Energy Citizenship and Energy Communities
for a Clean-Energy Transition

D5.1
Overview of available tools to support energy communities

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Abstract

This deliverable shows the results of a desk research for already existing (online) tools that promote energy citizenship and energy communities. For a better overview, the tools are first divided into four categories (information, cooperation/interaction, evaluation and technical tools) and then described in detail.

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List of Abbreviations

CEC	Citizens energy community
ec	energy citizen, energy citizens
e.g.	exempli gratia, for example
etc	et cetera
EU	European Union
IMED	Directive for common rules for the internal markets for electricity, OJ 14.6.2019 L 158/125
REC	Renewable Energy Community
RED II	Renewable Energy Directive, OJ 21.12.2018 L 328/82
RES	
RESCoop	Renewable energy sources cooperative
PV	Photovoltaic
WP	Workpackage

1 Introduction

WP5 aims to enable the joint development of tools that strengthen energy citizenship and energy communities by overcoming barriers or using facilitation. Based on the findings of the previous WPs which resulted in Deliverable D3.3 and the experiences of energy communities in four regions across Europe, a tool will be developed in WP5, which promotes energy citizenship. As laid down in WP2, participation in an energy community is one of the most pronounced expressions of energy citizenship, therefore the deliverable puts a strong focus on tools that can foster energy communities.

To prepare for tool development and to get an idea of what such tools look like and what requirements such a tool has to fulfil, desk research on already existing tools was conducted. For this purpose, we searched for existing tools (especially digital tools) that could be useful for promoting energy citizenship and energy communities. Specifically, an internet search was conducted, scientific databases (for example Scopus) were extensively scanned, and workshops on such tools (for example, a workshop called “from setting up energy communities to making them thrive: what tools are available?” in April 2022, held by 9 Horizon 2020 projects) were attended. Special attention was paid to the results of other EU projects on related topics such as energy transition, local energy cooperatives, local networks, social innovation and co-creation. The results of this desk research are presented in this report.

This report will therefore provide an overview of existing tools (mostly available online) to promote energy citizenship or energy communities. To provide a better overview, the found existing tools have been divided into four categories. Each of these categories has its own chapter in the deliverable. Namely, a distinction is made between (1) information, (2) evaluation, (3) cooperation/interaction and (4) technical tools. The categories are described in general terms at the start of their own chapters. This is followed by a detailed description of the individual tools in each category. It is not always easy to distinguish between categories, so some tools may contain elements from two or more categories.

The purpose of the deliverable is to show which tools are already available and in which areas the development of helpful tools would still be desirable in order to promote energy citizenship and energy communities. In addition, the different tool categories and examples of individual tools will also be presented to participants of co-creation workshops, which serve to find out which tools are still desired by members of energy communities.

Please note that because tool development is currently very rapid and new tools are being developed and released all the time, this list does not claim to be complete.

2 Information tools

2.1 Information on the tool category

WP3 identified a lack of reliable and easily accessible information, which is accompanied by a very complex and not sufficiently transparent legal framework. This is especially true in relation to energy communities. Often, although there is interest in establishing an energy community or joining an already existing one, potential participants are simply overwhelmed. They have to gather a lot of information about the various aspects (permits needed, the installation of the generation plant, establishment of the community, legal issues, energy management, energy billing, costs and revenues), from different sources. There are (mostly) two extremes: on the one hand, potential participants simply do not receive enough (easily comprehensible) information from one source. On the other hand, they are often overwhelmed by too much information available. In addition, this information is often incomprehensible to non-experts. Obtaining this information is often time-consuming and (in the case of legal advice) also costly.

The category of "information tools" includes tools that provide easy-to-understand information on the topic of energy in general and energy communities. They aim to bundle information and to have all necessary information collected in one place. Information tools are, for example, websites, webinars, manuals, step-by-step guides or other guides, aimed at interested people and providing information on the topic. The information can be very general and relate to topics such as energy saving or energy efficiency. However, there are also information tools that are very specific and deal with the establishment and operation of energy communities.

Furthermore, model contracts for the establishment of an energy community fall under this category. The founders can use these forms and enter their data in them and can be confident that important things that need to be regulated at the incorporation are covered.

Information tools should help interested parties to obtain the required information quickly and, above all, be low priced or, ideally, free of charge. It should also be borne in mind, however, that information overload should be avoided, since it can overwhelm the intended audience and thus lead to them missing out on important information. This is also what psychological research points towards, as studies have shown that giving people too much information can lower environmental efficacy beliefs, making them less likely to act (Andrews et al., 2022).

Information tools can be seen as a first step to engage people through raising awareness and providing information (Gangale et al., 2013). Nevertheless, research has shown that providing information is often not an effective way to change energy related behaviour. However, information has been proven to be more effective when used in combination with other interventions (e.g., Van Houwelingen & Van Raaij, 1989).

2.2 Listing of tools from this category

Handbook: Energy Literacy for Energy Communities	
Description	The handbook explores different aspects and viewpoints regarding energy generation and consumption, energy transitions more broadly, and the role energy communities play in this complex system. It offers energy community members to improve their knowledge on different energy-related topics. The handbook contains general information, but includes best practice examples from Germany, Italy, the Netherlands, Sweden and the UK.
Developer	NEWCOMERS (H2020 project)
Target users	Energy community members and other people from all over Europe, interested in energy communities
Source	https://www.newcomersh2020.eu/upload/files/NewcomersHandbook_spread_fin.pdf

Our Energy-platform	
Description	The platform provides an overview of various topics such as clean energy, energy sources, energy conservation and energy communities. There are articles and also short videos. Furthermore, there is a map showing different organizations related to renewable energy (authorities, energy communities, etc) in different countries.
Developer	NEWCOMERS (H2020 project)
Target users	People from all over Europe interested in renewable energy
Source	https://our-energy.eu/

Knowledge HUB	
Description	An information gateway directing visitors to the existing and emerging initiatives, provides links to repositories, marketplaces, databases, platforms and projects among others.
Developer	DECIDE (H2020 project)
Target users	People from all over Europe who want to approach the topic of energy collective actions for the first time looking for inspiration/information
Source	https://knowledge4energy.eu/

Postcards	
Description	Post cards were sent out to possible customers of OurPower (an energy cooperative in Austria operating a peer-to-peer market-place for RES electricity generated by its members) to raise interest and to motivate people to make a first contact with the OurPower website. 9000 households with pre-existing PV installations received a postcard, which contained a QR code and link with access to the website. The post cards were sent out in Austria, but the tool could be used in all Member States.
Developer	DECIDE (H2020 project)
Target users	Households with pre-existing PV installations
Source	https://decide4energy.eu/fileadmin/user_upload/Resources/D1.5_final.pdf

Powerfund	
Description	Is a one-stop-shop of information about setting up and operating an energy community or a cooperative. Provides users with an online marketplace for collective energy initiatives such as energy communities and cooperatives, as well as an open space to learn about innovative financial instruments such as crowdfunding and how the potential of collective financing can be harnessed to overcome the economic and financial barriers that prevent energy-poor citizens from participating in the energy transition. Provides links to funding opportunities in the Netherlands, France, Portugal, Germany, Italy, Spain, Belgium, Austria and Poland.
Developer	POWERPOOR (H2020 project)
Target users	People from all over Europe affected by energy poverty and anyone who are interested in the topic
Source	https://www.powerfund.eu/

Knowledge Exchange Platform	
Description	Provides a one-stop-shop for different stakeholders (RESCoops, community initiatives, municipalities, investors, etc.) to remove barriers for cooperation across regions and sectors and to minimize costs thanks to information sharing and knowledge exchange.
Developer	BECoop (H2020 project)
Target users	RESCoops, community initiatives, municipalities, investors, people from all over Europe interested in REC and CEC
Source	https://becoop-kep.eu/

Financial handbook for REScoops	
Description	The handbook provides an overview of possible investment plans (e.g. self-financing, crowdfunding, bank loans, joint ventures, etc), presents example investment plans from practice and informs about new, innovative investment opportunities. Organisations from Belgium, Denmark, Great Britain, France, Germany, Italy and the Netherlands. Italy and the Netherlands have collaborated on the project. The handbook shows best practice examples from Scotland, France, Belgium, Portugal, Italy, Spain and UK.
Developer	REScoop.eu
Target users	Cooperatives/RESCoops, Associations, public institutions from all over Europe
Source	https://www.rescoop.eu/toolbox/financial-handbook-for-rescoops

Community energy guide	
Description	Provides information to get started with a community energy project, such as tips on dealing with group dynamics, advice on using technology, or guidance on overcoming obstacles one may encounter.
Developer	REScoop.eu, Energy Cities, Friends of the Earth Europe
Target users	People interested in community energy from all over Europe, local authorities, municipalities
Source	https://www.rescoop.eu/toolbox/community-energy-a-practical-guide-to-reclaiming-power

Best practice guides for local public authorities	
Description	These guides summarise the knowledge and experience of municipal officials and are relevant for everyone working in a municipality. The guides are available on "Co-Creation with Citizens", "Building Energy Communities", "Future fit homes" and "Energy Poverty". Best practice examples are available from Germany, France, Spain, Belgium, Greece Croatia and UK.
Developer	mpower (H2020 project)
Target users	Employees of a municipality, citizens from all over Europe interested in renewable energies
Source	https://municipalpower.org/best-practice-guides/

Regional learning events	
Description	Regional events that bring together different groups of actors in the renewable energy sector (local municipalities, local citizen groups, installers, supply companies, digital platforms for energy) to work together on solutions for the energy transition. Shows best practice examples from Spain, UK, Portugal, the Netherlands and the Balkan states.
Developer	mpower (H2020 project)
Target users	Local municipalities, local citizen groups, local businesses (installers, supply companies, digital platforms for energy)
Source	https://municipalpower.org/activities/kronenberg-regional-learning-event/

Renewable Energy Knowhere website	
Description	A map showing municipal energy projects, local initiatives, companies, NGOs, research institutes and authorities involved in renewable energy (currently in Hungary, Germany, Austria, Slovenia and the Czech Republic).
Developer	New Horrizon (H2020 project)
Target users	People from all over Europe interested in renewable energies
Source	https://reknowhere.eu/

Energy efficiency e-learning course	
Description	Free online courses on energy efficiency at home and at work. The website offers a tool for self-assessment and then provides tips on how to increase or optimize energy efficiency both at work and at home.
Developer	start2act (H2020 project)
Target users	Company managers and also private individuals from all over Europe interested in the topic
Source	https://start2act.eu/online-energy-saving-platform/e-learning

Energy community platform	
Description	A one-stop solution for everything about community energy. The platform offers information about community energy, go-to guides, best practice examples, technical documents, online tools etc. and connects interested people with experts in the field. Shows best practice examples from Ireland, UK, Belgium, German, Italy, Spain, Greece and Turkey.
Developer	ECCO project, COME RES project, Compile project

Target users	People all over Europe interested in renewable energy and community energy, founder of energy communities
Source	https://energycommunityplatform.eu/

Information website for energy communities	
Description	Provides general information on energy communities, a step-by-step guide to setting up an energy community, model contracts, a comprehensive FAQ as well as a list of service providers in Austria.
Developer	Österreichische Koordinationsstelle für Energiegemeinschaften
Target users	(Primarily) People in Austria who want to start/join an energy community
Source	https://www.newcomersh2020.eu/upload/files/NewcomersHandbook_spread_fin.pdf

Step-by-step guide for EC	
Description	A short and compact step-by-step guide to setting up an EC and for the construction of new generation plants providing many useful links.
Developer	Österreichische Koordinationsstelle für Energiegemeinschaften
Target users	(Primarily) People in Austria who want to start an energy community
Source	https://energiegemeinschaften.gv.at/schritte-zur-gruendung/

Model Contracts for energy communities	
Description	The sample contracts for RECs provide guidance for the most important contract contents and represent one possible solution among many. They serve as an aid in the preparation of required contracts, such as the Articles of association, of Incorporation, the Subscription Agreement, and agreements regarding ownership of the generation facility. Only applicable in the Austrian legal system.
Developer	Österreichische Koordinationsstelle für Energiegemeinschaften
Target users	People in Austria who want to start/join an energy community
Source	https://energiegemeinschaften.gv.at/mustervertraege-fuer-energiegemeinschaften/

energiedigital one-stop-shop for REC	
Description	One-stop-shop for establishing an energy community. Provides information on starting and running an energy community, a planning tool and connects people interested in starting an energy community with service providers.
Developer	energiedigital
Target users	(Primarily) People in Austria who want to start an EC
Source	https://energiedigital.at/

Local energy consultations	
Description	Energy consultations of the federal states of Austria provide free information on the topics of new construction or renovation of a single-family house, renewal or improvement of the heating system, installation of a solar system, questions on energy-saving measures, purchase of energy-saving electrical appliances, and subsidies.
Developer	Energy and environment agency of Lower Austria, federal state of Styria, federal state of Carinthia
Target users	People in Austria interested in renewable energies
Source	https://www.technik.steiermark.at/cms/beitrag/12475094/82233481/, https://www.enu.at/, https://blog.kelag.at/energieberatung-kaernten

EUCENA European Citizen Energy Academy	
Description	Free online courses on various topics related to renewable energy (e.g. renewable energy generation, management and establishment of EC, financial components and business models, etc.). Shows best practice examples, e.g. in Greece.
Developer	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, BBEn
Target users	People from all over Europe interested in renewable energies
Source	https://citizenenergy.academy/courses/

Guide “From the climate- to the energy-cooperative”	
Description	Summarizes selected project results to gives an overview of effective and inspiring activities of individual energy cooperatives. Intents to provide fresh impulses for business activities as well

	as membership and public relations work of already existing energy cooperatives.
Developer	klimaGEN
Target users	People in Germany, who are interested and/or active people in and around energy cooperatives
Source	https://www.dgrv.de/publication/leitfaden-von-der-energie-zur-klimaschutzgenossenschaft/

Energy together academy	
Description	Provides free articles, videos, webinar recordings and information about workshops on various topics such as heat, energy saving, wind and solar energy.
Developer	energiesamen
Target users	People from all over Europe interested in renewable energies, some (more specific) articles refer to the Dutch legal situation.
Source	https://academie.energiesamen.nu/

CollectiveKracht	
Description	Knowledge platform by and for citizen collectives from all sectors: from energy to housing, from care to nutrition. Collective Power connects and helps citizen collectives to develop resiliently and overcome obstacles together.
Developer	Institutions for collective action, Rotterdam School of Management Erasmus University
Target users	People in The Netherlands interested in renewable energies
Source	https://www.collectievekracht.eu/default.aspx

Green decision-making website	
Description	Helps energy service providers find out what motivates their potential clients to make a positive investment in renewable energy. The article offers a look behind the scenes of the decision-making process of these potential clients. It provides insights into the values that are important in this process, which is essential for energy service providers to have persuasive influence at their client's boardroom level. Based on real-life examples of

	energy efficiency investments projects, three journeys are presented that describe the different stages of the decision-making process, how decisions were made, who influenced those decisions, and what aspects were most important to make that decision. One can choose between the journey of an end client, tech supplier and an energy advisor.
Developer	TNO
Target users	(Primarily) Dutch energy service providers (energy advisors, technology suppliers, etc)
Source	https://energy.nl/tools/green-decision-making/

Manual Społeczności Energetycznych	
Description	The (Polish) handbook shows what energy communities are and why we need them, it points out different advantages and limitations of different forms of energy communities, advises on the choice of the right form of energy community, accompanies the founding process and further operation, presents different financing models and encourages people to found energy communities.
Developer	CoopTech Hub
Target users	(Primarily) People in Poland interested in community energy
Source	https://www.hub.coop/publikacja/manual-spolecznosci-energetycznych/

3 Cooperation/interaction tools

3.1 Information on the tool category

In WP3, we found that the number of energy communities and the number of members of these communities indicate that the activity of citizens in initiating this type of organisation is still low. There is an urgent need to activate residents, especially of apartment buildings, to establish energy communities.

Cooperation/interaction tools are intended to encourage people in general to get involved with renewable energies, but especially to motivate them to become active and to get in touch with others.

On the one hand, "Cooperation and interaction tools" are aimed at people who are ready to connect with other people interested in renewable energy. Some of them also let people monitor their own energy consumption and compare to the consumption of others. They are meant to connect these people and let them interact with each other.

On the other hand, they are aimed at those people who have already come together and want to promote communication. They are intended, for example, to help simplify organisation in the communities. This is done, for example, by networking the individual members, organising them into smaller groups and thus quickly sending messages to all group members, holding votes, discussing new ideas, etc. They can also be used to recruit new members, for example by helping groups to advertise.

Tools in the category of cooperation/interaction tools might help people to form groups and develop a shared social identity. Social identity can be understood as "that part of an individual's self-concept which derives from his knowledge of his membership in a social group (or groups) together with the value or emotional significance attached to that membership" (Tajfel, 1978, p.63). Having a sense of belonging and salience to a certain group leads to assimilation into the group's norms and attitudes (Fielding & Hornsey, 2016). Research has found a strong correlation between social identification with a group and the willingness to engage in collective, pro-environmental action (Schulte et al., 2020). Membership and salience of a social group promoting pro-environmental action can lead to internalization of norms and result in behaviour change (Fielding & Hornsey, 2016). Moreover, psychological research has also shown that when a team of individuals share the belief that through their unified efforts, they can overcome challenges and produce intended results, groups are perceived as more effective. This effect is called collective efficacy and was first introduced by Bandura (1977). By building a social identity and promoting collective efficacy, tools in the cooperation/interaction tools category might be very effective.

Another element that tools in this category make use of is called comparative feedback. Comparative feedback includes feedback on individual performance relative to the performance of others. Research has shown such comparative feedback to be highly effective, especially when an important and relevant reference group is used, as this can lead to feelings of competition, social comparison, or social pressure (Abrahamse et al., 2005). In some cases, however, comparative feedback may even be counterproductive, for example, when the feedback shows that one's consumption is relatively low compared to others, indicating that there is space for improvement on comfort and setting the social norm of consuming more (Brandon, & Lewis, 1999; Fischer, 2008).

3.2 Listing of tools from this category

Energy Cockpit	
Description	With the help of the energy cockpit, an app for smartphones, households are to be connected with each other, which can then jointly use electricity generation and battery storage capacities. The energy cockpit serves as a tool for transparency and interaction between electricity suppliers and customers. It helps to keep an eye on energy consumption and to identify potential savings. One can also compare their consumption with that of other households. Companies from Austria, Belgium, France, Germany, Greece, Spain, Sweden and Turkey want to implement the tool.
Developer	eCrew (H2020 project)
Target users	Energy retailers/utilities, prosumers and consumer from Austria, Belgium, France, Germany, Greece, Spain, Sweden and Turkey interested in establishing an energy community
Source	https://ecrew-project.eu/

UP-Stairs platform	
Description	Connects citizens, who are aiming to set up CEC or REC, with implementation champions and offers collaboration, communication and project management tools to support these common goals. Aims to create “one-stop-shops” helping to set up CEC and REC. Tests the “one-stop-shops” in Austria, Bulgaria, Germany, Ireland and Spain.
Developer	UP-STAIRS (H2020 project)
Target users	Citizens (mainly in Austria, Germany, Bulgaria, Ireland and Spain), but also other stakeholders (e.g. municipalities) in CECs or RECs
Source	https://www.h2020-upstairs.eu

Celsius Forerunner Groups	
Description	Cities with similar challenges are grouped together. There is a "spearhead city" in which the challenges are solved together with experts. The other cities in the group accompany the project, share their experiences and approaches to solutions and benefit from the know-how of the experts.
Developer	CELSIUS-project
Target users	Public authorities, associations, municipalities from all over Europe
Source	https://celsiuscity.eu/forerunner-groups/

LICHT approach	
Description	Interested citizens are brought together in groups that go through a training process. They learn how to select, evaluate, implement and communicate about energy transition projects. The funding path helps to build local capacities for the energy transition and is based on the principle of "train the trainer". Citizens become energy transition experts, take on new projects and help new groups to grow their business.
Developer	REScoop.eu
Target users	Citizens from all over Europe who want to get involved and join forces in the field of renewable energies
Source	https://www.rescoop.eu/toolbox/the-licht-approach

Your Priorities	
Description	Online platform for idea generation, consultation and decision-making that connects governments and citizens. Citizens can add points for or against ideas and vote them up or down.
Developer	citizens.is
Target users	Cooperatives, associations, end consumers, public institutions from all over Europe
Source	https://citizens.is/your-priorities-features-overview/

Discourse	
Description	A kind of social network within which you can start discussions and votes, send emails, etc. Such a network could be used for internal organization in energy community.
Developer	Civilized Discourse Construction Kit Inc
Target users	energy communities in development/already established energy communities from all over Europe
Source	https://www.discourse.org/

Participation Coalition	
Description	Focusses on resident participation in the development and elaboration of regional energy strategies and natural gas-free neighbourhoods. Brings the worlds of governments and citizens' initiatives closer together. Supports citizens' initiatives and acts as the link between citizens and governments. In addition, they represent the citizens' perspective vis-à-vis The Hague.
Developer	klimaatstichting HIER, de Natuur en Milieufederaties, Energie Samen, Buurkracht and LSA bewoners
Target users	(Primarily) Dutch municipalities, local authorities, residents
Source	https://departicipatiecoalitie.nl/over-participatiecoalitie/

Econobis	
Description	Assists with membership administration (invoices, newsletters, mailing lists), supports bookkeeping, etc. Such a network could be used for internal organization in energy community.
Developer	energiesamen
Target users	energy communities in development/already established energy communities from all over Europe
Source	https://econobis.energiesamen.nu/

Buurkracht Online	
Description	Online platform developed by and used in a community energy initiative that informs about current projects, contains the most important contacts and email addresses, displays statistics and generally contributes to better networking. Helps local energy initiatives reach out to communities by making it very easy to set up their own website, design and order communication material (like posters, flyers, letters), design and sent e-mailings, sent out surveys and keep track of all their members/interested people and share knowledge with other communities
Developer	Buurkracht neighbourhood initiative
Target users	Neighbourhood initiatives, people in the Netherlands who want to start a community initiative (the tool is only available in Dutch, but the idea could be used as inspiration in all member states)
Source	https://www.buurkracht.nl/buurkracht-online/

4 Evaluation tools

4.1 Information on the tool category

In order for people to consider energy-saving measures, it is important to first identify their individual consumption and habits. This is how ways of wasting energy can be identified and measures can be taken against them. This also applies in particular to people who are affected by energy poverty.

The category of "evaluation tools" includes, for example, self-assessment or gamification items that are related to energy consumption and energy saving. These are, for example, tools that analyze people's inputs and give them tips on how they can improve their behaviour and/or subsequently reduce their energy consumption.

This category also includes so-called gamification tools. Gamification is used, for example, to visualize an imaginary energy community and thus show the wishes and needs of the potential participants.

Based on past empirical research we could assume that the category of evaluation tools may be an effective strategy in engaging users in residential energy conservation by making them aware of the energy impacts of their household energy behaviours. These self-assessment tools and the energy feedback which is given by the tools, is a way to turn a resource that until recently was more or less invisible to energy consumers into a visible one, and ultimately giving people a feasible way for engaging in the energy transition. A recent meta-analysis revealed, however, that this kind of indirect feedback which can be achieved through evaluation tools, is on average much less effective than direct feedback provided by an In-House-Display (for example a smart meter) which provides real time information on energy consumption (Zangheri et al., 2019).

4.2 Listing of tools from this category

Energy management self-assessment tool	
Description	Excel sheet which allows to make a quick self-assessment of the state of your energetic management. Quick high-level assessment of strengths and weaknesses across six areas of energy management; and a more detailed appraisal of your energy management performance across twelve key areas
Developer	Carbon Trust
Target users	End users, Cooperatives / RESCoops, Associations, Investors from all over Europe
Source	https://www.carbontrust.com/de/node/1024

PowerTarget	
Description	Analyses energy consumption and gives advice on how to decrease it. First, a person has to fill in a survey, then the service analyses their energy costs. In the end, the person receives recommendations to reduce their energy costs.

Developer	POWERPOOR (H2020 project)
Target users	People from all over Europe interested in renewable energies, energy saving and energy efficiency
Source	http://powerpoor.epu.ntua.gr/powerpoor-toolkit/target/

PowerAct	
Description	Analyzes energy consumption in the household, makes personalised suggestions for behavioural changes, and proposes support programmes to increase energy efficiency.
Developer	POWERPOOR (H2020 project)
Target users	People from all over Europe interested in renewable energies, energy saving and energy efficiency
Source	http://powerpoor.epu.ntua.gr/powerpoor-toolkit/act/

Energy Game	
Description	To better understand the visions people have about their local energy transition, DECIDE has developed a game approach which enables decisions along four different aspects: The participants are asked with whom they would organize their local energy transition together; participants can assign different roles. The game aims to learn more about how people would participate, implementers, i.e. the types of actions people would support, and motivators, i.e. why people would participate..
Developer	DECIDE (H2020 project)
Target users	People from all over Europe interested in renewable energies
Source	https://decide4energy.eu/energy-game

Energy transition: POWER	
Description	A game, where players gain an insight into the sustainable energy transition and learn how to form new local partnerships. In the subsequent reflection, the players discuss their experiences during the game and lessons learned that they can take back to practice. Participants will learn more about the following questions: What is the role of cooperatives in the energy system now and in a possible future? How the current energy system works: In which system does a cooperative operate? Different interests: We want to be more sustainable, but what other interests are there?
Developer	TNO
Target users	People from all over Europe interested in renewable energies, but also energy communities, municipalities, grid operators, energy suppliers

Source	https://energy.nl/tools/serious-game-energietransitie/

BECoop self-assessment tool	
Description	The self-assessment tool is designed for inexperienced users seeking to assess the current state of a cooperative/community bioenergy project. The tool consists of self-evaluation forms (through questions) that allow to assess an initiative's status and recommendations to continue with their initiative.
Developer	BECoop (H2020 project)
Target users	Inexperienced users from all over Europe seeking to assess the current state of a cooperative/community bioenergy project, provider, facility operator
Source	https://becoop.fcirce.es/self-assessment/

ActEnR	
Description	A game that simulates the development of an energy cooperative and its major decisions. It helps users to gain an understanding about the barriers and opportunities for developing a local energy cooperative.
Developer	Énergies citoyennes en Pays de Vilaine
Target users	People from all over Europe interested in renewable energies
Source	https://www.rescoop.eu/toolbox/ecco-simulation-act-enr-live-a-citizen-ecco-project-in-two-hours

C.L.E.A.R.	
Description	Supports municipalities by providing a tool for a self-assessment process that helps to assess the development of policies that best fit the situation.
Developer	European Committee on Local and Regional Democracy (CDLR) of the Council of Europe
Target users	Municipalities
Source	https://rm.coe.int/c-l-e-a-r-a-citizen-participation-tool/168074701b

5 Technical tools

5.1 Information on the tool category

In WP3 we found that there are concerns about renewable energy technologies and their negative impacts. In addition, we found that financial incentives play a major role. The purchase of a renewable energy system is expensive. Also forming an energy community might be expensive, especially in the starting phase. For many interested people, however, precisely this cost factor can be an obstacle to purchasing such a system or joining an energy community. Participation in an energy community has to be at least cost-neutral for the individual.

These costs make it particularly difficult for people who have low levels of income and savings. The savings rate in some member states, such as Poland, is very low compared to the European average. In addition, the problem of energy poverty has been growing in the last few years and is increasing due to the energy crisis related to the Covid-19 pandemic and Russian aggression on Ukraine. However, energy communities are supposed to contribute to reducing energy poverty by enabling the people concerned to get cheaper electricity through the community. The benefits that can be gained from installing a renewable energy system or participating in an energy community often have to be explained to potential participants. Calculators that can be found in the technical tools category serve this purpose.

The "technical tools" category includes tools that, for example, calculate the savings in electricity generation from photovoltaics, wind power or other energy sources. There are also tools that calculate the positive effects that participating in an energy community can bring to the individual user. The tools represented in this category can help to evaluate the costs accurately and support the decision to buy such a system or to join an energy community. They can also calculate the positive effects of such an investment on the environment.

Many tools in the category of technical tools, try to promote energy conservation or motivate people to join energy communities by appealing to and trying to reduce their economic concerns. This dominant reliance on economic appeals reflects the common misconception that people are primarily motivated by (economic) self-interest (Miller, 1999; Thøgersen, 2011). Even though many studies have shown economic interventions to be effective (e.g., Sloot & Scheibehenne, 2022; Curtin et al., 2017), psychological research indicates that this may not always be people's main motivating force. People are generally motivated to maintain a positive view of themselves (they want to maintain a 'positive self-concept') which can be achieved by acting in line with one's internal moral standards (Mazar et al., 2008). Therefore, as studies have shown, appealing to people's biospheric values (which focus on caring about nature and the environment), for example through highlighting potential CO_2 savings, can sometimes be even more effective than focusing on economic benefits and monetary savings (Bolderdijk et al., 2012).

5.2 Listing of tools from this category

(Renewable) energy community benefit calculation tool	
Description	After entering all information about their own electricity consumption, the generation plant, the energy community and its generation plant etc., the tool provides users with information about which positive benefits can result from an REC, how

	much of the own generation plant can be consumed, how much electricity can be fed into the REC and how much energy can be consumed or generated within the REC. The tool is only applicable in the Austrian system.
Developer	Österreichische Koordinationsstelle für Energiegemeinschaften
Target users	People in Austria, interested in founding a/participating in an energy community, planned and emerging energy communities
Source	https://www.energieinstitut.at/tools/benefit/

Excel-calculation tool for (renewable) energy communites	
Description	This calculation tool is used for a first estimation of the profitability of a REC. Two different Excel-tools are provided. One for REC with PV plants, one for REC with PV plants and storage.
Developer	Österreichische Koordinationsstelle für Energiegemeinschaften
Target users	People in Austria interested in energy and emerging energy communities
Source	https://energiegemeinschaften.gv.at/tools/

PV self-consumption calculator	
Description	Helps determine the individual and optimally designed PV-plant solution for both single-family households and for the share in a community plant.
Developer	Photovoltaic Austria
Target users	(Primarily) People in Austria interested in renewable energy, but the results can also be used for a rough assessment for other regions.
Source	https://pvaustria.at/sonnenklar_rechner/

Solar Power Calculator	
Description	After answering a few questions about the location and the output of the PV-plant, you get a report estimating how much value you could get from a PV-plant.
Developer	Solarserver
Target users	People all over Europe interested in the economic viability of a solar system
Source	https://www.solarserver.de/pv-anlage-online-berechnen/

6 Conclusion

In this deliverable we reviewed existing tools which aim to promote and facilitate energy citizenship and energy communities. We divided the tools that we found into four categories.

For one, there is the category of information tools which aims to provide easy-to-understand information on the topic of energy communities and to have all relevant information on how to set up an energy community bundled together in one place, often in the form of a website.

Another tool category is made up of interaction tools which help people connect with others who are interested in energy communities, get them in touch with experts or let people monitor and compare their electricity consumption. Interaction tools intend to simplify organisation within the communities or help to recruit new members.

Next, there is the category of evaluation tools which includes self-assessment tools which, for example, analyse people's inputs and give them tips on how improve their behaviour in order to reduce their energy consumption.

Lastly, the technical tools category includes tools that, for example, calculate potential savings in electricity generation from photovoltaics, wind power or other energy sources. Some tools also calculate the positive effects that participating in an energy community could bring to the individual.

The desk research described in this deliverable lays the foundation and severs as a first step in the tool development process within the project. We now have an overview of the tools that are currently available in the domain of energy citizenship and energy communities. It is noteworthy, however, that many of the available tools do not take psychological knowledge and research into account and there is rarely any information on the effectiveness of the tools available, which leaves a lot of room for improvement in future tool development.

7 References

Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. Journal of Environmental Psychology, 25(3), 273-291. https://doi.org/10.1016/j.jenvp.2005.08.002

Andrews, T. M., Kline, R., Krupnikov, Y., & Ryan, J. B. (2022). Too many ways to help: How to promote climate change mitigation behaviors. Journal of Environmental Psychology, 81, 101806. https://doi.org/10.1016/j.jenvp.2022.101806

Bolderdijk, J. W., Steg, L., Geller, E. S., Lehman, P. K., & Postmes, T. (2012). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. Nature Climate Change, 3(4), 413-416. https://doi.org/10.1038/nclimate1767

Brandon, G., & Lewis, A. (1999). Reducing household energy consumption: A qualitative and quantitative field study. Journal of Environmental Psychology, 19(1), 75-85. https://doi.org/10.1006/jevp.1998.0105

Curtin, J., McInerney, C., & Ó Gallachóir, B. (2017). Financial incentives to mobilise local citizens as investors in low-carbon technologies: A systematic literature review. Renewable and Sustainable Energy Reviews, 75, 534-547. https://doi.org/10.1016/j.rser.2016.11.020

Fielding, K. S., & Hornsey, M. J. (2016). A Social Identity Analysis of Climate Change and Environmental Attitudes and Behaviors: Insights and Opportunities. Frontiers in Psychology, 7. https://doi.org/10.3389/fpsyg.2016.00121

Fischer, C. (2008). Feedback on household electricity consumption: A tool for saving energy? Energy Efficiency, 1(1), 79-104. https://doi.org/10.1007/s12053-008-9009-7

Gangale, F., Mengolini, A., & Onyeji, I. (2013). Consumer engagement: An insight from smart grid projects in Europe. Energy Policy, 60, 621–628. https://doi.org/10.1016/j.enpol.2013.05.031

Mazar, N., Amir, O., & Ariely, D. (2008). The dishonesty of honest people: A theory of self-concept maintenance. Journal of Marketing Research, 45(6), 633-644. https://doi.org/10.1509/jmkr.45.6.633

Miller, D. T. (1999). The norm of self-interest. American Psychologist, 54(12), 1053-1060. https://doi.org/10.1037/0003-066x.54.12.1053

Schulte, M., Bamberg, S., Rees, J., & Rollin, P. (2020). Social identity as a key concept for connecting transformative societal change with individual environmental activism. Journal of Environmental Psychology, 72, 101525. https://doi.org/10.1016/j.jenvp.2020.101525

Sloot, D., & Scheibehenne, B. (2022). Understanding the financial incentive conundrum: A meta-analysis of the effectiveness of financial incentive interventions in promoting energy conservation behavior. Renewable and Sustainable Energy Reviews, 168, 112761. https://doi.org/10.1016/j.rser.2022.112761

Tajfel, H. (1978). Differentiation between social groups: Studies in the Social Psychology of Intergroup Relations. London: Academic Press.

Thøgersen, J. (2011). Green shopping. American Behavioral Scientist, 55(8), 1052-1076. https://doi.org/10.1177/0002764211407903

Van Houwelingen, J. H., & Van Raaij, W. F. (1989). The effect of goal-setting and daily electronic feedback on in-home energy use. Journal of Consumer Research, 16(1), 98. https://doi.org/10.1086/209197

Zangheri, Serrenho, & Bertoldi. (2019). Energy savings from feedback systems: A meta-studies' review. Energies, 12(19), 3788. https://doi.org/10.3390/en12193788