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ABSTRACT

This report investigates how stakeholders are interconnected in ecosystems. The analysis results in a structured overview of the stakeholder networks' goals, members, activities, and outreach channels. The network refers to the way in which the stakeholders are interacting within a group, meaning that they are connected to local initiatives such as clusters, energy communities, local authorities, or other ecosystems. These networks have been grouped and characterised in project Task 1.1, resulting in the deliverable D1.1 Extended stakeholder and ecosystem mapping. This overview of ecosystems further builds on the knowledge of ecosystems and networked individuals as described in D1.1 and provides more details on the networks' characteristics. The deliverable will describe both networks of individual residents as well as networks of organisations, covering energy communities, local authorities, cluster organisations, and advocacy organisations. Lastly, and in addition to the interconnected stakeholders, this report also identifies new-to-digital-energy ecosystems and their outreach channels through which stakeholders, who are not networked in the energy-focused ecosystems might be reached, to include in the overall objective to engage everyone in the digitalising electrical energy system.

Contents

1 Introduction: Stakeholders in Ecosystems

The digitalisation of the electrical energy system is receiving increased attention in the transition towards a more sustainable society. The digitalisation of energy means the increased uptake of information and communication technologies, and holds promise to improve the connectedness, efficiency, reliability, and sustainability of our electricity systems. All stakeholders in the energy system are impacted by the digital transition. This leads to new needs for knowledge and skill of individuals as residential energy consumers and for working professionals. Therefore, the Horizon Europe Every1 project aims to support everyone with knowledge and skills to enable them to play an active role in the digitalising energy system.

To support and reach the variety of stakeholders, the Every1 project will collaborate with ecosystems in which the stakeholders are embedded. Within the Every1 project, we understand stakeholders as anyone who can or needs to be engaged in the digitalising energy system. We understand ecosystems as networks of stakeholders, which are often also referred to as clusters, communities, platforms, or networks. The ecosystems are understood as valuable networks through which the Every1 project can reach out to a variety of stakeholders. The Every1 project engages with ecosystems for two purposes:

1. **Co-creation of learning material.** The learning material developed by the Every1 project will be co-created in collaboration with various ecosystems, to ensure the learning materials address needs from stakeholders in practice. The co-creation consists of the piloting, testing, and validating of the learning material to iteratively improve it.
2. **Supporting the ecosystems in their work.** The Every1 project will support ecosystems in their work of supporting their members. This support can for example entail contributing to the education and training of ecosystem members, help in understanding different needs in the digitalisation of energy, support about engaging with members.

To set-up the ecosystem engagement, this deliverable provides a structured overview of the European ecosystem landscape and maps the different types of ecosystems for whom the Every1 project could potentially add value and engage with. In this deliverable a distinction is made between existing digital-energy ecosystems and new-to-digital-energy ecosystems**. Existing digital-energy ecosystems** are ecosystems which are already working on the energy transition. This often includes the digitalization aspect of the energy transition. These ecosystems are already familiar with offering support to their members about energy, and therefore the Every1 project fits immediately within the ongoing business of the existing-digital-energy ecosystems. Second, the **new-to-digital-energy ecosystems** are not focussed on the digitalisation of energy. Nevertheless, we aim to reach these ecosystems, as potential alternative stakeholder groups who are often not involved with existing-digital-energy ecosystems. The new-to-digital-energy ecosystems will be supported by the Every1 project in expanding the scope of their ecosystem, taking up efforts to support their members in the digitalisation of energy, and by seizing the potential of the digitalisation of energy for the operations of the ecosystem itself.

This deliverable builds upon earlier work in the Every1 project in deliverable 1.1 *Extended ecosystem and stakeholder mapping,* which mapped the stakeholders in the digitalising electricity system, their

learning needs, preferences, and how they are networked. The insights from D1.1 are brought a step further by pinpointing which specific ecosystems could potentially be engaged to reach the variety of stakeholders mapped in D1.1. Furthermore, this deliverable 1.2 details the characteristics for these ecosystems, which can inform further engagement with these ecosystems.

The outline of this deliverable is as follows: first, this introduction Chapter is followed by Chapter 2 detailing how we understand stakeholders and ecosystems in the Every1 project. Next, Chapter 3 elaborates on the methodology used to map the ecosystems in this deliverable. Then, Chapter 4 maps the existing digital-energy ecosystems, and Chapter 5 the new-to-digital-energy ecosystems. For both the existing digital-energy ecosystems and the new-to-digital-energy ecosystems, the following aspects are mapped: their function (goals and activities), types of engaged stakeholders, geographical coverage, and communication channels to engage with members. This in-depth description of the different ecosystem types will be accompanied by lists of identified existing ecosystems that could potentially be engaged with the Every1 project. In this way, this report will serve as the basis for the Every1 project's further engagement with ecosystems.

2 Understanding Stakeholders and Ecosystems

Before further analysing how stakeholders are networked in ecosystems, this section details our take on stakeholders and ecosystems.

2.1 Stakeholders in the digitalising energy system

An overview of stakeholders is presented in deliverable *D1.1 Extended stakeholder and ecosystem mapping*, including an analysis of their knowledge needs, learning preferences, and networks of stakeholders. The identified stakeholders in the digitalisation of electrical energy systems can be grouped into five categories:

1. **Energy sector stakeholders** operate the electrical energy system and the digitalisation in the electrical energy system. Organisations in this category are for example energy regulators, distribution system operators (DSOs) and companies providing digital energy technologies.
2. **Electricity users** use electricity as consumers, but also when they produce electricity as prosumers. This category includes both organisations who use electricity, and individuals as residential energy consumers who use electricity in their household.
3. **Local and regional authorities** are policy makers on a local and regional level. Local and regional authorities decide on local and regional policies and initiatives on digitalisation and energy. This category includes organisations like municipalities and provincial governments.
4. **Education and training institutes** are institutes providing education and training to support the digitalisation of the electrical energy system. Examples of organisations in this category are universities and vocational education and training (VETs).

5. **Cluster organisations** are networks in which individual stakeholders are brought together to collaborate in the digitalising electrical energy system and support in learning of its members. This category comprehends organisations that guide and organise the networks.

Furthermore, for the purpose of Every1 project work, we also use an additional alternative categorisation of stakeholders: organisations and residents.

1. **Organisations** are structured entities who have a role in the digitalising electrical energy system. Professionals working in those organisations should have the skills and knowledge that is required to foster the digitalisation of energy (Lucas et al., 2018).
2. **Residents** are individual persons who interact or can potentially interact with the digitalising energy system in their household. As residential energy consumers the digitalisation means that individuals should have the skills to be able to make informed choices and benefit from the digitalising energy system (Calver & Simcock, 2021; Chambers et al., 2022; European Commission. Directorate General for Energy. & Tractebel Impact., 2020)

In the five stakeholder categories presented above, both organisations and individuals are considered residential energy consumers. This distinction between organisations and individuals is helpful to understand the different roles in which people engage with the digitalisation of energy. When considering organisations as stakeholders, we look at people who interact with the digitalising energy system in their professional role. When focussing on individuals as residential energy consumers, we consider residents who deal with energy and therefore digitalisation in their household, as energy consumers or prosumers. Depending on these different roles, we focus on different ways to understand, reach, collaborate and support them, including the different ways in which organisations and individuals are networked in ecosystems.

2.2 Ecosystems as networks of stakeholders

The stakeholders can be networked in ecosystems in various ways. We understand ecosystems as any grouping wherein stakeholders are interconnected. In the Every1 project, we distinguish between existing digital-energy ecosystems and new-to-digital-energy ecosystems. The existing digital-energy ecosystems are ecosystems in which digitalisation of energy is already part of their daily operations. The new-to-digital energy ecosystems are ecosystems that are not yet actively working on digitalisation of energy in their daily operations. This distinction helps to understand the different opportunities for engaging with the different ecosystems, as the opportunities for the co-creation of learning material, and the support to the ecosystem operations, have different focus points.

1. **Co-creation of learning materials:** The learning materials that will be co-created with both the existing digital energy ecosystems and the new-to-digital energy ecosystems, offer both ecosystem types the opportunity to use tailor-made learning materials that directly address their learning needs. This offers the variety of stakeholders in the ecosystems insights that can support them to take up their role in the digitalising energy system. Co-creation with the existing digital-

energy ecosystems provides an opportunity for the Every1 Project to improve the materials with insights from stakeholders who have experience in the digitalisation of energy. The co-creation with the new-to-digital energy ecosystems offers insights from another group of stakeholders: those with little experience with the digitalisation of energy. Both types of ecosystems offer valuable insights for the learning materials, but in a different manner.

2. **Support for the ecosystems:** For the support to ecosystems' operations, the focus will differ between the existing digital energy ecosystems and the new-to-digital energy ecosystems. The existing digital-energy ecosystems are already more familiar with the digitalisation of energy, and the Every1 project can mainly focus on advancing their work and keeping their work up to date with the latest developments in the digitalisation of energy. In contrast, the new-to-digital energy ecosystems can be supported by the Every1 project in taking up a role in the digitalisation of energy, and in supporting their members to take up their role in the digitalisation of energy. Insights created in collaborating with existing digital-energy ecosystems can help to understand how to engage with new-to-digital energy ecosystems.

For both the existing-digital-energy ecosystems and the new-to-digital energy ecosystems, several ecosystem types are identified to investigate further for engagement. Those will now be explained. The distinction between existing digital-energy ecosystems and new-to-digital energy ecosystems is made for operational purposes and should not be understood as a dichotomy. For example, we classify energy communities in the existing-digital-energy ecosystems group, but within this type of ecosystems there might also be energy communities who have less understanding of digitalisation of energy than others. And conversely: there might be soccer clubs that we classify as new-to-digital energy ecosystems, but in practice it is active in the topic. Nevertheless, we see the distinction as a valuable way to analyse the differences between ecosystem types, to help our thinking and operationalisation of ecosystem engagement further.

2.2.1 Existing-digital-energy ecosystems

For the existing-digital-energy ecosystems, we focus on four types: local and regional authorities, energy communities, clusters of organisations, and advocacy groups. Each of the ecosystem types has another focus in their daily operations, but all relate to the digitalisation of energy. The variety of ecosystems enables to reach a variety of stakeholders.

1. **Clusters of organisations** bring together various organisations working in the same field but not specifically in the same region. Clusters have the potential to respond to the increasing demand from their members regarding reskilling, upskilling and talent attraction related to digitalisation (European Commission, 2021). This type of network is valuable to target a broad range of organisations as stakeholders, to support them in their daily operations.
2. **Local and regional authorities** are local policy makers who have an impact on a variety of stakeholders at a local scale. The local and regional initiatives that local and regional authorities can support can vary. For example, supporting local energy communities, promoting self-production, providing opportunities for participating in projects, and by

focussing on energy poverty (European Committee of the Regions ., 2019). The local and regional authorities might reach both organisations and residents but are especially valuable when aiming to target residential energy consumers, because every resident is related to a local and regional authority.

3. **Energy communities** are networks uniting stakeholders on a local scale. Energy communities are initiatives that empower citizens, small businesses, and local authorities to produce, manage and consume their own energy (Directorate-General for Energy, 2022). Energy communities thus offer an opportunity to engage with stakeholders who are already more familiar with energy and the digitalisation of energy.
4. **Advocacy groups** seek to create social and political change by providing active support to a particular issue through mechanisms such as policy making (Fuller & McCauley, 2016). They are often also referred to as non-governmental organisations, lobby organisations, pressure groups, activist groups, or social movement organisations (Obar et al., 2011).

Within the scope of this project, we do not focus on engaging with educational institutes to support them in their curricula. Although the curricula of educational institutes help to deliver professionals in organisations who are skilled to foster the digitalisation of energy, the Every1 project will not further analyse nor engage with the educational ecosystems because this has been the focus of the EDDIE project (Chronis et al., 2020). Valuable insights can be retrieved from the EDDIE project, about the education needs of the energy sector. Whereas EDDIE aims to address these needs via the education curricula, the Every1 project aims to address this need by upskilling and reskilling the professionals who are already part of the existing workforce.

2.2.2 New-to-digital energy ecosystems

The identified stakeholders might be intertwined in ecosystems or reached by existing networks which are not directly involved in digitalisation of energy. The so called new-to-digital energy ecosystems do have the potential to reach many stakeholders through their outreach channels or engagement strategies. These ecosystems typically operate in the social or popular space, which offers a platform to integrate communication on digitalisation of energy. A wide range of new-to-digital energy ecosystems have been explored from which the following have the potential to engage with on the topic of digitalisation of energy: social welfare organisations, religious communities, elderly associations, sport associations, as well as consumer and producer organisations. These ecosystems' organisations have been investigated as well as their potential outreach channels for the purpose of the Every1 project. To what extent could the topic of digitalisation of energy be integrated in their operations?

3 Methodology

The aim of this deliverable is to provide an understanding of ecosystems with which the Every1 project can engage in a valuable way. Therefore, for each of the identified ecosystem types, both existing-digital-energy ecosystems and the new-to-digital-energy ecosystems, two aspects are focused upon. First, for each ecosystem type a deeper understanding is sought by investigating key dimensions of the ecosystem types, providing a more conceptual understanding of them. Second, for each type, existing ecosystems are listed with whom the Every1 project can potentially engage.
This section continues by stating the research aims in more detail, specifying what we aim to understand and map for the ecosystems. Next, the data and analysis approach are explained that were used to fulfill the research aims.

3.1 Research aims

First, the existing digital-energy ecosystems are analyzed through a more conceptual understanding of the ecosystem types. Next, for each ecosystem type concrete examples are listed with whom the Every1 project can potentially engage. Second, the new-to-digital energy ecosystems are investigated. As these ecosystems vary more in their way of operating and aims, a more flexible research approach is taken, aiming to provide all details that can inform further engagement with these ecosystem types.

3.1.1 Existing digital-energy ecosystems

Each of the identified existing-energy ecosystem types will be investigated in more detail in four dimensions. The first three dimensions were identified to be key in understanding ecosystems in *D1.1 Extended stakeholder and ecosystem mapping*. The fourth dimension, outreach channels, is added in this deliverable because this will be a relevant aspect to be able to engage with the ecosystems. All in all, the following four dimensions will be investigated for each ecosystem type:

1. **The function of the ecosystem.** The purpose of the ecosystem can vary, as some ecosystems might have educating members as priority, whilst for other ecosystems the facilitation of connections and exchange is more important. Depending on its function, the ecosystem is familiar with educating members and digitalisation of energy.
2. **The stakeholder types involved in the network.** Some ecosystems target a variety of organisations or residents, and some ecosystems target one specific stakeholder type. The involved stakeholder types determine who can be reached by engaging with the ecosystem.
3. **The geographical spread of members.** Some ecosystems target stakeholders in the same region, and other networks have a broader geographical spread. The geographical spread of the ecosystem shapes who can be reached.
4. **Outreach channels.** The ecosystems can vary in their way of reaching out to members. Understanding the outreach channels will help to understand what the most suitable engagement approach could be per ecosystem type.

Furthermore, to create a deeper understanding of the different ecosystem types, examples of each ecosystem are provided. Additionally, this deliverable aims to provide an overview of the ecosystems with whom the Every1 project can potentially engage. For each ecosystem type, there have been identified several potential ecosystems to engage, presented in Annexes 1,2 and 3.

3.1.2 New-to-digital energy ecosystems

For the analysis of new-to-digital energy ecosystems a more flexible approach is taken. The ecosystems vary more in terms of what they do, what and who they are, who they reach within the selected types. Therefore, focus of the analysis was exploring all details that are needed to understand potential steps of engagement with these ecosystems.

Furthermore, for each ecosystem type examples are listed that make the descriptions of the ecosystems more tangible. Moreover, those examples offer concrete starting points for setting up engagement with those ecosystems.

To describe the outreach channels of the new-to-digital ecosystems one overarching analysis has been done to ensure an inclusive approach because new-to-digital energy ecosystems may lack access or awareness of the options available to reach everyone in scope of the project. A general overview opens the opportunity to involve a wider range of stakeholders including marginalised groups. Emphasising inclusivity and accommodation during network identification and outreach planning improves the chances of successfully incorporating marginalised communities. In Work Package 5 the project envisions to activate and support local ecosystems in the dissemination and communication of the created training materials towards their stakeholders. Based on the empirical research of this planned ecosystem engagement, Deliverable 5.2 *Report on ecosystem engagement and impact*, will report in more detail on the outreach channels of the identified ecosystems.

3.2 Data and analysis

The analysis for the dimensions and examples of the ecosystems is based upon insights and data collected in D1.1 *Extended stakeholder and ecosystem mapping,* literature research, and the expertise of our Every1 consortium.

In *D1.1 Extended stakeholder and ecosystem mapping* a first exploration of ecosystems is provided, on which this D1.2 builds further. D1.1 analysed how citizens and organisations are networked in ecosystems. This was based on a qualitative literature analysis, a survey conducted with organisations across the EU, another survey conducted with 4000 citizens in the EU, and was informed by the expertise available in the Every1 consortium. These insights have also served the more extended analyses for this ecosystem review.

Furthermore, literature was sought that could deepen our understanding of the various ecosystem types. The literature research was conducted using a narrative approach, meaning that the search process was iteratively updated when more was learned about the ecosystems and their dimensions. Both snowball and key word search strategies were used to find information that would enrich our understanding. This was especially valuable because information about the different dimensions and different ecosystem types could be find in different fields of research.

Additionally, for the research on examples and potential ecosystems, desk research was done. In this search, networking organisations on European scale were helpful as they often list local ecosystems that we are interested in as part of their European networking organisation. For example, energy communities are networked in the Energy Communities Repository and in the Rural Energy Community Advisory Hub. Another example are cluster organisations where repositories of existing clusters can be found on platforms such as Geode and the European Cluster Collaboration Platform. Additionally, ecosystems were added to the overview of potential ecosystems to engage with based on connections that our Every1 partners already had with ecosystems.

Moreover, the research in this deliverable was embedded in the expertise of our consortium partners. Partners involved are actively working in the field of digitalisation of energy and have experience with the variety of ecosystem types. These experiences helped to navigate and enrich our analysis.

4 Existing-digital-energy ecosystems

This chapter expands on the four dimensions: function, stakeholder types, geographical spread, and the outreach channels of the networks. The following chapter provides an in-depth description of energy communities, local and regional authorities, clusters, and other stakeholder networks such as advocacy groups, as well as concrete examples of each type of ecosystem. Annex 1, Annex 2, and Annex 3, complements this chapter by providing detailed lists of identified existing ecosystems of each type.

4.1 Energy communities

Energy communities are initiatives that empower citizens, small businesses, and local authorities to produce, manage and consume their own energy (Directorate-General for Energy, 2022). There is a wide variety of energy community initiatives, which has led to a diversity of definitions of what a community is and should be (Devine-Wright, 2019; Van Veelen & Haggett, 2017; Walker & Devine-Wright, 2008). The European commission defines energy communities as initiatives that (European Commission, 2023c):

- deal with electricity or other forms of renewable energy
- are based on voluntary and open participation
- are controlled by members or shareholders and
- their main aim is to provide environmental, economic, and/or social benefits for the community, whereby financial aspects play a minor role

This definition not only in itself allows for various forms of (potential) energy communities, it is also transposed differently (or not yet) within different Member States (RESCOOP, 2023). Therefore, the (estimated) numbers of energy communities in Europe varies drastically depending on the definition, from around 4.000 to almost 10.000 (Koltunov et al., 2023).

Not only that, due to the different regional conditions and administrative frameworks, the European landscape of energy communities also varies in many aspects when looking closer at their function, stakeholder types and geographical spread. Despite this, the landscape can be organised according to different aspects:

Dimension *function*:

- According to main activities: E.g.: Generating electricity by using different (green) technologies (e.g., solar, wind, hydropower, biomass/biogas), distributing (clean) energy, producing heat, providing infrastructure for support of electricity provision or e-mobility. A considerable number of European energy communities perform multiple activities simultaneously, especially the older ones due to the maturity of their business model. Concrete numbers are unfortunately almost never given. The use of certain technologies is strongly dependent on respective national legislation. In Denmark, for example, it is not

allowed to make profit from district heating, leading to a high number of communities serving this purpose.

- According to corporate purpose: Generation of electricity, operating grid, retail, consumption related services (e.g., consulting services, charging points for electric vehicles).
- According to economic benefits for members: Lower energy-price, dividend pay-out, energy savings.

Dimension *stakeholder types*:

- According to membership size: Some energy communities have many members, depending again on different conditions in the countries: Spain for example has an average number of 6,841 members per Energy Community, which is due to the presence of powerful retail energy communities. The most prominent Spain Energy Community, Som Energia has around 70,000 members. Its main business is to sell electricity. Other countries, such as Italy, Portugal, Switzerland, and Finland, have an average of 500 to 600 members, in Switzerland and Finland, for example, this is due to district heating cooperations.
- According to initiating actors: Public governing bodies, citizens, NGOs, local SMEs, intermediate organisations, big cooperatives, research, or consultancy organisation.

Dimension *geographical spread of members*:

- According to geographical context: Communities where members are (mostly) rural citizens and those wherein members are (mostly) urban citizens. The first is almost exclusively "communities of place" where all members come from the same local region, whereas the second can also be "communities of interest" where people live in different regions (and have for example a virtual business model, where the generate and distribute energy).
- By country: While energy communities exist in almost all European countries in one form or another, big differences between countries can be observed: In some, such as in Germany, the Netherlands, and Denmark, there exists already a considerable number of initiatives, whereas other countries, such as Italy and Spain, or North Macedonia are only now starting the process. The enrolment (and nature) of "typical" energy communities in different countries also strongly depends on the national law. In Denmark for example, where the law prohibits district heating systems from making profit, they have a large number of around 340 energy communities using biomass (Koltunov et al., 2023).

To summarise, the European landscape of energy communities, is very diverse. However, despite all these differences some specifics can also be observed which are relevant for identifying digital services that might be of interest to energy communities:

- Focus on providing benefits for members and local communities: Other than companies, where the main purpose usually is to generate profit for owners and shareholders, the main purpose of energy communities is to provide benefits for members and local communities. Such benefits might be financial, for example providing cheap electricity, but could also be other types of benefits like providing clean energy security.

- (More or less) democratic decision structure: Energy communities are (almost) always structured in a way that allows all members to take part in decision-making processes (usually via General Assemblies where all strategic decisions are discussed). For the distribution of digital services this means that the adoption of specific digital services may depend on people who usually are no professionals in the energy sector and therefore might have a restricted knowledge about all aspects connected to this solution. Learning materials might therefore be of great benefit to this group.

Digitalisation plays a key role in energy communities, as digital technologies enable energy communities to operate. The basic enabling technology for energy communities is a stable and reliable electricity grid and a tool to measure produced and consumed energy, which is almost always a digital tool (Gjorgievski et al., 2021).

Digital technologies enable energy communities to operate their energy community in various ways: to generate electricity locally, to offer demand response flexibility and to share energy within the community. Sharing energy within an energy community requires each actor to have installed an advanced metering infrastructure, consisting of smart meters, a network, and a communication system (Gjorgievski et al., 2021).

Furthermore, digital technologies can increase engagement of community members, for example via online platforms in which members can be involved (Hansen et al., 2021). Hansen et al. (2021) also found that the degree of sophistication of digital technologies used in an energy community, might depend on the actors who are in the lead in the energy community. When the energy community is initiated by local community members, less sophisticated technologies are used than in energy communities which are initiated by commercially oriented entities.

i. Examples of energy communities in Europe

Minoan Energy Community (Greece)
Minoan Energy is a cooperative made up of private individuals and local businesses, which, with the support of Region of Crete and many other Municipalities that are members of it, contests to be part of the energy transition from fossil fuels to Renewable Energy Sources (RES), promoting at the same time the sustainability and socially inclusive economy.
Read More: https://minoanenergy.com/en/

Elektrizitätswerke Hindelang e.G. (Germany)
Elektrizitätswerke Hindelang is a cooperative which was founded in the 1920s by the citizens of Hindelang to supply their village with electricity. The initiative generates electricity, organises local energy trading and operates the local grid of Bad Hindelang.

Read More: https://www.ewhindelang.de/

Som Energia (Spain)

Som Energia is the first renewable energy cooperative in Catalonia founded in 2010 and offers the opportunity for thousands of people to power their homes with locally generated, clean, affordable, and sustainable electricity. The cooperative has nearly 75,000 members from across Spain contributing to a transformative change towards achieving a 100% renewable and fair energy future in Spain.

Read More: https://www.somenergia.coop/

ii. Outreach channels of energy communities

Due to the democratic structure which leads to a diversified decision-making process, it is of high importance for energy communities to communicate with their members and to educate them about critical challenges connected to the clean energy transition as well as about advantages and disadvantages of the adoption of new (digital) services. These communities therefore usually use a variety of outreach channels to reach out to their members and keep them informed and involved:

Social media is used by many energy communities to disseminate news updates, articles, events, and other pertinent material. They connect with users from various locations and demographics by using platforms such as Twitter, Facebook, LinkedIn, and Instagram. These platforms facilitate member sharing and communication, making it simpler to distribute knowledge and generate momentum around the Energy Transition. Encouragement of member comments can result in increased collaboration and engagement.

Newsletters and Email Lists: Email is another efficient way to reach out to people in the energy community. Industry newsletters can give frequent updates on news, research, forthcoming events, innovations, and success stories. By sending helpful summaries straight to mailboxes, email distribution of news helps enhance members' awareness. Regular emails from industry experts with unique insights may assist promote awareness of new trends and possibilities in the sector, while also keeping members linked to key players and advancements. Experts can guarantee messages reach their target audience at scale while measuring performance data along the way with email marketing campaigns.

Websites: An official website serves as a focal point for all the energy community's operations. Members can easily access resources such as webinars, reports, case studies, whitepapers, infographics, videos, podcasts, tutorials, Slideshare, calendars, event registration forms, discussion boards, FAQs, and more by creating an online platform designed specifically for the group. This

primary hub serves as a comprehensive resource centre, allowing visitors to stay engaged for longer and return frequently.

Online Meetings & Webinars: Virtual interactions with subject matter experts are facilitated through live webinar broadcasts. This outreach channel is highly adaptable, thanks to interactive presentations, slide shows, video demos, podcasts, chat rooms, screen sharing capability, file distribution, and question-and-answer options. Increased participation criteria result in increased attendance, which raises awareness among relevant member circles.

General Assemblies and members meetings: Due to the democratic constitution of ECs, they are required to provide on a regular basis a forum for all members and to vote for strategic decisions. Usually this is done in General Assemblies (and other members meetings), which also gives the possibility to exchange information and to address hopes and fears related to the future development of the community.

Networking Events & Workshops: Organised networking gatherings provide face-to-face contact among participants, fostering cross-functional dialogue, idea generation, professional support, mentorship, and expert advice seeking. Furthermore, instructional workshop formats disseminate information through hands-on training, roundtable discussions, lectures, and breakout sessions guided by knowledgeable instructors with current, real-world expertise in the industry.

Publications & Reports: That can be authoritative, in-depth materials that are distributed physically or digitally and contain information on in-depth interviews, company profiles, technological assessments, policy analysis, regional overviews, global predictions, and thought leadership comments. Print editions of elegantly designed magazines, glossy yearly reviews, special interest bulletins, digests, leaflets, booklets, catalogues, directories, manuals, handbooks, pamphlets, instructions, white papers, and case studies are just a few examples of content that may be used.

4.2 Local and regional authorities

Local and regional authorities have the potential of supporting and stimulating local and regional initiatives related to energy, including digital energy. Such support can vary for example, through empowering local energy communities, promoting self-production, providing opportunities for participating in projects, and by focussing on energy poverty (Gancheva et al., 2019). In the range of initiatives, often multiple stakeholders are involved to achieve the goals in the initiative. The collaboration between the various stakeholders in these types of local and regional initiatives can be understood as a network collaborating to achieve a common goal.

I**n the dimension *function***, this type of network aims primarily to successfully develop the local or regional initiative, aiming for concrete action in the energy system. This concrete action can for example be created by projects that aim to make the city more sustainable and the energy provision

in the city more secure, sustainable, and affordable for all. Facilitating learning can be another aspect of this type of network but does not necessarily have to be part of it. However, the type of network holds promises for facilitating learning, as it unites organisations at a local or regional scale that could potentially benefit from learning about aspects of digitalisation of energy, especially related to challenges specifically present at the local or regional scale.

In the dimension *stakeholder types*¸ the local or regional initiatives often consist of a variety of organisation types, including residents, local regional businesses, and non-profit organisations - depending on the organisation types identified to be relevant for achieving the goals of the initiative. The local and regional initiatives often include various organisations and individual citizens.

In the dimension *geographical spread of members* local or regional initiatives comprise stakeholders that have in common that they operate in the same region. This means that the organisations who can be supported in learning via local or regional authorities might have similar knowledge needs that are relevant in the specific region of the network. An example of this type of network type is Leuven 2030.

Governments of all levels impact **the digitalisation of energy systems**. In this research focus is on local and regional authorities. Governments on these levels are operating close to the electricity users. Local and regional authorities can support and stimulate energy initiatives at a local or regional level, often including digital aspects. This can be done in various ways (Gancheva et al., 2019). One aspect in which local and regional authorities can support local digitalisation of energy, is by stimulating and supporting the development of local energy communities and the development of local renewable energy production in general. Local and regional authorities can stimulate and support this by developing necessary infrastructure, and by removing regulatory and administrative barriers.

Another aspect in which local and regional authorities can foster energy digitalisation initiatives, is by promoting local generation of energy on the local and regional level. This is for example done by promoting participatory investment in energy production projects by citizens and local authorities, or by providing local opportunities for direct participation in projects.

Local and regional authorities furthermore play a crucial role in reduction of energy poverty, meaning that they focus on the affordability of energy and access to energy for all. Local and regional authorities are envisioned to play a key role in energy poverty reduction due to their proximity to and knowledge of local needs.

i. Examples of Local and regional public authorities

Local authorities	
Also referred to as	Municipalities, cities, villages, local governments
Role in energy system	Support and stimulate local energy initiatives
Impact of digitalisation	Digitalisation plays an increasingly more important role in the local energy initiatives

Regional authorities	
Also referred to as	Provinces, regions, regional governments
Role in energy system	Support and stimulate local energy initiatives
Impact of digitalisation	Digitalisation plays an increasingly more important role in the local energy initiatives

Covenant of Mayors
The EU Covenant of Mayors for Climate & Energy is an initiative supported by the European Commission bringing together thousands of local governments that want to secure a better future for their citizens. By joining the initiative, they voluntarily commit to implementing EU climate and energy objectives. The initiative launched in 2015 has successfully signed up over 11.000 mayors from across Europe by its bottom-up governance, its multi-level cooperation model and its context-driven framework for action. The Covenant of Mayors initiative has been designed to provide local governments with a framework for their local energy and climate action which include sharing best practices and promotion and exchange of experience. This channel holds promise to engage with the mayors on the topic of digitalising of energy.
Read More: https://eu-mayors.ec.europa.eu/en/home

The Eurocities network
The Eurocities network focusses on Climate change and energy transition. In the fight to mitigate global warming and adapt to climate change, European cities are leading the way: 64% of Eurocities members have already committed to becoming climate neutral by 2050. Nearly 90% have also adopted a climate adaptation strategy to adjust to the impact of climate change and protect their citizens.
Read More: https://eurocities.eu/

City of Bratislava
Bratislava is the capital of Slovak Republic, often positioned as the economic, cultural, educational and political centre of the country. The city has approximately 650 000 inhabitants, and 100 000 daily commuters to the city area. The local authorities aim to let Bratislava a liveable, accessible and healthy city with a low carbon footprint. The participation of Bratislava in the Atelier project supports the city in reaching those goals. The main objective of the Atelier consists of three principles: [1] reduction of CO2 emissions, [2] sustainable, secure and affordable energy systems for citizens, and [3] collaboration and knowledge sharing. Especially in the aim for becoming a sustainable, secure and affordable energy system for systems the Every1 project could offer meaningful opportunities to the city, by co-creating learning materials and supporting the city in their initiatives.
Read More: https://smartcity-atelier.eu/about/partners/bratislava/

ii. Outreach channels of public authorities

Public authorities can make use of a range of outreach channels to share relevant information with citizens. This includes opening sessions to the public for face-to-face engagement, providing a variety of print materials (flyers for example) at local events, sharing information via the public authority's website and engaging with local media to cover related information and updates in regional press. Posters, billboards and other traditional means of public communication can also be effective, as well as engaging with citizens via social media.

The outreach channels typically used by local authorities are also listed for the other ecosystems described in Chapter 4. Specifically, subchapter 4.1 on Energy communities provides a detailed description of these various tools. The outreach tools commonly used by the local authorities are the following:

- Printed materials such as posters, newsletters and local press to distribute information
- Website from local authorities
- Social media platforms such as Facebook and Instagram to inform citizens
- Informal informative meetings or webinars to provide updates directly to citizens

The selected outreach channels used by a local authority might differ depending on the size and geographical location of the specific authority. Small towns in the countryside might use fewer and more direct communication channels compared to large cities and metropoles who have more means and channels at hand to reach out to their citizens. Finally, different topics might require various formats of communication or engagement, where one will fit better the objective than the other.

4.3 Cluster organisations

A cluster can be defined as geographic concentrations of industries related by knowledge, skills, inputs, demand, and/or other linkages (Delgado et al., 2016). Silicon Valley being a well-known example of a cluster. Cluster organisations are legal entities which seek to facilitate cooperation between actors within a certain field to achieve similar synergies as with geographical clusters, although the members/stakeholders of a cluster organisation are not always located in the same place. Cluster organisations act as innovation support by facilitating cooperation, networking and learning among actors usually across the triple helix (industry, academia, and public sector).

As mentioned in D1.1 the primary role of clusters is to connect members of the entity and drive regional innovation, activities of clusters strive to further these ultimate goals. Analysing further **the dimension *function,*** cluster organisations have various functions, of which facilitating learning opportunities is one of them. The members of the cluster organisations can be supported with knowledge and skills on topics relevant to them. In the European Commission's action plan for the digitalisation of the energy system, the relevance of partnerships in the energy value chain is explicitly mentioned as way to educate and train the workforce of organisations in the digital energy field. The support in the form of knowledge and skills can be provided by offering learning material and events to members, and by facilitating knowledge and skill exchange among the members.

There is a broad range of clusters across Europe which are diverse in terms of their activities and thematic focus areas. There might be clusters which are more actively working on educating their members, and there might also be clusters which focus more on other aspects and less on educating. Depending on the maturity levels of the networks, their function will determine the various activities and services the ecosystem offers to their members. Cluster organisations create value for their members though carrying out activities such as:

- **Matchmaking:** Based upon societal and industry challenges cluster organisations bring together companies, knowledge partners, and various other actors with the goal of developing new collaborations (Match-to-challenge). One of the core components of this matchmaking is connecting companies and or members to funding opportunities.
- **Knowledge and competence development:** Facilitation and organisation of workshops webinars and physical events where companies can get inspiration and new knowledge from within the digitised energy field
- **Innovation Projects:** Innovation projects are based on a specific challenge from industry, utilities, municipalities, or regions and involve partners from the ecosystem. The clusters develop and fundraise for programs which support corporate innovation and internationalization.
- **Internationalisation:** Internationalisation is based upon a variety of activities which help boost members' international endeavours

In the dimension *stakeholder types*, clusters of organisations can consist of various organisations and most often include both businesses, universities/research institutions, and public sector actors, but in

general, citizens as individuals are not involved (in contrast to local or regional initiative networks initiated by local or regional governments).

In the dimension *geographical spread of members*, the stakeholders involved in clusters of organisations are not by definition grouped in a certain region. This means that the stakeholders who can be facilitated in learning via clusters of organisations might be more geographically spread out than the local or regional initiatives. Some clusters do have either a national, or regional focus.

The cluster organisation is the entity which manages and organises the activities carried out in the clusters targeted region. It facilitates the cooperation between the actors in the ecosystem and handles administration and strategy work as well as the activities and services which the cluster participants are seeking. Clusters are tasked with transforming knowledge into growth. (Cluster Excellence Denmark, 2023).

i. Examples of Cluster organisations

Tenerrdis, Grenoble, France

Created in 2005, Tenerrdis is a French Pôle de Compétitivité (innovative Cluster) based in Grenoble, capital of the Alps. Its goal is to promote sustainable business growth and job creation across the new-energy-technology industries by developing new technologies to drive the energy transition through R&D projects involving industrial, institutional, academic and scientific partners. As of 2023 is has 262 members of the cluster, the network originates from industry (59% SMEs and Start-ups), government, academia**,** and scientific research. All members work towards addressing challenges in connection to the energy transition.

The cluster's activities encompass support for innovation, the development of collaborative R&D projects with the capacity to shape emerging new-energy-technology industries, and targeted support for SMEs. Tenerrdis strives to make the Auvergne Rhone Alpes region a frontrunner in distributed energy, the digitisation of the energy industry, grid flexibility and carbon-free energy. The cluster focuses its action in 6 thematic domains:

- Renewable Energy Production
- Energy Conversion and Storage
- Embedded intelligence & cybersecurity for energy systems
- Multi-energy microgrids
- Carbon-free mobility
- Energy-efficiency for buildings and industry

Read More: https://www.tenerrdis.fr/en/

Green Tech Valley, Graz, Austria

Green Tech Valley is a cluster organisation which strives to act as a catalyst of green innovation and promotes the growth of leading lighthouse projects. With this mission it facilitates linkages

between companies and industry and ensures that regions of Styria & Carinthia in Southern Austria get increased visibility both regionally and internationally. Today GTV has more than 230 members of the cluster with 180 SME and Start-ups, 25 Research Institutes and Universities, 15 Corporates and up to 5 Civil Society members. More than 600 innovation green technologies characterise the location of Southern Austria. Every 5th kWh of renewable electricity originates from GTV ecosystem, 550 million tonnes of CO2 to date has been saved through green solutions originating from Styria & Carinthia. Renewable energy technologies from the region have thus become best sellers with an export rate of around 90%.

GTV strives to create value for its members through:

- **Matchmaking:** Through active matchmaking, i.e., online activities and events, GTV assists its members find ideal partners for innovation projects. SMEs & Start Ups are given a platform through GTV to discuss ideas with CEOs, R&D and marketing managers from major green tech companies and institutions located in Austria. This is done through arranging target meetings for mutual learning and benefit and facilitating introductions to the right B2B contacts.
- **Portfolio Development:** GTV provide a technology scouting service where they provide members with up-to-date technology trends and market opportunities which can help companies boost their effectiveness. This involves updating companies on which products/technology is in demand, potential subsidies of interest and input in how to boost sales, this service is carried out through in person and online workshops.
- **Internationalisation:** This is achieved through promotions of GTV companies on their multiple platforms whether at international events, trade shows, SoMe, publications or newsletters.

Read More: https://www.greentech.at/en/

Flux50, Belgium

Flux50 is the membership organization that helps Flanders gain international recognition as a Smart Energy Region. Flux50 facilitates cross-sector collaboration between energy, IT and building companies to enhance the competitiveness of the Flemish smart energy industry in the transition towards low carbon systems. To bring innovative and fully-integrated energy products and – services to the international market, Flux50 sets up and coordinates living labs in five 'innovator zones':

- Energy harbours
- Microgrids
- Multi-energy solutions at district level
- Energy cloud platforms
- Intelligent renovation

Flux50 brings together relevant players from industry, academia and government and provides them with project support, networking opportunities and a knowledge-sharing platform.

Read More: https://flux50.com/

ii. Outreach channels of clusters

Clusters organisations use many different channels of connecting with their members to engage them in activities, collaborations, events, or to share interesting news. Being able to engage the stakeholders in the industry is key for the cluster to be able to fulfil its purpose.

Below are some examples of relevant outreach channels used by clusters, as many of these are very similar to the channels described under 'outreach channels of energy communities, please refer to this section for a more in-depth description:

- Direct email: Most cluster organisations will be in dialog ongoing with different organisations in the ecosystems with employees reaching out directly to organisations to engage in dialogue around relevant activities. The direct email and phone dialogue between cluster organisation and member organisation is a key tool for the cluster.
- Newsletters: Most clusters send out regular newsletters to inform about their activities (e.g. monthly or quarterly) some cluster have newsletters sole available to members, some have open newsletters that can be received by anyone interested and signing up for it. Some will have both.
- Social media platforms such as LinkedIn pages or groups or Twitter profiles to engage with members
- Online communities such as forums or discussion boards where members can share ideas and ask questions, as well as connect directly with each other.
- Networking events such as conferences, trade fairs, and meetups where members can interact in person. Cluster organisations can play an active role in both arranging networking events or by supporting and making it possible for members to attend bigger trade conferences.
- Publication of reports, articles, and whitepapers to keep members informed of key trends and developments. Examples of this can be market reports or sector mappings.
- Virtual meetings and webinars to gather members interested in specific topics or opportunities and to enable a larger
- Partnership agreements with other organisations to leverage existing resources and reach new audiences.
- General meetings: depending on the organisational structure, but many cluster organisation will be set up so that the members elect the board and at the general meetings have impact on the management and direction of the cluster.

The channels used varies based on the target audience, desired outcome, level of interaction, frequency, cost, and accessibility. Regular evaluation of these channels is important to ensure they remain effective and efficient at communicating with members, as engaging members is key for the function of the cluster organisations.

4.4 Advocacy groups

For this report, we define advocacy groups as groups that seek to create social and political change by providing active support to a particular issue through mechanisms such as policy making (Fuller & McCauley, 2016). They are often also referred to as non-governmental organisations, lobby organisations, pressure groups, activist groups, or social movement organisations (Obar et al., 2011).

Advocacy activities, according to the Advocacy Coalition Framework (Malmborg, 2023), is necessary since "policy making in modern societies is so complex that actors must specialise in order to be able to exercise any influence. This specialisation takes place within policy subsystems where actors regularly try to influence policies within the subsystem" (Sabatier & Weible, 2007). A policy subsystem is defined by a policy topic, territorial scope, and the actors directly or indirectly influencing policy subsystem affairs. Importantly, policy subsystems are semi-independent but overlap with other subsystems and are nested within yet other subsystems (Jenkins-Smith et al., 2018).

The policy problem, or rather a policy area of influence, is the electrical energy system and its digitalisation. In October 2022, the European Commission released the EU Action Plan on digitalising the energy system (European Commission, 2022). The Action Plan recognised the potential of digital solutions to drive the necessary deep digital and sustainable transformation of the energy system as part of the European Green Deal. In addition, the Spanish Presidency of the European Council, which took over on 1 July 2023, stated that it will focus on energy and digitalization (European Council, 2023).

Looking at the **dimension *function,*** the main aim is to influence politics and politicians. However, there are also other activities typically connected to lobbying including, but not restricted to (Webb, N.N.):

- Educating the public
- Conducting research
- Backing political candidates
- Donating money
- Filing lawsuits
- Coordinating protests
- Mobilizing the public
- Running media campaigns
- Hosting fundraising events

From the perspective of the ***stakeholder types'* dimension** we can differentiate between two types of advocacy groups for the distribution of digital solutions:

1) Partnerships of profit-oriented actors, including DSOs, companies' associations producing and/or selling and/or installing digital energy solutions which therefore have an intrinsic interest into a fast and broad roll-out; and
2) Non-profit organisations that advocate for a more sustainable future and see digital energy solutions as a relevant part of this future.

Finally, we take note of the organisations that for various reasons, such as cybersecurity and GDPR concerns advocate against the digitalisation of the electrical energy system. However, as the objective of this report is to address the outreach channels of the stakeholders promoting the digitalisation, only the latter will be considered. In the following subchapters 4.4.1 and 4.4.2 examples are listed of both profit and non-profit organisations.

4.4.1 DSOs and private sector actors

This subsection presents examples of different types of stakeholders advocating at the EU level for the digitalisation of the electrical energy system. We focused on the representatives of European DSOs (E.DSO), and various business and for-profit organizations and trade associations.

Stakeholder	Main activities and drivers for digitalization
E.DSO - representative of European DSOs	E.DSO represents European DSOs at the EU level, gathering 35 leading electricity DSOs in 19 Member States, including 2 national associations, cooperating to ensure the reliability of Europe's electricity supply for consumers and enabling their active participation in our energy system. E.DSO advocates for the increase in the use of clean energy sources through electrification, the development of smart and digital grid technologies in real-life situations, new market designs and regulation. **Read more:** https://www.edsoforsmartgrids.eu/
EHPA – European Heat Pump Association	EHPA represents the Heat Pumps sector in Brussels and has nearly 200 members form across the EU. EHPA advocates for digitalization in the heating and cooling sector. **Read more:** https://www.ehpa.org/about-ehpa/
ESMIG - European association of smart energy solution providers	ESMIG's members are ranging from small to multinational companies, developing devices, information technologies and services for multi-commodity metering, display and management of energy production and consumption. These products and services cover and connect the entire energy chain, from energy suppliers to distributors, and production at consumer premises in a two-way information highway. ESMIG's members' products, technologies and services provided, facilitate the digital transformation in energy sector. **Read more**: https://www.esmig.eu/
Eurelectric – Federation of the European electricity industry	Eurelectric represents more than 3500 European utilities active in power generation, distribution and supply. One of its missions is to help steer the transformative inertia of digitalisation towards a socially fair and technologically enabled energy transition in the European power sector.

	Read more: https://www.eurelectric.org/
smartEn – European business association	SmartEn is the European business association integrating the consumer-driven solutions of the clean energy transition. It aims to "create opportunities for every company, building and car to support an increasingly renewable energy system". SmartEn advocates for digitalization of the electrical energy system through supporting "the cost-effective integration of renewable sources and smart electrification of heating, cooling and transport". The association states clearly that it advocates for smart energy solutions with policymakers to help create supportive regulatory conditions. **Read more:** https://smarten.eu/
SolarPower Europe - association for the European solar PV sector	SolarPower Europe is the member-led association for the European solar PV sector, it represents over 300 organizations across the entire solar sector. Regarding the digitalization, it aims to ensure that "the solar sector in Europe takes the opportunities arising from the digitalization of the energy system". This means promoting data-driven solutions to integrate solar, storage, and other DER devices into the electricity system and unlocking their flexibility potential. SolarPower Europe members contribute to solar deployment by supporting the design, development, construction and maintenance of solar power plants. **Read more:** https://www.solarpowereurope.org/
Wind Europe – association of wind industry actors	Wind Europe advocates wind energy policies for Europe on behalf of more than 450 member companies and organizes leading wind industry events. Wind Europe advocates for the of digitalization of energy sector, as it affects the entire wind energy supply chain, from wind turbine manufacturing to daily wind farm operation and decommissioning. **Read more:** https://windeurope.org/
DIGITALEUROPE – trade association	DIGITALEUROPE represents the interests of the digitally transforming industries in Europe and its membership counts for over 45,000 businesses who operate and invest in Europe. It includes 102 corporations which are global leaders in their field of activity, as well as 41 national trade associations from across Europe. In October 2022, DIGITALEUROPE organised a high-level roundtable for the digitalization of the energy system in the EU. Experts at the roundtable identified 4 key accelerators that the EU should focus on to bring about more harmony across the EU: data cooperation, Green Network Infrastructure (to speed up connectivity), investment (to boost R&D and innovation in green

	tech) and enabling regulation (to create synergies between digital and green policies). **Read more:** https://www.digitaleurope.org/

4.4.2 Non-profit organisations

In this section we provide examples of organisations, that advocate for digital solutions at the European (and trans-European) level, not because they profit from their faster and broader enrolment themselves, but because they see these solutions as one (of many) puzzle pieces to reach the broader goals of their initiative (e.g. a more sustainable (and just) energy system or a broad distribution of collective non-commercial initiatives in the energy system). For that reason, apart from those groups lobbying for energy communities for which digital applications are very often an essential aspect of how they work, digital solutions usually are not at the centre of their activities and recommendations with regards to digital solutions are rather general.

Stakeholder	Main activities and drivers for digitalization
Client Earth	Client Earth is an environmental organisation with the aim of influencing laws in over 50 countries to initiate a (faster) transition towards a more sustainable future. Client Earth advocates for changes in regulations towards a cleaner energy supply on European and national level, by direct lobbying and providing information material and guidance documents for the public, specific stakeholders, and politicians. Digitisation of the energy sector plays only a minor role in the activities of Client Earth, but they for example evaluate if law proposals adopted by the EU are designed in a way that allows sustainable and inclusive transformation or inform about EU regulations aiming for the transition of the energy sector. **Read more:** https://www.clientearth.org/about/
Friends of the Earth	Like Clean Earth, Friends of the Earth is an environmental non-profit organisation with the aim of creating a more sustainable and just future. As such, they see the transition of the energy system towards energy as a more democratic sufficient and clean energy supply as central aspect, although digital solutions are not mentioned in a pronounced manner (Friends of the Earth, 2023). **Read more:** https://www.foei.org/
RESCOOP	RESCOOP is a federation of citizen energy cooperatives with the aim of representing the interests of cooperatives to European policy makers. The organisation puts a strong emphasis on digital solutions that might benefit energy cooperatives and prosumers (e.g., RESCOOP, 2021, RESCOOP 2020).

	Read more: https://www.rescoop.eu/about-us
Climate Action Network	Climate Action Network is a climate network of more than 1.900 civil society organisations with the aim of pressuring governments to take action to end the era of fossil fuels. To do so, the network informs political agents what from their perspective is needed for a just and sustainable transition in and outside of Europe. Digital solutions thereby play no explicit role. **Read more:** https://climatenetwork.org/
European Environmental Bureau	The European Environmental Bureau is a network of environmental citizen's organisations in Europe and advocates for politics that create a better environment in European countries. It has a strong focus on environmental and less climate related topics. Nevertheless, they see and advocate for example for policies that help to create energy savings- and thereby acknowledge the importance of digital solutions (such as smart metering and other forms of monitoring energy use) (EEB, 2023). **Read more**: https://eeb.org/about/

i. Outreach channels of advocacy groups

The above mentioned, both profit and non-profit oriented, organizations and associations are usually member-based. They rely on so-called membership software to provide their services to members including representing and advocating for their interests with EU policy makers. Such tools of communication between the members and the organisation include:

- Newsletters,
- Communication via emails
- Organizing meetings and thematic workshops
- Events both online and in person.

External communication also plays an important role for them since that also can increase the pressure on politicians to change legislation in favour of their goal. This involves:

- Public advertising campaigns
- Publicly
- Commenting in legislation drafts (or adopted law)
- Organising conferences/meetings to raise awareness and change information about relevant topics.

For distributing learning materials to various stakeholders, these advocacy organisations cannot be considered as a main distribution channel, since their main goals and activities only marginally touch the aims of this project.

5 New-to-digital-energy ecosystems

The Every1 project aims to engage a broad range of stakeholder groups and therefore will seek to also engage stakeholders who are not already networked in energy related ecosystems like the diverse types described in the preceding chapter.

We aim to reach those groups who are less engaged with the digitalisation of energy, as those groups should never be expected to be passive beneficiaries of project outcomes. Rather, their participation should be actively solicited and encouraged. Understanding these stakeholders' perspectives and experiences necessitates creativity, respect, sensitivity, inclusion, and transparency in the design and implementation of participatory processes that support collaborative efforts towards common goals. Furthermore, failing to incorporate these stakeholders' risks perpetuating inequality and impeding social innovation. Seeking their participation actively displays a commitment to equitable and democratic norms.

5.1 Identification of non-networked stakeholders

The data on learning interest and needs of individuals, collected in Task 1.1 '*Stakeholder clustering and characterisation*', give insights on who are less interested, less understanding, and less familiar with the topic of digitalisation of energy compared to others in the same socio-demographic dimension. This group, according to our survey, consists of women, older people, people without formal education, people not working due to disabilities, people living in smaller households and people living in rented houses. It is assumed that the stakeholders with few interests or understanding of the topic would be less represented in the existing digital-energy ecosystems and less engaged with the digitalisation of energy.

These identified non-networked stakeholders represent a wide section of society and therefore, identifying alternative ecosystems or ways to reach these groups is a priority. In the next sub chapter, we explore alternative ecosystems to find answers to the question how to reach out to these marginalised groups of stakeholders and finding ways to engage with them on the digitalisation of energy.

Another aspect to consider in the identification of non-networked individuals is their geographic locations, as this can impact whether stakeholders are easily connected to existing networks. For example, rural areas where communities live far apart or have limited internet access are likely to be disadvantaged in establishing robust connections. As a result, developing novel approaches to communication and consultation procedures will aid in ensuring that every voice is heard.

5.2 Exploration of alternative ecosystems

The project's ambition to reach non-networked stakeholders as identified above, leads to alternative venues with the common aspect that they are open and accessible for individuals not networked in structured energy-related ecosystems as described in the first chapters. Although we expect that these groups are less involved in existing-digital energy ecosystems, we do expect them to be networked in other ecosystems, in other ways not related to the digitalisation of energy but valuable starting points for engaging with the groups less engaged with digitalisation of energy.

In this chapter, we map new-to-digital energy ecosystems, who do not have digitalisation of energy as part of their daily operations and core focus. Examples of these alternative ecosystems are social welfare organisations, elderly or disability associations, religious communities, and sport organisation. These social networks have the potential to reach a broader public not yet involved in digitalisation or energy related networks as they do engage with their public on other matters. In addition, individuals are represented in consumer organisations whereas producers are similarly organised in sectoral federations. Important economic sectors in the European regions such as agriculture provide a leverage to reach a wide range of stakeholders.

5.2.1 Social Welfare Organisations

The identification of the non-networked stakeholders as described in the previous chapter reveals potentially a spectrum of society which we could characterise from an 'energy perspective' as marginalised individuals facing a higher risk of energy poverty. Over the past years, the COVID-19 crisis followed by the surge in energy prices and the Russian invasion of Ukraine in February 2022, have worsened an already difficult situation for many EU citizens. Although the number of people who were unable to keep their homes adequately warm decreased from 8% in 2020 to 6.9 % in 2021, the figure grew to 9.3% in 2022 (Eurostat, June 2023). The higher share of the energy costs in the average EU household budget led to an increased number of citizens depending on social welfare measures. For that reason, energy efficiency became a topic to discuss in social mediation. Various actors and authorities in the energy space are putting effort to tackle the energy poverty challenges and might therefor provide valuable channels to reach out to these marginalised groups.

As the closest level of government to people, city governments are well placed for connections to be made and bridge the gap between people and politics. Local authorities work with the citizens on a daily basis including those who are marginalised. In the scope of the Every1 project the social welfare departments are most connected to disadvantaged individuals in their area. They engage with economic or social marginalised groups for the purpose of reintegrating them into society, placing them within the job market, locating social housing and providing other public support services.

Social welfare organisations are interesting for the cocreation and dissemination of learning materials on digital energy solutions because their services can be leveraged to inform and engage everyone in the digitalisation of energy transition by dissemination of learning materials.

5.2.2 Religious communities

Religion has been a major influence on today's European society and culture. Christianity is still the largest religion in Europe accounting for 64% of EU population, according to a survey about Religiosity in the European Union in 2019 by Eurobarometer. Catholics were the largest Christian group in EU, and accounted for 41% of the EU population, while Eastern Orthodox made up 10%, Protestants made up 9%, and other Christians 4%. Muslims as the second largest religious group account for around 2% of the population (European Commission, 2019). While practical secularisation continues, religion still has a strong voice in some European regions. Organisation of these religions thereby is very different: The catholic church is organised strictly hierarchical with the Pope and his administration on top, followed by, also strictly hierarchically organised national churches who govern the local branches.
The Eastern Orthodox and Protestant churches on the other hand are organised on national levels with bishops as the heads of the organisation. The Islamic population in Europe is split up, even within countries, into many different organisations without central steering (WorldWatchMonitor, 2023).

Religious organisations are interesting for the cocreation and dissemination of learning materials on digital energy solutions for various reasons:

- First, they have access to citizens not easy to reach: Rural people, people with less education and income, people not (yet) interested in energy topics, migrant populations, etc.
- Secondly, all named churches recognise climate change and climate-change mitigation measures as a relevant topic within their organisations mainly out of responsibility for creation which they see as a divine mission, as the current pope Francis puts it for example: "living our vocation to be protectors of God's handiwork is essential to a life of virtue; it is not an optional or a secondary aspect of our Christian experience" (Pope Francis, 2015).
- Third, and on a non-religious level, all the named churches own many buildings and land and therefore might benefit from optimizing their energy use with the help of digital solutions.

5.2.3 Elderly associations

Several associations exist, that aim at representing and lobbying for a fair representation of elderly people in decision making and everyday life. Usually, they are organised on a national level, but there are also European-wide associations, some linked to political parties like the European Seniors' Union (the largest political seniors' organisation associated with the European People's Party), the Green Seniors in the European Union (associated with the Green Party), the EURAG (Europäische Arbeitsgemeinschaft), or the AGE Platform Europe.

Organisational forms thereby usually are constructed as followed: members are accepted that either are organisations of older people, represent older people, or provide services to older people (AGE, 2023b). The political elderly associations only accept national or regional organisations as members that are associated with a member party of the respective political party (e.g. (ESU, 2023).
The steering boards are usually voted for in a general assembly. Activities of these associations are manyfold. On the European level, they lobby for example to better incorporate age equality strategies

into EU policies but also initiate and support projects that aim at making everyday lives of elderly people in Europe easier (AGE, 2023a).
The last point also covers aspects of reducing the “digital divide” of elderly people, as well as topics of energy use and energy poverty of older people.

Elderly organisations are interesting for the co-creation and dissemination of learning materials on digital energy solutions for several reasons:

- First, they represent a part of the society that is assumed is less familiar with digital applications than other groups. Shaping learning material in a form that suits (also) the needs of this group therefore might fulfil a learning need and enlarge the potential reach of the materials.
- Secondly, older generations have a higher share of homeownership (Paz-Pardo, 2022), making them relevant target groups for many home-improvement devices.
- Furthermore, a significant share of older people lives in care facilities (STATISTA, 2023) (Statista, 2023), which might also have a need to use digital solutions to optimise their energy use.

5.2.4 Disability associations

The project’s ambition to enable everyone's engagement in the energy transition implies that the project should be inclusive in its reach. A group of people which might be more difficult to reach depending on their specific disability, we explored how individuals with disabilities are networked within Europe. Around 87 million people in the EU have some form of disability. The EU and its Member States are committed to improving the social and economic situation of persons with disabilities, building on the Treaty on the Functioning of the EU and on the Charter of Fundamental Rights of the EU (European Commission, 2023b).

EDF is an umbrella organisation of persons with disabilities that defends the interests of persons with disabilities in Europe through campaigning and project work around standards and policy. It is structured as an independent non-governmental organisation (NGO) that brings together representative organisations of persons with disabilities from across Europe. Members consist of national disability organisations as well as specific disabilities groups for deaf or blind people (EDF, 2023).

Another disability association training people working in the social services sector is EASPD, a non-profit NGO, promoting the views of over 20,000 social services and their umbrella associations. They strive for equal opportunities for people with disabilities through effective and high-quality service systems. Based on the belief that support services play a key role in enabling people to enjoy their human rights on an equal basis, EASPD lobbies for fair working conditions and lifelong learning opportunities for staff employed in services (EASPD, 2023).

Finally, the "Disability Hub Europe for Sustainable Growth and Social Innovation” is a multi-stakeholder engagement initiative aimed at building a reference space for best practice exchange, dissemination, mutual learning and raising awareness on the binomial Disability and Sustainability.

The project is carried out within the framework of the "Spanish Operational Programme on Social Inclusion and Social Economy 2014-2020", as a Transnational Cooperation action, co-funded by the European Social Fund (ESF). The final goal of D-Hub is to foster social and labour inclusion of people with disabilities in Europe while promoting inclusive and sustainable business in a just transition context (Fundacion Once, 2023).

Given the variety of needs of persons living with disabilities it could be relevant to engage with disability associations to cocreate adapted learning materials. Secondly these learning materials could be spread through the above-mentioned associations to reach people with disabilities in an adapted and accessible way.

5.2.5 Sports

Sports unite people towards a common goal. Sport in Europe is organized through a diverse and intricate system that varies from country to country, while sharing common elements across the continent.

At the grassroots level, community sports clubs serve as the foundation, nurturing young talent and fostering a passion for various disciplines. Aspiring athletes often progress to regional and national competitions, where sports federations play a crucial role in overseeing and regulating their respective disciplines. These federations work in close collaboration with government bodies and the European Union to establish standardized rules, anti-doping regulations, and safety protocols. At the pinnacle of the sporting pyramid are the professional leagues and international competitions, attracting immense fanfare and sponsorship. Football stands as the most prominent sport across Europe, commanding the attention of millions of devoted followers.
Because of the diversity in sports, not all organisations can be described, but we will use the biggest association, the football association, as an example:

The European umbrella organisation of all football associations is the UEFA (Union of European Football Associations). UEFA encompasses 55 member associations, each representing a European nation. This organization is responsible for overseeing and governing various prestigious football competitions. Through its comprehensive structure, UEFA ensures the regulation of player transfers, financial fair play, and the establishment of equitable rules for all participating clubs and nations. (UEFA, 2023a).

Below UEFA, there are several levels of football organizations that operate at different regional and national levels. These organizations are responsible for overseeing football in their respective areas and implementing the rules and regulations set forth by UEFA.

Sports associations are interesting for co-creating and distributing learning materials for the following reasons:

- First, they have a huge outreach.

- Secondly, many sports organisations acknowledge their responsibility for society and have incorporated climate-related goals into their strategic development. Again, exemplified using UEFA, they commit to a reduction of direct and indirect carbon emissions at their operations and events and to advocate and raise awareness for climate-actions and environmental protection across the football community (UEFA, 2023b).
- Thirdly, sports associations rely on a lot of (large) facilities (for training as well as for competition) with a large energy demand and very specific load profiles. Digital solutions may therefore be of great help to optimise the energy use.

5.2.6 Consumer and producer organisations

Energy **consumers** in the European market are represented by consumer organisations. The European Consumer Organisation BEUC defends consumers on the European stage, it is the umbrella group for 45 independent consumer organisations from 31 countries. Their main scope is influencing EU policy decisions to protect consumers in the European Single Market. Besides this major task, they form a network of local consumer organisations who have an ongoing dialogue with the citizen consumers in their regional scope (BEUC, 2023).

A different way to connect with consumers is presented by STEP, Solutions to Tackle Energy Poverty - a European Union's Horizon 2020 project, where they reached out to individuals through consumer organisations. Consumer organisations from Bulgaria, Cyprus, the Czech Republic, Latvia, Lithuania, Poland, Portugal, Slovakia, and the UK take part in the STEP project. They are joined by the EU-level consumer organisation BEUC and a UK research team. This consortium specifically aimed at getting consumer groups and frontline organisations, who advise people on a range of issues such as financial or health-related ones, to partner and deliver advice to energy poor consumers. For this purpose, the STEP project delivered online training modules which are available in different languages (STEP, 2023).

At the beginning of the supply chain, one could also consider the **producers** as a target audience to engage with on digitalising energy systems. The largest economic sectors in the EU are the financial and services sectors, followed by industry, construction, and agriculture. Europe historically developed strongly around agriculture and the European Union continuously supports the primary sector to strengthen its role in the European economy and in the development of rural areas (European Commission, 2023a).

Nowadays, the agricultural sector represents barely 2% of the European economy, with a leading role for France. Still, almost half (48%) of European land is used for agriculture. Besides its economic impact, the farmers associations play a significant societal role in these countries where they have strong representation. In European countries such as the Netherlands and Belgium, society has been pillarized by political parties strongly linked with these farmer associations. Pillarization is the vertical separation of citizens into groups by religion and associated political beliefs. These societies were and, in some areas, still are divided into two or more groups known as pillars. The European farmers and agri-cooperatives are united in COPA and COGECA (COPA & COGECA, 2023).

Engaging and co-creating learning materials with both the consumer as producer organisations provide an opportunity to reach out to their wide networks on digitalisation of energy topics, which are already on their agenda's.

5.3 Outreach channels and engagement

Leveraging technology and the resources at hand present a chance to increase the engagement of stakeholders through current networks as opposed to forging brand-new communities. For instance, online amplification will enable energy clusters and communities, as well as local organisations to spread project messages and stories to a wider audience. Collaborations with projects and outlets that target identified stakeholders, will encourage content development by people from these areas. Additionally, networking activities like roundtable discussions, online conferences, and webinars aid in bringing people from different backgrounds together to share knowledge and strengthen connections. This strategy creates links between groups, which results in more integrated, interconnected networks. It also helps individual stakeholders.

This is also true of marginalised populations. Identifying existing networks relevant to these stakeholders is critical for effectively connecting with them via focused outreach and engagement. Platforms focusing on specific concerns impacting various groups, such as religious groups, sports associations, consumer and producer organisations, social services, or the rights of the elderly and people with disabilities, could be among them. Furthermore, considering numerous modalities of communication (e.g., webinars, podcasts) may make involvement more accessible to individuals who prefer alternative modes of connection for personal reasons. This can include considering making information available in print, for elderly persons who may not be computer-literate, including accommodations for a range of disabilities, such as a read aloud function for the blind, or considering the backgrounds and situations of each stakeholder group, such as those affected by fuel poverty, and providing information for the ways in which the digitalisation of energy can help combat this. More of these groups may become involved if existing networks are leveraged and multichannel outreach tactics are used. Finally, emphasising inclusivity and accommodation during network identification and outreach planning improves the chances of successfully incorporating marginalised communities.

6 Conclusion

The first objective of the Every1 project is to support local ecosystems to become digitalisation-of-energy ecosystems. To get there, Every1 makes a detailed and data-informed assessment to understand the needs, barriers, and readiness level of different actors such as DSOs, cities, consumers, energy communities and local/regional authorities in local ecosystems to use digital solutions. Based on this assessment, specific learning paths and dedicated co-created information, engagement, and bespoke capacity building material will be delivered. Ecosystems will be provided with and engaged in communication and dissemination activities in their local language, guided and supported in developing learning paths, as well as on how to use and adapt the engagement and capacity building material for wider uptake and continued use after the project.

The aim of Task 1.2 was to investigate **how stakeholders are networked in local ecosystems**, both existing digital-energy ecosystems (Chapter 4) as new-to-digital ecosystems (Chapter 5). The analyses resulted in a structured overview of ecosystems with a description of their goals, members, activities, and outreach channels. In *D1.1 Extended stakeholder and ecosystem mapping* a first exploration of ecosystems is provided, on which this D1.2 builds further. The digital-energy **ecosystems** identified to support and to establish ecosystem engagement are the **energy communities**, **clusters**, **local authorities** and **advocacy groups**. These different types of ecosystems are described in Chapter 4 of this deliverable with respect to three dimensions. The activities undertaken by the networks, the types of stakeholders they unite and the geographical coverage of the ecosystem. The types of stakeholders and the activities undertaken will lead to different outreach channels to reach their members. For each of the mentioned ecosystems their common outreach channels are described. These include shared means of outreach, such as social media, and options that will depend on the level of professionalisation the ecosystem has reached, such as regular newsletters, contact to the press and running local events. In can be concluded that the networks of energy communities, local authorities and cluster organisations have **strong outreach channels** which can act as a lever for the uptake of digitalisation of energy learnings. The advocacy groups should not be considered as a main distribution channel, since their main activities only marginally touch the aims of this project.

In Chapter 5 the **non-networked stakeholders** are identified which are not yet included in the existing digital-energy local ecosystems we have focussed on so far. In combination with the stakeholder characterisation done in Task 1.1 we can make assumptions that the groups of individual stakeholders who are not yet networked, have limited access to energy related information and the least learning interests in the topic, are also the groups who risk falling out of scope of the local ecosystems. These groups are mainly composed of women, older people, people without formal education, people not working due to disabilities, people living in large households, people living in rented houses. This is a wide section of society which we can further segment from an ‘energy perspective’ and focus on reaching individuals with a higher risk of energy poverty.

These identified non-networked stakeholders represent a wide section of society and therefore, identifying alternative ecosystems or ways to reach these groups is a priority. In the second part of Chapter 5, we explored **new-to-digital energy ecosystems** to find leverages to reach out to these marginalised groups of stakeholders. These new-to-digital energy ecosystems are not focussing on

digitalising of energy as such but could add new topics to their agenda in the scope of supporting their members. The various ecosystems described aim at being accessible spaces for and defend interests of a specific target group such as the associations for **elderly** or **disabled** people. Other ecosystems might cover a wider scope of stakeholders. As an example of the latter, **social welfare organisations** have the goal to support and provide services to marginalised groups such as lower educated or unemployed people. On the other hand, a variety of individuals is united by personal belief and connected in religious communities. Other examples of new-to-digital ecosystems are set up around popular activities such as **sports,** often organised in structured associations through which they have the power to connect and reach out to everyone. A final but not less important ecosystem uniting many kinds of individuals who might not yet be reached by the listed networks are the **consumer and producer organisations**. Both have well established structures on local and regional levels which go back in history and have considerable track-records of proven service to their target audiences.

The **outreach channels** and potential outreach opportunities of these new-to-digital energy ecosystems are generally described. Considering a range of communication channels beyond traditional communication makes the networks more accessible for diverse stakeholders to be involved. Additionally, networking activities are often used to bring people together and strengthen connections. This results in more integrated and interconnected networks. The described networks relevant to reach marginalised stakeholders are critical for effectively connecting with them via focused outreach and engagement.

This report feeds into the further tasks defined in the Every1 project to achieve the objective of supporting competence clusters for digital energy concepts, enabling them to be autonomous in reacting to local energy transition needs. Building on this mapping and description of local ecosystems, Task 1.3 develops the strategies to engage with these local ecosystems. The project will zoom in on diverse engagement strategies for the support and enforcement of existing ecosystems. The actual engagement with the local ecosystems will further detail and complement the insights on how stakeholders are networked in and reached by ecosystems. Furthermore, the project sets the ambition to set-up or strengthen new-to-digital energy ecosystems based on models of existing successful ecosystems. At least one ecosystem is foreseen per member state and associated country, while the ambition is to double that towards the end of the project.

The planned support to the local level pinpoints Every1's focus on stakeholders' engagement as a key success factor of the project, combining the transfer of expertise on capacity building development with the creation of a culture of cooperation on capacity building across ecosystems. This will provide local ecosystems the means and tools to become truly autonomous (yet connected) competence clusters and establish a culture of exchange and collaboration on capacity building across various ecosystems.

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Annex 1 – Schematic Overview of Energy Communities

Name and description of the Energy Community/ Initiative	Geographical location
Schoonschip is a sustainable floating neighbourhood community that produces, stores, and shares its self-produced renewable electricity, operates its own grid and participates in the different electricity markets.	Amsterdam, the Netherlands
Samsø: Denmark's municipality of the island of Samsø has completely transformed its energy system from fossil fuels to renewable energy, becoming the world's first renewable energy island becoming carbon negative; 100% local ownership of renewable energy investments; and significant socio-economic benefits from the energy transition.	Samsø, Denmark
Hyperion Energy Community is officially the first energy community of citizens in Athens, which will produce its own solar energy for self-consumption.	Athens, Greece
Collective Energy is a non-profit citizen energy community founded in Athens at the beginning of 2020 according to the Greek law 4513/2018. Collective Energy is a means of exploring collective paths that can lead to the transformation of the existing energy model, in the basis of social, environmental, economic, and political reform.	Athens, Greece
WenCoop Energy Community is an energy cooperative created by the Greek Association of Women Entrepreneurs in 2021.	Thessaloniki, Greece
Kivotos Korogona is an eco-farm provided for sustainable living	Lakonia, Greece
Skala Ecovillage is an ecovillage established outside Thessaloniki	Skala, Greece
Enosi Agriniou is an agricultural union concerned with various activities. The past decade has established many RES projects.	Agrinio, Greece
Lochem Energie is an energy cooperative with a variety of products (solar panels, collective energy generation, energy coach, electric car sharing	Lochem, Netherlands
Energie Citoyennes is a French energy cooperative	Redon, France
Courant d'air is an energy community that offers services regarding energy education, efficiency and e-car sharing	East Belgium
Energent is an energy cooperative active in renewable energy, energy efficiency and energy services	Ghent, Belgium
Som Energia is the first Spanish cooperative promoting renewable energy through collective PV purchases, originated in Catalonia.	Catalonia, Spain

OurPower is an emerging energy cooperative in Austria operating a peer-to-peer marketplace for RES electricity generated by its members. OurPower handles the online matching services as well as the whole process of electricity supply and billing.	Upper-Austria, Styria, Austria
Rafina aims to stimulate and foster active involvement and awareness of the citizens to enhance self-supply in combination with energy efficiency of the municipality and reduce its energy dependence on the main grid.	Rafina, Greece
Collective Energy is a self-sufficient energy community that has been formed and was influenced by the COMPILE work in Rafinia.	Attika Region, Greece
Postfossil is an e-car sharing initiative that runs two electric cars (Renault Zoe), one with a 22kWh battery (average range 120km) and one with a 40kWh battery (average range 240km), supported by the university of Graz.	Graz, Austria
Elektrizitätswerke Schönau is a citizen-owned energy cooperative in the community of Schönau.	Schönau, Germany
Community of Wildpoldsried: supports the citizens of the community to expand renewable energy. There are also 11 citizen-owned wind power plant organised like an energy community.	Bavaria, Germany
Energy Cooperative Loenen (ECL) is cooperative of and for all residents of Loenen. The members jointly own the cooperative to promote the use of sustainable energy in Loenen and to make the village energy neutral.	Loenen village, the Netherlands
Energy Cooperation Langebeesten Energiek; collective investment of the members for renewable energy mostly for purchase of solar panels; in control of the members.	Den Haag, the Netherlands
Energiecoöperatie Westerlicht Renewable energy production. Investment and control by members.	Amsterdam, the Netherlands
Wassenaarse Energie Coöperatie. Energy production through PV roof installations organised by themselves. Financially supporting other initiatives. Foundation, investment, and control by members.	Wassenaar, the Netherlands
Neighbourhood Cooperation Duurzaam Garenkokerskwartier; this is a cooperative of and for all residents of their neighbourhood in Haarlem. The members jointly own the cooperative to collectively enhance the generation and use of sustainable energy.	Haarlem, the Netherlands
Alpine Pearls is a transnational network of tourism destinations in the Alps, promoting sustainable tourism with focus on soft mobility. The RECAP initiative is a cooperation between Alpine Pearls, the City of Magliano Alpi (that in December 2020 activated the first Italian REC in compliance with the early adopted RED-II Directive) and the Energy Center of the Politecnico di Torino. The initiative aims at fostering the development of sustainable mobility using renewable sources within a governance model based upon Renewable Energy Communities and at creating RECs in the Alpine Pearls villages, enabling synergies between building retrofit, RECs and e-mobility.	Alps, Italy

COOPÉRNICO is the first Portuguese renewable energy cooperative. Our mission is to engage citizens and companies in the creation of a new energetic, economic**,** and social paradigm that benefits both society and the environment: renewable, efficient, fair**,** and decentralized. COOPERNICO has 3 main activity areas: renewable energy production, commercialization (retail) and energy efficiency. Currently, COOPÉRNICO has over 2100 members who have already invested 1,8M€ in a total of 32 RES projects, up to 2,1MWp (so far). From 2020, COOPÉRNICO has become an electricity retailer and provides its members with green electricity. With this process – called the green energy revolution by the cooperative members - the cooperative invites everyone to engage in the creation of a more sustainable future by using green electricity in their houses or companies. The third main area of activity is energy services and energy literacy: COOPÉRNICO organises and promotes workshops about energy savings and energy communities between its members and other interested Portuguese citizens that are willing to become smart energy consumers.	Portugal
Klimaan is an emerging collective action initiative in "Rivierenland", the region around the city of Mechelen in Flanders, Belgium. Klimaan collaborates with local authorities and other associations in Mechelen and the surrounding area. Klimaan is one family but consists of two organisations. Klimaan vzw is a non-profit organisation of 230 volunteers that strive for a climate neutral society and focusses on awareness raising and positive actions. Klimaan cvso is an emerging energy cooperative with 800 shareholders and member of RESCOOP Flanders and RESCOOP-EU. Key activities include cooperative PV-installations on public buildings, a group purchase of PV-panels and energy advice to community groups with an energy savings kit.	Mechelen, Belgium
KM0 Energy is a renewable energy developer and energy services company based in the north-east of Spain and has recently been working with several Catalan municipalities, regional agencies and citizen associations on the design and deployment of new local energy communities. For the DECIDE replicant pilot, KM0 Energy in collaboration with the municipality of Vila-Rodona, will promote a lighthouse project that can serve as a model for developing new Local Energy Communities, by analysing and testing technical, legal, economic**,** and participatory issues involved in the development of these new entities.	Vila-Rodona, Spain
Local Energy is a small non-profit association based in Anzi a little city in the province of Potenza, south Italy. Local energy promotes opportunities linked to the development of energy communities and has already involved five municipalities: Anzi, Brindisi di Montagna, Laurenzana, Trivigno and Tursi. Their main goal is to create the best conditions to ensure that the energy transition becomes an opportunity for these territories and for the people who live it.	Anzi, Italy
LUCE Energy Community is a small village (400 inhabitants) in the alpine valley, with a week supply connection with near-by town Ljubno with MV overhead line results in frequent power outages due to weather events, even several times per night. Due to low capacity of the local LV network, the distributed RES generation is curtailed as the voltage during the day rises above the limits. Aim is therefore to establish an EnC to increase the self-sufficiency and security of supply of the local energy system containing residential and commercial buildings with high penetration of RES.	Luce, Slovenia

Cooperative Crevillent: The grid of the municipality is managed by Cooperative Crevillent, a part of Enercoop which manages 14.315 consumers (13.047 households and 1.268 companies) in low voltage network; and 30 consumers in medium voltage network (mainly industrial and service sector companies). They have installed and integrated into their grid more than 75.000 PV panels in solar plants and 2.000 modules of PV panels in solar roofs. The photovoltaic plants connected to the Cooperative Network produce a total power of 13,4 MW. The entire energy production of the entity has zero emissions; the entity is working hard to get all the generated and distributed energy 100% clean (saving 35.000 tonnes of CO2 per year). The experience and background have led the company to be one of the most important cooperatives in Spain having a great international prestige. The cooperative offers its users a full range of options, services**,** and capabilities to meet the energy needs of businesses, households**,** and municipalities, with full guarantees of supply and distribution of electricity. The profits of the Cooperative are used to invest in the Distribution Network, to improve its technology and to give back to the society. Some of their contributions to the city are a nursing home, schools for the disabled and a free mortuary for all the citizens of Crevillent. However, the main challenges are the lack of active users to provide residential demand response (DR), lack of flexibility to balance the variable RES production and lack of investment in small-scale PV generation.	Crevillent, Spain
ECOPA (Energia Collettiva Palermo) vision is to support the development of energy communities (EC) in the province of Palermo by encouraging parties' activation. To produce the following common goods: energy democracy: ownership and decision-making process about energy production, supply**,** and consumption; reduction of carbon emissions: increase renewables and decrease fossil fuels; social cohesion through empowerment and economic benefit for citizens of Palermo, Sicily; and explain the energy transition in a simple way. Next to direct consultancy services, ECOPA aims to provide capacity building around EC for its members and build an open-source knowledge platform with a step-by-step guide on how to build an EC from scratch with united knowledge of regional and national experts. All activities are rooted in a deep human-centric approach with sustainability at its core.	Palermo, Italy
SEC is a non-profi**t** organisation supporting social enterprises through research, consultancy, and network-building towards building a solidarity economy. CESCO is a non-profi**t** company developing community solar projects across the country established by a project consortium led by National Society of Conservationists - Friends of the Earth Hungary. Together the Solidarity Economy Centre (SEC) and Community Energy Service Company (CESCO) are working on developing the first citizen-lead energy communities in Hungary. As first step SEC has established the Kazán community solar project in Budapest in cooperation with the CESCO consortium.	Budapest, Hungary
City of Prague voluntarily undertook to actively monitor and gradually reduce its carbon dioxide emissions. The city has thus officially declared its climate commitment to reduce CO 2 emissions by 45% by 2030.	Prague, Czechia

The Cluster of Bioeconomy and Environment of Western Macedonia (CluBE) is a non-profit company established among local actors and stakeholders of the Region of Western Macedonia, Greece. CluBE emerged since early '00's from the continuous collaboration of regional players during previous projects, analysing regional bioenergy and biomass potentials, the core cluster structures, and the regional innovation systems devoted to the energy sector. CluBE is developing R&D and business activities in the fields of bioeconomy, bioenergy**,** and environment, in order to reinforce green, smart and circular economy in the region and the neighbouring area. After being legally established in February 2014 as a not-for-profit company, the cluster currently includes more than 40 quintuple helix members.	Macedonia, Greece
ThermoVault offers a software and hardware solution of electric energy services of residential thermal appliances, unlocking the most cost-effective form of energy storage, while simultaneously allowing for the integration of more renewables through aggregation. Its retrofit solution for existing water and space heaters results in direct energy savings for residential customers, as well as it is used to offer valuable services to utilities, plumbing companies, appliance manufacturers and system operators, transforming end-users into green, active**,** and profitable stakeholders of the energy transition. The company currently controls over 1MW of storage. The pilots selected here include 2 communities of housing apartment buildings and will further expand to another group of social housing apartments.	Belgium
TREA is energy agency located in Tartu, Estonia, providing services to citizens, SME-s and municipalities. TREA consists **of** experts on energy efficiency, energy planning, sustainable transport, energy renovation and energy communities. TREA supports the energy transition of South Estonian region but also in other regions and national level. Agency is actively participating in international cooperation networks, introducing the latest examples of innovation from all over the Europe. Currently, TREA is providing the technical expertise for European light-house project SmartEnCity advising the deep renovation and implementation of smart technologies of Soviet era apartment buildings. Services for smart cities include the energy planning, technical guidance for energy renovation, monitoring of the energy consumption and evaluating the environmental impact of cities/communities.	Tartu, Estonia
HERON is the largest independent electricity retailer, and a rapidly developing natural gas supplier in Greece owning a customer portfolio, consisting of more than 150000 subscribers. HERON continuously introduces new climate-friendly energy services to its consumers and through. The target initial clients for DECIDE include 200 electricity consumers with real-time power meters for consumption & 15 electricity prosumers with real-time power meters for consumption and production from local RES (net metering).	Greece
DomX offers a unique retrofit solution for the automation of legacy gas-based heating systems. The system brings several advantages to end-consumers, including improved heating efficiency (up to 40%), smart and remote control, improved comfort**,** and direct participation in flexibility aggregation services. Through DECIDE, 50 residential end consumers of HERON's portfolio will experience the advantages of smartly connecting with their heating and the reduction of energy costs achieved through improved heating	Greece

efficiency and additional revenues from the offering of balancing services to the supplier. Exploitation will focus on engaging more consumers through HERON's gas portfolio, currently consisting of over 4.000 subscribers.	
Abattoir is in the middle of the city of Brussels, Belgium. The site (10ha) evolved from a pure slaughterhouse to a hub for start-ups in the food industry, answering the need for fresh and safe food in urban areas. As urban farming is closely interlinked with the availability of electricity/heat and water, Abattoir wants to further develop 'power farming' where the production of food and renewable energy are combined and reinforce each other. Abattoir is a living lab of sustainability where business, living & leisure/education meet, fuelled by renewable energy, rainwater harvesting and human connection.	Brussels, Belgium
The Albanian Business Cooperation Development (ABCD) Ltd is a company operating in the transport, logistics and mobility for the development of technical skills and competences of transport operators, public bodies and local authorities in Albania and Regions through research, consultancy**,** and training. ABCD carries out the activity in collaboration with public authorities (Tirana, Provinces and municipalities, Railway and Port related authorities), private companies (logistics providers, manufacturing companies, transport operators, etc.) and educational institutions (business schools, universities, professional educational programme providers, etc.). ABCD is supporting cities in Albania in developing sustainable mobility plans for people and goods and to become part of EU projects for low-carbon transport in the city.	Tirana, Albania

Annex 2 – Schematic Overview of Regional and Local Authorities

City	Country	EU Project/Initiative
Stuttgart	Germany	CIVITAS Initiative
Pforzheim	Germany	CIVITAS Initiative
Aalen	Germany	CIVITAS Initiative
Ulm	Germany	CIVITAS Initiative
Freiburg	Germany	CIVITAS Initiative
Mannheim	Germany	CIVITAS Initiative
Amsterdam	NL	Atelier EU Project
Bilbao	Spain	Atelier EU Project
Bratislava	Slovakia	Atelier EU Project
Budapest	Hungary	Atelier EU Project
Copenhagen	Denmark	Atelier EU Project
Krakow	Poland	Atelier EU Project
Matosinhos	Portugal	Atelier EU Project
Riga	Latvia	Atelier EU Project
Pamplona	Spain	oPENLAB EU Project
Genk	Belgium	oPENLAB EU Project
Nantes	France	MySmartLife EU Project
Hamburg	Germany	MySmartLife EU Project
Helsinki	Finland	MySmartLife EU Project
Bydgoszcz	Poland	MySmartLife EU Project
Palencia	Spain	MySmartLife EU Project
Vitoria-Gasteiz	Spain	MySmartLife EU Project

Tartu	Estonia	SmartEnCity (completed), oPEN Lab EU Project, SmartENCity EU Project
Sonderborg	Denmark	SmartEnCity EU Project
Lecce	Italy	SmartEnCity EU Project
Asenovgrad	Bulgaria	SmartEnCity EU Project
Brønderslev	Denmark	RESTORE EU Project
Gmunden	Austria	RESTORE EU Project
Ružomberok	Slovakia	RESTORE EU Project
Brescia	Italy	RESTORE EU Project
Holzkirchen	Germany	RESTORE EU Project
Milan	Italy	RESTORE EU Project
Sofia	Bulgaria	#connectedinEurope German Tender
Arezzo	Italy	#connectedinEurope German Tender
Vari Voula Vouliagmeni	Greece	#connectedinEurope German Tender
Utrecht	The Netherlands	#connectedinEurope German Tender
Alba Iulia	Romania	#connectedinEurope German Tender
Munich	Germany	#connectedinEurope German Tender
Krefeld	Germany	#connectedinEurope German Tender
Hamm	Germany	#connectedinEurope German Tender
Geestland	Germany	#connectedinEurope German Tender
Arnsberg	Germany	#connectedinEurope German Tender
Pirna	Germany	#connectedinEurope German Tender
Athens	Greece	Fusilli EU Project
Castelo Branco	Portugal	Fusilli EU Project
Differdange	Luxembourg	Fusilli EU Project
Kharkiv	Ukraine	Fusilli EU Project

Kolding	Denmark	Fusilli EU Project
Nilufer	Turkey	Fusilli EU Project
Oslo	Norway	Fusilli EU Project
Rijeka	Croatia	Fusilli EU Project, MySmartLife EU Project MySmartLife (completed)
Rome	Italy	Fusilli EU Project
Sab Sebastian	Spain	Fusilli EU Project
Tampere	Finland	Fusilli EU Project
Turin	Italy	Fusilli EU Project
Poznan	Poland	Invest4Nature EU Project
Aarhus	Denmark	Invest4Nature EU Project
Cascais	Portugal	Invest4Nature EU Project

Annex 3 – Schematic Overview of Clusters

Cluster	Region/Country	Focus Area
Aclima	Bilbao, Spain	Waste, integrated water cycle, contaminated soil, air and climate change, ecosystems, eco-efficient production and eco design
Baltic Eco-Energy Cluster	Gdańsk, Poland	Biomass-energy, CO2 capture, agriculture
Baltic Sea & Space Cluster	Gdynia, Poland	Maritime
Cleantech Bulgaria	Sofia, Bulgaria	Energy efficiency, building emissions, renewable energy, green hydrogen
Cleantech Energy Innovation Cluster	Vercelli, Italy	Energy & Efficiency, CE, sustainable mobility, clean solutions
Cluster Energy Technology Berlin-Brandenburg	Berlin, Germany	Renewable energy, smart grid, energy efficiency
Energy Saxony	Dresden, Saxony, Germany	Mobility, energy efficiency, resources, efficiency & smart cities
Green Tech Latvia	Liepaja, Latvia	Future mobility, smart manufacturing, green resources & energy efficient buildings
Green Tech Valley	Graz, Styria, Austria	Climate adaptation, green hydrogen, mobility, renewable energy, solid biomass, heat storage, solid biomass
Greenreality Network	Lappenranta, Finland	Circular economy, energy efficiency, renewable energy
Kexport	Budapest, Hungary	Air, wastewater, waste management, environmental engineering
LE2C	Lombardy, Milan, Italy	Smart energy systems, sustainable manufacturing, green building, water energy nexus, clean air & circular economy
NetPort energy Cluster	Karlshamn, Sweden	Green mobility, smart grid
Prešov Region Energy Cluster	Prešov, Slovakia	Renewable Energy, energy efficiency, environment & economy
Renewable Energy Hamburg	Hamburg, Germany	German energy transition, international energy markets, wind energy, sector coupling & hydrogen & renewable heat

Silicon Alps Cluster	Villach, Carinthia, Austria	Power electronics, smart sensor systems, IOT, digitisation
Sustainable Business Hub	Malmo, Skane, Sweden	Circular economy, renewable energy, smart cities
TECES	Maribor, Slovenia	Energy efficiency, energy storage, smart buildings, green transformation
Tehnopol Greentech Cluster	Tallinn, Estonia	Electricity, construction, air
Tenerrdis	Grenoble, Auvergne-Rhône-Alpes, France	Energy storage and conversion, carbon-free mobility, renewable energy production multi energy microgrids
The Cluster of Bioeconomy and Environment of Western Macedonia (CLuBE)	Kozani, Greece	District heating, biomass, biogas, biohydrogen, protection of natural environment, supply chain management, bioeconomy, and smart cities
Tweed	Wallonia, Belgium	Biomass-energy, energy efficiency, storage, wind power & smart grids
Umweltcluster Bayern	Augsburg, Bavaria, Germany	Waste, recycling, alternative energy generation, soil & contaminated site remediation, air pollution control, resource efficiency & water damage
Water Alliance	Leeuwarden, Friesland, Netherlands	Water management, wastewater, water tech
Cluster Mobility and Logistics	Regensburg, Bavaria, Germany	Green Mobility, IOT
Circular Bio-Economy Cluster South West	Tralee, County Kerry, Ireland	Waste Management, energy efficiency, circular economy, bioeconomy
ITS Mobility	Brunswick, Germany	ITS mobility networks, intelligent infrastructures
Innovation Greece	Heraklion, Crete, Greece	Water, hydraulic engineering, biofuels, energy, blue economy
Lithuanian Clean Technologies Cluster	Vilnius, Lithuania	Agriculture, waste, soil, energy
FETEK	Vilnius, Lithuania	Photovoltaics Technology
Latvian IT Cluster	Riga, Latvia	IOT, AI
3R Green	Bucharest, Romania	Waste management, air pollution, soil

TREC	Transylvania, North-west region, Romania	Renewable energy, biofuels, bioeconomy, resource efficiency
CREA Hydro and Energy	Brno, Czech Rep	Water management, ecological services, renewable energy
Valmetal Cluster	Valencia, Spain	Renewable Energy, Batteries Recycling
Greentech Cluster	Bologna, Italy	Low Carbon Economy, Renewable Energy
Business Environment Institutions Cluster	Krakow, Poland	IOT, environmental technology
Cleantech Latvia	Riga, Latvia	Renewable energy, circular economy
Nanoprogress	Pardubice, Czech Rep	Nanotechnology
Cluster of Hydrogen Technologies	Gdynia, Poland	Renewable energy and hydrogen
Energy Cluster North Savo	North Savo, Finland	Renewable energy, waste & materials
Technological Corporation of Andalusia (CTA)	Andalusia, Spain	Agri-foods, aerospace, biotech, energy and environment
Forum Oceano	Leça da Palmeira, Madeira, Azores, Portugal	Maritime technologies, green shipping fuels
Czech Marine Cluster	Zlin, Czech Republic	Maritime, green shipping fuels
Malta Marittima	Blata L-Bajda, Malta	Maritime, green shipping fuels
Cluster Marítimo de Canarias	Tenerife, Canary Islands, Spain	Maritime, offshore wind and tourism
Westpomeranian MARITIME CLUSTER	Szczecin, Poland	Maritime economy, ports, shipping
The BIO DANUBIUS cluster	Bucharest, Romania	Mobility, agriculture, renewable energy
Marine Cluster Bulgaria	Varna, Bulgaria	Blue economy
MARITIME TECHNOLOGY CLUSTER FVG	Monfalcone, Italy	Blue economy, maritime
Green Transport Cluster	Sofia, Bulgaria	Green mobility
Black Sea Energy Cluster	Varna, Bulgaria	Environmental technology, energy efficiency
SAPI - renewable energy cluster	Bratislava, Slovakia	Renewable energy, PV, smart grid
Sinotaic	Katowice, Poland	IOT, AI

ThEEN Thurigian Renewable Energies Network	Erfurt, Germany	Renewable energy, mobility, environmental technology
3D Grupa	Novaki, Croatia	Digital production, automation, AI, IOT
Luxembourg Martime Cluster	Luxembourg	Green shipping, maritime technology
Smart Cities Mediterranean Cluster	Limmasol, Cyprus	Buildings, energy transition, mobility, urban environment, climate change
Green Cluster	Nicosia, Cyprus	Environmental technology, green transition
Greenhub Denmark	Aalborg, Denmark	Waste, recycling, CCUS, energy & supply