reschool

Creation, growing and management of energy communities

Engagement strategies and implementation plans based on co-creation

Deliverable nº: D2.3

Deliverable name: D2.3 - Engagement strategies and implementation plans based on co-creation

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Executive Summary

This deliverable outlines the engagement strategies, and implementation plans developed through a co-design and co-creation process within the RESCHOOL project, funded by the European Union's Horizon Europe research and innovation programme. The primary objective of D2.3 is to detail the methodologies and tools used to engage various stakeholders in energy sustainability practices through innovative digital and physical game research solutions.

This report focuses on the implementation results of the RESCHOOL Co-Design & Gamification Framework, described in detail in D2.2. It provides an in-depth exploration of the co-design and co-creation steps that led us to the development of the two prototypes: the Serious Energy Game Digital App and the Card Deck. These prototypes cater to both in-person and remote gaming experiences, addressing the needs and preferences (identified in D2.2) within the RESCHOOL consortium.

Furthermore, the report highlights innovative engagement strategies and implementation plans, showcasing ways to promote the two prototypes through social engagement campaigns aimed at various target audiences and end-users. The strategic approach aims to increase individual awareness and responsiveness at household and community levels, ensuring the success of RESCHOOL's serious games and gamification efforts.

The RESCHOOL project implements diverse gamification approaches across several pilot locations, each supported by different partners and unique platforms. The Greek pilot, supported by COEN in Athens, focuses on engaging local community members in sustainability practices. Similarly, the Spanish pilot, backed by Diputació de Girona (DdG) and Kilometre 0 (KMo), fosters community energy initiatives in Girona with technical support of Bamboo Energy (BBEN) and Open Remote (OR) for energy management. The Swedish pilot in Stockholm involves the "Electricity" energy community using the "Oden" platform developed by Locallife (LCLF), which emphasises community engagement and energy conservation. In Amsterdam, the Sporenburg region pilot, supported by Resourcefully, employs the OpenRemote platform to promote energy-saving behaviours. Plans are underway to expand this initiative to another region in western Amsterdam. Each of these pilots evidenced the need to increase the active participation of community members. With this purpose, technical providers already started simple gamification strategies tailored to their local contexts that offer personalised energy services (advice, actions and challenges) to increase energy use awareness. The proposals presented in this deliverable extend these capabilities in two main directions. First, active participation and engagement of community members with access to online smart meter data through a new serious game digital app conceived independently of any energy platform, and second, the dissemination and exemplification of benefits achievable by energy communities supported by a playable physical card deck. All pilots agreed to adopt both gamification approaches once ready for testing, aiming to demonstrate engagement capabilities and citizen empowerment.

Overall, D 2.3 presents a comprehensive plan to engage stakeholders in sustainable energy practices through innovative gaming solutions, supported by robust data collection and continuous feedback mechanisms to ensure the effectiveness and adaptability of the engagement strategies.

Serious Energy Game Digital App Development for Sustainability

The second section focuses on the development of a digital application designed by Utrecht University (UU) to promote sustainable energy practices among households by connecting the data from smart energy meters. The app's key features include:

- **User-Friendly Interface**: Designed for daily engagement with missions, personalised energy-saving tips, and progress tracking.
- **Onboarding Process**: A structured introduction to the app's functionalities, ensuring users understand how to utilise the app effectively.
- **Data Privacy**: Adherence to GDPR guidelines with anonymised user data management.
- **Partnerships**: Collaboration with game studio IJsfontein and energy cooperative Energie-U and consortium members to enhance app development and deployment.

Card Game Development for Energy Communities

The third section describes the creation of an educational card game by CERTH aimed at increasing awareness and engagement with energy communities. Key highlights include:

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- **Co-Design and Co-Creation Activities**: Engaging stakeholders, including energy experts and community members, in the design process.
- **Game Objectives**: Educating young audiences about energy communities through interactive gameplay.
- **Implementation**: Continuous feedback integration to refine game mechanics and content.

- **Engagement Strategies and Implementation Plans**

    - **Social Campaigns**: Targeted efforts to engage energy community members and students through workshops, social media, and public events.
    - **School Campaigns**: Integrating the card game into educational settings to foster intergenerational learning about sustainability.
    - **Pilot Community Involvement**: Active participation of pilot communities from Spain, Greece, Sweden, and the Netherlands in testing the prototypes and promoting the developed tools.

- **Data Analysis and Impact Assessment:**

    - **Stakeholder Feedback**: Systematic collection and incorporation of feedback from energy experts, community members, and students to continuously improve the engagement tools.

- **Challenges and Lessons Learned**

Future Work

Looking ahead, the document outlines a roadmap for ongoing and future activities:

- **Serious Energy Game Digital App:** As we have concluded the preliminary design of the digital application, future activities will focus on designing and implementing the user campaigns for public engagement, developing the final application via iterative prototyping, and defining the pilot experimentation approach. Since the work is ongoing, a detailed review of the co-design and co-creation sessions and outcomes, as part of the iterative prototyping process, will be reported as part of the report D2.4.

- **Card Game Development for Energy Communities:**

    - **Dedicated Webpage**: Launching a webpage to provide access to the card deck and related information.
    - **Recruitment Campaigns**: Expanding the reach of the card game by inviting new energy communities.
    - **School Workshops**: Organising workshops to introduce the game in educational settings and gather feedback for further refinements.

In conclusion, Deliverable 2.3 presents a comprehensive plan to engage stakeholders in sustainable energy practices through innovative digital and physical gaming solutions, supported by robust data collection and continuous feedback mechanisms to ensure the effectiveness and adaptability of the engagement strategies.

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1 Introduction

The "Engagement Strategies and Implementation Plans Based on Co-Creation" deliverable (D2.3) is an important documentation component of the RESCHOOL project, funded by the European Union's Horizon Europe research and innovation programme.

The RESCHOOL project implements diverse gamification approaches across several pilot locations, each supported by different partners and unique platforms. The Greek pilot, supported by COEN in Athens, focuses on engaging local community members in sustainability practices. Similarly, the Spanish pilot, backed by Diputació de Girona (DdG) and Kilometre 0 (KM0), fosters community energy initiatives in Girona with technical support of Bamboo Energy (BBEN) and Open Remote (OR) for energy management. The Swedish pilot in Stockholm involves the "Electricity" energy community using the "Oden" platform developed by Locallife, which emphasises community engagement and energy conservation. In Amsterdam, the Sporenburg region pilot, supported by Resourcefully, employs the OpenRemote platform to promote energy-saving behaviours. Plans are underway to expand this initiative to another region in western Amsterdam. Each of these pilots evidenced the need to increase the active participation of community members, and, with this purpose, technical providers have already started simple gamification strategies tailored to their local contexts that offer personalised energy services (advice, actions, and challenges) aiming to increase awareness on energy use. The proposals presented in this deliverable extend these capabilities in two main directions. First, active participation and engagement of community members with access to online smart meter data through a new serious game digital app conceived independently of any energy platform, and second, the dissemination and exemplification of benefits achievable by energy communities supported by a playable physical card deck. All pilots agreed to adopt both gamification approaches once ready for testing, aiming to demonstrate engagement capabilities and citizen empowerment.

This deliverable presents a comprehensive framework for engaging various stakeholders in sustainable energy practices through innovative tools and methodologies. The document is structured to provide an in-depth look at the development of a Serious Energy Game app for promoting sustainable energy behaviours and an educational card game designed to increase awareness about energy communities.

Through a co-creation approach involving multiple stakeholders, including energy experts, community members, and educational institutions, the deliverable aims to foster a collaborative environment that enhances the adoption of sustainable practices. The strategies outlined herein are supported by rigorous data collection and impact assessment processes, ensuring their effectiveness and adaptability in real-world applications.

1.1 Objectives

The primary aim of this report is to detail the development and implementation of engagement strategies and co-creation plans within the RESCHOOL project, specifically for the development of the digital app (UU) and the card deck game (CERTH).

The report focuses on innovative gamification approaches designed to promote sustainable energy practices and community engagement across multiple pilot locations in Europe.

1.2 Contribution of partners

Table 1 Contribution of partners to this deliverable

Partner	Contribution
UU	Lead development of the Serious Energy Game Digital App for sustainability. Conduct research and user testing. Lead contributor, editor, and reviewer in this deliverable.
CERTH	Lead the development of the card game for energy communities. Design game mechanics and educational content. Document reviewers.
Locallife	Document reviewers.
UdG	Document reviewers.
RESCHOOL consortium	Provision of overall support and collaboration.

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1.3 Report Structure

This section summarizes the work presented in each section of the report.

Introduction The report begins with an introduction to the Engagement Strategies and Implementation Plans Based on Co-Creation activities of the RESCHOOL project, emphasising the importance of engaging various stakeholders in sustainable energy practices through innovative tools and methodologies.

Digital App Development for Sustainability This section details the development of a digital app designed by Utrecht University to promote sustainable energy practices among households by connecting data from residential smart energy meters. It details co-design and co-creation activities and plans. Challenges encountered and resolutions are also discussed.

Card Game Development for Energy Communities This section describes the creation of an educational card game aimed at increasing awareness and engagement with energy communities. The section covers co-design and co-creation activities, game objectives, presentation of the card game, rules, and the continuous improvement process based on stakeholder feedback. Furthermore, engagement strategies and implementation plans are outlined, as well as the methodology for assessing the impact of the engagement strategies. Finally, challenges and lessons learned are discussed.

Future plans This section outlines ongoing and future activities, including launching a dedicated webpage, recruitment campaigns, organising school workshops, and co-design activities as part of iterative prototyping.

Conclusions The report ends with conclusions, highlighting the overall significance of the work presented and the main findings and reflecting on the relationship of the work to the wider project goals.

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2 Digital App Development for Sustainability

Utrecht University (UU) is developing a digital application to promote sustainable energy practices among households by connecting the data from smart energy meters. Game research is coupled with advanced modelling techniques and smart meter data to provide informed and reliable feedback to citizens about optimal energy management in households. Users are actively engaged in the co-design process, refining experimental conditions and features within the application. Iterative prototyping enables us to adapt and optimise the application based on anticipated user input. Activities that continuously monitor users' progress need to be created and provide them with a set of interactive use-case scenarios. To do this, we collaborate with a game studio (IJsfontein), an energy cooperative (Energie-U), and citizens to integrate activities into the serious game and test them in co-design workshops to ensure that the activities are not only impactful but also enjoyable and engaging for users. The process is ongoing and will be concluded with adaptation to the particular pilots' circumstances before the project's experimentation phase.

2.1 User Feedback and Iteration

To ensure the digital app meets user needs and promotes sustainable energy practices effectively, user feedback is applied to our development process, ensuring relevance, usefulness, and high usability. This section outlines the methods employed to gather user feedback and integrate it into the design of the digital app.

User Feedback and Iteration Process: To collect and utilise user feedback effectively, we have developed a structured process involving multiple interaction stages with end-users. The design process can be summarised in the following steps:

1. **Initial Concept Development**:
    - **Workshops and Brainstorming Sessions**: Initial ideas and concepts are drawn with project partners.
    - **Co-Design Sessions & Workshops**: Specific game elements are isolated for detailed brainstorming and are presented to citizens in co-design sessions & workshops for collecting feedback.
2. **Prototype Development**:
    - **Early Prototyping**: Based on citizens' initial feedback, prototypes of the app features are developed.
    - **Feedback Collection**: Test users began using these prototypes, providing critical feedback.
3. **Iterative Refinement**:
    - **Analysis of Feedback**: The feedback from test users and workshop participants is continuously analysed to identify common issues and areas for improvement.
    - **Integration of Feedback**: The insights gained are used to refine the prototypes, focusing on usability and functionality.
4. **Advanced Iteration**:
    - **Testing and Feedback Loop**: Refined versions of the app are tested by test users, and further feedback is collected to ensure continuous improvement.
    - **Broader Testing**: As features stabilise, testing is expanded, including a wider audience from the RESCHOOL consortium pilots, to address the need for adaptation to the pilots' particular circumstances.

2.2 Collection Methods

This section provides a detailed overview of the feedback collection and integration process, highlighting the importance of user involvement in the development of the digital app for sustainability. User feedback is collected through multiple channels to capture a broad range of insights and ensure comprehensive data collection. The primary methods included surveys and questionnaires distributed to users after the initial use of the app, focusing on user experience, usability, and suggestions for improvement. Workshops and focus groups are conducted with community members and students to gather qualitative feedback and observe user interactions with the app. Additionally, one-on-one interviews are conducted with selected users to dive deeper

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into their experiences and gather detailed feedback. While feedback is collected manually during this phase, an in-app feedback function could be an interesting feature to explore in future iterations.

Main Channels and Methods: Feedback is gathered through various structured and informal channels. Master's level students from the interdisciplinary course Energy in the built environment (GEO4-2522) at UU provided feedback through structured Community Engaged Learning (CEL) activities and group presentations, focusing on fostering long-term engagement in serious games aimed at sustainability. Test users from IJsfontein's internal testing pool of potential users and volunteers from Energie-U provided feedback through private communications. This feedback is currently being processed and translated from Dutch to English to be analysed and fed into the design process.

Incorporation of Feedback: Feedback integration follows a structured process. Collected feedback is compiled and analysed to identify common themes and critical issues. The first round of feedback from the Master's students in the autumn of 2023 was too scattered to implement directly, but it provided useful input informing the re-design of the course CEL assignment in the autumn of 2024 to focus on more structured reports rather than presentations. Feedback from test users is expected in the period from July 2024 onwards, based on which UU and IJsfontein will guide the prioritisation of game features to adjust or enhance. This iterative approach ensures continuous improvement based on user insights. Updated versions of the app will be tested with users to validate the changes and ensure they address the feedback effectively.

Iterative Design Process: The design process is iterative, involving multiple cycles of feedback and improvement. The first prototype is developed based on preliminary research and initial user needs. As specific elements of the app are stabilised, e.g., data analytics, challenges, and prosumption/consumption data, these are isolated for targeted feedback. This approach allows us to refine individual components before integrating them into the broader app. Once all desired elements (e.g., data analytics dashboard, gamification features focusing on competition, cooperation, and customisation, and Demand-Side Management activities such as peak shaving and self-consumption) are developed, broader external testing is planned across the RESCHOOL pilots in Amsterdam, Stockholm, Spain, and Athens.

Types of Feedback and Insights: The types of received feedback include insights into customisation needs, where users emphasise the importance of customisation options, suggesting that rewards should be meaningful, such as currencies for cosmetic/customisation options rather than just points or badges. Early feedback is based on mock-ups and hypothetical scenarios, highlighting the necessity for user customisation and relevant rewards. More comprehensive feedback on actual game elements will be reported as part of deliverable D2.4.

The iterative process of collecting and incorporating user feedback ensures that the digital app prototype is continuously improved and aligned with user needs. This approach not only enhances the app's usability and functionality but also fosters a sense of ownership among users, thus contributing to its overall success in promoting sustainable energy practices.

2.3 Partnerships and Collaborations

For the co-design activities, the RESCHOOL consortium members collaborate with IJsfontein, an Amsterdam-based developer with experience in energy sustainability games, and with external partners such as the energy cooperative Energie-U.

2.4 Challenges and Resolutions

To develop an effective serious game, academics must team up with professional game developers, which usually involves a tendering process. At this stage, it is crucial to specify the requirements of the envisioned application clearly and to assess the contributions of the invited game studios based on the different disciplines involved. The risk of not doing this properly is either to run into delays or to receive contributions that do not meet the expectations of the project consortium. In our case, we invited three competent studios that responded to our call. We have selected to work with the game studio IJsfontein, based on their presented

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concept, their long experience, especially in research projects, and their methodology, including co-creation. The main challenge was the time-consuming and bureaucratic tendering process, and this was addressed through the support of the UU Research Support Office and by maintaining continuous communication with the project coordinators and partners, informing them of the process status at every step.

2.5 Collaboration with Energie-U for Co-Design Activities

2.5.1 Introduction and Background

Energie-U is a dedicated collective of volunteers and members of an energy cooperative based in Utrecht, the Netherlands. The organisation has been actively involved in assisting the local community in understanding energy consumption and efficiency measures, exploring photovoltaic (PV) energy, and learning about energy aggregators. For the development of our digital app, Energie-U will play a crucial role in engaging interested community members. Energie-U provides invaluable feedback during the early stages of the digital app development by approaching these individuals, interviewing them, and recruiting them as initial test users. This feedback will be instrumental as we iterate on our serious game.

2.5.2 Roles and Responsibilities

The collaboration between Utrecht University (UU) and Energie-U encompasses various roles and responsibilities:

- **Organisation of Workshops and Co-Design Sessions:** Organising and conducting workshops and co-design sessions to gather user feedback that us used to refine the app's features.
- **Participant Recruitment:** Recruiting community members and citizens to participate in the development process and provide feedback.
- **Research and Data Exploitation:** Assisting in research activities, data collection, and analysis to inform app development.
- **Dissemination and Exploitation:** Helping to disseminate findings and progress to a broader audience and explore replicability potential.

To streamline these efforts, Energie-U is in the process of hiring a full-time staff member who will serve as a liaison between UU and Energie-U. This individual will ensure timely communication and coordination between both parties.

2.5.3 Co-Design Methodology

Energie-U boasts an existing and engaged audience with a strong interest in sustainability and community energy initiatives. Our co-design methodology leverages iterative design and continuous communication with our target audience and developers. This approach enables rapid iteration and refinement of the app based on real-time feedback from users.

2.5.4 Stakeholder Engagement

The stakeholders involved in the co-design activities include:

- **Citizens from the Utrecht area:** Local Energie-U members who will participate in workshops and provide feedback on the app design and development.

- **Masters Level Students from Utrecht University:** Students participating in course workshops, contributing their insights and knowledge to the app's development.

2.5.5 Workshops and Sessions

The collaboration features various workshops and sessions:

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- **Course CEL Activities and Workshops:** Spanning over two months in autumn 2024, these CEL activities and workshops for UU students will include guest lectures, interactive activities, and assignments. The end course deliverable will be group reports on real-life use cases of the app. The students' results will be analysed and the findings will feed into the app development.

- **Co-Design Sessions:** Based on citizen and energy community initiatives, these sessions will leverage Energie-U's expertise and experience in engaging the community. The sessions will be interactive and focus on practical applications and feedback collection.

2.5.6 Collaboration Framework

The collaboration with Energie-U is planned to continue for at least the next two years, coinciding with the duration of the RESCHOOL project. However, Energie-U has expressed interest in continuing the partnership beyond the project's timeline to support the ongoing development and improvement of the Serious Game. This potential for long-term collaboration highlights the mutual commitment to promoting sustainability and community energy initiatives.

2.6 Key Achievements and Outcomes

A key achievement over the past period is establishing a structured collaboration with energy cooperative Energie-U and game studio IJsfontein through sub-contracting agreements. Energie-U's participation is relevant in the activities of co-designing and co-creation of the energy game, supporting a pretesting with the prototype game and exploring replication potential on specific use cases. This will be done in cooperation with the professional game development studio IJsfontein, which supports the development of the digital app. This partnership has been instrumental in supporting our co-design activities and providing us with reliable test users. A significant learning through the conducted workshops and co-design sessions is about the importance of isolating specific game elements for brainstorming and development. As of June 2024, five test users are providing initial feedback on our app design. The user tests performed on the 21st of June 2024, addressed aspects related to the visual style of the digital app prototype (see Figure 1). Although the development is still in its initial testing stages, these early engagements are promising, and additional test users will be added to the co-design process as of October 2024 to test the complete app. A detailed review of the co-design and co-creation sessions and outcomes, as part of the iterative prototyping process, will be reported as part of the report D2.4.

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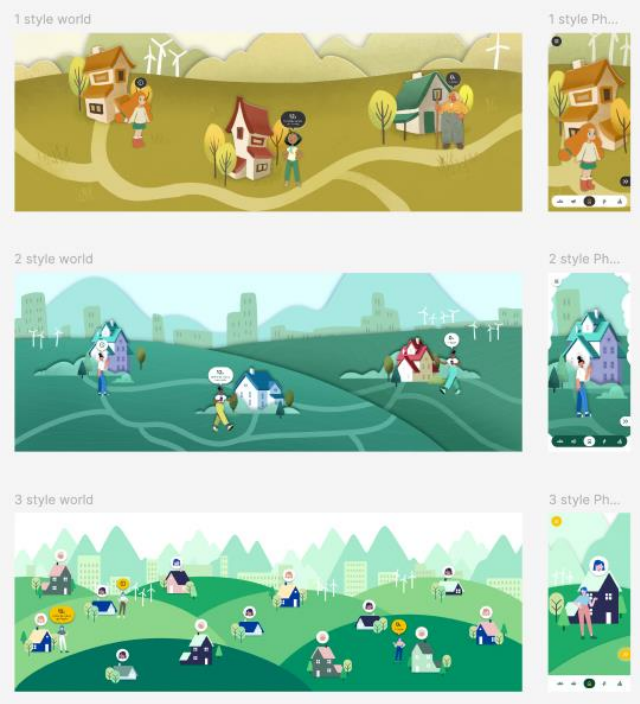

Figure 1: Illustration of different visual styles of the digital app prototype (Source: IJsfontein).

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3 Card Game Development for Energy Communities

3.1 Introduction

The energy community card game is a serious game developed following the RESCHOOL Co-Design & Gamification Framework (as described in D2.2 and depicted in Figure 2), through a series of co-creation sessions, including many stakeholders. The main purpose of the game is to familiarise audiences with the concept of energy communities and to increase awareness about green initiatives. In this section, the methodological and data collection steps are described.

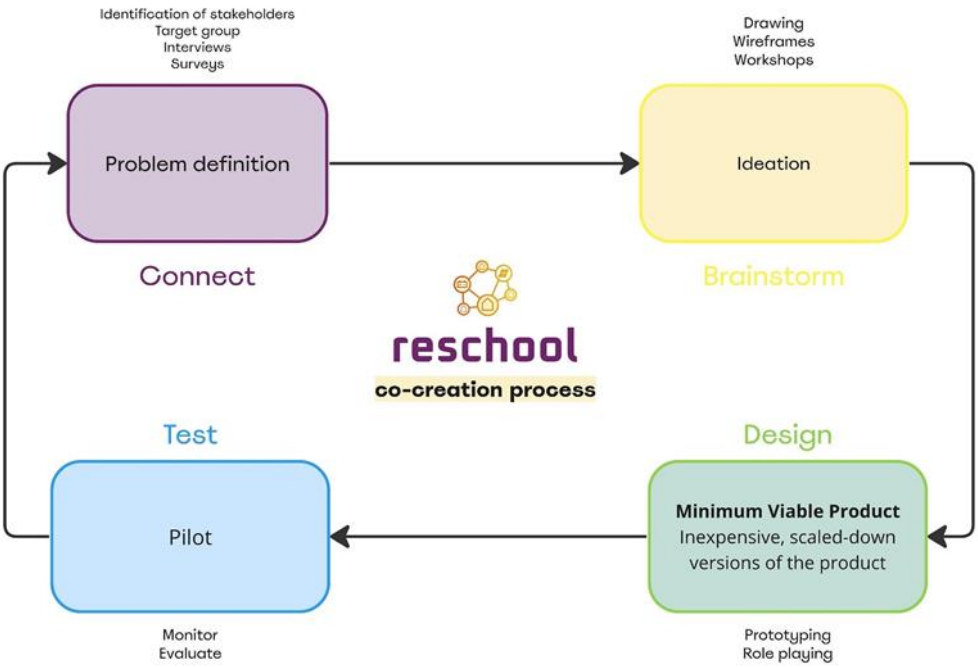

Figure 2: Steps of the RESCHOOL co-design and gamification framework.

3.2 Objectives of the Energy Community Card Deck

The Energy Community Card Game primarily targets young audiences, particularly students aged 10-14, aiming to educate and engage them by introducing fun elements into non-game contexts. At the same time, the game, being largely designed around the concept of Top Trumps, can be appealing to a wide range of ages. By incorporating relevant attributes into the cards, the game reinforces factual knowledge while promoting critical thinking. It effectively addresses educational and behavioural goals, helping players understand energy communities (ECs), attracting interest among young people, and increasing awareness of sustainable practices. The overarching objective is to transform children from passive participants into proactive contributors within their communities, extending sustainable practices beyond the educational setting.

Additionally, the card game fosters a sense of bonding within the energy community by encouraging collaboration and shared learning experiences. It can also be used as a tool to attract new households to join the EC by showcasing the benefits and positive impact of participating in such initiatives. The game's visual and interactive nature caters to diverse learning styles, fostering a sense of enjoyment and competition that enhances the learning experience. Although primarily designed for young students, it can also serve as an

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icebreaker or conversation starter for any age group. Our survey, detailed in D2.2, identified card games as one of the most preferred mediums, highlighting the versatility and educational potential of this dynamic tool.

Through engaging and educational gameplay, the game enhances individual awareness and responsiveness at both household and community levels. The success of RESCHOOL's serious games and gamification approaches is ensured by continuously refining them based on feedback and strategic insights.

3.3 The Energy Community Card Deck

3.3.1 Presentation of the Card Game

The first version of the card deck consists of 32 energy community cards, 2 "special cards", 1 rule card and 1 card that explains the icons of the fields of activity. Each energy community card contains information about the fields of activity and the attributes of the respected community, as well as, and a QR code that leads to a webpage in the RESCHOOL website that provides further information about the game. In Figure 3, the front and back cover of the Energy Community Card Deck is illustrated.

Figure 3: The front and back cover of the Energy Community Card Deck.

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There are six attribute categories:

- **Founding year:** Founding year of the Energy Community.
- **Members:** Number of members (people, small / medium enterprises, Municipalities, NGOs/Associations, other).
- **Gender Diversity:** Percentage of women and non-binary members out of total number of individual members.
- **Energy Poverty Support:** Percentage of vulnerable members out of all members (all types of members included). A vulnerable customer means a household customer which due to social reasons is entitled to certain special rights regarding the electricity supply, ensured on explanatory cases (Power Sector Law 2018).
- **Active Participation:** Percentage of members participating in the last General Assembly of the Energy Community out of all members (all types of members included).
- **Installed Capacity (kW):** The total power production of the community (Sun, Wind, Biomass, Hydro, Geothermal).

3.3.2 Rules of the Game

The Energy Community Card Game is designed to be simple, fun, and versatile, making it enjoyable for a wide audience. Inspired by the popular Top Trumps card game, this deck features a variety of energy communities from across Europe. The objective is to collect all the cards in the deck by having the highest "stats," or numerical values, on each card. The game is recommended for 2 to 5 players, as long as the cards can be divided evenly among them:

Expected round time: 5'-10'

1. Shuffle and deal the cards face down.
2. Players pick up their cards and look at their top cards only.
3. Player 1 (left of dealer) chooses and calls out their best stat (e.g., 'Members - 28').
4. The other players see if they can beat this stat (highest number wins).
5. The card with the highest stat wins all of the top cards and adds them to the base of their pile.
6. The winner of the round chooses the stat for the next round.
7. Players are eliminated when they lose their last card.
8. The first player to get all of the cards wins.

The deck also features a green and an orange trump card. The purpose of these special cards is to make the game more competitive and fun for the players (see Figure 4):

- If the player has the green card in his/her hand, he/she can randomly select two cards from an opponent's deck.
- If the player has the orange card in his/her hand, he/she can randomly select one card from an opponent's deck.

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Figure 4: The special cards of the Energy Community Card Deck.

By following these simple rules, players can enjoy a fun and educational experience while learning about the various energy communities across Europe.

3.4 Co-design and Co-creation Activities

There was substantial collaborative effort behind the Energy Community Card Deck (see Figure 5), as outlined in D2.2. Engaging various stakeholders, including energy communities within the RESCHOOL consortium, energy experts, students, game designers, and AI specialists, underscores a commitment to inclusive and innovative development practices.

The contributions of these diverse participants have been instrumental in shaping the prototype of the game and crafting the initial version of the Energy Community Card Deck. This collaborative approach ensured that the final product would reflect a wide range of perspectives and expertise, enhancing its relevance and effectiveness. Throughout the work, we have been hosting and providing support for ongoing workshops and co-design sessions post-launch to keep the content we generate fresh and relevant.

Moving forward, the co-creation process continues into the testing phase of the game. With active involvement from all energy communities participating in the card deck, as well as input from expert evaluators, the game will be benefiting from rigorous scrutiny and refinement. This ongoing collaboration ensures that the final product will meet the needs and expectations of its intended audience while maintaining a high standard of quality.

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Figure 5: The Energy Community Card Deck.

3.4.1 Cooperation with Participating Energy Communities

The active involvement of Energy Communities (ECs) participating in the card deck has been pivotal in shaping the co-design journey. From the initial stages, where they completed the "Co-creating an Energy Community Card Deck" survey (Annex), as detailed in D2.2, to the ongoing modifications that allow ECs to upload images of their communities, their input has been invaluable.

By providing comprehensive information through the survey, ECs have enabled the seamless creation of their respective cards, ensuring that each card accurately represents their unique energy community. Furthermore, the ability for ECs to contribute their own images adds a personal touch to the design process, making them even more integral to the project's development.

The ongoing contribution of Energy Communities (ECs) to the development of the Energy Community Card Deck extends beyond the initial design phase. Since the release of the first version of the card deck, there has been continuous communication via email with the majority of participating communities. This open line of communication has proven to be immensely beneficial.

Through these interactions, ECs have provided valuable feedback and shared their first impressions of the card deck. This feedback has been instrumental in identifying areas for improvement and ensuring that the representation of each community is accurate and meaningful. Many ECs have taken the opportunity to highlight any mistakes or aspects of their community that they feel could be better represented, facilitating a collaborative process of refinement and enhancement.

This collaborative approach not only strengthens the connection between the card deck and the participating ECs but also enhances the overall authenticity and relevance of the game. By actively engaging with ECs and incorporating their feedback, the project team can ensure that the final product meets the needs and expectations of its intended audience while fostering a sense of ownership and pride among participating communities. As such, the ongoing participation of ECs continues to be a driving force in shaping the co-creation process and ensuring the success of the Energy Community Card Deck.

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3.4.2 Demo with Energy Experts

On May 24th, 2024, a significant milestone was achieved with the first demo session of the Energy Community Card Deck, attended by 32 energy experts as part of the RESCHOOL consortium meeting in Hammarby Sjöstad, Sweden as part of the RESCHOOL consortium meeting in Hammarby Sjöstad, Sweden. The workshop, which lasted 40 minutes, began with a brief introduction to the card game and a presentation of the card deck. During the main activity, participants were divided into groups of four, allowing them to experience the game first-hand for approximately 25 minutes (see Figure 6).

Figure 6: Photos from the demo session in Hammarby Sjöstad, Sweden.

At the conclusion of the workshop, participants completed a questionnaire designed to gather feedback on the usability, quality, and overall impact of the Energy Community Card Game. This survey, along with additional valuable feedback and suggestions regarding the gameplay and overall appearance of the deck, is presented in Table 2: Results of the Energy Community Card Game (Gameplay Experience) survey.

Table 2: Results of the Energy Community Card Game (Gameplay Experience) survey

Questions	Answers by energy experts
What do you think about the flow of the gameplay?	68.75% →It was generally smooth, but there were a few moments of confusion 31.25%→It flowed smoothly
How do you rate the simplicity and comprehensibility of the rules of the game?	50%→ Simple and comprehensible 43.75%→ Very simple and comprehensible 6.25%→ Moderately simple and comprehensible
How visually appealing do you find the artwork and design of the cards?	68.75%→ Extremely appealing 25% →Very appealing 6.25%→ Moderately appealing

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Did you feel motivated to continue playing throughout the game?	60%→ Motivated 26.67%→ Neutral 6.67%→ Very motivated 6.67% →Unmotivated
Would you play this game again?	50%→ Probably 25%→ Maybe 12.5%→ Definitely 12.5%→ Probably Not
Would you recommend this game to others?	50%→ Yes 37.5%→ Maybe 12.5%→ No
Do you believe that this card game can increase the impact of public outreach campaigns and effectively promote understanding about energy communities?	50%→ Agree 43.75% →Neutral 6.25%→ Strongly Agree
On which age groups do you think the game will have a greater impact? (Select all that apply)	1. 10→Teens (13-17) 2. 9→ Children (under 12) 3. 9→ Young Adults (18-24) 4. 7→ Adults (25-64) 5. 4→ Seniors (65+)
What did you enjoy most about the game?	1. 11→ The visual design and artwork of the cards. 2. 8→ Playing and competing with others. 3. 5→ The overall theme and concept of the game. 4. 5→ The strategic element of the game and making decisions 5. 4→ Learning about energy communities in a fun and interactive way 6. 3→ The educational content presented through the game. 7. 3→ The variety and richness of the card attributes.
On a scale of 1 to 5, how would you rate the overall experience while playing the game?	62.5% →4 18.75%→ 3 12.5% →5 (best) 6.25%→ 2

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The survey also included two 'open answer questions:

1. Do you have any suggestions concerning attributes that could enhance the way the concepts of energy communities are presented in the game?

See Figure 7 for an example of the answers.

2. What do you think could be improved in the game to make it even more fun or educational?

See Figure 8 for an example of the answers.

Figure 7: Example of open question (1) answers.

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Figure 8: Example of 'open question (2) answers.

Survey Conclusions

Based on the feedback from energy experts, the usability and accessibility of the Energy Community Card Game show promise but also highlight areas for improvement. While the flow of gameplay was generally smooth, a significant portion of players experienced moments of confusion, indicating a need for clearer instructions. The simplicity and comprehensibility of the rules received positive feedback, but there is room for making them even more straightforward. The visual appeal of the cards was highly praised, though some suggestions included making icons more visible and reducing clutter.

Motivation levels varied, with a majority feeling motivated to play but some expressing neutrality or lack of motivation, suggesting that introducing more engaging and varied gameplay elements could enhance the overall experience. While half of the participants were inclined to play again and recommend the game, others were more tentative, highlighting the potential for increased replay value and recommendation through strategic enhancements. The educational value of the game was acknowledged, with many appreciating the fun and interactive learning about energy communities. However, several suggestions emphasised the need for clearer definitions of attributes, more detailed explanations, and additional educational content.

To improve overall engagement, incorporating feedback on gameplay variety, strategic elements, and clearer visual representations is essential. Continuous improvement based on user feedback, as initiated from the co-design sessions, will ensure that the game evolves to meet the educational and engagement needs of its diverse audience.

The incorporation of the feedback into the gameplay has been documented in subsection 5.2. The insights gained from this feedback session are critical for refining and enhancing the game, ensuring it meets the needs and expectations of its users.

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This demo session not only provided a practical test of the card game but also fostered engagement and collaboration among energy experts, whose input is essential for the continuous improvement of the Energy Community Card Deck .

3.5 Improvement of the Energy Community Card Deck

The release of the first version of the card deck is an important milestone. However, we recognize the need for continuous improvement and inclusivity.

In the transition from the prototype version of the Energy Community Card Deck, several design changes were implemented to enhance usability and visual appeal. The arrows on the attributes were removed, and the text of the fields of activity was replaced with icons. These modifications were made to ensure that the cards are visually pleasing and do not overwhelm players with excessive information. In the future, additional visual changes will be implemented based on the feedback from testers and participating energy communities. This ongoing refinement process ensures that the Energy Community Card Deck remains user-friendly and visually appealing, continuously improving based on user input and suggestions.

The basic gameplay of the Energy Community Card Deck, which is played individually and relies on comparing cards to determine the "best" attributes, was noted as simple but potentially monotonous. To address this, combined gameplay options have been suggested and will be assessed through upcoming testing sessions with players. Based on feedback, the second version of the game will include additional gameplay options to enhance variety and engagement. These new gameplay modes aim to cater to the needs and preferences of players and testers. Future testing sessions will evaluate the effectiveness and enjoyment of the new gameplay options, with feedback crucial for refining the game. This iterative process of feedback and improvement is essential for the game's ongoing development and success.

3.6 Energy Community Data Collection

Primary data collection involves gathering new, firsthand information directly from original sources through methods such as surveys, interviews, and experiments. Secondary data collection, on the other hand, involves analysing existing data that has already been collected by others, such as reports, academic articles, and statistical databases.

For the creation of the Energy Community Card Deck, the CERTH team utilised both primary and secondary data collection methods. Firstly, as detailed in D2.2, a literature review of existing gamification strategies specifically designed for public outreach in energy communities was conducted. This review provided a foundational understanding of the strategies and their effectiveness.

Following this, a series of interviews with the four pilot communities in the RESCHOOL project were conducted to identify open issues and questions regarding public outreach. These interviews aimed to provide a nuanced understanding of the unique challenges, aspirations, and contextual factors that each pilot community encountered when integrating gamified strategies. The insights from these interviews informed the creation of a survey.

The survey results offered valuable insights into the preferences for gamified strategies among the respondents. Building on this research, a framework was developed to assess and design gamification strategies (GS) for energy communities (ECs), ensuring it was an easy-to-use tool for any stakeholder interested in organising public outreach activities related to ECs. This iterative approach ensures continuous refinement of GS, fostering engagement and sustainable behaviour change within ECs.

This process led to the brainstorming phase. The insights collected and discussions with game and design experts facilitated the creation of the card game. The data collection process did not stop there; it continued with open communication in the form of co-design sessions with EC members and energy experts to finalise the content of the card game. Open discussions in workshops with students were also held to gain their perspective on energy communities.

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Additionally, a survey was created to collect information about the energy communities to develop the cards. Finally, a questionnaire (as showcased in Section 3.4.2) was used to gather feedback from energy experts on the demo of the card game, and further surveys were planned to gather player opinions and improve the game.

All these data collection tools were essential in creating a game that caters to the target audiences' needs and will continue to be used to enhance it.

3.7 Engagement Strategies: Card Game

The main purpose of this section is to describe innovative strategies intended to engage users and stakeholders during the rollout of the card game. These strategies aim to engage members of energy communities, strengthen bonds within these communities, and also attract young audiences and households that don't participate in energy communities. The engagement strategies will prioritise the needs and interests of energy community members rather than the wider public. This targeted approach aims to foster a strong sense of community and shared purpose, leveraging the game as a tool for communal energy-saving efforts.

Our initial plan includes the following Social Engagement Campaigns :

EC Recruitment Campaign for the Card Deck

- **Objective:** Attract new energy communities (ECs) to join the card deck by showcasing the benefits and positive impact of participating in such initiatives.
- **Activities:** Use testimonials from current EC members and demonstrate how the card game can be a fun and educational tool to engage with energy-saving practices.

Pilots' Campaigns

- **Objective:** Promote the card game within the pilot communities of the RESCHOOL project.
- **Activities:** Host events, workshops, and interactive sessions specifically within the pilot communities to introduce the game and gather feedback.

ECs Participating in the Card Deck Campaign

- **Objective:** Encourage current ECs participating in the card deck to actively promote the game within their networks.
- **Activities: Provide promotional materials, organise community events, and facilitate discussions on the game's impact on communal energy-saving efforts.**

School Campaigns

- **Objective:** Engage students and educators by integrating the card game into educational settings.
- **Activities:** Organise school workshops, present the game as a tool of intergenerational provide teacher training, and distribute educational materials to enhance the learning experience through gameplay.

The main target audiences of our social campaigns are:

- **EC Managers:** Conduct informational sessions to explain the benefits of the card game, provide tools for promoting the game within their communities, and gather feedback to refine the game.

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- **Households of ECs Participating in the RESCHOOL Project:** Utilise newsletters, community meetings, and social media to promote the game, share success stories, and encourage participation.
- **Households of ECs Participating in the Card Game:** Foster a sense of ownership and pride by involving these households in the game's development and promotion through feedback sessions and co-design workshops.
- **Households Not Participating in ECs:** Use the card game as an introductory tool to educate and attract new households to join ECs, highlighting the benefits of collective energy-saving efforts.
- **Students:** Integrate the game into school environment, organise after-school programs, and develop youth ambassador programs to promote the game among peers.

Below are innovative ideas for promoting the games of the RESCHOOL project:

Social Media Campaigns

- Platforms: Utilise popular social media platforms to reach and engage energy community members.
- **Content Creation:** Develop engaging content such as teaser videos, how-to-play guides, and testimonials from early adopters within the energy communities. Use visually appealing graphics and short, engaging videos to capture attention.
- **Community Spotlights:** Highlight specific energy communities and their efforts, creating a sense of pride and recognition within the community.

Workshops and Interactive Sessions

- **Community Workshops:** Organise workshops specifically for energy community members to introduce the card game. These sessions can include demonstrations, guided play, and discussions on how the game can support community energy-saving goals.
- **Virtual Workshops:** Conduct virtual workshops and webinars to make the game accessible to remote community members, fostering a sense of inclusivity.
- **Youth-Focused Sessions:** Host interactive sessions at community centres or schools targeting young members of the community to engage and educate them about energy practices through the game.

Public Events and Demonstrations

- **Energy Community Gatherings:** Introduce the card game at regular community meetings and special events to encourage collective participation.

Educational Partnerships

- **School Collaborations:** Work with local schools to integrate the card game as a tool for learning about sustainability and community energy efforts.
- **Teacher Training:** Provide training sessions for teachers in the community on how to use the card game effectively in their classrooms.
- **Supplementary Materials:** Develop supplementary educational materials such as lesson plans, activity sheets, and discussion guides to enhance the learning experience for community members.

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Community Engagement

- **Community Meetings:** Introduce and play the card game during regular community meetings to engage members and discuss communal energy-saving strategies.
- **Feedback Channels:** Establish channels for ongoing feedback from community members to continuously improve the game and ensure it meets their specific needs and interests.

Youth Engagement

- **After-School Programs:** Collaborate with after-school programs within the community to introduce the game to young members in a fun and informal setting.
- **Youth Ambassadors:** Recruit young ambassadors from the community to promote the game and its benefits, leveraging peer influence to increase engagement.

By prioritising the needs and interests of energy community members, these innovative engagement strategies aim to foster a strong sense of community and shared purpose. The Energy Community Card Game will serve as a tool for communal energy-saving efforts, strengthening bonds within the community and attracting a young audience through targeted and engaging activities. Moreover, by implementing these targeted engagement strategies, the Energy Community Card Game can effectively reach and engage a diverse audience within energy communities. These efforts will help foster a deeper understanding of energy communities and promote sustainable practices among players, ensuring the success of RESCHOOL's serious games and gamification approaches.

3.8 Implementation: Card Game

The implementation plans for the games are closely connected with Task 4.2: Engagement Campaigns. Although the exact timeline hasn't been finalised yet, the initial roadmap of the campaigns has been settled.

Recruitment Campaign for New Energy Communities (ECs) and dedicated Webpage

We will continuously invite new Energy Communities (ECs) to participate in the Card Game via email and through a dedicated webpage for the card deck, launching in mid-June on the RESCHOOL site. This webpage will feature detailed information about participating energy communities and will include a map of Europe highlighting these communities, along with a prompt button for downloading the card deck. For card creation, ECs will provide the necessary data by filling out the Co-creation Survey, which will also be featured on the webpage. To gather feedback, we are developing a questionnaire to collect insights from participants.

Pilots Campaigns

We are collaborating with the pilot communities to support their social engagement campaigns and identify target audiences. For example, the GR PILOT will target local citizens, encouraging them to share personal data and increase active participation with the goals of fostering a sense of community, understanding the benefits of energy efficiency, and promoting social awareness and solidarity. Similarly, the ES PILOT will target local citizens, both engaged and uninvolved in local renewable energy communities, as well as SMEs. This campaign aims to disseminate information about local energy communities, including solar panel energy production, member energy savings, and consumption, with the overarching goals of boosting participation, increasing the number of energy communities, fostering a sense of community belonging, and empowering members. We will discuss with the pilot communities the necessary material or content to support their social campaigns and provide them with copies of the card deck and surveys.

ECs Participating in the Card Deck Campaign

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We will provide copies of the card deck to participating ECs and collect feedback. Additionally, we will reach out to households that don't participate in the RESCHOOL project or ECs and gather their feedback.

School Campaigns in Greece

- Workshops: In September we will organise workshops in schools in Athens and Thessaloniki, targeting students aged 10 and above. We will work with local schools to present the card game as a tool for learning about sustainability and community energy efforts.

- Public Event: On September 27th the CERTH team will participate in a research event called "RESEARCHERS' NIGHT".

The implementation plans will remain flexible over the next 4-5 months, adapting to feedback and intensifying engagement campaigns under WP4. This approach will ensure that the game stays relevant and effective in meeting the needs of energy communities and young audiences.

3.9 Card Deck Impact Assessment

During the co-creation and co-design phase, 84 people took part, 35% of whom were women, overwhelmingly exceeding the target and making a significant impact on the relevant high level use case (HLUC8). The purpose of this section is to evaluate the impact of the card game on the target audiences and stakeholders. This includes analysing feedback, discussing how it influenced game development, and assessing the educational impact. By systematically evaluating the impact of the game and incorporating stakeholder feedback, we aim to create a dynamic and engaging tool that effectively educates and inspires its users. This continuous improvement process ensures that the game not only meets but exceeds the expectations of its diverse audience. This is a process that has been used from the start, with the co-design and co-creation sessions.

Now that the testing phase has already begun and the implementation period is about to start, the impact of the game will be evaluated through the social campaigns. The true impact assessment of the game is a complex task, but we can employ several strategies to evaluate it effectively.

Some strategies or tools that can be used for impact assessment are listed below:

- **Pre- and Post-Engagement Surveys:** Distribute surveys to participants before and after they engage with the game to measure changes in knowledge, attitudes, and behaviours related to energy communities and sustainability. The game aims to increase awareness about energy communities and sustainable practices among young audiences. We assess the educational impact by evaluating how well players understand these concepts after engaging with the game.
- **Feedback Forms:** Collect feedback immediately after game sessions to gather qualitative data on user experiences and suggestions for improvement.
- **Focus Groups:** Conduct focus group discussions with participants from different target audiences (e.g., students, community members) to gain deeper insights into their experiences and perceptions of the game.
- **Interviews:** Conduct one-on-one interviews with key stakeholders, including teachers, community leaders, and energy experts, to understand the broader impact of the game on their communities.
- **Engagement Levels:** Track the number of participants, frequency of gameplay, and duration of engagement to assess the popularity and reach of the game.
- **Social Media Metrics:** Analyse social media engagement, such as likes, shares, comments, and followers, to gauge the game's reach and popularity.
- **Website Analytics:** Use website analytics to track visits, downloads, and user interactions on the game's dedicated webpage.

With these tools, we can effectively track the behavioural and knowledge changes of the participants. This will allow us to observe and document any shifts in behaviours related to energy consumption, recycling, and other sustainable practices among participants.

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By employing these strategies, we can comprehensively evaluate the impact of the Energy Community Card Game, ensuring it meets its educational and engagement goals while continuously refining it based on feedback and outcomes.

3.10 Card Deck: Incorporation of feedback

Continuous feedback was collected from energy community members, students, and experts. This input was crucial in understanding different perspectives and improving the game. As presented in subsection 3.3.2, during the General Assembly (GA) meeting in Stockholm, we conducted a survey among energy experts to gather their insights and opinions on the card game. This survey focused on various aspects such as usability, educational value, and overall engagement. The feedback from experts and stakeholders has been instrumental in refining the game. For example, suggestions from the GA survey are going to lead to modifications in the game rules and design to enhance clarity and engagement. These changes will be integrated into the second version of the Energy Community Card Game.

Enhancements under consideration include:

- Adding one card to explain the attributes.
- Changing the evaluation of the diversity attribute, where 50% will be the optimal value.
- Handling different tie situations by allowing the player who selected the attribute to choose another attribute for tie-breaking numbers on the same cards (but only between the tied two players).
- Addressing the simplicity of the basic gameplay by exploring additional gameplay with more strategic elements, such as adding more special cards and introducing new ways to play the game.

Based on the collected feedback, the game undergoes constant improvement. This iterative approach ensures that the game evolves to meet the needs and preferences of its users, making it more effective and enjoyable.

3.11 Challenges and Lessons Learned

The development and testing phases of the Energy Community Card Deck have presented various nuanced and unexpected challenges.

Creating the card deck has been a complex task, often marked by the collision of different opinions and beliefs from various stakeholders during the co-creation process. Balancing these diverse perspectives to create a product that satisfies everyone has proven difficult. Additionally, communication with participating energy communities has posed challenges. The back-and-forth exchange of emails to resolve differences in the appearance and content of the cards has been slow, causing delays in the production process.

As we entered the testing phase, we encountered unforeseen variables impacting the card game's effectiveness and reception. Gathering and integrating continuous feedback from energy community members, students, and experts has been crucial for understanding diverse perspectives and improving the game. Feedback from the General Assembly meeting in Stockholm and subsequent surveys among energy experts highlighted areas needing refinement, including the game's usability, educational value, and overall engagement.

Despite these challenges, the iterative approach to development ensures the game evolves to meet user needs and preferences, making it more effective and enjoyable. The main purpose is to create a game that fulfils the needs of the social campaigns, especially those of the pilot communities.

Overall, while the development process has been challenging, the ongoing collection and integration of feedback have been instrumental in refining the game. This continuous improvement process ensures that the Energy Community Card Deck not only meets but exceeds the expectations of its diverse audience, enhancing its educational value and engagement.

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4 Future Plans

This section outlines ongoing and future activities, including launching a dedicated webpage, recruitment campaigns, organising school workshops, and co-design activities as part of iterative prototyping.

4.1 Future Work: Card Deck

Using the results and discussions from our development and testing phase, we have outlined a roadmap for future activities in relevance to engagement campaigns:

- Launch the dedicated webpage for the Energy Community Card Deck on the RESCHOOL site, providing access to the deck in PDF form and information about participating energy communities.
- Organise social campaigns with the RESCHOOL pilots during the summer, finalising the roadmap for these campaigns and supplying stakeholders with valuable content such as the card deck, surveys, game guides, and other useful materials.
- Conduct regular assessments to evaluate the impact of these campaigns on target audiences, adjusting strategies based on findings to ensure maximum engagement and educational impact.
- Recruit new energy communities to join the game by inviting regions and communities via email and the RESCHOOL site to expand the deck's reach within and outside the RESCHOOL consortium.
- Initiate school-related campaigns in Greece at the start of the new school period in September, presenting the card game as a tool for learning about sustainability and community energy efforts.
- Finalise timelines for school visits and prepare to showcase the game at the "RESEARCHERS' NIGHT" event on September 27th 2024.
- Analyse collected feedback during this period to inform the creation of the second version of the card deck, incorporating suggestions, adjusting gameplay mechanics, improving the deck's appearance, and finalising translations in the pilots' languages.

By following this roadmap, we aim to enhance the effectiveness of our engagement campaigns, ensure the continuous improvement of the Energy Community Card Deck, and maximise its educational and community-building impact.

4.2 Future Work: Digital App Development for Sustainability

Our immediate next steps involve gathering more detailed feedback from our test users and incorporating this feedback into advanced versions of the app. Once we finalise the key game features like the dashboard, collaboration/competition mechanisms, challenges, and gamified elements, we will initiate participant outreach across the four pilots of the RESCHOOL consortium. Discussions with pilot leads and technical support for data integration and connection are underway.

Innovation and Improvement: Based on initial feedback, our primary focus will be on completing and polishing the core game features to a high level of fidelity. There is interest in a cross-European comparison feature, allowing users to see how participants in other countries are performing as part of the RESCHOOL pilots. However, this idea is still under exploration. Our main innovation will continue to be the use of real-time smart meter data and the iterative development of the game using the co-design methodology. Additional test users will be added in the co-design process as of October 2024 to test the complete app.

Expansion and Scaling: We plan to implement the app across four pilot locations: Spain, Amsterdam, Stockholm, and Athens. The process is ongoing and will be concluded with adaptation to the particular pilots' circumstances before the project's experimentation phase.

Dissemination and Community Engagement: We plan to disseminate our findings and progress by attracting a sample size of 300-400 users across all pilots and conducting a longitudinal case study to observe user reactions to our game features once they are fully developed. We will maintain our collaboration with Energie-U and their users, leveraging their practical knowledge of sustainability and their deep understanding of the

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Dutch market. This ongoing partnership will be particularly beneficial for our largest RESCHOOL pilot in Amsterdam, as it will help us better understand and cater to the needs of our primary user base.

4.3 Impact Assessment

Currently, we are developing a list of key performance indicators (KPIs) that we could evaluate quantitatively to measure engagement, and these will formulate:

- **Learning outcomes:** Assessing the impact of serious gaming on knowledge gain by evaluating players' knowledge before and after playing the game and their ability to apply it in real-world scenarios.
- **User's satisfaction with the game:** Collecting players' feedback on likes, dislikes, and areas for improvement to increase player retention and engagement.

The project's KPIs are being shaped as part of the work in WP 4 Pilot deployment, adaptation, and validation. WP4 is deploying pilot activities for the four RESCHOOL energy communities and connected validation of these pilots. The main objective of WP4 is to adapt and improve energy management solutions for energy communities in an iterative and co-creative process, as well as assess and validate the solutions in relation to the KPIs. These KPIs will evaluate the impact of the RESCHOOL's serious games and gamification tools.

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5 Conclusions

This deliverable outlined the engagement strategies and implementation plans developed through a co-design and co-creation process within the RESCHOOL project. The methodologies and tools used to engage various stakeholders in energy sustainability practices through innovative digital and physical game research solutions have been detailed. Engagement is first facilitated via a mix of internal user testing sessions to ensure the functionality of the developed tools is sufficient for solid external testing, as usability is a significant factor in user satisfaction.

Our engagement strategy for promoting the developed games targets several audiences. It utilises various promotional methods to reach end users at the pilot level and through our network of energy communities. We have planned several social engagement campaigns, detailed in this report, which form our implementation plan to connect with end users.

These users will be followed up with surveys over the next few months to gather feedback that can be implemented into future iterations. Essentially, we intend to facilitate good engagement with the game via co-design, ensuring that users feel more ownership and attachment to the game.

This report focused on the implementation results of the RESCHOOL Co-Design & Gamification Framework, described in detail in D2.2. It provided an in-depth exploration of the co-design and co-creation steps that led us to the development of the two prototypes: the Serious Energy Game Digital App and the Card Deck. These prototypes cater to both in-person and remote gaming experiences, addressing the needs and preferences (identified in D2.2) within the RESCHOOL consortium. The co-design and co-creation process in D2.3 is demonstrated in detail through these prototypes.

Regarding the Serious Energy Game Digital App, we have concluded the preliminary design of our application and are currently fine-tuning the first prototype. The next steps will focus on designing and implementing the user campaigns for public engagement, developing the final application via iterative prototyping, and defining the pilot experimentation approach. The process is ongoing and will be concluded with the adaptation of the final application to the particular pilots' circumstances before the project's experimentation phase. A key achievement over the past period is establishing a structured collaboration with energy cooperative Energie-U and game studio IJsfontein through sub-contracting agreements. This partnership has been instrumental in supporting our co-design activities and providing us with reliable test users. As of June 2024, five test users are providing initial feedback on our app design. Although the development is still in its initial testing stages, these early engagements are promising, and additional test users will be added to the co-design process as of October 2024 to test the complete app.

Since the work is ongoing, and we are currently working on finalising our first working prototype, it would be impossible to report completely on all co-design and co-creation activities regarding the development of the serious energy game digital app. For a complete overview of co-design/co-creation activities regarding developing the serious energy game app, we advise the reader to keep an eye out for upcoming project deliverables (especially D2.4) and scientific publications acknowledging the RESCHOOL project.

Regarding the energy community card game, a serious game developed following the RESCHOOL Co-Design & Gamification Framework (as described in D2.2 and depicted in Figure 1), through a series of co-creation sessions, including many stakeholders, the main purpose of the game is to familiarise audiences with the concept of energy communities and to increase awareness about green initiatives. This report has detailed the methodological and data collection steps of the co-design and co-creation activities, cooperation with participating energy communities, and demonstrations with energy experts, which all led to improvements in the Energy Community Card Deck. The implementation and the impact assessment were discussed, as well as the challenges and lessons learned.

Finally, ongoing and future activities have been detailed. While we are eager to complete the developments and proceed with the pilots' experimentation, the steps we have taken so far and the lessons learned during this implementation plan based on the co-creation activities are useful to document and share with practitioners and the academic community through this report.

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6 Acronyms and abbreviations

Table 3: Deliverable Acronyms

Abbreviation	Definition
ECs	Energy Communities
UU	Utrecht University
DSM	Demand-Side Management
GDPR	General Data Protection
KPIs	Key Performance Indicators
IJsfontein	The game development
Energie-U	Energy community involved
COEN	Collective Energy
RESCHOOL	The project's name

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Annex

a) List of energy communities included in the Energy Community Card Deck

#	Energy Community	City	Country
1	Comunitat Energètica de Cornellà del Terri	Cornellà del Terri (Girona)	Spain
2	Comunitat Energètica d'Amer	Amer (Girona)	Spain
3	Comunitat Energètica de La Cellera de Ter	La Cellera de Ter (Girona)	Spain
4	Comunitat Energètica de Rupià	Rupià (Girona)	Spain
5	Aran Islands Energy Co-Operative	Aran Islands, Galway	Ireland
6	Energigemenskap Hammarby Sjöstad (Energy Community Hammarby Sjöstad)	Stockholm (Hammarby Sjöstad)	Sweden
7	Collective Energy (COEN)	Athens	Greece
8	Hyperion Energy Community	Athens	Greece
9	ENERGIE PARTAGÉE	PARIS	France
10	Goiener	Gasteiz	Spain
11	Vereniging Aardehuis Oost-Nederland (VAON)	Olst	Netherlands
12	Enherkom	Hernani	Spain
13	IZGREI BG	Plovdiv	Bulgaria
14	COMMONEN energy community	Ioannina	Greece
15	Energiaühistu TÜ	Tallinn	Estonia
16	Culatra 2030 - Comunidade Energética Sustentável	Culatra Island (Faro)	Portugal
17	Flexcity Sporenburg	Amsterdam	Netherlands
18	Energy Community of Karditsa SYN.PE.	Karditsa	Greece
19	PIZTU KOOPERATIBA ELKARTEA	ZUMAIA (GIPUZKOA)	Spain
20	Comunitat Energètica de La Vall d'en Bas	La Vall d'en Bas	Spain
21	Comunitat Energètica de Vilanant	Vilanant	Spain
22	Comunitat Energètica de Vilafant	Vilafant	Spain

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23	Comunitat Energètica de Viladamat	Viladamat	Spain
24	Comunitat Energètica de Castelló de Farfanya	Castelló de Farfanya	Spain
25	Comunitat Energètica de Les Cabanyes	Les Cabanyes	Spain
26	Comunitat Energètica de Torroella de Montgrí	Torroella de Montgrí	Spain
27	Comunitat Energètica de Les Planes d'Hostoles	Les Planes d'Hostoles	Spain
28	Comunitat Energètica Les Comes Genera	Les Comes	Spain
29	Ekiherri	Errenteria	Spain
30	volterra	Watervliet	Belgium
31	Energy Cooperative WEnCoop	Thessaloniki	Greece
32	SeaCoop cvso	Oostende	Belgium

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Table 4: List of energy communities included in the Energy Community Card Deck.

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b) EU survey: Co-creating an Energy Community Card Deck

This is the link to the survey that was used to collect information about the ECs that were interested in participating in the Energy Community Card Deck: https://ec.europa.eu/eusurvey/runner/reschoolECCD

It will remain open to facilitate the creation of more cards for the Energy Community Card Deck.

c) Energy Community Card Game (Gameplay Experience) survey

This is the link to the survey which was used to collect feedback from the Energy Experts at the General Assembly in Stockholm: https://ec.europa.eu/eusurvey/runner/CDSURVEY2024

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