can help build trust and interest in the project among various relevant actors. These may include, e.g., workshops, digital platforms, surveys, and participatory discussion sessions. The tools are chosen to foster collaboration, inclusivity, and transparency. They can assist in initiating as well as facilitating participation.

Step 6: Co-design of solutions

Stakeholders actively participate in the co-design of energy solutions tailored to their local context. This phase emphasizes mutual learning, creativity, and the integration of technical and social dimensions. The co-designed solutions aim to be both technically viable and socially accepted, and are based on consensus-building mechanisms.

Step 7: Iteration of steps 4 to 6 with non-frontrunner stakeholders

Once frontrunner engagement has yielded initial insights, the process is extended to the broader stakeholder community. This ensures that solutions are refined, validated, and scaled through inclusive participation, enhancing legitimacy and adoption potential. It is important that special attention is given to groups that are typically underrepresented in energy planning processes, through a **social inclusiveness scaling strategy**.

Step 7 can encompass a full repetition of steps 4 to 6, but does not necessarily have to. In line with Rogers' Diffusion of Innovations model (Rogers et al., 2008), the engagement process can also (partly) spread organically as enthusiasm and peer influence grow. In this case, the role of the project team is primarily **facilitative**, providing light-touch support, guidance, and resources to sustain momentum and reinforce engagement where needed. According to Rogers' Diffusion of Innovations theory, the adoption of new ideas or technologies typically follows a bell curve, with stakeholders falling into five categories:

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innovators, early adopters, early majority, late majority, and laggards. In REFORMERS, frontrunner stakeholders correspond to innovators and early adopters. Their successful engagement and visible participation are essential to catalyze the interest of the early majority, being the broader stakeholder groups reached in Step 7. Social inclusiveness scaling strategy is essential to also reach the late majority and laggards.

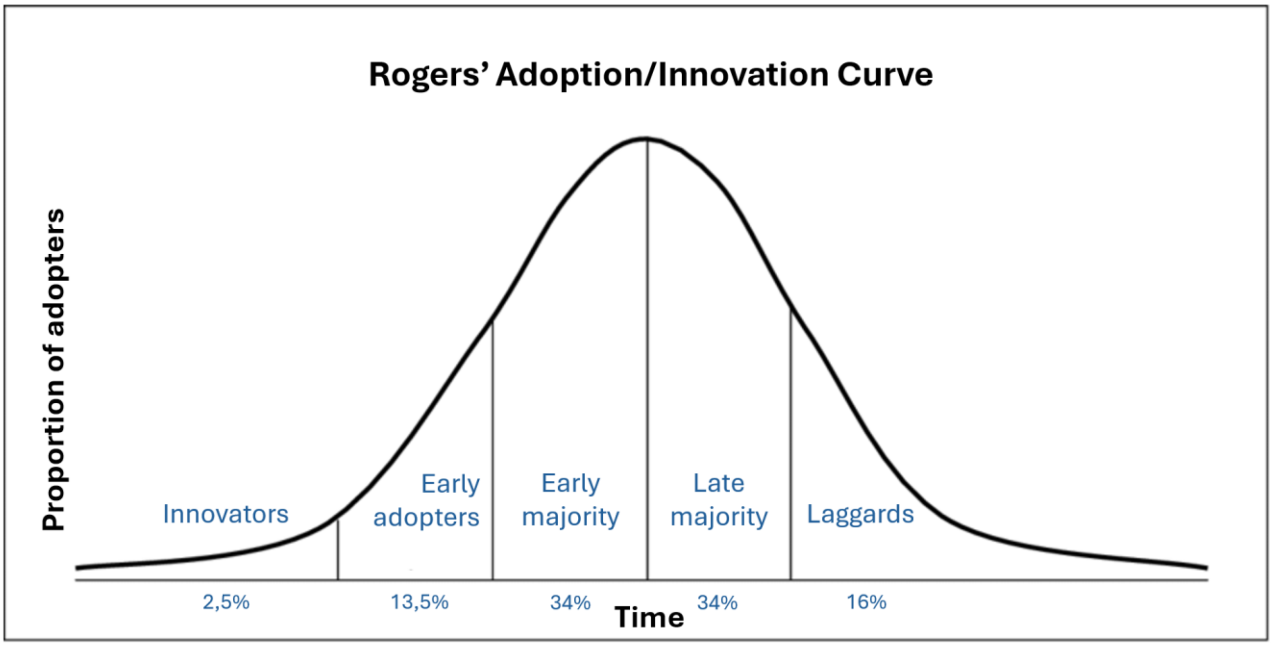

Figure 2 Rogers' Adoption/Innovation Curve. Adapted from Rogers (2008)

Rogers' theory underpins our phased engagement strategy, where initial co-creation with frontrunners is followed by broader outreach and support mechanisms tailored to later adopters.

The various general steps of this approach also align with the different phases identified within REFORMERS for the setup of an energy valley transformation (see Figure 3). This figure also showcases the importance of interlinking stakeholder engagement with all other, e.g. technical, activities that are considered part of each phase, making it an integral and central part of all process stages. The lower half of this schedule (representing the implementation level) also aligns with the general methodology that is presented in D4.4 for the Flagship Valley systems setup.

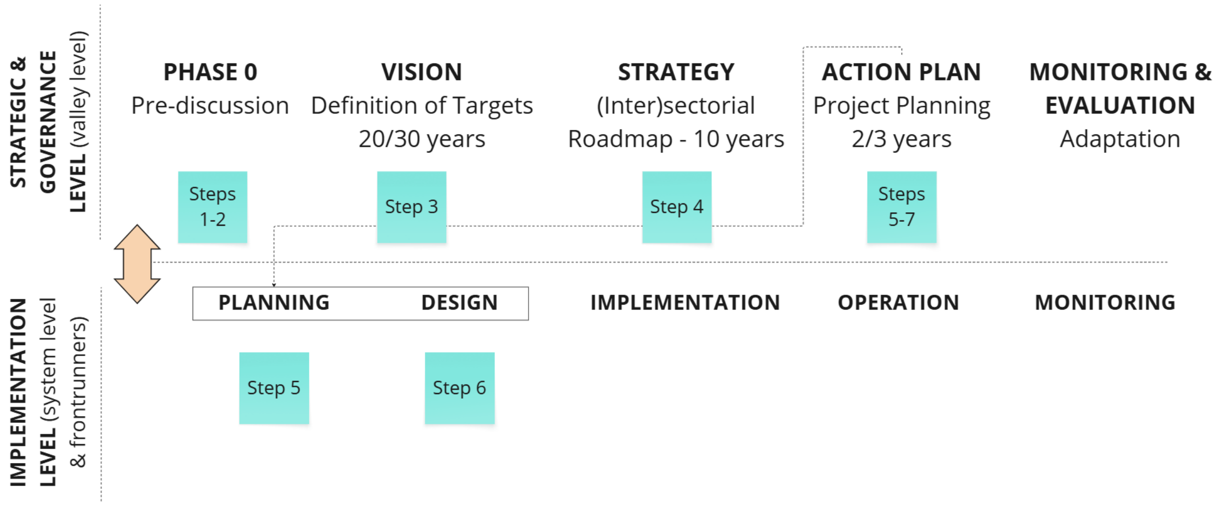

Figure 3 Energy valley transformation phases and engagement approach steps

2.2. Stakeholder mapping

Stakeholder mapping is a foundational step in the engagement process, as it enables you to identify, understand, and strategically engage the individuals, groups, and organisations that influence, or are influenced by, the development of local energy systems. Before you can set up participatory actions, you have to know who you are doing it for and why.

This subchapter outlines the methodology and rationale behind the stakeholder mapping process conducted within REFORMERS. It aims to ensure that all relevant actors are recognised early in the project lifecycle, their interests and influence are assessed, and their potential roles are clearly defined. It's important to note that while stakeholder mapping is performed at the start of the engagement process, it is a continuous exercise repeated throughout the project. As the project evolves, actor roles may shift and stakeholder influence can change, requiring regular updates to the mapping.

The **purpose** of the mapping process includes:

- *Identification of stakeholders*: Stakeholder mapping helps identify and categorize key stakeholders involved in the REV initiative. This may include government bodies, local companies, local communities and residents, energy companies, research institutions, environmental organizations, and others.
- *Understanding interests and influence*: By mapping stakeholders, you can understand their interests, concerns, and the level of influence they have on the REV project. This knowledge is essential for effective communication, collaboration, and conflict resolution.
- *Building alliances and partnerships*: Stakeholder mapping facilitates the identification of potential allies and partners who can contribute resources, expertise, or support to the REV project. This helps in creating a network of stakeholders working towards common goals.

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- *Mitigating risks and challenges*: Assessing the stakeholders allows you to identify potential risks and challenges that may arise during the setup of the REV. Understanding these risks early on enables proactive planning and risk mitigation strategies. It also allows to identify the hurdles and reluctance different actors currently experience, that hold them back from joining an REV initiative. This information helps in developing communication and deployment plans that focus on overcoming these hurdles.
- *Promoting inclusivity and engagement*: Stakeholder mapping promotes inclusivity by ensuring that a diverse range of stakeholders are considered and involved in the decision-making process. This inclusivity is essential for garnering support from various sectors and maintaining social acceptance.
- *Policy advocacy and regulatory compliance*: Mapping stakeholders helps in understanding the regulatory environment and policy landscape. Engaging with relevant governmental bodies and regulatory agencies ensures compliance with regulations and facilitates the necessary approvals for the REV project.
- *Community and social impact assessment*: Local communities are often key stakeholders in energy projects. Mapping these communities helps in assessing the potential social and environmental impacts of the REV. This information is vital for developing sustainable and socially responsible initiatives.
- *Effective communication*: Understanding the diverse stakeholders allows for tailored and effective communication strategies. Different stakeholders may require different approaches, and a well-informed communication plan can foster transparency and support for the REV initiative.

2.2.1.1. Methodology: Influence vs. Interest Grid

To ensure a structured and strategic approach to stakeholder engagement, we have adopted the ‘Influence vs. Interest Grid’ as the primary stakeholder mapping methodology. This well-established tool provides a visual and analytical framework for categorizing stakeholders based on two key dimensions:

- **Influence**: The degree of power or capacity a stakeholder has to affect the outcomes of the project.
- **Interest**: The level of concern, involvement, or benefit a stakeholder perceives in relation to the project’s objectives and activities.

By plotting stakeholders on a two-dimensional grid (see Figure 4), the project team can identify which actors should be:

- **Managed closely** (high influence, high interest),
- **Met in their needs/kept satisfied** (high influence, low interest),
- **Kept informed** (low influence, high interest), or
- **Monitored with minimal effort** (low influence, low interest).

This classification supports the development of tailored engagement strategies that align with each stakeholder group’s expectations, motivations, and potential contributions. It also helps anticipate areas of resistance or support, prioritize communication efforts, and allocate resources efficiently.

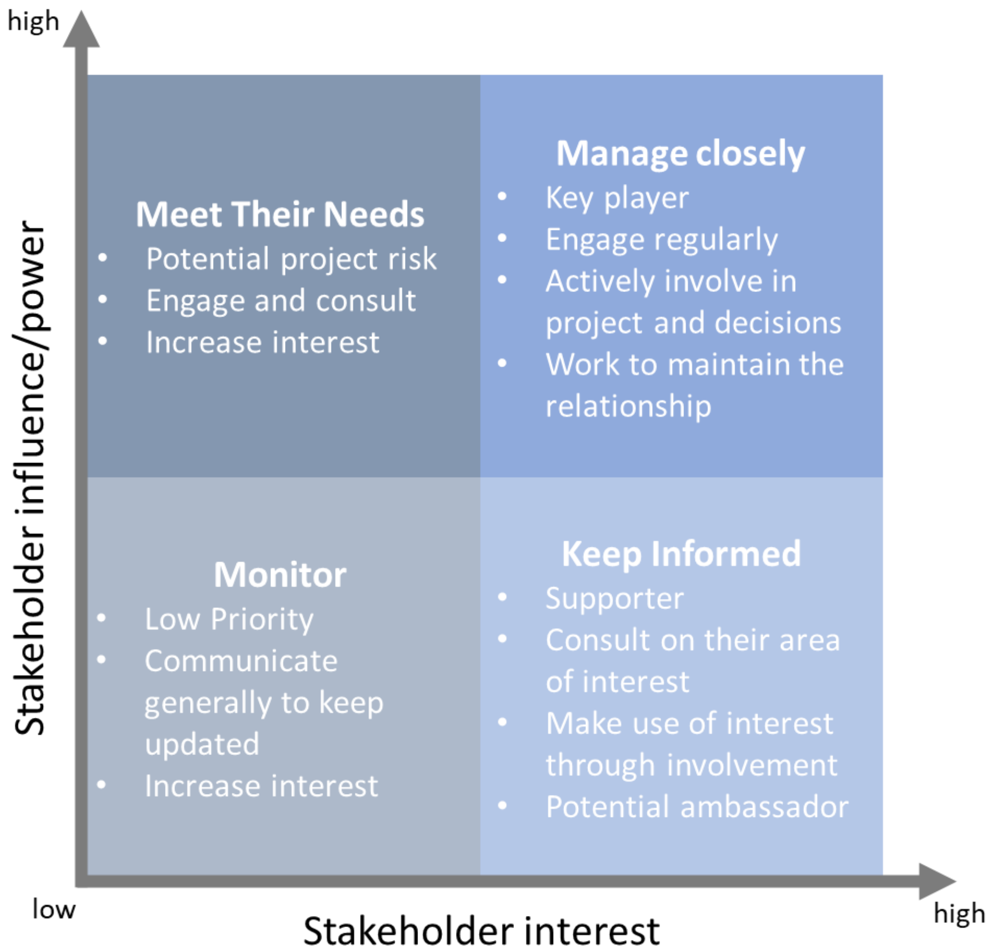

Figure 4 Influence vs. Interest Grid – Related engagement strategies

While the Influence vs. Interest Grid provides a clear and accessible framework for stakeholder categorization, it is important to recognize that both dimensions, influence and interest, can be further nuanced during the discussion phase. For example, influence may stem from different sources such as financial capacity, institutional power, regulatory authority, or the ability to shape cultural norms and public opinion. Similarly, interest can be driven by personal values, strategic alignment, community identity, or direct impact on daily life. Although these subdivisions are not visualized in the matrix itself to preserve its usability in brainstorming sessions, they can be introduced during stakeholder workshops or internal analysis to enrich understanding and guide tailored engagement strategies.

2.2.1.2. Frontrunner selection

Following the stakeholder mapping, a select group of **frontrunners** can be identified within each of the stakeholder groups targeted for initial engagement efforts. These are individuals or organizations that show a strong interest and have the capacity to test and lead by example. Brought together as a ‘frontrunner group’, they serve as early collaborators in engagement activities and the co-creation of energy solutions. Their involvement acts as a testing ground, helping to refine approaches and gather insights that can guide broader community engagement. As visible pioneers, they play a key role in inspiring and mobilizing wider participation. These frontrunners can often find a place as a specific group in the ‘high influence, high interest’ quarter of the Influence vs. Interest Grid.

2.2.1.3. Implementation example in the FV

First, a **general list** of all relevant stakeholder groups was created. In the next step, each of these groups was given a place within the **Influence vs. Interest Grid**, and as a final step, a list with concrete names and **contact details** for representatives of each of the identified stakeholder groups was compiled.

An initial draft of a general list of relevant stakeholder groups was jointly developed by the partners involved in T4.4 and those responsible for T6.4. This list was subsequently presented to and discussed with all WP4 consortium partners during an on-site meeting on February 26th, 2024, for review and further input. These results formed the basis for a first ‘Influence vs. Interest Grid’ exercise, performed by the T4.4 and T6.4 partners, of which the outcome can be seen in Figure 5.

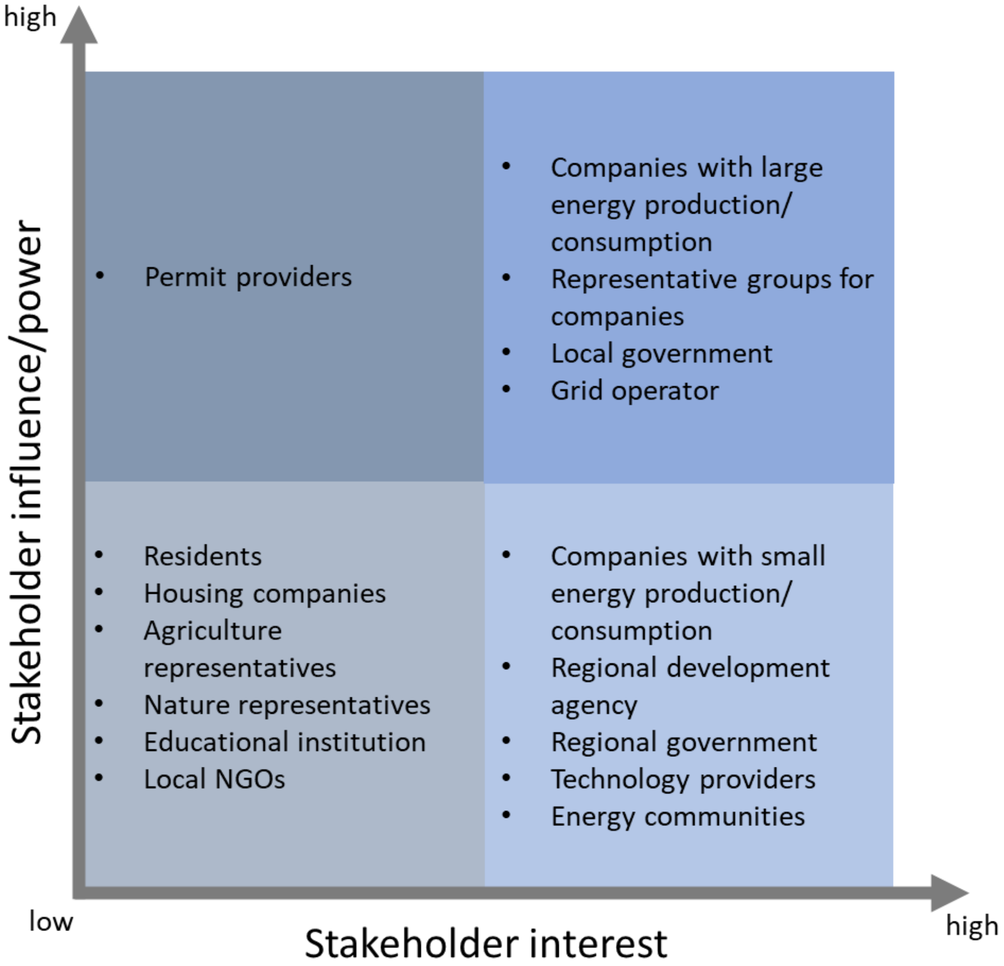

Figure 5 FV Influence vs. Interest Grid – 1st exercise results

In parallel, for all featured groups, contact details of representatives were collected, with the help of WP4 partners.

The groups categorized as ‘high influence, high interest’ were discussed in more detail, to identify **potential frontrunners**. Starting from the companies with large energy production or consumption as a basis, various ‘**frontrunner companies**’ groups were identified (see Deliverable 4.4 for more explanation on their specific selection and composition).

During the development of the engagement approach for all categories, it became evident that specific groups of residents also fell into the 'High Influence–High Interest' category. Two groups of '**frontrunner residents**' have been identified: residents of Plan Oost (Heiloo), where a home battery will be installed as part of the REFORMERS project, and social housing residents in Overdie, for whom the project aims to enable connection to the heat network.

As part of the project's ongoing stakeholder monitoring and mapping efforts, a second 'Influence vs. Interest Grid' exercise was conducted one year later, in May 2025, to reflect changes in stakeholder roles and updates in the stakeholder process approach. The outcome of this second exercise is depicted in Figure 6. For example, the frontrunner groups have now been identified as distinct stakeholder groups requiring a tailored approach. In addition, a better understanding of the regional specificities has led to the identification of housing companies as high-power actors in Overdie.

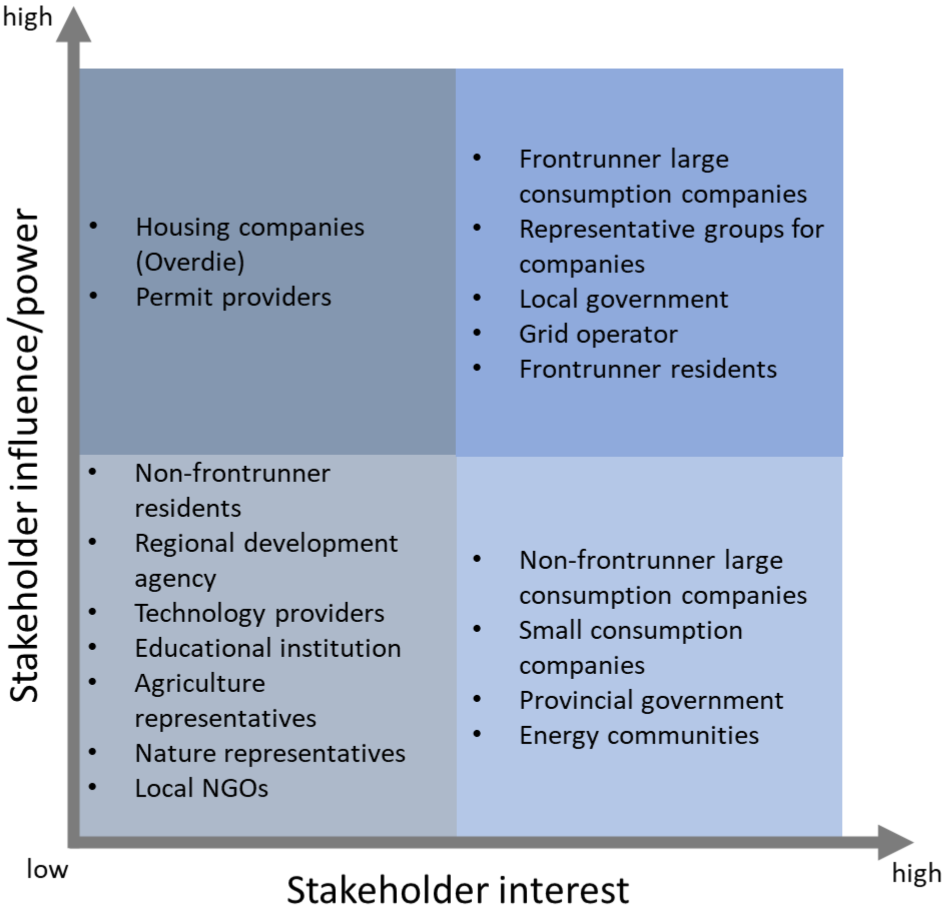

Figure 6 FV Influence vs. Interest Grid – 2nd exercise results

2.3. Awareness raising & first engagement step

2.3.1. Awareness raising

Awareness raising is a foundational step in the REFORMERS stakeholder engagement methodology, serving as the critical bridge between project initiation and active participation. In the context of complex energy transitions, where technical innovation intersects with social acceptance, early and effective awareness efforts are essential to build trust, foster understanding, and stimulate interest among diverse stakeholder groups.

Awareness raising ensures that stakeholders understand the project's objectives, relevance, and potential benefits. This shared understanding is key to overcoming scepticism, addressing misconceptions, and aligning expectations. Moreover, awareness activities help identify and activate frontrunner stakeholders who are willing to engage early and co-create solutions. These frontrunners often become ambassadors within their communities, amplifying the project's visibility and credibility. By using tailored communication strategies, such as local events, digital campaigns, and accessible educational materials, stakeholders can be reached in a way that resonates with their values and priorities.

In the context of stakeholder engagement, awareness raising is not about promoting predefined solutions or technologies. Instead, it is about initiating a shared journey; one that begins with listening, mutual understanding, and the co-development of a local vision for the energy transition. The goal is to create a safe and inclusive space where stakeholders feel invited to explore the project's relevance to their own lives, communities, and values.

Key principles guiding awareness raising include:

- *Transparency*: Clearly communicating project goals, limitations, and opportunities.
- *Accessibility*: Using inclusive formats and language tailored to different stakeholder groups.
- *Trust-building*: Engaging through familiar community channels and trusted intermediaries.
- *Co-visioning*: Facilitating early discussions that allow stakeholders to express their values, concerns, and aspirations.
- *Empowerment*: Encouraging stakeholders to take initiative and contribute ideas from the outset.

Ultimately, awareness raising is not a one-time effort but a **continuous process** that supports transparency, inclusivity, and long-term engagement. It lays the groundwork for meaningful dialogue, informed decision-making, and the co-design of energy solutions that are both technically sound and socially accepted.

Part of the awareness raising aspect is covered in WP2, which supports visibility and outreach through a specific focus on external communication, branding, and dissemination. Tools, techniques and a full dissemination and communication plan for REFORMERS are included in finalised deliverables D2.2 and D2.4.

2.3.2. First engagement step

Before launching into a structured and in-depth stakeholder engagement process, it is essential to organize an initial live meet-up with interested stakeholders from all identified groups. This is a gathering designed not for decision-making, but for acquaintance, orientation, and trust-building. This early interaction serves as a cornerstone for the collaborative journey ahead, laying the groundwork for meaningful participation and long-term commitment.

The primary **purpose** of this first meeting is to:

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- *Introduce the project* in an accessible and transparent way, clarifying its goals, scope, and relevance to the local context.
- *Create a shared space* where stakeholders can meet each other, exchange perspectives, and begin forming relationships.
- *Foster trust and openness*, which are critical for successful co-creation and conflict resolution later in the process.
- *Build a common understanding* of the energy transition challenges and opportunities, helping stakeholders align on key concepts and terminology.
- *Identify initial expectations and concerns*, which can inform the design of future engagement activities.

The live setting fosters a sense of informality that helps lower barriers to participation; particularly for stakeholders who may be unfamiliar with the technical or policy aspects of energy systems. It also conveys that their input is valued from the outset and allows them to 'put a face' to the project, making it easier to reach out to project representatives with questions or concerns throughout the process.

2.3.2.1. Tools and methodologies

To support the goals of the first engagement step, a variety of tools and activities can be employed. These methods are designed to foster informal yet meaningful interaction, encourage open dialogue, and create a welcoming environment for all stakeholder groups. Below are several proposed tools and formats.

Information Event

An information event serves as a tool to raise awareness, disseminate knowledge, and introduce stakeholders to the project in an accessible and low-threshold setting. Such events provide participants with essential background on the project's objectives, planned activities, and expected benefits, while also signaling openness and transparency. The focus is on creating an inviting atmosphere where stakeholders can familiarize themselves with the initiative without the expectation of active contribution. These events are particularly effective in the early phases of engagement, as they build trust, reduce barriers to participation, and allow for informal interactions between project representatives and the community.

Round Table

A round table is a participatory methodology designed to facilitate dialogue, exchange of perspectives, and co-reflection among stakeholders in a structured yet informal setting. Unlike information events, round tables require active participation and encourage stakeholders to share their insights, concerns, and ideas on equal footing. This tool is especially useful for exploring diverse viewpoints, identifying shared objectives, and addressing potential conflicts. The format promotes inclusiveness, as each participant is given space to contribute, and it often leads to a deeper understanding of stakeholder priorities.

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Links with practical background information on the format:

- Engaging Stakeholders with Roundtable Discussions – Detailed guide on preparation, inclusivity, and facilitation techniques.
- How to Host a Roundtable Discussion in 8 Easy Steps – Practical steps for organizing effective roundtable sessions.

World Café

The World Café is a structured conversational process that facilitates open and creative dialogue around key questions in small, rotating groups. Participants are seated at tables (like a café), and after a set time, they rotate to a new table, bringing insights from their previous discussion. Each table focuses on a specific question or theme related to the project. This format encourages cross-pollination of ideas, builds connections, and helps surface shared concerns and opportunities in a relaxed setting. It is particularly effective for large, diverse stakeholder groups and helps build a sense of collective ownership early on.

Links with practical background information on the format:

- World Café Method – Official Guide – Principles and steps for hosting World Café sessions.
- Guide to the World Café Method (FSG) – When and how to use World Café for inclusive dialogue.

Interactive Project Fair

An informal "project fair" setup allows stakeholders to explore different aspects of the REV project through thematic booths or stations. Each station can present a specific topic, e.g. energy transition goals, local challenges, or planned technologies, using posters, videos, or interactive displays. Project team members are available at each station to answer questions and collect feedback. This format promotes curiosity, lowers barriers to engagement, and allows participants to engage at their own pace.

Links to examples of similar local initiatives:

- Energy Efficiency Fair in Lewes – interactive event focused on energy efficiency with local energy organisations targeted at local homeowners
- Community Energy Roadshows in Leicestershire – interactive event focused on community/energy collaboration in roadshow form

Storytelling Circles

Storytelling circles invite stakeholders to share personal experiences or community stories related to energy use, sustainability, or local challenges. These sessions help surface emotional and cultural dimensions of the energy transition, which are often overlooked in technical discussions. They also foster empathy and mutual understanding among participants, laying out the groundwork for trust and collaboration.

Links with practical background information on the format:

- Story Circles Toolkit (OSU) – How to facilitate storytelling circles for community engagement.
- How—and Why—to Facilitate a Story Circle – Practical steps and cultural context for story circles.

Mapping exercises

Participatory mapping activities allow stakeholders to visually identify and annotate local assets, challenges, and opportunities related to energy systems. Using printed maps or digital tools, participants can mark locations of interest (e.g., renewable energy installations, areas of concern, community hubs). This helps build spatial awareness and provides valuable input for later technical planning stages.

Link with practical background information on the format:

- Participatory Mapping: Best Practices, Tools & Examples – Overview of participatory mapping methods and tools
- NOAA Guide – Guide With Stakeholder Engagement Strategies for Participatory Mapping

Icebreaker games and networking activities

Simple icebreaker games or structured networking rounds can be used to help participants get to know each other. These activities are especially useful in multi-stakeholder settings where participants may not have interacted before. They help reduce social distance, encourage informal conversation, and create a more relaxed atmosphere for future collaboration.

Link with practical background information on the format:

- 67 Engaging Icebreakers for Workshops – A curated list of icebreaker activities for workshops.

Open Mic or "Energy Café" sessions

An open mic format allows stakeholders to voice their thoughts, questions, or ideas in a casual setting. These sessions can be framed as "Energy Cafés", where participants are invited to speak freely about their hopes, concerns, or expectations regarding the energy transition. This format signals openness and inclusivity, and helps identify early themes for deeper engagement.

Link with practical background information on the format:

- Hosting Energy Cafés – CEES Toolkit – Best practices for organizing informal Energy Café sessions.

All of these tools are not mutually exclusive and can be combined or adapted to suit the local context and stakeholder composition of each REV. The key is to create a welcoming, inclusive, and interactive environment that encourages participation and sets the tone for the collaborative journey ahead.

2.3.2.2. Citizens' Assembly

A specific instrument to highlight is the formation of a Citizens' Assembly. The tools mentioned in section 2.3.2.1 work for interested stakeholders from all identified groups. However, not all actors feel empowered enough to volunteer to participate in these types of activities. To make sure that those who are often left behind in the energy transition, such as low-income households, elderly people, migrant communities, etc., are not alienated from the process from the start, rolling out an instrument such as a Citizens' Assembly can help **foster inclusion and sense of ownership**.

A Citizens' Assembly is a participatory governance instrument that brings together a diverse group of local residents to deliberate on complex societal issues, such as in this case the local energy transition. It is a structured form of citizen engagement that goes beyond consultation, offering participants real influence over decisions that affect their community. This Assembly can serve as a **complementary engagement mechanism** alongside frontrunner groups. While frontrunners are often early adopters with a strong interest in innovation, Citizens' Assemblies are designed to reflect the broader diversity of the community, including those who may be less extrovert, less informed, or more sceptical about energy initiatives.

A Citizens' Assembly typically consists of 15-30 randomly selected residents, chosen to reflect the demographic and socio-economic diversity of the local population. As a remark about representativeness, the recent project CLIMAS deeply reflects on how to increase inclusivity of Citizen Assemblies and ensure higher participation of vulnerable to exclusion groups (project CLIMAS, 2025). Participants are invited to take part in a series of facilitated sessions where they:

- Receive balanced, accessible information about the energy transition and local plans.
- Hear from experts, stakeholders, and peers.
- Deliberate in small groups and plenary discussions.
- Formulate recommendations or priorities for the local energy strategy.

The process is guided by trained facilitators and supported by independent experts to ensure neutrality, inclusiveness, and transparency. In the REV context, a Citizens' Assembly can be established at the district or neighbourhood level, particularly in areas where large-scale energy interventions are planned (e.g., installation of home batteries, heat networks, or shared solar infrastructure). The Assembly can be initiated through a public call at a district meeting, with invitations distributed via local channels and trusted intermediaries.

The **purpose** of a Citizens' Assembly is:

- *Democratizing decision-making* by giving ordinary citizens a structured voice.

- *Building trust* in the process by demonstrating transparency and responsiveness.
- *Surfacing local knowledge* and lived experiences that may be overlooked in expert-driven planning.
- *Creating social legitimacy* for energy initiatives, especially when difficult trade-offs are involved.

Moreover, research shows that Citizens' Assemblies can increase public understanding, reduce polarization, and foster a sense of ownership over complex policy issues. In the REFORMERS context, this can lead to higher acceptance, stronger community buy-in, and more resilient energy systems.

2.3.2.3. Implementation example in the FV

In the Alkmaar FV, this first engagement step took different forms:

Representatives of all stakeholder groups except residents were invited to a World Café event on October 1st 2024, to familiarize participants with the stakeholders and their energy-related concerns and ideas. A total of 26 representatives from local businesses, government organisations, residential groups, educational institutions, and others gathered in a local venue situated in the REV area. They had the opportunity to meet, have some free food and drinks, and jointly discuss how REFORMERS can help address pressing local energy challenges. The aim of the evening was to introduce participants to the project, foster informal connections among them, and gain insights into their relevant energy concerns.

The event proceeded as follows: After a word of welcome from the consortium and the municipality of Alkmaar, and an introduction to the REFORMERS project, two interactive sessions were held. In the first one, participants were clustered in homogenous groups according to the stakeholder group they represented, and got to discuss the following topics:

1. Are you experiencing energy-related problems? If so, what are these problems, and what do you see as possible solutions?
2. Do you have specific energy needs? If so, what are these needs, and how would you like REFORMERS to address them?
3. Are you willing to contribute to the setup and implementation of REFORMERS? If so, what kind of effort (time, effort, tasks) are you willing to invest?

In the second session new groups were formed, with a mix of stakeholder types, and the following topics were discussed:

1. Based on the introduction, what do you think the impact of the project could be on the entire Alkmaar valley/community?
2. What do you see as challenges and opportunities for collaboration?

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Figure 7 Interactive sessions at general World Café event

For the **residential stakeholders**, an information session was organised on April 17th, 2025, chaired by Duurzaam Heiloo. Invitations were distributed through a neighborhood event, two ads in the local newspaper, and personal letters delivered to the mailboxes of Plan Oost residents. The main goal of the evening was to familiarize people with the project in an accessible way, without requiring active participation, and identifying who is willing to become part of the frontrunner group.

The evening opened with an introduction to the REFORMERS project, followed by presentations on the planned Teleport installation and an overview of the components that could become available to participating households through REFORMERS, including home batteries, thermal storage systems, and integration with smart management tools like Teleport Home. In the subsequent interactive sessions, participants had a chance to ask questions and explore the potential of different energy systems:

1. Home Batteries (Focused on how households can store solar energy for personal use or sell it back to the grid).
2. Teleport Home (Showcasing how this smart home system enables users to manage and share energy efficiently).
3. Thermal Storage (Focused on innovative ways to store heat energy).

Figure 8 Information session for residents

2.4. Stakeholder motivation identification and analysis

In the development of REVs, understanding the human dimension is just as critical as mastering the technical and economic aspects. Collecting social data, such as stakeholders' objectives, motivations, concerns, and barriers to participation, is a vital step in designing inclusive, responsive, and sustainable energy solutions that are supported by those who will have to implement them.

Gathering this data from stakeholders allows project teams to move beyond assumptions and gain direct insights into the lived experiences, expectations, and values of the people and organizations involved. The **purpose** of this information gathering is to:

- *Align project goals with stakeholder priorities*, increasing relevance and buy-in.
- *Identify potential barriers to participation*, and proactively address them.
- *Tailor engagement strategies to different stakeholder groups*, ensuring that communication and involvement are meaningful and accessible.
- *Enhance transparency and trust*, by demonstrating that stakeholder voices are heard and valued.
- *Support social impact assessment*, by providing baseline data for evaluating changes in attitudes, behaviours, and community dynamics over time.

Moreover, collecting social data fosters a culture of co-creation and shared ownership, where stakeholders are not just consulted but actively shape the direction of the project. In REFORMERS, these insights are essential for designing REVs that are not only technically sound but also socially accepted and resilient. By embedding stakeholder perspectives into the different phases of the project, it is ensured that the transformation is truly inclusive, equitable, and grounded in local realities.

2.4.1.1. Methodology

The core of the methodology is a **standardized survey** instrument, which includes:

1. **General stakeholder profiling**: Gathering basic information on the stakeholder's socio-economic background, prior experience with renewable energy or sustainability collaborations, willingness to cooperate with others on energy matters, etc.

2. **Motivation assessment**: Stakeholders are asked to rate a curated list of potential objectives for joining a collective energy initiative on a 5-point Likert scale (from "Not important at all" to "Essential"). These objectives span technical, economic, social, and environmental dimensions.

3. **Barrier identification**: Stakeholders evaluate a list of potential barriers to participation, indicating whether each is a current point of doubt, not a concern, or unclear.

The proposed list of objectives and barriers is derived from a comprehensive literature review and includes elements such as:

- Objectives: Emissions reduction, return on investment, energy independence, community building, and green image enhancement.
- Barriers: Legal uncertainty, administrative complexity, lack of knowledge, trust issues, and infrastructure incompatibility.

Stakeholders are also invited to add any additional objectives or barriers they feel are missing, ensuring the survey captures context-specific concerns.

An **analysis** of the objectives and barriers that are identified as relevant by the stakeholders provides information about the type of engagement initiatives need to be set up to get/keep them on board for the next steps of the project.

For companies, an additional instrument is proposed to gather more detailed information on their operation, motivations and needs: **structured personal interviews** with company representatives. The proposed questions fall into seven categories: introduction of the company, operational characteristics, information on current energy generation and consumption, flexibility in energy consumption and generation, future energy generation and consumption, willingness for energy cooperation, and willingness to actively participate in the proposed REV project. See ANNEX I - interview protocol and questions for companies for an interview protocol and questions template.

2.4.1.2. Implementation example in the FV

Interviews

First, the focus was laid on the companies. In Q2 of 2024 interviews were performed with 12 large companies on the Boekelermeer grounds that had potential to become a frontrunner, based on a first general assessment. Connections were made through Bedrijvenvereniging Boekelermeer, a well-established business association representing companies in the Boekelermeer industrial area. As this is an existing trusted actor, the companies were more willing to participate. The interview results, combined with the collected technical information, contributed to the identification of the specific 'frontrunner companies' groups, comprising companies that are technically compatible and demonstrate a willingness to collaborate on energy-related matters.

The full interview protocol and questions can be found in ANNEX I.

Survey

The survey on objectives and barriers for **companies** was also sent out through 'Bedrijvenvereniging Boekelermeer', to their members. A total of 12 companies filled it out between November 2024 and February 2025. The same survey was sent out to **other stakeholders** from the 'High interest' quadrants of the stakeholder mapping exercise. A total of 4 groups filled it out: the local as well as the regional government, a regional development agency, and an independent community-driven sustainability initiative based in Heiloo.

The full survey can be found in ANNEX II.

The survey on objectives and barriers for the **residents** was sent out through Duurzaam Heiloo, a well-established local sustainability initiative in Heiloo focused on promoting and supporting sustainable living, energy transition, and environmental awareness within the community. A total of 16 residential stakeholders filled it out between April and May 2025. This survey was tailored to be more understandable for people without knowledge on energy matters (through easier wording and less detailed choice options), and to gather more information on experience with and willingness to adopt specific assets. A similar survey will be sent out again at the end of the project (2028), to see whether the engagement actions throughout the project have shifted residents' views and participation willingness.

The full survey can be found in ANNEX III.

The survey results of the **companies** are discussed here. The results, analysis and conclusions of the surveys for 'other stakeholders' and residents can be found in ANNEX IV.

Survey results of companies

Collaboration preferences

Collaboration preferences

The survey asked companies first to indicate what energy collaboration form they prefer, and subsequently rate their willingness to collaborate with local residents on energy-related initiatives, using a scale from 0 (Totally not willing) to 10 (Fully willing).

<u>Key Findings:</u>

- **Neutral stance dominates**: Most companies rated their willingness to cooperate with residents at level 5 (neutral), suggesting **uncertainty or hesitation** rather than outright opposition.
- **Low enthusiasm for mixed collaboration**: 10 out of 12 respondents indicated a preference for collaborating only with other companies, while none preferred a mix with residents.
- **Minimal strong willingness**: Only one company expressed full willingness (level 10) to cooperate with residents, while several gave low scores (0–4), reinforcing the overall reluctance.

Objectives for participation in energy initiatives

The survey asked companies to indicate the importance of various potential objectives when deciding whether to join a collective energy initiative, on a 5-point scale from 'Not important at all' to 'Essential'. The results provide valuable insight into the priorities and expectations of commercial stakeholders.

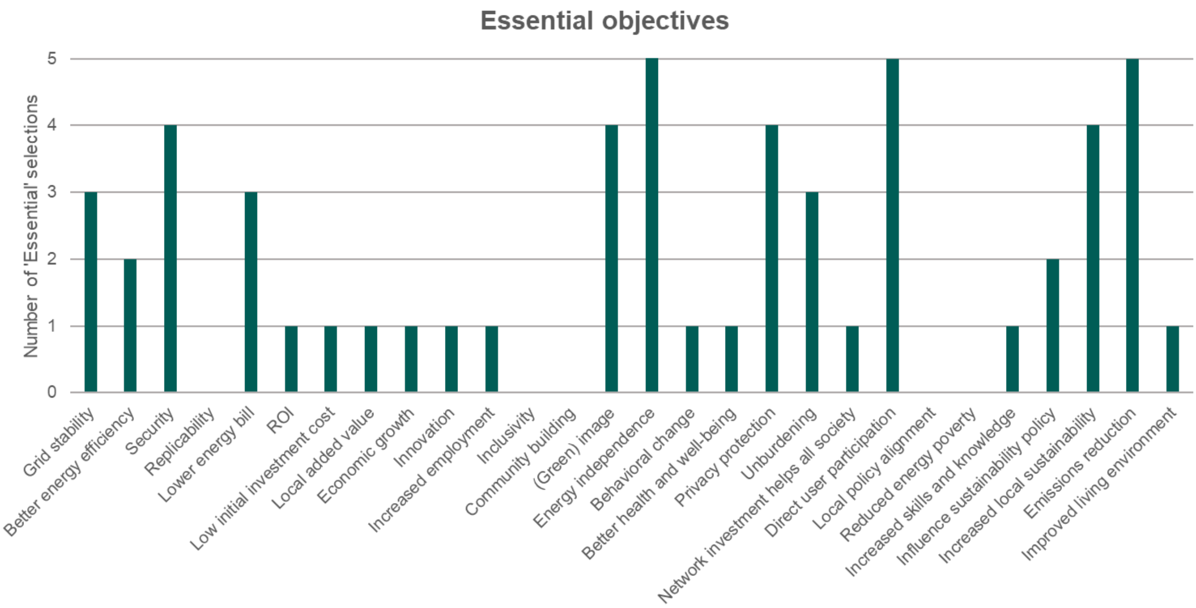


Figure 9 Survey results: Objectives that are selected by companies as essential for them to be convinced to participate in a collective energy initiative

<u>Essential objectives - Key Findings</u>:

The survey reveals that companies' strongest drivers for participation are linked to independence, participation, and sustainability (see Figure 9).

- Top motivators
  - **Energy Independence** is marked as essential by half of the participants, reflecting a strong desire for autonomy and control over energy supply.
  - **Direct User Participation** also ranks high, indicating that companies value having a voice in decision-making processes.
  - **Emissions Reduction** (5 'essential' selections) and **Increased Local Sustainability** (4 'essential' selections) confirm that environmental responsibility is a key priority.
  - **(Green) Image**, **Security** and **Privacy Protection** are key secondary drivers.
- Moderate priorities
  - Objectives like Grid Stability, Lower Energy Bills, and **Unburdening** received moderate support, suggesting that while reliability and cost savings matter, they are not as decisive as independence and sustainability.
- Lower priorities
  - Economic objectives such as ROI, local added value, economic growth, inclusivity, and community building were rarely marked essential, despite moderate average scores. Technical goals like replicability and social objectives such as reduced energy poverty scored lowest in both essential counts and average importance, indicating limited influence on corporate decision-making.

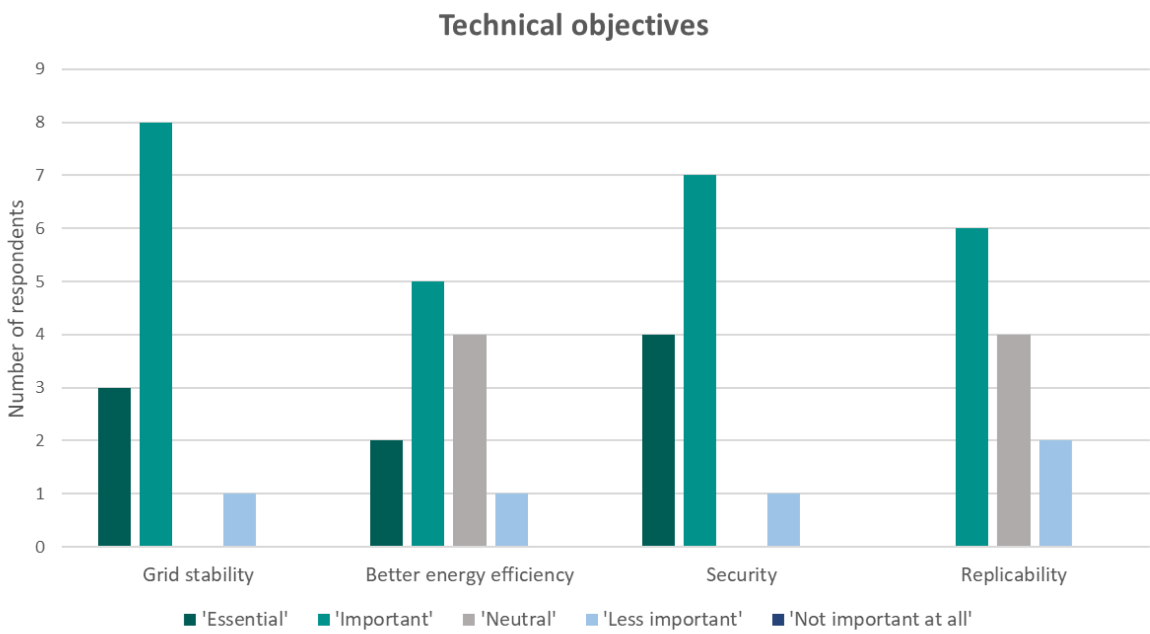


Figure 10 Survey results: Importance companies assign to various technical objectives in convincing them to participate in a collective energy initiative

<u>Technical objectives - Key Findings:</u>

- **Security** and **Grid Stability** are the most valued, with the highest number of 'Essential' and 'Important' ratings. These reflect strong concerns about system reliability and protection.
- Better Energy Efficiency also received solid support, though with slightly more neutral and less important ratings, suggesting it's appreciated but not a top priority.
- Replicability had the most mixed responses, including several neutral and lower importance ratings, indicating it's less critical for initial engagement.

Economic objectives - Key Findings:

- Even though the amount of 'essential' selections is low in this category, the average importance scores given to the economic objectives are relatively high, indicating the value of these objectives, although they are not necessarily a 'make or break' aspect.
- **Lower Energy Bill** and **Low Initial Investment Cost** are the strongest motivators, with the highest average importance scores. These clearly reflect companies' **focus on cost savings**, and the fact that affordability and upfront feasibility are critical for participation**.**
- **ROI** also ranks high, indicating the importance of financial return.
- Local Added Value and Economic Growth received more mixed responses, with several neutral or lower importance ratings. These broader economic benefits are less influential in individual decision-making.

Social objectives - Key Findings:

- **Direct User Participation**, **Energy Independence**, and **Privacy Protection** received the most 'Essential' and 'Important' ratings, indicating strong interest in engagement, autonomy, and data security.
- Increased Skills and Knowledge, and (Green) Image, Community Building, and Unburdening also have a high average importance score, suggesting companies value capacity building, enhance corporate image, operational ease and positive local societal impact.
- Objectives like Reduced Energy Poverty, Local Policy Alignment, Inclusivity, and Better Health and Well-being were rated lower, showing that broader social goals are less influential in corporate decision-making.

Environmental objectives - Key Findings:

- **Increased Local Sustainability** received the highest average importance rating, showing broad alignment with sustainability goals.
- **Emissions Reduction** was also widely rated as 'Important' or 'Essential'..
- Improved Living Environment had a more mixed response, with many 'Importance' ratings but also several 'Neutral' and 'Less Important' ones—suggesting it's valued, but not universally prioritized.

Barriers to energy initiative participation

The survey aimed to identify the main concerns companies have when considering participation in collective energy initiatives. Respondents were asked to evaluate a list of potential barriers, indicating whether each was a current point of doubt, not a concern, or if they felt neutral or lacked understanding of the issue.

Key Findings:

- Top barriers:
  - **Regulatory complexity**, **lack of knowledge on possibilities and benefits**, and **legal uncertainty** emerged as the most significant barriers, as they were identified as a current point of doubt by at least half of the participating companies. This indicates a widespread concern about the clarity and accessibility of the regulatory framework and available options.
  - These results suggest that **informational and legal support** are critical to lowering entry barriers for companies.
- Technical and operational concerns:
  - Incompatible infrastructure and the perception that such initiatives are time-consuming were also frequently cited as current doubts. These reflect practical concerns about the feasibility and resource demands of participation.
  - Complex administration was similarly noted, reinforcing the need for streamlined processes and support mechanisms.
- Lower-ranked barriers:
  - Distrust of cooperation partners, fear of lack of long-term commitment, and less control and autonomy were among the least cited as current points of doubt. This suggests that trust and governance concerns, while present, are not the primary obstacles in this context.
  - No experience in similar cooperation was moderately cited, indicating that while unfamiliarity is a factor, it is not as critical as structural and informational barriers.
- Neutral responses:
  - A notable number of respondents selected ‘neutral/don’t understand’ for several barriers, particularly for more abstract or technical concerns. This highlights a knowledge gap that could be addressed through targeted awareness campaigns and stakeholder education.

Conclusions

Companies have shown low willingness to collaborate with households on energy-related matters, expressing a preference to work exclusively with other businesses. To enable the mixed collaborations essential for successful REVs, targeted engagement efforts will be needed to **address companies’ concerns and overcome their reluctance**. Phased engagement strategies can be considered, starting with company-only models and gradually introducing residential collaboration once trust and understanding are built.

The objectives survey results reveal that companies prioritize objectives that combine **operational reliability**, **financial feasibility**, and **(visible) sustainability impact**. Social and policy-related goals remain secondary motivators, though participation and knowledge-building stand out as important.To effectively engage these stakeholders, it is necessary to:

- **Emphasize autonomy and sustainability**: Position energy independence and emissions reduction as core benefits.
- **Highlight opportunities for active involvement**: Stress governance models that allow direct participation.
- **Communicate technical reliability and security**: Reinforce grid stability and data protection as trust-building factors.
- **Frame economic benefits clearly**: Showcase cost savings and operational convenience without overpromising ROI.
- **Present social and policy goals as complementary**: Avoid positioning inclusivity or policy alignment as primary drivers, but highlight them as added value.
- **Leverage reputational and environmental incentives**: Promote emissions reduction and green image for added value.
- **Simplify complexity**: Address legal, regulatory, and administrative barriers through clear guidance and support tools

By aligning project design, communication, and engagement strategies with these priorities, company participation can be enhanced.

The findings on company barriers for participating in a collective energy initiative underscore the importance of:

- **Clear communication and education** about the benefits and operational models of collective energy initiatives
- **Simplifying legal and administrative procedures** to reduce perceived complexity
- **Providing technical support** to address infrastructure compatibility and time/resource concerns

2.5. Engagement tools and activities for trust and interest building

Building trust and generating interest among stakeholders is a cornerstone of successful engagement in the REFORMERS project. This process goes beyond informing; it involves creating meaningful, two-way interactions that foster ownership, transparency, and long-term commitment. To achieve this, a tailored engagement approach is required, recognizing that there is no one-size-fits-all solution. Each REV has its own socio-cultural, institutional, and technical context, which requires selecting and adapting tools and activities that resonate with local stakeholders. The chosen technique must be tailored to the target group and the objectives that are being pursued, with a combination of activities applied in most cases.

Whether through workshops, living labs, digital platforms, or participatory design sessions, the goal is to create inclusive spaces where stakeholders feel heard, empowered, and motivated to contribute to the energy transition; not only through structured engagement, but also through self-driven initiatives that the project team facilitates and supports.

2.5.1. General tools and methodologies

Stakeholder panels and roundtables

Organizing moderated panels or roundtable discussions with representatives from different stakeholder groups allows for structured dialogue and mutual learning. These sessions can be used to explore shared concerns, clarify misunderstandings, and build consensus on key issues. The format promotes transparency and makes all voices being valued in the process.

Link with practical background information on the format:

- Engagement Activities: Stakeholder Roundtables – Constructive Dialogue – Best practices for organising inclusive and productive roundtable discussions.

Interactive exhibitions and info markets

These are informal, open-house-style events where stakeholders can explore different aspects of the project through booths, posters, videos, interactive displays, etc. Project team members are available to answer questions and collect feedback. This format lowers barriers to participation and allows stakeholders to engage at their own pace, fostering interest and trust through visibility and accessibility.

Link with practical background information on the format:

- Community Issue Exhibition Toolkit – Guidelines with practical components of an exhibition preparation and setup.

Digital engagement platforms

Online platforms can be used to share project updates, host discussion forums, and collect feedback. These tools are particularly useful for reaching stakeholders who may not be able to attend in-person events. Features such as polls, comment sections, and interactive scenario visualizations can help maintain engagement between live meetings and provide a space for continuous dialogue.

Links with practical background information on the format:

- Comparing 8 Popular Stakeholder Engagement Tools – Overview of digital platforms for stakeholder engagement.
- Public Consultation Platforms To Consider – Review of leading online platforms for public engagement.

Participatory mapping

This tool involves stakeholders in identifying and visualizing local energy assets, challenges, and opportunities using physical or digital maps. Participants can mark locations of interest, such as renewable energy installations, areas of concern, or community hubs. This activity builds spatial awareness, encourages local knowledge sharing, and helps stakeholders see their role in the energy transition.

Links with practical background information on the format:

- Participatory Mapping: Best Practices, Tools & Examples – Overview of participatory mapping methods and tools.
- NOAA Guide – Guide With Stakeholder Engagement Strategies for Participatory Mapping.

Living Labs

Living Labs are real-life environments where stakeholders can interact with emerging technologies, concepts, or prototypes. They can be used to showcase renewable energy solutions, digital tools, or community energy models. Stakeholders are invited to test, observe, and provide feedback, which fosters transparency and builds confidence in the project's direction. The hands-on nature of Living Labs helps demystify technical aspects and encourages curiosity and dialogue.

Links with practical background information on the format:

- Living Lab Methodology and Online Handbook – Guide on how to set up/run a Living Lab.
- ENERGISE Living Labs – Steps for planning local Living Labs in the energy field.

Community storytelling and testimonial sessions

Inviting stakeholders to share personal stories or experiences related to energy use, sustainability, or community challenges helps humanize the energy transition. These sessions build empathy, uncover hidden concerns, and create emotional connections to the project. They also help identify local champions who can support future engagement efforts.

Links with practical background information on the format:

- Story Circles Toolkit (OSU) – How to facilitate storytelling circles for community engagement.

- Impact Projects - Sustainability Ambassadors – Adaptable templates and examples for youth-led storytelling projects focused on sustainability.

Gamification and simulation tools

Using games or simulations to explore energy system dynamics can make complex topics more accessible and engaging. For example, role-playing exercises or scenario-based games can help stakeholders understand trade-offs, system constraints, and the impact of different choices. These tools foster learning and stimulate interest in a playful, non-threatening way.

Links with practical background information on the format:

- Guideline Gamification – A step-by-step approach to implementing gamification in energy projects.
- Storytelling for Energy Solutions Toolkit – Methods to gathering energy stories, empower marginalized voices, and effectively communicate energy stories.

Each of these tools contributes to building trust and interest by creating spaces for dialogue, learning, and shared exploration. The choice of tools should be guided by the local context, stakeholder composition, and engagement objectives. In most cases, a combination of tools is to be used to ensure inclusivity and maximize impact.

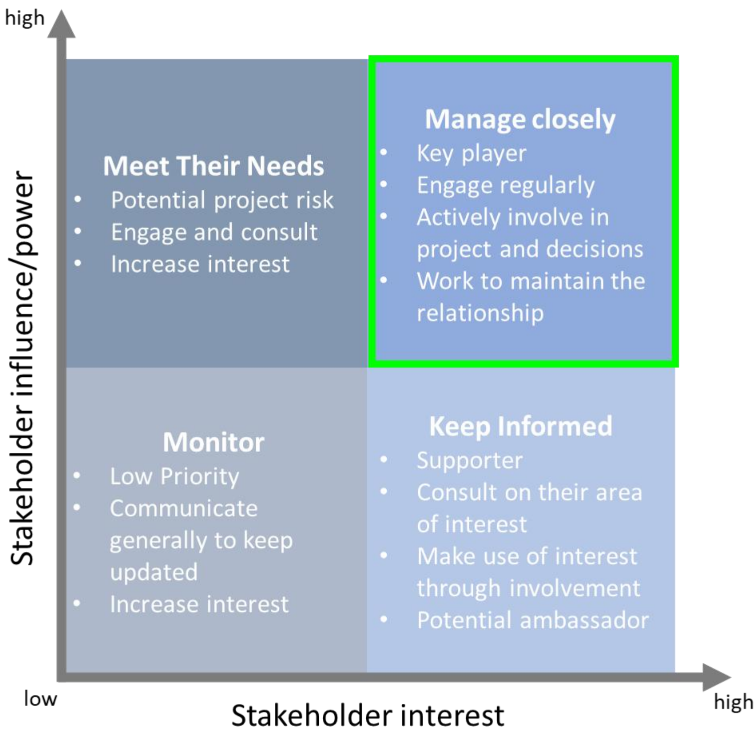
Table 1 Overview of potential engagement tools and methods for trust and interest building, with their characteristics

Tool	Key Features	Strengths	Limitations
Stakeholder panels and roundtables	Moderated discussions among diverse stakeholders	Builds mutual understanding; supports consensus	May exclude less confident voices; limited scalability
Interactive exhibitions and info markets	Open-house events with booths and displays	Low threshold for participation; informal learning	Limited depth of engagement; passive interaction
Digital engagement platforms	Online tools for updates, feedback, and discussion	Accessible anytime; scalable; good for ongoing dialogue	Digital divide may exclude some groups; requires moderation
Participatory mapping	Visual identification of local energy assets and concerns	Encourages local knowledge sharing; spatial awareness	May require facilitation; less suited for abstract issues
Living Labs	Real-life testing environments for technologies and concepts	Builds trust through hands-on experience; demystifies tech	Resource-intensive; limited to specific contexts

Community storytelling and testimonial sessions	Sharing personal experiences related to energy and sustainability	Builds empathy and emotional connection; surfaces hidden concerns	May not yield actionable data; requires trust
Gamification and simulation tools	Games or simulations to explore energy dynamics	Engaging and educational; simplifies complex systems	May oversimplify issues; not suitable for all audiences

2.5.2. Potential engagement activities related to stakeholder categories

2.5.2.1. 'High Power/High Interest' stakeholders



These stakeholders are sometimes called the **"Key Players"** of the Power-Interest Grid. They must be closely engaged, actively managed, and deeply involved in decision-making. The strategy here is co-creation, partnership, and frequent two-way communication.

Attention points

- Treat them as co-owners, not stakeholders, and put partnership over consultation. Institutionalize their involvement by embedding them in decision-making and governance bodies

- Ensure high visibility & co-ownership, e.g., through shared branding, public recognition, and policy advocacy
- Set up frequent, two-way communication, with, e.g., monthly check-ins
- Highlight mutual benefits (e.g., jobs, resilience, innovation), with an emphasis on both shared risk and shared value
- Transparency is key: keep expectations clear, especially on costs, timelines, and risks

General engagement actions

- Establish formal governance structures: invite them into steering committees, advisory boards, or joint task forces to share ownership of decisions
- Co-create roadmaps and strategies: develop joint action plans (e.g., for energy infrastructure, innovation pilots, or workforce transition)
- Frequent, two-way communication activities: hold regular high-level roundtables and working group meetings to align interests and resolve issues early
- Dedicated account management: assign relationship managers/liaisons to ensure continuous contact and trust-building
- Information-sharing platforms: provide secure dashboards with real-time updates on project progress, data, and KPIs relevant to them
- Aligned advocacy efforts: partner on joint lobbying or policy recommendations at regional/national levels
- High-visibility recognition: involve them in launch events, press releases, and branding opportunities to strengthen their association with the project
- Early involvement in critical decisions: consult them first on issues like infrastructure placement, permitting strategy, or funding allocations

Examples of engagement actions for specific stakeholders

<u>For local companies with large energy consumption</u>:

- Organize joint strategic planning sessions on energy needs and security of supply
- Showcase co-investment opportunities in generation, storage, or flexibility services
- Prepare tailored energy transition roadmaps aligning company decarbonization with valley infrastructure

- Set up pilot projects/testbeds to trial new energy technologies (hydrogen, demand response)
- Organize regular executive roundtables with CEOs/plant managers to align on risks and opportunities
- Ask their expert support to feed context analyses with fresh data from the market

For local governments:

- Offer a formal role in governance structure, such as an advisory board or steering committee
- Organize policy alignment workshops (e.g., on spatial planning, zoning, permitting, climate goals)
- Co-branding of public communication to show political and community backing
- Organize citizen-facing engagement together, e.g., public town halls, awareness campaigns
- Integrate energy valley KPIs into municipal development plans and vice versa
- Ask their support in identifying and understanding relevant statistics and figures of the area

For grid operators:

- Guarantee early involvement in infrastructure design to avoid bottlenecks
- Organize joint scenario modelling for demand/supply balancing, grid stability, and future-proofing
- Set up data-sharing agreements e.g., on load forecasts and consumption patterns
- Set up a dedicated coordination platform for project phasing and investment timing
- Align policy advocacy through joint lobbying for supportive regulations/incentives

For representative groups for local companies:

- Organize regular dialogue forums to collect feedback and diffuse information
- Set up sector-specific working groups (e.g., manufacturing, logistics, agriculture)
- Showcase business cases highlighting benefits for member companies
- Further develop their bridge-building role to connect companies with financiers, tech providers, and public programs

For residents:

- Set up co-design participation channels, such as decision-making forums, citizen panels, or co-creation workshops where key project choices (location, design, benefits) are discussed.
- Guarantee local benefits and protections by developing mechanisms like reduced energy tariffs, local ownership shares, community funds, or job programs to ensure tangible and fair benefits.
- Ensure transparent two-way communication and maintain open channels (e.g., regular town halls, digital platforms, feedback systems) to build trust, address concerns, and adapt plans to community priorities.

For social housing companies:

- Create joint financing schemes (subsidies, blended finance, grants) to enable upgrades without raising rents
- Embed them in governance & tenant engagement to ensure social acceptance and equitable benefits
- Co-develop large-scale retrofit & renewable programs (insulation, heat pumps, PV, district heating) to decarbonize housing stock affordably

For major investors & financial institutions:

- Co-develop financing mechanisms and set up investment platforms
- Ensure transparency by providing regular briefings on the project pipeline to help de-risk investments
- Show how energy valley projects tick ESG (Environmental, Social, and Governance) / Taxonomy boxes

2.5.2.2. ‘Low Power/High Interest’ stakeholders

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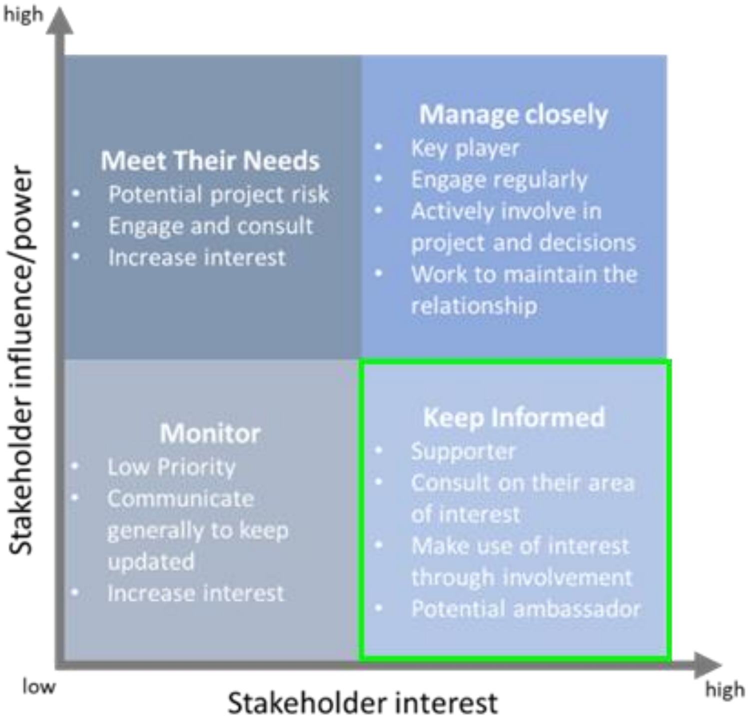


These stakeholders are enthusiastic, supportive, and often deeply invested in outcomes, but they don't (yet) have the formal authority or resources to significantly influence decision-making. They're valuable advocates, testers, and amplifiers; the ones who spread the word, demonstrate proof-of-concept, and legitimize the initiative at the community level.

Attention points

- Map their interests clearly: understand what motivates each group: economic opportunity, regional pride, environmental benefit, etc.
- Be transparent: low power doesn't mean low influence; these stakeholders can rally public opinion
- Build trust over time: regular, respectful, two-way communication is key

General engagement actions

- Regular updates and briefings: e.g., regular newsletters, webinars, or info sessions to keep them informed of progress and developments
- Tailored communication materials: e.g., with infographics, executive summaries, and case studies that show benefits and lessons learned
- Feedback mechanisms: e.g., surveys, online forums, or dedicated contact points to capture their input and concerns

- Recognition and visibility: e.g., acknowledge contributions and involvement in public materials or at events

Examples of engagement actions for specific stakeholders

For existing companies:

- Set up an information event:
  - Inspire, by showcasing approach, lessons learned and results from the frontrunners approach
  - Provide step-by-step roadmap for their own group (contracting) initiative (incl. cost proposition)
  - Set up a question round, to collect information on willingness, as well as what is needed for them to take action
  - Organise a "speed date" event to start off collaborations + link them to professional process facilitators
- Offer co-branding or PR opportunities for their sustainability initiatives
- Invite them to join pilot programs or early-adopter schemes
- Offer technical and financial support guidance, e.g., access to subsidies, grants, or partnerships
- Create a local supplier database, that larger infrastructure projects can use to hire SMEs (Small and Medium-sized Enterprises)

For local and regional governments:

- Involve them in advisory committees to tap into policy and subsidy alignment
- Enquire about joint communication channels to showcase own pilots as a model project
- Share impact metrics that align with governmental development goals (e.g., job creation, innovation hub)

For existing collective energy initiatives:

- Involve them in demonstration projects to test and validate new actions
- Enable peer-to-peer learning sessions with external similar communities, to share lessons, experiences, and best practices
- Support capacity building programs (technical, governance, funding strategies)

For citizen cooperatives

- Community of Practice: share lessons and connect them with other cooperatives

- Involve them in early-stage renewable energy installations, giving them a pilot project role
- Offer workshops on governance, finance, and scaling models

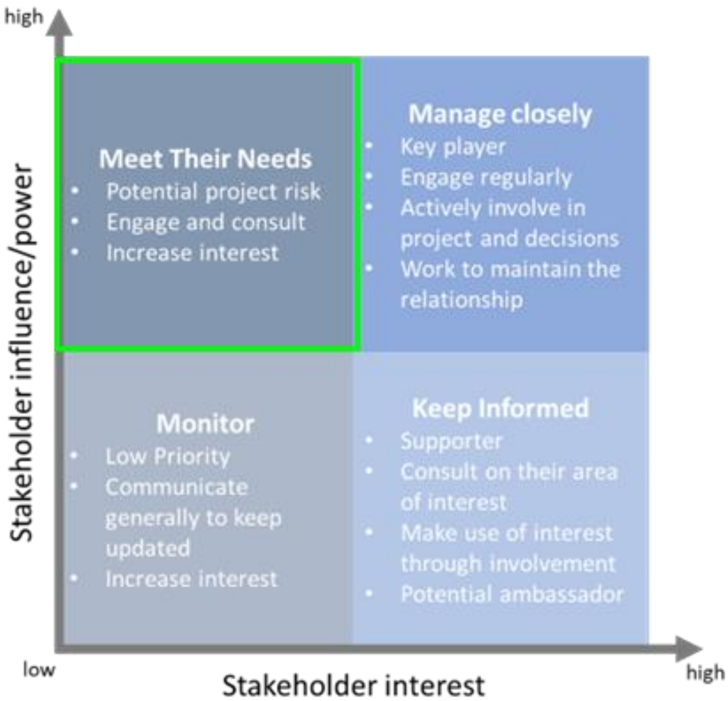
For youth/student environmental groups

- Train and support them as youth advocates within ambassador programs
- Set up campus or community projects in which you provide small-scale demo opportunities.
- Engage them in communication and use their voice for social media storytelling.

Professional Associations

- Invite them to co-create best practices within Technical Advisory Circles
- Collaborate on workforce upskilling through training and certification programs
- Build credibility through their endorsement by creating standard-setting partnerships

2.5.2.3. 'High Power/Low Interest' stakeholders



These are the stakeholders who can make or break your REV initiative with a decision or a signature, but they don't (yet) care enough to actively engage. The strategy is to keep them satisfied, minimize friction, and frame the project as aligned with their existing mandates without demanding too much of their attention.

Attention points

- Selective engagement: involve them only in decisions that affect their areas of authority to avoid fatigue
- Provide concise, actionable information (e.g., executive summaries, 1-pagers, or briefings tailored to their sector) and highlight alignment with their mandate and/or challenges
- Anticipate risk concerns: address liability, legal, or operational concerns early to avoid delays or opposition

General engagement actions

- Maintain strong personal relationships: identify key individuals/champions within these organizations for direct, efficient communication
- Offer reputational benefits: if appropriate, showcase their involvement in public forums or reporting materials

Examples of engagement actions for specific stakeholders

For housing companies

- Develop an information session or brochure that showcases the benefits of various collective investments and energy actions in terms of asset value, sustainability value, and tenant satisfaction
- Organize roundtables: discuss the potential for, e.g. district heating, green roofs, or energy storage solutions with minimal operational disruption
- Offer plug-and-play participation models: develop standard investment packages or green energy supply schemes for housing portfolios
- Facilitate access to funding or co-financing mechanisms: share information about subsidies, energy performance contracting, or EU/green bond programs
- Provide ESG reporting incentives: help housing companies see how involvement supports their Environmental, Social, and Governance metrics

For permit providers

- Early technical briefings: Proactively provide technical dossiers to demonstrate compliance and minimize review time

For utility companies/grid operators

- Involve them in dedicated infrastructure planning meetings
- Demonstrate how the project supports stability and long-term demand, through risk reduction messaging
- Prevent "surprises" that force reactive responses, through early warning and coordination

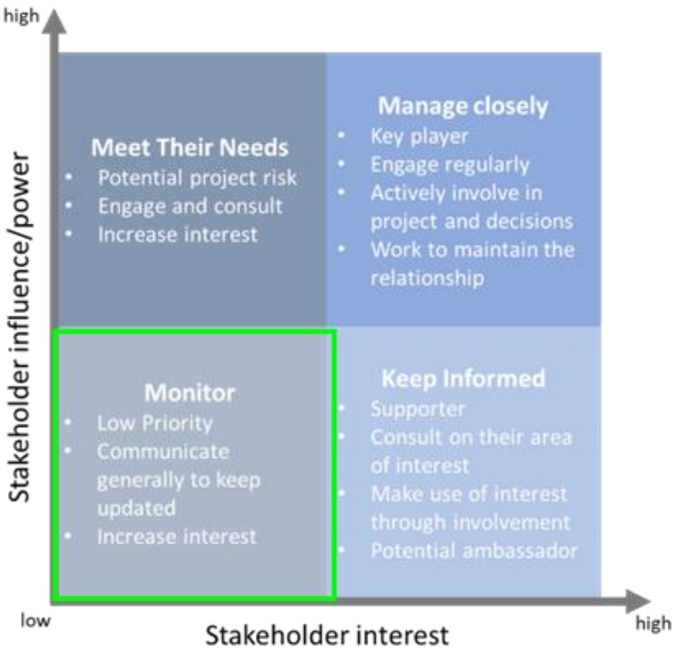
For banks and institutional investors

- Stress risk management and stable returns, through targeted financial briefings
- Present a long-term project pipeline for investment clarity.
- Position energy valleys as a way to meet EU Taxonomy or ESG reporting obligations.

For large commercial real estate owners

- Business Case Presentations: Show how participation improves asset value & ESG scores.
- Prepare and showcase simple, low-risk on-site renewables or efficiency retrofit offers
- Offer co-branding as "early supporters."

2.5.2.1. 'Low Power/Low Interest' stakeholders



These are the stakeholders who are unlikely to affect your project directly and aren't strongly invested in it right now. Still, they can influence public perception and may shift quadrants if conditions change (e.g. a project impacts their land, jobs, or values). The strategy here is to monitor lightly, inform transparently, and keep optional channels open without investing too many resources.

Attention points

- Don’t ignore, and inform lightly: while not engaged now, some stakeholders can shift quadrants (e.g., residents becoming organized or NGOs (non-governmental organisations) reacting to local impacts)
- Segment communications: avoid generic messaging; even passive stakeholders appreciate relevance
- Monitor sentiment: passive does not mean unimportant. Track public tone via social media, public forums, or local news

General engagement actions

- Inform through passive channels: e.g., local newsletters, websites, local social media posts
- Provide one-way communication materials: simple factsheets, FAQs, or infographics explaining the project’s purpose, benefits, and expected impacts. Also create a visual timeline or map of the project, and include contact info for questions
- Offer optional participation opportunities: opt-in events, such as demo days or site visits. Inform on newsletter subscription option
- Community presence without pressure: e.g., information booths at local events, light non-technical presentations for community centers, schools, or events
- Monitoring and sentiment tracking: e.g., through surveys or community boards
- Leverage trusted intermediaries: to share materials and information

Examples of engagement actions for specific stakeholders

<u>For citizens</u>

- Send out public newsletters or local press coverage explaining project milestones in plain language
- FAQs on project websites addressing impacts, timelines, and benefits
- Set up community noticeboards or events booths at markets or fairs (low-effort presence)
- Create an optional feedback form for questions or concerns
- Set up “Good neighbour” initiatives (e.g., noise control updates, visual impact info)

For technology providers

- Invite them to future procurement events or demo days
- Create a supplier database for them with opt-in updates
- Invite them to informational webinars on upcoming opportunities
- Set up a light-touch market watchlist to stay aware of emerging providers

For agricultural representatives

- Create plain-language fact sheets on land-use implications
- Distribute a survey to identify future collaboration interest in energy/agriculture crossover
- Send out occasional invites to local consultation sessions, as observers
- Highlight any agri-energy synergies, e.g., bioenergy, co-located projects in communication with them

For nature representatives

- Make environmental reports and updates available transparently
- Invite them to public environmental briefings or Q&A sessions
- Monitor media or social channels to gauge concern, respond if needed
- Map out shared interests for future biodiversity or conservation programs

For educational institutions

- Create information packages for potential curriculum alignment
- Send out periodic invitations to site visits or public presentations
- Passive inclusion in stakeholder newsletters
- Consider light collaboration opportunities (e.g., student projects, internships)

For local NGOs that are not directly focused on energy

- Distribute general community bulletins and progress snapshots
- Organise open house or info days where they can casually participate
- Optional mailing list inclusion
- Set up awareness campaign partnerships if they express interest

For local media

- Send press releases or milestone summaries (ready-to-publish)
- Use them to counter misinformation quickly if needed

- Use them to promote engagement events, site visits, etc.

2.5.3. Facilitating organic engagement and bottom-up initiatives

Stakeholder engagement is not only structured through planned activities, but it also grows organically through the initiative and creativity of local actors. Many stakeholders are not just participants but potential co-creators, with unique skills, interests, and networks that can enrich the project in unexpected ways.

The role of the project team is to **facilitate** rather than direct this process. This means creating space for spontaneous contributions, supporting self-organized initiatives, and providing tools and platforms that stakeholders can use independently. Examples include:

- Enabling stakeholders to conduct their own interviews and publish results via a shared online platform
- Inviting technically skilled individuals to review or contribute to system design elements
- Supporting community members in producing media content (e.g., videos, blogs) that reflect their perspective on the energy transition

These contributions often emerge outside formal planning and require a flexible, responsive approach. The project team acts as a gardener, nurturing growth while gently guiding it to align with the overall vision when needed, to maintain coherence and inclusivity. Recognizing and supporting this organic bottom-up process is key to building trust, ownership, and long-term commitment.

2.5.4. Implementation examples in the FV

At the time of submission of this deliverable D6.4, the FV project is still in its ‘strategy development’ stage (see Figure 1, with engagement up until step 4). Though with regards to step 5, Identification and implementation of relevant engagement tools and activities for trust and interest building, a first brainstorm already resulted in the identification of some engagement initiatives out of the proposed list, to be implemented in the following months (a more elaborate list and planning will be compiled later):

<u>‘High Power/High Interest’ stakeholders</u>

Local government:

- Set up a formal support structure, to offer them a formal role in the governance
- Include them in regular project meetings

Representative/Support organisations for local businesses:

- Further develop their bridge-building role to connect companies with financiers, tech providers, and public programs: provide them with a portfolio
- Include them in the handover preparations for 'life after REFORMERS'

'Low Power/High Interest' stakeholders

Existing energy communities/collective energy initiatives:

- Set up more interaction to exchange practical lessons learned
- Enable learning sessions about external similar communities, to share lessons, experiences, and best practices

Non-frontrunner large consumption companies Boekelermeer:

- Set up an information event:
  - Inspire, by showcasing the approach, lessons learned and results from the frontrunner process
  - Provide a roadmap to set up a similar initiative themselves

'High Power/Low Interest' stakeholders

Social housing company in Overdie:

- Set up a trust and interest-building community storytelling initiative
- Organize interviews and roundtables to discuss the potential for district heating

2.6. Co-design of solutions

Within REFORMERS we also adopt a structured and participatory co-design methodology to ensure that the various energy initiatives that together make up the REV are not only technically feasible but also socially accepted and contextually relevant. Co-design is a cornerstone of Task 6.4 and is deeply embedded in the project's broader stakeholder engagement strategy. It is conceived as a dynamic and iterative process that runs together with the technical development of energy systems.

Co-design begins with the early involvement of **frontrunner stakeholders**, identified during the mapping phase. These actors bring valuable insights into local energy needs, behaviours, and constraints. Through structured engagement activities such as workshops, living labs, and participatory planning sessions, stakeholders contribute to the definition of energy scenarios, the selection of technologies, and the design of governance models.

The process is iterative and adaptive. Initial co-design efforts with frontrunners serve as a testing ground for tools, concepts, and engagement formats. Once validated, these are extended to **broader stakeholder groups**, ensuring that the solutions reflect a diversity of perspectives and priorities.

Importantly, co-design in REFORMERS is not limited to technical aspects. It also encompasses social innovations, such as new forms of collaboration, data sharing, and community-based energy management. The integration of technical and social dimensions is supported by the REFORMERS Toolbox.

2.6.1. Co-creation steps

At the heart of the co-design process lies the principle of **co-creation**, which positions stakeholders not merely as recipients of innovation but as active contributors to the design, development, and validation of energy solutions. Their involvement is essential to ensure that the solutions reflect local needs, values, and constraints, and that they are robust enough to be adopted and sustained beyond the project's lifetime.

The co-design process proposed in REFORMERS follows a structured sequence of steps:

1. **Determination of potential solutions (preliminary scenario building)**: Combining technical and social data to identify feasible energy system configurations.

2. **Evaluation of proposed solutions**: Using participatory tools to assess trade-offs, benefits, and risks from multiple stakeholder perspectives.

3. **Consensus building**: Facilitating dialogue and negotiation to arrive at shared decisions and commitments.

2.6.1.1. Preliminary scenario building

The co-design process is closely **linked to the technical planning and modelling activities carried out in WP6**. The data on stakeholder motivation and barriers collected during engagement feeds directly into the Energy Planning tool, while stakeholder preferences and feedback inform the Environmental and the Socio Economic Impact Assessment and Business Model and Governance Frameworks. This integration ensures that the technical solutions are not developed in isolation but are shaped by real-world needs and constraints.

The aim is to use the aforementioned tools to first develop multiple viable energy solutions, or 'scenarios,' grounded in the technical and social data provided by participating stakeholders. For example, the survey questions on stakeholder motivations provide useful input for the KPI selection in the Energy Planning and SEIA tool.

2.6.1.2. Evaluation

In a second step, the developed scenarios are presented to stakeholders for evaluation, highlighting potential advantages and disadvantages based on their earlier input. For example, an overview may be provided showing how each scenario aligns with the motivations identified as important or essential by specific stakeholders, as well as potential mitigating measures and their implications. The link between the proposed scenarios and the various barriers identified by stakeholders in an earlier process step may also be presented to stimulate discussion.

This input serves only as background information and is not intended to influence or steer opinions. Its purpose is to provide a foundation for open discussion and evaluation of potential solutions among the participating stakeholders.

There is no one-size-fits-all approach to organise this evaluation process step. Each REV has its own socio-cultural, institutional, and technical characteristics. Therefore, the engagement tools and activities used need to be tailored to the local context and the types of stakeholders involved. Proposed potential formats are:

- **Participatory workshops** with a preliminary scenario presentation, followed by a moderated open discussion on pros and cons, concerns and potential alternatives and mitigation measures
- **Digital platforms** for scenario exploration, with a forum feature in which all stakeholders can share their remarks and opinions
- Stakeholder-specific **training** and capacity-building sessions before opening evaluation discussions, to build confidence and knowledge among participants
- Focus groups and **community forums**, to gather general ideas within the community before discussing it in more detail with a smaller group of representatives
- **Visual and interactive tools** for energy system design, that help participants better understand and visualize the implications of scenarios and scenario changes

It is important to create space and opportunity for interaction among the different stakeholders involved in this process step. Such exchanges not only influence opinions but also foster openness to revise perspectives and support consensus building.

This scenario evaluation step can serve two purposes: either laying the groundwork for decision-making on solutions to be implemented or functioning as a dialogue tool for project managers by exploring multiple possible futures to enhance the organization's learning and adaptive capacity (de Geus, 2002). However, it is essential to clarify at the outset which of these objectives is being pursued, in order to avoid creating false expectations among participants.

2.6.1.3. Consensus building

Consensus building is a pivotal step in the co-creation process, where stakeholder dialogue transitions from evaluation to shared decision-making. This phase is not merely about reaching agreement; it is also about fostering mutual understanding, trust, and collective ownership of the proposed energy solutions.

The diversity of stakeholders involved in REVs means that perspectives, priorities, and levels of technical expertise can vary widely. Consensus building provides a structured space for these differences to be acknowledged, discussed, and reconciled. It ensures that the final solutions are not only technically sound and socially acceptable but also supported by a broad coalition of actors who are committed to their implementation.

This process can be facilitated through various formats:

- Moderated **workshops**
- **Negotiation sessions**, with iterative feedback loops, where stakeholders are encouraged to express concerns, propose alternatives, and collaboratively refine scenarios
- **Visual tools**, scenario **simulations**, and **impact assessments** can be used to support transparent and informed discussions

Special attention is to be given to balancing individual and collective interests, identifying win-win outcomes, and ensuring that no stakeholder group is left behind.

Importantly, consensus building runs in parallel with technical development in an integrated approach, allowing stakeholder input to continuously shape and validate the evolving energy system designs.

2.6.2. Implementation example in FV

At the time of submission of this deliverable D6.4, the FV project is still in its ‘strategy development’ stage (see Figure 1, with engagement up until step 4).

Only for one ‘**Frontrunner companies**’ group, called ‘**Ring 117**’, a co-creation process has taken place, in which the co-creation steps, in brief, took the following form:

1/ Preliminary scenario building

A first joint meeting with representatives from all participating companies was held in November 2024. The primary objective was to foster mutual understanding among the companies, and facilitate an open group discussion on potential avenues for energy collaboration. During this session, practical insights into each company’s operations were gathered, along with an overview of the energy-related challenges they face and the roles they envision for themselves within a collaborative energy framework.

Building on this input -alongside the technical consumption and production data previously provided and the outcomes of the interviews conducted during engagement step 4, where companies shared their future energy needs- the REFORMERS consortium developed five potential formats for collaborative energy sharing. These formats were designed with a key focus on addressing the capacity limitations, which had been identified by the majority of companies as a critical concern.

2/ Evaluation of solutions

A follow-up in-person meeting was hosted at the offices of one of the participating companies. During this session, a presentation was given outlining the various identified energy collaboration options, including an analysis of their respective advantages, disadvantages, and key characteristics (e.g., added value, feasibility, and robustness). The results of the stakeholder survey on objectives and perceived barriers were also shared, providing a framework to evaluate how each option aligned with their most relevant goals.

This input served as the foundation for an open group discussion focused on preferred solutions and potential next steps. Among the proposed formats, the ‘group contract’ solution emerged as the clear favourite. Participants also expressed a willingness to make a financial commitment to appoint an external ‘Gebiedsregisseur’ (area manager), who would support the group in finalizing the preferred solution, formalizing the collaboration, and guiding the implementation process.

Figure 11 Meeting frontrunner group Ring 117 on energy collaboration solutions

3/ Consensus building

The appointed Gebiedsregisseur organises regular meetings with the frontrunner companies to provide updates on progress and to facilitate decision-making on key issues. Within the framework of these sessions, discussions are held on the preferred group contract model, building consensus among participants. These meetings have also led to the signing of letters of intent, marking a concrete step toward formalizing the collaboration.

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For the **frontrunner residents in Plan Oost** the actual co-creation as described will be done at a later stage of the project. In preparation, two-way communication opportunities (such as regular meetings and a digital forum) have already been set up, and co-creation workshops are being prepared.

2.7. Scaling up with social inclusiveness

As the engagement process expands from frontrunner stakeholders to the broader community, it is essential to embed a stronger focus on social inclusiveness. This means actively identifying and addressing barriers that may prevent participation from vulnerable or underrepresented groups, such as low-income households, renters, ethnic minorities, migrants, youth, elderly citizens, people living in energy poverty, and others. These groups are often harder to engage as frontrunners due to limited time, resources, and capacity for risk-taking or ambassadorship. However, with tailored approaches and support mechanisms, they can play a central role in the replicator phase that follows the frontrunner stage.

Engagement formats should be adapted to meet the needs of these groups, using accessible language, culturally sensitive materials, and trusted intermediaries (e.g., local NGOs, social workers, community leaders). This step should also include a reflective assessment of whether the initial engagement tools and co-design formats are sufficiently inclusive, and if not, how they can be adjusted to reduce barriers to participation (e.g., language, digital access, technical literacy) and ensure that the co-design process reflects a diversity of lived experiences. Flexible participation formats, such as drop-in sessions and mobile outreach, can help lower the threshold for involvement.

The Citizen Assembly setup, discussed in section 2.3.2.2, is also a potential instrument for enhancing social inclusiveness. In contexts where citizens feel socially marginalized or disconnected from political processes, traditional top-down engagement can exacerbate resistance. The Citizens’ Assembly model helps address this by creating a space where residents are treated as equals to policymakers, fostering mutual respect and reducing the potential sense of exclusion.

As highlighted by (Carley & Konisky, 2020), the energy transition risks perpetuating existing inequalities unless deliberate efforts are made to ensure equity and justice. Their review underscores that vulnerable communities often bear disproportionate burdens—such as energy poverty or displacement—while lacking access to the benefits of clean energy, including employment opportunities and decision-making power. This reinforces the need for inclusive engagement formats and just transition policies that actively involve underrepresented groups in shaping energy futures.

The overall aim is to ensure that the energy solutions being developed are not only technically and economically viable, but also equitable, representative, and socially embedded. The goal is to move beyond consultation and toward empowerment, ensuring that all voices are heard and considered in shaping the REVs. As Sovacool et al. (2023)

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argue, social innovation and inclusive governance are key to accelerating just energy transitions, particularly when they are rooted in local contexts and co-created with affected communities.

2.7.1. Tools and methodologies for inclusive engagement

To support inclusive scaling, REFORMERS proposes a set of tools and methodologies that are specifically designed to engage harder-to-reach groups and ensure their meaningful participation:

Trusted intermediaries and community anchors

Partnering with local organizations, social workers, social housing organisations, and community leaders helps bridge trust gaps and reach stakeholders who may not respond to institutional outreach. These intermediaries can host events, distribute materials, and facilitate dialogue in familiar settings.

Simplified and multilingual communication

Materials should be adapted to different literacy levels and translated into relevant local languages. Visual aids, storytelling formats, and short videos can help convey complex energy concepts in an accessible way.

Mobile and on-site outreach

Instead of expecting stakeholders to come to central venues, outreach teams can visit neighbourhoods, community centres, and public spaces. Mobile engagement booths or pop-up info stands can be used to gather input and share project updates.

Drop-in and low-commitment formats

Events such as open cafés, informal meetups, or drop-in consultation hours allow stakeholders to participate without long-term commitment. These formats are especially useful for engaging residents with limited time or availability.

Digital inclusion strategies

Digital platforms should be designed with accessibility in mind, offering mobile-friendly interfaces, multilingual options, and offline access where possible. For digitally excluded groups, alternative formats (e.g., printed surveys, phone interviews) should be provided.

Social impact mapping

Using SSH-informed tools such as social network analysis, ethnographic mapping, or participatory needs assessments can help identify hidden dynamics, informal networks, and community assets that are critical for inclusive design.

Link with practical background information on the format:

- Mapping the Social Impact of Energy Communities – REScoop.eu – Offers indicators and frameworks for assessing social impact in energy communities.

2.7.2. Monitoring and Evaluation of Inclusiveness

To ensure that inclusiveness is not just a stated goal but a measurable outcome, REFORMERS proposes the following monitoring mechanisms:

- **Feedback loops**: Use surveys, interviews, and informal feedback to assess stakeholder satisfaction and perceived fairness.
- **Adaptive engagement planning**: Regularly review and adjust engagement strategies based on inclusiveness metrics and stakeholder input.
- **Inclusiveness checklist**: Track participation rates across demographic groups, languages, income levels, and housing types.
- **SSH-informed SEIA indicators**: Include metrics such as perceived empowerment, trust in institutions, and community cohesion in the socio-economic impact assessment.

2.7.3. Embedding SSH perspectives in scaling

The integration of SSH is essential to ensure that scaling efforts are not only technically sound but also socially grounded. SSH perspectives help uncover:

- Power dynamics and representation gaps in stakeholder groups
- Cultural narratives and values that shape energy perceptions
- Behavioural patterns and trust relationships that influence participation
- Ethical considerations in data collection, consent, and governance

In REFORMERS, SSH experts contribute to the design of engagement tools, the interpretation of social data, and the development of inclusive governance models. Their input ensures that the scaling process is reflexive, adaptive, and sensitive to the lived realities of diverse communities.

2.7.4. Implementation example in FV

At the time of submission of this deliverable D6.4, the FV project is still in its 'strategy development' stage (see Figure 1, with engagement up until step 4). The scaling-up phase will follow once the frontrunner group processes are more fully developed. At that point, tools and principles outlined in this chapter will be applied to ensure social inclusiveness.

3. SOCIO-ECONOMIC IMPACT ASSESSMENT TOOL (SEIA) INTRODUCTION

The SEIA is a critical component of the REFORMERS Toolkit, particularly to guide regions and local communities in their transformation into Energy Valleys that maximize the benefits for society at large while also ensuring higher transparency and awareness.

3.1. Objectives of the SEIA tool

The scope of the SEIA framework and tool is to provide guidance to any Renewable Energy Valley promoter group to design, plan and implement a Socio-Economic Impact Assessment (SEIA) that fits their energy transition projects and allows them to monitor impacts in the short, medium and long term. The SEIA is designed to ensure that the development of REVs is not only technically sound, economically viable and environmentally sustainable but also beneficial for the people and their wellbeing. The assessment helps identify and evaluate the potential socio-economic impacts of the proposed energy transformations on the local communities, ensuring that the benefits outweigh any potential adverse effects.

The SEIA framework developed for the REFORMERS project is tailored specifically to the unique context of Renewable Energy Valleys. Given the large-scale nature of these infrastructures, the selection of assessment indicators requires the definition of the different levels of analysis (micro, meso, macro – see 5.1). Rather than concentrating on individual well-being, the framework emphasizes the broader impacts on the community as a whole and as a sum of interactions. Broader impacts on the global scale (e.g. S-LCA) are out of scope for the SEIA, nevertheless its results can help frame such assessments.

The SEIA framework is guided by the project's focus on the integration of multiple renewable energy sources and the scale at which needed infrastructures shall be implemented. The framework prioritizes stakeholder participation and consultation, new businesses development and community wellbeing. The framework draws from the quadruple helix model, further developed based on Parsons's sociological AGIL framework (Burgman, 2005) to better incorporate social aspects with attention to team roles and education. Since in smaller regions effective consultation springs from effective knowledge sharing, it means building relationships with citizens who are not yet familiar with energy-related topics, paying attention to tacit knowledge (Nonaka & Takeuchi, 1995) and potential difficulties with digital communications (Hofman & Treur, 2021). Being rather technical yet increasingly influencing every aspect of our daily lives as citizens, it might be difficult to transfer via digital media or academic contents. Such model (see Figure 12). The SEIA tool helps assess how the project influences social cohesion and addresses disparities in energy access within the community. The stakeholder engagement strategy outlined in Section 2 ensures that sociological perspectives are integrated and understood since early deployment phases. In this regard, we will study the impacts on entrepreneurship, employment and social cohesion while also ensuring that the benefits of the Energy Valley are equitably distributed and that vulnerable groups are not left behind.

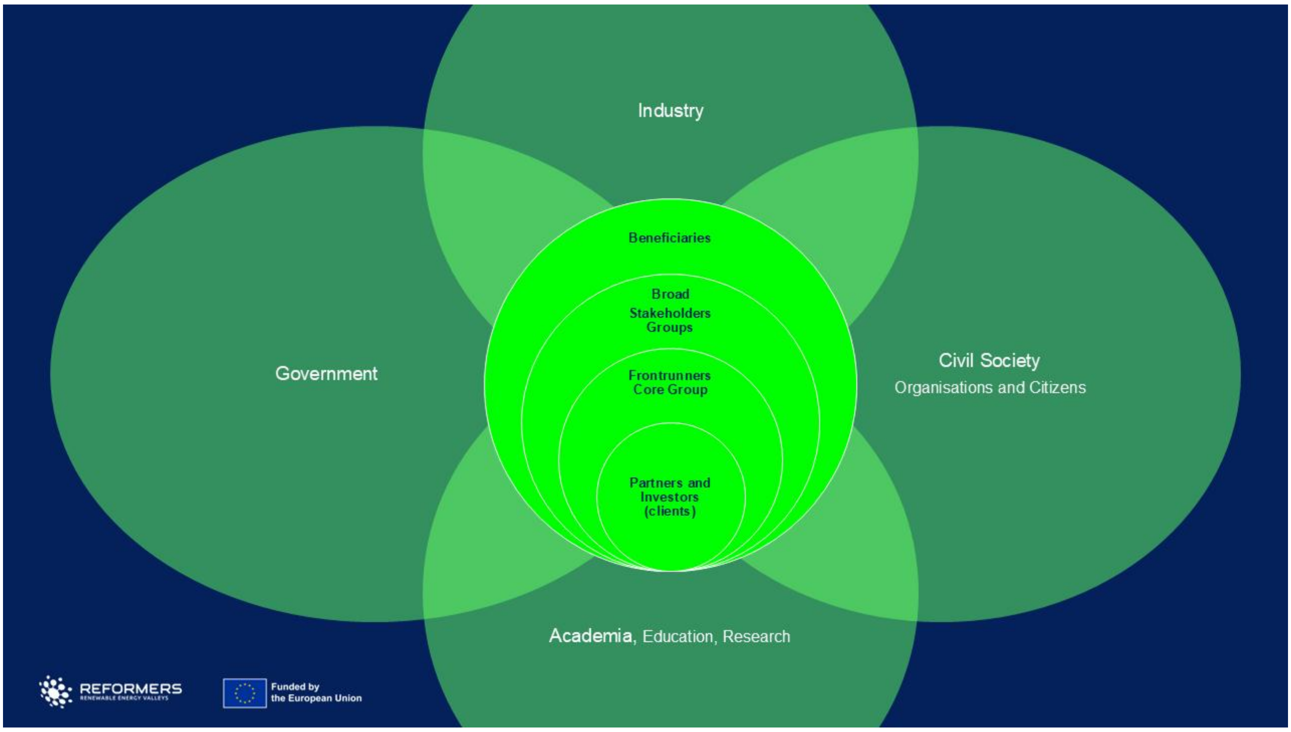

Figure 12 The quadruple helix - AGIL diagram for Energy Valleys

The SEIA framework has the ambition to:

- Support the understanding and provide evidence of the broader benefits energy valleys may bring to society and economy,
- Establish an empirical foundation to refine governance models for REVs and offer informed recommendations for replicability.

The current version of the SEIA framework will be tested and applied in the Reformers FV and RVs throughout years 2025 and 2026. It is a foundation upon which subsequent work will be performed to further improve and consolidate a final version, expected by the end of the project.

3.2. SEIA structure

This document presents the SEIA framework developed in the context of the REFORMERS project. It is a living document that consists of 6 sections and annexes from VI to IX.

- In **Section 3** the SEIA framework is placed in the context of the REFORMERS, including synergies with other Reformers Energy Valley tools;
- In **Section 0** the framework and methodology including state of the art and international indicators landscape help contextualization in the scientific research landscape;
- **Section 5** explains how to run a SEIA step-by-step, from scoping to impact flow definition and actual assessment through iterative monitoring actions.

- **Indicators** and related metrics are defined in **Section 6**;
- **Section 0** shows how to monitor progress and performance of impacts
- the final measurement and evaluation processes are detailed in **Section 8**;

3.3. SEIA co-creation process

The development of the SEIA tool throughout the REFORMERS project timeline can be summarized as follows:

1) In WP6, thanks to the activities organized with FV stakeholders, the definition of a structured and replicable SEIA framework and methodology was completed.
2) In October 2025, a first version of the SEIA tool was delivered, including step by step guidelines.
3) During WP7 and throughout year 2026, the SEIA tool will be tested with RV.
4) Further refinement will be planned, organizing stakeholder feedback sessions and expert reviews.
5) The final validation of the whole toolkit with relevant actors and potential adopters both with Flagship and Replication valley representatives will take place in year 2027.
6) The final version of the SEIA tool open to other European communities setting up an Energy Valley will be delivered as training material in October 2027 (D6.5 Training Materials).

After initial collection of data and needs in the REFORMERS FV in Alkmaar, the Socio-Economic Impact Assessment will be tested in the six REFORMERS Replication Valleys. As shown in the Table 2 below, the SEIA is built to ensure its applicability in different bioclimatic areas, socio-economic contexts and technological and social readiness levels. Final validation will take place towards the end of the project, when the full REFORMERS Toolkit will be refined.

Table 2 Short description of REFORMERS Replication Valleys

Replication Valley	Specificities of interest
Delft Region, Netherlands	Delft Region, Netherlands, is a densely populated centre of inventing and making, where science and manufacturing industry have a long history. Next to the condensed build environment there is a large area of glass house farming located west of Delft and a more rural and agricultural area east of Delft. Municipality, citizens, entrepreneurs, and knowledge centres like the Technical University of Delft will jointly take concrete steps to bring our ambition

	of a sustainable valley closer.
Region of DDS, Province of East Flanders, Belgium	In the Province of East Flanders, Belgium, the current industrial ecosystem is fed mainly by fossil-derived power. A further electrification of their processes is expected, therefore the opportunities for renewables will increase within the region, such as more PV-installations, as well as a new fermentation plant, has been erected.
Murau district, Austria	The district Murau is an inner-alpine valley in the region of Styria, in the Southern Part of Austria. This rural area aims to reach the energy transition in 2040, by covering the whole region with renewable energy communities.
Greater Poland Energy Valley, Poland	Greater Poland Energy Valley comprises five regions with the same goal: shift from lignite mining to green energy, by focusing on renewable sources and green hydrogen, with Konin city as a key replication site. In fact, the City of Konin together with the association “Konin Agglomeration” with 16 urban and semi-urban counties will be the replication site.
Western Macedonia (WM), Greece	The Western Macedonia economy, heavily reliant on the lignite mining industry and the Agios Dimitrios Power Plant in its capital Kozani, is transitioning away from lignite, affecting 16,000 jobs. In response, the region is developing financial tools and innovation hubs to mitigate the impact of this shift.
Tolosaldea, Basque country, Spain	Tolosaldea is one of the eight *comarcas* in Gipuzkoa, formed by 28 municipalities and almost 50.000 inhabitants. Its economy

	relies primarily on the papermaking industry.

3.4. Links with other tools and tasks

The REFORMERS SEIA tool is a part of a larger toolkit developed for those entities and communities planning to develop as a Renewable Energy Valley (see Figure 13).

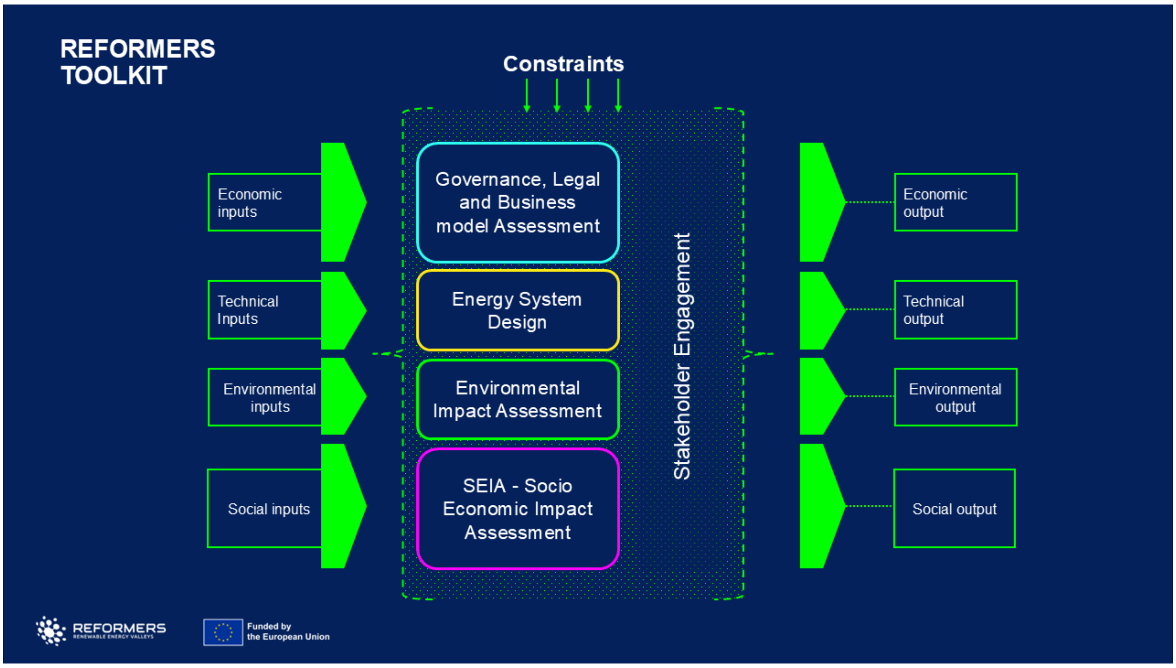

Figure 13 REFORMERS Toolkit diagram

The tools developed under the REFORMERS project are listed below:

- **Energy System Design**. A tool to support energy planning of the valleys' energy systems transformation by optimizing size and location of technologies to satisfy specific needs (i.e., energy cost reduction, emission reduction, fuel independence, etc.). It focuses on power, heating, cooling, gas, hydrogen and mobility sectors and is based on a graphical user-friendly interface – (T6.1).
- **Environmental Impact Assessment**. A tool dedicated to assisting regions in evaluating the environmental impact of the measures they select for their transformation to an energy valley. This tool, designed following a component-based life cycle approach, is able to assess the energy sectors and variable systems configuration, in agreement with those addressed in the Energy System Design toll (i.e., power, heating, cooling, gas, storage, hydrogen and mobility) – (T6.2).
- **Business models, Governance and Policy & legal assessment**. A tool aimed at supporting the identification of structure for governance, business models and the assessment of policy and legal aspects needed to establish and keep alive future

energy valleys. In this context, a holistic approach that combines these four aspects will be developed to assess their mutual influence while optimal solutions are identified – (T6.3).

- **Stakeholders' engagement and impact assessment**. A tool aimed at facilitating stakeholder mapping and engagement to achieve energy valley transformation. The stakeholder engagement approach consists of two components. First, raising the knowledge and awareness of the stakeholders on the topic of renewable energy and self-sustaining carbon-neutral energy valleys. Second, a co-creation of the technical design of the energy valley that combines social and technical data to determine potential energy valley systems that have broad implementation support. The co-creation process follows five steps: identification of the relevant stakeholders, identification of the stakeholder motivations, determination of potential solutions, evaluation of the potential solutions and consensus building as a basis for decision-making – (T6.4).

Table 3 below describes in more detail these interconnections, mainly answering the question:

"What processes and activities are informed or linked to the SEIA framework, in a Renewable Energy Valley transition project, such as the one envisioned by REFORMERS?".

Table 3 SEIA Connections with REFORMERS tasks

	Project activities and processes	Connections
T6.1	FV Energy Transition Design and implementation[1] *(design and implementation of the REV energy system, including technologies for the production, transformation, distribution, storage and consumption of energy)*	The contents of SEIA reports will provide a thorough assessment of the impacts of selected technological solutions that are needed to deploy an Energy Valley. The tool is intended to be used by the Energy Valley leading entity/ies since the early design phase, through implementation and monitoring up to its completion phase. Iterations shall be foreseen to ensure a continuous assessment. The contents of SEIA reports can lead to decision-making processes aiming to eliminate, mitigate or compensate those potential negative impacts (e.g. reduction of employment in fossil fuel energy production activities) and/or to strengthen or maximise positive impacts through strategic

[1] Work Packages (WP) of the REFORMERS project No 3 and 4 (for the Flagship Valley in Alkmaar) and No 7 (for the Replication Valleys).

		planning and support actions (e.g. increase in employment in "green" jobs, increase in citizen participation, economic growth of companies producing energy from renewable sources).
T2.2	Communication[2] and Engagement	The role of local stakeholders is essential to collect data, select the main impact to be assessed and define the mitigation measures. Throughout the whole impact assessment, all relevant stakeholder groups, including beneficiaries, will be involved with targeted campaigns and activities, to ensure their needs, requirements and expectations are properly considered. Finally, the advantages of adopting the SEIA tool should be properly communicated to stakeholders with decision making powers to drive the implementation process, and to beneficiaries to ensure they are involved and able to provide feedback.
T6.5	Training material for toolbox implementation *(training materials about the functioning, expected usage and customization of the REFORMERS toolbox)*	The final version of the SEIA tool will be accompanied by a dedicated training kit, which will be derived from lessons learnt while applying it in the RVs. Such training will serve future Renewable Energy Valleys across Europe, maximizing the project impact and the replicability and scalability of the Energy Valley concept at large.
T7.2, T7,3, T7,4, T7.5	RV Energy Transition Design and implementation, including evaluation of environmental impacts, regulatory aspects, and social impact	The SEIA tool will be applied in Replication Valleys under WP7, working in synergy with task leaders to ensure that data can be collected and impacts monitored.
T7.6	Training activities into practice	Training sessions will be organized with RVs, providing guidance and support in the use of the SEIA tool. From training activities with RV leaders and key stakeholders, the training kit will be refined for broad replication in T6.5.

[2] WP2 of the REFORMERS project.

T8.1 and T8.2	Project monitoring and evaluation[3] *(monitoring and evaluation of the effectiveness of the development and replicability of the Renewable Energy Valley model)*	The evaluation of project solutions includes the SEIA model effectiveness and replicability potential, feeding also the exploitation roadmap in T8.3 and long term vision in T8.4. If relevant, recommendations resulting from SEIA assessments in the FV and RV could be transferred to the general list of policy recommendations of the whole REFORMERS project.

4. SEIA FRAMEWORK AND METHODOLOGY

SEIA stands for Socio-Economic Impact assessment and in this document a tentative framework is delineated which shall support its planning and the whole monitoring process in any existing or future Renewable Energy Valley. This section brings relevant knowledge from consolidated scientific sources and offers a thorough mapping of socio-economic indicators broadly adopted by international organizations.

4.1. State of the Art

Over the last decade in Europe, a huge effort has been put on the transition to a decarbonized energy system. Such effort is supported by a broad regulatory and policy-making action, to speed up and become carbon neutral by 2050 (Paris Agreement). From a merely technological point of view, the market is already mature, and investments are fast increasing in Hybrid Renewable Energy Systems (HRES).

[3] WP8 of the REFORMERS project.

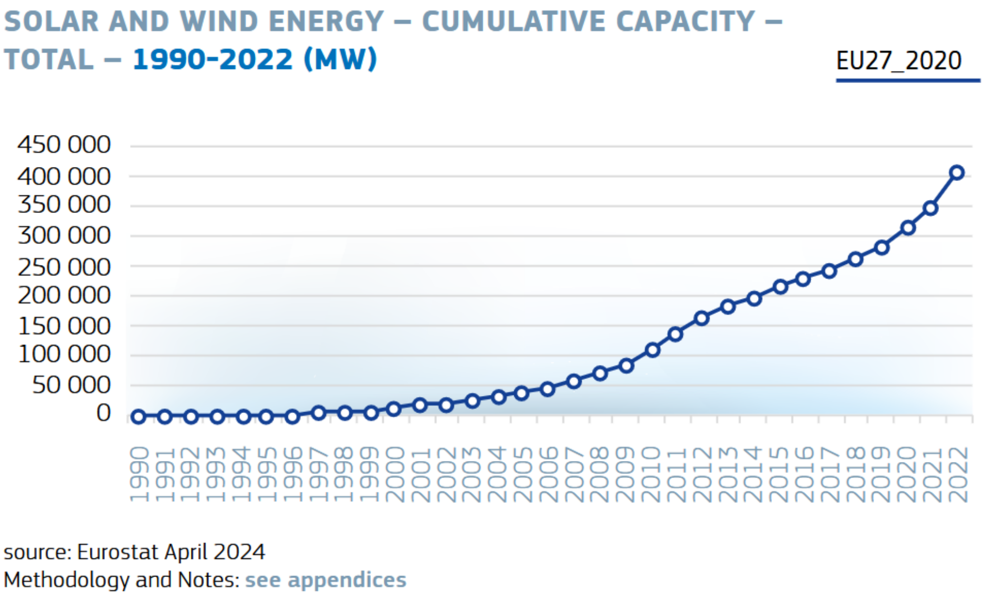

Figure 14 Eurostat EU energy in figures, 2024

Yet, at the regional and local level, investors in industry and business struggle to implement such solutions. Bottlenecks are linked to the inherent complexity of deploying such systems, in a dynamic regulatory context and uncertainties related with self-consumption schemes, energy sharing, Peer-2-Peer and other governance models foreseeing more flexible, resilient and adaptable local energy systems. Energy Valleys, as Energy Communities, are still developing concepts and a multi-stakeholder consultation process is essential to run successful strategic planning. Beyond bureaucracies and legal aspects, the low familiarity of public and private entities with the evaluation of socio-economic aspects and impacts of innovative shared energy schemes can slow down their deployment (Sovacool, Brugger, Brunzema, Dańkowska, Wemyss, Vernay, Betz, Avelino, De Geus, et al., 2023). A JRC study highlighted how in EU-funded R&I projects social impacts are not consistently measured and tend to prioritize energy and economic performance rather than the needs of consumers, such as comfort, well-being and health (European Commission Joint Research Centre, 2020).

The REFORMERS SEIA is a comprehensive framework allowing any public or private entity or subject design, plan and implement its own socio-economic impact assessment by following a step-by-step methodology. This framework is informed by the most recent studies and collects a preliminary set of socio-economic indicators from relevant literature sources, specifically focusing on local renewable energy systems.

The REFORMERS SEIA Framework ensures that any future Energy Valley project can deal with societal changes and complex socio-technical systems, where “socio-cultural aspects or social practices have just as much influence as individual choice and behaviors (European Commission. Joint Research Centre., 2024a). According to Proedrou et al. “energy transition policies not only involve choosing energy technologies, prices or emissions reduction targets, they also result in the transformation of our economic and social structures, and have social impacts including impacts on citizen's rights, communities, and how energy systems will be governed (Proedrou, 2022). The design of HRES shall be informed by socio-economic parameters, ranging from job creation and social acceptance, and included in HRES optimization software algorithms (Cuesta et al., 2020a). The SEIA intentionally seeks deep connections with SSH disciplines and well-known theories such as the Tenets of Transitional justice: distributional, representative, and procedural and (Heffron & McCauley, 2017) (Sovacool & Dworkin, 2015). It is important to specify that most methodologies in the literature propose approaches specific to a known spatial scale or use-case, and there is no standardized approach that could work without adapting it to the scope, objectives, and ambition of the specific Energy System project. In REFORMERS, the main common trait of case studies is the presence of a mixture of light industries, residential and commercial consumers, a need for higher RES integration, for new energy sharing models and for smart optimization systems. In the Flagship Valley, such needs are addressed thanks to a fully working digital twin (developed in WP5). Several studies analyzed existing multi-criteria decision-making techniques (Wang et al, 2009) and decision support systems based on different hierarchy layers – strategic, tactical and operational (Wang et al., 2009). The REFORMERS project draws from these experiences and proposes SEIA adopters a comprehensive framework that is flexible by design and can easily incorporate additional methodological steps, when necessary.

From an extensive literature review, socio-economic impact assessments of RES systems identify specific sets of key performance indicators. Figures show that the most utilized were by far: job creation (46%), followed by social acceptability (28%),social benefits (15%), visual impact (14%), local development (13%), impacts on health(10%), and income from jobs (8%) (Strantzali & Aravossis, 2016). Researchers worldwide introduced new criteria to support decision making, bringing e.g. broader socio-political factors, infrastructure compatibility (Cuesta et al., 2020b) social welfare (Rahman et al., 2013) and human development indexes (HDI)into play (Štreimikienė et al., 2016). More recent studies stress the importance of indicators that are able to highlight those socio-economic factors -e.g. low customer awareness and digital literacy – which might slow-down the adoption of more advanced, digitalized and automated smart energy systems (SES), leading to a weaker RES penetration: "the utilization of SESs can lead to multiple benefits for the stakeholders involved (…) yet due to their multidisciplinary nature, there are no known or universally accepted standards for assessing their performance"(Efkarpidis et al., 2022). The associated KPI repository has been analyzed and partially included in the REFORMERS framework, nevertheless the technical requirements such as (a) network operation optimization, (b) improved network development, (c) increased flexibility, (d) enhanced system feasibility, (e) improved interoperability, and (f) improved model accuracy shall be further explored by those emerging Energy Valleys in which such aspects play an essential role. Similarly, the EU funded IRIS Project underlined the links across environmental, economic, social, legal and ICT dimensions and proposed a scalable approach to assess stakeholder objectives in order to correctly map such links and define localized thresholds per each KPI assessed (Angelakoglou et al., 2019).

In the REFORMERS SEIA tool, the preliminary set of socio-economic impact indicators and metrics derived from literature review, are mapped consistently with those suggested by world-renowned organizations and international bodies: OECD, UN Sustainable Development, the IAIA International Association for Impact Assessment, and the BES indicators by the Italian National Institute of Statistics (Stiglitz et al., 2019[4]). In the section 4.2 below a quick overview of each source is provided.

4.2. Matching with international indicators

In this section a summarized overview of widely known socio-economic indicators used in international reports is provided, that have been mapped and included in the SEIA KPI list. Reference to sources have been added to the SEIA KPI list.

The Human Development Index (HDI) published by UNDP in 2010 represents the most known well-being mapping framework. It is a combined index of average achievements in three key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living[5].

OECD indicators are considered global standards for businesses, corporate governance bodies, and policy makers. A recent OECD Working Paper stresses aspects linking economic development with equality and wellbeing (Distributional Impacts of Energy Transition Pathways and Climate Change, 2024a).

The seventeen (17) SDG Goals have been developed by the UN Department of Economic and Social Affairs to provide “a shared blueprint for peace and prosperity on the planet”, and they were adopted by all UN Member States in 2015. The SDG Progress report is presented yearly and is based on the global indicator framework with data produced by national statistical systems and regional information. The US based organization IAIA was born in 1980 with the mission of enhancing and harmonising how Environmental Impact assessments were conducted and ensuring they could properly meet the increasing need for sustainable investments and informed decision-making tools for professionals.

A recent publication from the International Association for Impact Assessment (IAIA, 2024)[6] provides guidance for Strategic Environmental Assessments (SEA) in an era of global energy transition. The current set of **BES indicators** features 152 indicators across 12 dimensions of wellbeing, and the Italian ISTAT institute publishes a report every year, providing a thorough depiction of quality of life in Italy through BES indexes. The authors’ ambition was that of identifying the limits of GDP as an indicator of economic performance and social progress and produce a set of more relevant indicators and present the statistical information in an appropriate way. As a result, the household perspective was emphasized, subjective dimensions became as important as objective ones and inequalities were addressed consistently over all dimensions (Stiglitz, 2009).

[4] https://ec.europa.eu/eurostat/documents/8131721/8131772/Stiglitz-Sen-Fitoussi-Commission-report.pdf
[5] https://hdr.undp.org/data-center/human-development-index#/indicies/HDI
[6] https://training.iaia.org/sea-guidance-full-document/

Ideally, thanks to the common definition and the source mapping references provided for each SEIA indicator, those in charge of running an Energy Valley assessment – a SEIA team, from now on in this document - can derive figures, indexes and performance metrics that allow measuring multidimensional socio-economic impacts, which can be also compared across different cases and with other studies in the scientific literature.

4.3. Framework

The Reformers SEIA framework defines and describes how to set-up a prior study, plan and then monitor the societal impact of an Energy Valleys in the short, medium and long term.

The SEIA tool provides more than 80 indicators organized in three main dimensions:

- Social/Societal impacts: This dimension explores the impact of a Renewable Valley project on the local community, focusing on their lifestyle and participation. It comprises the categories Community cohesion and participation, Job health and safety, Households and housing opportunities, Community capabilities, Health and Wellbeing, Justice and Inclusivity.

- Economic impacts: This dimension focuses on the impact of a Renewable Valley project on the economic activity of the region. It comprises the categories of Employment, Economic Attractivity, Energy poverty, Households and financial opportunities, Local Development and innovation.
- Environmental impacts. This dimension focuses on the impact of a Renewable Valley project on the environment and the related impacts on the quality of living environment, water management, household consumption patterns and footprint, mobility and transport, waste management and air quality.

Data collection methods suggested are both quantitative and qualitative, to better grab the complexity and identify the deep connections across dimensions, sub-categories and individual indicators. Moreover, the KPIs proposed in this framework partially overlap with those developed and monitored under other tasks (technical, environmental, economic, legal), which are used in the SEIA for a different purpose. Due to the systemic nature of socio-economic changes, it is important to gain access to such indicators and follow monitoring actions, with the specific aim of capturing changes in any of those “sub-systems” that may influence SEIA results (see Section 9.1.2).

Target stakeholder groups must be involved since the early phases specifically aiming at identifying all potential issues that might not be apparent to a person not belonging to the local context. They shall include, among others, energy system operators, energy service providers, energy communities’ representatives and civic groups, to ensure their objectives are also considered (Dincer & Acar, 2017). For a full description and guidance on stakeholder mapping and engagement refer to Section 4.5 and to the first part of this deliverable fully dedicated to Stakeholder Engagement.

4.4. Methodology

A socio-economic impact assessment for Renewable Energy Valleys, as proposed by the REFORMERS project, shall proceed as follows:

1) **Scoping**
This step entails contracting the extent of the assessment with the main actors promoting the REV development: the project developer/s and investors, the key decision makers (e.g. local institutions), other actors acting as "clients". The SEIA team can be considered the "contractor", namely the team who is in charge of designing, planning and implementing the monitoring activities needed to deliver a socio-economic impact assessment report around a specific REV implementation project.

In the context of REFORMERS project the team is composed by Deep Blue as guiding partner, by all partners involved in T6.4 and WP7, helping with coordinating across the different sites and by Flagship and Replication valleys site leaders and key local actors as actual "assessing" team.

2) **Context analysis**: This preliminary phase involves identifying and prioritizing the information needed to understand the local context and build a preliminary information kit with figures and relevant sources required for a thorough assessment. This step consists in collecting and synthesizing information (qualitative and quantitative) on the REV project socio-economic context. This step may narrow down the scope of the assessment, and it may include a preliminary drafting of the Impact Flow diagram.

3) **Planning**
    a) **Impact flow definition:** This step consists of the definition of an impact flow (from socio-economic problems, to objectives, to actions, output, outcome and impact), through a participatory process involving key stakeholders. This key phase allows a correct planning of the socio-economic impact assessment, which focuses on impacts that are actually relevant to the community and can bring tangible changes in the future.
    b) **Selection of relevant indicators**: This step involves selecting the indicators and metrics necessary for evaluating socio-economic impacts, based on information from scoping and context analysis and stakeholders' perspectives, including local Public Administrations.
    c) **Trends and forecasting:** This step builds on previous ones to better detail the socio-economic impacts and their trends in the medium (5 years) and long term (20 years). It includes evaluating trade-offs between adverse and beneficial outcomes and deciding what are the thresholds between relevant and negligible impacts. This step constitutes the first core content of a SEIA Report – Baseline.

4) **Monitoring**: An effective assessment requires a robust monitoring plan to ensure that measures are effective and to make necessary adjustments as needed. It is usually organized as an iterative process.

5) **Final evaluation and reporting**: This is the final monitoring step which closes the SEIA process by evaluating the final actual socio-economic impact of the Energy

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State Secretariat for Education, Research and Innovation SERI

Valley and the general efficacy of the assessment itself. It delivers a report including comparison across results of the monitoring step iterations and a set of final recommendations for further improvement.

Figure 15 SEIA methodology

4.5. Stakeholder Engagement in SEIA

The SEIA follows the common stakeholder engagement approach: after a thorough mapping process, and the influence - interest analysis with motivation assessment, the SEIA process can initiate. It shall run as much as possible in synergy with the other planned project engagement activities, therefore coordination is essential.

4.5.1. Stakeholders grouping in SEIA

In the proposed socio-economic impact assessment, there are three important actors who play an essential role: the beneficiaries, the stakeholders and the "client". In the case of beneficiaries, they shall be identified through the stakeholder mapping activity, yet in the SEIA it is important to specify beneficiaries as a separate subgroup since even though they might be represented by local organizations or NGO, the impacts shall be assessed, estimated or projected on them separately, in order to derive realistic results at the broad societal level. As for clients, – including project implementers - they play an active role in the SEIA, and they overlap to a certain degree in REFORMERS.

Beneficiaries: individuals, formalized and informal community groups and organizations (public or private) who, thanks to the implementation of the project (the transformation into a Renewable Energy Valley), can experience an improvement in an aspect of their living conditions in the medium (2030) and long term (2050). The direct involvement of citizen group representatives in the impact flow definition, KPI relevance and in subsequent monitoring steps ensures that measures identified to mitigate or promote impacts are aligned with their needs. Among the beneficiaries, we shall include vulnerable groups. They are defined as those people and communities who risk being excluded or suffering negative externalities from the implementation of a Renewable Energy Valley project (e.g. local workers who may lose their jobs following the decommissioning of fossil fuel energy production plants).

Stakeholders: stakeholders, understood as primary witnesses of the reference context, i.e. the one in which the project action intends to generate an impact (e.g. trade associations, energy communities, local electricity grid managers, energy suppliers). These can have different levels of influence on the actual achievement of the project objectives and on the production of impacts and different levels of interest in contributing to the achievement of the objectives and the production of the impact. Stakeholders that are relevant to a SEIA assessment might differ from those that are relevant to a business modelling activity or to research-related communication activities targeting groups that work or live far from the energy valley and are indirectly impacted by the implementation itself.

Frontrunners: the “frontrunners” are those key stakeholders that have the interest, influence and power to act as pioneers and can be an example to others in joining a challenging project as such a Renewable Energy Valley design and implementation. For example, in the REFORMERS’ Flagship Valley a frontrunners group was created to ensure early involvement of local businesses in Boekelermeer and a tailored community engagement strategy was adopted in the residential area in Heiloo (Plan-Oost).

Clients: the client is the formal or informal entity that needs and requests a socio-economic impact assessment of a Renewable Energy Valley project. It is usually a heterogeneous group of investors, interested actors and local institutions representatives who are supporting the deployment of an energy transition project in a specific area. It could also be an emerging energy community or local entity in charge of exploring the perceptions and concerns of its members towards one or more initiatives they would like to assess. In a real-market dynamic, the client would contract a professional team to run the SEIA or dedicate financial resources to hire someone or train their own personnel. Similarly to the second case mentioned, Similarly to the second case mentioned, in REFORMERS the group is composed of local partners and of enterprises in the FV and RV, namely those entities actively supporting the implementation of the project. In the flagship such group is coordinated by InVesta, and NEC as FV leader. The RV leaders (REFORMERS project partners) can also be considered as clients who are training their own personnel with support from the SEIA training team led by Deep Blue, VUB and EUREC. REFORMERS training activities and knowledge exchange workshops, both for the FV and RVs, are specifically intended to provide them guidance on how to use all REFORMERS tools, including the SEIA.In Figure 17 a combined infographic shows how this grouping aligns with the quadruple helix approach for Renewable Energy Valleys.

Figure 16 Stakeholder grouping

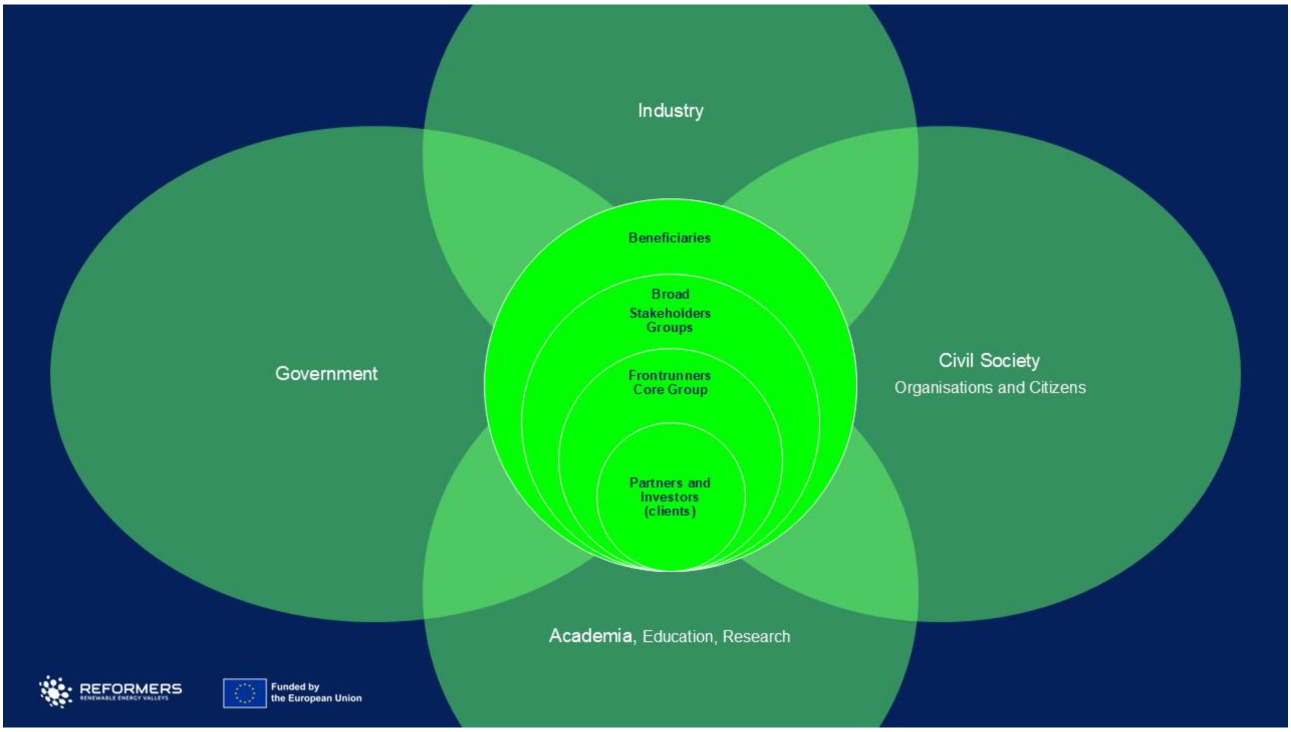

Figure 17 Quadruple helix approach and SEIA stakeholder grouping combined

4.5.2. Phases of engagement in SEIA

The different stakeholder groups shall be engaged in each step of the SEIA implementation process, The level of engagement depends on many factors including available resources and skills, stakeholder availability and overall feasibility: The REFORMERS project recommends an extensive involvement of stakeholders to ensure better results and reliability, while also fostering knowledge exchange and increasing acceptability.

Here below an overview of the level of involvement in each step of the SEIA:

- During the **scoping phase:** partners need to actively involve individual actors at the local level – key stakeholders with decision powers or potential frontrunners - to better understand their needs and expectations at the different levels (micro, meso, macro). Scoping largely depends on how a SEIA report would be used for, who is commissioning it, what time horizon it shall work with.
- In the **context analysis** phase: local partners and key stakeholders collaborate in identifying trusted data sources and retrieving the relevant socio-economic information.
- During **planning** phases: the client, the frontrunners group and the broader stakeholder groups from the four domains (Civil society, Academia, Government and Industry) shall be invited to **develop the Impact Flow diagram, select relevant indicators,** and **provide feedback** on its complete version before monitoring begins.

- In the **trends and forecasting** phase for a more detailed **definition of mitigation actions,** if deemed necessary.

- From the first monitoring phase, also called **baseline data collection** until the **final measurement** phase: the iterative monitoring activity can be carried out through questionnaires, semi-structured interviews and - for more qualitative data and perception of impacts – workshops and focus groups.

- In the **final evaluation and reporting phase**: before sharing results with the client and/or publicly, the final results of the evaluation shall be circulated among all stakeholder groups, including experts, for a final review and round of feedback collection.

Stakeholder engagement activities in a SEIA should be preferably carried out as in person activities, adequately facilitated and with a careful participatory process management. The simultaneous participation of multiple stakeholders (belonging to the same category or to different categories) helps to stimulate discussions and identification of creative solutions, capable of satisfying different needs. In some cases, it might also entail a certain level of disagreement or conflicting opinions. It is important to act carefully and rely on professional moderation for multi-stakeholder activities and foresee homogeneous groups activities too. In some cases, organising the activities with each target group separately might help higher confidence and openness in discussions, but results might be rather aligned too, in part due to social group dynamics.

5. STEP BY STEP SEIA GUIDELINES

This section briefly outlines how to run a SEIA in practical terms and links each step with templates, examples and canvas which the SEIA team can download, adapt, print and use during data collection.

5.1. Scoping

The scoping phase establishes the goals and boundaries of the assessment. It identifies and prioritizes the key issues associated with a project to be assessed, to determine the amount of effort and resources needed to complete it. It is inherently intertwined with the context analysis described in Section 5.2.

A scoping document shall contain:

1. A brief description of the REV project, including an implementation timescale.
2. REV construction site maps and photos, project plans, designs, maps.
3. The list of innovations, technologies and ancillary features that are new to the specific context and deserve in-depth examination, from a social impact perspective. (e.g. hydrogen facilities, digital twins, IoT sensors for data collectoin).
4. Relevant existing or planned polices (at the meso or macro level) that can affect the project or cause uncertainties and any other relevant regulation, policy or document.

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State Secretariat for Education, Research and Innovation SERI

5. Preliminary desktop study of the socio-economic context in the form of a brief document (population, area, social groups affected, human activities - e.g. industrial, residential, agricultural areas, etc.);
6. Description of how the SEIA methodology will be applied in the specific case study.
7. The spatial and temporal extent of the study.
8. A preliminary timing and list of milestones, with the related description of each output (a report, an infographic, a list of recommendations).
9. Roles and point of contact of the SEIA team.

In the case of a Renewable Energy Valley project aiming to maximize energy autonomy, the definition of the levels of impact and the temporal boundaries may largely differ across projects. While the energy transition process may entail similar implementation activities, the impacts it has on society may be extremely different. To understand such differences, it's demonstrated how the rapid growth of renewable energy technologies (RET) in Europe led to greater impact on local communities, shifting from small or individual assets to concentrated areas where renewables are sourced from multiple vectors, as in Renewable Energy Valleys. Such scale-shift may result in increased perception of negative impacts and opposition (Irie et al., 2019). In other cases, the same transition process may result in higher positive impacts related to increased employment rates and perceived quality of life.

An effective scoping draws from the well-known "Theories of Change" and helps your SEIA team and the client better comprehend the different levels of impact and the amount of time and resources that can be allocated to understand impacts at each level. A balanced approach shall ensure that all levels are taken into account. Proper effort must be dedicated to enhancing the comprehension of needs and the involvement of those potential beneficiaries and stakeholder that are potentially most impacted by the changes and have the least resources to address emerging challenges (see Figure 18).

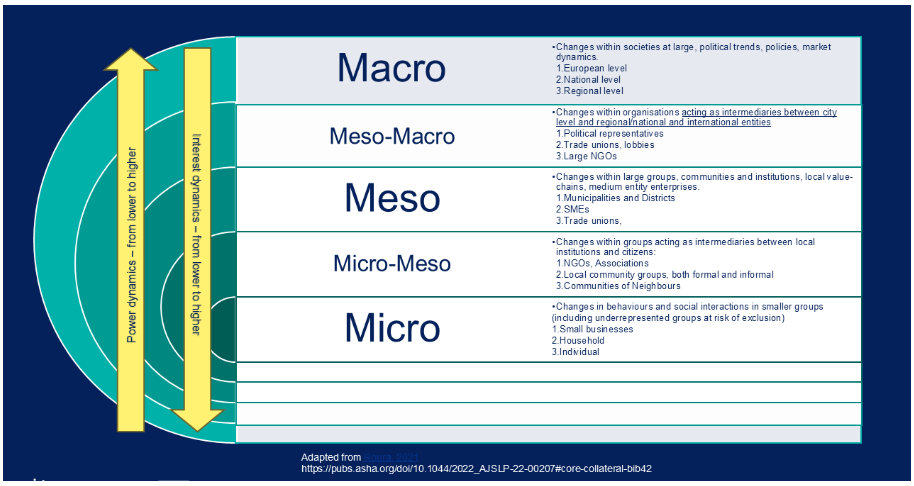


Figure 18 Theory of change - Micro, Meso, Macro scale for SEIA scoping

On the one hand, the scarce consideration of a group at the proper societal level (micro, meso, macro) of analysis in the scoping analysis may result in lower comprehension of such groups' needs, perceptions and a flawed impact assessment. On the other hand, exceeding in dedicating effort and money to collect data that is not relevant to the level or physical area involved in planned changes and implementation of a Renewable Energy Valley or not relevant in the chosen temporal resolution may result in a too vague assessment, with low or no margin of actions. The time span for a short, medium and long term outlook depends on the spatial and temporal scale of the intervention.

The initial scoping and context analysis steps can run in parallel, since relevant changes in one might influence the other. Ensure that information exchange happens in between and verify coherence before. Run a final cross-review of both the scoping and the context analysis before proceeding with the next phase.

To anticipate part of the impact flow definition, already in this phase key stakeholders can be involved in a quick elicitation of the socio-economic issues associated with the project technological innovations. As guided elicitation exercise the SEIA suggests building a "Tree of Problems" as final step of the scoping activity with the client, which builds on main problems – described as the visible "leaves" or symptoms of deeper issues, that come from the branches, the body and the roots. The same exercise shall be repeated for each stakeholder group involved (see Figure 19).

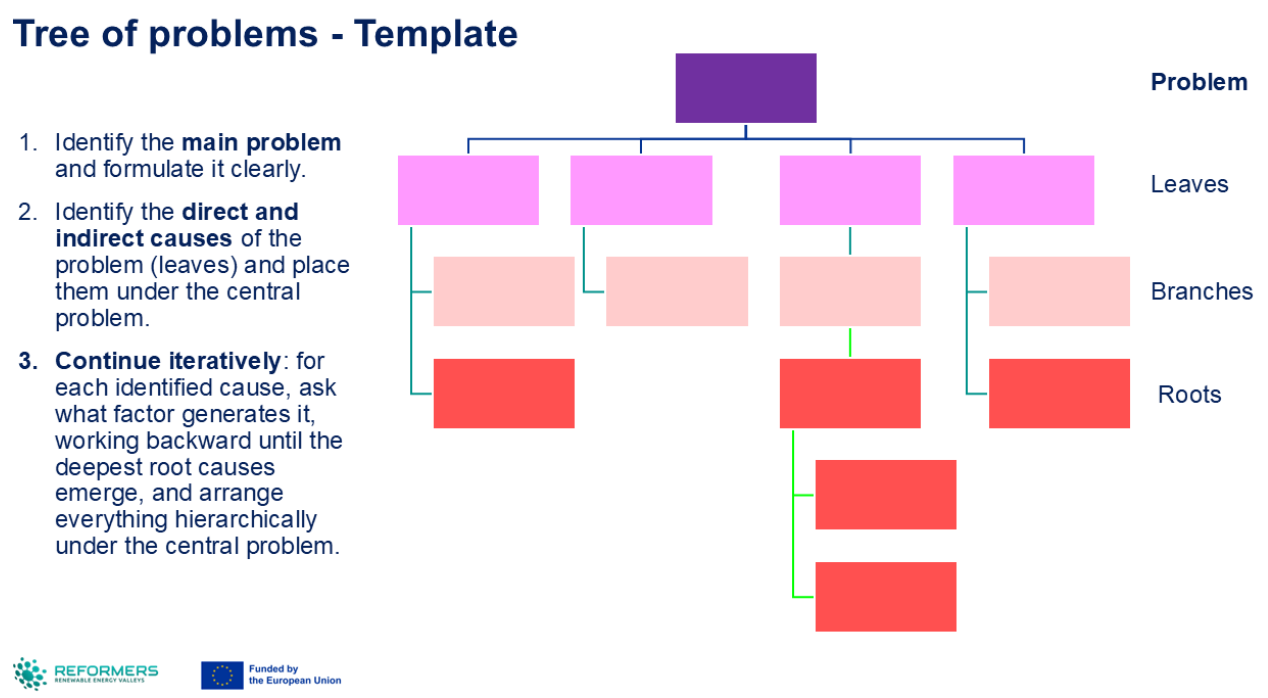


Figure 19 Tree of problems template

A good understanding of the tree of problems will allow to reflect on how they can be addressed with the appropriate solutions, towards the complete definition of the impact flow.

5.2. Context Analysis

The context analysis for a socio-economic impact assessment entails a detailed examination of the economic and social characteristics of the area where a project will take place. This includes understanding the main demographics of the population, local economic activities, and the local energy ecosystem. The data gathered is needed to establish the baseline conditions, which are crucial for accurately predicting the potential impacts of the intervention. This analysis ensures that the project is tailored to the specific needs of the community, maximizing benefits and mitigating potential negative effects. Depending on the extent of available information, the SEIA team shall decide on its actual usefulness in each -micro, -meso or -macro scale, in which timeframe it shall be monitored and how potential or expected gaps in data can be addressed (e.g. through questionnaires, interviews etc..).

This phase foresees the collection of quantitative and qualitative data, also recurring to semi-structured interviews to those stakeholders representing key local actors (see par. 6.2.2), as initial step or as verification method of the reliability of the information already collected. In some cases, the SEIA team might prefer to externalize this data collection to third parties and/or acquire existing socio-economic reports. In this case it is essential to ensure that they are appropriate to a REV development (e.g. a socio-economic context analysis focused on land use targeting investors in the livestock market or on commercial development of tourism might strongly differ from one focused on energy infrastructure developments).

The REFORMERS project provides a template form for the **Satellite Valley Preliminary Data Collection** (See ANNEX VI - Replication valley preliminary data collection). Each site's SEIA team can make due changes to ensure that the template structure and guiding questions help better capture the nature of those problems elicited through the "Tree of Problems" exercise.

5.2.1. The challenge of data collection

An effective data collection is a key step to a successful assessment. The acquisition of reliable sources of information requires the direct involvement of the project partners and stakeholders. The nature and characteristics of the information sought justify the choice of a mixed set of instruments for data collection. Project partners, including technology providers and stakeholders shall provide support in identifying, accessing and navigating datasets and statistics at the different micro- meso- macro level, and help verifying their reliability. Collection methods may vary according to the phase of the project to enhance measurement or impacts' forecasting.

The analysis of some of the context indicators requires the search and collection of hard data. Part of the information sought may be publicly available whilst other data is oftentimes private, protected or available for purchase only. Such datasets shall be sought through internal sources and treated with due confidentiality[7].

Datasets should include at least:

1. Demographic statistics
2. Local and regional economic activity statistics
3. Public and private services statistics
4. Transport statistics
5. Datasets from Chambers of commerce
6. Tourism statistics
7. Real estate figures
8. Environmental statistics and/or impact reports
9. Health and safety (including job and non-job related accident reports)

It's recommended to include figures and summarized infographics to quickly grab the socio-economic features associated with each dataset and present them to the client in a comprehensible manner, increasing readability and for quick reference.

For all aspects concerning data collection and treatment, all partners including those running a SEIA assessment shall follow provisions included in REFORMERS D1.6 – Data Management plan and its updates.

5.2.2. SEIA Surveys

Surveys in this initial phase are useful if the desired dataset cannot be found in existing databases, is outdated or not specific enough and it is necessary to extract the information directly. Questions should be framed in such a way that respondents can answer without the need to seek information outside what they already know (or can easily retrieve) and possibly be directly referring to topics that have been introduced in previous steps or with which they are already familiar.

In the case of SEIA, questionnaires can be used:

- in the phase of preliminary KPI selection;
- in the phase of KPI relevance assessment;
- in the monitoring phase, when quantitative and qualitative data from specific categories of stakeholders is needed;
- during final evaluation phase, when stakeholder feedback is needed to validate conclusions and review recommendations and next steps, including potential SEIA iterations.

The selection of the sample of respondents is important in order to have adequate representativeness of the collected data. Stratification and segmentation of respondents is essential and expert advice might be needed to effectively design an extensive survey campaign.

7 https://www.optics-project.eu/optics1/wp-content/uploads/2017/07/OPTICS-D1.4-Societal-Impact-Assessment-Methodology_2.0.pdf

The questionnaires could be sent in an online format, in order to ease both the data collection and the analysis phases, or on paper, in case the local stakeholders to be addressed are not familiar with technology or hard to reach through online campaigns.

The chosen approach should reflect on:

- the nature of the information to collect;
- the target groups composition (segments) and consistency (number of complete responses needed by your study)
- the languages spoken in the area in scope (consider the possibility to translate questionnaires in the most representatives' foreign language groups);
- the targeted groups comfort and familiarity with surveys and the channel chosen to deliver it;
- the time and resources available for the distribution of surveys;

To find a balance between an effective data collection and the risk of "engagement fatigue", refer to D6.4a and D2.1 for guidance. Survey templates are available in ANNEX VII – SEIA Survey templates.

5.2.3. Semi-structured interviews (SSI) for SEIA

A semi-structured interview (SSI) is a method of collecting data and information, during which the interviewer prepares a series of questions or predetermined topics to guide the conversation with the interviewee (e.g. a specific stakeholder). Interviews aim to fill the gaps of quantitative data with qualitative information, maintaining a certain flexibility that can lead to asking questions that were not initially planned, but functional to the collection of information. Semi-structured interviews can be especially relevant during the context analysis phase, since specific stakeholders (e.g. public administrations, representatives of business categories, representatives of neighborhood committees etc.) might help spot key factors not mentioned in the available datasets and guide the subsequent phases of research and data collection.

This type of interview may concern:

- general public policy on energy consumption;
- main sources of energy production in the area (both renewable and from fossils);
- main entrepreneurial characteristics or "vocations" of the project implementation area and changing or emerging value-chains;
- distinctive cultural elements of the community constituting identity values;
- existence of cultural, religious, linguistic or ethnic minorities;
- existence of civic action groups or movements for energy democracy (both acting pro and against REV implementation or any of its ancillary features);
- trends or aspects not grasped by previous data collection steps.

Semi-structured interviews, usually follow the initial desk study to further investigate specific dimensions of analysis as well as to include more subjective stakeholders' views on the project. The interviews also represent an important opportunity to collect further details on answers provided via questionnaires. The interviews will be carried out in person, online or via phone-calls. An example of semi-structured interview template to be used in a SEIA for a Renewable Energy Valley is available in ANNEX IX – SEIA semi structured interview template.

5.2.4. Focus Groups for SEIA

During a SEIA, the involvement of specific categories of stakeholders, experts or other relevant actors (e.g. companies, inhabitants of a specific area) may be required to integrate missing information. A focus group is a research method that involves a small group of participants in a meeting aimed at sharing points of view or answering questions in a moderated setting. The group, made up of ten participants, is chosen considering specific perspectives, characteristics, expertise or knowledge that are important to share and discuss. Groups can be homogeneous or heterogeneous depending on the aim of the activity. Focus groups ease communication and enable researchers to gather insights that emerge during direct interactions, including non-verbal cues and the ability to confront and clarify responses in real-time. In particular, in SEIA, focus groups may be used for the trends and forecasting phase and/or define mitigation measures (see Section 9).

5.3. Planning a SEIA with the Impact Flow

The definition of the **Impact flow** of a socio-economic impact assessment refers to the plan and pathway through which the benefits and costs of a renewable energy project unfold across time and stakeholders. The science behind Impact Flow is based on the well-known Theories of Change (ToC), methodologies broadly adopted to plan and evaluate projects, especially in the social sector, focusing on impacts and their qualitative and quantitative monitoring. It allows the SEIA team to define problems, long-term objectives, identify the conditions necessary to achieve them, and logically reconstruct the causal links between the actions that shall be undertaken and the expected results.

5.3.1. Contents of the Impact Flow

The **Impact Flow diagram** should help evaluators explicit how direct effects (e.g. job creation, local investments, and changes in energy supply) can trigger secondary effects (e.g. business opportunities, skills development, increased household incomes). Over time, tertiary impacts may emerge (e.g. regional growth, improved community resilience, and broader environmental benefits). This structured approach allows decision-makers to understand not only the immediate gains, but also the ripple effects that shape society and the economy. In renewable energy projects, such analysis highlights the capacity of clean technologies to generate sustainable development well beyond the energy sector itself.

The first steps are related to the collaborative and multi-stakeholder identification and detailing of:

- **Socio economic problems** which can be addressed with the creation of an REV or that come because of a REV implementation;
- **Solutions and related objectives**, as goals to be achieved in the framework of the energy transition, in technological, legal, social and economic terms;

- **Activities** all those actions and interventions that need to be implemented to achieve each identified objective, be it a mitigation action or a positive impact maximisation action; they basically translate objectives from theory to practice. There will be several activities under each objective, and some activities might help reach more than one target objective.

- **Outputs**, as tangible results achieved through the activities or associated with one or more specific activity.

- Expected **outcomes** in technological, governance, social and economic terms, associated to one or more output;

- Socio-economic **impacts** that can describe how a certain outcome is performing and can therefore be measured through socio-economic indicators.

A broad stakeholder consultation to collect them can run in parallel with each stakeholder group or one after the other. The SEIA team can organize one or more of the following activities, depending on the available resources:

- workshops
- digital forms for systematic collection.
- focus groups with boards and sticky notes

In the Figure 20 below a preview of the diagram template is provided, available in ANNEX VIII - Impact flow Definition templates and examples

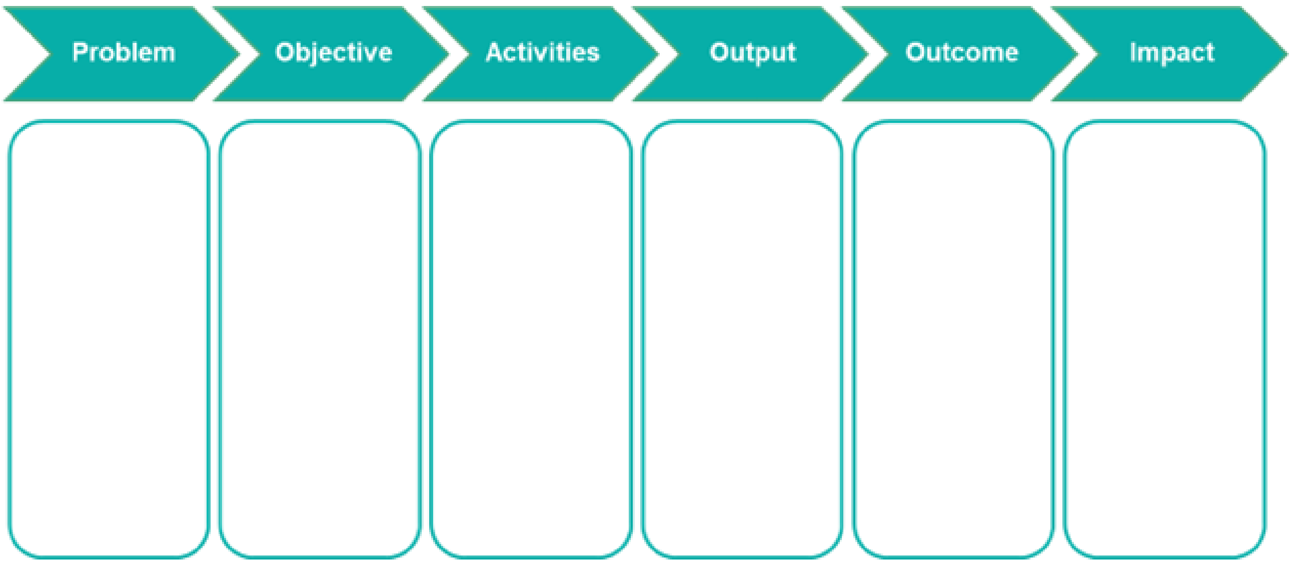
- 

Figure 20 Impact flow diagram template

5.3.2. From problems to solutions

Thanks to the knowledge gained through context analysis and specifying stakeholders and beneficiaries, the preliminary list of direct effects of an intervention can be extended, allowing the complete definition of the impact flow with each stakeholder group – **the Tree of Problems exercise** (see a filled example in Figure 21 below**).**

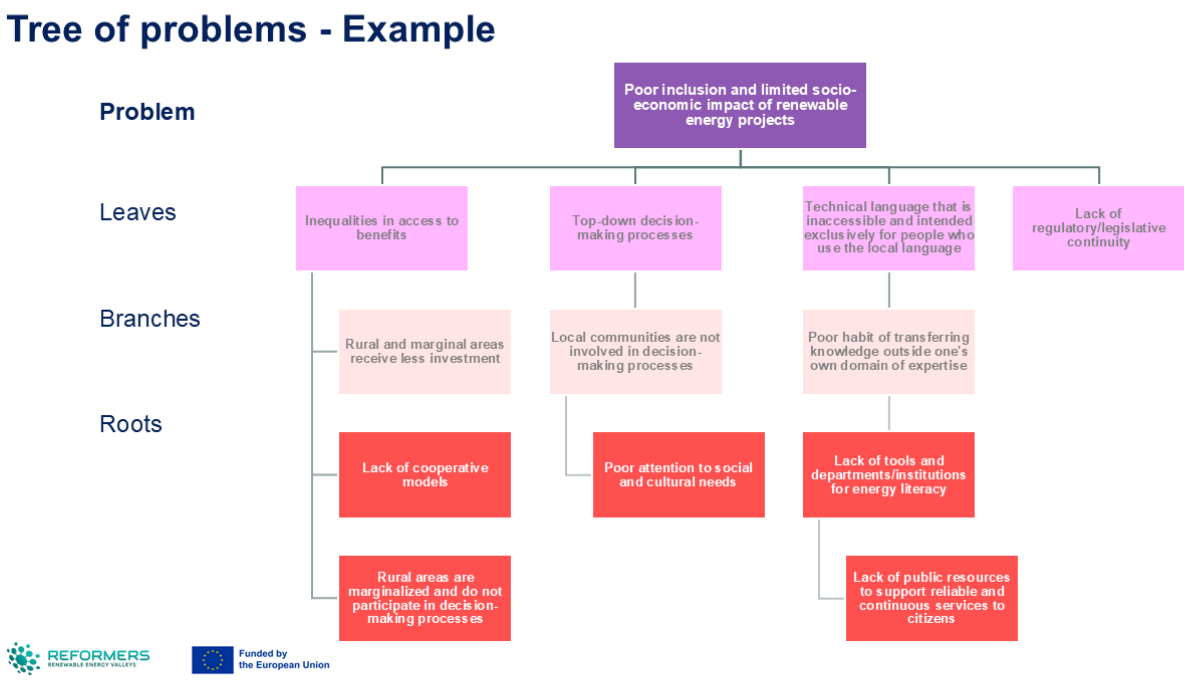


Figure 21 Example of a tree of problems for a REV

Each potential or existing problem can now be turned into a positive counteraction, i.e. transformed in an objective or solution that would help mitigate the problem or promote positive influence of the project on society – **the Tree of Solutions** (Figure 22**).**

To complete the Tree of Solutions, all stakeholders are asked to suggest a solution to each problem, and broke it down into concrete actions hierarchically. After a short feasibility check, each solution can be transferred in the Impact Flow diagram in the column of **objectives.**

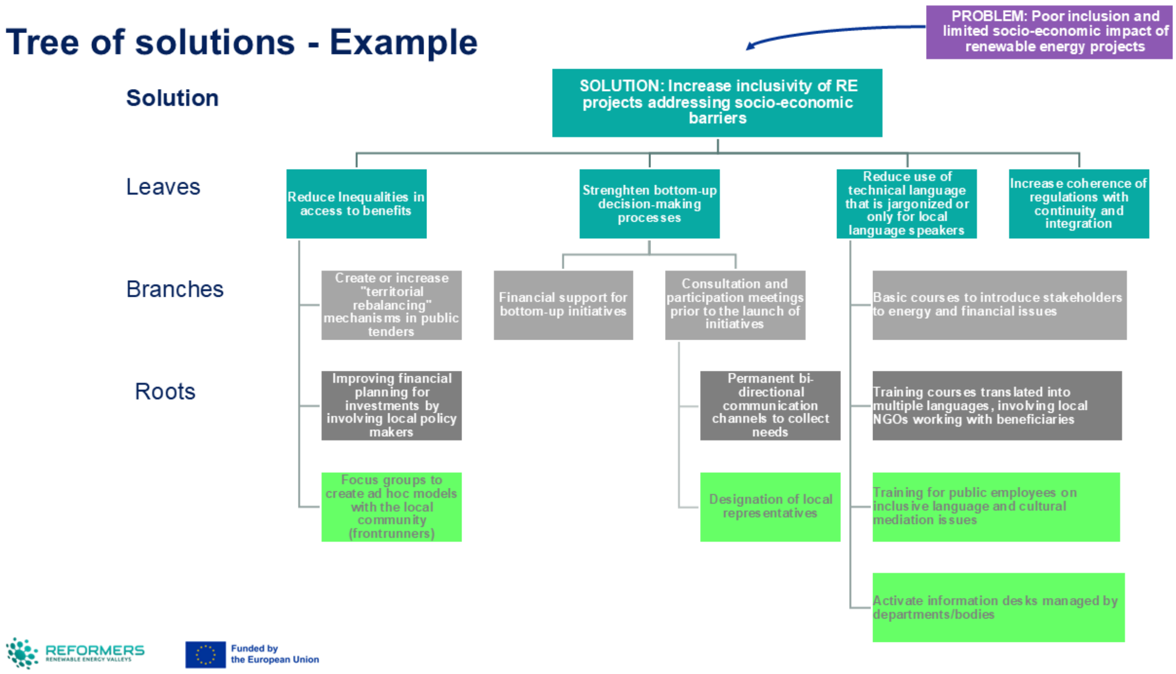


Figure 22 Tree of solutions example

5.3.3. From solutions to impact

The tree of solutions can now be used as input for the Impact Flow Diagram. Here the solutions can be simply copy/pasted as objectives. Each objective is then turned into one or more **activities**, and for each activity a number of tangible **outputs** is agreed upon. Mindful of the scope and extent of the assessment and available resources, stakeholders involved shall now be able to complete the last two steps: define **outcomes,** as the acceptable extent to which each output can be considered successfully delivered or able to generate a meaningful and desirable impact on society. Finally, the impact is the projection of the success rate of each objective or solution identified in the short, medium or long term at the -micro, -meso or -macro scale (see Figure 23).

Example:
Problem: low workforce skills in renewable energy
Objective or solution: Upskill and Reskill of local workforce
Activities: Practical Training programmes for under-employed and for local SMEs
Output: 2 training programmes within 48 months, one for NEETS and unemployed people and one for the local workforce.
Outcome: at least 500 people completing the training, 10 SMEs involved
Impact: higher skills and employment rate in 10 years in the area (e.g. +5%)

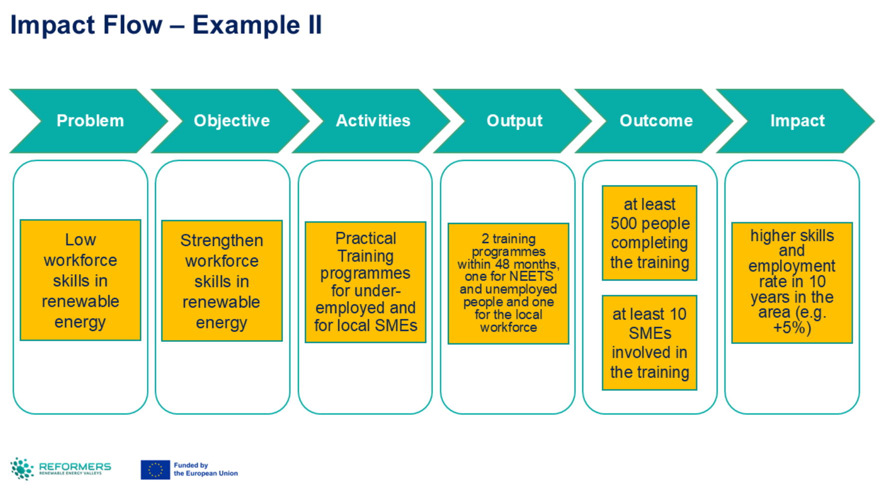


Figure 23 Example of the contents of an Impact Flow diagram for REVs

5.3.4. Impact Flow diagram definition and review

When each stakeholder group, from key stakeholders (including clients, partners and frontrunners) to civil society representatives, has provided input to the Impact Flow diagram, the output can be shared again for final review and feedback collection before concluding the planning phase. When a complete Impact Flow is available, the SEIA team shall have a good understanding of which identified impacts shall be monitored more closely, following stakeholders' recommendations. If needed, this activity can be expanded by asking stakeholders to project impacts in the short-, medium-, and long-term. When all impacts have been listed, the SEIA team can define metrics and target values for each impact. An expert advice might be needed at this stage.

5.3.5. Wrap-up discussion

As a wrap up of the SEIA planning activity, less structured discussions with stakeholders can take place, also asking support in the definition or review of thresholds, trends and forecasting, if already present. This last planning step is paramount to foster informed decision making for both the SEIA team and those stakeholder groups who have any kind of agency or interest in promoting a successful implementation of the project and maximizing positive social impacts, in particular the project implementers and the frontrunners.

5.4. KPI Prioritisation

As seen in the previous section, the selection of KPIs is primarily driven by stakeholder views and novel indicators could emerge thanks to their input. Even if this SEIA framework proposes an extensive set of indicators, is not necessary to monitor all of them. To better plan allocation of resources during the monitoring iterations, prioritization is mandatory.

5.4.1. KPI prioritisation process

It's time to create the consolidated KPI list for your REV project. The SEIA team should

- Add or highlight those indicators closely linked with the elicited impacts resulting from the Impact Fow process to consolidate the set of preliminary impact indicators;
- Update and distribute the baseline survey through which stakeholders can review the preliminary list of indicators and prioritise those they deem most significant for themselves and for their community based on their perceptions and experience (see ANNEX VII – SEIA Survey templates
- Make financial estimations of most relevant socio-economic impacts adopting methods such as the Social Return of Investment estimation (SROI) or other similar methods (see section 9 for guidance and ANNEX XI – Composite Indexes and ANNEX XII – SROI method for examples).

Most likely in this phase the number of impact indicators will increase and new ones not mentioned in the list proposed in this document might be needed. This iterative process ensures the final selection of KPIs reflects local values and priorities, making the assessment more relevant and targeted.

Important notice: there are impact indicators that shall be monitored even if not selected by stakeholders due to their intrinsic relevance (e.g. increase in employment levels). Such impacts are usually identified already during the scoping and context analysis, although they might appear in later phases and their monitoring implemented in the SEIA planning and data collection templates. If in doubt, ask for expert advice before starting with monitoring activities.

5.4.2. KPI prioritisation exercise

In this section, guidance is provided on how to ensure all stakeholders prioritize KPIs. Starting from the dimensions and sub-categories in which the impact is considered to be:

1. more desirable
2. more effective
3. tangibly measurable

To assign weights, stakeholders shall be asked to reflect in advance on the difference across direct and indirect impact measures, and across indicators and indexes. Such reflections can happen as an ice-breaker activity before the actual weighting.

The prioritization and weighting of objectives, impacts and associated indicators with stakeholder can be done as workshops, focus groups, world cafés, dot-voting sessions etc. The level of detail and the time and effort dedicated to this phase largely depends on the scope of the assessment, on the available budget and the level of detail required by the client.

The activity shall at least entail:

1. A summarised overview of identified problems and solutions
2. A thorough description of the dimensions, sub-dimensions and indicators of impacts

3. An open opportunity to propose new impacts and the related indicators needed to measure it
4. A structured voting session, that ensures balance in how each stakeholder group is represented, inclusivity and representativeness of the addressed community – all voices shall be heard – fair and equal opportunities to express votes. In case this is not fully possible, normalisation could be needed to ensure that the prioritised list output is correctly balanced.
5. An intuitive visualisation of the KPI ranking, such as a diagram or graph, to allow direct feedback.
6. An open feedback session to collect comments from participants.

5.4.3. KPI prioritisation methods

As the context analysis, also the indicator selection and prioritization should be designed with a collaborative approach. To ensure input from different stakeholders groups, it can be implemented using one or more of the following methodologies:

- **Survey-based assessments on objectives, barriers and SEIA KPI's;**
- **Stakeholders workshops as focus groups, dot voting sessions or world cafés**;
- **Semi structured interviews;**

In ANNEX X – Indicators Database the full set of 80 socio-economic indicators is provided, divided into 14 categories and 45 subcategories. The KPI categorization rationale is provided in the following Section 6.

6. SEIA KPI CATEGORISATION

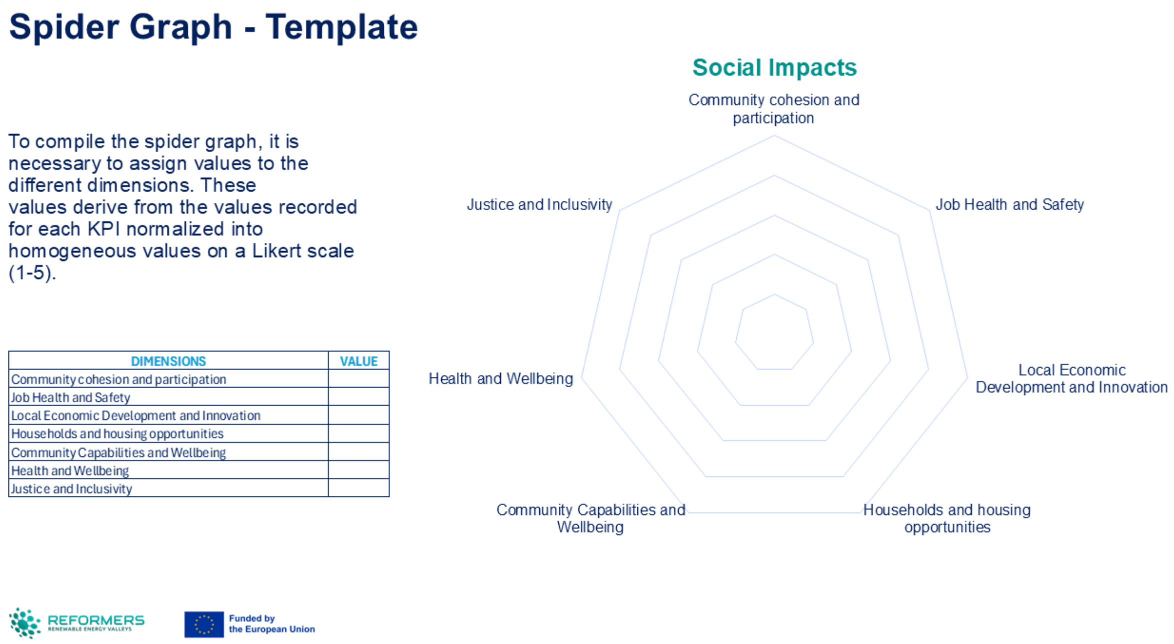
In this section, a rationale of REFORMERS socio-economic KPIs categorization is provided.

Socio-economic KPIs are often assessed through methods like Likert scales, ultimately quantifying qualitative values. While proceeding with the preliminary selection of indicators, an evaluation shall be conducted with the client to ensure each proposed KPI is:

- Relevant (to the project's objectives)
- Complete and reliable (based on available data)
- Measurable
- Familiar and understandable to stakeholders and beneficiaries
- Non-redundant and independent from other indicators

In the following sections, the REFORMERS preliminary list of socio-economic indicators is clustered in three main dimensions, main categories and several sub-categories of analysis. Categories and KPIs are described in plain language, including the stakeholders and beneficiaries potentially impacted.

Such dimensions and categories will be reflected in the performance evaluation infographics, as spider graphs or similar graphs for quick interpretation (see Figure 24).



DIMENSIONS	VALUE
Community cohesion and participation	
Job Health and Safety	
Local Economic Development and Innovation	
Households and housing opportunities	
Community Capabilities and Wellbeing	
Health and Wellbeing	
Justice and Inclusivity	

Figure 24 Spider graph template

.

6.1. Social impacts

The first dimension of assessment relates to the core social set of indicators. It aims to explore the potential impacts that the development of an energy valley delivers to society. Eight categories of indicators have been identified under the social dimension:

- Community Cohesion and Participation;
- Workplace Health and Safety;
- Local Economic Development and Innovation;
- Health and Well-being;
- Households and Housing Opportunities;
- Justice and Inclusivity;
- Community Capabilities and Well-being.

Each category includes one or more sub-categories and related indicators, as shown in the following paragraphs.

6.1.1. Community cohesion and participation

A Renewable Energy Valley is more than an infrastructure project; it is a profound community endeavor. Its long-term success and sustainability depend on securing a ‘social license to operate’, the ongoing acceptance and approval from local residents and stakeholders. This is deeply linked to the concept of social capital, which refers to the

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networks, shared norms, and trust that enable a community to act together effectively (Putnam, 2000). A community with high social capital is better equipped to navigate the complexities of a major transition, engage in collaborative decision-making, and build a collective knowledge that will be necessary for success. This dimension, therefore, assesses the strength of the community's social fabric by measuring levels of civic engagement, active participation in the project, and the overall sense of belonging and trust among residents, which are the cornerstones of a resilient and empowered community.

Definition	This category tracks how green initiatives foster a sense of community, civic participation, and social cohesion. It looks at participation in local events, volunteerism, and civic activities, which are crucial for successful project implementation. Indicators measure the level of community engagement and participation in local governance, assessing the strength of social ties and collective action stimulated by green projects.
Subcategories	**Sense of Belonging:** Measures the feeling of security and connection residents have to their community. **Project Participation:** Tracks the active involvement of citizens in the project's design and planning, as well as their perception of its benefits. **Local Initiatives and participatory processes:** Quantifies the number of community-led projects and formal opportunities for public consultation. **Volunteering:** Assesses the percentage of residents dedicating time to community or environmental causes. **Community Interaction:** Measures participation rates in local cultural events. **Civic Participation and Engagement:** Tracks involvement in local governance, such as attendance at council meetings. - **Political Turnout:** Measures the percentage of eligible voters participating in elections.
Stakeholders affected	Residents, workers, employees, community groups.
Stakeholders to involve	Local government, community leaders, NGOs, residents' associations.
Total No of indicators[8]	11

[8] See Annex I for details.

6.1.2. Job Health and Safety

The creation of 'green jobs' is a primary anticipated outcome of the transition to a renewable energy economy. However, from a social impact perspective, the analysis must extend beyond mere job creation figures. This dimension focuses specifically on the quality and safety of work, aligning with the International Labour Organization's concept of 'Decent Work', which emphasizes safe working conditions as a fundamental pillar of social and economic progress. The development of a Renewable Energy Valley involves new technologies and infrastructure, which can introduce new occupational risks. Therefore, this dimension assesses whether the new employment opportunities are not only green but also safe, ensuring that the project contributes positively to the well-being of the workforce and fosters a proactive safety culture as an integral part of a just transition.

Definition	This category assesses the project's impact on the labor market, with a specific focus on the health and safety conditions of workers. It measures the effectiveness of safety protocols and the overall quality of the working environment, particularly within the new jobs created by the green energy sector.
Subcategories	**Workplace Safety and Conditions:** This subcategory focuses on workplace safety, including the rate of work-related accidents, the prevention of injuries, and the proactive reporting of potential hazards to foster a culture of safety.
Stakeholders affected	Workers, employers, job seekers, trade unions.
Stakeholders to involve	Employers, trade unions, employment agencies, occupational health and safety bodies.
Total No of indicators[9]	2

6.1.3. Local Economic Development and Innovation

This category assesses the direct engagement of citizens in the energy transition through their own consumption patterns. The successful integration of renewable energy at the household level is a critical indicator of a project's ability to foster widespread social acceptance and participation. It reflects a shift from residents as passive consumers to active participants, or 'prosumers', a concept central to the EU's 'Clean Energy for all

[9] See Annex I for details.

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Europeans' package. This transition is a cornerstone of energy democracy, empowering individuals and communities to take ownership of their energy future. Tracking the adoption of renewable systems for essential needs like heating and cooking provides a tangible measure of how deeply the project's sustainability goals are being embedded into the daily lives of the community.

Definition	This category tracks the adoption of renewable energy solutions at the household level. It measures the transition away from fossil fuels for essential services like heating and cooking, reflecting the project's direct impact on making clean energy accessible and utilized by residents.
Subcategories	**Energy use (households):** it measures the percentage of homes utilizing renewable energy systems as their primary source for domestic needs, indicating a tangible shift towards sustainability.
Stakeholders affected	Residents, homeowners, renters, low-income households.
Stakeholders to involve	Energy providers, municipalities, housing associations, installers of renewable technologies.
Total No of indicators[10]	1

6.1.4. Households and housing opportunities

The development of a Renewable Energy Valley fundamentally reshapes the 'sense of place' and can alter a community's trajectory. This dimension uses the movement of households as a key indicator of the project's impact on the area's desirability and social stability. A net inflow of residents can signal that the project has successfully enhanced the quality of life, creating a more attractive environment. Conversely, a net outflow could indicate negative disruptions or unintended consequences, such as "green gentrification," where rising property values displace long-term residents. Monitoring these demographic shifts is therefore crucial for understanding the project's influence on community stability, a core component of social sustainability (Colantonio, 2009).

[10] See Annex I for details.

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Definition	This category measures the project's influence on the residential attractiveness and stability of the area. It uses demographic trends, such as population movement, as an indicator of whether the Energy Valley is perceived as a desirable and sustainable place to live.
Subcategories	**Population Dynamics**: Tracks the movement of households (inflows and outflows), serving as a proxy for the perceived quality of life and **residential attractiveness**.
Stakeholders affected	Current and potential residents, homeowners, renters.
Stakeholders to involve	Real estate agents, municipal planners, local government, community development organizations.
Total No of indicators[11]	1

6.1.5. Community Capabilities and Well-being

This category evaluates the project's contribution to the foundational capabilities that enable residents to lead fulfilling lives, a concept central to the Capability Approach pioneered by Amartya Sen (Sen, 1999). Rather than focusing on economic output alone, this perspective argues that true development lies in expanding the real freedoms and opportunities people have. In this context, indicators like high-speed internet access represent a crucial ‘capability’ for full participation in modern economic, educational, and civic life. Similarly, the Human Development Index (HDI), a direct application of this philosophy, provides a holistic measure of progress.

Definition	This category evaluates the project's contribution to the broader advancement and modernization of the local community. It tracks improvements in essential infrastructure and overall quality of life, reflecting a holistic and sustainable development approach that goes beyond just energy.
Subcategories	**Digital Inclusion**: Measures the availability of crucial digital infrastructure for economic and social participation. Human Development: Uses the **Human Development Index (HDI) to** track overall progress in living standards, health, and education.

[11] See Annex I for details.

Stakeholders affected	All residents, local businesses, public institutions.
Stakeholders to involve	Local government, regional development agencies, telecommunication providers, public service providers.
Total No of indicators[12]	2

6.1.6. Health and Wellbeing

This category evaluates the direct and indirect health outcomes of the energy transition, moving beyond a narrow definition of health to embrace the World Health Organization's holistic view of complete physical, mental, and social well-being. A primary benefit of shifting to renewable energy is the reduction of air and noise pollution from fossil fuels, which has well-documented positive impacts on public health, such as lower rates of respiratory illness (WHO, 2021). These are often termed the 'co-benefits' of climate action. This dimension assesses these tangible health improvements by tracking indicators related to physical health, access to healthcare, and mental well-being, including residents' perception of their environment. It aims to quantify how the project contributes to creating a healthier, more livable community for all.

Definition	This category focuses on the physical and mental health outcomes of the population, which are directly affected by environmental quality and access to services. It includes indicators such as life expectancy, disease rates, stress levels, and access to healthcare, reflecting the broader societal benefits of a green transition. Health and wellbeing indicators measure how improved environmental conditions, reduced pollution, and positive changes in the urban environment contribute to healthier communities.
Subcategories	**Access to Healthcare:** Assesses the availability, accessibility, and quality of primary and specialized medical services. **Leisure and Recreation:** Measures residents' satisfaction with the availability and quality of local recreational facilities.

[12] See Annex I for details.

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	Mental Wellbeing: Tracks emotional well-being, such as stress levels, optimism, and access to mental health support. **Physical Health and Environment:** Monitors overall physical health through indicators like life expectancy, chronic disease rates, and physical activity levels. This also includes residents' perception of their urban environment.
Stakeholders affected	Residents, workers, employees, travellers (tourists, migrants).
Stakeholders to involve	Healthcare institutions representatives, employers, welfare institutions representatives.
Total No of indicators[13]	13

6.1.7. Justice and Inclusivity

The concept of Energy Justice (Miller & Townsend, 2022), involves equitable access to energy, fair distribution of costs and benefits, and participatory decision-making. While digital innovations like smart metering can potentially lower costs for vulnerable households (Gangale et al., 2013) (European Commission. Joint Research Centre., 2024a) research also highlights significant risks. If not implemented with care, these technologies can lead to privacy violations, reduced user autonomy (Milchram et al., 2020), or even exacerbate existing social and power imbalances, particularly if utilities do not empower consumers with their own data (DellaValle & Czako, 2022). Some smart technologies may exacerbate or create power imbalances, allowing manipulation or control by more tech-savvy members of the household, reinforcing existing gender roles, establishing hierarchies, or changing access to shared spaces (Sorman et al., 2020).

Criteria identified by the JRC and tracked by our related KPIs are: knowledge, empowerment, leaving no one behind, transparency, wellbeing, consideration of needs, protection of ecosystems and vulnerable communities, systemic change. KPIs include policy appropriateness, trust levels, accountability, knowledge and awareness, motivation, power balance, cultural aspects, costs for households, infrastructure readiness.

Definition	This category assesses the equitable distribution of the project's benefits and burdens across all segments of society. It focuses on ensuring that vulnerable or marginalized groups are not disproportionately affected and have equal opportunities to participate in education,

[13] See Annex I for details.

	employment, and economic prosperity generated by the energy transition.
Subcategories	Focuses on the integration of young people into the workforce and education system by tracking the percentage of those Not in Education, Employment, or Training (NEET). **Equality and Diversity:** Measures fairness in economic representation and income **gaps** across different ethnic groups and genders. **Educational Attainment and School Performance:** Assesses the quality and relevance of education in preparing the community for a sustainable future, tracking academic standards and enrollment in relevant fields.
Stakeholders affected	Low-income households, minority groups, young people, women, students, people with disabilities.
Stakeholders to involve	Social advocacy groups, NGOs, educational institutions, local government, community leaders.
Total No of indicators[14]	6

6.2. Economic impacts

This dimension of analysis focuses on the economic effects of the Renewable Energy Valley project. It covers impacts on local businesses, employment, household finances, and the overall economic structure of the region. A key focus is ensuring that the economic benefits, such as job creation and reduced energy costs, are distributed fairly and contribute to a resilient, attractive, and sustainable local economy. This dimension is composed of five distinct sub-categories:

- Employment
- Energy Poverty
- Households and Financial impacts
- Economic Attractivity
- Local Development

6.2.1. Employment

The transition to a green economy represents one of the most significant structural changes to the labor market in decades. The development of a Renewable Energy Valley is expected

[14] See Annex I for details.

to be a key driver of this change at the local level. This dimension, therefore, evaluates the project's net impact on employment, considering both the creation of new opportunities and the potential disruption to traditional sectors. A central theme is the principle of a 'just transition', which aims to ensure that the benefits of the green economy are shared widely and that those working in carbon-intensive industries are supported through reskilling and new opportunities. The analysis goes beyond a simple headcount of jobs created; it assesses the quality, stability, and inclusivity of these new roles and the region's capacity to develop a skilled workforce capable of sustaining a green industrial ecosystem.

Definition	This category evaluates the project's direct and indirect effects on the local labor market. It measures the creation of new employment opportunities, the quality and stability of these jobs, and the alignment of local skills with the demands of the emerging renewable energy industry.
Subcategories	**Job Creation:** Tracks the net number of new jobs generated by the project, including "green jobs" in the renewable energy sector, and their impact on the local employment rate. **Job Quality:** Assesses the stability, wages, and working conditions of the jobs created or affected by the project to ensure they offer decent work. **Skills and Training:** Measures the availability of relevant training programs, investment in workforce development, and any mismatch between available skills and industry needs.
Stakeholders affected	Workers, job seekers, local businesses, young people.
Stakeholders to involve	Employers, trade unions, educational institutions, vocational schools, employment agencies.
Total No of indicators[15]	7

6.2.2. Economic attractivity

A Renewable Energy Valley can significantly enhance a region's competitiveness and reputation, making it more attractive to new businesses, investments, and skilled talent. This

[15] See Annex I for details.

dimension measures the project's ability to act as a magnet for economic activity, positioning the area as a leader in the green transition. By fostering an innovative ecosystem and a strong "green" brand, the REV can stimulate a virtuous cycle of investment and growth that extends beyond the energy sector itself. This assessment evaluates the project's success in improving the region's overall economic appeal and market position.

Definition	This category measures the project's ability to enhance the region's appeal for new investments, businesses, and skilled professionals. It assesses the REV's impact on the local business environment, investment flows, and the area's brand as an innovative and sustainable hub.
Subcategories	**Business Attraction and Growth:** Tracks the number of new companies (especially in the green-tech sector) establishing in the area and the growth rate of existing local businesses. **Investment Flows:** Measures the volume of private and public investment attracted to the region as a result of the REV initiative. **Regional Branding and Reputation**: Assesses changes in the perception of the region as a destination for sustainable business and innovation.
Stakeholders affected	Local businesses, entrepreneurs, investors, skilled professionals, real estate sector.
Stakeholders to involve	Regional development agencies, chambers of commerce, investment funds, municipalities, business associations.
Total No of indicators[16]	4

6.2.3. Energy poverty

In 2022, in the aftermath of the Covid-19 crises and Russia’s invasion of Ukraine, the number of people who were unable to keep their homes adequately warm grew to 9.3% in the EU (Eurostat, 2023) According to the JRC Report (European Commission. Joint Research Centre., 2024b). Energy poverty affects around 50 million people in Europe. An energy poverty observatory was established in 2016 and beyond collecting data it also

[16] See Annex I for details.

shares best practices and policy solutions. Moreover, in 2023, a Social Climate Fund was created to provide support for vulnerable households. Energy poverty has been defined as "'a household's lack of access to essential energy services, where such services provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context, existing national social policy and other relevant national policies, caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes. The related KPIs have been included in the REFORMERS SEIA KPI list, and a human-language description provided for each one. They include energy prices, energy expenditure, building features, perceived comfort, income levels and health conditions[17] (Thema & Vondung, 2020).

Definition	This category measures the project's impact on alleviating energy poverty. It assesses the accessibility and affordability of essential energy services for all households, particularly focusing on how renewable energy and efficiency measures affect energy costs, housing quality, and overall well-being for vulnerable populations.
Subcategories	**Affordability:** Tracks the share of household income spent on energy and the ability of residents to pay for the energy they need without financial strain. **Access to Energy:** Measures the ability of all households, especially low-income ones, to access reliable and modern energy services. **Energy Efficiency of Homes:** Assesses the quality of housing stock, including insulation and efficient appliances, which directly impacts energy consumption and costs.
Stakeholders affected	Low-income households, renters, residents in poorly insulated homes, vulnerable and elderly populations.
Stakeholders to involve	Social services, housing associations, energy providers, consumer advocacy groups, local government.
Total No of indicators[18]	5

6.2.4. Households and Financial opportunities

[17] https://energy-poverty.ec.europa.eu/observatory/publications/epov-indicator-dashbord-methodology-guidebook

[18] See Annex I for details.

Beyond energy costs, the creation of a Renewable Energy Valley can have profound and direct impacts on the financial well-being of households. This dimension examines the net effect of the project on household wealth and cost of living. For instance, the aesthetic and environmental improvements associated with a "green" area can lead to an increase in property values, benefiting homeowners. At the same time, it is crucial to monitor disposable income to ensure that the economic benefits of the transition, such as lower energy bills or new income streams from local energy production, genuinely improve the financial resilience of families in the community.

Definition	This category measures the direct financial impacts of the project on individual households. It examines changes in disposable income, living costs, and property values to determine the net effect on household financial stability and wealth.
Subcategories	**Disposable Income:** Tracks changes in the amount of money households have available after accounting for energy costs and other project-related expenses or income. **Property Value:** Measures the impact of the project on the market value of residential properties within the affected area.
Stakeholders affected	Homeowners, renters, local residents.
Stakeholders to involve	Real estate agents, municipal tax assessors, local banks, community development organizations.
Total No of indicators[19]	3

6.2.5. Local Development and Innovation

A Renewable Energy Valley should act as a catalyst for the structural and long-term advancement of the entire local economy. This dimension moves beyond immediate economic outputs to assess the project's contribution to building a more resilient, innovative, and diversified economic base. Aligned with the ‘Beyond GDP’ paradigm (Sen, Fitoussi, Headey, 2022), it focuses on foundational elements such as the strength of local supply chains, which ensures economic benefits circulate within the community, and investment in R&D, which fosters a culture of innovation. Furthermore, it tracks improvements to public

[19] See Annex I for details.

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infrastructure, recognizing that a modern energy system must be supported by, and contribute to, a broader ecosystem of high-quality local services.

Definition	This category examines the project's contribution to the structural development of the local economy. It includes the strengthening of local supply chains, fostering innovation, and improving public infrastructure, leading to a more resilient and diversified economic foundation.
Subcategories	**Innovation and R&D:** Measures the level of investment in research and development and the creation of innovative technologies or business models. **Infrastructure Development:** Tracks improvements to local public infrastructure (e.g., energy grids, transport, digital networks) driven by the project. **Local Supply Chain:** Assesses the extent to which the project utilizes local goods, services, and suppliers, retaining economic value within the community.
Stakeholders affected	Local businesses, entrepreneurs, public institutions, research centers, residents.
Stakeholders to involve	Local government, regional development agencies, universities, business associations, public service providers.
Total No of indicators[20]	9

6.3. Socio-Environmental impacts

This dimension of analysis evaluates the project's direct and indirect effects on the natural and built environment. A sustainable energy transition must be holistically assessed to ensure it enhances, rather than degrades, the local environmental context. This involves looking beyond primary energy goals to consider the project's broader footprint on the community's surroundings and resource systems.

[20] See Annex I for details.

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Therefore, this section systematically evaluates the project's effects across seven critical environmental dimensions:

- Quality of Living Environment
- Water management
- Households
- Energy use and accessibility
- Local Development
- Waste management
- Air quality

6.3.1. Quality of Living Environment

This category assesses the tangible impact of the Energy Valley on the environmental, functional and aesthetic quality of the area under a REV development and its surrounding – i.e. in scope for the SEIA assessment. This dimension moves beyond technical metrics to capture how residents experience their surroundings. Sustainable development is not only about resource efficiency but also about creating pleasant, healthy, and livable spaces that strengthen the sense of belonging and social cohesion[21]. This is directly linked to community well-being and the social acceptance of the project. By evaluating standards for green buildings and the availability and perception of green spaces, this dimension measures the project's success in creating an environment that residents value and enjoy.

Definition	This category evaluates the project's impact on the physical and aesthetic aspects of the local environment, including the sustainability of buildings and the quality of public green spaces.
Subcategories	**Green Building Standards:** Measures the adoption of certified sustainable and energy-efficient building practices. **Aesthetic Quality:** Assesses the availability of parks and green spaces and the residents' perception of their urban environment.
Stakeholders affected	Residents, property owners, local businesses, tourists.
Stakeholders to involve	Urban planners, real estate developers, environmental agencies, residents' associations, tourism boards.

[21] https://www.jstor.org/stable/26269580

Total No of indicators[22]	4

6.3.2. Water management

Water is a fundamental resource for both human well-being and ecosystem health, and its sustainable management is a core principle of global development, as highlighted in Sustainable Development Goal 6 (Clean Water and Sanitation). While renewable energy projects are critical for decarbonization, they can interact with local water systems through consumption during construction or operation, or by affecting water quality. This dimension evaluates the project's impact on this vital resource from two perspectives: the accessibility of clean water for the community and the chemical quality of the water itself. It ensures the energy transition does not compromise water security or ecosystem integrity, safeguarding this essential resource for current and future generations.

Definition	This category assesses the project's impact on local water resources, focusing on both the community's access to clean water and sanitation and the quality of the water, free from harmful contaminants.
Subcategories	**Water Usage and Access:** Measures the reliable access of households to clean water and functioning sanitation systems. **Water Quality:** Assesses the concentration of harmful contaminants in local water bodies and drinking water.
Stakeholders affected	All residents, agricultural users, local industries, aquatic ecosystems.
Stakeholders to involve	Water management authorities, environmental protection agencies, public health departments, agricultural associations, community representatives.
Total No of indicators[23]	2

6.3.3. Households consumption patterns

[22] See Annex I for details.
[23] See Annex I for details.

The household is the fundamental unit where consumption patterns are formed and where the environmental impact of daily life is most direct. This category examines the demographic composition of households, specifically the number of dependents, as a proxy for understanding potential resource demand and environmental pressures. A community with a higher dependency ratio may have different consumption footprints (e.g., in terms of energy, water, and waste) and may require different policy interventions to encourage sustainable **behaviours**. Tracking this indicator provides context for resource planning and helps tailor environmental initiatives to the specific social fabric of the community.

Definition	This category assesses the demographic structure of households to understand its potential influence on consumption patterns and the environmental footprint of the community.
Subcategories	**Family Structure:** Measures the average number of dependent members per household, which can influence resource demand.
Stakeholders affected	All residents, families with children or elderly dependents.
Stakeholders to involve	Municipal planners, social services, community development organizations, public utility providers.
Total No of indicators[24]	1

6.3.4. Households footprint

The environmental effectiveness of an Energy Valley is ultimately measured by the real-world reduction in fossil fuel consumption. This dimension directly tracks this outcome at the household level, which is a primary source of final energy demand. Aligning with Sustainable Development Goal 7 (Affordable and Clean Energy), it measures the tangible shift to renewable energy sources for daily living. A high rate of adoption signifies not only successful technological deployment but also effective policy, social acceptance, and accessibility. Monitoring the percentage of households consuming renewable energy provides a direct and powerful indicator of the project's success in decarbonizing the community's energy footprint.

[24] See Annex I for details.

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Definition	This category assesses the actual consumption of renewable energy at the household level, reflecting the project's direct impact on reducing the environmental footprint of energy use.
Subcategories	**Energy use (households):** Measures the percentage of households that source their energy consumed from renewable systems.
Stakeholders affected	Residents, homeowners, renters.
Stakeholders to involve	Energy providers, municipalities, housing associations, installers of renewable technologies, consumer groups.
Total No of indicators[25]	1

6.3.5. Mobility and transport

An effective environmental strategy extends beyond the energy system to include the infrastructure that shapes daily life and consumption. This dimension focuses on the role of transportation, a key component of Sustainable Development Goal 11 (Sustainable Cities and Communities). By reducing reliance on private vehicles, a community can significantly lower its overall energy consumption and carbon footprint. This dimension assesses the project's influence on the local transportation system by measuring both the availability of sustainable infrastructure (like bus and bicycle lanes) and the actual usage of public transport by residents.

Definition	This category evaluates the project's impact on the development and use of sustainable transportation infrastructure, a critical factor in reducing the community's overall environmental footprint.
Subcategories	**Public Transports:** Measures the extent of sustainable public transportation infrastructure and the rate of its adoption and use by the community.

[25] See Annex I for details.

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Stakeholders affected	All residents, commuters, public transport users.
Stakeholders to involve	Municipal planners, public transport authorities, urban development agencies, cycling and pedestrian advocacy groups.
Total No of indicators[26]	2

6.3.6. Waste management

Sustainable development requires a shift from a linear 'take-make-dispose' model to a circular economy where resources are used more efficiently and waste is minimized. This dimension evaluates the community's performance in waste management, a critical indicator of its commitment to resource efficiency and environmental stewardship. Aligning with Sustainable Development Goal 12 (Responsible Consumption and Production), it assesses two key aspects: the total amount of waste generated per person and the effectiveness of systems in place to recycle and recover materials. Success in this area demonstrates a deeper integration of sustainable practices into the community's daily habits and economic systems.

Definition	This category assesses the effectiveness of the community's waste management systems and the adoption of sustainable consumption patterns, focusing on both waste reduction and recycling.
Subcategories	**Waste Management:** Measures the total amount of waste produced per capita and the percentage of that waste that is successfully recycled.
Stakeholders affected	All residents, businesses, municipalities.
Stakeholders to involve	Municipal waste management authorities, recycling companies, environmental NGOs, business associations, community groups.
Total No of indicators[27]	2

[26] See Annex I for details.

[27] See Annex I for details.

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6.3.7. Air quality

Clean air is a fundamental requirement for public health and ecosystem vitality. While the reduction of greenhouse gases is a global objective, the improvement of local air quality has immediate and tangible benefits for the community. This dimension focuses on the concentration of key pollutants that directly impact human health and the environment, such as particulate matter (PM2.5, PM10) and nitrogen dioxide (NO2). In addition to these direct health hazards, it also measures the overall Greenhouse Gas (GHG) emissions, linking local air quality to the broader challenge of climate change addressed by Sustainable Development Goal 13 (Climate Action). This provides a comprehensive assessment of the project's success in creating a cleaner, healthier atmosphere.

Definition	This category evaluates the project's impact on air quality by measuring the concentration of harmful local pollutants as well as the overall emissions of greenhouse gases that contribute to climate change.
Subcategories	**Air Quality:** Measures the concentration of key local air pollutants that have direct impacts on health. **Greenhouse Gas Emissions:** Assesses the total volume of GHG emissions, providing a measure of the project's contribution to climate change mitigation.
Stakeholders affected	All residents, particularly vulnerable groups (children, elderly), public health systems, local ecosystems.
Stakeholders to involve	Environmental protection agencies, public health departments, meteorological services, industrial facility operators, transportation authorities.
Total No of indicators[28]	6

7. SEIA MONITORING

Throughout the SEIA process, iterative monitoring is essential. The results of each monitoring activity are the key content of assessment reports. They entail:

[28] See Annex I for details.

1. **Continuous Stakeholder Engagement**: Continuously involving stakeholders in the monitoring process to gather feedback, address concerns, and ensure that the impacts are being accurately assessed and managed.

2. **Regular Monitoring**: Conducting periodic assessments using the described methods (surveys, interviews, and data analysis) to track changes in the identified indicators. Tools implemented can be modified and improved.
3. **Reporting and Review**: Regularly documenting the findings and comparing them against the baseline data to assess the effectiveness of the mitigation measures. This includes preparing reports for stakeholders and regulatory bodies.
4. **Adaptive Management**: Adjusting the project's strategies and mitigation measures based on the monitoring results to better address any unforeseen negative impacts or to enhance positive outcomes.
5. **Feedback Loops**: Creating a continuous feedback loop where monitoring results inform decision-makers, ensuring that the project remains responsive to the socio-economic response of the affected area.

8. FINAL SEIA EVALUATION

The methodology for the final measurement and evaluation of a Socio-Economic Impact Assessment (SEIA) involves assessing the overall impact of a project upon its completion and comparing it with the predicted outcomes[29][30]. This process ensures that the project's objectives have been met and that any socio-economic changes are accurately documented. The key steps in this methodology include:

1. **Final data collection**: Gather data on socio-economic indicators after the project's completion. The same tools as before may be used or modified and improved.
2. **Comparison with baseline, expectations and current trends**: Compare the post-implementation data with the baseline conditions established before the project and the predictions made during the SEIA. This helps to identify deviations and assess the accuracy of the impact forecasts.
3. **Impact analysis**: Analyze the data to determine the extent of the project's socio-economic impacts, both positive and negative. This involves evaluating how well the project has achieved its intended objectives and whether it has inadvertently caused any adverse effects.
4. **Effectiveness of activities and measures**: Assess the effectiveness of the activities and measures implemented during the project to maximize positive impacts. Determine whether these measures successfully addressed the anticipated negative impacts and enhanced positive outcomes.

[29] https://www.ifc.org/en/insights-reports/2012/ifc-performance-standards

[30] https://www.worldbank.org/en/projects-operations/environmental-and-social-framework

5. **Stakeholder feedback**: Obtain feedback from stakeholders, inquiring local communities, businesses, and other affected parties, to understand their views regarding the project's outcomes, and include it in your final report.
6. **Lessons learned:** Identify lessons learned from the SEIA process and the project's implementation. This includes evaluating what strategies worked well, what challenges were encountered, and how future projects can benefit from these insights. Add insights on the project's overall success and areas for improvement.
7. **Final recommendations:** Derive final recommendations and update or integrate existing ones, identified at the beginning of the SEIA process. This final step could become the initial step of further reiterations of the SEIA in the long term.

This comprehensive methodology ensures that the final measurement and evaluation of a SEIA provide a clear and accurate picture of the project's socio-economic impact, supporting accountability and continuous improvement in an Energy Valley project planning and execution.

9. THE SEIA RESULTS REPORT

This section of the document is designed to assist the team in charge of running a SEIA assessment in correctly monitor, read and communicate its results. If the KPI selection and Impact Flow definition is properly delineated in the first phase, monitoring and evaluating the impact of development projects within the Energy Valleys is rather an easy task, that shall be planned in advance and systematized as much as possible. It emphasizes the importance of considering the interdependencies across impacts and those direct and indirect effects, which may be distant in time, space, more intricate and less apparent. This approach equips the SEIA team with the necessary understanding to properly monitor KPIs and deliver meaningful reports. Also, project decision-makers are provided with all the information needed to take informed decisions and adapt their implementation plans based on the SEIA results.

9.1.1. Structure

The SEIA report is a living document that documents the SEIA process in all its phases. At each periodic update, the report shall integrate the additional information, therefore clear versioning and date labels are recommended. After each SEIA iteration, a report is delivered, and possibly shared with all stakeholder groups, including an expert review. After the closure of a full SEIA process, the client shall be consulted to define future steps. If needed a new iteration of SEIA can initiate and scoping updated with the client (see Figure 25 for an outline of a full SEIA process).

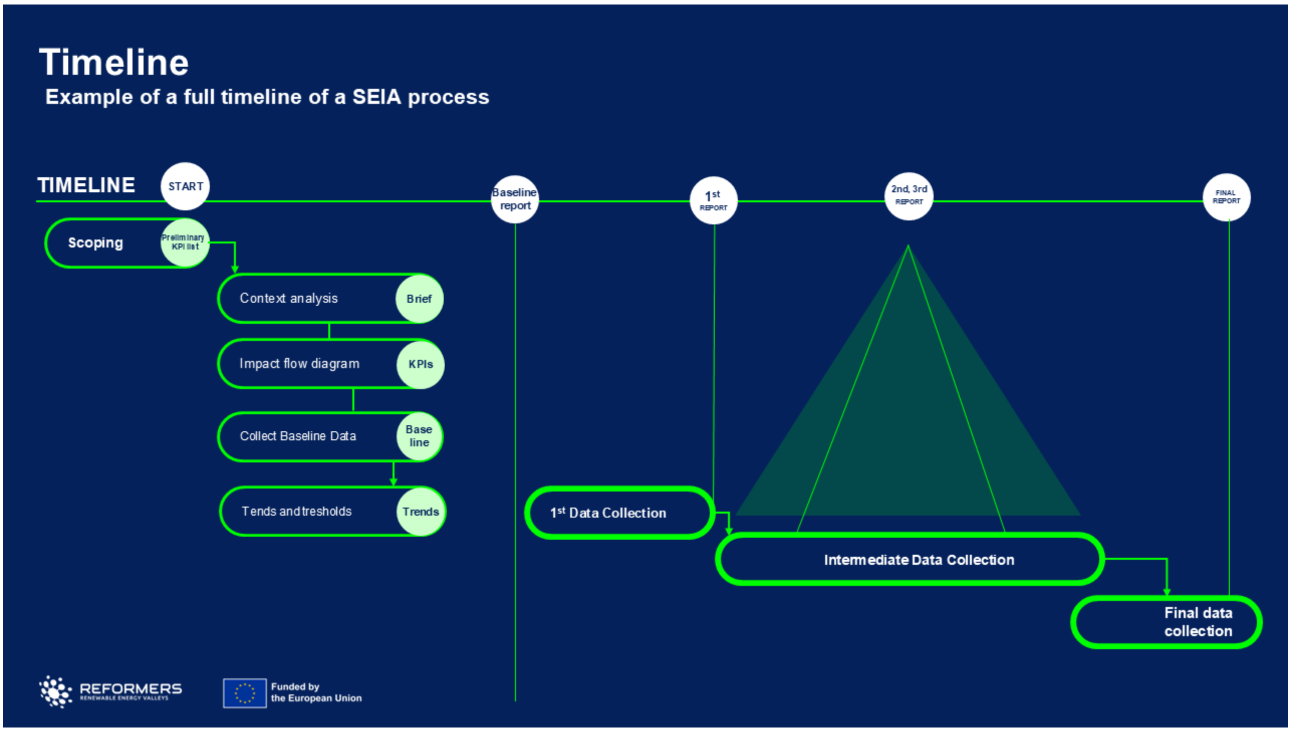

Figure 25 Timeline of a SEIA process

A SEIA report can be structured as follows:

- Scoping documentation
- Summary of context analysis (can include spider graph representation of baseline assessment or *status quo*)
- Impact Flow Diagram
- Short, medium and long term impacts
- List of consolidated and prioritised impact and related indicators (including composite indexes, if any)
- Trends and forecasting (optional)
- Values and thresholds
- Monitoring plan

Which will be updated at each monitoring iteration with the following:

- Spider graph results of the 1st monitoring iteration
  - Detailed report
- Spider graph results of the 2nd monitoring iteration
  - Detailed report
- Spider graph results of the 3rd/n/final monitoring iteration
  - Detailed report

In each report, a final section will include:

- Visual Comparison from each monitoring phase result (see Figure 26)
- Recommendations

- Conclusions
- Next steps

Figure 26 Example of a spider-graph comparison from baseline to final evaluation of impacts

9.1.2. Using Composite Indicators

A key challenge in any socio-economic assessment is summarizing the results from a large dashboard of individual indicators into a clear, understandable message. While spider graphs are useful for visualization, stakeholders and policymakers often benefit from a single, synthetic performance score to track overall progress. This is the purpose of composite indicators, which aggregate a multidimensional framework into a single metric to make it easier to assess progress or decline in complex areas like well-being. As the ‘beyond-GDP’ movement has highlighted, such indices are crucial for policy evaluation, as they facilitate communication and promote accountability (Bacchini et al., 2020). The process involves two main steps: normalization (bringing all indicators to a common scale) and aggregation (combining them into one score).

However, the method chosen to aggregate indicators is critically important. A simple arithmetic mean, while straightforward to compute, assumes perfect substitutability among indicators—meaning that a strong improvement in one dimension could entirely offset a severe decline in another. This approach can therefore conceal unbalanced progress. Modern well-being and sustainability frameworks often adopt aggregation methods that penalize imbalance, ensuring that all dimensions contribute fairly to the overall result. One such method is the Adjusted Mazziotta–Pareto Index (AMPI), which rewards balanced performance across all indicators.

This method ensures that holistic, balanced progress is valued more highly than unbalanced progress, as shown in Figure 27 Assessing composite indicators with AMPI below. See ANNEX XI – Composite Indexes for the full example and formula.

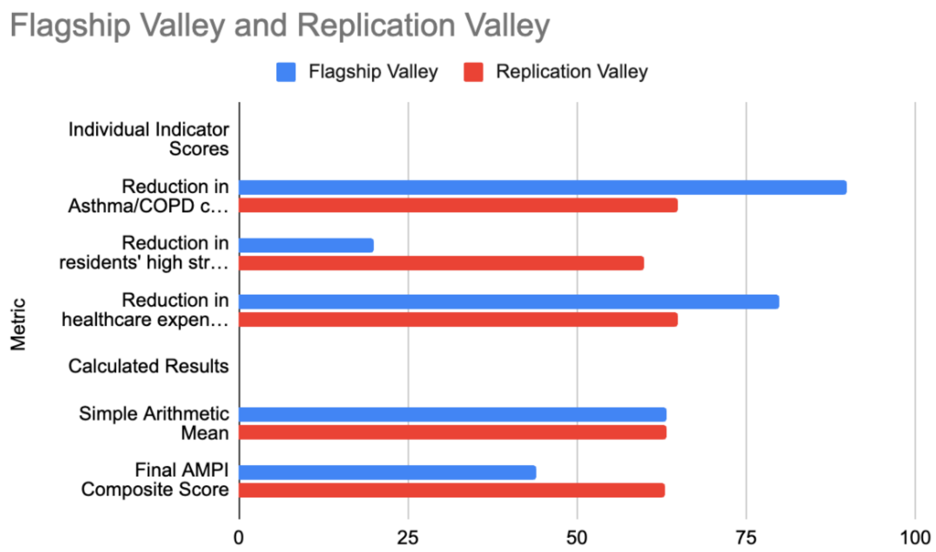

Figure 27 Assessing composite indicators with AMPI

9.1.3. The systemic nature of socio-economic impacts

KPIs are crucial for providing measurable data points that gauge progress against defined objectives. Nevertheless there are hard-to-identify indirect impacts on society that are paramount to understand the full value of initiatives, yet they are often overlooked. The methodology outlined in this SEIA tool ensures that stakeholders involved in the process consider both the direct and indirect effects of various initiatives while defining objectives and strategies. By emphasizing the interconnected nature of socio-economic indicators and suggesting the use of composite indexes, this guide helps users fully interpret the outcomes of the Socio-Economic Impact Assessment (SEIA) in the context of the REFORMERS project.

Here are key aspects that both the SEIA team and all stakeholders involved shall consider, including the client:

- **Temporal and Spatial Factors**: impacts may manifest in different times or across different spatial scales.

  Example: the Renewable Energy Adoption Rate KPI is one of the possible direct measures of an energy resilient/independent community; improving energy efficiency in the Delft Region might have long-term effects on energy affordability in neighbouring communities, thus reducing economic inequality over time).

- **Complex Interdependencies**: Changes in one sector can create ripple effects across others (Distributional Impacts of Energy Transition Pathways and Climate Change, 2024b). The systemic nature of impacts shows how an input in one part of the energy valley or its close context can enhance performance in another region or on future generations.

  Example: an increase in electric vehicle use in Andorra could indirectly improve air quality, which would then lead to better public health, such as reduced respiratory illness rates. A more “cybernetic” example that can be easily tracked in the JRC (Figure 28 below) highlights how inadequate policies (legal) directly impact levels of trust (socio-political factor) which affects demand-side management (technical factor) due to lack of support from citizens (social factor), ultimately reducing RES penetration, limiting emission reductions (environmental) and thus nullifying efforts towards healthier communities and lower health expenditure (socio-economic).

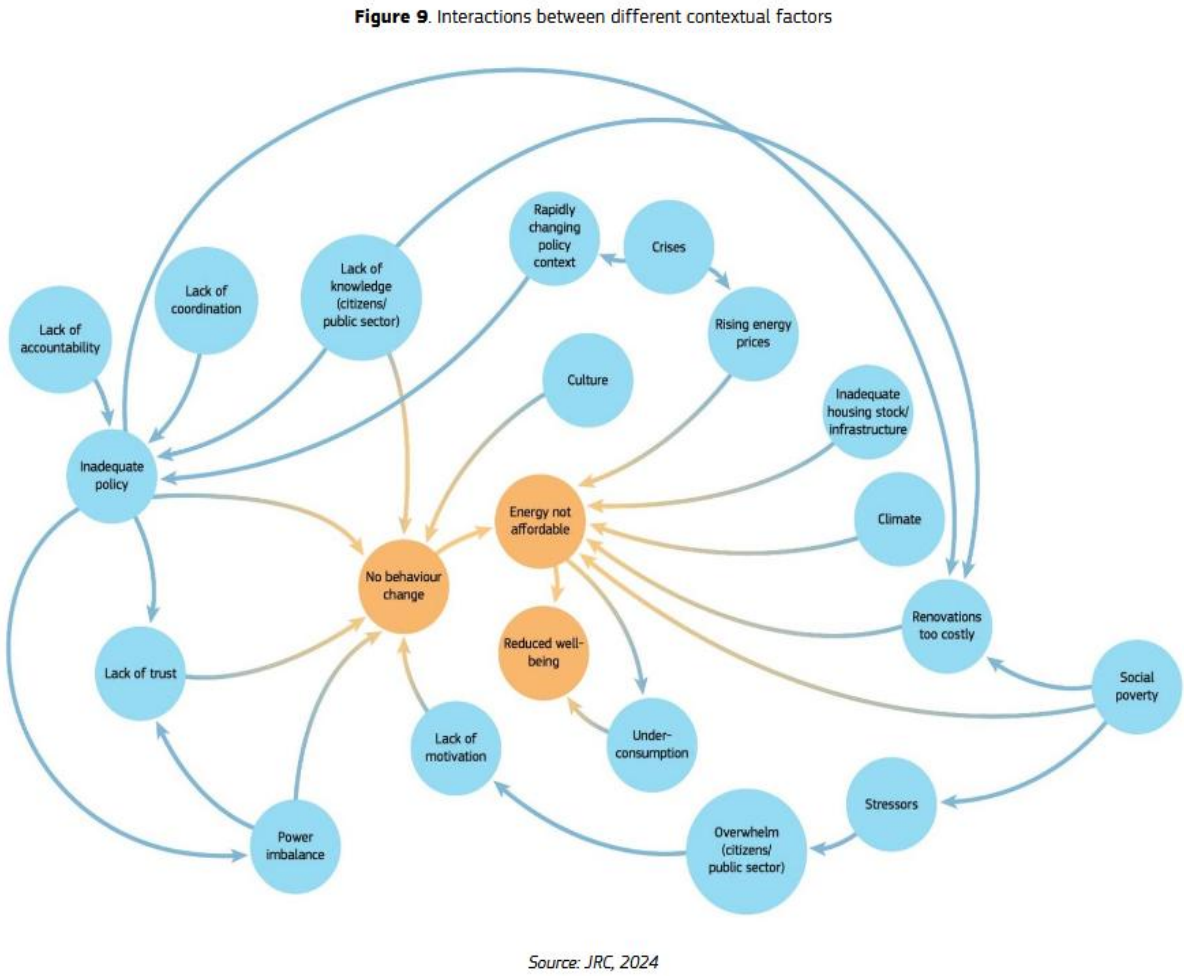

Figure 28 Interactions between contextual factors - JRC 2024

In brief:

- **Direct Impact Indicator**: directly measures the achievement of a specific objective within the Energy Valley

  Example: total Co2 or GHG emissions of a REV project: monitoring their variation could show a steady reduction over the years.

- **Cause-Effect Indicator**: Understanding cause-effect relationships between KPIs in the same dimension helps determine which direct or immediate changes are occurring.

  Example: for example, linking the Public Transport Usage KPI with GHG Emissions provides insight into how shifting to public transport can reduce carbon emissions.

Employment Rate Changes in Green Jobs measures job creation in the renewable energy sector, with cause-effect benefits for social stability and local economic growth.

- **Indirect Impact Indicator:** innovations and initiatives often have secondary effects that are not immediately apparent or that happen farther in time or space. It is crucial to consider the relevance of such indirect impacts as well

  Example: the consequence of increased renewable energy adoption might impact positively local employment or help reduce healthcare costs due to lower air pollution, but these impacts happen in a different dimension of impacts and can be hard to capture in the short term. An in-depth study on expected trends with the use of proxies might be needed to deliver an appropriate forecasting.

- **Index:** there are impacts that cannot be measured with a single indicator or that need to be observed over a certain period of time, across regions, or in different age ranges. Even if you do not need to go in such detail or run in-depth statistical analyses, it is important to understand and identify those impacts that can be better represented and understood by using indexes.

  Example: energy price trends vs. household income indicates whether energy is becoming more affordable and its impact on disposable income and quality of life. In some cases, there are indexes commonly adopted by Member States that are updated constantly and only need to be monitored, such as the HDI index.

9.1.4. Assigning values and thresholds with SROI

In this section we show how through the weights assigned to each indicator by the different stakeholder groups, the SEIA team is enabled to assign Social Return of Investment values (SROI, project on the short, medium and long term, and properly implement monitoring activities.

Thanks to set values and thresholds expected over the different time horizons, each KPI can be assessed iteratively:

- in the design phase (baseline)
- in the early implementation phase (T1 – first iteration)
- in the monitoring phase (T2 to TN – intermediate iterations, as planned during the scoping phase)
- in the final phase (TF).

Depending on the time span of each SEIA iteration and of the planned duration of the assessment, thresholds shall be defined. With the baseline as starting point, the thresholds define the difference between success and failure of the assessed Energy Valley project – on a specific impact factor (Angelakoglou et al., 2019). As for the prioritization and weighting, thresholds can be proposed by the SEIA team and then discussed with relevant stakeholders. In this case, an expert opinion might help identifying appropriate thresholds and the strategies to quickly spot when impacts are potentially crossing them (this applies both to positive and negative ones).

While context analyses will not be updated during the SEIA assessment, baseline measures of indicators will be the subject of each iteration and their variations will help update expected trends.

The SROI method

The SROI stands for Social Return on Investment, a method used to assess and measure the value generated by a project, an activity, or an organization. It is especially useful for understanding the impact of outcomes that are hard to monitor or do not have a direct market price (e.g., increased community well-being, greater social cohesion). The SROI method consists of assigning monetary values to social benefits (or costs) that are not reflected in standard financial reports. These values are derived from financial proxies, which are existing market values for comparable goods or services. This method is extremely helpful in a SEIA assessment for a REV because it translates complex social changes into a common, understandable language of value, making it easier to communicate the project's full impact to funders, policymakers, and the public. This task should be deployed by the SEIA team only after the KPIs have been consolidated and prioritized with stakeholders. The core principle of SROI in the REFORMERS context is to connect the valuation process directly to stakeholder priorities. The weights assigned by the community during the KPI prioritization workshop (see ANNEX X – Indicators Database) are used to adjust the calculated financial value, ensuring that the final "social value" reflects what is most important to the people affected by the project.

Example: in SROI-based methods – the average market value of a service shall be multiplied according to what the weight assigned by the stakeholders is. Alternatively, if a certain indicator is very important for the stakeholders (10 out of 10), a higher than average financial proxy can be marked, precisely because that product or service is important to stakeholders, so in theory they would have a greater propensity to spend money, if they could, to acquire it.

See ANNEX XII – SROI method for a full fictional example.

9.1.5. Trends and forecasts

Mitigation actions in a socio-economic impact assessment are strategies designed to minimize or eliminate the negative impacts of a project on the local community and economy; as well as amplifying the positive ones. By implementing these measures, the project can reduce its negative socio-economic footprint, promote positive outcomes, and foster long-term community support and resilience.

This optional activity, which can integrate or substitute the KPI relevance exercise, is especially needed when it is difficult to identify those measures and actions to avoid, mitigate or manage negative impacts or measures and actions that can trigger, maximize or enhance beneficial impacts. It can integrate the KPI relevance analysis, adding a more risk-oriented

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evaluation of impacts. There are several methodologies[31][32] allowing forecasting and significance assessment to provide a comprehensive evaluation of potential impacts. This process is informed by the context analysis, where past data and related trends are scrutinised, and allows to predict additional socio-economic impacts in the future. This step can be complemented by including dedicated questions in the stakeholder surveys or interviews.

The significance of each identified impact or indicator can be assessed to better project potential mitigation or reinforcement actions over time and space. This involves defining clear evaluation criteria that ensure that each impact is systematically evaluated, enabling the identification of those that require the most urgent or significant attention. Four main criteria are used to measure significance:

1. **Intensity** (or magnitude) refers to the strength or severity of an impact. It measures how significant the effect will be in terms of its influence on socio-economic or environmental conditions.
2. **Duration** measures how long the impact will persist. Impacts can be categorised as short-term (temporary), medium-term, or long-term (permanent).
3. **Geographic extent** refers to the spatial distribution of the impact. It considers whether the impact is confined to a small area or affects a broader region (draw from scoping and context analysis, or extrapolate from stakeholder input).
4. **Probability** measures the likelihood that a given impact will actually occur. It helps differentiate between potential impacts that are almost certain and those that are less likely. It helps in understanding the risk associated with potential impact.

All findings shall be meticulously recorded on an impact significance assessment record, providing a detailed and transparent basis for decision-making. There are several other methods in the literature that can be adopted, depending on the specific need and familiarity of the SEIA team with standard risk-assessment methods. See ANNEX XIII – Forecasting with Significance Assessment for basic template.

9.1.6. Visualisation tips

- Co-build relationship maps or mental maps to visualize direct and indirect impacts between indicators, helping stakeholders understand complex interactions.

- Show current trends with the same type of infographic used for other reports, to help quick comparison with actual performance in the following phases (T2, T3, TN, T-Final). Thanks to intuitive and aligned infographic outputs, results are way easier to navigate and understand to both expert and non-expert readers.

- For each dimension and sub-dimension of the most relevant impacts analysed, considerations should be added to highlight any important element that can help a deeper understanding: threshold selection rationale, considerations over the

[31] https://epub.wupperinst.org/frontdoor/deliver/index/docId/6757/file/6757_Terrapon-Pfaff.pdf

[32] https://cdn.slrconsulting.com/uploads/2022-08/AppC17_Social_0.pdf

difference among expected trends and actual performances, deviations from planned implementation or assessment procedures, limitations, and key takeaways.

- Share final reports showing figures using spider graphs or similar diagrams: each dimension of impact performance is presented as a spider graph and repeated for each iteration phase and for each case study area (see Figure 29):

- Baseline or Status Quo
- 1st Iteration
- 2nd Iteration
- Final iteration

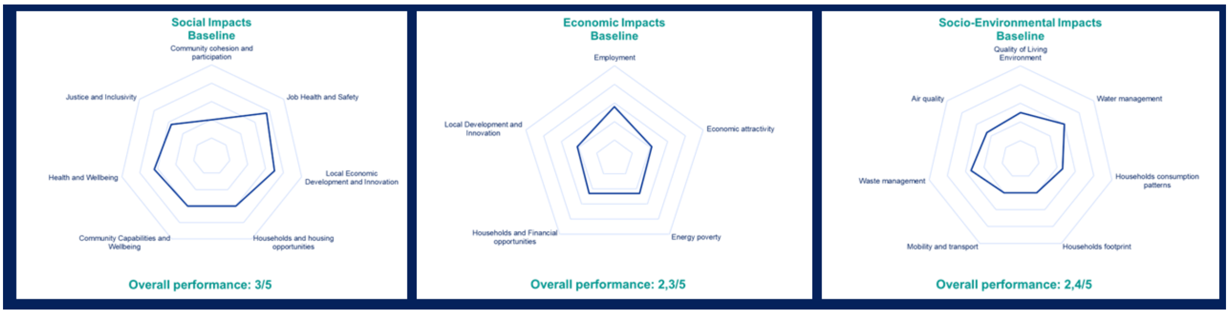

Figure 29 Example of a baseline report of mapped impacts, summarised in spider graphs per each dimension

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ANNEX I - INTERVIEW PROTOCOL AND QUESTIONS FOR COMPANIES

Objectives of the interview

- Mapping the ecosystem: Understanding how companies operate at Boekelermeer, including their energy consumption, business processes, and current challenges.
- Introducing and exploring collaboration: Exploring the extent to which companies are willing to collaborate in the field of energy generation and consumption.
- Willingness to share data: Determine whether companies are willing to share relevant data about their energy consumption and generation.
- Participation in follow-up: Gauge whether companies are interested in participating in follow-up discussions and joint workshops, with an emphasis on building a good relationship.

Interview itself

1. Ask if they agree to the interview being recorded
2. Provide a brief explanation of the purpose and timing of REFORMERS:

Introduction

1. Could you introduce yourself, including your role within the company and your responsibilities with regard to energy matters?
2. Who within your company is responsible for decision-making on energy-related issues? Are there others involved in this?
3. What convinced you to participate in this interview?

General company characteristics

1. Could you briefly explain what your company does, including its mission and strategy?
2. What type of specific activities take place at your Boekelermeer site? E.g. production, offices, storage, workshop, logistics activities, etc.
3. Do you have any sustainability objectives? If so, what are they?

Current energy generation and consumption

1. Can you tell us more about your current energy generation and consumption?
    a. What has already been electrified within your company? E.g. fleet of cars/trucks, heating, cooling, production processes, etc.

   b. What energy-saving measures has your company already taken?
2. To what extent does your company monitor energy generation and consumption?
   a. If so, how do you do this? If not, why not?
   b. Explanation of the possibility of obtaining a Teleport, a device that can be connected to your energy assets. The initial aim is to provide insight into production, storage and consumption data.
3. What challenges does your company face in terms of energy consumption and supply?
   a. Are you aware of any capacity issues (grid congestion) on the electricity grid that could affect your company?
   b. Does your company currently have an application pending with the grid operator for an upgrade to its connection?

Flexibility in energy consumption and generation

1. How are your business processes distributed across seasons, weeks and days? How does this affect your energy demand?
2. What potential flexibility do you see in your business processes to shift consumption and/or generation over time?
3. And which parts of your current consumption could be made flexible in the future (if financially advantageous)? E.g. Cooling, heating, charging infrastructure, batteries...

Future energy generation and consumption

1. What are your future plans in terms of energy supply?
   a. What energy-saving measures does your company plan to implement in the near future? Are these measures mandatory or voluntary?
   b. What new installations that will impact your energy consumption and/or production are specifically planned in the short term? E.g. installation of wind turbines, solar panels, heat pumps, charging stations, an additional production line, an additional oven, etc.
   c. Are there any further investment plans (or divestments) that are relevant to your energy consumption, profile and generation?

Energy Hub

A brief explanation of REFROMERS' collective approach.

1. How does your company feel about collaborating with other companies in the area to tackle joint energy challenges?
2. Have you already considered individual or joint solutions to your energy challenges, such as participating in an energy hub?
3. Is cooperation already taking place, and if so, in what way?

4. What do you see as the most important economic and social benefits of an energy hub for your company?

Openness and willingness

1. Are you willing to share your energy consumption and energy production profiles with us?
2. Would you like to use REFORMERS' Teleport sensors to monitor your energy generation and consumption?
3. Are you interested in being kept informed about the project and/or further cooperation?
4. May we contact you again? For example, for a survey about your wishes and needs in terms of energy supply, and to share energy consumption and production profiles and an energy bill.

ANNEX II - SURVEY COMPANIES/OTHER STAKEHOLDERS FV

Start of Block: Company name and GDPR

Q1 Wat is de naam van uw bedrijf?

____

Q2 **GDPR regelgeving** Deze vragenlijst maakt deel uit van het onderzoek dat gebeurt in het kader van het Europees gesubsideerd project REFORMERS. De resultaten zullen worden gebruikt om het technische ontwerp en de uitvoeringplannen voor de energievallei Alkmaar-Heiloo beter af te stemmen op de noden en wensen van de betrokkenen. De verzamelde gegevens worden geaggregeerd en nooit individueel gepubliceerd. Er worden geen persoonsgegevens verzameld.

○ Ik wens deel te nemen aan deze vragenlijst (1)

End of Block: Company name and GDPR

Start of Block: Relevant objectives for participation (part 1 of 3)

Q3 **Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een collectief energie-initiatief** Hoe belangrijk is het voor uw bedrijf dat een collectief energie-initiatief aan volgende objectieven voldoet, opdat u overweegt om deel te nemen:

	Volkomen onbelangrijk (1)	Eerder onbelangrijk (2)	Neutraal/Ik snap dit niet (3)	Belangrijk (4)	Essentieel (5)
Gridstabiliteit, -continuïteit en -betrouwbaarheid (er zijn minder storingen en uitval van het energienetwerk dan zonder het initiatief)	○	○	○	○	○
Verbeterde energie-efficiëntie (er is minder elektriciteits- en warmteverlies in het netwerk)	○	○	○	○	○
Veiligheid (de fysieke veiligheidsrisico's verbonden aan de installaties zijn beperkt en het netwerk is beschermd tegen bv. cyberaanvallen)	○	○	○	○	○
Repliceerbaarheid (hetzelfde initiatief kan ook op andere plekken worden opgezet)	○	○	○	○	○
Lager energiefactuur (er wordt netto bespaard op je energiefactuur)	○	○	○	○	○

Rendement (de investering levert een rendement op op korte tot middellange termijn, en is betrouwbaar en stabiel)	○	○	○	○	○
Beperkte initiële investeringskost (de kost voor de aankoop en installatie van de noodzakelijke nieuwe installaties is beperkt)	○	○	○	○	○
Creatie van lokale toegevoegde waarde (lokaal worden economische opbrengsten gegenereerd, bv. via jobs en investeringen)	○	○	○	○	○
Algemene economische groei (er wordt economische toegevoegde waarde gecreëerd op regionaal of (inter)nationaal niveau)	○	○	○	○	○
Innovatie en pionieren (pionieren in nieuwe technieken en systemen)	○	○	○	○	○
Verhoogde tewerkstelling (het energie-initiatief levert bijkomende jobs op)	○	○	○	○	○

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Inclusiviteit (iedereen kan deelnemen aan het initatief, dat ook voor socio-economisch zwakkereneen een meerwaarde biedt)	○	○	○	○	○
Gemeenschapsopbouw (de lokale sociale cohesie wordt versterkt door het initiatief, dat bv. meer samenwerking en ontmoetingen stimuleert)	○	○	○	○	○
(Groen) imagoversterking (deelname aan het initiatief is een mooi visitekaartje naar de buitenwereld)	○	○	○	○	○
Energie-onafhankelijkheid (deelnemers zijn minder afhankelijk van de huidige externe energie-instanties en hebben meer controle over het eigen energiesysteem)	○	○	○	○	○
Gedragsverandering (bewustwording) (deelname zet ertoe aan om ook in andere aspecten van het dagelijks leven meer met duurzaamheid en efficiënter energieverbruik bezig te zijn)	○	○	○	○	○

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Positieve impact op gezondheid en welzijn (het initiatief beïnvloedt de gezondheid en het algemeen welzijn van de lokale bevolking op een positieve manier)	○	○	○	○	○
Bescherming van de privacy (databeheer voldoet aan alle GDPR-voorschriften)	○	○	○	○	○
Ontzorging (er worden bekwame (externe) partners aangesteld met tijd en expertise om alle plannings- en beheersaspecten van het initiatief op zich te nemen)	○	○	○	○	○
Maatschappelijk optimum voor netwerkinvesteringen (het initiatief leidt niet tot kosten aan het algemene energienetwerk zonder dat dit voordelen oplevert voor de ruime maatschappij)	○	○	○	○	○
Directe gebruikersparticipatie (deelnemers hebben rechtstreekse inspraak en betrokkenheid in de besluitvorming)	○	○	○	○	○

Afstemming met het lokaal beleid (het initiatief ondersteunt of implementeert bestaande beleidsplannen)	○	○	○	○	○
Terugdringing van energiearmoede (de kans dat huishoudens geen toegang hebben tot noodzakelijke energievoorziening verkleint door het initiatief)	○	○	○	○	○
Vergroten van vaardigheden en kennis (er worden mogelijkheid gecreëerd om je kennis over energie te vergroten)	○	○	○	○	○
Beïnvloeding van duurzaamheidsbeleid (door als voorbeeld te fungeren kan het initiatief druk uitoefenen op de politieke duurzaamheidsagenda)	○	○	○	○	○
Versterking van de lokale duurzaamheid (er wordt meer hernieuwbare energie gebruikt ten koste van fossiele brandstoffen en het systeem heeft een duurzamer karakter)	○	○	○	○	○

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Verkleining van emissies (het initiatief leidt tot minder fossiele uitstoot)	○	○	○	○	○
Verbetering van de lokale leefomgeving (de lokale visuele en geluidsimpact worden beperkt)	○	○	○	○	○

Q4 Andere relevante objectieven die niet in bovenstaande lijst zijn vermeld?

____

End of Block: Relevant objectives for participation (part 1 of 3)

Start of Block: SEIA input (part 2 of 3)

Onderdeel 2 van 3: Hier polsen we naar wat we in de socio-economische impactanalyse van het REFORMERS project moeten onderzoeken (het aantal vragen hieronder is afhankelijk van de antwoorden op het vorige onderdeel)

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Lager energiefactuur (er wordt netto bespaard op je energiefactuur) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Lager energiefactuur (er wordt netto bespaard op je energiefactuur) [Essentieel]

Q5 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief zorgt voor **besparingen op het energiefactuur**. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
De energiekost voor huishoudens	○	○
De energiekost voor bedrijven	○	○
De energiekost voor publieke instellingen	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Creatie van lokale toegevoegde waarde (lokaal worden economische opbrengsten gegenereerd, bv. via jobs en investeringen)   [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Creatie van lokale toegevoegde waarde (lokaal worden economische opbrengsten gegenereerd, bv. via jobs en investeringen)   [Essentieel]

Q6 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief **lokale toegevoegde waarde** creëert. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Gemiddeld huishoudensinkomen	○	○
Koopkracht van huishoudens	○	○
Levensonderhoudskosten voor huishoudens	○	○
Gemiddeld besteedbaar inkomen per huishouden	○	○
Gemiddeld loon voor lokale jobs	○	○
Gemiddelde woningwaarde	○	○
Gemiddelde woninghuurkost per m²	○	○
Toegang tot snel internet	○	○
Aantal huishoudens die uit of naar de regio verhuizen	○	○
Aantal bedrijven die uit of naar de regio verhuizen	○	○
Omzetsgroei van bedrijven	○	○

Gebruik van belastingvoordelen voor duurzaamheidsprojecten	○	○
Overheidsgeld besteed aan duurzame infrastructuurprojecten	○	○
Buitenlandse investeringen in duurzame infrastructuur en technologieën	○	○
Aantal nieuwe startups gericht op duurzaamheidsoplossingen	○	○
Aantal nieuwe bedrijven met focus op duurzame activiteiten	○	○
Publiek-private samenwerkingen rond duurzame infrastructuurprojecten	○	○
Human Development Index, gelinkt aan socio-economische elementen zoals gezondheid, onderwijs en inkomen	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Verhoogde tewerkstelling (het energie-initiatief levert bijkomende jobs op)   [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Verhoogde tewerkstelling (het energie-initiatief levert bijkomende jobs op)   [Essentieel]

Q7 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief zorgt voor **bijkomende tewerkstelling**. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Werkgelegenheid	○	○
Aantal gecreëerde jobs	○	○
% van de gecreëerde jobs die resultaat zijn van duurzaamheidsinitiatieven	○	○
Aantal tijdelijke arbeidskrachten	○	○
Jeugdwerkloosheid	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Inclusiviteit (iedereen kan deelnemen aan het initatief, dat ook voor socio-economisch zwakkereneen een meerwaarde biedt) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Inclusiviteit (iedereen kan deelnemen aan het initatief, dat ook voor socio-economisch zwakkereneen een meerwaarde biedt) [Essentieel]

Q8 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief **inclusief** is. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Toegang tot schoon water en werkende sanitaire systemen	○	○
Loonkloof tussen mannen en vrouwen	○	○
Etnische samenstelling van de bevolking	○	○
Economische verschillen binnen de gemeenschap	○	○
Inkomensongelijkheid tussen armste en rijkste huishoudens	○	○
Gemiddeld aantal afhankelijke gezinsleden (jonger dan 18 of ouder dan 65) per huishouden	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Positieve impact op gezondheid en welzijn (het initiatief beïnvloedt de gezondheid en het algemeen welzijn van de lokale bevolking op een positieve manier) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Positieve impact op gezondheid en welzijn (het initiatief beïnvloedt de gezondheid en het algemeen welzijn van de lokale bevolking op een positieve manier) [Essentieel]

Q9 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief een positieve impact heeft op **gezondheid en welzijn**. Vindt u het relevant dat het REFORMERS project in dit kader volgende aspecten voor uw regio onderzoekt en opvolgt:

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	Relevant	Niet relevant
Gemiddelde levensverwachting	◯	◯
Stressniveau van inwoners	◯	◯
Aantal hart- en vaataandoeningen	◯	◯
Aantal chronische obstructieve longaandoeningen	◯	◯
Aantal dokters in de regio	◯	◯
Uitgaven van huishoudens aan gezondheidszorg	◯	◯
Wachttijd voor toegang tot eerstelijnsgezondheidszorg	◯	◯
Toegang tot de mentale gezondheidszorg	◯	◯
Beschikbaarheid van parken en groene ruimte	◯	◯
Regelmatige inwonersdeelname aan recreatieve activiteiten	◯	◯

Beschikbaarheid en kwaliteit van recreatiemogelijkheden	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Gemeenschapsopbouw (de lokale sociale cohesie wordt versterkt door het initiatief, dat bv. meer samenwerking en ontmoetingen stimuleert) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Gemeenschapsopbouw (de lokale sociale cohesie wordt versterkt door het initiatief, dat bv. meer samenwerking en ontmoetingen stimuleert) [Essentieel]

Q10 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief **gemeenschapsopbouw stimuleert**. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Optimisme van inwoners over de toekomst	○	○
Gevoel deel te zijn van een gemeenschap	○	○
Gevoel van veiligheid binnen de gemeenschap	○	○
% inwoners dat deelneemt aan plaatselijke culturele evenementen	○	○
% inwoners dat deelneemt aan burgeractiviteiten zoals zetel in een lokale adviesraad	○	○
% inwoners dat deelneemt aan vrijwilligerswerk voor de gemeenschap of het milieu	○	○
% inwoners dat stemt tijdens verkiezingen	○	○
Jaarlijks aantal gemeenteraadsvergaderingen	○	○
Aantal lokale participatieprocessen	○	○
% inwoners die een positieve impact van het project ondervinden	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Directe gebruikersparticipatie (deelnemers hebben rechtstreekse inspraak en betrokkenheid in de besluitvorming) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Directe gebruikersparticipatie (deelnemers hebben rechtstreekse inspraak en betrokkenheid in de besluitvorming) [Essentieel]

Q11 U gaf aan het belangrijk te vinden dat **gebruikers een stem** hebben in het ontwerp en de besluitvorming van een collectief energie-initiatief. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Aantal participatiemoment binnen het project	○	○
Aantal belanghebbenden die actief deelnemen aan het ontwerp en de planning van het project	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Terugdringing van energiearmoede (de kans dat huishoudens geen toegang hebben tot noodzakelijke energievoorziening verkleint door het initiatief) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Terugdringing van energiearmoede (de kans dat huishoudens geen toegang hebben tot noodzakelijke energievoorziening verkleint door het initiatief) [Essentieel]

Q12 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief bijdraagt aan het terugdringen van **energiearmoede**. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
% huishoudens die afhankelijk zijn van financiële steun	○	○
% van de huishoudeninkomsten dat naar energie gaat	○	○
Energiearmoede cijfer	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Versterking van de lokale duurzaamheid (er wordt meer hernieuwbare energie gebruikt ten koste van fossiele brandstoffen en het systeem heeft een duurzamer karakter) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Versterking van de lokale duurzaamheid (er wordt meer hernieuwbare energie gebruikt ten koste van fossiele brandstoffen en het systeem heeft een duurzamer karakter) [Essentieel]

Q13 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief **lokale duurzaamheid** versterkt. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

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	Relevant	Niet relevant
Gebruik van openbaar vervoer	○	○
Beschikbaarheid van openbaar vervoersinfrastructuur	○	○
Registratie van nieuwe elektrische wagens	○	○
% huishoudens met hernieuwbare energiesystemen als primaire verwarmingsbron	○	○
% huishoudens met hernieuwbare energiesystemen als primaire elektriciteitssbron	○	○
% bedrijven met hernieuwbare energiesystemen als primaire verwarmingsbron	○	○
% bedrijven met hernieuwbare energiesystemen als primaire elektriciteitsbron	○	○
Recyclingspercentages	○	○

Display this question:

If Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Verkleining van emissies (het initiatief leidt tot minder fossiele uitstoot) [Belangrijk]

Or Onderdeel 1 van 3: Hier polsen we naar wat uw bedrijf kan overtuigen om deel te nemen aan een col... = Verkleining van emissies (het initiatief leidt tot minder fossiele uitstoot) [Essentieel]

Q14 U gaf aan het belangrijk te vinden dat een collectief energie-initiatief zorgt voor het **verkleinen van emissies**. Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt:

	Relevant	Niet relevant
Luchtkwaliteit	○	○
Concentratie van schadelijke waterverontreinigingen	○	○
Waterbesparingsprojecten	○	○
Afvalproductie per capita	○	○

Q15 Vindt u het relevant dat het REFORMERS project volgende aspecten voor uw regio onderzoekt en opvolgt, om een beter beeld te krijgen van de context?

	Relevant	Niet relevant
Opleidingsniveau	○	○
% studenten dat (beter dan) gemiddeld scoort op kernvakken	○	○

End of Block: SEIA input (part 2 of 3)

Start of Block: Relevant barriers for participation (part 3 of 3)

Q16 **Onderdeel 3 van 3: Hier polsen we naar wat uw bedrijf op dit moment tegenhoudt om deel te nemen aan een collectief energie-initiatief** Wat houdt uw bedrijf op dit moment tegen om deel te nemen aan een collectief energie-initiatief?

	Dit is geen huidig twijfelpunt	Neutraal/Ik snap dit niet	Dit is een huidig twijfelpunt
Juridische onduidelijkheid (het is niet duidelijk hoe dergelijke samenwerking er wettelijk kan/moet uitzien)	○	○	○
Regelgevende complexiteit (de officiële stappen die moeten gezet worden om de samenwerking mogelijk te maken zijn (waarschijnlijk) te tijdrovend en te ingewikkeld)	○	○	○
Complexe administratie (samenwerking levert meer papierwerk op dan individueel beheer)	○	○	○
Gebrek aan kennis over de mogelijkheden en voordelen die aan dergelijke samenwerking verbonden zijn (het is niet duidelijk wat de samenwerkingsmogelijkheden zijn, en welke voordelen eraan verbonden zijn)	○	○	○
Onvoldoende voordelen die aan dergelijke samenwerking zijn verbonden (ik ken de voordelen voor mijn bedrijf maar deze zijn onvoldoende groot om een partnerschap op te zetten)	○	○	○

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Geen ervaring in een gelijkaardige samenwerking (mijn bedrijf heeft geen of beperkte expertise in dergelijke samenwerkingsinitiatieven)	○	○	○
Wantrouwen t.a.v. samenwerkingspartners (de anderen zijn onvoorspelbare partners, wat moeilijk in te schatten risico's met zich meebrengt voor mijn bedrijf)	○	○	○
Dergelijke samenwerking lijkt tijdrovend (samenwerking kost meer tijd dan individueel beheer)	○	○	○
Vrees voor gebrek aan lange-termijn engagement en capaciteit van de samenwerkingspartners (het lange-termijn engagement dat noodzakelijk is voor een energiesamenwerking kan onvoldoende gegarandeerd worden door de andere partners)	○	○	○
Incompatibele infrastructuur (wat bijkomende kosten kan opleveren om ze allen in één systeem te integreren)	○	○	○

Minder controle en autonomie (dergelijke samenwerking kan leiden tot minder zeggenschap over het eigen energiesysteem)	○	○	○

Q17 Andere relevante twijfels/barrières die niet in bovenstaande lijst zijn vermeld?

____

Q18 Geef aan wat het meest van toepassing is:

○ Mijn bedrijf geeft de voorkeur aan energiesamenwerking met hoofdzakelijk andere bedrijven op het bedrijventerrein

○ Mijn bedrijf geeft de voorkeur aan een meer gemengde samenwerking, met bv. zowel de andere bedrijven als privé-huishoudens uit de buurt

○ Geen voorkeur

Q19 Hoe bereid is uw bedrijf om in een gezamenlijk energie-initiatief te stappen met privé-huishoudens uit de buurt (0 = Helemaal niet bereid, 10 = Volledig bereid)?

	0	1	2	3	4	5	6	7	8	9	10

Q20 Heeft u nog vragen of bemerkingen bij deze vragenlijst?

____

End of Block: Relevant barriers for participation (part 3 of 3)

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ANNEX III - SURVEY RESIDENTS FV

Start of Block: GDPR

Q1 **Regelgeving rond gegevensbescherming** Deze vragenlijst maakt deel uit van het onderzoek dat gebeurt in het kader van het Europees gesubsidieerd project REFORMERS. De resultaten worden enkel gebruikt in het kader van dit project, om de energiestrategie voor de regio beter te kunnen afstemmen op de noden en wensen van de bewoners, en om de ingezette aanpak te evalueren. Uw privacy is belangrijk voor ons. Wij verzamelen daarom geen namen of andere direct identificeerbare data. Er worden in deze vragenlijst enkel algemene gegevens verzameld over uw woonomgeving, gezinssamenstelling, leeftijd en geslacht, uw bereidheid tot deelname aan een lokaal energie-initiatief en uw bereidheid om te investeren in een thuisbatterij

○ Ik ga akkoord met het verzamelen van deze gegevens voor het REFORMERS onderzoek (1)

End of Block: GDPR

Start of Block: Socio-economic info

Q2 In welke wijk woont u?

○ Plan Oost

○ Andere wijk in Heiloo

○ Elders in Alkmaar

○ Buiten Alkmaar

Q3 Uit hoeveel leden bestaat uw gezin?

____

Q4 Wat is uw leeftijd?

____

Q5 Wat is uw geslacht?

- ◯ Vrouw
- ◯ Man
- ◯ Anders
- ◯ Zeg ik liever niet

Q6 Wat is uw hoogst behaalde diploma?

- ◯ Basisonderwijs
- ◯ VMBO
- ◯ HAVO
- ◯ VWO
- ◯ MBO
- ◯ HBO
- ◯ WO

Q7 Is je moedertaal Nederlands?

◯ Ja

◯ Nee: ____

Q8 Wat is het bruto maandinkomen van uw huishouden?

◯ Minder dan €2.000

◯ €2.000 – €2.999

◯ €3.000 – €3.999

◯ €4.000 – €4.999

◯ €5.000 – €5.999

◯ €6.000 of meer

◯ Zeg ik liever niet

End of Block: Socio-economic info

Start of Block: Property details

Q9 In wat voor woning woont u?

◯ Koopwoning

◯ Huurwoning (sociale huur)

◯ Huurwoning (vrije sector)

◯ Andere: ____

Q10 In wat voor type woning woont u?

- ◯ Vrijstaand
- ◯ Tussenwoning
- ◯ Hoekwoning
- ◯ Twee onder een kap
- ◯ Appartement
- ◯ Andere: ____

Q11 Wat is het bouwjaar van uw woning?

- ◯ Voor 1945
- ◯ 1946-1975
- ◯ 1976-1990
- ◯ 1991-2005
- ◯ 2006-2015
- ◯ Na 2015

Q12 Hoe verwarmt u uw woning?

- ◯ Met gas
- ◯ Met stookolie
- ◯ Elektrisch
- ◯ Via warmtepomp
- ◯ Via hout- of pelletkachel
- ◯ Andere: ____

Q13 Hoeveel zonnepanelen heeft uw woning?

- ◯ Geen
- ◯ 1-5
- ◯ 6-10
- ◯ 11-15
- ◯ Meer dan 15

Q14 Beschikt uw woning over een elektrische thuisbatterij?

- ◯ Ja
- ◯ Nee

Q15 Beschikt u over een elektrische auto?

- ◯ Ja
- ◯ Neen, maar ik plan er een aan te schaffen binnen 1 jaar
- ◯ Neen, maar ik plan er een aan te schaffen binnen 2-3 jaar
- ◯ Neen, maar ik plan er een aan te schaffen binnen 4-5 jaar
- ◯ Neen, en ik overweeg ook geen aanschaf

Q16 Waar zoekt u meestal informatie over hernieuwbare energie?

- ◯ Vrienden, familie, buren of collega's
- ◯ Lokale organisaties
- ◯ Gemeente
- ◯ Lokale tv, radio en kranten
- ◯ Nationale tv, radio en kranten
- ◯ Internet en sociale media
- ◯ Ik doe het niet
- ◯ Andere: ____

End of Block: Property details

Start of Block: Willingness to participate in collective energy initiative

Q17 Hoe vertrouwd ben je met samenwerken rond hernieuwbare energie?

- ◯ Ik ben hier niet mee bekend
- ◯ Ik heb er weleens van gehoord
- ◯ Ik heb er enige kennis van
- ◯ Ik ben goed geïnformeerd
- ◯ Ik heb er (praktijk)ervaring of expertise in

Q18 Hoe bereid bent u deel te nemen aan een energie-initiatief met andere bewoners uit uw buurt?

- ◯ Helemaal niet bereid
- ◯ Niet bereid
- ◯ Neutraal
- ◯ Bereid
- ◯ Zeer bereid

Q19 Hoe bereid bent u deel te nemen aan een energie-initiatief met andere actoren uit de regio (bv. bedrijven, publieke organisaties)?

- ◯ Helemaal niet bereid
- ◯ Niet bereid
- ◯ Neutraal
- ◯ Bereid
- ◯ Zeer bereid

Q20 Welke mogelijke voordelen zouden u kunnen overtuigen om deel te nemen aan een lokale energie-samenwerking?

- ☐ Technische voordelen: bv. minder kans op black-outs en storingen
- ☐ Kostenbesparing
- ☐ Versterkt gemeenschapsgevoel
- ☐ Ik kan invloed uitoefenen op het energiebeleid
- ☐ Minder afhankelijkheid van grote energieleveranciers
- ☐ Kans om mijn kennis over energie te vergroten
- ☐ Is een innovatief initiatief
- ☐ (Groen) imagoversterking
- ☐ Lokale jobcreatie
- ☐ Duurzaamheid en emissieverlaging
- ☐ Ik heb een directe stem in beslissingen
- ☐ Niets
- ☐ Andere: ______________________________

Q21 Wat houdt u op dit moment tegen om deel te nemen aan een lokale energie-samenwerking?

- ☐ Mijn kennis hierover is beperkt
- ☐ De regelgeving is te ingewikkeld (of ik ben hier onvoldoende in thuis)
- ☐ Te veel papierwerk
- ☐ Het lijkt tijdrovend
- ☐ Ik vrees dat hier (investerings)kosten aan verbonden zijn
- ☐ Het is niet duidelijk welke voordelen het mij oplevert
- ☐ Ik heb geen ervaring in dergelijke samenwerking
- ☐ Ik weet niet of ik de samenwerkingspartners kan vertrouwen
- ☐ Ik heb mogelijks minder controle en zeggenschap over mijn eigen energiesysteem
- ☐ Niets
- ☐ Andere: ____

Q22 Op welke manier zou u willen deelnemen aan een lokale energie-samenwerking?

- ☐ Door te investeren (financieel)
- ☐ Actief deelnemen aan vergaderingen en besluitvorming
- ☐ Vrijwilligerswerk doen voor projecten
- ☐ Promotie en bewustwording in de buurt
- ☐ Ik heb geen interesse in deelname
- ☐ Ik heb wel interesse, maar één van de barrières uit de voorgaande vraag houdt me tegen
- ☐ Andere: ____

Q23 Denkt u in het algemeen dat hernieuwbare energieprojecten een positieve impact kunnen hebben op uw leven?

- ○ Ja
- ○ Nee
- ○ Ik weet het niet

Q24 Denkt u in het algemeen dat hernieuwbare energieprojecten een positieve impact kunnen hebben op uw gemeente?

- ○ Ja
- ○ Nee
- ○ Ik weet het niet

End of Block: Willingness to participate in collective energy initiative

---

Start of Block: Willingness to invest in a home battery

Q25 Hoe bereid bent u om te investeren in een **elektrische thuisbatterij**?

- ◯ Helemaal niet bereid
- ◯ Niet bereid
- ◯ Neutraal
- ◯ Bereid
- ◯ Zeer bereid

Q26 Welke mogelijke voordelen zouden u kunnen overtuigen om te investeren in een elektrische thuisbatterij?

- ▢ Technische voordelen: bv. energiezekerheid bij stroomuitval
- ▢ Kostenbesparing
- ▢ Minder afhankelijkheid van grote energieleveranciers en het elektriciteitsnet
- ▢ (Groen) imagoversterking
- ▢ Duurzaamheid en emissieverlaging
- ▢ Betere benutting van zelfopgewekte zonne-energie
- ▢ Andere: ____

Q27 Wat houdt u op dit moment tegen om te investeren in een elektrische thuisbatterij?

- ☐ Mijn kennis hierover is beperkt
- ☐ Kostprijs
- ☐ Technische complexiteit
- ☐ Het is niet duidelijk welke voordelen het mij oplevert
- ☐ Ruimtegebrek
- ☐ Onderhoud
- ☐ Veiligheid
- ☐ Andere: ____
- ☐ Niets

Q28 Hoe bereid bent u om te investeren in een **warmtebatterij**?

- ○ Helemaal niet bereid
- ○ Niet bereid
- ○ Neutraal
- ○ Bereid
- ○ Zeer bereid

Q29 Welke mogelijke voordelen zouden u kunnen overtuigen om te investeren in een warmtebatterij?

- ☐ Technische voordelen: bv. energiezekerheid bij stroomuitval
- ☐ Kostenbesparing
- ☐ Minder afhankelijkheid van grote energieleveranciers en het elektriciteitsnet
- ☐ (Groen) imagoversterking
- ☐ Duurzaamheid en emissieverlaging
- ☐ Betere benutting van zelfopgewekte zonne-energie
- ☐ Andere: ____

Q30 Wat houdt u op dit moment tegen om te investeren in een warmtebatterij?

- ☐ Mijn kennis hierover is beperkt
- ☐ Kostprijs
- ☐ Technische complexiteit
- ☐ Het is niet duidelijk welke voordelen het mij oplevert
- ☐ Ruimtegebrek
- ☐ Onderhoud
- ☐ Veiligheid
- ☐ Andere: ____
- ☐ Niets

End of Block: Willingness to invest in a home battery

Start of Block: Follow-up

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Q31 We houden u graag verder op de hoogte van de volgende projectstappen, om samen te werken aan een duurzame toekomst. Hoe wilt u het liefste betrokken blijven?

- ☐ Bijeenkomst eens per jaar
- ☐ Zo nu en dan thematische discussieavond in kleine groep
- ☐ Per kwartaal een nieuwsbrief via e-mail
- ☐ Zo nu en dan een kort artikel in de uitkijkpost
- ☐ Ik heb geen belangstelling om betrokken te blijven
- ☐ Ik zou bereid zijn om mee te werken aan de voorbereiding en uitwerking van die activiteiten
- ☐ Ik ben beschikbaar voor interviews

Q32 Om uw privacy te beschermen vragen we geen naam, maar creëren we voor u een uniek identificatienummer   Zou u hieronder een **code van 6 tekens** kunnen invullen, samengesteld uit volgende onderdelen: 2 laatste cijfers van uw geboortejaar + de eerste 2 letters van uw geboorteplaats + de laatste 2 cijfers van uw telefoonnummer.   (Bv. Voor Sarah Jansens, geboren in 1976 in Utrecht, met telefoonnummer 0625/15.00.02 wordt dit: 76UT02)

____

End of Block: Follow-up

Start of Block: Teleport installation

Q33 Indien u openstaat voor de installatie van een thuisbatterij, warmteopslag of Teleport Home in uw woning kan u zich hiervoor aanmelden via volgende link: https://duurzaamheiloo.nl/135864-2/

End of Block: Teleport installation

ANNEX IV – SURVEY RESULTS OF 'OTHER STAKEHOLDERS' AND RESIDENTS IN THE FV

Survey results of 'other stakeholders'

Objectives for participation in energy initiatives

Key findings:

- **Grid stability** stands out as the most critical requirement, with the highest average importance and multiple essential selections.
- **Influence Sustainability Policy, Security, Energy Independence, Increased Local Sustainability** and **Economic Growth** were also marked as essential, indicating that stakeholders value both technical reliability and the ability to shape broader policy and societal outcomes.
- Better Energy Efficiency, Local Added Value, Direct User Participation and Emissions Reduction received high average scores but were not marked as essential, suggesting they are expected benefits rather than decisive factors.
- Unlike with companies, Lower Energy Bill has a relatively lower importance score and was not marked as 'Essential' by any participant.

Barriers to energy initiative participation

Key Findings:

- Most respondents indicated **no current doubts** across the listed barriers, suggesting a generally positive or open attitude toward participation.
- The following barriers were indicated as a current doubt by only one respondent (the same actor selected all three): **Regulatory complexity, Legal uncertainty, and Lack of knowledge on possibilities and benefits**

Conclusions

Although the sample size of 'other stakeholders' participants is limited, some general suggestions can be made for them with regards to relevant engagement strategies, based on their stated objectives:

- **Prioritize** grid stability, security, and energy independence in system design and stakeholder engagement, as these are core motivators.
- **Integrate tools that enable stakeholders to influence sustainability policy** and support local sustainability and economic growth.
- Frame benefits like efficiency, user participation, and emissions reduction as valuable outcomes, while recognizing that **lower energy bills are less decisive** for non-commercial stakeholders.

Compared to companies, other stakeholders appear less hindered by barriers. Their openness presents an opportunity to:

- **Leverage early engagement** with these groups to build momentum and community support.
- **Use their participation to model successful collaboration**, potentially easing company concerns.
- **Provide targeted information and support** to address the few remaining doubts, especially around regulation and knowledge gaps.

Survey results of residents

Objectives for participation in energy initiatives

Key findings:

- **Cost Savings** is the most compelling benefit, showing that financial incentives remain a strong motivator. **Sustainability/Emissions Reduction** and **Opportunity to Increase Energy knowledge** are also highly valued, indicating strong interest in environmental impact and personal empowerment.
- **Innovation**, **Technical Reliability**, and **Less Dependence on Large Suppliers** each received 7–8 responses, suggesting residents appreciate both novelty and autonomy.
- Social benefits like Community Building, Local Job Creation, and Green Image Enhancement were less frequently selected, indicating they are secondary motivators. Direct Decision-Making Power had minimal appeal (2 responses), and no respondents selected “Nothing” or “Other,” showing overall openness to participation if benefits are clear.

Barriers to energy initiative participation

Key Findings

- **Limited Knowledge** is the most cited barrier, indicating a strong need for awareness and education.
- **Fear of Investment Costs** (6 responses) and **Unclear Benefits** (4 responses) suggest financial concerns and lack of perceived value are major deterrents.
- Complex Regulations (3 responses) and Lack of Experience (2 responses) also contribute to hesitation, though to a lesser extent.
- A small group (3 responses) reported no barriers, showing potential for immediate engagement.

Preferred local energy collaborations

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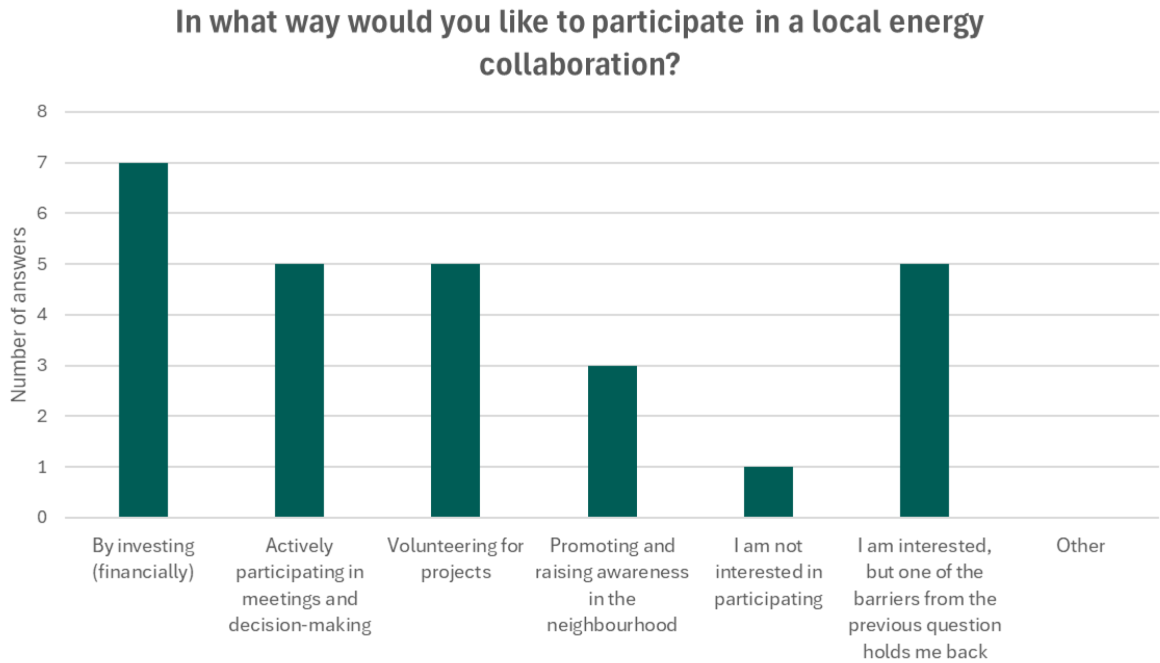


Figure 30 Survey results: Preferred ways of residents to collaborate in local collective energy initiatives

Key Findings:

- **Financial investment** is the most preferred form of participation among residents.
- Many residents are also open to **active involvement**, including decision-making, volunteering, and awareness-raising.
- **Barriers remain significant**, with several interested residents held back by concerns identified earlier, such as limited knowledge or financial uncertainty.

Conclusions

The survey results on potential objectives lead to the following suggestions for future engagement:

- Emphasize **cost savings** (if applicable), **sustainability**, and **knowledge-building** in outreach and engagement strategies.
- Highlight the **innovative and autonomous nature** of REVs to appeal to residents' desire for independence and modern solutions.
- Offer opportunities for **learning and involvement** to empower residents who value influence and participation, while recognizing that not all will seek active roles.

The following actions can help address residents' perceived barriers to participating in collective energy initiatives:

- Develop **clear, accessible communication materials** to improve understanding of local energy initiatives.

- Provide **transparent financial models** and highlight tangible benefits to address cost-related concerns.
- Simplify regulatory messaging and offer **low-barrier entry points** to engage residents with no prior experience.

The results of the question on preferred energy collaboration participation suggest that REFORMERS should offer **diverse participation pathways**, ranging from financial contributions to active roles in meetings and projects. Addressing key barriers, especially around knowledge gaps and perceived costs, will be essential to unlocking further engagement. Communication strategies should also include opportunities for residents to contribute to awareness-raising, while recognizing that not all participants will seek deep involvement.

The results of the question on preferred REFORMERS involvement suggest that future engagement strategies should prioritize **informative, low-effort communication channels** while offering occasional opportunities for light participation, without expecting residents to take on active roles in project development (see Figure 31).

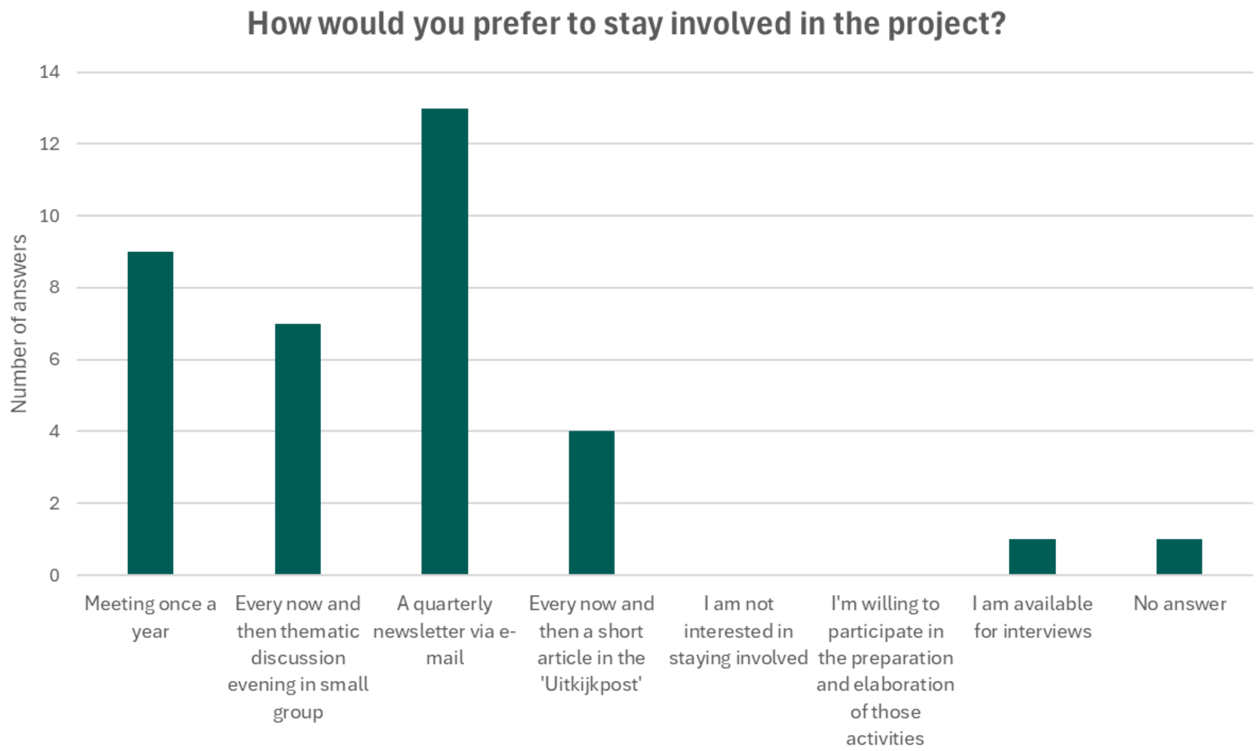
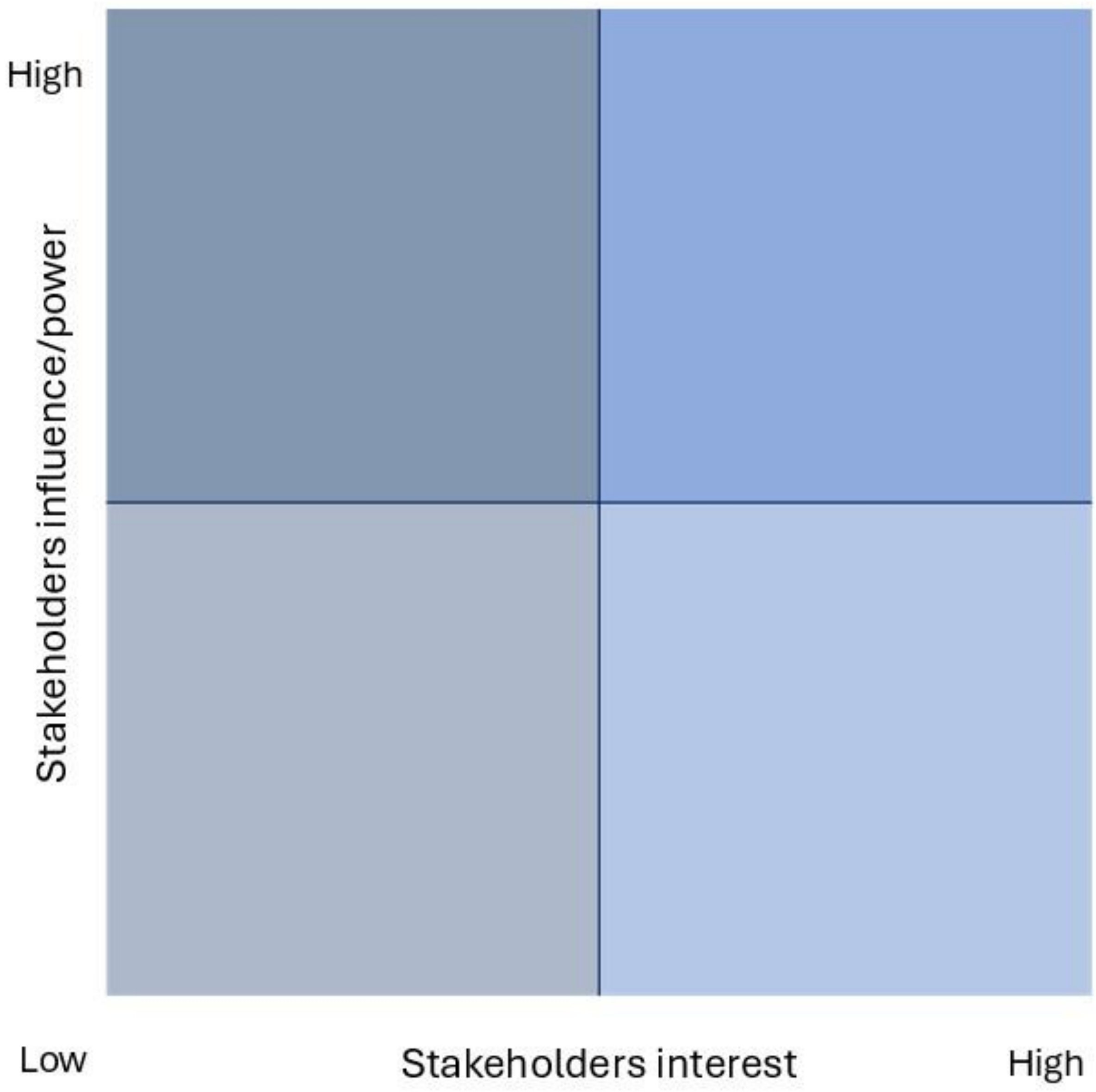


Figure 31 Survey results: Preferred future REFORMERS involvement of residents

ANNEX V - STAKEHOLDER RELEVANCE AND INTEREST EXERCISE

Template for stakeholder mapping plus relevance and interest analysis exercise



Example of Alkmaars' stakeholder mapping exercise output

Alkmaar Renewable Energy Valley

Stakeholder type	Interest level	Influence/Power level	Current level of knowledge on the EV project
Local government	H	H	L
Regional government	M	L	L
Regional development agency	H	M	M
Companies with large energy production/consumption	H	H	L
Companies with small energy production/consumption	M	L	L
Representative groups for companies	H	H	M
Grid operator	H	H	H
Educational institution	M	L	M
Technology provider/developer	M	L	L
Residents	L	L	L
Residential committees	L	L	L
Housing companies	M	L	L
Nature representatives	M	L	L
Agriculture representatives	L	L	L
Local NGOs	L	L	L

L: Low
M: Medium
H: High

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ANNEX VI - REPLICATION VALLEY PRELIMINARY DATA COLLECTION

How to fill-in the document

Each REFORMERS' Replication Valley should fill in the document by following the *guiding instructions and questions provided in blue text.* Tables and columns where your input is required are marked with the

yellow background

Context data

In the following Table general data related with the Replication Valley is collected through guiding questions.

CONTEXT DATA
Energy Valley #: Short Description
Energy Valley # current energy mixture profile and level of smartness
Building sector: some key facts about the type of buildings, number of buildings it has and key numbers for their consumption (electricity, heat, fuel) on an annual basis. *…* *Industrial Sector: some key facts about the type of industries/commercial activities in the area and key facts about their electricity, heat and fuel needs on an annual basis. If there is an industrial park within the area, please elaborate more (emphasis on synergies if any)* *…* *Electricity/Heating/Cooling: a list and key facts of technologies/power plants present on-site (fossil and renewable energy sources) existing/feeding this area and of the current energy mixture for electricity/heating/cooling. Include also available storage systems (i.e., electrical, heating/cooling, H2)* *…* *Transportation sector: some key facts related to transportation needs, number of vehicles in circulation, green vehicles, EV chargers available etc.*

Energy Valley # Energy Transition related policies - Investing and Funding in Energy Valley #
Key information about on-going local investments and key targets of the local decarbonization roadmap. *Clean Energy:* *District Heating:* *Industry and Trade:* *Smart Agriculture:* *List any on-going activities, serving this scope:* *What regional investments are foreseen in the Valley by 2030 and by 2050?* *What is the status about local Energy Communities foreseen to be formed?* *What type, LEC or REC?*
Main Objectives / Challenges for Energy Valley # towards decarbonization - Expected Impact
List briefly objectives and challenges for your site's transition towards decarbonization and expected – negative and positive - impacts:
Energy Valley current state of data monitoring and availability

• *Are there any measurements of energy production/consumption currently available? Historical or real-time data available?* • *Energy prices/contracts of the region*
Energy valley socio-economic data

• *Some key facts about the socio-cultural context and community initiatives in the area, not necessarily related to energy aspects (e.g. local associations, community groups including energy communities, initiatives promoting social cohesion, participatory processes etc..)*
 	
• *Are there socio-economic databases, statistics or reports available open access or accessible by REFORMERS' partners through local administration on the REPLICATION VALLEY area, including:*
  ○ *Local development and economic activities (e.g. % new sustainable businesses, Human Development Index)*
  ○ *Employment*
  ○ *Welfare, health*
  ○ *Environmental indicators*
  ○ *Energy poverty*
 	
• *Who are the relevant stakeholders we shall reach out for to have an overview on socio-economic aspects?*

List of innovative technologies of a REV

Drawing from REFORMERS FV. Add more technologies, if planned or existing by adding rows below before distributing to the relevant group of stakeholders.

A/A Name of the Technology	Short description	Interest for the Valley # (Y/N). *In case of Y, you need to provide the following information stated in the below paragraph entitled as* ***"Short Description for each of the replicated Technology"***
1.1 Hydrogen NO Carbon	Production of clean hydrogen from organic waste products via thermolysis with byproduct being biochar that acts as a carbon sink.	
1.2 Biological Carbon Capturing and Usage (B-CCU)	Digestor with a photobioreactor to fixate CO2 through the cultivation of algae.	
1.3 Thermochemical energy production	Production of renewable energy carriers such as biogas, syngas, hydrogen and biomethane through gasification or other thermo-chemical technologies.	
1.4 Unlocking existing large-scale RES assets	Existing renewable production systems, which will be accounted for the build up of the Replication Valley (to be examined).	
2.1 Hydrogen infrastructure	Local hydrogen infrastructure to connect the hydrogen producers to hydrogen consumers within the FV.	
2.2 Hybrid battery electrolyser	A hybrid system for production of green H2 an storage, which operation is based on a zinc intermediate step electrolysis (ZZE).	
2.3 Residential and neighborhood battery	Individual batteries at residential dwellings and collective battery/ies to increase the energy self-sufficiency of the residents and reduce the dependence on the regional	

	electricity grid and thereby also reducing the pressure on the grid.	
2.4 Flow battery	A type of rechargeable battery in which two chemical components are dissolved in liquids separated by a membrane.	
2.5 Batteries as part of VLES	The municipality of Alkmaar will implement two batteries, one will be part of a Virtual Local Energy System (VLES) and the other is intended to support the electricity peak demand.	
2.7 Energy conversion and integration technologies	Conversion technologies such G2P, G2H, P2H, H2P and P2G will be demonstrated to balance the FV.	
2.8 Large-scale heat buffer (Extended heat capacity)	A heat buffer	
2.9 (PCM) heat buffer	Individual, small scale, (PCM) heat buffers, in combination with water/water heat pumps able to be used at residential dwellings for heat storage.	
3.3 Battery integrated smart chargers	A battery integrated smart/fast EV charger for heavy duty battery electric vehicles.	
3.4 BEV and FCEV integration	a) BEV: Battery Electric Vehicle (*BEV*) for the case of heavy-duty trucks and b) Fuel Cell driven EVs	

Standard technologies planned or existing in a REV

List and add

A/A Name of the Technology	Interest for the Satellite Valley # (Y/N). *In case of Y, you need to provide the following information stated in the below paragraph entitled as "Short Description for each of the replicated Technology"*

Photovoltaics (PV)	
Wind turbines	
Boilers (natural gas/ biomass)	
EV chargers	
Other technology	

Collection of Descriptions for each technology

Copy/paste the following table and complete required data per each of the technologies of interest for your Satellite Valley

[Name of Technology of interest #1]
Shortly describe *i) the size/expected capacity* *ii) ii) where (area of the region) this will be installed,* *iii) iii) how many consumers/residents it will serve,* *iv) iv) the relevant scope/objective of operation and* *v) v) the associated value streams (input-output) (e.g. electricty, heating, cooling, vehicles)*

Foreseen issues for Energy Valley
This can include missing any type of data or information on current energy system, lack of any possible future changes to energy system due to external factors (financial, political, etc.) or conflicts with other ongoing similar projects. *…* *Any other issue you can foresee.* *…*

Level of interest in deploying innovations

In the table below an example of innovations deployed in REFORMERS FV which could be of interest for other REVs in Europe. A similar table was used to collect data for other REFORMERS tools. In the SEIA Context it can be used as a standalone template to collect interest in studying socio-economic impacts associated with each technology. Add rows below if more innovations can be listed and related socio-economic impacts derived.

Exercise:

1. Ask each stakeholder group representative to vote the level of interest in studying the potential socio-economic impacts, which can help better focus discussions before the Impact Flow definition (can be done through dot voting sessions).
2. Create a balanced score for each technology
3. Share results and discuss
4. Use final scores as initial input to trigger discussions when initiating the Impact Flow definition

Name and description of innovation	Level of interest of related SOCIO ECONOMIC IMPACTS (1-low 5-high)
1.1 Hydrogen NO Carbon (Hynoca Technology): HYNOCA will produce clean hydrogen at InVesta's center of expertise. HYNOCA will produce 30 kg of H2 per hour from organic waste products via thermolysis with the byproduct being biochar that acts as a carbon sink. The produced hydrogen will (partly) feed a local hydrogen infrastructure (REVT2) and be distributed to NXT Mobility's hydrogen filling station (REVT3).	
1.2 Biological Carbon Capturing and Usage (BCCU): Sustenso will connect its digestor, located opposite from InVesta, to a Photobioreactor at InVesta to fixate CO2 through the cultivation of algae. The digestor annually produces 5 – 7.5 million m3 biomethane to be fed into the existing natural gas grid, and the photobioreactor will capture 12,600 kg CO2 per year.	
1.3 Thermochemical energy production: Multiple SMEs will locate at the indoor and outdoor facilities of InVesta's center of expertise and produce renewable energy carriers such as biogas, syngas, hydrogen and biomethane through gasification or other thermo-chemical technologies.	
1.4 Unlocking existing large-scale RES assets: Existing renewable production assets – such as HVC's 2.4MW solar, 4.6MW wind and 100MW	

bio-energy plant – will be unlocked for monitoring, optimization as further delineated in REVT4.	
2.1 Hydrogen infrastructure: To connect the hydrogen producer(s) to hydrogen consumers within the FV, Alliander and HYNOCA will demonstrate a local hydrogen infrastructure at InVesta. This hydrogen infrastructure entails a storage vessel, distribution pipelines, compressor and docking station. The hydrogen will partly be locally taken off by NXT and potential other local consumers, and the surplus of produced hydrogen will be transported to external off-takers through tube trailers.	
2.2 Hybrid battery electrolyser: The hydrogen infrastructure (EI2.1) will further be extended with STOFF2's Hybrid Zinc-Intermediate Electrolyser (ZZE) with integrated storage unit. This hybrid electrolyser with a capacity of 2 MWh will annually produce 18,000 kg H2.	
2.3 Residential and neighborhood battery: Duurzaam Heiloo will demonstrate ten individual batteries (10kWh) at residential dwellings and one collective battery (100 kWh) at a neighborhood within the Eastern part of Heiloo. The collective is most likely to be implemented at CiRoPack, a packaging company, situated at 'De Oude Werf 10'. The demonstration of the energy storage systems (ESS) will increase the energy self-sufficiency of the residents and reduces the dependence on the regional electricity grid and thereby also reducing the pressure on the grid.	
2.4 Flow battery: Repowered will demonstrate a business level (1 MWh) flow-battery for which InVesta will open up their facilities including the grid connection at their center of expertise.	
2.5 Batteries as part of VLES: The municipality of Alkmaar will implement two batteries (3.3 and 1.1 MWh) in which the 3.3 MWh battery will be part of a Virtual Local Energy System (VLES) that will circumvent the grid constraints for +/- 7 businesses at the new harbor at the Boekelermeer. The 1.1 MWh battery is intended to support the electricity peak demand at InVesta.	
2.6 Remote controlled MV switchgear: Alliander will monitor and intelligently optimize the current state of the medium voltage switch gear using the ENTRNCE platform (REVT3) to balance electricity flows and avoid overloading the electricity grid.	
2.7 Energy conversion and integration technologies: The energy carriers produced at InVesta will be distributed, converted and directly utilized within the FV. Conversion technologies such G2P, G2H, P2H, H2P and P2G will be demonstrated to balance the FV.	

2.8 Large-scale heat buffer (Extended heat capacity): With an emphasis on the storage and distribution of heat, HVC will demonstrate a 2,000–4,000 m3 heat buffer be installed in connection to the bio-energy plant. The buffer allows for a more optimal balance in heat and electricity production and for peak heat demand to be covered by the heat buffer instead of the bio-energy plant directly.	
2.9 (PCM) heat buffer: Duurzaam Heiloo will facilitate the demonstration of individual, small scale, (PCM) heat buffers, in combination with water/water heat pumps at five dwellings in Heiloo.	
3.1 District heating connection: A high-rise building, owned by Woonwaard consisting of 112 dwellings, will be connected to HVC's district heating network. The dwellings, located at Overdie, Melis Stokelaan 49 – 271, will be equipped with indirect delivery sets that HVC and Woonwaard first demonstrated as part of POCITYF.	
3.2 P2P energy exchange: Peer-to-peer energy exchange will be made available for a number (+/-7) of businesses that face severe grid constraints. The businesses will be connected through a virtual local energy system (VLES) physically tied to GP Groot's, NXT Mobility's mother company's, existing grid capacity. To further compensate for short-term and seasonal fluctuation in energy availability, the system covers a 3,3 MWh battery and the potential usage of biogas or hydrogen to supplement the electricity provisioning (G2P) being produced.	
3.3 Battery integrated smart chargers: NXT Mobility will demonstrate a battery integrated smart/fast EV charger at their premises (Diamantweg 18) for heavy duty battery electric vehicles. The integrated solution, consisting of a 200-kWh battery, enables fast charging services despite only having a small grid connection.	
3.4 BEV and FCEV integration: GP Groot will utilize three fuel cell electric vehicles for which the hydrogen is produced by HYNOCA (REVT1), and directly being distributed via the local hydrogen infrastructure (REVT2) to the hydrogen filling station operated by NXT Mobility (Diamantweg 32). Also, the battery integrated EV charger (EI3.3) will be utilized by a heavy-duty battery electric vehicle. The heavy-duty BEV will collect agricultural and organic waste residues that serves as the input for the production of biomethane by Sustenso or hydrogen by HYNOCA.	

Table 4. Energy innovation actions

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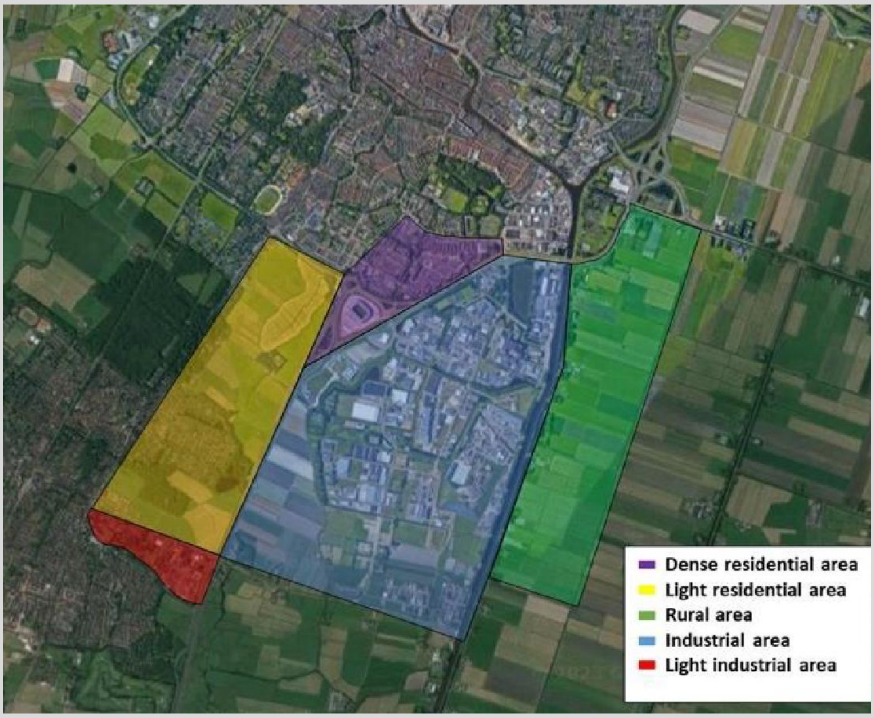
Example: Alkmaar Flagship Valley preliminary data

Alkmaar Renewable Energy Valley

Geographical extension

The geographical extension of the assessment is related to the Flagship Renewable Energy Valley in Boekelermeer area, at Alkmaar, in the Netherlands. In particular the FV Alkmaar comprises the area in which the Boekelermeer business park is centrally located (blue) , and is bordered on the north side by dense residential area in Overdie (purple). On the west side of the FV, the area is bordered by the light residential area (yellow) and light industrial area in Heiloo (red). On the east side, the area extends beyond the Noordhollandskanaal including the rural area of Zuidschermer (green). The gross surface area of the FV is 4km2 and the typology of the area is diverse with the inclusion of industrial, commercial, residential, and agricultural end-users.



Project period

The entire socio-economic assessment process will take place between September 2024 and November 2028. The baseline construction phase is planned between October and November 2024, the monitoring in November 2026 and the final evaluation in November 2028.

Nature of the project being assessed

The Reformers Project aims at the realization of a REV and therefore its nature is strictly connected with the production, conversion, distribution, storage and consumption of energy from renewable sources; with sustainable mobility; with the energy autonomy of local communities; with the socio-economic dynamics connected to the realization of projects in

which it is necessary to integrate the needs and interests of different stakeholders of the same community.
The FV is ideally situated with 1) the availability of current and extended RES (wind, solar, bio-energy plant), 2) the localization of Energy Innovation Park Alkmaar (EIPA) and InVesta for the stimulation of biomethane and hydrogen production, and 3) the availability of current gas assets that can be repurposed for the distribution and storage of renewable energy carriers. Finally, the tools and solutions being developed and demonstrated by REFORMERS helps the FV to circumvent and resolve the existing grid capacity constraints and enables southrand to become Europe's first REV.

Available information
The existing Databases concerns …………………
The data gaps will be filled through direct consultation of the identified and engaged stakeholders (see par. 4.3 and 6.1).

Alkmaar Renewable Energy Valley

Boekelermeer, Alkmaar, in the Netherlands.
Alkmaar's Renewable Valley is an innovative initiative started in the Netherlands, designated to become Europe's first Renewable Energy Valley. This medium-sized area hosts over 300 business facilities and 3000 households, all connected to a shared energy grid. It serves as a part of the EU-funded REFORMERS project, aimed at creating regional ecosystems, focusing on renewable energy and local energy production and consumption.
This valley is unique for its comprehensive diversification and integration of various renewable energy sources, such as solar, wind, and bio-energy plants. It's a Flagship for future energy valleys in Europe, focusing on locally produced and consumed energy. The initiative also involves the requalification of existing infrastructure for renewable energy distribution and storage.
Alkmaar's Renewable Valley is at the forefront of green energy production, housing facilities like the Energy Innovation Park Alkmaar, for testing new technologies in renewable energy generation, storage, and distribution. It's a model for energy resilience and sustainable development, bridging traditional energy sectors with innovative systems.

Innovation testbed in Boekelermeer
The FV Alkmaar 'southrand' is a 4km² area including housing, industrial, commercial, and agricultural activities. It is centred around the Boekelermeer business park 1, surrounded by Overdie's dense residential zone 2 to the north, Heiloo's lighter residential 3 and industrial sectors 4 to the west; finally, extending eastward beyond the Noordhollands Kanaal to include Zuidschermer's rural region 5.
The key features of the Valley include accessible and expanding renewable energy sources (wind, solar, bio-energy), the Energy Innovation Park Alkmaar (EIPA), and InVesta for advancing biomethane and hydrogen production. Additionally, existing gas infrastructures are being re-designed to increase green energy distribution and storage.

Transitioning households in Heiloo

Next to the transformation of the energy system on Boekelermeer business park, REFORMERS also includes other end-consumers such as households at Overdie and Heiloo.
Overdie is a neighbourhood in Alkmaar where approximately 4,000 residents are situated. Many of the residents in the neighbourhood are living in social housing being provided by housing corporations. Whereas these houses are currently connected to the natural gas grid, the aim of REFORMERS is to extent the existing regional heat grid to the neighbourhood and thereby replacing natural gas usage. At least one high-rise building, owned by Woonwaard, will be connected to this extended heat grid.
Heiloo is an adjacent village to the city of Alkmaar. The municipality is home to 24,000 residents on 19 square kilometres. As part of REFORMERS, the neighbourhoods will be equipped with additional solar panels on rooftops, 10 individual and 1 collective battery units, and 10 individual small heat storage units for the residents and businesses. Also, WiththeGrid will install a “Teleport home innovation” to allow the optimization of electricity flows.

<u>Business ecosystem</u>
N/A>

<u>Energy profile</u>
N/A

<u>Energy poverty</u>
N/A

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ANNEX VII – SEIA SURVEY TEMPLATES

During the scoping and context analysis, a SEIA team can use the following questionnaires for a first review of the different stakeholders points of view and to map existing datasets.

Before distributing the questionnaire, ensure that you personalize your call to action, your data treatment policy and responsible entity, in line with GDPR provisions. If you need to shorten up the questionnaire, test it beforehand with representatives of different stakeholder groups, to ensure all views are equally considered, and avoid biases.

1. **Questionnaire to collect the core stakeholders and frontrunners points of view on participating to a Renewable Valley (objectives, constraints and expected impacts)**

Link: https://vub.fra1.qualtrics.com/jfe/form/SV_erKXNAL8K75Uj8a

2. **Questionnaire for KPI elicitation from core stakeholders and frontrunners (including guideline for use of the questionnaire)**

Link: https://it.surveymonkey.com/r/CSGCFXG

3. **Questionnaires for KPI elicitation for citizens and civic organisations (including guideline for use of the questionnaire)**

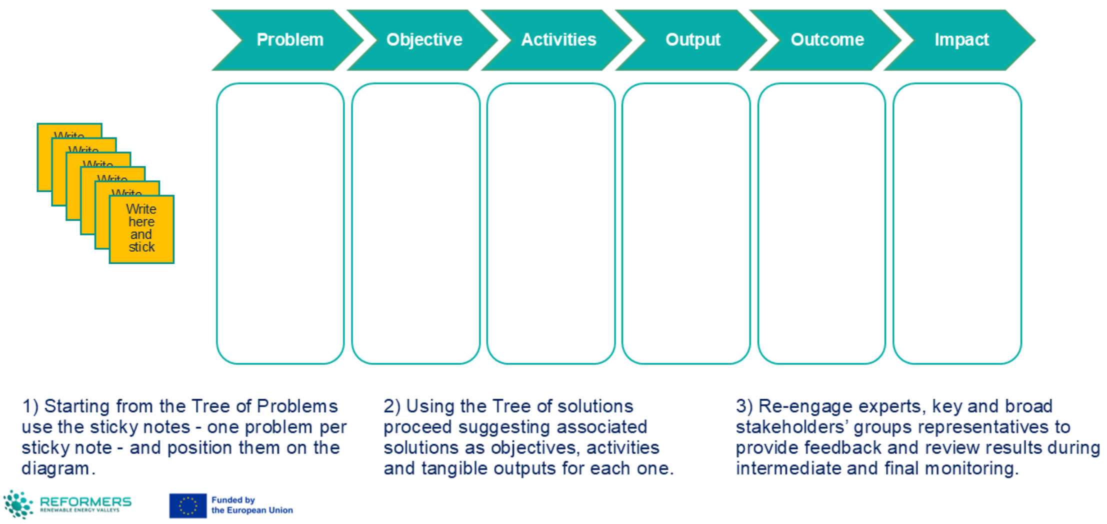
This questionnaires aims at directly measuring the socio-economic impacts to the citizens and grab the needs and concerns of beneficiaries not directly involved in your project's stakeholder engagement activities.

https://it.surveymonkey.com/r/CSP83RW

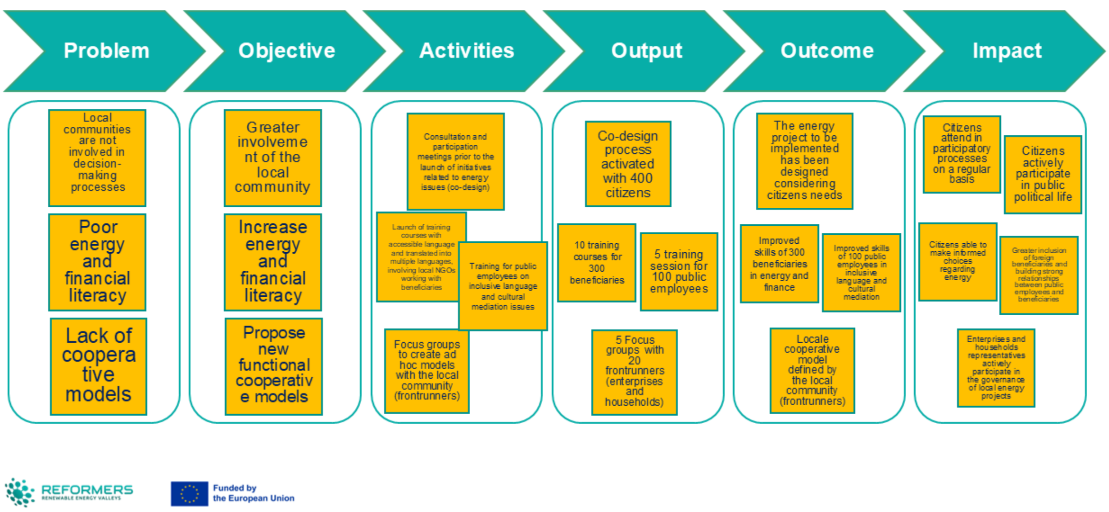
ANNEX VIII - IMPACT FLOW DEFINITION TEMPLATES AND EXAMPLES

Use the following templates and check examples provided during the Impact Flow definition phase. We recommend to dedicate at least two hours for this exercise, with each stakeholder group, and provide sufficient time for comments, reflections and group feedback. The activity can be done in person or online, and professional facilitation is recommended.

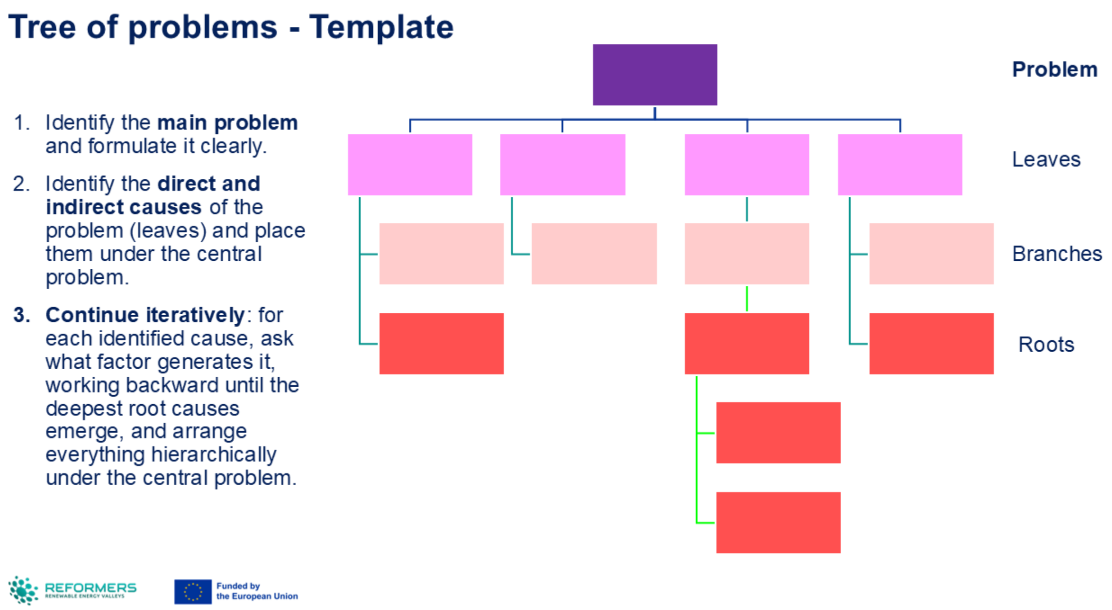
Impact Flow - Template

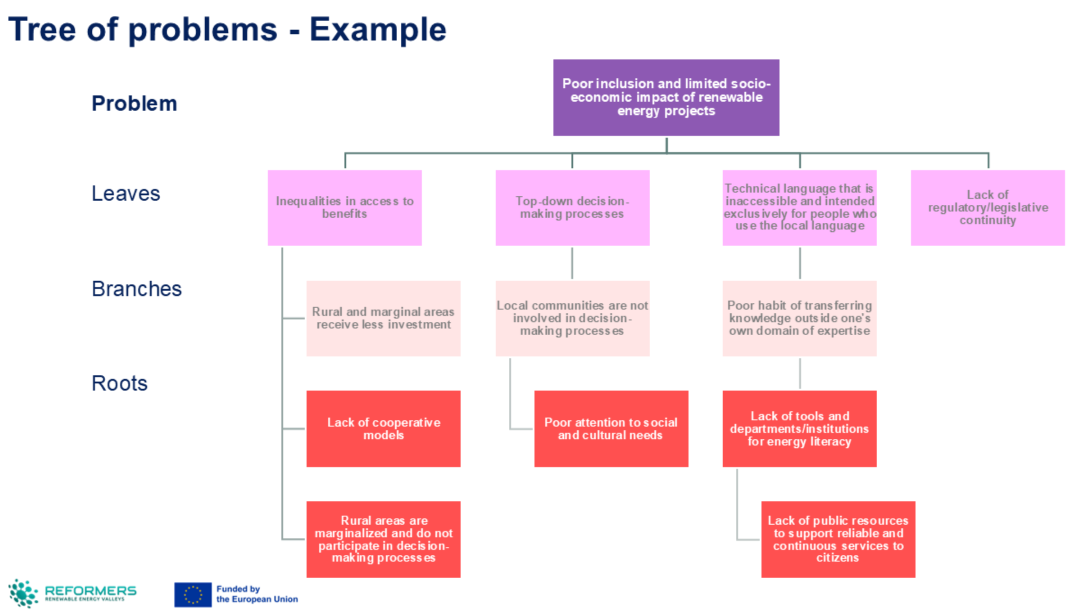


Impact Flow – Example I



Preliminary Exercise - From Problems to Solutions

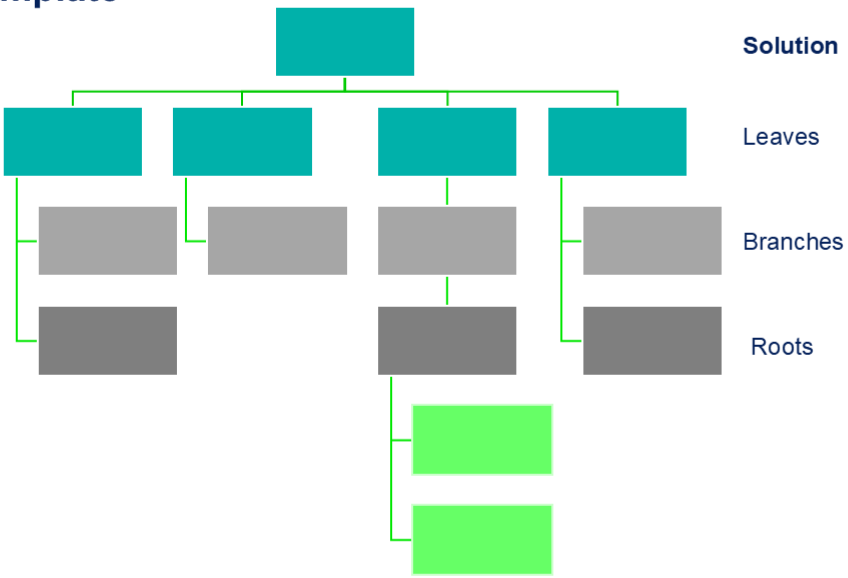




From solutions to impact

Tree of solutions - Template

1. For each **problem identified** focus on the **root causes**.
2. Suggest **possible solutions to** address each **root cause**, up to the **leaves**.
3. **Each main solution** shall be broken down **into concrete actions** hierarchically.
4. **Check the consistency and feasibility** of the proposed actions and make any necessary adjustments.



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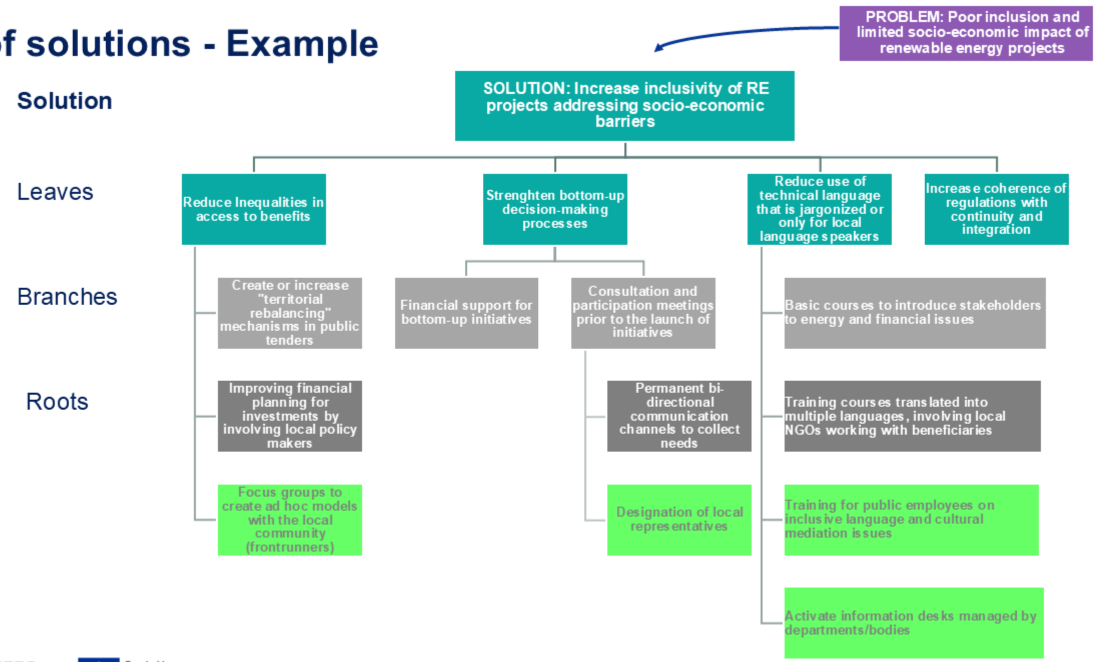
Tree of solutions - Example



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ANNEX IX – SEIA SEMI STRUCTURED INTERVIEW TEMPLATE

In this first version of the SEIA the template is not available yet. Future updates will populate this Annex with guidelines and examples of guiding questions.

ANNEX X – INDICATORS DATABASE

The full set of indicators is available online for download at the following link, and its validated version will be uploaded on Zenodo platform later on in the project.

Spreadsheet location on Sharepoint:

REFORMERS SEIA KPI Mapping (Final Version) _ logo.xlsx

Here below a screenshot of the table, up to the first dozen of indicators.

Columns include:

- Dimension
- Category
- Sub-Category
- Key Impacted Stakeholders
- Other Stakeholders/Beneficiaries
- Indicator
- Metric
- Description
- Source
- Existing Datasets
- Collection Method
- Expected Trends
- Tresholds
- Relevance score

D6.4 Annex IV - Indicators Database / KPI List				Add here relevant stakeholder groups or beneficiaries not listed	Blocked cell	Blocked cell	Blocked cell
DIMENSION	CATEGORY	SUB-CATEGORY	KEY-IMPACTED STAKEHOLDER GROUPS	OTHER STAKEHOLDER GROUPS	INDICATOR NAME	METRIC	DESCRIPTION
Economic	Energy use and accessibility	Energy Affordability	Households	Local authorities; SMEs; Energy suppliers	Average cost of energy for households	Average cost of energy per household (€/MWh)	Cost of energy for households. A lower average cost reflects successful initiatives in improving energy efficiency and promoting affordable, renewable energy sources.
Economic	Energy use and accessibility	Energy Affordability	SMEs; Large enterprises	Local authorities; Energy suppliers	Average cost of energy for companies	Average cost of energy per company (€/MWh)	Cost of energy for businesses. A lower average cost reflects successful initiatives in improving energy efficiency and promoting affordable, renewable energy sources.
Economic	Energy use and accessibility	Energy Affordability	Local authorities		Average cost of energy for public administrations	Average cost of energy for public admin (€/MWh)	Cost of energy for Public Administrations. A lower average cost reflects successful initiatives in improving energy efficiency and promoting affordable renewable energy.
Economic	Economic Attractivity	Business Performance	SMEs; Large enterprises	Investors; Local authorities	Average percentage increase or decrease in income for businesses participating in green projects	Percentage change in income (%)	An increase in income for businesses involved in green projects reflects their financial viability and ability to promote sustainable practices.
Economic	Economic Attractivity	Investment	Investors; SMEs; Large enterprises	Local authorities; Research institutions	Investment in RES technologies	Total investment in RES (€)	A higher level of private investment in green infrastructure projects reflects confidence in sustainable development's economic benefits.
Economic	Economic Attractivity	Policy and Incentives	Households; SMEs; Large enterprises	Local authorities	Use of tax incentives for green projects	Number and value of tax incentives claimed (€)	Tax incentives encourage businesses and households to invest in environmentally friendly practices, reducing costs and supporting economic growth.
Economic	Economic Attractivity	Investment	Local authorities; Investors; Large enterprises	SMEs; Households	PPP for green infrastructure projects	Number and value of PPP projects (€)	Public-private partnerships (PPP) demonstrate collaboration to finance and implement green projects, contributing to job creation and sustainable development.
Economic	Economic Attractivity	Business Climate	SMEs; Large enterprises	Local authorities	Businesses relocated to or away from the region	Net change in number of businesses	The number of businesses relocating reflects the region's attractiveness for sustainable development and economic opportunities.
Economic	Economic Attractivity	Innovation	Research institutions; Large enterprises; SMEs	Investors	New patents for environmentally friendly technologies	Number of patents filed/granted	The number of patents for green technologies highlights innovation and leadership in sustainable development, fostering economic growth and attracting investments.
Economic	Economic Attractivity	Innovation	SMEs; Large enterprises; Research institutions	Households	New green technologies	Number of new green technologies adopted/developed	The adoption of green technologies indicates innovation and the creation of economic opportunities, reflecting progress in fostering sustainable development.
Economic	Economic Attractivity	Business Performance	SMEs; Large enterprises	Investors; Local authorities	Growth in revenue of businesses in the region	Percentage change in revenue (%)	Business revenue growth indicates economic prosperity and reflects the impact of green initiatives on boosting business performance and competitiveness.
Economic	Economic Attractivity	Investment	Investors; Large enterprises	Local authorities; SMEs	Foreign investment in green infrastructure and technologies in the region	Amount of foreign direct investment (FDI) (€)	Foreign direct investment reflects the region's ability to attract international investors, driving economic growth and job creation.
Economic	Justice and Inclusivity (Employment)	Financial Viability	SMEs; Large enterprises	Financial institutions; Local authorities	External financial support needed by companies	Amount of external financial support (€) or % of companies needing support	How much companies rely on external financial support reflects their ability to self-sustain green initiatives, indicating financial stability.
Economic	Employment	Job Quality	Workforce; Households	Local authorities; SMEs	Average income in different sectors, with focus on green sector	Average annual income per sector (€)	Higher average incomes in the green sector reflect the creation of well paying jobs, supporting economic growth and reinvestment in the local economy.

ANNEX XI – COMPOSITE INDEXES

Let's imagine we are creating a 'Health and Wellbeing Composite Index' to compare two project sites: the Flagship Valley (showing unbalanced progress) and a Replication Valley (showing balanced progress). We will use three normalized indicators, scored from 0 to 100 (note: all values are pure examples)

Indicator	Flagship Valley	Replication Valley
Reduction in Asthma/COPD cases	90 (Excellent)	65 (Good)
Reduction in residents' high stress	20 (Poor)	60 (Good)
Reduction in healthcare expenditure	80 (Very Good)	65 (Good)
Simple Arithmetic Mean (μz)	63.3	63.3

A simple arithmetic average would suggest that both valleys perform equally well. However, the application of the Adjusted Mazziotta–Pareto Index (AMPI) reveals significant differences in balance and consistency across indicators.

Applying the AMPI Formula

$$AMPI = \mu_z - \mu_z \cdot \sigma_z^2$$

where:

- μ_x (mu) is the arithmetic mean of the normalized indicators (i.e., the average score);
- σ^2_x (sigma-squared) is the variance of those indicators, representing how much individual values deviate from the average.

The second term, $\mu_x \cdot \sigma^2_x$, acts as a penalty for imbalance, reducing the overall score when disparities between indicators increase.

As the formula shows, the final score (AMPI) is the simple average minus this penalty term. If all indicators have similar scores, the variance will be low, resulting in a small penalty. Conversely, if the scores are very different (e.g., one is very high and another is very low), the variance will be high, resulting in a larger penalty and a lower final score. This method ensures that holistic, balanced progress is valued more highly than unbalanced progress.

Flagship Valley (Unbalanced Progress)

The scores (90, 20, 80) display a wide dispersion, resulting in a high variance ($\sigma^2 z \approx 1{,}233$).

Penalty = 63.3 × 0.195 ≈ 19.5

AMPI Score = 63.3 − 19.5 = **43.8 (≈ 44)**

Replication Valley (Balanced Progress)

The scores (65, 60, 65) are closely aligned, producing a very low variance ($\sigma^2 z \approx 8.3$).

Penalty = 63.3 × 0.0013 ≈ 0.13

AMPI Score = 63.3 − 0.13 = 63.17 **(≈ 63)**

(Note: The original example's scores of 51 and 62 may reflect a slightly different normalization or penalty coefficient. The calculations presented here follow the standard AMPI formulation, highlighting more clearly the difference generated by the imbalance penalty.)

This calculation demonstrates that, although both valleys share the same average score, the Replication Valley's more balanced performance leads to a significantly higher composite index. The AMPI therefore captures the principle that progress should be both substantial and evenly distributed across all dimensions of well-being. The same composite indicator can also be applied longitudinally, for instance, to assess a single valley over several years (e.g., Baseline, Year 2, Year 5), thus generating a time series that tracks the evolution of socio-economic well-being. As noted by Bacchini et al. (2019), a key methodological challenge lies in ensuring that the selected normalization and aggregation techniques support consistent spatial and temporal comparisons. Choosing an appropriate approach is therefore essential to maintain the interpretability and credibility of SEIA results.

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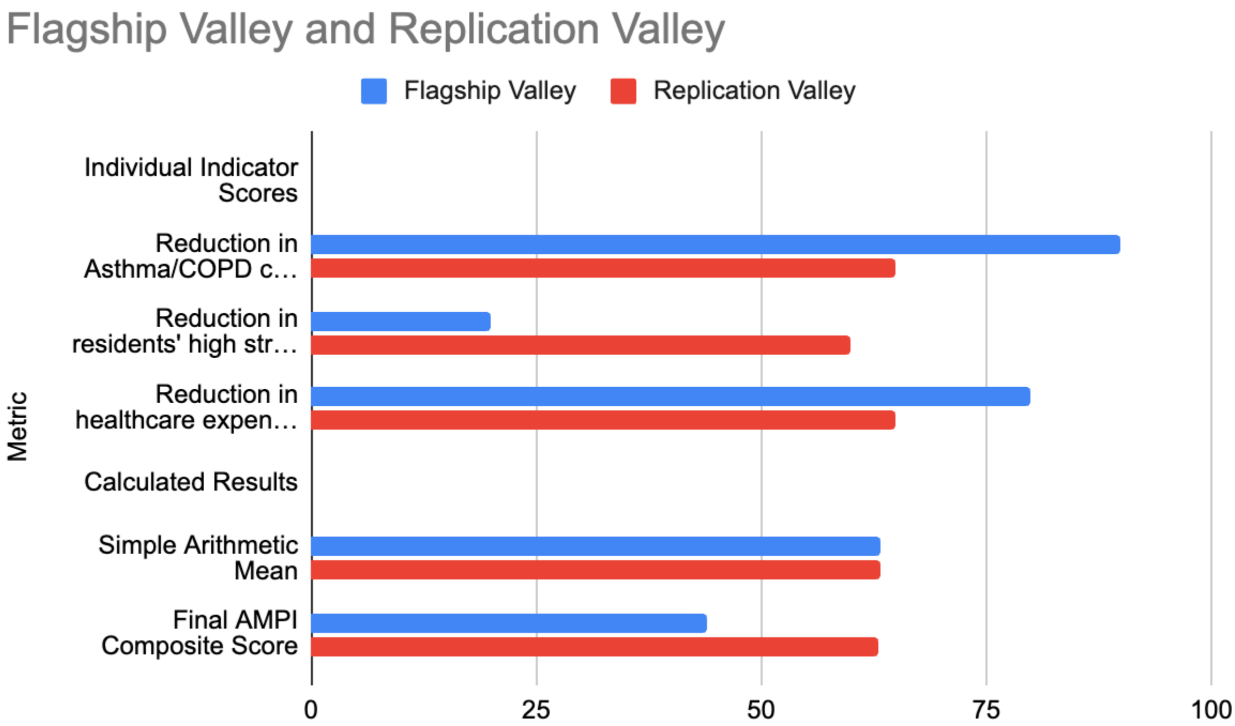
Flagship Valley and Replication Valley
Flagship Valley
Replication Valley
Metric
Individual Indicator Scores
Reduction in Asthma/COPD c…
Reduction in residents' high str…
Reduction in healthcare expen…
Calculated Results
Simple Arithmetic Mean
Final AMPI Composite Score
0
25
50
75
100

ANNEX XII – SROI METHOD

Scenario: A key objective of the REV project, as defined in the Impact Flow, is to improve local employment opportunities. During the KPI prioritization workshop, stakeholders identified "Reducing Youth Unemployment" as a top priority, giving it a high importance score.

- **Step 1: Identify and Measure the Outcome**

The first step is to clearly define the specific change that has occurred.

Outcome: The REV project's activities (e.g., training programs, support for green startups) have led to the creation of one full-time job for a previously long-term unemployed young person.

- **Step 2: Identify and Quantify Financial Proxies**

Next, we identify existing financial data that can represent the value of this outcome.

Proxy 1: Savings to the state. The state no longer has to pay unemployment benefits.

Value: €15,000 per year.

Proxy 2: Increased economic contribution. The newly employed person now pays income tax and social security contributions.

Value: €5,000 per year.

Proxy 3: Reduced public healthcare costs. Research often links long-term unemployment to higher rates of physical and mental health issues, leading to increased costs for the public health system. We can use a conservative estimate for this saving.

Value: €1,000 per year.

The Total Raw Value of this outcome is the sum of these proxies: **€15,000+€5,000+€1,000=€21,000**

- **Step 3: Apply the Stakeholder Weighting**

This is where the community's priorities are integrated. During the prioritization workshop, stakeholders rated the importance of this impact. We can translate this rating into a multiplier to adjust the raw value.

Stakeholder Priority Score (from workshop)	Description	SROI Weighting Multiplier
1-3	Low Priority	1.0 (No adjustment)
4-7	Medium Priority	1.25 (+25% value)
8-10	High Priority	1.5 (+50% value)

In our example, stakeholders gave "Reducing Youth Unemployment" a score of 9 out of 10. According to the table, this corresponds to a Weighting Multiplier of 1.5.

- **Step 4: Calculate the Final Adjusted Social Value**

Finally, we apply the multiplier to the raw value.

Calculation: Adjusted Social Value = Total Raw Value × Stakeholder Weighting Multiplier

Result: €21,000×1.5=€31,500

This final value of €31,500 represents the socially-weighted value of creating one job for a young person in this specific community. It demonstrates that this outcome is considered 50% more valuable than its direct financial effects suggest, precisely because it aligns with a top community priority. This SROI figure provides a powerful and defensible number to communicate the true, holistic value of the REV project.

ANNEX XIII – FORECASTING WITH SIGNIFICANCE ASSESSMENT

[Intro text will be added]

Description of impact		
Definition	[Add definition of impact in plain language]	
Type of impact	Direct/indirect	
Nature of impact	Positive/Neutral/negative	
Phase	Planning/Construction/Operation/Decommissioning	
Significance assessment		
Intensity	Low/Medium/High	
Duration	Low/Medium/High	
Extent	Low/Medium/High	
Probability	Low/Medium/High	
Significance		
Degree to which impact can be reversed	Low/Medium/High	
Degree to which impact may cause irreplaceable loss of resources	Low/Medium/High	
Degree to which impact can be mitigated	Low/Medium/High	

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State Secretariat for Education, Research and Innovation SERI

Mitigation actions	
The following actions are recommended :	

ANNEX XIV – OTHER TEMPLATES

REFORMERS Stakeholder Objectives Template

This table can be used when transforming problems in objectives, to compare objectives across different stakeholder groups or across different geographic areas or neighbourhoods. The SEIA team can adapt it to needs and use it to visualize, prioritise and compare during stakeholder workshops.

How to use it:

1. Add in the first column the list of main objectives expressed by the different stakeholder groups during the Impact Flow diagram definition.
2. Ask all other stakeholder groups to rank their perceived relevance for each one of those objectives.
3. Fill in this table and present the final output to all stakeholders and use it to trigger discussions. A professional facilitator might be helpful to extract valuable conclusions.
4. Use the main insights from discussions to add qualitative information to your reports.

Objectives/Stakeholder Group	SG 1	SG2	SG3	SG4	SG5	SG6	SG7
Objective #1							
Objective #2							
Objective #3							
Objective #4							
Objective #5							
Objective #5							
AL - Alkmaar, DR - Delft Region, EF - East Flanders, MD - Murau District, AM - Andorra Municipality, GP - Greater Poland Energy Valley, WM - Western Macedonia							

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Detailing impact on each stakeholder group

During the Impact Flow definition phase, you can use this in-depth template to analyze more in-depth the consequences of specific activities or measures to maximize positive impacts or minimize negative ones.

1. List the different stakeholder groups identified, including all those impacted by your project and not directly involved (beneficiaries).
2. List the consequence of the activity on each specific group, using the guiding question "What do you think will happen as a consequence of this activity to this specific group?"
3. Find strategic or detrimental links across the different columns and rows.

Name of Activity (as in the impact flow diagram)			
Stakeholder Group	What happens at first?	What else can happen?	Are there overlooked impacts, nested under previous ones?
Stakeholder #1			
Stakeholder #2			
Stakeholder #3			
Stakeholder #4			
Stakeholder #5			
Stakeholder #5			