



establishing Community Renewable Energy Webs - Rolling out a business model and operational tool creating webs of households that jointly manage energy to improve efficiency and renewables uptake

Contract No. 890362

Deliverable 3.1:

Specification of the CREW monitor



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Disclaimer

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Executive Summary

The aim of this deliverable is twofold. First of all, to provide a few theoretical references and a list of possible tools to be implemented in the current version of the PeakAPP application to shift the behavioral change and energy efficiency strategy from the individual to the community level. Secondly, to provide a description of the functionalities actually implemented in the eCREW monitor. The starting point of the eCREW monitor is in fact the current version of the PeakApp application that aimed at fostering improvements in consumers energy behaviors and energy efficiency by adopting an individual perspective while the ambition of the eCREW monitor is to steer the members to feel part and, to the extent it is possible, to act as an actual community instead of a group of consumers.

The deliverable is structured as follows

In section 3 the main aspects to be considered as determinants for a successful community building are recalled and briefly described, namely: collective identity, motivation of people to join, trust (among community's members and against third entities) as a requirement and effect of collective action, solidarity as a pillar around which building community's mission and objectives, participatory decision making as a tool to strengthen the community itself and the achievement of collective goals. Being the eCREWs an instance of the wider category of community based initiatives all these aspects should be carefully considered when designing tools to support eCREWs implementation.

In section 4, the state-of-the-art of the web and mobile application is described with attention paid to the main features that characterize the PeakAPP application (the starting point for the eCREW monitor) and a few platform that are currently available to support community building (inspiring practices for the eCREW monitor).

Section 5 presents the result of an additional websurvey aimed at identifying the most common functionalities implemented in community based platforms. These functionalities are then assigned to five main categories (*Identity, Information and knowledge, Interaction, Behavioral change and Participatory/inclusive processes*) and each of this category is considered in terms of the contribution that it might give to addressing the crucial aspects considered in section 3. A 'wishes list' of eight possible functionalities to be implemented in the eCREW monitor is finally provided.

Inspired by the 'wishes list' and on the basis of some selection criteria related to the actual feasibility and the need of satisfying technical requirement for the implementation of the eCREW model, five features have been finally selected for being implemented in the eCREW monitor. A description of the selection process and of the features themselves is provided in section 6.

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1. Introduction

Energy transition (ET) plays a fundamental role in the fight against Climate Change. Through the reduction of energy demand and the exploitation of renewable energy sources (RES), ET aims at the transition from a centralized energy system based on the use of fossil fuels to a more sustainable one characterized by a decentralized production of energy from RES with a relevant increase in the role played by citizens that should move to be active consumers and prosumers, able to play, following the traditional definition by Toffler, both the role of consumers and producers¹.

The eCrew project aims to contribute to this process by fostering the exploitation of Energy Communities (EC) and their role as enablers of citizens active engagement and RES promoters through the establishment of virtual communities of energy consumers, the eCREWs. In order to reach this twofold objective it is crucial to provide a robust contractual and technological infrastructure to support the consumers in building their own community and to make more efficient the consumption of energy produced by RES within the community. A crucial component of this infrastructure is the eCREW monitor, on which this deliverable is focused, that allows eCrewers (i.e. eCREWs' members) to act and interact within the eCREW they belong to. Starting from the application developed within PeakAPP project², through the implementation of new functionalities aimed at shifting the application from the individual (consumer) to the collective (eCREW) perspective, the final release aims at supporting the active engagement of eCrewers and the interaction and coordination among them and at the same time aims at fostering energy production from RES.

As for the consumers engagement, the eCREW monitor is inspired by a participatory model, in which eCrewers should be steered towards the development of an active attitude towards cooperation, environmental sustainability and as much as possible they should be able to express and share their views on their own eCrew's performance and objectives. Fostering cooperation and collective perspective among members are in fact two key factors in pushing eCREWS from being just a group of consumers to be actual, although virtual, communities able to promote shared production, distribution and purchase to facilitate the mobilization of society and guaranteeing their acceptance of the project.

As for the efficient consumption of energy produced by RES, that is a crucial component of ECs, the eCREW monitor adopted by eCrewers will allow eCrewers to be aware of their own energy and environmental performance (in terms of RES consumption and GHG emission) and to have an overview of the overall performance of the eCREW. The aim of this 2-levels perspective on energy production and consumption, individual and collective, is to trigger a more conscious and efficient use of energy by the consumers involved in the collective initiatives of building and maintaining an eCREW.

The deliverable is structured as follows. After a detailed presentation of the main objectives and ambitions of the eCREW monitor in section 2, the crucial components of collective action in the energy field are explored in section 3 in order to identify the functionalities needed for the collective perspective to be effectively implemented³. In section 4 a brief overview of the current release of the application (PeakAPP) to be renewed

¹ Alvin Toffler (1984) *The Third Wave: The Classic Study of Tomorrow*. Bantam Doubleday Dell Publishing Group Inc

² <http://www.peakapp.eu/>

³ For a deeper analysis of the determinants of Collective Action please make reference to the deliverable 2.4 – Collective Action Plan

is provided while in section 5 the main categories of functionalities to be considered for the adoption of a full collective perspective are explored in details and a few references of currently implemented mobile and web applications are presented. Section 5 therefore provides a kind of 'wishes list' composed of the functionalities that should be implemented in an application to make it able to actually address all the determinants for a successful collective initiatives (I.e, ECs and eCREWs) introduced in chapter 3. Given the resources and time constraints of eCREW not all of them can be taken into account and in section 6 the functionalities actually implemented in the eCREW monitor are described with attention paid to the feasibility criteria adopted in the selection process.

2. Objectives

The overall objective of the eCREW monitor is to provide the app functionalities to be integrated in the current version of the PeakAPP to make it as much as possible able to foster a collective perspective within each eCREWs thus maximizing their social, economic and environmental benefits. Within the eCREW project, the eCREW monitor plays as a tool for the implementation of the strategies identified in the Collective Action Plan (Deliverable 2.4)

The eCREW monitor therefore aims at two main objectives:

1. The first, on the process/operational side, is to make each Crew a working organization that is to provide all the tools needed to manage the main processes that characterize eCREWs ordinary life. The processes to be effectively managed for an eCREW to reach their objectives are referred to the building of eCREWs as communities, in terms of cooperation, interaction and adoption of a collective perspective by consumers when they join a eCREW and to the management of energy flows within and beyond the eCREWS to maximize self-production and self-consumption.

More in details, as for the operational level, the eCREW monitor should help each eCrew to reach the following objectives:

- Implement and making clear rules and procedures that facilitate the correct transaction of energy and monetary incentives within the eCREW
- Strengthen the collective instead of the individual level as the basic element around which the eCREW's processes are organized and at the same time give the eCrewers the opportunity to be the engine of the community, in terms of cooperation and participation.
- In the medium run (and beyond the scope of the project), provide a basis for the further exploitation of ECs as promoted by the directive 2018/2001 and the directive 2019/944 directives that paved the way for the flourishing of the bottom-up and collective approaches to the production and consumption of renewable energy⁴. In fact, although eCREWs establishment is independent from the EU discipline it might be crucial in fostering ECs approach

⁴ For a detailed analysis of the EU directives please make reference to the deliverable 2.4 Collective Action Plan

2. The second objective, on the effects side, is to measure and maximize the social, economic and environmental impact:
- **Social benefits:** as we already mentioned, a bottom-up approach is needed to implement an effective energy transition and citizen involvement is a key factor allowing citizens to become active consumers of the energy supply chain. By joining a community (i.e. an eCREW) individuals can be benefitted first of all by gain relevance in the energy chain as collective prosumers. Households that by themselves could never become prosumers (due to social and economic constraints) are highly facilitated if the satisfaction of the requirements needed to produce energy (i.e. installing RES technologies, managing energy flows...) are shared with others. In addition, by being part of a community consumers can receive important social benefits, such as cooperation, interaction between members, sharing of resources, participation in the life of the community and the mutual support in satisfying their own needs.
 - **Economic benefits:** the more an eCREW works efficiently (i.e. the operational requirement mentioned at objective 1), the more it becomes self-sufficient, the more some savings will be produced for the consumers, on the basis of the split incentives scheme adopted.
 - **Environmental benefits:** since the energy produced and consumed within an eCREW comes from RES the CO₂ emissions are expected to be reduced

Given the constraints to the measurability of these objectives, eCREW monitor is able to provide evidence of the achievement of economic and environmental benefits, with the numbers of eCrewers and their use of the app as a proxy for the social benefit (see section 6). Of course dedicated research efforts should be instead provided to assess the extent to which eCREW monitor is able to actually works as a crucial component of the implementation of the Collective Action Plan

Overall, eCREW monitor aims at allowing the collective action perspective implemented through eCREWs to meet energy transition objectives by supporting the decentralization of the energy system and by promoting a new active role of the consumer overcoming the limits and constraints to the individual engagement.

3. Conceptual framework: crucial aspects to be considered for collective action and community building

As described more in-depth in eCREW's *Deliverable 2.4 – Collective Action Plan* (see note 3) collective action has been gaining relevance for the past decades as a social innovation able to support the transition towards a more sustainable socio-economic model (and energy system) with respect to the environmental, economic and social dimensions along which sustainability is traditionally declined. ECs (and eCREWs as a kind of ECs instances) development relies on collective action that has been recognized more generally as one of the foundations of social life and that engaged social theorists and policy makers for centuries (Padovan et al., 2019). When they act as part of a collective, individuals adapt their roles and behaviors, decision making processes are dramatically changed, collaboration and coordination patterns emerge and the objectives and the results of actions need to be carefully considered along the individual-collective spectrum.

In this regard, the use of an App (see section 5) could be an essential tool to foster Collective Action within a group of individuals:

- on the one hand, it should allow individual members to get the feeling of being part of a wider group, e.g., through the provision of updated information about their own and eCrew's performances, through push notifications about the best timeslot to use the energy produced by the eCrew..;
- on the other hand, it should allow individual members to share a (virtual) space in which they should be able to build the community through proper interactions and sharing of information and resources .

In view of the identification of the functionalities to be implemented in the eCREW monitor to reach these objectives, this paragraph provides an overview of the main components and dynamics that might foster the promotion of a collective perspective in order to support the establishment of community based initiatives in the energy field and therefore might be relevant in determining eCREWS' successful implementation⁵ (Walker et al 2010, Huybrechts et al 2014, Padovan et al 2019, Gangale et al 2020, Gregg et al 2020).

The crucial aspects to be considered and effectively addressed for a successful community building briefly described in the following are: (1) *identity*, (2) *Motivation*, (3) *Trust*, (4) *Solidarity* and (5) *Participation and decision making*.

1. Identity

The construction of community identity is necessary to help members identify, recognize and create a sense of belonging and acceptance, towards other individuals who are part of the same community. Community identity, in most of the cases understood as collective identity, indicates the importance for participants to develop or maintain, factors such as pride, belonging, self-respect and social responsibility, as characteristics that lead to participation in community activities by members. (Ratanakosol et al, 2016)

Identity can be defined on two levels, the psychological and the socio-anthropological. In the first case, identity expresses the way in which the individual perceives himself and constructs himself, as member of social groups (for example the construction of a group for sharing a certain culture or ideology) and to the social level of belonging. In the second case, however, it is considered as the ways in which everyone relates to oneself, to the group to which he belongs and to external groups perceived as other than itself. (Giacomarra et al 2014).

What is relevant from the collective action perspective is the shift from the individual to the collective or community identity that is to make people feeling part of an acting entity wider than his/herself. Community identity is characteristically the collective identity that indicates the particularity and distinguishing features of the community. It is important to individuals, groups and community as the driving force that can create pride, self-respect, unity, a sense of belonging, and social responsibility which leads to participation in community activities.

⁵ See note 2

2. Motivation

Connected to the aspect of creating and maintaining collective identity is the motivation that might steer individuals to the decision of joining a collective initiative and maintaining their participation over time. According to Soeiro and Ferreira Dias, one of the reasons for participating in the Energy Communities is linked to concerns about the environmental impacts of the use of non-renewable energy sources. Motivations can be then reinforced by components belonging to different categories of processes, such as environmental, economic, technological, but also more closely linked to a wider social awareness and the role of energy policies towards the decentralization triggered by a bottom-up approach (Soeiro et al, 2020). In this general framework motivations can mainly take two, often intertwined, forms: collective and/or individual. Some EC projects offer their members the opportunity to take advantage of economic savings in the use of energy from renewable sources. Consequently, this may be one of the above reasons that induce an individual to participate in a community. While as regards the social reasons, they are linked to the construction of a community identity among the members of the same group, to the sharing of relational goods and to the effects deriving from the adoption of certain innovations. (Verde et al., 2020)

In order for motivating people to join a collective initiative therefore social, economic and environmental principles should be jointly considered in order to cover the entire spectrum of incentives that might motivate people to be involved.

3. Trust

Trust among the members of a community could be considered both as a requirement and a result of the community itself. If, on the one hand, trust is crucial to strengthen communication, cooperation and (finally) the commitment itself of the members, on the other it might result from the joint action performed by community members. In the case of energy communities, it has been noticed how an increase in trust resulting from the engagement of people in civic actions might result in a greater confidence in participation in projects and the adoption of future renewable technologies. (Walker et al, 2010)

According to some authors, socio-institutional factors, as trust and sense of community, can positively influence the participation of individuals in community-based sustainable project (Koirala et al, 2018) through a strong interaction with the above described construction of identity. The relationship between these two determinants of community success is bi-directional as when high levels of trust are reached, the community identity is also reinforced and the way around (Kalkbrenner et al, 2016) This implies a more equitable and motivated participation of the members in the life of the Energy Community.

Creating a sense of belonging is the basis of community development, while trust is one of the core requirement for community to be developed and work properly as a coordinated entity aimed at fulfilling common goals. But trust is not only a matter of peer-to-peer relationships as involves also trust in institutions and other entities out of the community's boundaries. In eCREW the role of CAEs and the trust in them among the eCrews is as important to be guaranteed as the trust among the eCrews themselves, the latter being crucial for members to act together as a collective, the former being crucial for the members to comply with rules, accept the incentives and adopt coherent energy behaviors.

4. Solidarity

This dimension relates to the many social aspects that can affect (within and beyond the community itself) the energy systems such as the increasingly important issues of energy poverty and energy justice. One of the premises of the EC's model is in fact to be developed in a mutualistic, altruistic and solidary way (Cusa, 2020) in order for contributing to the objective of providing everyone with a sufficiently guaranteed access to heating and lighting in homes, in order to fight energy poverty, intended as the circumstance in which a household cannot access a socially and materially necessary level of energy services in home. In this respect, many ECs are in fact already tending towards forms of energy solidarity and tackling energy poverty by providing their members with cheap access to renewables and energy saving strategies (Bouzarovski et al, 2010). In addition of the guarantee of minimum level of energy access, all the citizens, including the marginal those and low incomes groups, should be able to benefit from the opportunity to become prosumers and therefore become an active part of the energy transition. ECs can be a possible solution to address this challenge, as they allow individuals who could never invest in the creation of renewable technologies to share the benefits deriving from the installation of a renewable source plant and thus obtain reductions in their energy costs in their bills and a positive environmental impact.

5. Participation and decision making

The engagement in the decision-making process is a strong leverage to enhance motivation of citizens in taking part to collective initiatives and might also play the educational role of making people more aware about the consequences of their behavior, such as the use of renewable energy sources in the case of energy communities.

A participatory approach is of course a bottom-up approach that requires high competence to listen and steer the process that should lead from an initial exchange of opinions to a true participatory planning of intervention strategies. The benefit of a collective decision-making process, according to some authors, derives from the fact that it favors the possibility for the participants (the members of a community) to compare their respective points of view. (Sibertin-Blanc et al, 2015) In this regard, active participation might play a relevant role for the development of participation activities since it allows members to individually partake to the event/project interacting with other individuals, sharing ideas and analyzing solutions with the result of making the participant part of a shared experience, enhancing the attractiveness of the event itself.

In the energy sector, ECs have shown a great potential in triggering the establishment of an effective participatory decision making through the institutionalization (on-member one-vote) of the cooperation among producers, consumers and prosumers with the aim of producing, consuming and managing energy through one or more local energy plants. (Geco 2020).

In order for the collective perspective to be effectively implemented in the eCrews, the above described aspects should be considered as targets to be reached through the design and implementation of the new APP functionalities in the current version of the PeakAPP. In other words, these 'theoretical' aspects cannot be directly implemented through specific functionalities (i.e. we cannot provide a 'trust building' functionality in the app) but as shown in section 5.1. the APP functionalities can contribute to some extent to the achievement of a satisfactory consideration of the community building requirements.

4. The state-of-the art: the PeakAPP application and some references from around EU

This section provides the main references that have been considered as the starting point for the development of the eCrew monitor. In section 4.1, the main features of the current release of PeakApp are explored while in section 4.2 is provided a brief comparative analysis of a few European web and mobile apps aimed at supporting community building.

4.1. THE PEAKAPP APPLICATION

Developed within the framework of the PeakAPP project⁶, the mobile application was aimed at promoting energy efficiency and improving the use of energy produced from renewable sources, with attention paid to fostering sustainable behavior changes. The latter relying on an increased awareness, thanks to the energy consumption tracking (mediated by a technical infrastructure based on smart metering) users had the opportunity to increase their awareness about their energy consumption practices. PeakApp was designed and implemented with a focus on the individual consumers. Therefore it was conceived to create a direct relationship between individual consumers and the energy provider and to allow the individual consumers to monitor their own consumption and assess their performance against the average of other app users. The ambition of the eCREW Monitor would be instead to shift the app towards a collective perspective, e.g., by making the eCrewers able to know other eCrewers, to interact to some extent with other eCrewers, to access information not only about their own consumption but also about the eCrew overall consumption, to be compared with other eCrews,....

In the original PeakApp, there are some a few elements that can be changed a collective perspective for the implementation of the eCrew Monitor while other have to be created from scratch.

In the following the main functionalities of the current release of the app are briefly presented (GreenPocket, 2017)⁷:

⁶ *Personal Energy Administration Kiosk App - PeakAPP* was a H2020 RIA project ended June 2019. For more info see <https://cordis.europa.eu/project/id/695945>

⁷ For a detailed description please make reference to PeakAPP deliverables

D 1.2 Documentation of functionalities – system specification

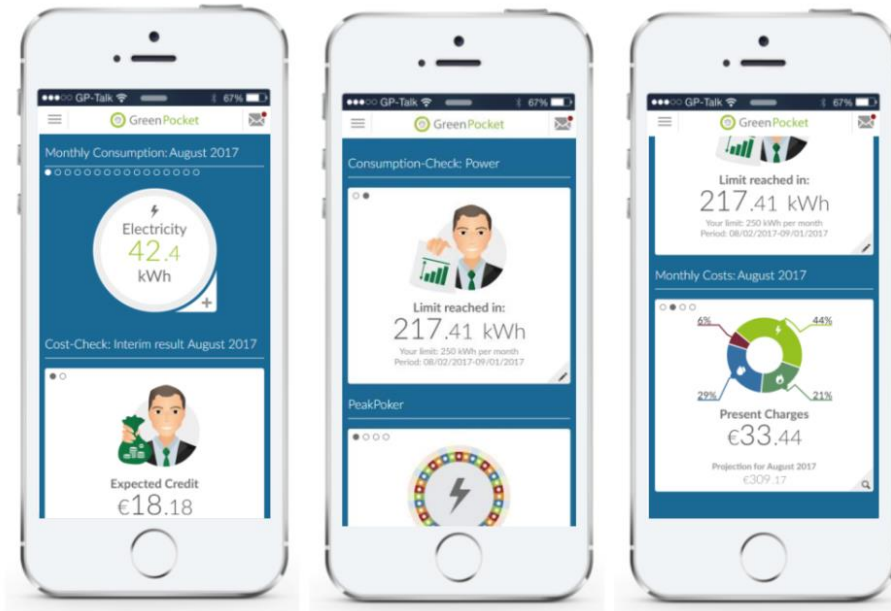
D 1.4 Documentation of functionalities – Serious Game specification

D 2.2 The Smart phone/tablet app

Available at <http://www.peakapp.eu/publications/>.

SAVE MONEY

“Save money” is related to the idea of saving energy costs by applying smart controls (e.g., smart meters)



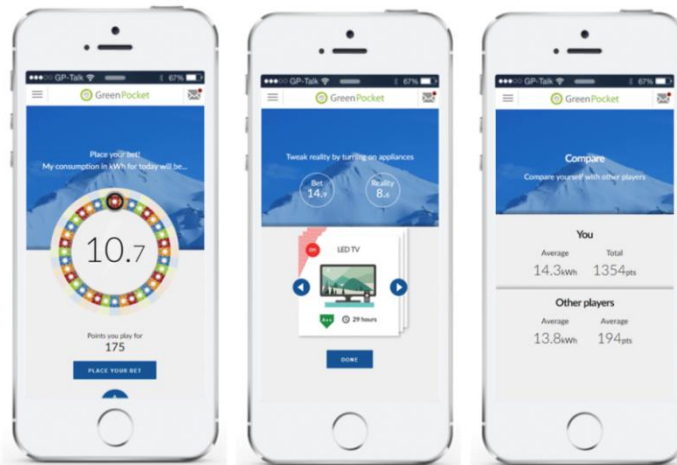
DETECT DEVIATION

“Detect deviation” compares energy consumption, identify irregularities and set the limits of each individual personal consumption. In this section there are graphs to allow users to better understand their energy consumption.



SAVE ENERGY PLAYFULLY

“Save energy playfully” emphasizes that gamification plays an important role within this app. This is used to stimulate and increase energy consumption and compete with friends through PeakPoker; each user can bet about their personal energy consumption and they will see on the next day how good their estimate was. A sort of competition game can be the sharing of every success through Social Media to compares its own result with other individuals. The game involves a sort of score, in which every gamer receives points for good estimates daily; these points can be become a prize to spend in the energy shop.



Other factors that were useful in the implementation of the current version of PeakApp, are:

CONSUMPTION TRANSPARENCY

With the functionality, “Consumption transparency” users gain a quick overview about current meter readings, payroll relevant measurement data, total electricity and gas consumption, with a responsive design for tablet, PC and mobile. Administrator can share smart energy saving tips with their users to help the environment and the fight against climate change.



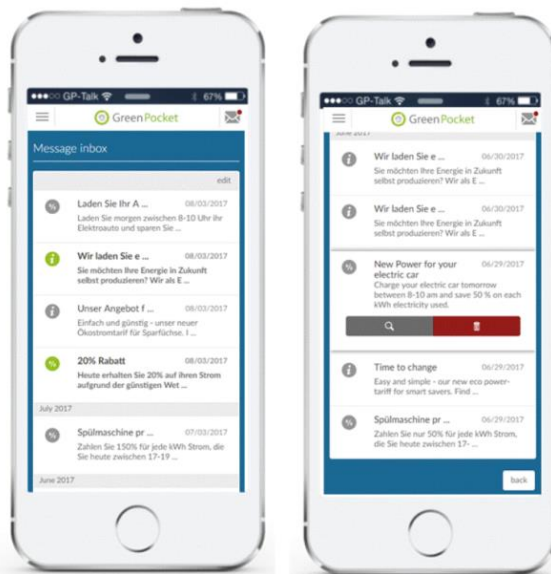
INDIVIDUAL ANALYSES

“Individual analyses” is necessary to increment the awareness of users in the energy consumption; in this section are presented data structured distribution to help the customer to understand his own energy generation, feed in and consumption. Data can be downloaded in a document to access to a more detailed analysis. User can compare its current consumption with its historical data.



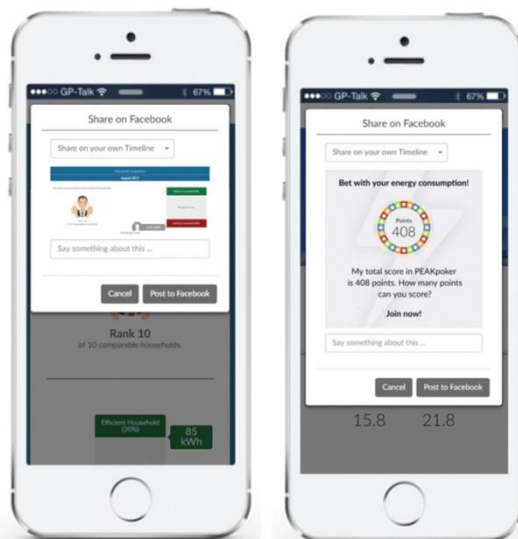
FLEXIBLE DISCOUNTS AND NOTIFICATIONS

“Flexible discounts and notifications” is an intelligent control of client behavior, which controls the consumer behavior and to reduce consumption peaks. The user is informed by a push notification or via e-mail and they will have no more surprises about supplementary payment. Every customer can set its individual limit to be alerted in case of exceeding.



COMPARE WITH OTHERS

“Compare with others” is the section, in which every user can compare its own success, in terms of renewable energy consumption and data consumption with other members via Social Network, as Facebook and Twitter.



GENERATION & SUSTAINABILITY FROM CONSUMER TO PROSUMER

“Generation & sustainability from consumer to prosumer” serves to understand the autarky, that is the percentage of self-generated energy in relation to supplied energy at a glance. A tool to assess the CO₂ balance is also implemented to estimates the individual environmental impact.

4.2. EU REFERENCES OF WEB AND MOBILE APPS TO SUPPORT COMMUNITY BUILDING

In the following are provided a few examples of current European web and mobile applications aimed at supporting community building and maintenance that might play as crucial reference to integrate the collective perspective in the current version of the app described above. The comparative analysis aims at giving a general overview of some best practices already implemented to address the challenge of promoting a collective perspective and it is developed along 3 dimensions: (1) *information about product*, (2) *information about individual level*, (3) *information about collective perspective*. (GreenPocket, 2021)

Example of energy community ict solutions	Information about the product	Information about individual level features	Information about community level features
Sonnen			
Presence of community	Yes	The app offers live data on self- consumption and production of energy and a section describes the	It is possible to contact community members to experience its operation and its products.

How it works	Everyone that owns a PV and an intelligent storage system can join in the community	production capacity of member PVs and its level of autarky.	
App	App android/ios "My Sonnen"		
Country involves in this project	Austria, Germany, Italy and Switzerland.		
Greencom networks			
Presence of community	Yes	In the app, are presented each profile, with personal data of consumption, production.	It is possible to access to the live net consumption of other anonymous members and also, the weekly, monthly, yearly energy usage is visible on the collective level.
How it works	Public buildings support the community with energy production and members pay a monthly fee of 10 euros, plus 5 euros for the smart meter.		
App	"Shine community app"		
Country involves in this project	French and Germany		
Oxygen technologies			
Presence of community	Yes	Members can see their electricity consumption and production data, receive information on environmental arguments and improve their knowledges with some tips about individual energy behavior.	In the app are visualized the aggregate consumption and production, the level of autarky and self-consumption of the community.
How it works	Creation of new energy business models through the platform, thanks to which customers can use better household energy flows, control them and reduce their bill.		
App	Web and mobile app		
Country involves in this project	Germany and Switzerland		
Kisters			
Presence of community	Yes	Representation graphs are used to show users the production of own generating facilities, feed-in and consumption.	It is represented the community behavior of consumption, production, and autarky.
	The platform enables public utilities to connect consumers, producers and prosumers to		



CREW

eESTABLISHING
COMMUNITY
RENEWABLE
ENERGY
WEBS



How it works	regional energy communities and put electricity from renewable energies on the regional market.		
App	No, via web browser		
Country involves in this project	Germany		
Buzzn – people power			
Presence of community	Yes	Customers can visualize their own energy behavior.	Creation of community groups; both consumers and producers can benefit from the purchase and sale of energy.
how it works	It is an energy community and a local community; every owner of a small energy producing facility can join in it and sell the electricity to residents		
App	Not yet available		
Country involves in this project	Germany		
Enyway			
Presence of community	Yes	Portal don't offer any individual data related to customers.	It is possible to create a sense of community, as producers can write about their motivation and history, with the aim of selling their energy.
How it works	It is an online marketplace, in which producers can join it and offer their own green energy; consumers can select any producer they want and buy their electricity		
App	No, only website		
Country involves in this project	Germany		
Senec			
Presence of community	Yes	In the app, a customer can visualize current electricity production, consumption, cloud and battery feed-in, battery charging levels and	There is a package "family & friends", that allows to consume the electricity from the cloud at up to two other measuring points within Germany.
How it works	Customers can feed the		

	excess electricity of their PV into the online cloud	periodical statistics.	
App	Yes		
Country involves in this project	Italy and Germany		
Lition – good energy			
Presence of community	Yes	Every day, users can pick their producers and access to individual consumption data.	Producers decide their own price and they have a personal profile, thanks to which they can show their own information to other members in the platform.
How it works	Customers are connected to renewable power plants in the company marketplace. Several larger green energy producers are under contract. Others can only become sellers on the marketplace if they buy or already have a PV from Lition. Producers can sell excess electricity, which they cannot consume or sell on the marketplace, to the solar community		
App	No, website		
Country involves in this project	Germany		
Example of energy community ict solutions	Information about the product		
Spotty smart energy partner			
Presence of community	Yes	The app shows graphical description of energy consumption and prices.	The app allow for the comparison with similar customer and electricity can be sold to Stromfreunde group, that is the electricity friend.
How it works	Customers can sell and buy electricity from each other and owner PVs can sell their excess of energy to a group of up to 10 members in Austria		
App	Yes, Android and iOS app		
Country involves in this project	Austria		

Efriends energy			
Presence of community	Yes	The app shows ones current feed in and how much of that is sold to the community and how much to Efriends energy. It is also possible to see the graphs about energy consumption. It is also possible to download own consumption and production data.	It is possible to see how much the consumption in the community is; producers can sold their energy, and they can do it for free, for example to their parents, friends etc.
How it works	It is an energy community, in which members are primarily households and smaller scaled businesses		
App	Yes, web app		
Country involves in this project	Austria		
Ourpower energiegenossenschaft			
Presence of community	Yes	Consumers can choose their producers and, as a consequence, the type of renewable energy sources to use.	Prosumers can create their personal profiles, in which they introduce their self and explain their motivation and information about their energy.
How it works	It is a cooperative, in which consumers can buy green electricity directly from regional energy producers. Producers have to join the cooperative to become sellers on the marketplace		
App	No, website		
Country involves in this project	Austria		
Suncontract			
Presence of community	Yes	Representation graphs are used to show users the periodical production and consumption data.	There is an official telegram group to chat and a forum on reddit for all who are interested.
How it works	The model directly connects peers in an open energy marketplace, eliminating intermediaries, enabling peer to peer electricity trading. Via an app, users can enter deals with each other, set prices and share energy amongst one another. Surpluses at the end of the year can be transferred to others or used in the following year.		
App	Web or mobile app for Android/iOS		
Country involves in	Slovenia		



CREW

eESTABLISHING
COMMUNITY
RENEWABLE
ENERGY
WEBS



this project			
I-leco			
Presence of community	Yes	The app provides insights into one's electricity consumption and production in the past weeks, months, and years.	It is possible compare one's electricity consumption with the community average. Moreover, the App monitor the overall energy import and export of the community and ow much of one's green energy is being used in the community. With a gamification feature one can compete with neighbors on a variety of challenges, earn badges, and score points. (GreenPocket, 2021)
how it works	It is a local energy community to allow residents to participate in energy transition to renewable.		
App	Yes, "i.leco prosumer app"		
Country involves in this project	Europe		
Beeta game			
Presence of community	Yes	Every user can access to its personal profile to see the level of its own consumption. The beeta box is necessary to collect data sent by the on-board sensor, that is those installed in the environment and those connected to the energy systems of the house.	Through beeta box, data is collected and sent to the wall display and to a cloud platform, where they are made available to users both through a pc interface and through an app for mobile devices. Every user can also see its position through a score and the position of other members of community.
How it works	Its characteristic is that of gamification, thanks to which user can save money and adopt a sustainable behavior		
App	Beta game app for iOS and Android		
Country involves in this project	Italy		
Vilfredo platform			
Presence of community		The app provides insights into one's electricity consumption and production in real time; moreover, allows users to optimize the energy needs of the building.	The sense of community is given by all users who can monitor the energy consumption and production data of the entire building.
	It contributes to reducing energy consumption in public buildings, offices and industrial plants.		

how it works			
App	Yes		
Country involves in this project	Italy (Emilia Romagna)		

5. Pushing the APP towards the collective perspective: a proposal of functionalities

By taking inspiration from the overview presented in the previous section, in this section the objective is to identify possible tools and functionalities to be implemented in the current version of the PeakAPP that might trigger the introduction of a collective perspective in the eCrew monitor.

In the following therefore some new functionalities are described and assign to 5 different functional categories (1) *identity*, (2) *information and knowledge for shifting awareness*, (3) *training*, (4) *interaction* and (5) *pushing behavioral change*. These categories have been defined on the basis of an additional review of web and mobile platforms aimed at fostering community building in order to systematize the heterogeneous landscape of functionalities currently available online. For each of the category is then proposed to provide a provisional assessment of the potential effects of the functionalities on the crucial aspects for a successful community building described in section 3 as it results from a focus group involving UNITO research team.

5.1. IDENTITY

The aim of this category of functionalities is to “put a face” on the eCrewers, to bring them out of the anonymity and make them transparently interacting and to reach a consensus on the eCrew identity, that is to share a view of the eCrews boundary, mission and objectives. eCrewers should therefore be able to create their own personal profile including as many personal information as possible in order for them to describe both themselves and their interests, motivations, personal goals, including those related to the community. All these info should be shared among the members with the ambition of creating as much as possible a personal interactions among eCrewers to maximize the sense of belonging to the community and make sure that each eCrewers is facilitated in acting as part of a collective.

More in details, the goals related to Identity functionalities are:

- Get a complete picture of the crew members
- Have a presentation of each eCrewers
- Know the thoughts, ideas, motivations and self-representations to improve the community relationship in the aforementioned Crew

- Create its own profile, with own motivation, goals, interests, relevant to decide to join the Crew
- Give importance to each individual eCrewer for community building
- Create a common point, linking the various objectives, aimed at environmental sustainability
- Understand what their idea about the Crew is
- Pick out a collective identity
- Create each eCrewer internal network
- Express mission and expectations about the Crew

Based on the overview of web and mobile apps carried out three functionalities can be implemented:

1. ECREWER PERSONAL PROFILE
2. COMPLETE LIST OF ECREWERS
3. SURVEY

As for the community building requirements described in section 3, the Identity functionalities can contribute primarily to Identity and Trust Building but can also play a role in addressing the need of adopting a Solidaristic approach.

1. ECREWER PERSONAL PROFILE

eCrewers Profile

eCrewer profile is considered as a registration form that every member can complete and update. The idea is to have a page, in which the eCrewer can enter his personal information and outline a presentation of himself, through objectives, motivations linked to the idea of the Crew. The aim is to make each eCrewer known to other members of the Crew.

Personal information to add

For example, information that can be requested in the personal profile are:

1. Name/surname - insert a text field where each person indicates their name and surname
2. Age – insert/enter a number in the field that corresponds to the age of eCrewer
3. Place and date of birth – insert a text field that corresponds to the place, where an eCrewer live, and enter a date for the birth date with this format (DD/MM/YYYY)
4. Profession – insert a text field, that corresponds to the profession of each eCrewer.
5. Family members (who they are) – insert a text field for the name and surname of each family member. We can ask to complete this field because only one person uses the app, but the whole family enjoys the benefits of the Crew.

From question number 6 to number 9, we introduce a collective perspective; all of these are not mandatory requests.

Infact, the following requests ask the eCrew to describe itself to make oneself known to other members:

6. About person (Who I am?) – insert a text field, in which an eCrewer can describe itself with words. Every eCrewer introduce itself.
7. Personal interests - insert a text field, in which every eCrewers can describe which are their interests and hobbies. (e.g.: sport, reading, gardening etc.)
8. Goals about join the Crew - insert a text field, in which every eCrewer can describe which are the potential goals to reach as a member of the Crew.

9. Adjective to describe yourself and other people – insert a text field, in which eCrewer can write 3 adjectives that describe itself, but also, another 3 to describe what would like to find in other members.

Some Examples from the web

1. PLUSH is a forum software to build a community. Figure 1 shows the construction of an example of entering personal information. (<https://plushforums.com/>)

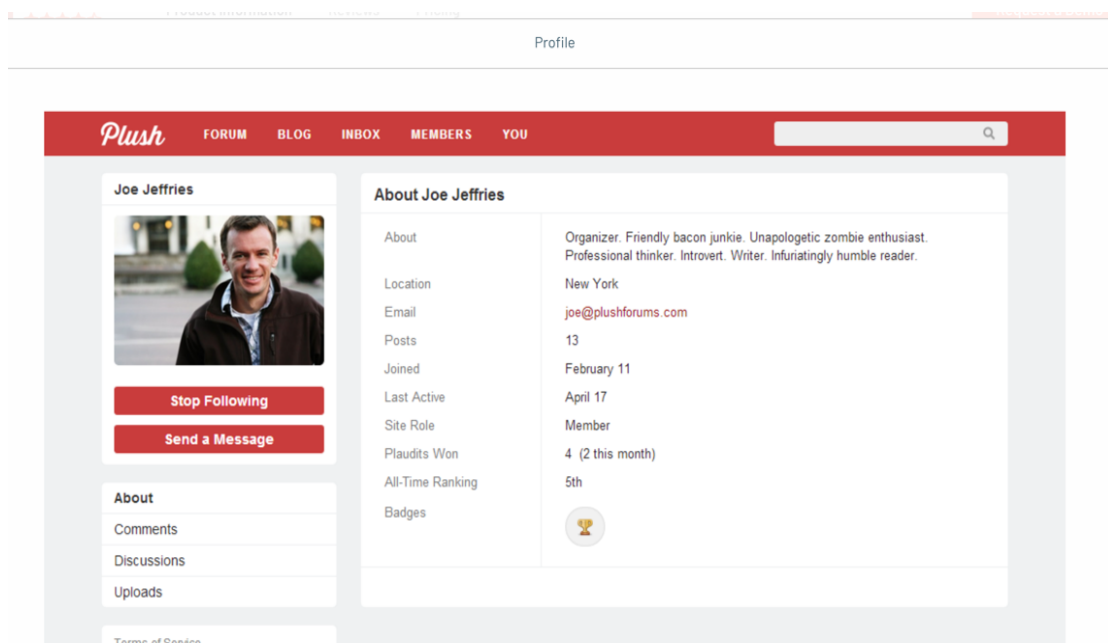


Figure 1 - PLUSH - example of personal profile with informations of every memebers. These informations can be shared with others "eCrewers".

2. FACEBOOK PROFILE is always a useful example, to report the information of every users, e.g., name, surname, origin, interests, goals, information about yourself.
3. MOBILIZE APP implement a software, a strategy and a people solution to offer the building of a new community. There are a lot of examples of potential member profiles. (<https://www.mobilize.io/product/>)
4. BRILLIANT DIRECTORIES is online directory software for any industry. It includes template, tools, customize a website and also tools to manage members etc for the development of a personal profile in eCrew project. In figure 2, there is a form, in which each individual can enter contact information to complete personal profile. (<https://www.brilliantdirectories.com/online-directory-software-solution>)

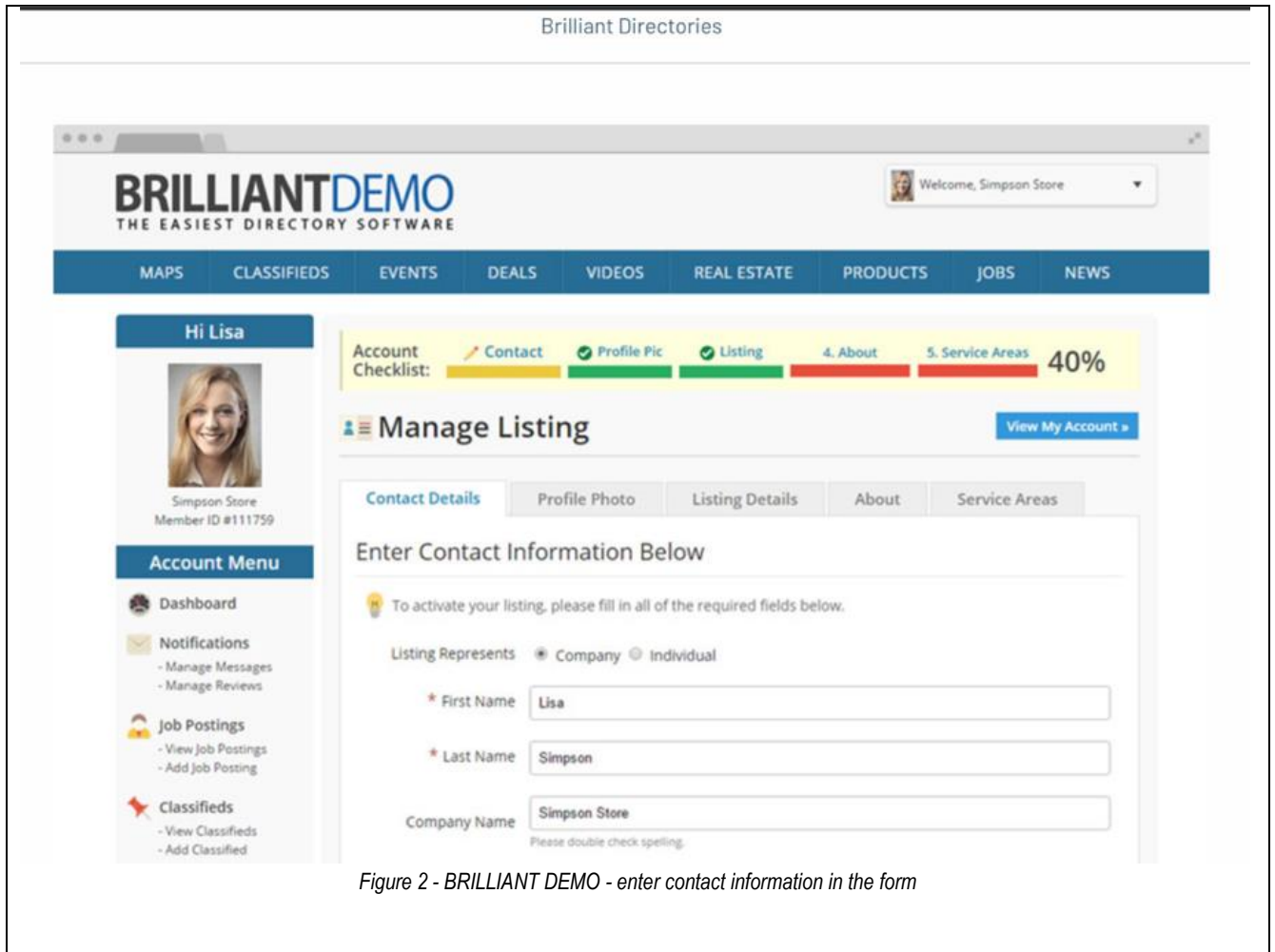


Figure 2 - BRILLIANT DEMO - enter contact information in the form

2. COMPLETE LIST OF ECREWERS

List of eCrewers access

The idea is to build and access the list of all the other eCrewers, in order to see their profiles to "get to know each other". The level of accessibility of information should be linked to the percentage of completion of the personal profile.

eCrewers list in detail:

The aim is to create a list of all the members of the crew. eCrewers can search other members through this list and visit its personal profile. This list can be also become a potential score for gamification, to identify which people are achieving missions set by the Crew.

Some Examples from the web

1. MOBILIZE APP – members of the community can access a complete list of all participants of the Crew; moreover, they can have an overview of all the conversations (<https://www.mobilize.io/product/>)

Member Profiles

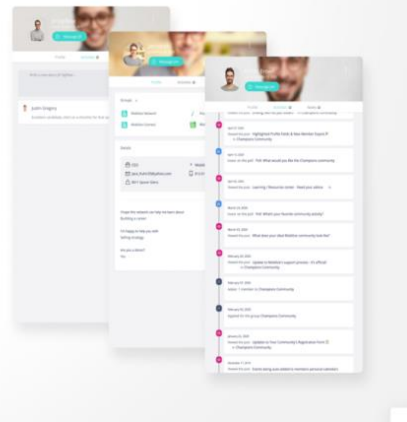


Figure 3 - Mobilize App - examples of member profile settings

3. SURVEY

Survey 1 for eCREWERS

Create a form, in which eCrewers are asked to explain the objectives they want to achieve within the community.

The idea is to create a space dedicated to the interview, where each member will answer questions; such an example, they can get their opinion about eCrew mission, values and activities.

This interview aims to know the eCrewers better and to act in decisions according to their answers.

The survey can be completed at the beginning after registration, later or never (not mandatory survey)

Examples of survey questions (qualitative and quantitative):

1. Why did you decide to join this Crew?
2. Do you think that the introduction of a collective perspective could be useful for this Crew? Yes / no and why
3. What are your goals for this project?
4. What are the features you would like to find in other eCrewers?
5. How important is environmental sustainability in your life?
6. How important is it to express your opinion within the Crew?
 - a. little
 - b. quite
 - c. very
7. What decisions would you like to make within the Crew?

Survey 2 for potential eCrewers:

The Survey 2, is an example to be submitted to, e.g., participants to event where eCrew is presented with the scope to collect and provide info, expectations etc.

NOTE: only if the app is available for being installed by other than eCrew (e.g., available on Gstore and AppStore for people potentially interested).

Examples of survey questions (qualitative and quantitative):

General and 'engaging' questions grouped into three blocks are proposed in this section:

1. Knowledge and awareness about energy transition (e.g. renewables Vs fossils, energy poverty etc)
2. Opinions and proposals for energy transition (e.g. what are in your opinion the most effective strategies to support transition towards renewables?)
3. Experiences and interests in community based initiatives

5.2. INFORMATION AND KNOWLEDGE

Environmental awareness and the use of renewable energy are the heart of the eCrew project. Promoting awareness on the issue of sustainability is one of the fundamental steps for building an Energy Community. In this regard, it is important to inform and update eCrewers on certain issues, useful for the positive development of the Crew.

In this category, information and knowledge for shifting awareness to and from the App can:

- be linked to awareness of key issues, such as: (1) the environment, (2) energy use and consumption, (3) being and acting as a community, (4) sustainability issues.
- be made available by Administrators, by inserting training sessions in the app (with the aim of educating eCrewers on certain issues), to achieve common knowledge on environmental, community, energy use and consumption issues. Themes can also be suggested during blog discussions by eCrewers themselves.
- arrive from the app in the form of notifications that emphasize when and how to use the energy of the Crew;
- be created by the members themselves to discuss their experiences or in any case, more generally, anything that may concern a Crew.

In this case, eCrewers can produce and share contents.

More in details, the goals related to *Information and Knowledge* functionalities are:

- Educating eCrewers on the fundamental issues of the development of this project
- Propose training to help members in participating in energy transition
- Have information on the consumption of all aggregates

- Receive notifications for the right energy consumption by the Crew
- Receiving Information (from the system to the eCrewers), in particular, a type of Dashboard continuously updated on the individual and collective perspective:
 - information on one's own energy performance (environmental and economic)
 - possibility to see the behavior of the aggregate (eCrewers)
 - contribution of the individual to the performance of the group

Based on the overview of web and mobile apps carried out two functionalities can be implemented:

1. INFORMATION AND EDUCATION
2. OVERALL CONSUMPTION

As for the community building requirements described in section 3, the *Information and Knowledge* functionalities can contribute primarily to Motivation and Trust but can also play a role in addressing the need of adopting a Solidaristic approach and pave the way for adopting Participatory approaches to decision.

1. INFORMATION AND EDUCATION

Information and education

Create a space, in which eCrewers can find more information about events and administrators can create some kind of lessons to educate members on issues related to both the community, as well as other emerging issues, e.g.:

- Community;
- Energy community;
- Energy and environment.

The online training will last a few minutes, in order to give everyone the opportunity, in terms of time, to participate.

Section:

This section is divided in:

- Online/Offline events, with the purpose to meet and know others, to participate a community-related events etc;
- Information trainings are so important to educate eCrewers on certain topics, decided by the administrators or through the request of the eCrewers (e.g.: a short video that talk about the effects of climate change or explain what a energy community is);
- Meetings are a relevant tool to create videoconferences between crew members and administrators;
- Tutorial with the aim to teach eCrewers something; e.g.: how to use the app (As Greenpocket has already done).

Some Examples from the web

1. VIRTUAL EVENT HUB - Example of a section dedicate to events. The Virtual Event Hub is a central events repository where people can get access to a singular view of Microsoft Community Events. Administratrir or member can create an event page and it could also be recreated in PeakApp. Website: <https://www.virtualeventshub.com/>
2. MOBILIZE APP – this App can show a good way to organize events (organization of events calendar, online and offline, if the pandemic situation allow). Website: <https://www.mobilize.io/product/>
3. MAGENTRIX CUSTOMER SUCCESS – A web portal that allows people to enter in a Community and propose different way of learning. In this case, we can cite the example of FALCONTECH. Website: <https://www.magentrix.com/prm>
4. NEWCOMERS (exploring new energy communities) a website and online platform of project for education, awareness-raising and networking, focusing on energy communities, energy transitions and related topics. Website: https://www.newcomersh2020.eu/newsletter/kFk?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter01

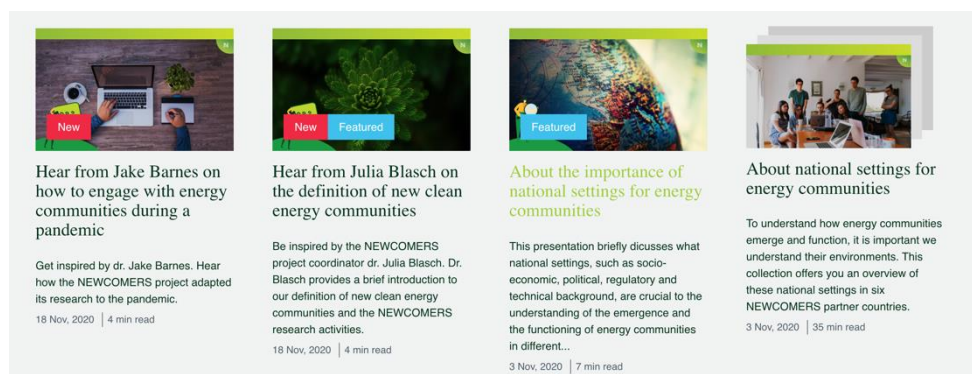


Figure 4 - NEWCOMERS - e.g. educate people to something

5. INFLUITIVE – Part dedicated to tutorials or trainings, which is useful as an example to repeat for the eCrew project. Website: <https://influitive.com/>

6. ZAPNITO – (community software) shows an examples of videoconferences, which can be proposed between eCrewers. Website: <https://zapnito.com/>



Figure 5 - ZAPNITO - online meetings

2. OVERALL CONSUMPTION

Overall consumption

The purpose is to create a section, in which eCrewers can view a comparison table and also, combine datasets:

- visualization of CREW energy consumption (kWh)
- energy production (kWh)
- autarky level (%)

In the same section, every eCrewer can see his consumption and the consumption of the other members introducing the collective overview, thanks to data-driven conclusions:

- Better / worse than CREW consumption;
- Better / worse than CREW self-consumption;
- Peak times: CREW consumption / production.

Overall consumption in details:

- Display for all CREW members: excess energy, x kWh / % consumed by CREW members;
- Display CREW member with PV: x % / kWh of my excess production was consumed by CREW members;
- Display CREW members with CREW energy usage: I was able to save x cent by consuming CREW energy;
- Display: CREW members with PV: I received x cent by selling my produced energy.

Some Examples from the web

1. DISCIPLÉ – a community platform.
2. Using this feature for eCrew, both individual energy consumptions and the entire Crew can be shown on one page using graphs. Website: <https://www.disciplemedia.com/>



Figure 6 - DISCIPLÉ - overview of consumption of all members of the Crew

5.3. INTERACTION

This section is dedicated to all the interactions that take place both between peers and in some case, also between administrators. In this regard, Social Interaction can therefore be defined as a process of more or less long duration, between two or more actors, who mutually orient their actions towards each other, thus influencing the motivations and development of this action and producing more or less intense effects of association. (Enciclopedia delle Scienze Sociali, 1996)

In this way, by offering the right tools, both online and offline, to encourage interaction between eCrewers, greater possibilities for cohesion within the Community can be developed. The purpose is that to create a forum, that is a part where people can interact with each other in real time. The interaction can also take place offline, thanks to the creation of events or workshops, in which all eCrewers can participate.

The interaction takes place between peers/members, as an exchange space for opinions, personal experience or ideas.

More in details, the goals related to *Interaction* functionalities are:

- Make eCrewers feel part of a community
- Interaction between eCrewers
- Create a point of reference both between peers and with administrators
- Create a common arena for mutual exchange and mutual help
- Create a virtual room in which eCrewers can exchange thoughts and opinions, to strengthen their identity
- Make it possible for people to share their personal experiences in terms of the community.

Based on the overview of web and mobile apps carried out one functionality can be implemented :
FORUM/CHAT

As for the community building requirements described in section 3, the *Interaction* functionalities can contribute primarily to Trust and Participatory approaches to decision but can also play a role in reinforcing Motivation and Collective Identity.

1.FORUM

Forum/ discussion groups

The intention is to produce a forum, that is a part where people can interact with each other in real time. Furthermore, this place will also be used for online trainings.

Sections/parts that can be implemented in this section are:

- Messages – inbox, an eCrewer can send messages to others.
- Announcements by administrator/moderator (task 2.2)
- Space of discussions – share its own opinion
- Blog – space in which people can write its own experience about eCrew and community (such as article) – eCrewers can leave comments below the blog and open a discussion.

Some Examples from the web

1. MUUT – software for commenting and forums. Comments and discussion made by other members of the Crew. E.g., eCrewers can leave comments below articles, written in the blog (<https://muut.com/forum/>)
2. HIGHER LOGIC ONLINE COMMUNITY – An example of private community platform that helps members of community to better use the potentiality of this tool.(<https://www.higherlogic.com/why-higher-logic/>)

3. TRIBE – Its aim is that of customize the online community platform to to respond effectively to the needs of potential users. Individuals (or potential eCrewers) can access to different tools, such as pools, comments, articles, forums, blogs, chat and other multiple type of contents (<https://tribe.so/communityplatform>)

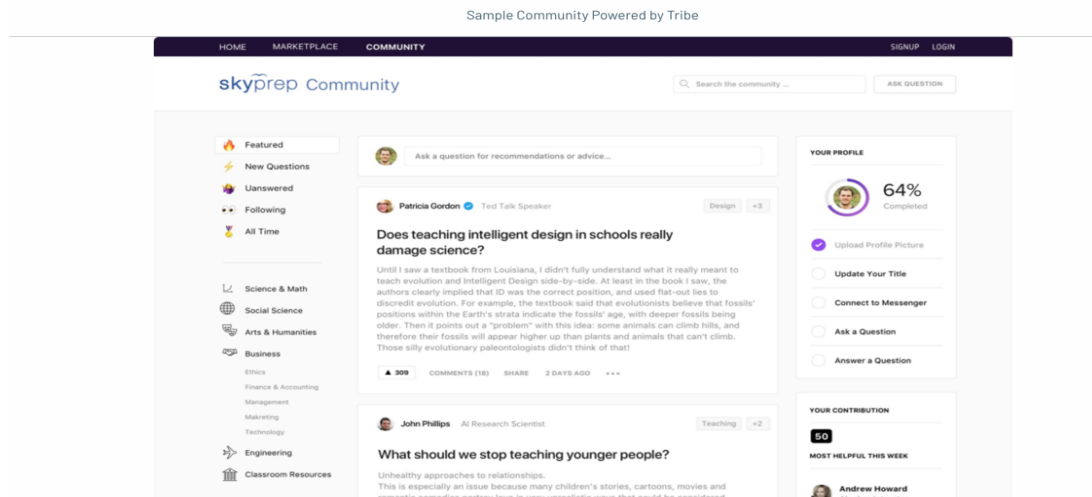


Figure 7 - TRIBE - example of community

4. MUUT – An example that show a way to the message exchanges between peers or eCrewers(<https://muut.com/forum/>)

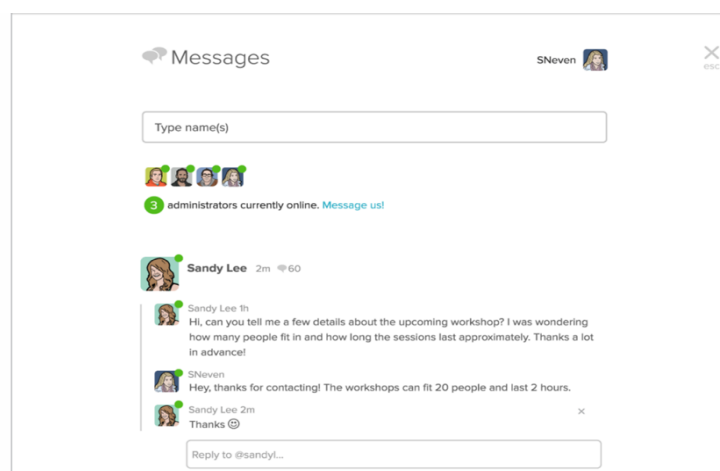


Figure 8 - MUUT – Example of message exchanges with other members

5.4. BEHAVIORAL CHANGE

We try to bring the eCrewers into a collective perspective, exploiting the energy produced for the Crew, in non-selfish terms. In this way, The energy that is produced within each Lighthouse Community must be rationalized equally among all its members. The enhancement of sharing within the Crew is very important, in order to affirm the collective perspective, in an altruistic view.

If it is feasible, the intent is to push downward a conditioning of the action of a community perspective; for example, it would be appropriate for an eCrewer not to abuse and selfishly consume the renewable energy produced, but also to take into account that other members can use it. In this way, each eCrewer should remain within a range determined by the performance of the collective.

Gamification can be the key of this category, as it can entice eCrewers to implement actions in a collective perspective. Gamification is the use of game design elements in non-playful contexts other than the game, with the aim of motivating people to achieve their goals. According to the author Gabe Zichermann, gamifying “is thinking, designing and relocating mechanics, dynamics and game elements in everyday systems or processes with the aim of orienting oneself to solving concrete problems or, in parallel, to motivate specific groups of users”. (Gabe, 2011)

This can be done through:

- Dedicated section from the app where objectives and actions are defined;
- Challenge, missions, point games, objectives to be achieved can encourage users to give their best in the field of environmental sustainability;
- The implementation of a progress toolbar;
- Well-balanced challenges between individual performance/ action and construction/ support;
- For the community, beyond the idea of challenges between members, it is important to underline group goals and reach them;
- Improve ideas and visibility through gamification;
- Creation of national and global rankings.

More in details, the goals related to *Behavioral Change* functionalities are:

- create cohesion within the Crew
- To stimulate eCrewers to make the best use of renewable energy
- Through gamification, set the goals that the community should achieve
- Creating challenges among members to stimulate them to implement better and sustainable behaviors within the community
- build loyalty

Based on the overview of web and mobile apps carried out different features can be implemented that refers to the wider typology of GAMIFICATION

As for the community building requirements described in section 3, the *Behavioral change* functionalities can contribute primarily to the Motivation of members to remain involved but can play a relevant role also in reinforcing Trust and Collective Identity with potential effect on fostering Participatory approaches to decision.

Gamification

Section for the definition of eCrewers:

- Goals (objectives to be achieved as a Crew)
- Missions (mission to complete and to confront the other crew members)
- Challenges (challenges to complete)

- Point (each completed mission will correspond to a score result)
- Best performance (all members have to try to reach its own best results)

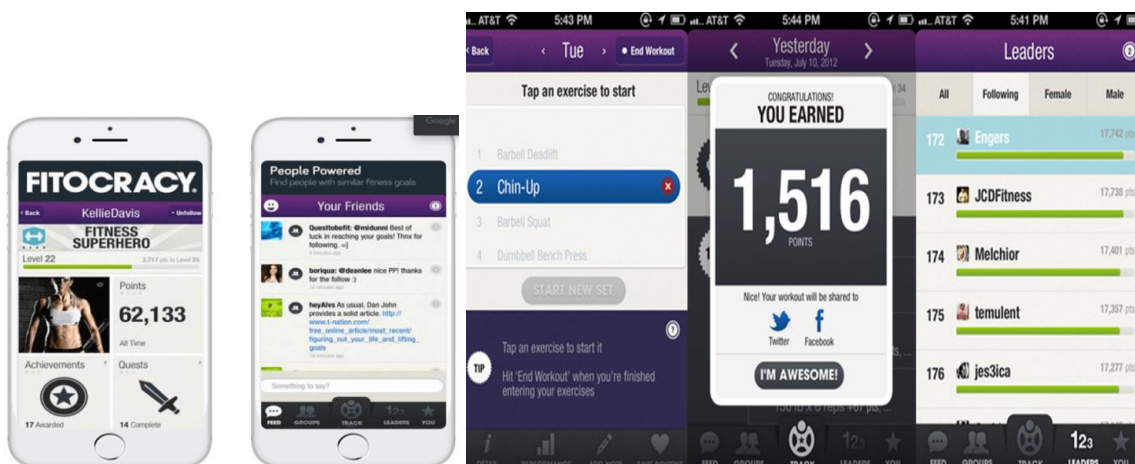
- Scoring (see above)

- National / global ranking (Germany, Spain, Turkey) (This ranking can be done through Social Network, as Instagram, Facebook, Twitter etc)

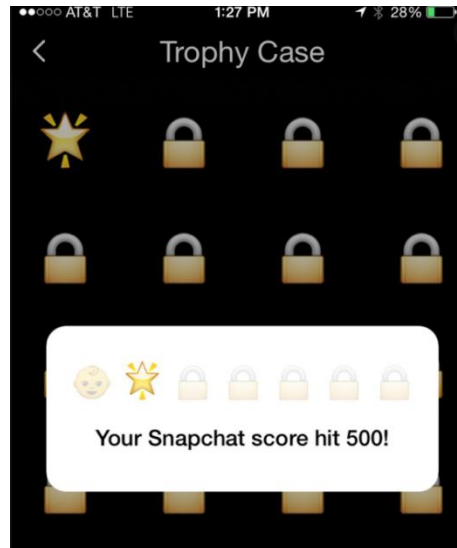
Please note: Gamification is used to induce people to consume the renewable energy coming from the Crew in the best possible way and to implement a collective perspective and NOT to create competition mechanisms.

Some Examples from the web

1. FITOCRAZY – Example of APP to getting in shape; the gamification aspect of the app comes in when Fitocracy encourages users to complete various fitness levels, awards badges and prize when a participant win, and creates competitive challenges. Website: <https://www.fitocracy.com/>



2. SNAPCHAT – its aim is to connect people, in an easy way, with gamification tool. More a user utilizes the App, more he will earn trophies and more he will get rewards. Website: <https://www.snapchat.com/l/en-gb/>



3. TODOIST – It is a productivity App that encourages people to put into practice the good intentions that everyone sets out to achieve in their daily life. The more goals a user achieves, the more he will be able to access high positions in the ranking and win prizes. Website: <https://en.todoist.com/it>

5.5. PARTICIPATORY AND INCLUSIVE PROCESSES

With this section, the aim is to identify the importance that eCrewers have within the decision-making process, as they, acting as a community and make the decisions to reshuffle the cards at stake (Crew trend).

It is very relevant build a relationship of trust between peers, towards the project and towards the administrators. By creating a relationship of trust, you can foster greater active, collaborative and effective participation among eCrewers.

More in details, the goals related to *Participatory and inclusive processes* functionalities are:


- Relation of trust between peers and administrators
- Act as a community
- Decisions at the bottom up level
- Collective decision making

Based on the overview of web and mobile apps carried out a dedicated system to involve eCrewers in the

decision making process can be implemented to define mission and objective of the community: the ECREW STRATEGY

As for the community building requirements described in section 3, the *Participatory and inclusive processes* functionalities can of course contribute primarily to the Participatory approaches to decision but they could have a relevant impact also on Motivation of members to remain involved and on reinforcing Trust and Collective Identity with potential effect on expanding the Solidaristic approach.

1. ECREW STRATEGY

eCrew strategy	
<p>People can discuss about decisions of the Crew to reach the best results as a collective perspective and foster bottom-up decisions and initiatives.</p> <p>Democratic tools, such as poll and vote, are used to give all eCrewers the opportunity to express their opinion and consequently, based on the majority reached, to be able to implement it in the Crew.</p>	
Some Examples from the web	
<p>1. This is an easy but effective example of how a participatory decision making process (voting) might appear</p> <div style="text-align: center;">  </div>	

In the table below summarizes the results of the assessment of the potential effects of the functionalities described above on the factors that might affect community building identified in section 3

		Community building crucial aspects (see section 3)				
		Identity	Motivation	Trust	Solidarity	Participation and decision making
Category of Functionalities	Identity	P		P	S	
	Information and Knowledge		P	P	S	
	Interaction	S	S	P		P
	Behavioral change	S	P	S	S	
	Participatory/inclusive .. processes	S	P	S		P

6. Pushing the APP towards the collective perspective: the functionalities implemented in the eCREW monitor

The functionalities introduced in the chapter before are a collection of potential solutions to achieve the overall goals of the eCrew project through the enhancement of the collective perspective. These are examples how to support the goals by introducing software features to the App. During the project there have been discussions about the scope and the prioritization of the functionalities to be implemented within the eCrew App. The discussions included whether or not some functionalities might be more sufficiently realized with an equivalent solution outside the eCrew App such as the conduction of customer surveys or an eCrew forum. Furthermore, we found our own solutions for addressing the goals of the project.

The criteria catalogue which forms the basis for the selection and prioritization consists of:

- Impact to achieve the overall eCrew goals
- Uniqueness of the feature
- Technical feasibility within the APP
- Fit to the realities within the lighthouse communities
- Future Market relevance and dissemination potential

The table below shows the results of the decision process.

Goal to achieve	Feature	Solution in eCrew APP
Strengthen Identity	eCrewer Profile List of eCrewers Surveys	My Data page eCrew Administration accessible via link on eCrew Dashboard
Information and knowledge for shifting awareness	Information and education Overall consumption	eCrew Dashboard eCrew Analysis page
Interaction	Forum / Chat	Is not realized within the eCrew App
Pushing behavioral change	Gamification PV Amortisation calculator	Is not realized within the App eCrew PV Amortisation Calculator
Influencing from the bottom up	eCrew Strategy	Is not realized within the App

With this set of features the eCrew App therefore concentrates on the following main tasks:

- Allow for in depth consumption transparency
- Provide the eCrew user with individual analyses
- Enable the benchmarking and comparison with others
- Support the way from consumer to prosumer

The list of implemented features contains:

1. eCrew Dashboard
2. eCrew Analysis
3. eCrew Administration
4. eCrew Tariff System
5. eCrew PV Amortisation Calculator

As described in the following, first steps in the direction of pushing the collective perspective as a leverage for community building and eCREWs successful implementation are represented by feature 1, feature 2 and to some extent feature 4.

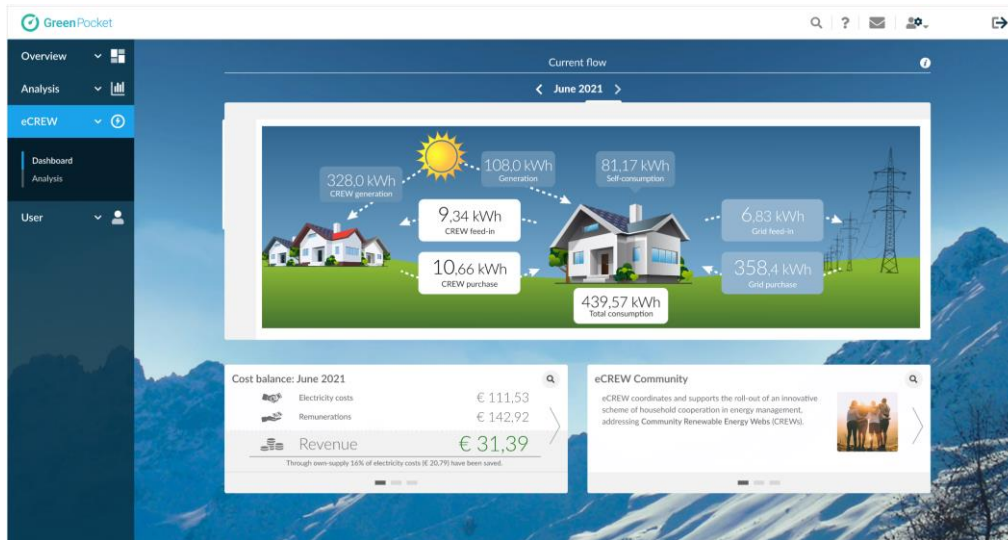
1. eCrew Dashboard

Section for the monitoring of own performance with the eCrew:

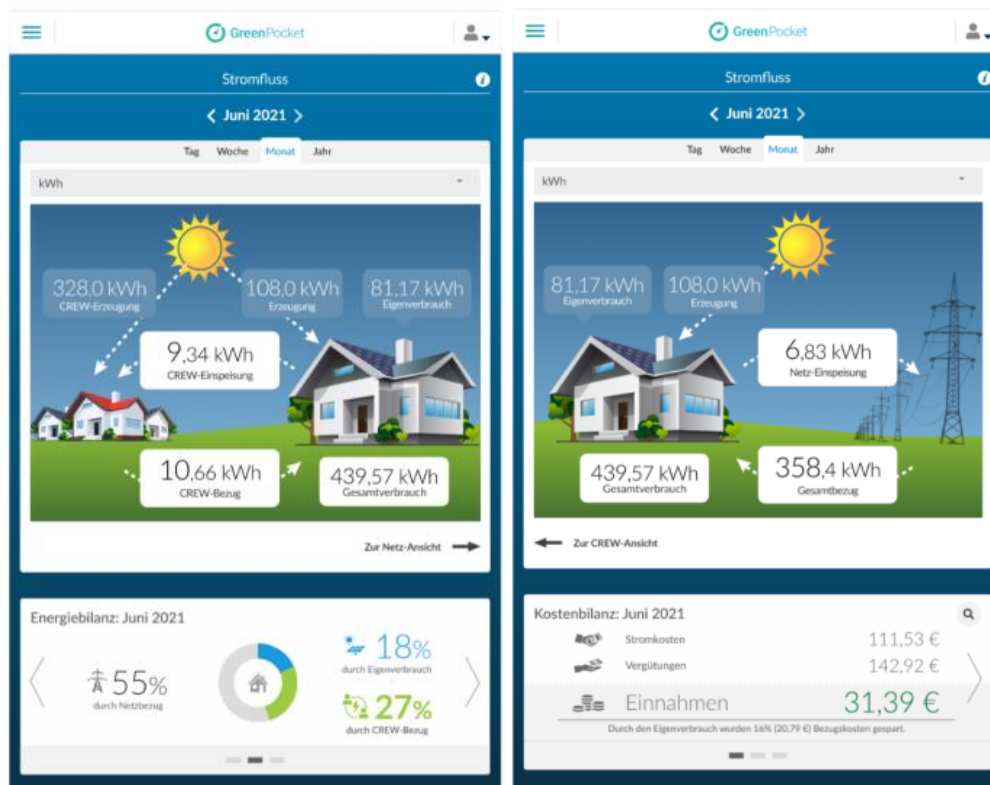
The dashboard allows the eCrew user to access the most relevant data easily. It is possible to select different timeframes for the analysis as well. It consists of the following components:

1. Energy flow diagram, which visualizes the electricity flows within the energy system. The user can also see these flows in monetary units.
2. A detailed view listing the monetary savings for electricity production and costs for electricity consumption. The benefit for the user is to see, whether or not he/she gained a surplus by being part of an eCrew.
3. The energy balance widget visualizes the origin of an user's electricity supply.
4. The autarky widget shows the autarky level in days and also the comparison to average of the eCrew he is part of. It enables the user to understand if he performs better than his crew members or not.
5. A customizable widget for the crew membership. It shows information about the eCrew the user resides in and strengthens the identification with the crew.
6. With the help of the "my Crew" widget the user can also access in depth information about the Crew. The user will receive information about the number of crew members within the Crew, as well as the monthly changes.
7. The last widget will inform the eCrew user about possible events, eCrew project related news, potential gatherings. This information will be provided from the eCrew administrator.

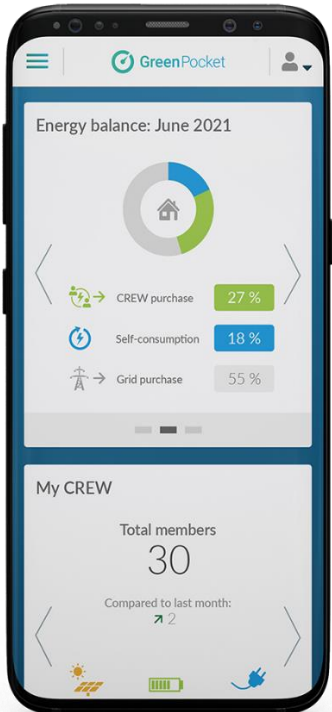
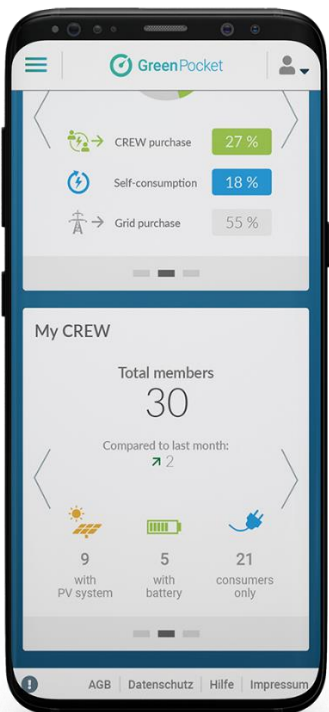
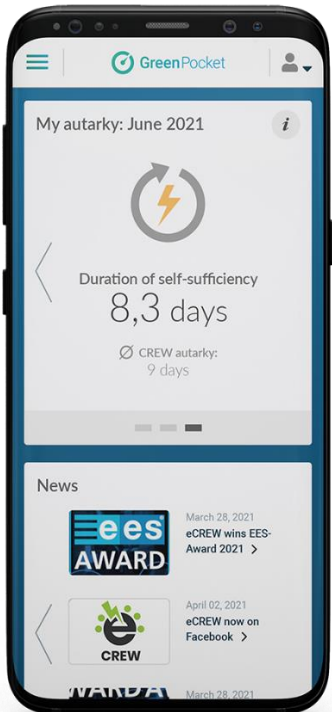
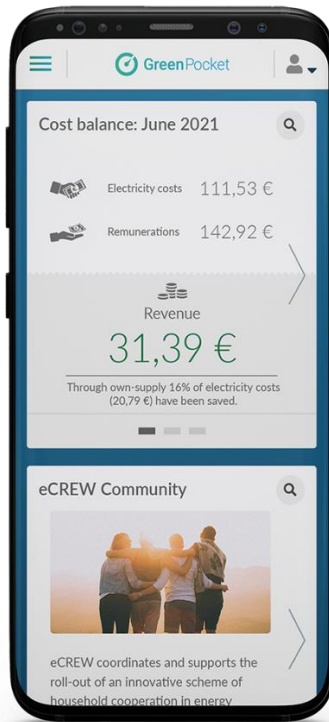
Dashboard in desktop view



Dashboard in tablet view:



The dashboard in mobile view:



2. eCrew Analysis page

Section for in depth analysis of individual and crew production and consumption:

The analysis page enables the eCrew user to analyse the production and consumption of his own meters and the aggregated data from the whole crew. The following functions can be conducted for a single user and for the overall eCrew. The functionalities include:

1. Presentation of the consumption in kWh, of the costs in Euro and CO₂-Emission in kg/CO₂
2. Forecast of the consumption, costs and CO₂-Emission
3. Selection and display of the consumption according to tariff zones (tariff use)
4. Presentation of production (full feed-in, surplus feed-in) in accordance with feed-in and self-consumption
5. Comparison of production (production as well as feed-in and self-consumption) with power-consumption
6. Presentation of the income from production (feed-in and self-consumption)
7. Summary box: Display of the minimum- and maximum value, as well as the sum of the consumption/feed-in
8. Data tooltip: Display of detailed information of a period to analyse
9. Blocking of the Y-axis for better comparison
10. Display of the date (time of day) of the last data delivery
11. Display of the tariff history in the cost analysis
12. Selection of different temporal resolution in the analysis (day, week, month, year)
13. Navigation to past periods for analysis (day, week, month, year)
14. Comparisons: Comparison with the previous period and comparison with the average
15. Export of all consumption- and production values for each metering point (Excel)
16. Selection of single metering points for each analysis (more than one metering point per sector)

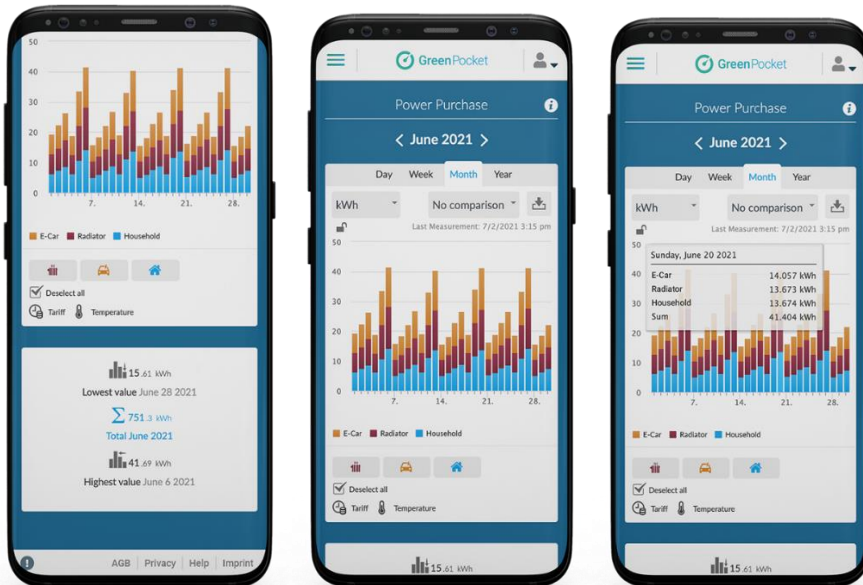
Desktop view:



Tablet view:



Mobile App view:



3. eCrew Administration

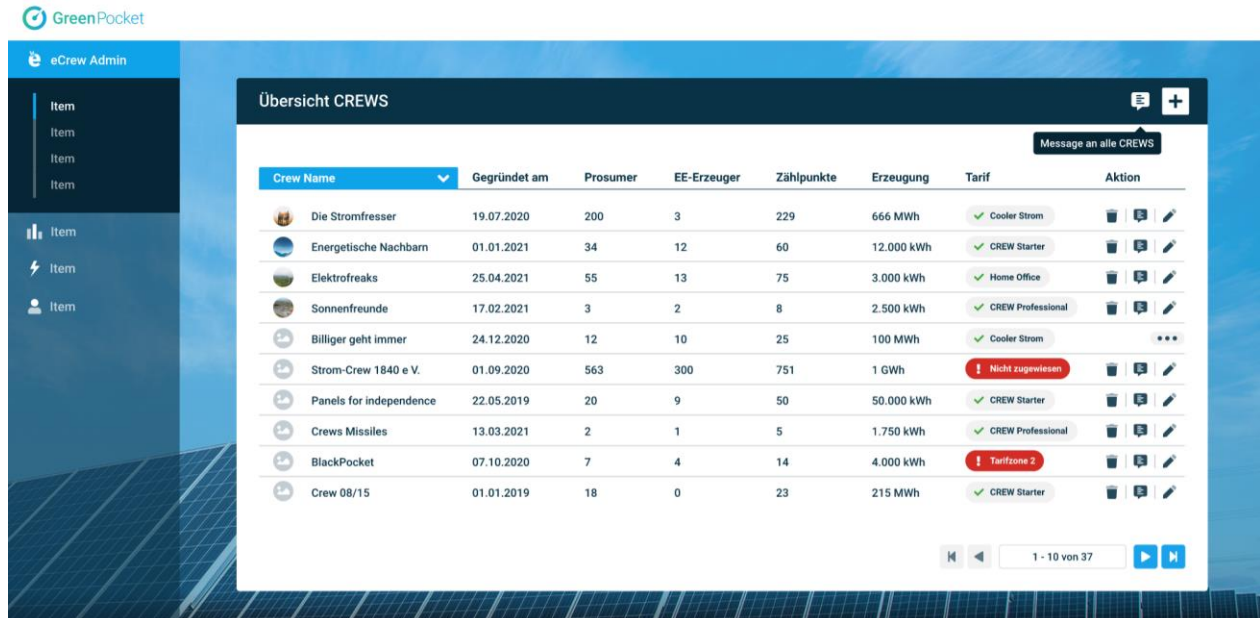
Section for eCrew administrator to create and alter eCrews:

This feature enables the eCrew Administrator role to administer the clients within the eCrew App. It is optimized for easy use and fast creation client groups (e.g. eCrews) within the GreenPocket Platform. The administrator has an overview table at hand where he or she can see important data about the existing crews within the tenant system.

The functionalities include:

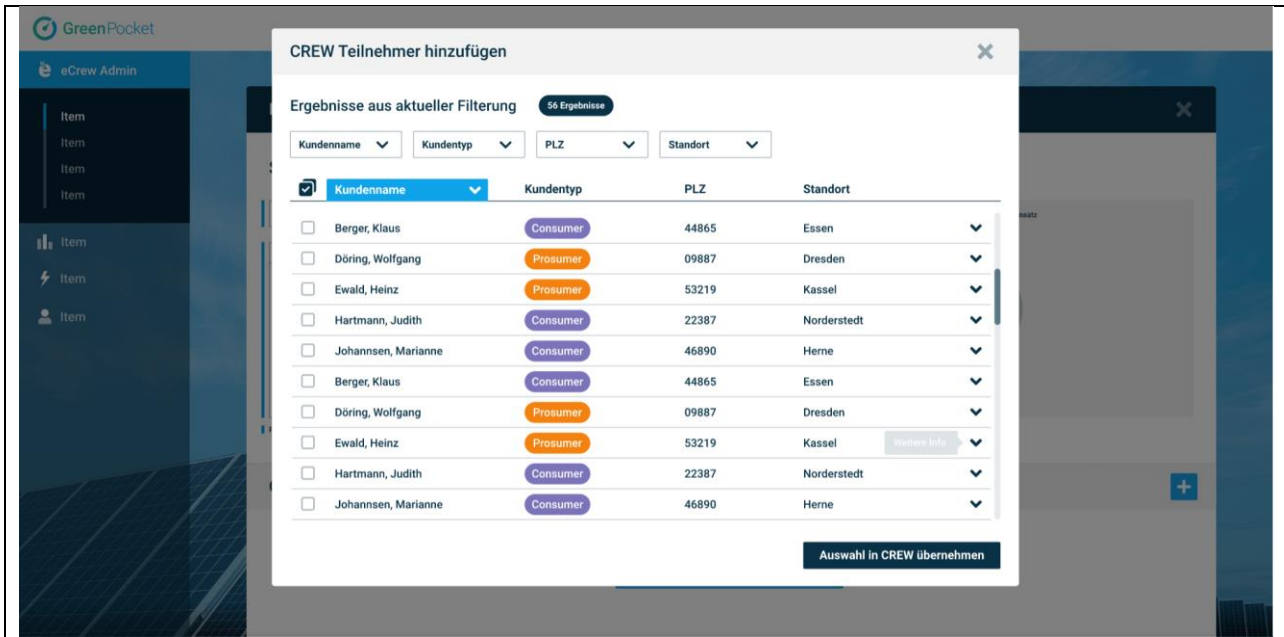
1. Creation and deletion of whole Crews
2. Adding master data such as names, description and pictures to a crew for personalization and individualization purposes
3. The administrator can add and remove eCrew members
4. eCrew can be compile by filtering client data of different kind
5. The administrator is able to assign tariffs to the created crew
6. Messages can be sent to all crew at once or only to individual crews and appear on the eCrewers dashboard

Desktop view:



The screenshot shows the 'Übersicht CREWS' (Crews Overview) interface. It features a table with columns for Crew Name, Gegründet am (Founded), Prosumer, EE-Erzeuger (EE-Producer), Zählpunkte (Meters), Erzeugung (Production), Tarif (Tariff), and Aktion (Action). The table lists 11 different crews with their respective statistics and assigned tariffs.

Crew Name	Gegründet am	Prosumer	EE-Erzeuger	Zählpunkte	Erzeugung	Tarif	Aktion
Die Stromfresser	19.07.2020	200	3	229	666 MWh	✓ Cooler Strom	[Icons]
Energetische Nachbarn	01.01.2021	34	12	60	12.000 kWh	✓ CREW Starter	[Icons]
Elektrofreunde	25.04.2021	55	13	75	3.000 kWh	✓ Home Office	[Icons]
Sonnenfreunde	17.02.2021	3	2	8	2.500 kWh	✓ CREW Professional	[Icons]
Billiger geht immer	24.12.2020	12	10	25	100 MWh	✓ Cooler Strom	[Icons]
Strom-Crew 1840 e.V.	01.09.2020	563	300	751	1 GWh	! Nicht zugewiesen	[Icons]
Panels for independence	22.05.2019	20	9	50	50.000 kWh	✓ CREW Starter	[Icons]
Crews Missiles	13.03.2021	2	1	5	1.750 kWh	✓ CREW Professional	[Icons]
BlackPocket	07.10.2020	7	4	14	4.000 kWh	! Tarifzone 2	[Icons]
Crew 08/15	01.01.2019	18	0	23	215 MWh	✓ CREW Starter	[Icons]



4. eCrew tariffs

Section for eCrew administrator to create and alter eCrews:

In order to address different kind of electricity tariffs and the eCrew incentivizing tariff system, the backend tariff system has to be expanded to 4 news types of tariffs to account for eCrew requirements. Tariff data will most likely only be imported, since we don't want the user to be able to change it own during the project lifetime.

1. External supply price
 - Whenever electricity is purchased from the supplier, the consumer pays the external supply price. This is a standard supply tariff and is part of every electricity supply contract.
2. External sales price (feed-in tariffs)
 - The feed-in tariffs (i.e. external sales price) are the remuneration that prosumers get for every kWh of electricity sold to the grid/supplier/etc. (instead of selling it to the CREW).
3. eCrew internal supply price
 - The internal supply price is paid by consumers whenever their electricity demands are met by CREW prosumers' surplus PV or other renewable electricity production in the CREW.
4. eCrew internal sales price
 - In eCREW, we denote the remuneration that prosumers get for every kWh of electricity sold to the CREW (instead of selling it to the grid/supplier/etc.) the internal sales price.

Since this is an internal feature to the backend-end unit, no screenshots of a front-end can be provided.

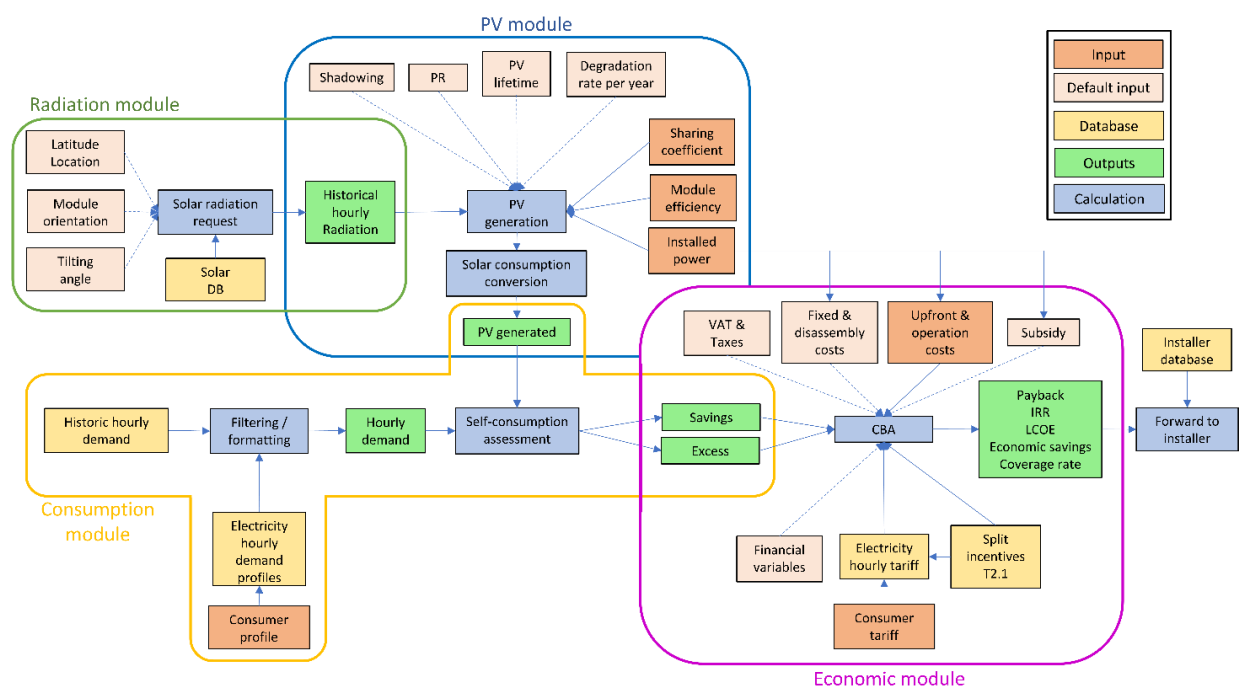
5. PV amortization calculator

This feature will allow every crew user to check, if the household is suited for a PV system, which size is optimal for it. Furthermore, the user will be provided with information about the economics of the system in dependence of his location and his demand. The goal is to increase prosumer numbers within the eCrew project by increasing transparency about the economic feasibility of a PV system for each user. The feature will have an user interface in which the eCrew user will state information necessary for the backend calculation and some data which is derived from his load profile and his location data. In combination with additional data and information (e.g., the attributes about the property he/she is living in etc.), it is possible to estimate an optimal pv-system. The details of the feature are explained in deliverable 3.2 - Specification for PV and battery storage simulation and self-consumption assessment.

The amortization calculator will have 4 main different stages:

1. Accessing the energy demand of the user
2. Acquisition of property related data
3. Calculation of the economic feasibility
4. Visualization of optimal PV system and monetary KPIs for the user

The user interface and backend unit is currently under development. The figure below visualizes the different modules of the PV amortization calculator.



7. Conclusion

This Deliverable has the primary objective of providing a few theoretical references and a list of practical tools (the eCREW monitor) to improve the current release of the PeakAPP application in the direction of fostering a collective perspective within the eCrews with the final aim of enhancing prosuming and the efficient use of energy produced from RES.

The features aimed at addressing these challenges from an individual perspectives have already been implemented in the current release of PeakApp with the aim of evaluating, analyzing and stimulating the efficient energy consumption of the households involved in the project. The added value of this Deliverable is therefore the proposal of features at a community level, able to shift sustainable energy consumption from the individual to the collective level of the eCREWS considered as a whole

If the PeakAPP release plays as the technical starting point for the eCREW monitor, the Energy Communities model, and the requirements for its successful implementation, plays as the theoretical backbone on which effective ICT tools should be designed. ECs in fact have been gaining relevance in addressing some of the challenges of energy transition for what concerns the exploitation of RES and the empowerment of citizens role through the means of collective action. Although merely virtual, eCREWS can be considered as an instance of the ECs model and therefore their successful implementation can be supported by the careful consideration of the common factors that seem to affect generally community building processes: *collective identity*, *motivation* of people to join, *trust* (among community's members and against third entities) as a requirement and effect of collective action, *solidarity* as a pillar around which building community's mission and objectives, *participatory decision making* as a tool to strengthen the community itself and the achievement of collective goals.

Many different strategies and dynamics might contribute to feed these factors and we went through some of them in the deliverable *2.4 Collective Action Plan*. As for the support that might be provided by proper ICT tools, in this deliverable we identified five categories of functionalities commonly detected in web and mobile applications that might affect, more or less indirectly, these factors, namely: *Identity*, *Information and knowledge*, *Interaction*, *Behavioral change* and *Participatory/inclusive processes*.

With respect to these five categories 8 functionalities have been explored in details and some examples for their implementation in the eCREW monitor have been provided as well as a preliminary assessment of their potential contribution in fostering the factors supporting community building. Then, on the basis of this 'wishes list' of possible functionalities according to feasibility criteria and the technical needs of the eCREW model implementation, five functionalities have been selected for their actual implementation in the eCREW monitor: eCrew Dashboard, eCrew Analysis, eCrew Administration, eCrew Tariff System, eCrew PV Amortisation Calculator.

Although not fully inspired by the above mentioned collective perspective, still it is worth to highlight that to some extent these functionality can actually be considered as first steps towards the community building support. The choice of a dashboard that allows individuals to view their consumption, but also those of the Crew, effectively and in real time, is a strong point in the development of collective perspective. This, in fact, allows members to be aware of what is happening around them and to increase the sense of belonging in the community. In this Dashboard is added the energy cost and consequently the savings, that based on the Tariff System, each member obtains also thanks to his participation in the Crew. Also, communication within each Lighthouse

Community is fundamental, as Administrators can send messages to all eCrewers. This is a key element in maintaining and building relationships and trust within each Crew and motivating individuals to collaborate each other. Moreover, eCrewers are constantly updated via push notification from the App, in the hours in which renewable technologies produce a greater amount of clean and green energy, in order to make the most and efficiently of sustainable energy.

Given the resource and timing constraints it has not been possible to implement the most engaging functionalities such as the "Chat/Forum" that could have been an element of cohesion and maintenance and the participatory decision making tools that could have represented a kind of ontological shift from the individual to the community perspective. Also gamification was also not fully exploited at this stage for what concerns the involvement of the eCREWs as players but it is well known the impact that this approach might have in motivating community members to act.

Although not fully implemented, it is worth to notice that all the functionalities that have been identified in this deliverable as component of the 'wishes list' (as well as the categories they belong to that can be further expanded through the definition of practical tools) keep their validity as a reference for future improvements of the APP in order to push the collective perspective in the eCREWS. In other words, the eCREW monitor should be considered the starting point of a process that aims at defining and implementing proper tools for strengthening collective action within eCREW but also applicable to other initiatives and projects beyond the eCrew scope and ambition.

And, finally, must be reminded that the eCREW monitor is just one component of a wider and more complex strategy to be adopted in the project in order to spread among the participants (and hopefully beyond) the collective action approach as a basis for the future development of the ECs model in EU. In fact, by exploiting the engagement strategies identified in *Deliverable 2.3 - End-user Engagement Strategy and Communication Campaign* eCrews administrators should be able to complement and integrate the eCREW monitor tools with additional strategies, such as (1) exploiting the geographical proximity of people in certain Crews and creating physical meeting and events or (2) creating workshops or events online or offline with the aim of bringing eCrewers together and (3) choosing proper communication channel to keep eCrewers informed and updated about the community performance and activity.

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