European Commission

Study on prize development for renewable energy systems (recognition and inducement prizes)

Final Report

Independent Expert Report

Research and Innovation

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European Commission
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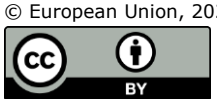

EUROPEAN COMMISSION

Study on prize development for renewable energy systems (recognition and inducement prizes)

Final Report

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TABLE OF ABBREVIATIONS

Abbreviations	Description
AP	Artificial Photosynthesis
AI	Artificial Intelligence
BIPV	Building Integrated Photovoltaics
CAPEX	Capital cost
CEC	Citizens Energy Communities
CEPS	Centre for European Policy Studies
CTR	Click-through rate
CRM	Critical Raw Materials
CSHPSS	Central solar heating plants with seasonal heat storage
DLE	Direct Lithium Extraction
DHC	District heating and Cooling
DG RTD	Directorate-General for Research and Innovation
EC	European Commission
EC	Energy Community
EGEC	European Geothermal Energy Council
EIC	European Innovation Council
EII	Energy Intensive Industry
ETIP	European Technology Information Platform
EU	European Union
GHG	Greenhouse gas
IEMD	Internal Electricity Market Directive
IOT	Internet of Things
KPI	Key performance indicators
LTDH	Low-temperature district heating
NGO	Non-Governmental Organisations (NGOs)
O&M	Operation and maintenance
Q&A	Questions and answers
REC	Renewable Energy Communities
REDII	Renewable Energy Directive II
RET	Renewable Energy Technology
R&I	Research and Innovation
SET	Strategic Energy Technology
SME	Small and medium enterprise
STES	Seasonal Thermal Energy Storage
TRL	Technology readiness level

ABSTRACT

This study aimed to design five innovation prizes for Renewable Energy Technologies (RET) suitable for launch under Horizon Europe or similar initiatives. The methodology involved three key stages: (1) review and analysis of six previous Horizon 2020 prizes, examining their success factors and challenges encountered; (2) prize concepts development, where ten potential prizes were pre-selected and refined; (3) prize design and implementation, wherein five prize concepts were chosen and their rules of contest, implementation strategies, and communication plans were formulated. This structured approach ensured the creation of effective and impactful innovation prizes for the renewable energy sector. Furthermore, the study provides key tools for future prize designs, handing a complete prize design methodology and recommendations.

EXECUTIVE SUMMARY

The purpose of this study was to identify, consult, select, conceptualise and design five innovation prizes for Renewable Energy Technologies (RET) that could be launched under Horizon Europe or other programmes. The study team included experts from Ecorys, WIP, and Carbon Counts. The approach taken involved three stages:

- Review and analysis: we reviewed the development and execution of six previously run Horizon 2020 prizes identifying lessons learned, focussing on the factors that contributed to success, and those that presented challenges.
- Concept development: we pre-selected and developed concepts for ten potential prizes.
- Prize design and implementation: we selected five of these concepts and designed their complete rules of contest, along with implementation and communication plans.

First, we examined and attempted to build from the experiences of six previous Horizon 2020 prizes. We provided a synthesised evaluation of the lessons learned to provide recommendations for future RET prizes and their respective communications strategies. Through careful review, we formulated the following nine recommendations for future RET prize design, including:

- Allowing sufficient time to design the RET prize;
- Clearly defining the target audience and their specific needs;
- Carefully considering the incentives designed to attract participants;
- Ensuring the technology readiness level (TRL) matches the prize concept and research;
- Establishing clear and balanced evaluation and award criteria;
- Developing a communications strategy tailored to the target audience;
- Ensuring potential applicants have easy access to information;
- Mobilising sufficient resources for implementing the communications strategy and understanding how resource limitations may impact the final output;
- Realising the full potential of prizes as a way to promote research and innovation (R&I).

Building on the recommendations formulated, the study then focussed on developing and sifting a long list of prize concepts and sifting these into an initial shortlist of ten. The long list of potential ideas was identified through desk research and expert consultations. We then developed two sets of selection criteria and refined this list to ensure a well-balanced set of 10 prize concepts.

A first set of criteria were applied to filter the longlist as follows:

- Relevance and alignment with current research needs and EU policy priorities;
- Feasibility, including clarity of target audience, and achievable timeframe
- Potential for significant Impact

A second set of criteria addressed then assessed the overall prize balance:

- Prize type: recognition and inducement prizes;
- RET scope, including cross-cutting and RET-specific, and
- Thematic focus, including competitiveness, technological improvement, circularity, and social impact.

Based on these selection criteria and the findings from the methodology, an initial shortlist of ten prize concepts was agreed as follows:

1. Application of green synthetic gases in the European glass sector
2. Lithium production from geothermal plants in Europe
3. RET solutions in Energy Communities
4. Fuel from the Sun [#2]: further Advancing Artificial Photosynthesis for renewable fuel
5. Advanced digital solution to improve the maintenance processes of RETs
6. Seasonal Thermal Energy Storage
7. Responsible Manufacturers for RET Circularity
8. Building Integrated Photovoltaics (BIPV) products and services for facades in building stock
9. Innovative and efficient District Heating and Cooling (DHC) systems
10. Innovative mitigation measures to increase biodiversity hydropower schemes

Following, the study focussed on further screening and the taking forward of five concepts from the initial shortlist into prize designs, accompanied with corresponding communication plans. The five selected prize designs are summarised below:

Prize for Lithium production from geothermal plants in Europe

This inducement prize aims to reward the on-site demonstration of lithium production from geothermal brines related to a geothermal plant, in order to stimulate further advancement of Direct Lithium Extraction (DLE) technologies, while contributing to meet the increasing EU's demand for a Critical Raw Material via its production domestically and sustainably.

RET solutions in EU Energy Communities

This recognition prize aims to highlight different participatory and governance innovations within energy communities while operating a RET. It specifically seeks projects addressing common shortcomings, challenges like energy poverty, by showcasing examples of innovative governance structures, participation methods and social procedures implemented by Energy Communities.

Fuel from the Sun: further Advancing Artificial Photosynthesis for Renewable Fuel

The prize seeks to build upon the successful European Innovation Council (EIC) Inducement prize "Fuels from the Sun" awarded in 2022, reproducing the same concept as the previous Artificial Photosynthesis (AP) Prize and improving it as necessary. A review of the prize implementation process (e.g. earlier stage gates) and award distribution (e.g. awards also to placed competitors) are seen by consulted experts as two key areas for improvement.

Advanced Digital Solutions for improved maintenance processes for RET

This prize recognises and gives visibility to digital innovations, among them Artificial Intelligence (AI) solutions, to promote their contribution to improving maintenance challenges. Several types of software or hardware applications are addressed in the RET sectors. The prize will contribute to operation and maintenance's operational efficiency, reducing its costs, saving employees' working time, and improving the safety of working conditions, as well as enhancing the sustainability of the RET system.

Seasonal Thermal Energy Storage

The prize aims to reinvigorate interest in long-duration (seasonal) high-temperature thermal energy storage and its coupling with renewable energy sources (e.g. solar, biomass, waste heat). The focus would be on high-temperature systems (>45°C providing seasonal thermal energy storage in geological reservoirs (aquifers).

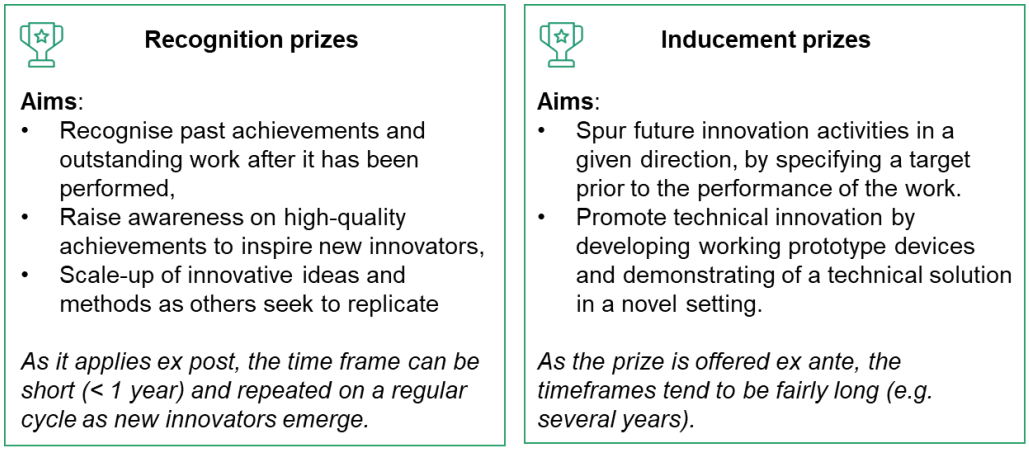
1. Introduction

1.1. The objective of the study

The European Union aims to reduce greenhouse gas (GHG) emissions by 55% by 2030, ultimately striving for climate neutrality. To reach this climate ambition, a profound and rapid energy transition is crucial, leveraging a wide range of renewable energy sources. In line with this goal, Horizon Europe, the EU's flagship Research & Innovation (R&I) programme, has been and will continue to introduce prizes in the field of renewable energy technologies (RET).

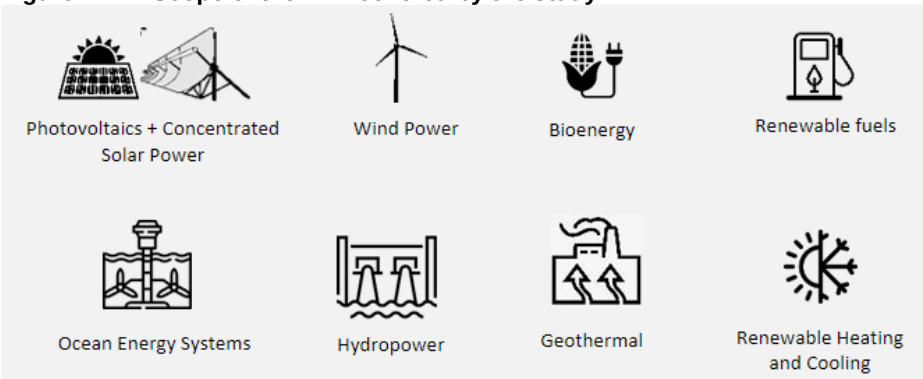
Prizes can serve a dual purpose: recognising and incentivising ground-breaking research, and increasing the awareness, development, and uptake of RET innovations. They foster innovation by tackling major RET challenges, engaging new participants, and promoting creative thinking through inducement prizes. Their acknowledge of achievements also supports the scaling-up of innovations and inspire peers. Prizes also represent an opportunity to increase stakeholder engagement towards the Horizon Europe Work Programme.

Figure 1 Defining elements of recognition and inducement prizes



This study aims to deliver five new prizes in the area of RETs, encompassing both recognition and inducement prizes. These prize concepts could potentially be launched under Horizon Europe or other European programmes. The scope of the study includes eight different RETs, as detailed in Figure 2. The study team included experts from Ecorys, WIP, and Carbon Counts.

Figure 2 Scope of the RET covered by the study

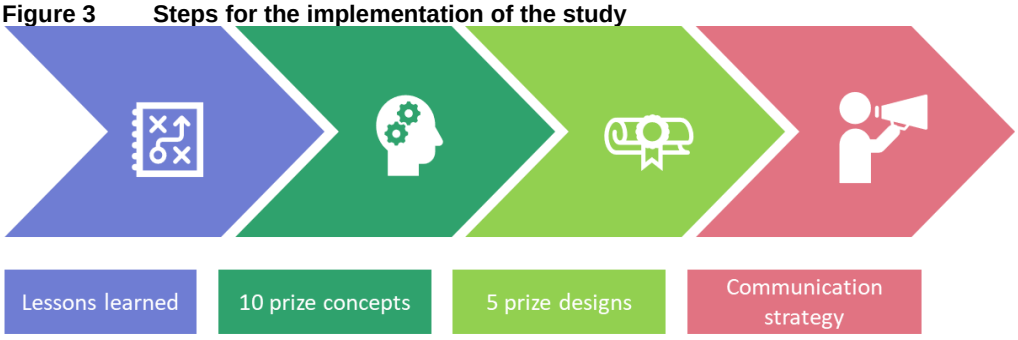


To obtain the five RET prizes, the study underwent three main steps:

1. Gathering lessons learned from past prizes, identifying key learnings and best practices.
2. Developing a long list of prize ideas and selecting ten concepts for further development.
3. Selecting the five most promising concepts, and developing them into full-fledged prize designs, and developing their communication plans.

The following figure below illustrates these steps in detail:

Figure 3 Steps for the implementation of the study



To ensure impactful and successful prize design, the study has examined the essential components for their comprehensive development, from conception to finalisation. The rules of contest are a key document outlining the main elements of each prize, serving as a reference guide for applicants. Table 1 presents these elements, following the structure of typical rules of contest.

Table 1 Key elements of a prize

Element	Description
The objectives of the prize	Describes in broad terms the key objectives of the prize, often backed up by a justification providing policy context. The target audience for the prize and the technology factor is usually outlined under the prize objective.
The expected results	Describes more clearly the expected results from the applications. These often vary depending on the prize type, for instance, recognition prizes will often point to both a result and a path to achieve it, while inducement prizes often include broader expectations.
The award	The nature of the award, as well as the amount and recipients' selection are specified. In the context of prizes, awards are received when the results are published, with no prior funding available. A key reflection by the project team is that the award size should be sufficient to incentivise participation. Additionally, it is key to consider the wider incentives of the target audience to participate beyond the award.
The eligibility criteria	The eligibility criteria includes both general conditions to apply, according to the Horizon Work Programme rules for prizes, as well as any potential restrictions depending on the selected target audience.
The award criteria	The award criteria provide a technical detail on the rules of contest. They outline technical expectations and define how the applications will be evaluated with respect to the selection criteria.
The indicative timetable & the evaluation procedure	The rules of the contest include a timetable outlining the different deadlines of the application process, as well as deadlines for the evaluation and award procedure. The evaluation procedure itself describes the admissibility thresholds for each award criteria, and details the steps required for the evaluation. For instance, shortlisted finalists may be invited to present their projects. *Note that the timeline is often much shorter for recognition prizes compared to inducement prizes.*

1.2. The structure of the report

This report constitutes the final deliverable of the Study on prize development for renewable energy systems, presenting and discussing the results obtained by the study. It provides the methodology used, bringing together the results from the desk research, and delivers key tools for future prize design and implementation, including recommendations, prize ideas selection methodology, prize concepts and prize designs.

The remainder of this report is organised into the following chapters:

- Chapter 2: Methodology
- Chapter 3: Recommendation for future prizes
- Chapter 4: Ten prize concepts
  - Selection Methodology
  - Prize concepts developed
- Chapter 5: Five prize designs
- Chapter 6: Prize communication strategy
- Chapter 7: Conclusion
- Annexes
  - Annex I – Rationale for the selection of 5 prizes

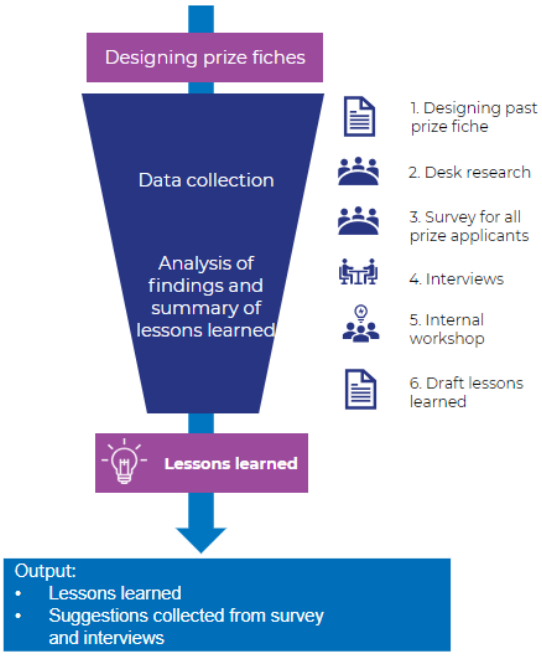
2. Methodology

This study aims to select and design five prizes in the area of renewable energy which could potentially be launched under Horizon Europe (or other programmes). To deliver these five RET prize designs, our research approach is based on (1) a review of the development and implementation of past prizes under Horizon 2020 – to identify lessons learned (with a focus on drivers and barriers to 'success' in RET prizes); (2) pre-selection and concept development for ten possible prizes; and (3) the selection and fully-fledged design of rules of contest of five prizes, accompanied by implementation and communication plan.

2.1. Methodology for analysing lessons learnt

The study focussed on analysing lessons learned from six previous prizes launched under Horizon 2020. These insights were then used to provide recommendations for the development of future renewable energy-related prizes and their respective communications campaigns under Horizon Europe.

Figure 4 Methodological approach for analysing the lessons learned



We defined "successful" prizes as featuring a sufficient number of relevant applications and winners such that the prize objectives and expected results were fulfilled. To analyse drivers and barriers to a RET prize "success", we established a methodology consisting of six steps:

1. Designing prize fiches;
2. Collection of data through desk research;
3. Drafting and disseminating a survey targeting past applicants, and analysing its results;
4. Conducting interviews with prize organisers and applicants;

5. Organising an internal brainstorm to compare findings from each prize and formulate lessons learned and recommendations;

6. Drafting of conclusions and recommendations.

The desk research consulted various sources, including the rules of contest, the dedicated EC webpage for prizes, the application portal, prior studies relevant to the design of the prize concept, press releases, infographics, webinar slides depending on their availability. This research was used during **step 2** to populate the prize fiches developed in **step 1.**

Then, **step 3** and **step 4** bridged the information gaps through stakeholder consultations. This included surveys with applicants and interviews with both prize designers and applicants. Table 2 summarizes the combined findings from these steps.

Table 2 Overview of the data collection methods for each prize

Sources	RESponsible Islands (2019 & 2020)	Horizon Prize for C02 Reuse	Horizon Prize for low carbon hospital	Horizon Prize for integrated photovoltaics energy system in historical buildings	EIC Prize Fuel from the Sun	EIC Prize Affordable High Tech for Humanitarian Aid
Desk review	✓	✓	✓	✓	✓	✓
Survey Respondents	6	2	✗	✗	4	5
Prize organisers interview	✓	✓*	✓	✓	✓	✓
Applicants' interviews	2	2	✗	1		2

*The prize organiser of CO2 reuse was only involved on the design phase of the prize, therefore, there is no information available regarding implementation and/or follow up.

On 14 March, we organised an announcement webinar, which was a key activity to present the study and engage with stakeholders that will be relevant throughout our study. It also served to announce and launch the survey for past prize applicants. The survey was open from the day of the announcement webinar to 18 April and received a total of 18 responses (see Annex C for the survey analysis).

In parallel to the survey, the team carried out 7 interviews with organisers of the past prizes. Following the closing of the survey, we also organised 7 interviews with selected applicants.

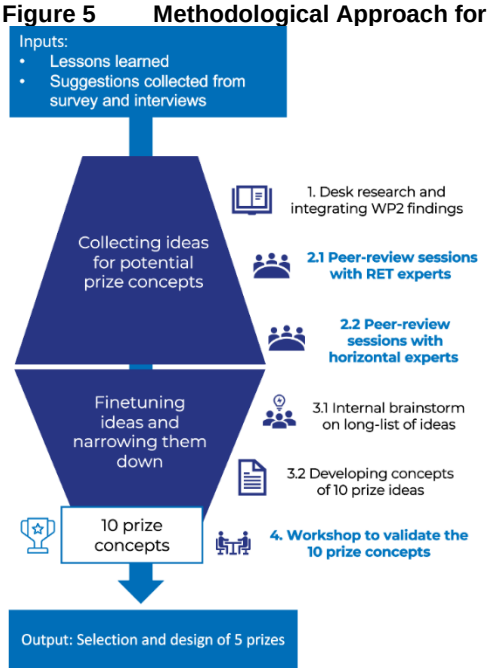
Step 5 involved in an internal brainstorming workshop held on April 13. This session focussed on synthesising learnings from each prize, identifying cross-cutting themes and devising a first set of recommendations. The discussion aimed to refine our definition of a 'successful' prize.

Finally, **step 6** produced a report summarising the findings and lessons learned during the analysis of the lessons learned, to be used as input for prize concepts development.

2.2. Methodology for developing 10 prize concepts

Building on the recommendations formulated, we developed 10 prize concepts, taking the most relevant and impactful concepts from a long list of potential prize ideas established thanks to desk review and several sessions of expert consultations.

Figure 5 Methodological Approach for developing 10 prize concepts



To develop both inducement and recognition prizes that would either be cross-cutting or cover one or more RET in the scope, we established a methodology consisting of four steps:

1. Conducting a desk review to gather an understanding of European Union (EU) policy priorities and the state-of-the-art of each RET;

2. Consulting stakeholders through two horizontal peer-review sessions and eight peer-review sessions with experts covering each RET, to establish a long list of prize ideas;

3. Selecting and developing ten prize concepts most likely to be "successful" and

4. Validating and collecting feedback on the ten prize concepts through a Validation Workshop inviting experts, EU institutions staff and industry organisations.

In the **first step**, we conducted desk research to understand the challenges faced by each RET industry to ensure that the objectives of the identified prizes aligned with the EU's energy and climate policies and priorities. The research team reviewed the Strategic Energy Technology (SET) plan, the European Technology Information Platform (ETIP) and "Fit for 55" package. This review emulated an initial list of prize ideas, considering the earlier findings and recommendations.

In parallel, in the **second step**, we extended and refined the list of prize ideas by conducting two horizontal peer-review sessions and eight RET peer-review sessions. These took place from mid-June 2023 to end-July 2023, each lasting around 1.5 hours. The horizontal peer-review sessions respectively hosted members of European institutions and experts across RETs. The eight RET peer-review sessions were each dedicated to a specific RET in the scope. The objective of the peer-review sessions was to gather a small committee, for increased interactivity, of high-quality experts that could provide a representative overview of the industry needs in RET research and innovations. Table 2.2 presents the number of experts who attended these RET peer-review sessions.

Table 3 Number of experts that participated per RET

Stages/Scope	PV/CSP	Wind Power	Bioenergy	Renewable Fuels	OES	Hydropower	Geothermal	RHC
Peer-review sessions attendance	7	3	3	5	4	6	4	5

These peer-review sessions aimed to collect inputs and feedback from experts on each RET field on the initial list or prize ideas and collect additional prize ideas. The sessions focused on both prize ideas specific to each RET, as well as cross-cutting ideas.

To identify cross-cutting prize ideas for RETs, the team conducted two horizontal peer-review sessions specifically aimed at identifying cross-cutting challenges across RETs. Several recurring themes were emerged covering two or more RETs. Subsequently, eight additional peer-review sessions provided a platform to discuss these initial ideas and identify further cross-cutting themes. Notably, some experts attended multiple peer review sessions, allowing the team to make connections between challenges across different discussions.

Following the peer review sessions, the team compiled the most relevant and feasible cross-cutting prize ideas, from which it selected the ten prize ideas to be developed into full prize concepts during a brainstorming session (step 3). For this selection, the team followed a set of criteria presented in Section 4.2. This set of criteria guided the team in the process of identification and refinement of potential prize ideas based with the highest likelihood of success. The shortlist of prize ideas is included in chapter 4.

Based on the findings from the desk research, the inputs collected during the peer-review sessions, and additional targeted consultations with experts and additional desk review, the project team developed the ten prize concepts, which are included in Section 4.3

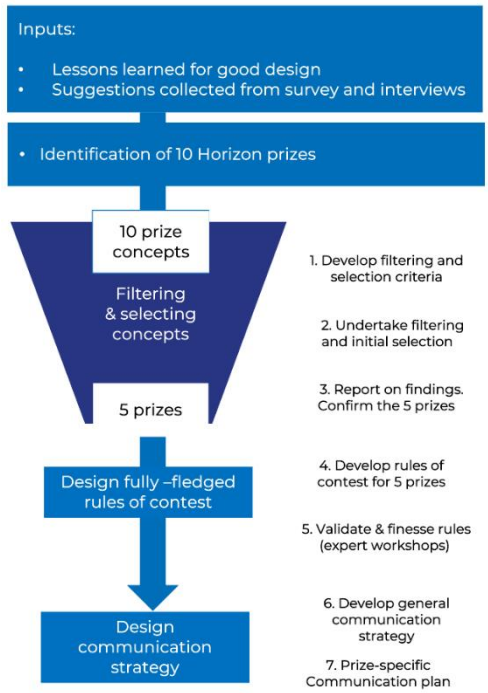
After developing the concepts, the project team organised a half-day expert Validation Workshop on 3 October (step 4), aimed at validating and refining the prize concepts to address current needs and challenges in their respective technology areas. This also informed the selection process to narrow down the selection of five prize concepts to be fully

developed. The workshop gathered 15 persons, including 7 high-level external participants from diverse relevant backgrounds, including policy, research, industry.

2.3. Methodology for selecting 5 prize ideas to develop

Then, we selected five out of the ten prize ideas created, and develop them into fully-fledged prize concepts. The methodological approach was carried out in seven steps, as summarised in the figure below.

Figure 6 Methodological approach for selecting 5 prize ideas to develop



Steps 1, 2, and 3 short-listed five of the ten prize concepts ideas. The selection criteria were developed from lessons learnt and recommendations to filter the concepts, guide the assessment, and selection process. This ensured a balance between the type of prizes developed (recognition or inducement).

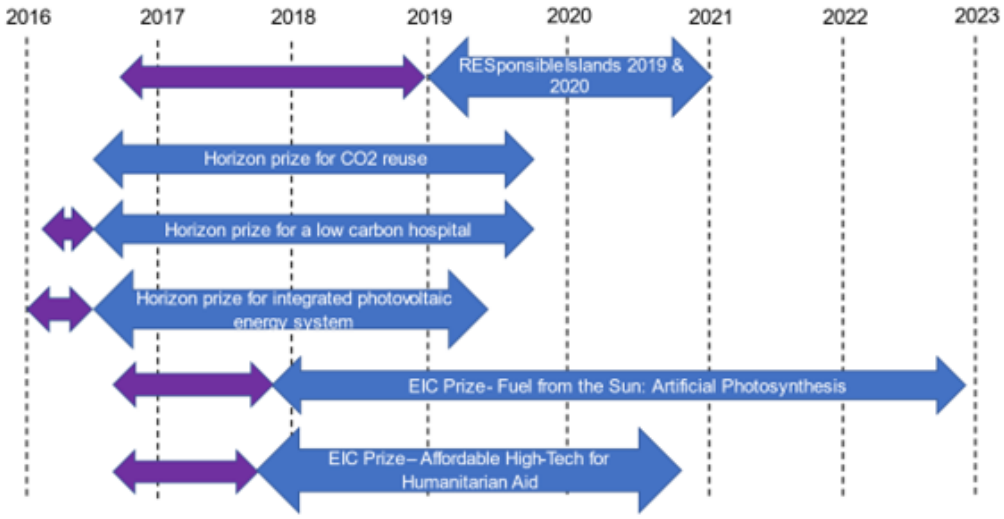
Steps 4, 5, 6 and 7 involved finalising the full design of each prize, including the contest rules. After the first draft of the concept was finalised, an expert validation workshop was carried out with relevant stakeholders to fine-tune the fitness rules and validate different aspects of the prize, with an aim to ensure a well-defined concept. The validation workshops also informed the development of a general communication strategy for all prizes and helped tailor specific communication plans for each individual prize.

3. Recommendations for future prizes

The six previous prizes in scope for extracting lessons learnt included the following (also shown in Figure 7):

- Prize for renewable energy islands (RESponsible islands)
- Horizon prize for CO_2 reuse
- Horizon prize for a low-carbon hospital
- Horizon prize for integrated photovoltaic energy system
- European Innovation Council (EIC) Prize - Fuel from the Sun: Artificial Photosynthesis
- EIC Prize - Affordable High-Tech for Humanitarian Aid

Figure 7 Overview of the six past prizes under analysis



3.1. Lessons learnt

We defined a prize as “successful” if it featured a sufficient number of relevant applications and winners, such that the prize objectives and expected results were fulfilled. We analysed drivers and barriers from successful and unsuccessful prizes. Overall, when comparing RET prizes that achieved their objectives and expected results to the ones that did not achieve, we observe that there were some common success factors and challenges across the RET prizes. The table below develops per topic the lessons learned gathered.

Table 4 Detailed lessons learned

Topic	Finding
Lessons learned 1: Target audience	The biggest challenge encountered by RET prizes that were not successful was to define an appropriate target audience that would be interested in applying. The RET prizes that were the most successful featured a study on which the prize design was based, suggesting a better understanding of the market and interest in the given RET. Also, a good practice was to involve the target group during the design process to ensure that the prize concept was adapted to their needs.
Lesson learned 2: Design process	The most successful RET prizes are those for which sufficient time was allocated to all steps in the process, from their inception to their launch. It is interesting to see that often, where time was available, it was used to involve stakeholders and reflect on past studies that served for establishing the prize concept. Also, it was highlighted that relying on existing networks or utilising existing events or ongoing projects to advertise a topic-related prize eased the communication process. As interest already existed, there was no specific need to increase incentives to participate.
Lesson learned 3: Type of prize	The requirements for a successful inducement and recognition RET prizes are different as they do not have the same aim. For instance, the timeline for application should be longer for inducement RET prizes. The TRL and the prize type did not seem to be necessarily linked. Overall, the prize type should receive careful consideration during the prize design process.
Lesson learned 4: Technology factor	The TRL for a prize did not constitute a specific success factor. However, the TRL should be well-tailored to the prize concept and defined in the rules of contest.
Lesson learned 5: Incentives for applicants	The award amount was sufficient for all RET prizes. However, to increase participation in the prizes, it is critical to increase the incentives to participate and ensure successful prizes. Several proposals for non-monetary rewards were suggested during applicant interviews.
Lesson learned 6: Eligibility Criteria	The eligibility criteria did not hinder the RET prizes success and most of the applicants found them appropriate. When a prize was not successful applicants that applied did not meet the eligibility criteria. However, this is rather linked to an issue in the design of the target audience and not the eligibility criteria.
Lesson learned 7: Award criteria	The award criteria were mostly found to be clear enough by the applicants. There were contrasting strategies in terms of drafting more or less detailed award criteria. The more precise the expectations of the prize and the more they were based on prior studies, the more detailed they seemed to turn out. In general, the importance of the award criteria was that they were clear such that all applicants understood what was required to win and provided a clear interpretation for evaluators too. When award criteria are drafted clearly, they offer a fair competition.
Lesson learned 8: Rules of contest	Most of the applicants found the rules of contest to be clear. However, with a lack of access to further information, they are the main tools the applicants have when applying. In several cases, including successful prizes, the clarity of the terms

Topic	Finding
	used in the rules of contest and expectations such as TRL or award criteria could have been improved. It is critical to have the rules of contest reviewed and as clear as possible.
Lesson learned 9: Duration of prize	Overall, the duration of the RET prize from its launch to the award was challenging. Both because applicants need to be given a sufficient amount of time to consider applying and because they must have sufficient time to put the application together. If prize organisers are constricted in setting up the timeline as they see fit, they should adapt the prize concept and the rules of contest to the time available.
Lesson learned 10: Communication Strategy	Most prize communication strategies were not well developed. The RET prizes that were the most successful also did not feature a structured communication strategy. Successful prizes saw an ad hoc strategy being implemented. Furthermore, some prize applicants struggled to find relevant information about their prizes.
Lesson learned 11: Implementation (including launch and award phases)	Overall, the implementation was not found to hinder the success of RET prizes. Challenges in the implementation often derived from unforeseen challenges that came from the design phase. It was highlighted that it was particularly relevant to make all elements of the rules of contest as clear as possible. To ensure that the interested potential applicants have increased chances to submit relevant applications, they could be guided throughout the process through a “prize community” or at least through a webinar. Prize organisers did not always foresee the issues that applicants struggled with to complete an application and misunderstandings, or divergent interpretations were often revealed too late in the process (Q&A or even evaluation).
Lesson learned 12: Monitoring of prize implementation	Data collection to analyse the RET prizes turned out to be a challenge, notably regarding the implementation. Monitoring tools could be introduced to improve the prize success and allow for lessons learnt past prizes for each future prize.
Lesson learned 13: Potential impacts of the prize and solutions developed	In the context of this study, impact was achieved as soon as winners were found to the RET prizes as winners are awarded only if the prize objectives and expected results are fulfilled. Having winners generated impact (use of the award, visibility on the winner and the technology targeted, as well as on the Horizon Programme, further work or scale-up of the technology, etc.). Broader impact could be further explored in another study.

Based on the key lessons learnt, we developed nine recommendations for future RET prize designs and include:

1. allow for sufficient time to design the RET prize;
2. clearly assess and define the target audience and its needs;
3. carefully consider the incentives for applying in the prize design;
4. ensure that the targeted TRL matches the prize concept and research;

5. ensure clear and balanced evaluation and award criteria;

6. develop a communications strategy relevant to the target audience;

7. ensure potential applicants have access to information;

8. mobilise sufficient resources to implement a communications strategy and understand how limited resources will impact the final output;

9. realise the full potential of prizes as a way to promote R&I.

3.2. Recommendations in detail

Drawing on the evidence, analyses, and key lessons learnt, we here present nine detailed recommendations for future prize designs in the field of RET.

Recommendation 1: Allow for sufficient time to design the prize

To ensure that a RET prize is a suitable policy tool and that the objectives and scope are clearly defined, sufficient time must be dedicated to the prize design to conduct the different activities required to establish a successful prize. The time required depends on the complexity and novelty of the prize, but the following elements should be given sufficient time during the prize design:

- The assessment and definition of the target group and its needs (see recommendation 2). The use of user persona is recommended.

- The timeframe for implementation and linked to it the size of the award and other incentives, to ensure its suits the prize objectives and requirements (see recommendation 3).

- A thorough consideration of the prize type (inducement or recognition) should be made and linked to the targeted TRL of the prize (see recommendation 4).

- The evaluation and award criteria should be clear and balanced (see recommendation 5).

- The available communication channels and existing fora and networks that can be used to promote the prize (see recommendation 6).

Recommendation 2: Clearly assess and define the target audience and its needs

To ensure participation and the success of the RET prize, it is critical that the target audience is well-defined and is interested in participating. We recommend that a needs assessment is carried out to identify user persona and link them to the prize concept. In case of time pressure due to a restricted timeline for the prize design, the target audience should be based on needs assessed through previous recent studies or identified through a stakeholder mapping and analysis. If possible, consultations of the target group during the prize design should be foreseen to test and validate the prize concept, as well as gauge the interest among the audience and build an initial community around the prize. To facilitate the assessment, communication and the targeting of applicants, the prize could target existing communities of stakeholders. Collaborations with other DGs could be foreseen as a successful way to

address new topics at the nexus of RET, as well as an interesting way to attract new stakeholders to Horizon prizes.

Recommendation 3: Carefully consider the incentives for applying in the prize design

Appropriate incentives to apply must be provided, both by ensuring a relevant award size, as well as providing additional incentives. Organisers should provide various incentives for the target audience to participate and clearly communicate these. It is important that these incentives not only include benefits for the winner but also to other participants. Typical incentives include increased visibility, networking opportunities, ability to scale-up ongoing projects and attracting private and public investment through participation.

The benefits for participants should be clearly defined during the design phase through, for example, a user persona. Based on the identified incentives, the prize design should be adapted to reflect these. For example, if the main interest in the target group is to gain visibility for their project, this could be reflected in the rules of contest by having several finalists or in the communication strategy by including success stories, which gives more opportunity for applicants to be advertised.

Additional non-financial incentives should be further explored to increase applicant visibility or to provide them with other opportunities. For instance, an event for finalists could be organised to present their solution, it would increase their visibility and give them a chance to network. For inducement prizes, exploring partnerships with incubators or offering space to test their technology could be offered as a part of the process for finalists.

The financial reward should preferably be split among multiple finalists (i.e. first, second and third place) to increase incentives for applicants. Rewards should also reflect the scope and costs associated to the technology covered for the prize. In case of external limitations to the award size, other non-monetary awards (for finalists or participants) could be conceived. For example, access to expertise, equipment or networks relevant to the participants projects. Apart from this, applicants could also be supported or directed towards other financing and funding opportunities provided by public or private sources.

Recommendation 4: Ensure that the targeted TRL matches the prize concept and research

When designing a RET prize, it is critical to ensure that the TRL level is consistent with the foreseen prize concept. This requires the prize designer to consider aspects such as the prize goals, the prize award, the envisioned timeframe and the prize type. While generally inducement prizes are considered to target lower TRL this does not always have to be the case for an inducement prize, since this could have the goal of applying an existing and used technology in a novel manner. Additionally, a prize should meet a specific need assessed or be consistent with the development of the technology on the market. Thus, when designing a prize, the TRL should not only be properly aligned with the prize concept, but the prize concept and TRL should reflect the state of the market.

Apart from deciding on the TRL, the required TRL needs to be clearly indicated in the prize concept and supporting documents to avoid misunderstanding for prize applicants, and later on, evaluators.

A proper needs assessment, as well as involving the target audience during the design phase, can facilitate the decisions regarding the TLR and limit misunderstandings.

Recommendation 5: Ensure clear and balanced evaluation and award criteria

The award and evaluation criteria should be tailored to each RET prize and must strike a delicate balance: While sufficient detail is crucial for applicants to understand what their solution and its application require, an overly detailed process can become cumbersome. Striking at the right balance involves ensuring applicants understand what documents to submit, and how to demonstrate their solutions potential for winning, while still allowing for some flexibility.

Thus, award criteria should be kept clear, simple, and aligned with the prize concept, while additional details are provided in supporting documents not as mandatory requirements but to guide applicants. The evaluation criteria should be well defined and unchanged during the competition to ensure fairness and objectivity. Finally, they should also where possible promote for diversity in the selection of winners.

Recommendation 6: Develop a communications strategy relevant to the target audience

During the prize design phase, it is critical to develop a communications strategy aligned with the needs of the target audiences and the objectives of the prize concept. Prizes that fail to reach their target audience either failed at identifying them effectively or to develop a suitable outreach strategy. Therefore, the development of a well-defined communications strategy should provide a clear outline and schedule for all communications activities and materials.

Where sufficient resources are available, investments in promotion on social media should be incorporated into the communications strategy. Social media allows for targeted information dissemination, community building, and direct interaction with those interested, which can be critical to reach the often-small pool of potential applicants. If resources (such as budget and timeframes) are limited, focus on “easy wins” like leveraging existing initiatives or stakeholder networks and their communication channels to spread messages. In such scenarios, the focus should be on the key stakeholders clearly defined thanks to stakeholder mapping (see recommendation 1 on the target audience).

The communication unit could be involved from an early stage and maintain participation throughout implementation for support. Moreover, it is particularly key to introduce tools to monitor communication activities to ensure dissemination is on track and reaches the target audience. Nevertheless, it is worth pointing out that the ad-hoc approach to communications is still an effective tool to consider in cases where there sufficient is time and the will to implement it. Its effectiveness however cannot be quantified.

Effective communication fosters community building, which can amplify the prize’s significance and extend its benefits beyond its immediate goals.

Recommendation 7: Ensure potential applicants have access to information

It is critical to ensure that the potential applicants have all the elements to submit a suitable application to fulfil the eligibility and award criteria. To do so, and to ensure that potential divergent interpretations of the rules of contest are spotted early on, we recommend the following actions:

- Contact potentially interested stakeholders and ask them to register to a mailing list to stay-up-to date.

- Organise a webinar with potential applicants to present the prize and its objectives allowing stakeholders to raise questions and clarify aspect of the prize.

- Each prize or all Horizon prizes should have a dedicated functional mailbox where applicants may ask questions during the application process.

Recommendation 8: Mobilise sufficient resources to implement a communications strategy, and understand how limited resources will impact the final output

Before prizes are conceptualised, it is essential to draw up an assessment of resource limitations, such as budget and personnel, potentially impacting the prize. A risk assessment could be carried out as a result, but understanding resourcing and its limitations before writing the communications strategy will enable a strategy that can be implemented, rather than taken from or not used at all.

The communication strategy should be developed with the prize's limitations in mind, particularly budget and resources. These factors are outside the organizer's control and will influence the strategy's outputs, such as the type of communication materials (such as infographics) that can be produced.

Despite a lack of control over limited resources, DG RTD could attempt to mobilise resources internally which would assist in both expanding the communications strategy but addressing limitation. It is crucial to incorporate communications units where possible.

Existing planned events targeting EU-relevant policy topics or innovative fields can provide available opportunities to communicate the prize. Organisers can develop concepts related to the event’s topic to stimulate or recognise innovation in RET.

Recommendation 9: Realise the full potential of prizes as a way to promote R&I

Prizes offer a unique and engaging entry point to R&I activities of the European Commission, fostering stakeholder participation in European R&I. It is therefore critical to highlight, as a part of the communication strategy, how prizes provide an opportunity for stakeholders to engage with EU initiatives and receive recognition for their work. By leveraging prizes as an “exciting aspect” of the Horizon Work Programme, the Commission can create momentum around key themes and increase visibility. Prizes, thus, represent a strategic opportunity to engage more largely European researchers and innovators.

4. Ten Prizes concepts

The study focussed on designing both inducement and recognition prizes. These prizes could be either cross-cutting or address one or multiple RETs within the study's scope. Through desk research and peer-review sessions, the team developed a long list of prize ideas, which were then narrowed down to 10 concepts via a selection process.

4.1. Long list of prizes

During the desk research and the RET peer-review sessions, the project team gathered valuable information on challenges, research needs, state-of-the-art development on the market of each RET in the scope of the study, and the relevance of these to EU policy priorities. Several thematic areas arose in initial discussions. These included:

- Social aspects of renewable energy development and deployment (e.g. energy poverty, energy access, community ownership models).
- Materials selection, fabrication, and circularity for RETs, including:
  - Supply chains and manufacturing of RET components (e.g. sustainability of materials usage and recyclability of solar PV and turbine blades).
  - End of life considerations (recovery, repurposing or recycling of RET components).
  - Critical minerals for the energy transition (e.g. for battery manufacture for electricity storage).
- Forms (of renewable energy) and related enablers, including
  - Heat (which often neglected compared to electricity)
  - Liquid and gaseous fuels
  - Storage (and, thermal energy storage)
- Construction and siting, including
  - Building integration
  - Platform design and performance (e.g. for marine RETs)
  - Biodiversity of RET sites (e.g. hydropower)
- Operational aspects, including
  - Improving operational controls and the efficiency of maintenance and planned preventative maintenance).
  - Artificial intelligence (e.g. and its role in supporting enhanced operation performance of RETs).

Based on these findings, we created an extensive list of prize ideas, including cross-cutting prize ideas.

4.2. Selection Methodology

The long list of prize ideas followed three key considerations. Prize ideas must:

1. Align with both EU policy priorities and the prevailing state-of-the-art within the RET market (effectively addressing critical research needs,

2. Be feasible in terms of establishing a clear target audience, devising a straightforward set of incentives that would encourage active participation, and pinpointing a well-defined timeframe, as well as a transparent award and evaluation criteria, and

3. Have the potential to make a significant impact in its respective field.

To refine the long list to 10 prize concepts, the research team developed two sets of selection criteria. These criteria aimed at ensuring a balance between the type of prizes developed and the individual potential of each prize for success.

- The first set, for individual prize concepts:
  - Relevance to the current research needs and EU policy priorities;
  - Feasibility (clear target audience, timeframe, etc.); and
  - Impact
- The second set, for the overall balance in the prizes selected:
  - Prize type (i.e., recognition and inducement prizes);
  - RET scope, including cross-cutting and RET-specific, as well as and
  - Theme (e.g., competitiveness, technological improvement, circularity, social impact, etc.)

Table 5 10 prize shortlisted

Prize idea	Shortlist	Prize type	RET scope	Theme
Application of green synthetic gases in the European glass sector	Yes	Inducement	Bioenergy	Industry
Prize for Lithium production from geothermal plants in Europe	Yes	Inducement	Geothermal	Critical Raw Material
RET Solutions for Energy Communities	Yes	Recognition	Cross-cutting	Community & social
Fuel from the Sun (Stage 2): further advancing artificial photosynthesis for renewable fuel	Yes	Inducement	Renewable Fuels	Technology

Prize idea	Shortlist	Prize type	RET scope	Theme
Advanced Digital Solutions for improved maintenance processes for RET Energy Technologies (RET)	Yes	Recognition	Cross-cutting	Services and Maintenance
Seasonal Thermal Energy Storage	Yes	Inducement	Cross-cutting	Energy Storage
Responsible Manufacturers for RET Circularity	Yes	Recognition	Cross-cutting	Circularity
Building Integrated Photovoltaic (BIPV): products and services allowing effective retrofit of existing standard facades with BIPV elements	Yes	Recognition	PV	Building Integration
Innovative and efficient district heating and cooling systems (DHC)	Yes	Recognition	RHC	Community & social
Innovative mitigation measures to increase biodiversity at hydropower schemes	Yes	Recognition	Hydropower	Biodiversity and Ecological impact

4.3. Shortlist of 10 prizes ideas

This section features each of the 10 prize ideas that were pre-selected.

Table 6 Application of green synthetic gases in the European glass sector

Element	Description
Type of Prize	Inducement prize. The proposed prize aims at stimulating the development and demonstration of soon-to-be market ready and pre-commercial solutions (TRL 5-7) for the production and application of green synthetic gases to replace natural gas in the glass production process at European glass production facilities. The prize will allow for flexibility in innovative production and use solutions of the green synthetic gases and include hybrid fuel scenarios in line with the “Flexible Hybrid Furnace of the Future” vision of the European glass industry.
Description	This prize aims to develop and demonstrate innovative solutions for the production and application of green synthetic gases to replace natural gas to contribute to an effective decarbonisation of the European glass sector in line with the European Green Deal. Target gases are green (e.g. bio-based) synthetic gases that fulfil strict purity and heating value requirements for application in the European glass sector while being cost-competitive and available in sufficient quantities. Currently, the European glass sector is facing the double challenge of decarbonisation and competitiveness in global markets. Thus, European glass producers and technology providers are currently investigating innovative approaches and technologies to replace natural gas as the dominant fuel to reach the very high temperatures needed in the

Element	Description
	glass-making process. However, up to now such solutions for the production and application of green synthetic gases are not sufficiently demonstrated at a larger scale and technological challenges still need to be solved. Such solutions also serve to reduce import dependence and vulnerability to recent strong cost fluctuations of natural gas. Emphasis will be placed on both environmental and economic performance of the proposed solutions. Furthermore, innovative solutions should be cross-sectoral to enable application also in other industrial sectors[1].
Justification	The EU is one of the largest glass producers in the world together with China and North America. According to Glass Alliance Europe, annual European glass production in 2021 amounted to 39.1 million tons (+6.1% from 2020). The glass sector is an energy intensive industry consuming 4.5 billion cubic meters of natural gas annually which corresponds to 4% of the total industrial consumption in Europe[2]. The most energy-intensive process during glass making is the high temperature melting of raw materials. It accounts for over 75% of the total energy requirements and consumes from 3 to 8 GJ of gas per tonne of melted glass. About 75-85% of the CO_2 emissions (17 Mt in 2021) originate from the combustion of fossil fuels, while the remaining 15-25% come from the decomposition of carbonates in the virgin raw materials[3] Today, natural gas is the dominant fuel to reach the very high temperatures needed in the glass making process. To effectively decarbonise the glass sector in line with the European Green Deal, green alternatives to natural gas such as synthetic gases need to be found and implemented in the European glass sector. Furthermore, the replacement of natural gas by synthetic gases enhanced European energy security considering the Russin aggression on Ukraine which accelerated the need to reduce the EU's dependence on imported natural gas, whilst maintaining industrial competitiveness. The winter of 2022/23 showed significant industry production curtailment driven by high natural gas prices and government goals to maintain residential supplies. Green hydrogen should be excluded.
Potential contestants	This prize targets European technology developers and R&I institutions developing innovative solutions to produce green (e.g. bio-based) synthetic gases and European

1 https://www.glassallianceeurope.eu/images/para/2021-05-05-gae-position-paper-on-decarbonisation-v2_file.pdf.
2 https://www.glassallianceeurope.eu/images/cont/press-release-glass-industry-reacts-to-gas-reduction-plan-20july2022_file.pdf.
3 Dylan D. Furszyfer Del Rio etal., Decarbonizing the glass industry: A critical and systematic review of developments, sociotechnical systems, and policy options, Renewable and Sustainable Energy Reviews, Volume 155, 2022, 111885, ISSN 1364-0321.

Element	Description
	glass producers (which include many SMEs). Collaborations between technology developers, research and innovation institutions and glass producers are strongly encouraged. Potentially interested technology providers include Valmet (Finland), EQTEC (Ireland), ThyssenKrupp AG (Germany). Potentially interested R&I institutions include4 TNO (Netherlands), BEST (Austria), KIT, DBFZ (Germany), IFPEN (France), Potentially interested companies include Schott and Verallia. Promotion of the prize could be supported by the European Association Glass Alliance Europe and national sector associations (e.g. BV Glas).
Objectives	The prize aims to stimulate the development and implementation of innovative solutions for the decarbonisation of the European glass sector. The prize will reward technology developers and R&I institutions as well as industry stakeholders from the glass sector that develop and demonstrate innovative solutions for the replacement of natural gas by green synthetic gases. The prize will move forward technology development to produce green (bio-based) synthetic gases that fulfil (strict) requirements for application in the glass sector. The prize will also offer visibility and prestige to industry stakeholders for their successful ambition towards the decarbonisation of the sector. Finally, the prize will provide the foundations for replication of the innovative solutions in the European and global glass sector, as well as potentially in other Energy Intensive Industry (EII) sectors.
Award criteria	The award criteria should be based on demonstrated innovative solutions for the production and application of green synthetic gases to replace natural gas by synthetic gases (produced from renewable energy sources) and address technological, environmental, economic and broader market related topics. • Energy efficiency: Gasification thermal efficiency for the produced process heat (efficiency > 80%) • Environmental impact: reduction of greenhouse gas emissions • Economic performance: Cost of syngas (<60 EUR/MWh) in comparison with natural gas costs, Investment costs for the adaptation of glass production processes, Impact on glass production costs • Innovation: Innovativeness will be a bonus.

[4] https://www.ieabioenergy.com/wp-content/uploads/2022/03/Status-Report2021_final.pdf.

Element	Description
	• Market: Replication potential in the European glass sector, Replication potential in the global glass sector, Replication potential in other EII sectors SME participation is encouraged.
Award money	Three winners will be awarded corresponding to their final score with respect to the award criteria. 1st place: 3 million EURO 2nd place:2 million EURO 3rd place: 1 million EURO According to feedback from sector representatives, participation of industries and especially SMEs is promoted by simple application processes rather than prize amounts. It is thus recommended to implement a 2-stage application process with a first application stage in the range of 5-10 pages.
Duration	NA

Table 7 Prize for Lithium production from geothermal plants in Europe

Element	Description
Type of Prize	Inducement prize An inducement prize is recommended to foster the Europe industry to implement the "retrofit" to the core geothermal production and have significant replication and market penetration in the coming years.
Description	The prize aims to focus on the increase in the use of one of the critical raw materials to meet the obligations under the Paris Agreement to shift massively the renewable energy and green technologies: Geothermal energy. But it can be retrofitted to extract sustainably an important material to produce batteries: Lithium. However, currently, the technology to extract lithium from geothermal brines is not commercially on the market, and support is still needed to bring this technology from TRL 7 to TRL 9.
Justification	The current situation makes it timely to introduce a prize, especially due to its alignment with the EU Critical Raw Materials Act, which has yet to enter into force. The EU has set 2030 targets to achieve 10% of Europe's lithium supply from domestic sources. Lithium is the foundation stone for the new industrial revolution, which is based on clean energy production and efficient usage, electric mobility and the internet of interconnectivity. Over the last decade (2009-2020), there has been a notable 438% increase in recorded lithium trade—and this growth figure is only expected to continue rising.

Element	Description
	Even if more lithium is extracted in the EU, refineries are currently located elsewhere. The European Green Deal needs to embed the entire value chain lifecycle from raw material extraction to end-use recycling. Developing competitive value chains in a mission-orientated EU industrial strategy must be a central goal of the European Green Deal.
Potential contestants	The prize targets European contestants in the geothermal and mining industry (which include SMEs and larger companies) and R&I institutions developing innovative solutions for the extraction of Lithium. European geothermal energy extractors are potentially interested. Potentially interested R&I institutions include developers from different European countries: Vulcan energy, EnBW, German project, KIT and Bestec (Germany), Lithium Harvest (Denmark), Cornish Lithium, GT eneg lt, Weatherford, Mustang Services, Geolorn LTD and Brunel University London (UK), ES, Lithium de France, Eramet et Geolith (France) and ENEL GP, CNR, STEAM, Altamin and Energia Minerals (Italy). Other stakeholders involved in projects are potentially interested: EUGeLi EIT Raw Materials, BrineRIS, Therma'Li, EnergySource Minerals, CHPM2030, BrineRIS and CRM Geothermal partners. Promotion of the prize could be supported by the European Geothermal Energy Council (EGEC)
Objectives	This prize aims at developing solutions to the co-production of Lithium at existing geothermal facilities in Europe cost-effectively. The objective is to develop novel and potentially disruptive technological solutions that can help satisfy the European needs for lithium in a sustainable, environmentally positive way and safe for the local population. Geothermal plants may optimize the production of both energy and minerals according to the market demands, exploiting deep geological formations. By exploiting mineral production, geothermal plants will also become more economically competitive, create new market and supply chain opportunities, and reduce their impact with a circular economy approach. Specifically, regarding lithium, geothermal plants will also contribute to the reduction of the carbon footprint of lithium production compared to standard extraction methods (like hard rock and evaporation pond mining) which are significantly more harmful to the environment and CO_2 intensive than geothermal lithium. The winning project will help to demonstrate on-site the new extraction technologies at a commercial level and compete with traditional techniques and the feasibility of Lithium extraction in a cost-effective way.

Element	Description
Award criteria (initial criteria refined in Section 5)	The criteria proposed are the following: With respect to recovering lithium extraction from geothermal brines in a sustainable approach. The Project results are expected to develop a concrete experimental demonstration to contribute to the following expected outcomes: • A mapping of the resource and ensuring accessibility and sharing of the number of maps produced. • Increase the selectivity and efficiency of the separation technical solutions demonstrated in a demo-site at TRL9. • Develop new, potentially disruptive technologies to separate, increase concentration and transform lithium from geothermal brines. • Extend the operation conditions of existing separation technologies to the pressure and temperature conditions of geothermal plants. • Develop technical solutions to increase the separation capacity to deal with high flow rates that are typically encountered in geothermal plants. • Develop conceptual designs of a new type of future facility that has been designed and operated, since the very beginning, as a combined heat, power, and mineral extraction system. • Improve the geothermal plant economics by additional increased revenues of at least 5%. • Consider the health and safety issues faced in such geothermal power plants.
Award money (initial amount refined in Section 5)	We propose two winners which will be scaled based on their final score. The best/highest score will be the first place, and the other below score will be the second place. The amount suggested is: • 1st prize: 1 M EUR • 2nd prize: 800,000 EUR
Duration (initial duration refined in Section 5)	36 Months

Table 8 RET solutions in Energy Communities

Element	Description
Type of Prize	Recognition prize We recommend a recognition prize as means to validate/reward innovations in the implementation of RETs. The reward is for Energy Communities, defined as a collective organizations and citizen-driven energy actions that help to pave the way for a clean energy transition, while moving citizens to the fore and increasing public acceptance of renewable energy projects which in turn makes it easier to attract private investments in

Element	Description
	this transition[5]. The prize would be for such communities that have already taken up a RET technology in the past two years with TRL 8-9, where is clear to identify the innovations for overcoming the (usual) technical challenges to become (partially) energy independent and the provision of social benefits within the community. By providing a recognition prize, other types of communities could feel motivated to incorporate RETs in their communities to become more sustainable and contribute to climate goals. In addition, the already existing energy communities could be driven to enhance their RET concepts and utilisation to be recognised at a European (and global) level.
Description	This prize aims to focus on demonstrating how energy communities have been able to use RET to accelerate the energy transition, while addressing shortcomings and/or energy poverty (taken into consideration the challenges brought by the recent energy crisis). The role of community energy ownership can play a significant role within the EU meeting its climate and energy objectives, while at the same time driving local social innovation, as a way of teaming up to achieve the energy (just) transition. The prize will aim at showcasing technological and social innovativeness of Energy Communities.
Justification	Current momentum makes it timely to launch a prize on this topic, especially following the energy crisis. Energy communities represent an opportunity for various actors to benefit from the shared 'effective control' of energy, being innovative initiatives to counter energy poverty through the decentralisation of energy sources. In this way, they contribute to a just transition by empowering citizens with ownership of renewable energy sources and by helping to promote energy justice. Compared to other solutions involving communities (mainly focused on individual/household interventions), this prize gives a novel angle by targeting ongoing RET initiatives already implemented in existing energy communities, such as the ones on the Rural Energy Community Advisory Hub and the Energy Communities Repository, as well as multiple other Horizon and LIFE projects on energy communities. The prize will recognize energy communities using a RET, where it can be demonstrated the empowerment of citizens by having ownership of renewable energy sources, which helps to promote energy justice and alleviates energy poverty. In addition, the prize will also consider the innovativeness, in terms of 1) governance structure (diversity of actors participating), 2) digitalization - SMART management (use of smart tools to manage activities), 3) successful business models, 4) integration to the grid, and 5) inclusion of other services rather than energy generation.
Potential contestants	The prize would target energy communities that have been using a RET in the past two years, according to the Clean Energy for all Europeans Package, and the included recast Directive 2018/2001 (Renewable Energy Directive II, or REDII) and the recast Directive 2019/944 (the Internal Electricity Market Directive, or IEMD), which have legally established CECs (Citizens Energy Communities) and RECs (Renewable Energy

[5] https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en.

Element	Description
	Communities), as the two legal definitions covering energy communities, which provides them rights to participate across the energy market. There are nearly 4,000 Energy Communities in Europe. The recent European Commission proposals for the reform of the EU electricity market design also place significant emphasis on consumer participation in the electricity market, with proposals on how citizens and SMEs can more effectively share electricity. The two definitions are composed of a set of criteria, or 'principles-based' elements, which must be met to be considered an energy community such as: • Establishing a legal entity organised around specific ownership and governance principles. • A non-commercial purpose. In addition, the prize will target small and medium size Energy Communities, according to the division made by the 2023 publication[6] on membership size: • Small EC: 50–200 members; • Medium size EC: 200–500 members.
Objectives	This prize aims to reward energy communities, either CECs or RECs, that have already implemented and used a RET in their community for the past two years, while showcasing innovativeness in the common barriers encountered to operate (such as development of a successful business model, governance structure, integration to the grid, etc.). The winning community will be awarded as means to display case their innovativeness within the management of the energy community, and on their contribution to climate goals and emissions reduction, while incentivising other energy communities to enhance the performance-model of their RET technological innovativeness use and implementation.
Award criteria (initial criteria refined in Section 5)	The criteria proposed are the following: • Quantitative assessment of the innovativeness and replicability to grid integration (20%). • Quantitative assessment of governance structure (replicability) (including participation of different types of actors) (30%). • Quantitative assessment of replicability of business model to manage the community (30%). • Quantitative assessment of the use of SMART tools to manage the RET activities/performance (20%).
Award money (initial amount	We propose three winners which will be scaled based on their final score. The best/highest score will be the first place, and the two below scores will be the second and third places.

6 https://www.mdpi.com/2071-1050/15/10/8201.

Element	Description
refined in Section 5)	The amount suggested is: • 1st prize: 350,000 EUR • 2nd prize: 200,000 EUR • 3rd prize: 100,000 EUR
Duration	Suggested to be repeated

Table 9 Fuel from the Sun [#2]: further advancing artificial photosynthesis for renewable fuel

Element	Description
Type of Prize	Inducement
Description	This prize should build upon the successful EIC Inducement prize "Fuels from the Sun" awarded in 2022 and reproduce the same concept as the previous Artificial Photosynthesis Prize while improving it. A review of the prize implementation (e.g. earlier stage gates) and award distribution (e.g. awards also to placed competitors) are seen by consulted experts as two key areas for improvement.
Justification	The Fuels from the Sun prize (#1) proved to be an effective process with a successful outcome. The topic is therefore considered appropriate for a second horizon prize programme, building from previous experiences. The following justifications can be noted: • Today, no commercial scale Artificial Photosynthesis plants have been built. Research remains at laboratory or small demo scale, with similar TRL as at the time of launch of the initial Fuel from Sun prize (#1). • Active research into the technology remains globally, and a prize would continue to act to accelerate innovation in the field. Innovations can still be expected in respect of novel materials, novel processes and novel device configurations. • Given current TRL, the structure and goal of the initial Fuels form Sun prize (#1) would remain relevant. Innovations since the last prize should, however, result in more reliable devices, producing greater amounts of higher quality fuel. Such developments would still fit to the evaluation and award criteria/approaches applied in the initial Fuels from Sun prize (#1). • Minor modifications to the prize design may be made, drawing upon lessons learned from the initial Fuel from Sun prize (#1) judging process (e.g. evaluation scoring/thresholds; stage-gating; distribution of prize amount). By continuing its support in the area, the EU can maintain its reputation as a front-runner in supporting global Artificial Photosynthesis technology innovation.
Potential contestants	DG R&I has built up a list of potential contestants through the previous prize. Previous runners-up can be expected to compete again.

Element	Description
	Would need to adjust the rules of contest to disqualify previous winners. This would ensure participants are confident that they have a chance of winning and will avoid awarding the same research group again.
Objectives	To build an artificial photosynthesis device that can produce a useable fuel that can power a sterling engine. Propose a more staggered two-stage evaluation process compared to initial Fuel from Sun prize (#1). This could ensure better sequencing and allow shortlisted competitors more time to prepare for the grand final (consulted experts indicated that the cost of building an integrated device can only be justified once grand final participation is assured). On the other hand, an extended time for grand final preparation may discriminate against new entrants (who will have a short time to develop and test their device ahead of desk-based evaluation).
Award criteria (initial criteria refined in Section 5)	Two stage process. 1. Desk-based evaluation. Drawing from previous rules of contest: - Technical ability (device design and performance in respect of integrity; efficacy; efficiency; durability; novelty). Review to be conducted based on judging panel discussions to consider whether any may need modification. - Sustainability (energy use; materials use; water use; emissions to air; waste discharges, including hazardous waste) - Scalability (commercial assessment) 2. Grand final evaluation. To validate and verify desk-based assessment, per previous rules of contest (subject to any changes on technical ability criteria): - May wish to consider de minimis thresholds to ensure that some process improvement is achieved compared to previous grand final (e.g. that a minimum volume of useable fuel must be produced, or enough fuel to sustain the Sterling engine for at 1 minute).
Award money (initial amount refined in Section 5)	€5 million. Proposed to distribute then prize pot among placed finalists. 1st place (60%/€3 million) €2 million reserved for placed finalists. For example, 2nd (24%/€1.2 million) 3rd (16%/€0.8 million) Suggest also to keep a reserve of €50-100 thousand each for any remaining finalists placed lower than 3rd that are arrive with a viable device. This runner-up pot could be deducted from the 1-3 prize pot. A maximum of 7 grand finalists could be established to provide surety over the maximum level of deduction.

Element	Description
	A question to resolve is what to do if zero (or only 1 or 2) devices produce a useable fuel in the grand finale. In such an event, the runner up list would be extended, and competitors could all receive the minimum of €50-100k. The balance in the prize pot would be retained by the EC.
Duration (initial duration refined in Section 5)	Either: • 5 years, following the previous format; or • 3-4 years, given that innovations may be accelerated in the wake of the previous prize. (see also comments above on Objectives in relation to prize structure)

Table 10 Advanced Digital Solutions for improved maintenance processes for RET

Element	Description
Type of Prize	Recognition prize, with a rather high TRL (around 6, to be defined more precisely)
Description	This prize recognises and gives visibility to digital innovations, among them AI solutions, to shed light on their contribution to improving maintenance challenges. Maintenance challenges are cross-cutting, and solutions could be replicated across RETs. Several types of applications (such as wind power, solar power, bioenergy or hydropower) are foreseen and applied to software or hardware. For instance, in the wind sector, solutions such as autonomous drone systems, innovative sensors, and condition-based monitoring solutions could lead to efficient lower costs and quicker maintenance operations on wind turbines. Improving the maintenance should also improve the circularity of the RET, and the longer life duration of products, to ensure the digital solution's impact remains positive, despite the rare earth-element that might be involved. The TRL of the innovation should be rather high, minimum TRL 6 (technology demonstrated in relevant environment, industrially relevant environment in the case of key enabling technologies), as maintenance solutions already exist and are marketed, the innovation would then be about improving them.
Justification	RETs often require complex maintenance procedures, with high costs and time required. For instance, for solar installations, maintenance tasks also include cleaning panels, vegetation management, and replacement of damaged components being subject to meteorological conditions. For wind power companies, profit margins are at times reduced due to maintenance processes and their high expenses[7]. Furthermore, operations and maintenance (O&M) costs for renewables have become increasingly important, accounting for 20%–25% of lifecycle costs for wind and solar plants in 2017[8]. Smart technologies can strongly contribute to optimising renewable energies and

[7] https://iopscience.iop.org/article/10.1088/1742-6596/2151/1/012007/pdf.
[8] https://www.cell.com/joule/pdf/S2542-4351(19)30579-3.pdf.

Element	Description
	making it more flexible[9]. Cost and time reductions focused on maintenance processes, considering the carbon footprint as well, increasing availability, improving the efficiency of the maintenance, and contributing to the positive impact of RET. Improving the time and costs of maintenance could encourage a greater adoption of RETs by answering its challenges.
Potential contestants	The prize would target specifically artificial intelligence, digital technologies or RET SMEs. The incentives for stakeholders could be to showcase their know-how, gain wide visibility, obtain the image of a forefront innovator, and advertise a solution that could be introduced to the market and sold (which leads to more profit). SMEs: From desk research, it appears there would be enough potential SME applicants to the prize, working on digital technologies applied to the energy sector. The European DIGITAL SME Alliance[10], the largest network of small and medium-sized ICT enterprises in Europe represents about 20,000 digital SMEs. Among them several SMEs work on RETs, for instance, LinXole[11] and Eturny AG[12] both work with photovoltaics, Quick Algorithm[13] divis intelligent solutions GmbH[14] and about 3 other SMEs also work on predictive maintenance. In addition, its Focus Group on Artificial Intelligence (AI)[15] counts at least 95 members. However, they did not work necessarily with RETs, and might not have developed a similar solution to this prize call. However, a similar call, I-ENERGY[16] funded by H2020 which targeted SMEs and start-ups had seen around 80 applications for its last inducement call, which shows there is a good number of SMEs that work in artificial intelligence related to the energy sector. These elements provide positive indications the prize would find enough SME applicants with ready-to-apply solutions. Per RET, existing solutions are found for solar, PV, bioenergy and hydropower. For instance, SMEs can be found working on hydropower maintenance, the ones applying to the European funding Digital Maintenance for Sustainable and Flexible Operation of Hydropower Plant[17] . From desk research, it seems maintenance related to Ocean Energy System, geothermal, or renewable fuels digital maintenance, is still at an early stage of research. Moreover, for renewable heating and cooling energy, it appears the need for maintenance is lower than for other energies. For solar power, wind power, hydropower, and bioenergy[18], similar digital solutions are already marketed, and their

9 https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662906/IPOL_STU(2021)662906_EN.pdf.
10 https://www.digitalsme.eu/about/european-digital-sme-alliance/#:~:text=European%20DIGITAL%20SME%20Alliance%20is%20the%20largest%20network%20of%20ICT,digital%20SMEs%20across%20the%20EU.
11 https://www.digitalsme.eu/organisation/linxole/.
12 https://www.digitalsme.eu/organisation/eturnity-ag/.
13 https://www.quickalgorithm.com/.
14 https://divis-gmbh.de/en/.
15 https://www.digitalsme.eu/european-focus-group-on-artificial-intelligence/.
16 https://www.ai4europe.eu/ai-community/projects/i-nergy.
17 https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/999999999/project/101122311/program/43108390/details.
18 https://bktechgroup.com/products-services/our-services/maintenance/.

Element	Description
	maintenance has the potential for cost and time reduction. Therefore, the prize call will focus on these RETs. Large companies: numerous international companies based in Europe work with renewable energies and digital solutions, such as Siemens Gamesa renewable energy[19] ,The edge company[20] , Vestas Wind Systems AS[21] , Schneider Electric[22]. They could compete and submit relevant solutions; however, it might create some unfair competition for SMEs. Therefore, the prize won't be open to large companies to ensure fair competition. Research hubs: several hubs undergo research into the use of artificial intelligence for renewable energies, such as universities working with companies, for instance the Dutch TU Delft PowerWeb Institute[23] collaborating with the Green Village:[24] accelerator of innovation for a sustainable future (researchers, students, start-ups, entrepreneurs and governments). These types of applicants could be interested in applying for the prize. However, these applicants would be large consortiums which could create complexity in the prize award and the TRL might not be so high (research stage versus deployment stage the prize is targeting). Therefore, the prize will not be open to research hubs.
Objectives	Improve maintenance processes leading to: • reduced maintenance expenses, • increased availability/output, • improved run time. This prize also will consider the carbon footprint of the innovation to prevent the negative impact of digital technologies. It aims to limit the negative environmental impact of the Artificial Intelligence (AI), or other technology utilised; therefore, contestants will investigate the reduction of energy and materials consumption (e.g. consume less spares, consume less energy in scheduled maintenance, increasing lifespan).
Award criteria (initial criteria refined in Section 5)	The criteria proposed is the following: • Reducing expenditures and/or time: quantitative assessment of improvement of run time, cost savings/reductions • Quality of the innovation: qualitative assessment of the resilience of the energy system, increasing availability and output

19 https://www.siemensgamesa.com/en-int/about-us.
20 https://www.theedgecompany.net/who-we-are/.
21 https://www.vestas.com/en/about/this-is-vestas.
22 https://www.se.com/ww/en/.
23 https://www.tudelft.nl/en/ai/research-innovation/our-research-themes/ai-for-energy-and-sustainability.
24 https://www.thegreenvillage.org/over-ons/.

Element	Description
	• Reducing the carbon footprint: quantitative assessment of the carbon footprint of the innovation • Potential assessment and innovativeness of the solution • A special mention to cybersecurity and refurbishment themes; SMEs, gender-balanced, and inclusive companies encouraged. These assessments will be based on historical data of the applicant, comparing data with and without the use of the innovation to show and quantify progress.
Award money (initial amount refined in Section 5)	We propose three winners which will be scaled based on their final score. The best/highest score will be the first place, and the two below scores will be the second and third places. The amount suggested is: • 1st prize: 1 million EUR • 2nd prize: 500 000 EUR • 3rd prize: 300 000 EUR
Duration (initial duration refined in Section 5)	One year, allowing enough time for internal decision-making by the SME, reflecting on their participation in the prize competition.

Table 11 Seasonal Thermal Energy Storage

Element	Description
Type of Prize	Inducement (possibility to fall back to Recognition upon further investigations)
Description	Mechanical energy storage is proven and applied at scale (e.g. pumped hydro to balance electricity grids). Thermal energy storage is less mature, although has been considered for some time at pilot and demo scales in various parts of the world. With rising costs of energy, and in particular natural gas as the most common source of instantaneous heat supply to buildings in Europe, the potential for more lower cost, renewable, means of heating buildings in winter (and to cool during summer) is of heightened interest in Europe. The prize would seek to open innovations across a range of Seasonal Thermal Energy Storage (STES) pilots and demonstrators to induce improved performance and enhance replicability.
Justification	Provision of seasonal heat storage is essential to balance supply and demand of heat (and cooling) in the mid-latitudes, a major challenge for European energy systems. Such systems would have the capacity to harness and store for a significant duration

Element	Description
	(seasonal) surplus renewable thermal energy (especially that available in the summer months). A growing number of groups are assessing and testing the potential of high-temperature underground/seasonal underground (aquifer) thermal storage (STES or HT-ATES), with some countries moving into semi-commercial arrangements (e.g. the Netherlands has been particularly advanced in developing aquifer thermal energy storage). The focus would be on high temperature systems (>30°C providing long-duration (seasonal) thermal energy storage. Various conceptual, pilot and demonstration projects have been proposed in the EU (e.g. under the HEATSTORE project), in the U.S. and in China among others. A prize contest would offer a genuine possibility to reinvigorate interest in long-run (seasonal) high temperature thermal energy storage and its coupling with renewable energy sources (esp., solar, but perhaps also waste heat from waste incineration or from biomass combustion – to be confirmed).
Potential contestants	A range of organisations are involved in recent feasibility and demonstration projects including research institutes (e.g. VITO, TNO, GEUS, BRGM, NIOO-KNAW), consultants and technical specialists (e.g. PlanEnergi, Storengy) municipalities (City of Bern), industry (BMW). At least 10 pilot plants have been identified that may seek to compete.
Objectives	The purpose of the prize would be to promote and accelerate technology development in high temperature aquifer thermal energy storage (HT-ATES). The high CAPEX of HT-ATES systems (high temp means >30ºC; costs arise from the high cost of well drilling) would limit a prize to existing demonstrators and small-scale existing sites. Central solar heating plants with seasonal heat storage (CSHPSS) may also be in scope (need to check whether these the same as HT-ATES?). The topic of CSHPSS was a major focus area over the period 1990-2010, although has seemingly received less attention over the last decade or so. This observation notwithstanding, several demonstrators were developed over this period which may still be in operation today. Low temperature (<30°C), shallow (~< 200m), short-run (intra-day) storage would fall outside of scope. Presently a wide number of concepts are under consideration and being applied in wide array of settings and geological environments. As such, there is no one-size-fits-all HT-ATES solution to be identified and fostered. Rather, the goal of the prize would be to accelerate innovations that make the technology more efficient, economically viable, scalable and replicable in wider range of settings than is currently being considered. The winner of the prize would be the project that, in the opinion of the judges, has made the most significant progress in pursuit of these goals.

Element	Description
	Some care may be needed in scoping to discern and define eligible HT-ATES activities from other types of geothermal activities. Presently there is no definitive taxonomy of UTES systems. The heat source will also be a major factor for consideration (whether only solar, or to include more instantaneous sources of renewable heat e.g. biomass combustion)
Award criteria (initial criteria refined in Section 5)	The viability and potential for HT-ATES is subject to several technical factors: 1. The heat source being used to inject into underground storage. Sources may include solar thermal, industrial waste heat, building services waste heat (e.g. CHP), waste incineration, geothermal etc. 2. The storage medium being used to store the heat (heated water). Various systems exist, although the focus of this prize would be on aquifer storage (ATES) systems that can provide durable storage. 3. The end use heat load for the recovered heat. Typically, pilots and demos to date have involved low temperature applications (~25ºC) for building space heating, but other uses include in greenhouses. The volume and temperature of input heat will have repercussions for the overall system viability. The availability of, and access to, different storage media types (e.g. rock, soil, reservoir depth etc) will also significantly influence efficacy, efficiency and cost. Several factors therefore affect the characteristics of any specific HT-ATES activity. The variability and heterogeneity of circumstances will likely make direct, objective, comparison between contestants difficult. Rather, a combination of expert judgement backed by both quantitative and qualitative information and data provided by contestants will likely be required to discern areas where significant progress in pursuit of the prize has been made. Elements of the award criteria can include: 1. Efficacy – how much heat does the system effectively store? How has it been improved and enhanced? Efficiency – how much of the input is retained and recovered from the system? How has it been improved and enhanced? 2. Durability – how long does the storage last? How long after injection is the heat store available for? What measures have been taken to extend this period? 3. Scalability/replicability – can the system be scaled up? How applicable is it to different geographical/geological settings? What is the technical potential in the relevant region or other areas? 4. Useability – how straightforward is the system to use? How does the system address specific engineering challenges (e.g. reservoir containment, scaling?)

Element	Description
	5. Economics – what is the overall system cost? (considering the above factors, plus the cost of drilling and pumping, maintenance etc) How could costs be better controlled? 6. Sustainability/environmental performance – what is the overall carbon footprint of the specific activity? Are there are any secondary environmental impacts of the activity (e.g. groundwater contamination risks)
Award money (initial amount refined in Section 5)	€1-2 million The award would likely target existing pilot and demo projects that already receive research funding or received support in the past. A smaller award therefore may be appropriate since it would not be expected to fund significant primary research but rather incremental improvements in demo projects. Further investigations in these respects will help to discern whether an Inducement or Recognition prize may be most effective. Given the heterogeneity in ambient environmental conditions (e.g. different geological settings, different seasonal temperature fluctuations), and therefore the likely need for a qualitative evaluation process, it will be appropriate to include prizes for placements (i.e. for 2nd and 3rd). This will help to reduce the impact of any perceived injustices in the judging process.
Duration (initial duration refined in Section 5)	Around 3 years would seem appropriate (shorter if a Recognition prize is deemed more appropriate)

Table 12 Responsible Manufacturers for RET Circularity

Element	Description
Type of Prize	We advise for a recognition prize, rewarding a solution soon-to-be market-ready if not already on the market (from TRL 5 to 7).
Description	This prize takes a holistic view on the design and production of RET components for wind power, solar power, hydropower and energy Ocean System. It aims to stimulate the design and production of RET pieces that are more efficient, durable, sustainable and reusable while remaining affordable. This prize would bring visibility to the transversal challenge of circularity in the RET field. The prize should allow for flexibility in the scope of the innovative solutions that could be proposed by RET manufacturers. The state-of-the-art and regulatory settings differ for different RETs (on one hand, the end of life of PV is already heavily regulated, on the other hand, wind power regulations remain somewhat high level). Many academic and position papers discuss the momentum to be seized by industrial market players to improve RET circularity. The scope of RET is defined based on their common need to focus on reducing the amount of waste foreseen in the coming years and the possibility to propose longer lifetime ranges for the RET. Initially thought as cross-cutting, this prize could also be rolled-out as a specific RET prize. It would then focus on one RET and the key challenge they are facing to design more sustainable and circular RET components.
Justification	Renewable energy technologies are critical to the EU to reach climate neutrality. Demand for clean energy is continuously increasing. A growing challenge for the industry and its sustainability is the end of life of installed infrastructure. In the next 10 years, the waste arising from the end-of-life of RE infrastructure is projected to multiply by 30.[25] Not only should waste be treated, and pieces re-used, but significant resources are necessary to the deployment and maintenance of RE infrastructure, and numerous components require critical raw materials. RET manufacturing is encountering challenges to become fully sustainable. According to an IEA report,[26] there is sufficient material available to produce renewable-energy infrastructure to answer the global demand. However, the producer must ensure that their sourcing is conducted in a responsible manner to avoid adverse environmental and human rights impacts.

[25] EEA Briefing available at: https://www.eea.europa.eu/publications/emerging-waste-streams-opportunities-and.
[26] IEA Report available at: https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf.

Element	Description
	The challenges arising from the design and the end-of-life are somewhat linked. The EU cannot afford for industries to generate large amounts of waste in a short timeframe when the production of RET components is already increasing concerns about the sustainability of RE. Therefore, it is critical to tackle the challenges ahead from a circular economy perspective. This prize focuses on the lifecycle of RET components and challenges the stakeholders of the RET industry to turn to responsible circular models for the production and recovery of RET components. In 2020, the European Commission announced its new circular economy action plan, that "targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented, and the resources used are kept in the EU economy for as long as possible".[27] It looks at the full life cycle of products. In fact, the sustainability of RETs relies on improvements at different stages of the life cycle: • From the design phase, the RET component's lifetime range can be extended and optimised (e.g., maintenance and repair are easier, pieces are more resistant to extreme weather and hard environmental conditions, etc.) • For the production phase, RET components can be produced more sustainably (e.g., types of material, quantity of rare earths used, ethical sourcing of material, etc.) • For the end-of-life, the ability to recycle, recondition and reuse material and manufactured pieces is critical. The different aspects above would improve the durability and efficiency, sustainability and circularity of RET components. All these aspects can be integrated from the beginning of the life cycle: during the design phase. Producers should develop the most sustainable RET components thinking of the entire life cycle while being mindful of their manufacturing processes.
Potential contestants	The prize targets European RET manufacturers, and industrial producers of RET components. Collaborations between research institutions and producers are strongly encouraged to apply. Several Horizon Europe's projects and consortiums could typically be applicants to this prize.
Objectives	This prize will reward industry stakeholders that proposes an innovative ecological design for an RET component produced. The producer should showcase that one of their products (on the market, or soon to be market-ready) efficiently offers a conjunction of a design suitable for recyclability and a smart use of the materials for a low-carbon footprint production.

[27] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en.

Element	Description
	There are different strategies to introduce more circular models. It is not easy to comparatively measure which provides the best results. Therefore, this prize could take a holistic view on the different types of improvements proposed to contribute to deploy decarbonised solutions with reduced quantities of extractions and waste (see award criteria). Another possibility would be to focus this prize concept on one of the award criteria proposed below. For instance: aiming at reducing the environmental footprint of the production of RET components from their design.
Award criteria	The evaluation would be based on a global benchmark, such that the rule of contest would include a list of RET components considered as eligible for this prize; and specific criteria for each standard piece commercialised in the market would be established as a reference point. The applicant would have to provide proofs of improvement on the different aspects provided. These aspects would cover: • Technological improvement towards circularity: The barriers to sustainable production and recyclability of RET components differ from one RET to another. The piece presented should offer a new circular aspect compared to its pairs on the market: reduced use of critical raw materials, use of recycled material, increase in high-performance material, etc. The rules of contest would provide the technical criteria of each standard components eligible for this prize. Consultations with manufacturers would allow us to define quantitative measures of improvements for these technical aspects. • Improved environmental footprint of the production: During the production, an improvement compared to traditional solutions with, among others, the materials are ethically sourced, the materials are used in a “smart” way, less energy or water is used for the production, the waste generated during production is decreased. The rules of contest would be informed by some desk research, and participants would be invited to submit both qualitative and quantitative proofs. • Market attractiveness, as a change in the market, can only be induced if the demand side is interested. This includes at least two sub-criteria: (1) the quality of the solution; and (2) its affordability. - Regarding the quality of the solution, the component presented should be at least as attractive as traditional RET components sold on the market, or even more attractive thanks to improvements linked to their sustainability and efficiency (increased lifetime range, resistance to weather-related events, etc.). - Regarding its affordability, the manufactured solution does not become a luxury product; and the cost-efficacy ratio justifies an increase in prices if any. Regular customers could afford the mark-up. • Responsible and circular business models: The business model considers the whole life cycle of the component. On one hand, the manufacturing process is time-

Element	Description
	efficient and mindful of its environmental impact. On the other hand, the degree of recyclability of the component at its end-of-life and inversely the reduction or limited generation of waste by the end of life of the RET are carefully thought of. Dismantling and repurposing are also envisaged. Perhaps the producer could envision to handle themselves the end of life of their product or integrate into their production of new pieces, components of their old pieces that can be re-used. The producer becomes a fully circular actor. The applications would have to be supported by several additional documents providing evidence. These documents will include strategic documentation concerning the business model, documents on technical conception and the results obtained in a demonstration setting for the component presented. A life-cycle assessment could also provide evidence of the solution's suitability for the prize. To develop this prize further, consultations and additional desk research would be required. As this prize is very exhaustive, its feasibility and fast operationalisation would be improved with a focus on only one of the award criteria and select a limited number of relevant RET components eligible for the prize.
Award money	Three winners will be nominated in total. The award amount is EUR 1 million with a split of EUR 500.000 for the first place, 300.000 for the second and 200.000 for the third

Table 13 Building Integrated Photovoltaics (BIPV): products and services allowing effective retrofit of existing standard facades with BIPV elements

Element	Description
Type of Prize	We recommend a recognition prize because there is a range of solutions offered in the market which already replace building elements.
Description	The prize aims at innovations that significantly broaden the application range for PV electricity systems as part of existing and future infrastructure. The current PV market has a strong focus on large ground-based systems or PV systems attached to roofs (commercial and residential). The global PV market has shown rapid growth in the recent year. But still, only 1-2% of the cumulative PV capacity anticipated in 2050 has been installed so far.[28] Therefore, existing and future infrastructure needs to be addressed for PV applications to reach the ambitious goals mentioned above. Since there is a vast market of existing buildings, a strong focus should be on retrofit solutions for BIPV facades

[28] https://media.etip-pv.eu/filer_public/85/68/8568e2ee-ad42-4198-8211-27b703e15e1a/sriapv-fullreport_web.pdf.

Element	Description
Justification	BIPV adds another dimension to the PV market beyond the one of attached rooftop and ground-based systems. East/West façade systems can be particularly effective in achieving a more balanced energy production over the year. This responds to the current issue of an excess of solar electricity in summertime at noon. To accelerate the growth of the PV market needed for an energy transition towards renewables, the need to smoothen PV electricity generation over the day and year is a pressing issue. However, this does not mean neglecting south-oriented installations of BIPV. This solution would have clear benefits for building owners that could produce electricity.
Potential contestants	The target audience of the prize will be: • Developer and Producers of BIPV enabling building components such as façade elements (e.g. cladding systems, click & go systems) • Construction companies and building developers that include BIPV façade solutions in their standard portfolio
Objectives	The prize will reward products and services that enable a broad range of building types and the easy-to-apply retrofit of existing facades with BIPV. Scalability and sustainability of products and services will play a key role. Also, the social benefits such as the involvement of private citizens should be addressed. The offered solutions should be to a high degree compatible with standard components and procedures in the building industry. Offering additional qualities such as thermal insulation (by the PV module) would add value to the product
Award criteria	The following criteria are proposed: • LCOE of BIPV facade system • Scalability and sustainability of products and services • Involvement of private citizens • Additional values of the product such as thermal insulation • Share of the building stock that could be addressed by the BIPV façade solution • Potential impact on increased share of PV electricity in energy system through system cost reduction and increased social acceptance (no additional use of areas necessary) • Compatibility of products and services with standard and innovative products in the building industry • Potential impact of product or services on the existing and future buildings, such as cost reduction, increased energy efficiency, cooling, etc. • Availability of additional services to the customers such as cost-benefit analysis based on different electricity scenarios
Award money	1st prize: 300.000€ 2nd prize: 200.000€ 3rd prize: 100.000€
Duration	NA

Table 14 Innovative and efficient district heating and cooling systems (DHC)

Element	
Type of Prize	Recognition prize We recommend a recognition prize which is given for best practices and advancements in district heating and cooling systems (DHC). The size, type, age and characteristics of DHC can be very different, especially in terms of their efficiency.
Description	The aim of this recognition prize is to reward DHC systems that have made recently large improvements on their sustainability, including on efficiency, integration of renewable energies, management and innovations. Furthermore, it aims to reward applicants, such as DHC companies, operators and municipalities/cities about their past activities and to showcase this to other DHC systems that could take up some of the implemented measures.
Justification	DHC systems are among the most promising solutions for a fast decarbonisation of the heating and cooling sectors in densely settled areas, including in cities and in rural settlements, as well as for providing heat to businesses. They can reduce overall energy demand, enable the integration of renewable energies so that it is only operated by clean energy and thus significantly reduce primary energy consumption. Furthermore, energy exchange between the residential and commercial sectors is possible as well as with industries. This prize aims at rewarding technical and non-technical measures and innovations that have been recently implemented in existing DHC systems and that could be applied to other DHC systems, thus showing a high impact on the overall DHC sector.
Potential contestants	Target audience for this prize concept are DHC system operators and DHC system owners (e.g. cities, municipalities). Collaborations with research and innovation organisations and private companies are possible. To limit the target audience from the over 17,000 existing DH networks in Europe to about hundreds of potential applicants, focus could be placed on fourth generation district heating (4GDH), low-temperature district heating (LTDH), or fifth generation DH (5GDH). Furthermore, different prizes should be developed for several categories of DHC (small, medium, large).
Objectives	The prize aims to reward innovations and implemented measures for efficient and renewable energy driven district heating and cooling systems (DHC). Thereby, the price seeks to award DHC systems that go far beyond regular maintenance and business as usual work. It recognizes innovations that address whole DHC systems, including heat generation, distribution, and consumption to reduce heat losses and improve overall efficiency or only parts of DHC systems. Examples of eligible measures include technical enhancements like improvements on hydraulics, reduction of flow temperatures,

Element	
	integration of renewable energies and storages, application of digital management systems, planning and extension of the system. It should also include non-technical improvements such as on company management, consumer collaboration, design of investment plans, business plans and financing models. This initiative promotes sustainability and energy efficiency in DHC Systems.
Award criteria	The applicants must demonstrate innovations and implemented measures of DHC systems, as shown by examples under “Objectives”, that were implemented in the last 5 years. Measures taken before this period are not the focus. Award criteria (to be quantified by the applicant and showcase real breakthrough innovation) include: • Overall efficiency improvement of the DHC system by the applied measure (including details on heat losses in energy generation, distribution and use, digitalisation measures) • Integration of renewable energy sources and storages by the applied measure (share of renewable energy sources) • Innovations on non-technical aspects (involvement of heat consumers, management practices, investment plans, business plans etc.) • Scalability and adaptability: How easily the innovations and measures can be applied, adapted and scaled-up in different geographical, socio economical context.
Award money	3 winners according to their final evaluation score. 1st Place: € 250,000 2nd Place: € 150,000 3rd Place: € 100, 000

Table 15 Innovative mitigation measures to increase biodiversity hydropower schemes

Element	Description
Type of Prize	Recognition prize (biodiversity and ecological impact) We recommend a recognition prize as means to validate the already existing measures that tackle the negative effects on biodiversity that some hydropower schemes may generate. By recognising and awarding hydropower technologies that have already decreased (significantly) the effects on biodiversity, other hydropower projects would feel motivated to implement innovations that reduce the impacts on biodiversity.

Element	Description
Description	This prize aims to demonstrate how hydropower plants/projects have implemented innovative solutions to mitigate the effects of this technology in the surrounding biodiversity. Hydropower schemes are currently often criticised for having negative (local and sometimes even regional) environmental impacts, such as biodiversity loss due to the freshwater bodies on which they are built, which alter ecosystem functioning and harm diversity of (migratory) fish species, some of them critically endangered. Nowadays, hydropower schemes have shown efforts on mitigating impacts on biodiversity. However, this fact is hardly known to the public who often fear negative environmental impacts from hydropower. This prize aims at giving visibility and recognition to project developers presenting already implemented and existing solutions that showcase that hydropower schemes can protect biodiversity.
Justification	Current momentum makes it timely to launch a prize, especially due to its relevance both in terms of interest by the market (there are 21.378 hydropower plants and 8.785 additional plants planned or under construction[29]) and alignment with the European Green Deal priorities, specifically the Biodiversity Strategy for 2030. Additionally, this prize would also enhance social acceptance of this RET. This prize is also aligned with a recent Horizon call on the sustainable refurbishment of hydropower plants [30] and with the Taxonomy on sustainable investments.
Potential contestants	The target audience are hydropower plants with implemented projects (operating at least for five years), where they can showcase solutions being implemented that have restored biodiversity compared to the pre-monitoring of the situation (baseline) within the past two years.
Objectives	This prize aims to reward hydropower plants/projects that already implemented at least one mitigation measure tackling the negative effects of its operation on biodiversity within the past 5 years. The measure(s) should be demonstrable by reliable (scientific) data gathered before and after the implementation of the mitigation measure/s, in order to prove the positive effects.
Award criteria	The criteria proposed is the following:

[29] https://www.sustaineurope.com/8%2C700--new-hydropower-plants-threaten-europes-biodiversity-20200714.html
[30] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl5-2023-d3-02-09

Element	Description
	Quantitative assessment of scale of impact without the measure(s) in place measured against pre-measure/s indicators, considering relevant diversity indicators (e.g. impact assessment before the measure with relevant KPIs) Quantitative assessment of ecological effectiveness of the measure(s) in place measured against pre-measure indicators, considering relevant diversity indicators (e.g. impact assessment after the measure with relevant KPIs) Quantitative assessment of technical and economic performance for the plant with the implementation of the measure Quantitative assessment of communication and dissemination of the measure(s) as means to enhance public perception.
Award money	We propose three winners which will be scaled based on their final score. The best/highest score will be the first place, and the two below scores will be the second and third places. The amount suggested is: 1st prize: 350,000 EUR 2nd prize: 200,000 EUR 3rd prize: 100,000 EUR

5. Five prize designs

5.1. Selection of five prizes

After careful consideration based on the selection criteria of relevance and feasibility, target audience clarity and anticipated challenges, the team shortlisted 10 prize concepts. Outputs from the pre-selection of 10 prizes, and the brainstorming session resulted in the exclusion of 4 prize concepts. The four prizes excluded were:

- Innovative mitigation measures to increase biodiversity in hydropower schemes,
- BIPV products and services for facades in building stock,
- Responsible Manufacturers for RET Circularity, and
- Application of green synthetic gases in the European glass sector.

In consultation with CINEA and DG RTD, among the six remaining prizes, two were assessed as 'maybe', that could be fully developed in the following task.

Further desk research allowed the team to reach a final decision on the last prize to be excluded. Table 16 summarizes the exclusion and selection of the ten prize concepts.

Table 16 Selection of prize concepts

Prize concept	Pre-selection	Selection
Lithium production from geothermal plants in Europe	✓	✓
RET Solutions in EU Energy Communities	✓	✓
Fuel from the Sun: further Advancing Artificial Photosynthesis for Renewable Fuel	✓	✓
Advanced Digital Solutions for improved the maintenance processes for RET	✓	✓
Seasonal Thermal Energy Storage	☁	✓
Innovative and efficient DHC systems	☁	✗
BIPV products and services for facades in building stock	✗	✗
Responsible Manufacturers for RET Circularity	✗	✗
Innovative mitigation measures to increase biodiversity hydropower schemes	✗	✗
Application on bio-based synthetic gases in Energy Intensive Industries	✗	✗

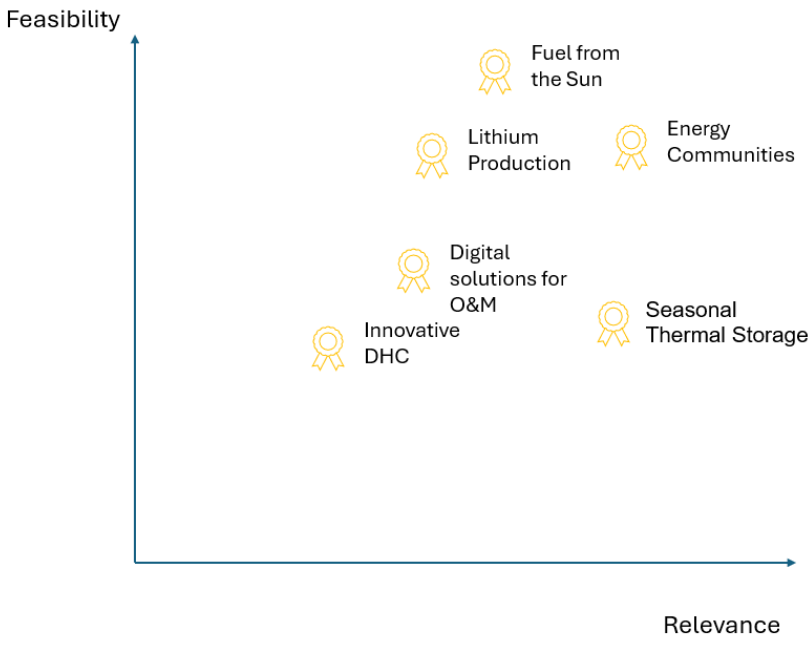
In consultation with DG RTD and CINEA, the feasibility and the relevance of each of the six prizes was discussed. The figure below shows the aspects considered under these two criteria. For the relevance assessment, the objectives and their alignment with EU priorities and research needs, were considered, along with the clarity of the target audience and the prize value. The feasibility assessment included several key elements: the TRL, the incentives offered to participants, clear

award criteria, the feasibility of evaluating the project's success, a defined timeframe, and the feasibility of reaching the target audience. A two-dimensional evaluation method was used to assess the prizes to identify those that were most difficult to implement and less relevant, allowing for their exclusion (Table 16).

Table 17 Brainstorming tool assessing the relevance and feasibility of each selection criterion for a given prize

Selection criteria for prizes	Relevance assessment	Feasibility assessment
Objective aligned with EU priorities and research needs	Yes/No	Yes/No
TRL	Yes/No	Yes/No
Clear target audience	Yes/No	Yes/No
Incentive to participate	Yes/No	Yes/No
Clear award criteria and evaluation	Yes/No	Yes/No
Prize value	Yes/No	Yes/No
Timeframe	Yes/No	Yes/No

Figure 8 Brainstorm of selection of 5 prizes



While all ten RET prizes address current EU priorities, and work towards EU climate objectives, some focus on more pressing climate challenges, and fall under established frameworks that would help to expedite them. The five selected prizes were prioritised based on clearer target audience and higher feasibility at the moment of evaluating applications. Annex II provides further detail on the selection rationale. The study then carefully refines these concepts to address remaining questions. The following section describes in more details the five prize designs selected.

5.2. Prize design 1- Lithium production from geothermal plants in Europe

Prize aim

The aim of this prize is:

the on-site demonstration of lithium production (lithium carbonate – Li_2CO_3 or lithium hydroxide – LiOH) from geothermal brines related to a geothermal plant

subject to meeting the eligibility requirements outlined below (Eligibility requirements).

Expected results

Lithium has been classified as a "Critical Raw Material" by the EU, as it is used in batteries, which are a key enabler of the clean energy transition, given the important role they play in the rollout of zero emission mobility and the storage of intermittent renewable energy. As demand for Lithium-ion batteries is expected to increase dramatically in the near future, a stable and sustainable supply of lithium is of utmost importance.

Direct Lithium Extraction (DLE) technologies can be applied to produce lithium, and other critical minerals, from geothermal brines. But the widespread development and adoption of DLE systems is still subject to ongoing research, technological advancements, and economic viability.

The prize competition is expected to stimulate progress in the field by advancing DLE technologies, and to commence and increase the amount of lithium produced from Europe's geothermal plants. The prize competition also seeks to increase visibility and public support for DLE technologies, and to generate interest from investors and stakeholders within the lithium mining industry.

The prize winner will be the participant that will have demonstrated lithium production from geothermal brines, while at the same time ensuring the greatest level of efficacy, efficiency, technological advancement and innovation, sustainability, profitability, and replicability of the technology.

Indicative reward & prize amount

The proposed three award amounts are as follows:

Table 18 Indicative prize award amounts*

Position	Proposed award amount
First-place winner	4.000.000 EUR
Second-place winner	2.000.000 EUR
Third-place winner	1.000.000 EUR

*These amounts are provisional and will be subject to approval.

Eligibility criteria

It is proposed to open the contest to all legal entities (including natural persons) or groups of legal entities regardless of their place of establishment.

Contestants are Lithium producers which must demonstrate production of lithium from geothermal brines through DLE technology related to a geothermal plant based within the borders of the European Union or of associated countries to Horizon Europe.

Award criteria

The proposed award criteria are the following:

Table 19 Award criteria

Award criteria		Criterion description
1. System performance		
1.1	Efficacy	Efficacy is a measure of a system's capacity to produce both useful volumes and quality of lithium from geothermal brines. Participants shall provide details in their application regarding the following: • Total amount of lithium produced by the system • Amount of lithium produced per unit time • The quality and purity of produced lithium (battery quality lithium) • The methods employed to make such measurements
1.2	Efficiency	Efficiency is a measure of the system's capacity to produce lithium from geothermal brines with respect to energy and materials used during operation. Participants shall provide details in their application regarding: • Energy inputs • Material and other inputs • Lithium output (consistent with efficacy measurements) • The calculated efficiency for each and all of these factors • The methods employed to make such measurements and calculations
2. Technology and innovation		
2.1	Operational characteristics	The application shall provide a detailed description of the Direct Lithium Extraction (DLE) technology (e.g. adsorption, ion exchange, solvent extraction, etc.) employed to produce Lithium from the geothermal brine, as well as of the challenges encountered in the operational environment and how they were overcome through innovative design. Information on the technology shall include: • Lithium concentration levels in the geothermal brine • Flow rates • Operation pressure

Award criteria		Criterion description
		• Operation temperature • Stability of operation
2.2	Novelty	Novelty is a measure of the innovations made in designing, constructing, and operating the demonstration unit and in improving the system's performance. It is a qualitative measure. Emphasis shall be placed on the ability of the system to produce Lithium from geothermal brines with a high level of contaminants and competing ions. Participants shall provide a description in their application regarding, inter alia, the following experiences gained during system development: • Innovations in materials used • Innovations in system design • Innovations made in respect of overcoming challenges by brines with high levels of contaminants. • Innovations made in respect of overcoming other existing challenges Such innovations shall be described in the context of existing constraints for the production of Lithium from geothermal brines.
3. Production of Lithium		This criterium will assess the demonstration of the Lithium produced from geothermal brines by the DLE technology. Applicants are requested to provide credible proof for the successful production of Lithium.
4. Environmental impact		The system should present significant environmental improvements with respect to conventional lithium production methods and pose no or minimal risk of damage to the environment throughout its lifecycle, including production, use and disposal. Specific factors to consider are: • GHG emissions per unit of produced Lithium • Materials consumed, in particular toxic, hazardous or rare earth elements use • Water consumption • Land use • Emissions to air • Waste production, including hazardous waste
5. Socio-economic impact		The systems demonstrated in pursuit of the prize aim should present positive socio-economic impacts for citizens of the European Union and the society as a whole. This criterion is a mix of qualitative and quantitative measures. Scores will be allocated based on the following parameters: • Health and safety aspects of workers involved in the DLE process

Award criteria	Criterion description
	• Job creation at the applicant's site • EU's security of supply for Critical Raw Materials
6. Economic performance, scalability and replicability	The commercial potential of the system developed in pursuit of the prize aim is linked to its scalability potential in terms of replicability, manufacturing value chain and cost competitivity. The commercial potential will be assessed according to the following factors: • Cost analysis of the system and its cost prospects at commercial scale • Production costs of lithium • Commercial viability, including whether the system has good prospects to become commercially viable in the near future • Increased economic competitiveness of geothermal plants integrating DLE technology • Replicability in circumstances outside that of the prize competition conditions, in order to support wide market applicability • Capability of being rolled-out and scaled-up within a tangible timeframe, without facing significant technical barriers (e.g. materials availability)

Procedure/Evaluation process

A panel of independent experts will review all applications and score them. The evaluation will consider the performance of each application against the award criteria, backed by relevant data and measurement methods.

Indicative timeframe

The duration of the prize call would cover a total of 40 months:

Table 20 Indicative prize call timeline*

Milestones	Dates
Opening of the submission	M1
Deadline for entrant registration of interest	M3
Closing date for submissions	M30
Evaluation	M38
Prize awarded	M40

*This timeline is provisional and might be modified later.

Glossary of terms/Definitions

Direct Lithium Extraction (DLE): it refers to a set of technologies designed to selectively extract lithium from geothermal brines, reducing the time and environmental footprint associated with conventional lithium extraction processes. There are currently several DLE processes that have been developed: adsorption, ion exchange and solvent extraction.

Geothermal brine: a hot and concentrated saline solution, having circulated through the very hot rocks of geothermal areas and enriched with minerals, such as lithium, boron, and potassium.

Lithium extraction: it refers to the initial process of separating lithium from its natural sources. The end product of extraction is typically an intermediate product like lithium chloride (LiCl) or lithium sulfate (Li_2SO_4).

Lithium production: it encompasses the entire process of transforming the extracted lithium into a usable form. It involves refining the intermediate product from extraction by removing impurities and converting the intermediate product into a commercially valuable form like:

- Lithium carbonate (Li_2CO_3): the most common form for various applications like glass, ceramics, and lubricants.
- Lithium hydroxide (LiOH): gaining importance in the battery industry for its role in high-performance lithium-ion batteries.

Lithium production essentially delivers the final product ready for industrial use.

Summary of the prize-dedicated communication plan

To maximise the prize impact, a communication strategy has been developed to expand recognition and engagement with the prizes within the programme. It emphasises the promotion of the prizes by engaging stakeholders and effectively, and stimulating their interest in participating, as well as raising broad awareness of the impact of the innovative solutions offered by the prizes.

The dedicated communications strategy for this prize aims at three specific objectives: to promote the understanding of lithium as key raw material and raise awareness about how geothermal plants offer a solution to produce it in a sustainable way; to foster the participation of qualified applicants; to generate a momentum around the prize and the innovative solutions it provides. Three key messages have been created for each of these objectives.

Table 21 Communications' objectives

Objective 1 - Promote the understanding of lithium as key raw material and raise awareness about how geothermal plants offer a solution to produce it in a sustainable way.	Objective 2 - Foster the participation of qualified applicants	Objective 3 - Generate a momentum around the prize and the innovative solutions it provides.
The aim of this message is to explain why we need lithium and to promote geothermal lithium and its role to support the EU's green and economic goals. It is targeted mainly to	The goal of this message is to clearly explain the prize to increase the number of applications. It is targeted to all potential applicants.	The goal of this message is to inform about the prize benefits and positive impact. It is targeted to all key target audiences with special emphasis on EU citizens.

Objective 1 - Promote the understanding of lithium as key raw material and raise awareness about how geothermal plants offer a solution to produce it in a sustainable way.	Objective 2 - Foster the participation of qualified applicants	Objective 3 - Generate a momentum around the prize and the innovative solutions it provides.
tertiary, but also to secondary audiences.		

The strategy utilises several channels. Targeted email campaigns and informative webinars could connect directly with potential applicants. Presentations at relevant EU and external events could elevate the program's profile and connect with targeted communities. Additionally, a social media strategy could leverage engaging content on platforms like Twitter and LinkedIn, making use of relevant hashtags and partnerships with multipliers to maximise broad audience reach and interaction. Finally, a dedicated website could serve as a central information hub for the prizes, providing clear information, updates, and downloadable resources for potential applicants.

5.3. Prize Design 2 – RET Solutions in EU Energy Communities

Prize aim

This prize aims to highlight different participatory and governance innovations within energy communities while operating a RET. It specifically seeks projects addressing common shortcomings, challenges like energy poverty, by showcasing examples of innovative governance structures, participation methods and social procedures implemented by Energy Communities.

Expected results

Individual energy communities face various challenges, including developing successful governance structures that are sufficiently inclusive of different types of actors, implementing effective business models and embedding activities within the structure and management of the EC to territorial regional and/or local plans (e.g. Just Transition Plans, etc.).

By rewarding ECs' innovative governance structure and management of a RET, the prize aims to inspire other Energy Communities to improve their operations and implementation activities. It also fosters innovations in the compliance of climate goals. Additionally, this prize will also serve as inspiration and example for other communities to transition into energy ones.

The prize accelerates the pace of development for existing ECs, by showcasing best practices and providing replicable frameworks for successfully addressing these issues. In this way, communities will feel incentivised to apply these practices, to improve their performance, management, etc., and so they can participate in future similar prize calls.

Since Energy Communities have encountered bottlenecks in terms of management, governance structure, provision of other services, this prize will aid to portray the successful

ones on how to carry out a fruitful business model that includes and promotes different type of services, while including and improving social aspects within the community.

While showcasing governance innovativeness within the common barriers encountered to operate, the awarded communities will present a clear example that can serve as a replicable framework for other communities on how to overcome challenges and barriers, and address encountered common bottlenecks.

Indicative reward & prize amount

The proposed three award amounts are as follow:

Table 22 Indicative prize award amounts*

Position	Proposed award amount
First-place winner	350.000 EUR
Second-place winner	300.000 EUR
Third-place winner	200.000 EUR
Fourth-place winner	100.000 EUR
Fifth-place winner	50.000 EUR

*These amounts are provisional and will be subject to approval.

Eligibility criteria

The contest will be open to all ECs that meet the definitions and concepts of the Energy Communities Repository, which identifies renewable ECs and Citizen ECs as defined in the Renewable Energy Directive and in the Internal Electricity Market Directive. Importantly, applicants do not need to be legally formed yet, but they can be in the process of formation.

In addition, only energy communities with up to 10,000 members will be eligible.

Award criteria

The proposed award criteria are the following:

Table 23 Award criteria

Award criteria	Award description
Criterion 1. Inclusivity within governance structure	
1.1 Gender-balance ratios	The applicant needs demonstrate the ratios of women vs. men within the management structure. Also, the applicant needs to describe how they have achieved this ratio, what does this mean within their local context, and what do they plan to do to improve it further.
1.2 Description on diversity of members	The applicant should explain in detail what they are doing to be more diverse within their members. This should include the following: • Is there a strategy in place? • What does the diversity strategy includes and is there a documented plan?

Award criteria	Award description
	• Are there quotas on diversity within the plan? • Is diversity mentioned in the statutes? If so, quality of description.
1.3 Solutions to inequalities	The applicant must describe the type of inequalities they have identified within their community (including the local context), and how they have addressed these inequalities, portraying clear solutions that are in place and identified impacts of these solutions.
Criterion 2. Excellence on internal governance processes	
2.1 Innovative finance	The applicant needs to demonstrate how (innovative) financing is put in place, explaining how capital is raised (debt vs equity), as well as on what terms (interest and maturity) and how impoverished individuals are enfranchised.
2.2 Mechanisms for representative governance (e.g. low-income members, etc.)	The applicant should explain in detail the process to become a member of the community. In addition, the applicant should describe the mechanisms in place for different groups of citizens, such as low-income, vulnerable ones, etc. In addition, it should describe how representing the community is by, for instance, successfully involving larger numbers of citizens, etc.
2.3 System and activities for member's involvement	The applicant must portray ratios of the different variety of members engaged within the community, and what are the processes and means for engaging the members. Here, not only the tools used must be described, but the process of engaging the maximum amount of people in their structure (e.g. through volunteering, SMEs, diversity of the stakeholders, etc.). Also, the applicant must describe how intensive is the engagement of the Energy Community with its members (e.g. how many times these are consulted, online consultations, general assemblies, annual meetings, etc.).
2.4 Engagement of local authorities	The applicant must describe the types of activities to involve and engage local authorities such as townhalls, municipalities, etc. to participate within the governance structure of the Energy community, either directly or indirectly.
Criterion 3. Regional/local transition approach	
3.1 Links of governance structure into territorial plans	This criterion refers to their governance structure and management of the community links and relates to territorial (regional) plans (e.g. the connection with Just Transition).
3.2 Multiple activities related to regional policies	This criterion refers to the explanation on how the community has been able to build more than one activity for their community, relating to local and regional relevant policies. For instance, how the community has been able to recreate a local organisation that provides citizens with the way forward to engage on Energy Transition (e.g. not only solar PV, but house renovations, among others).
Criterion 4. Other innovative approaches	

Award criteria	Award description
4.1 Efforts to integrate to the broader energy system	This criterion refers to the description on the different efforts that the community has carried out to (try to) integrate to the broader energy system of the region/city/country (even if it has not been successful to administrative burdens, etc.).
4.2 Alignment with local Sustainable Energy and Climate Action Plans or other relevant environmental-related plans	This criterion refers to the description on links and/or possible partnerships and/or the alignment with the local Sustainable Energy and Climate Action Plans.
4.3 Cost-saving initiatives	This criterion refers to initiatives in place that show-case cost-saving due to their governance structure and/or financial model.

Procedure/Evaluation process

The prize competition will be undertaken with a jury of experts on Energy Communities, having a geographical balance of knowledge within this jury, to provide a fair competition and assuring that the evaluation can recognize challenges and best practices from all round Europe. The prize evaluation will consist of the expert jury panel selecting 5 winners, based on the four award criteria. Eligible participants will then be ranked according to their scores.

Indicative timeframe

The duration of the prize call would cover a total of 15 months:

Table 24 Indicative prize call timeline*

Deadlines	
Launch of the call for applications	M1
Reminder of the call for applications	M3
Closing date for applications	M6
Evaluation	M12
Award ceremony	M15

*This timeline is provisional and may be modified later on.

Glossary of terms/Definitions

N/A

Summary of the prize-dedicated communications plan

To maximise the prize impact, a communication strategy has been developed to expand recognition and engagement with the prizes within the programme. This communication strategy aims to increase the reaching audience for applications of the Renewable Energy Technology Solutions in Energy Communities prize to be included in the Horizon Europe Framework Programme.

The objectives are to raise awareness about the benefits of participating in energy communities and inspire citizens to join them by awarding them on best practices on common challenges; to foster participation of relevant target audiences in the prize through the submissions of applications; and to showcase examples of innovative governance structures, participation methods, and social procedures used by successful energy communities that operate with renewable energy technologies. This will provide a replicable framework for other communities, inspiring them to improve their own operations.

Table 25 Communications' objectives

Objective 1 - Raise awareness about the advantages of participating in energy communities that use renewable energy and inspire citizens to join these communities.	Objective 2 Foster participation of qualified applicants.	Objective 3 - Generate a momentum around the prize and the innovative solution provided by successful energy communities.
The goal of this message is to explain what energy communities are and its benefits to the planet, citizens and local communities. It is targeted to all the key target audiences, especially citizens to drive their actions to achieve their energy independence.	The goal of this message is to clearly explain the benefits of the prize and call potential participants to apply aiming to increase the number of applications. It can highlight tangible benefits from participating in the prize. The message is targeted to all potential applicants.	The goal of this message is to inform about the prize benefits. It positions the prize as a platform to showcase successful models and inspire wider adoption of energy communities across Europe. The message is targeted to all key target audiences with special emphasis on applicants.

The strategy utilises several channels. Targeted email campaigns and informative webinars could connect directly with potential applicants. Presentations at relevant EU and external events could elevate the program's profile and connect with targeted communities. Additionally, a social media strategy could leverage engaging content on platforms like Twitter and LinkedIn, making use of relevant hashtags and partnerships with multipliers to maximise broad audience reach and interaction. Finally, a dedicated website could serve as a central information hub for the prizes, providing clear information, updates, and downloadable resources for potential applicants.

5.4. Prize design 3 – Fuel from the Sun: further Advancing Artificial Photosynthesis for Renewable Fuel

Prize aim

The proposed prize builds upon the European Innovation Council (EIC) Inducement Prize “Fuel from the Sun: Artificial Photosynthesis” awarded in 2022 to the University of Tokyo in cooperation with INPEX Corporation (Japan). In pursuit of the prize, the group successfully developed a fully functional prototype of an artificial photosynthetic fuel production system.

The aim of this repeat prize would also be to build a fully functional bench-scale prototype artificial photosynthesis device that can produce a useable synthetic fuel, subject to meeting the eligibility requirements outlined below (Eligibility requirements).

Expected results

The prize competition is expected to further stimulate innovation and focus research and development towards energy applications in a new energy technology through increased public and commercial interest. Moreover, it will accelerate the development of new innovative energy conversion systems using solar light and natural elements to produce renewable fuels to be used in industry, housing and transport.

The prize competition also attempts to create a stimulus for industrial participation and creation of start-ups, advancing artificial photosynthesis technology closer to deployment. Considering the innovative approach and the novelty of using artificial photosynthesis for fuel production, the prize will generate interest in the subject and foster interdisciplinary collaboration among potential participants, such as students, young researchers and engineers. The competition is expected to highlight the diversity of potential solutions.

The main expected outcome is a number of innovative devices and systems demonstrating the use of sunlight to produce a ready-to-use fuel. The prize winner will be the participant that will have developed a device that demonstrates the greatest level of efficacy, efficiency, novelty, durability, sustainability and scalability, with points being awarded for autonomous operation. The prize winner is required to verify the capacity of their device to perform these functions through a practical demonstration of its operation alongside other participants at an independent testing venue (a "Grand Final").

Indicative reward & prize amount

The proposed three award amounts are as follow:

Table 26 Indicative prize award amounts*

Position	Proposed award amount
First-place	3,000,000 EUR
Second-place	1,200,000 EUR
Third-place	800,000 EUR

*These amounts are provisional and will be subject to approval.

Eligibility criteria

Open only to technologies that mimic the physical chemistry of natural photosynthesis by absorbing solar energy in the form of photons and using the energy to generate fuel molecules through a synthetic system.

The device must integrate the whole artificial photosynthesis process from light capture to fuel production, and be limited to the following conditions:

1. Uses only natural sunlight

2. Uses only limited input materials consisting of:

   - Carbon dioxide, CO_2 (either bottled or captured from the air);

   - Electrical energy (this shall not include electrical energy to produce artificial sunlight or process heating); and

- Materials needed for catalysts and media.

3. Meet appropriate levels of sustainability and avoids the use of toxic materials (to be determined through a life-cycle assessment)

4. Be no larger than five [5] metres in length, five [5] metres in width, and three [3] metres in height, inclusive of all design elements, but excluding the CO_2 source.

Winners of the 2023 EIC Prize: Fuels from the Sun (or related entities and derivative devices) are not eligible to re-enter.

Award criteria

The proposed award criteria are as follows:

Table 27 Award criteria

Award criteria		Description
1.	**Degree of system integration**	
	Integrity	Measure of device's integration of the complete artificial synthesis cycle covering inter alia: light capture; water splitting; carbon reduction ('dark reactions'); fuel production
	Durability	measure of the device's capacity to perform under varying conditions, including variation in sunlight input during the operation cycle (light function), temperature fluctuations, and length of time of un-assisted operation
	Novelty	Measure of the innovations made in designing, constructing and improving the device's performance during its development. It is a qualitative measure.
2.	**Device/system performance**	
	Efficacy	Measure of a device's capacity to produce both useful volumes and quality of fuel
	Efficiency	Measure of the device's capacity to convert sunlight into fuel, also considering any energy utilised for ancillary services and materials consumed during operation
3.	**Production of fuel**	This criterion will assess the fuel produced by the device during the Grand Final
4.	**Environmental impacts**	The device should present no or minimal risk of damage to the environment throughout its lifecycle, including production, use and disposal. Specific factors to consider are: materials consumed, in particular toxic, hazardous or rare earth elements use; water consumption; emissions to air; waste production, including hazardous waste. An LCA shall be provided
5.	**Commercial potential of the device**	Linked to a device's potential scalability potential in terms of replicability, manufacturing value chain and cost competitivity

Procedures/Evaluation process

The prize evaluation will be based on a two stage process:

1. Desk-based evaluation conducted by an expert jury panel based on submissions from eligible entrants; and

2. ‘Grand Final’ event to determine the fuel successfully produced by each device.

Notice of the outcome of the desk-based review and qualification for the Grand Final will be provided to prize participants at least 9 months prior to the Grand Final start.

Indicative timeframe

Timeline of the prize

Table 28 Indicative prize call timeline*

Milestones	Dates
Opening of the submission	M1
Closing date for submissions	M48
Stage 1: Desk-based evaluation	M51
Stage 2: Grand Final event	M60
Prize awarded	M60

*These amounts are provisional and will be subject to approval.

Glossary of terms/Definitions

Artificial photosynthesis (AP): technologies that mimic the physical chemistry of natural photosynthesis by absorbing solar energy in the form of photons and using the energy to generate fuel molecules through a synthetic system.

Bench-scale process – a transportable AP device with dimensions of less than 5 metres length, 5 metres width and 3 metres in height.

Produced fuel – synthetic hydrocarbon based material produced by the AP process.

Assessment timeframe – the Grand Final permitted timeframe during which the eligible AP devices produce fuel.

Summary of the prize-dedicated communications plan

This communication strategy aims to increase the impact of the Fuel from the Sun: further Advancing Artificial Photosynthesis for renewable fuel " inducement prize within the Horizon Europe Framework Program. The objectives are to increase the knowledge the knowledge and importance of artificial photosynthesis; to foster participation of relevant target audiences in the prize through the submission of applications; and, to give recognition and raising visibility to prize winners and their solutions for artificial photosynthesis. Therefore, the strategy is focused on effectively promoting the prize but having an increase in the understanding of artificial photosynthesis.

Table 29 Communications' objectives

Objective 1 - Promote the understanding of artificial photosynthesis, using solar light and natural elements to produce renewable fuels	Objective 2 - Foster the participation of qualified applicants.	Objective 3 - Generate a momentum around the prize and the innovative solutions it provides.
The aim of this message is to explain the importance of producing energy through artificial photosynthesis technology. In addition, its role to support the EU's green and economic goals should be highlighted. The message is targeted mainly to tertiary, but also to secondary audiences.	The goal of this message is to clearly explain the benefits of the prize and call potential participants to apply aiming to increase the number of applications. in the prizes. It is targeted to all potential applicants.	The goal of this message is to inform about the prize benefits and positive impact. The aim is to promote new artificial photosynthesis technologies that deliver energy fuels that can be used as a sustainable alternative to fossil fuels. In order words, pushing the artificial photosynthesis technology for fuel production to the next level. It is targeted to all key target audiences with special emphasis on EU citizens.

5.5. Prize Design 4 - Advanced Digital Solutions for improved maintenance processes for RET

Prize aim

Operation and maintenance (O&M) practices are fundamental to enabling and sustaining efficient operation of renewable energy generation technologies. O&M ensures the efficiency and longevity of energy assets, such as power plants, turbines, or solar panels. In the context of Renewable Energy Technologies (RET), O&M presents several challenges, including distributed generation nodes that pose complex and time-consuming maintenance processes, downtime of assets, maintaining energy availability, and economic impacts. Enhancing O&M practices also has the potential to improve circularity through the extension of the lifespan of energy assets, and the reduction of waste. Efforts to achieve widespread adoption of renewable energies and greater circularity in energy systems, optimising O&M practices becomes of paramount importance to ensure their competitiveness with other sources of energy.

Recent digital innovations have sparked new advancements in RET O&M, offering promising avenues for better managing renewable energy-generating assets with greater efficiency and sustainability. Existing digital solutions are contributing to the reduction of O&M costs, the primary ongoing expense for RET after the initial investment. Cost reductions can be achieved by improving predictive maintenance and via optimised implementation of O&M activities. Solutions like drones also hold the potential for improving the safety of O&M workers. Digital solutions can also enhance the environmental impact of RET by increasing the life span of energy assets, reducing waste, and monitoring ecosystem impacts.

The recognition prize will reward existing advanced digital solutions that significantly improve O&M processes for RET. By fostering collaboration, visibility, and investment in these cutting-edge solutions, the prize will contribute to O&M's operational efficiency, reducing its costs, saving employees' working time, and improving the safety of working conditions, as well as enhancing the sustainability of the RET system.

Expected results

The prize winners will be the entrants who have developed digital solution(s) that demonstrate the best improvement in terms of performance, operational availability, cost-efficiency, carbon footprint, and health and safety conditions. Moreover, the solution should prove its utility by demonstrating how it addresses an existing gap in the RET market and fulfils its essential need for improvement.

Showcasing these solutions will inspire other companies to adopt similar O&M approaches. By promoting the winning solutions, the prize will help to enhance the competitiveness of renewable energy technologies compared to other non-renewable sources. Overall, the prize will benefit the RET sector by encouraging the adoption of RET systems, which will contribute to mitigating environmental impact and building a more sustainable future.

Indicative reward & prize amount

The proposed three award amounts are as follow:

Table 30 Indicative prize award amounts*

Position	Proposed award amount
First-place winner	1.000.000 EUR
Second-place winner	500.000 EUR
Third-place winner	300.000 EUR

*These amounts are provisional and will be subject to approval.

Eligibility criteria

It is proposed to open the contest to all legal entities (including natural persons) or groups of legal entities, regardless of their place of establishment.

Only digital technologies that are applied to RETs may participate. Digital solutions comprise both software and/or hardware. Eligible RET systems include solar photovoltaics, concentrated solar power, wind power (on-shore and off-shore), bioenergy, renewable fuels, ocean energy systems, hydropower, geothermal, and renewable heating and cooling. Solutions covering several RET and hybrids are eligible. The solutions may apply to a range of sizes, from an individual piece of generating equipment to a large-scale plant.

Contestants should have already demonstrated a prototype of their solution in a relevant environment, which is applicable to RETs.

Award criteria

The proposed award criteria are the following:

Table 31 Award criteria

Award criteria	Award description
Criterion 1. Improved operational performance	

Award criteria	Award description
1.1 Increased capacity factor	The capacity factor of an energy asset is the ratio of the energy output to the theoretical maximum energy output maximum possible over a defined period, which is assumed to be one calendar year. To define whether the capacity factor has increased or not due to the implementation of the solution, participants shall compare the capacity factor of the energy asset with and without the digital solution(s) (e.g. through provisional historical records and examples of the improvements made). A percentage improvement could be denominated.
1.2 Increased availability	The availability of an asset is the percentage of time an energy asset can be operational and available to produce electricity. It is calculated by the amount of time that the asset can produce electricity over a certain period, divided by the same amount of time in the period, which is assumed to be one calendar year. To show that the availability of the RET asset has increased, participants shall compare the availability over the same period with and without the solution (e.g. through provisional historical records and examples of the improvements made). A percentage improvement could be denominated.
1.3 Reduced maintenance working time	The maintenance working time is quantitative assessment of the time spent on O&M processes. Participants shall provide the number of hours saved for employees by using their digital solution.
Criterion 2. Potential of the solution	
2.1 Utility & adoption Positive environmental impact	The utility of the digital solutions refers to their usefulness, addressing concrete needs and gaps the RET market has. The potential for adoption of the solutions is about its demonstrated user-friendliness and its ability to meet identified market demands. These elements are closely intertwined. The applications shall provide a benchmark showcasing how the solutions addressed needs and gaps and be adopted by their audience.
2.2 Positive environmental impact	The solution has a positive environmental impact on RET systems, by reducing waste and/or monitoring and improving environmental impacts. Applicants shall either or both: - Demonstrate how their solution facilitates material savings and waste reduction efforts, including the repair and refurbishment of parts that might otherwise have been discarded and replaced. They shall explain how their solution impacts materials consumption and waste management and offer an assessment or records of the quantities of waste prevented. - Showcase how their solutions allow for the monitoring environmental of impacts, for instance tracking the soil contamination, water quality, or wildlife. Monitoring elements introduced by their solutions

Award criteria	Award description
	along with the associated positive impacts, supported by an assessment or historical data shall be presented.
2.3 Impact on health and safety of the workers	This parameter is an assessment of the improvement of health and safety scenario for workers. Applicants shall compare the scenarios regarding the health and safety of employees with and without the solution and indicate how the situation improved as a result of the innovations linked to the solution. This assessment may use quantitative metrics, such as the rate of incidents on a defined period, based on historical data whenever possible and relevant, or other qualitative descriptions.

Procedure/Evaluation process

For the evaluation, a panel of independent experts will review all applications and score them. The jury will evaluate each application against the two award criteria described above. The applicants ranked the first, second and third in the jury's evaluation will be awarded a prize. Then, the Commission will announce the jury's decision on the three winners to award the prize to, based on the jury's ranking.

Indicative timeframe

The duration of the prize call would cover a total of 22 months:

Table 32 Indicative prize call timeline*

Deadlines	
Opening of the submission	Month 1
Closing date of submission	Month 19
Evaluation	Month 21
Award ceremony	Month 22

*This timeline is provisional and may be modified later on.

Glossary of terms/Definitions

Operation and maintenance (O&M) processes: performance monitoring, diagnostics and fault detection, inspections, testing and calibration of equipment, failure responses, preventive maintenance and condition-based maintenance

Renewable energy technologies (RET): Renewable technologies cover photovoltaics, concentrated solar power, wind power (on-shore and off-shore), bioenergy, renewable fuels, ocean energy systems, hydropower, geothermal, and Renewable Heating and Cooling. Solutions covering several RET and hybrid are eligible.

Solutions can be applied to RET systems of any size, from a single generating equipment unit to a large plant.

Digital solutions: software and/or hardware, advanced digital solutions for maintenance processes can include:

- Artificial Intelligence (AI): consisting of computer systems performing tasks typically requiring human intelligence. AI notably includes machine learning, which is the process of learning from data to make predictions or decisions. One practical application of machine learning is in predictive maintenance allowing to anticipate malfunctions and repair them in time.

- Internet of Things (IoT): a network of physical devices equipped with sensors that collect and transmit data over the internet. This technology enables constant monitoring of energy assets.

- Big data analytics: covering computational techniques and tools to understand trends, patterns, and correlations within large amounts of digital data. This technology can be useful for real-time monitoring of energy assets coupled with datasets. It can be also integrated into predictive maintenance processes. Big data helps identify failure patterns thanks to large datasets from sensors and historical maintenance records. With this information, it can determine precisely when maintenance is required.

- Digital Twins, defined as virtual replicas of physical devices. They are often associated with IoT to access real-time data from physical devices. These virtual models, presented through interactive interfaces, provide a clear view of equipment states and fault information. This greatly enhances decision-making for maintenance processes.

- Drones: aerial vehicles often equipped with sensors, cameras, and GPS, that may be controlled remotely, or navigate autonomously through pre-programmed flight plans. They enable facility inspections, including plants, such as wind farms and solar farms.

Summary of the prize-dedicated communications plan

To maximise the prize impact, a communication strategy has been developed to expand recognition and engagement with the prizes within the programme. It emphasises the promotion of the prizes by engaging stakeholders and effectively, and stimulating their interest in participating, as well as raising broad awareness of the impact of the innovative solutions offered by the prizes.

The dedicated communications strategy for this prize aims at three specific objectives: to promote advanced digital solutions for maintenance processes in renewable energy, to foster participation in the prize and to give visibility to the innovative digital solutions provided by the prize. Three key messages have been created for each of these objectives.

Table 33 Communications' objectives

Objective 1 - Promote the understanding of advanced digital solutions for maintenance processes in renewable energy and raise awareness about the solutions they can provide.	Objective 2 - Foster the participation of qualified applicants.	Objective 3 - Generate a momentum around the prize and the innovative solutions it provides.
The goal of this message is to raise awareness about the prize and its purpose. It shows the importance of advanced digital solutions for renewable energy maintenance and how they can transform the industry. This creates awareness and sparks interest in the prize. It is targeted mainly to EU citizens and multipliers.	The goal of this message is to clearly explain the benefits of the prize and call potential participants to apply aiming to increase the number of applications. It can highlight tangible benefits from participating in the prize. The message is targeted to all potential applicants.	The goal of this message is to inform about the prize benefits and positive impact. The aim is to promote the potential of advanced digital solutions, by generating excitement and inspire further development of these technologies. It is targeted to all key target audiences with special emphasis on EU citizens.

The strategy utilises several channels. Targeted email campaigns and informative webinars could connect directly with potential applicants. Presentations at relevant EU and external events could elevate the program's profile and connect with targeted communities. Additionally, a social media strategy could leverage engaging content on platforms like Twitter and LinkedIn, making use of relevant hashtags and partnerships with multipliers to maximise broad audience reach and interaction. Finally, a dedicated website could serve as a central information hub for the prizes, providing clear information, updates, and downloadable resources for potential applicants.

5.6. Prize Design 5 – Seasonal Thermal Energy Storage

Prize aim

The Horizon Prize: Seasonal Thermal Energy Storage aims to promote emergent systems that can provide for longer-duration energy storage and in doing so reduce the use of fossil fuels in the provision of hot water and space heating (and cooling) requirements. The prize targets ongoing activities involving the piloting and demonstrating long-term, high temperature, underground heat storage for direct use or via heat pumps, using either boreholes (BTES), aquifers (ATES) or other novel storage zones (e.g. mining thermal energy storage (MTES).

The focus of the prize is on enhancing performance and overcoming barriers to development and deployment, with a view to encouraging innovations on project operations and to enhance knowledge sharing and best practice.

Expected results

Meeting the challenge will stimulate innovation and research into improvements in HT-STES systems at existing pilot, demonstrator and commercial-scale projects. The results of the prize competition will increase knowledge and understanding of the range operational HT-STES systems, their features, performance, and economic and environmental benefits. Actions taken in pursuit of the prize aim will allow the showcase of innovations in system design and operation to improve performance.

The prize winner will be the participant that will have developed a HT-STES system design and operational environment that demonstrates the greatest level of efficacy, efficiency, flexibility, durability, sustainability, scalability, operability and cost-effectiveness, taking into account any barriers to deployment.

Indicative reward & prize amount

The proposed three award amounts are as follow:

Table 34 Indicative prize award amounts*

Position	Proposed award amount
First-place	1,250,000 EUR
Second-place	500,000 EUR
Third-place	250,000 EUR

*These amounts are provisional and will be subject to approval.

Eligibility criteria

The following HT-STES system features are considered eligible for within the scope of the prize aim:

- Heat sources (wide variety of sources are considered, including solar thermal, industrial waste heat, geothermal or biomass)
- Storage types (primary candidates are aquifer thermal energy storage (ATES) and mine thermal energy storage (MTES). Other storage methods may be considered relevant where they meet the prize scope and criteria.
- Heat conversion systems (both direct use [heat exchanger] and heat pumps)
- Target operating temperatures (>45°C output temperature)

STES systems with the following features are excluded:

- Pit storage
- Tanks storage

Award criteria

The proposed award criteria are as follows:

Table 35 Award criteria

Award criteria		Description
1.	**Technical performance**	
	Efficacy and efficiency	Capability of the STES system to take in heat in useful quantities and at useful temperatures, withhold it and provide it on demand for the purpose of effective functioning of building space heating, hot water supply and cooling
	Durability, Operability and Flexibility	Capacity of the STES system to hold heat for long periods of time. Operability is a measure of how straightforward and reliable the system is to operate. Flexibility is the capacity of the system to perform multiple functions.
2.	**Economic performance**	
	Cost	System cost is significant factor affecting adoption. Where systems are highly effective but not cost effective, challenges will be faced to promote wider uptake. The following information on system performance shall be provided in these respects: • Levelized cost of heat (LCOH) • Simple payback period (SPP) • Storage volume cost • Storage capacity cost
3.	**Other performance**	
	Overcoming barriers	Steps taken to address barriers to development, deployment and operation (e.g. novel business case, novel financing, steps taken to address legal and regulatory barriers etc)
	Scalability	The possibility to scale the proposed system, considering technical and economic factors (e.g. costs)
	Sustainability	Energy consumption and GHG emissions GHG savings based on system optimisation

Procedures/Evaluation process

Desk-based evaluation of written applications.

Indicative timeframe

Table 36 Indicative prize call timeline*

Milestones	Dates
Opening of the submission	M1
Deadline for entrant registration of interest	M6
Closing date for submissions	M48
Award decision	M52

*This timeline is provisional and may be modified later on.

Glossary of terms/Definitions

Lack of expert engagement meant that key terms have still to be fully defined.

Summary of the prize-dedicated communications plan

Seasonal Thermal Energy Storage (STES) offers a solution by capturing excess renewable heat during peak periods and storing it for later use, bridging the seasonal gap and enabling more efficient use of renewable energy sources. Despite its potential for scaling up renewable heat STES applications remain limited due to technical, geographical, economic, and

regulatory barriers. However, successful deployments showcase the technology's potential to overcome these challenges.

The Seasonal Thermal Energy Storage Prize has the potential to significantly accelerate the development of STES systems, especially high-temperature systems.

Table 37 Communications' objectives

Objective 1 - Promote the understanding of STES technologies, its benefits and various applications.	Objective 2 - Foster the participation of qualified applicants.	Objective 3 - Generate a momentum around the prize and the innovative solutions it provides.
The aim of this message is to explain why we need seasonal thermal energy storage in Europe and its role to support the EU's green and economic goals. It is targeted mainly to tertiary, but also to secondary audiences	The goal of this message is to explain the prize in a clear way to increase the number of applications. It is targeted to all potential applicants.	The goal of this message is to inform about the prizes benefits and positive impact in the economy and environment. It is targeted to all key target audiences with special emphasis on EU citizens.

6. Prize Communication Strategy

Communication activities are a key enabler to ensure the maximum impact and leverage the success of the Horizon Europe renewable energy systems prizes. The goal of this chapter is to provide DG RTD and CINEA with a strategic guidance for the design and implementation of the communication actions around the prizes. It offers a set of activities that can be seen as menu, allowing DG RTD and CINEA to choose the most relevant ones based on resources, capacity, and preference.

The chapter sets clear, measurable and achievable objectives to stimulate interest, participation, and awareness of prizes impact. The communication strategy is based on a situational assessment, a comprehensive evaluation of past and ongoing communication activities conducted through a SWOT analysis. It identifies who are the main recipients of the campaign by selecting 10 target audiences, clustered into three groups (primary, secondary and tertiary audiences). The strategy also defines what are the key messages to be shared with target audiences. Specific communications activities and channels to conduct these activities are proposed for achieving the prize objectives as well as several communication materials to effectively spread the information on the prizes. In addition, Key Performance Indicators (KPIs) are suggested as a fundamental tool to measure the prizes communication impact.

General objective and rationale

The European Union, as outlined in the European Green Deal, aims to become the world's first climate neutral continent by 2050. The renewable energy systems prizes, set within the Horizon Europe Programme, are strategically aligned with this goal.

Key insight: The strategy emphasises promoting the prizes to stimulate interest, participation and awareness of their impact.

This communication strategy aims to support the impact of the prizes. Its overall goal is to expand the recognition of and engagement with the renewable energy system prizes within the Horizon Europe Framework Programme. The first objective is to raise interest amongst potential contestants, beneficiaries, multipliers and specialised networks. Secondly, it is to foster participation and broaden involvement from these stakeholders - in other words, engage diverse stakeholders effectively. Then thirdly, the communication activities are aimed at increasing a broader awareness amongst a wider audience who will ultimately benefit from the innovative solutions offered by the prizes. In the below approach we aim to ensure all three.

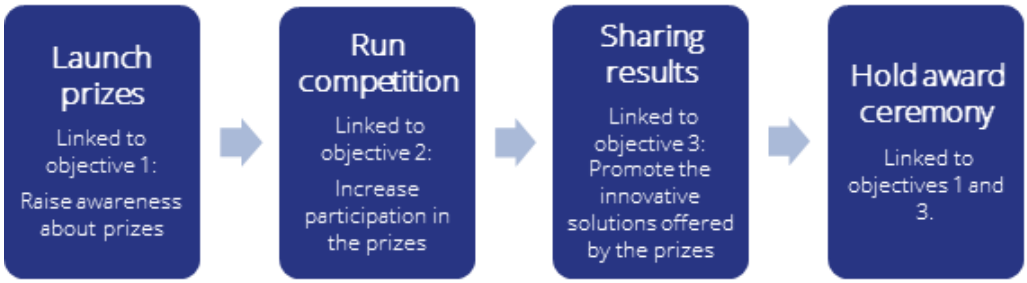
The strategy is focused on effectively promoting the prizes and their core objectives. We elaborate on these further below:

Table 38 Objectives of the communication strategy

OBJECTIVES	DESCRIPTION
Raise awareness about the prizes	Awareness in the past was low. Therefore, the primary goal here is to ensure that the target audience is aware of the existence of the prizes and their importance. This includes understanding the purpose of the prizes, their benefits, and how organisations can participate. Spreading the word effectively is vital. By raising awareness, we ensure that potential participants are informed and engaged. This can lead to increased interest and participation, ultimately enhancing the impact and reputation of the prizes.
Increase participation in the prizes	This objective focuses on encouraging more potential applicants to actively engage with the prizes by submitting applications. In other words: drive submissions. Increased participation indicates a broader interest and investment in the goals and outcomes associated with the prizes. Higher participation rates reflect the success and relevance of the prizes and contribute to a more diverse pool of ideas, innovations, or contributions, ensuring the highest quality of these applications. In short, widen the pool to raise quality.
Promote the innovative solutions offered by the prizes	Innovation inspires innovation. Promoting the innovative solutions that are proposed to the prizes will allow the showcasing of unique features and benefits. It demonstrates the practical outcomes and real-world impact of the prizes, inspiring others to participate and contribute. In addition, it is important to highlight their contributions to the green transition and other related polices to make Europe more sustainable.

In a nutshell, the communication strategy will play a key role in achieving the objectives of boosting the visibility of the five prizes, triggering participation, and promoting the solutions and their contribution to the green transition. It focuses on planning specific activities throughout the prize competition's lifecycles, including:

Figure 9 Competition life cycle



The recommended approach will be followed by a tailored approach with specific communication plans for the each of the prizes at later stage.

Situational assessment

We have, previously to this strategy, carried out an assessment of the six previous prizes under Horizon 2020. This was a crucial step to identify this plan's objectives and activities. Importantly, it also helps to identify lessons learned and a better understanding of the issues requiring attention as well as to inform our strategy. As a result, we have produced a SWOT analysis. This effectively identifies the primary strengths, weaknesses, opportunities, and threats. These insights are vital for proposing strategic actions (also shown below).

Table 39 SWOT analysis

STRENGTHS	WEAKNESSES
• Relevant and interesting topics with communicable content • Existing strong engagement through community building for some of the prizes • Existence of ready-to-use channels including social media platforms, events and digital media • Expertise and knowledge from previous prizes Strategic actions: Leverage these strengths in the strategy, especially to address threats. Build on existing engagement and knowledge from previous prizes.	• Some prizes previously lacked a fully realised communication strategy, resulting in improvised methods and missed opportunities • Limited resources and budgetary constraints for the development of the communication activities • Difficulties to identify and target the appropriate audience, leading to unfocused communication efforts and limited reach. • Limited or lack of monitoring and reporting of many communications activities Strategic actions: Ensure the communication strategy is clear, practical and actionable for DG RTD and CINEA. Create a clear mapping of target audience. Execute simple monitoring system. Consider outsourcing what cannot be achieved in-house.
OPPORTUNITIES	**THREATS**
• An increase in the prizes community and stakeholders engaged • Audience mapping to better target the communication activities • Increased number of applications for the prizes • Reporting mechanism to ensure the successful delivery of the campaign Strategic actions: Leverage new communities and networks ensuring targeting the right stakeholders. Plan and deliver an impactful communication campaign to increase participation in the prizes, including the implementation of robust monitoring and reporting mechanism.	• Lack of interest in the prizes • Short timeframes during the prize implementation phases. • Difficulties in identifying and reaching the appropriate target audience. Strategic actions: Develop clear contingencies in the event of such threats coming to pass.

The SWOT analysis and recommended strategic actions have been utilised to design the following sections of the communication strategy.

Target Audience analysis

Key insight: Tailored communication efforts aim to directly engage primary and secondary audiences while broadly informing tertiary audiences.

We have identified 10 target audiences and we have clustered them in three groups (primary, secondary and tertiary audience segments). These are divided according to the role they could play in the prizes, whether they are potential applicants, multipliers or citizens that need to be informed.

The identified audiences are:

- Primary audience segment: potential applicants

Strategic actions: Target directly and via relevant multipliers. Prioritise for objectives 1 and 2. Share success stories of previous winners, benefits to apply and ensure that application is simple and low friction.

1. Industry, comprising individual companies (both EU and non-EU), including Small and Medium-sized Enterprises (SMEs).

2. Research community and associated networks, encompassing centres, groups, institutes, scientists, scholars, and practitioners engaged in Research and Innovation (R&I) and Energy.

3. Cities/local communities and their related networks, comprising urban areas, regions, and local communities spearheading the transition towards adopting renewable energy sources like solar, wind, and geothermal.

4. Beneficiaries of EU-funded projects.

- Secondary audience segment: Multipliers:

Strategic actions: Building a stakeholder community will be important to reach the target audience. These stakeholders can amplify messages and share content, promoting the prize and the results. Prioritise therefore for objectives 1, 2 and 3, focusing on messages and assets they can easily reshare24.

5. EU associations, including organisations that promote European industry and facilitate its development both within Europe and globally, influencing policy, enhancing business conditions, and fostering increased research and development. These may include thematic organisations collaborating with the EU on specific areas of mutual interest or cross-sectoral bodies connecting organisations from diverse fields around overarching themes.

6. National associations, representing distinct groups or interests at the national level of EU Member States.

7. International organisations, advocating for and setting goals regarding the adoption and utilisation of renewable energy sources such as solar, wind, geothermal, hydropower, and biomass.

8. Third sector organisations, including Non-Governmental Organisations (NGOs) and foundations driven by a social mission to promote the public good and operating on non-profit principles.

9. Consultants and technical specialists, offering expert advice and guidance on matters related to renewable energy and research.

- Tertiary audience segment: Citizens

Strategic actions: Prioritise for objective 3, at the sharing results stage and award stage.

10. EU citizens are an important audience and it's important to explain how they will benefit from the innovative solutions coming from the prizes.

Key messages

Key insight: Messages are designed to align with objectives, targeting potential applicants, encouraging participation, and showcasing innovation impacts

We have proposed **three main messages linked to the communications objectives**, to be agreed following discussion.

Table 40 Key messages

Objective 1 - Raise awareness about the prizes	Objective 2 - Increase participation of the prizes	Objective 3 - Promote the innovative solutions offered by the prizes
Key message 1	Key message 2	Key message 3
Horizon Europe renewable energy systems prizes will foster innovation in clean energy.	Boost your solutions. Enter the Horizon Europe renewable energy systems prizes to gain recognition for your innovative solutions.	Solutions from the Horizon Europe renewable energy systems prizes will contribute to make Europe more innovative and sustainable.
Aim of the message		
Linked to Objective 1, the goal of this message is to promote the prizes and its main objectives. It is targeted to all the key target audiences.	**Linked to Objective 2**, the goal of this message is to increase the number of applications in the prizes. It is targeted to all potential applicants.	**Linked to Objective 3**, the goal of this message is to inform about the prizes benefits and positive impact. It is targeted to all key target audiences with special emphasis on EU citizens.

Communication activities and channels

Key insight: activities have been selected to optimise engagement across various platform and formats, tailored to audience preferences and resources availability. Channels recommended include:

- Events and Webinars: To engage stakeholders and potential applicants through informative sessions
- Social Media: Using platforms like X and LinkedIn to spread awareness and engage audiences
- Website: A dedicated site for prize information, update and resources
- Award Ceremony: A hybrid/virtual event to celebrate winners and highlight innovations

The following **activities and channels** are recommended for effectively communicating about the prizes are outlined below. These should **be seen as a menu, which can be refined** following discussion depending on resources, capacity and preference.

Stakeholder engagement activities

Stakeholders that act as multipliers can contribute to reaching our target audiences as they have established networks in the fields of R&I and renewable energy. We recommend approaching them through:

- A targeted series of **emails**, inviting them to engage in the dissemination of Horizon Europe Renewable energy system prizes. Initially, we would introduce the prizes, the criteria, events and information on how to apply. We would encourage them to act multipliers and spread the word. We suggest providing stakeholders with a **ready-made email template along with relevant communication materials in the form on outreach toolkit (see section of ''communication materials''**). This close collaboration will ensure that potential applicants receive information on the prizes from a trusted source and it will enable them to create a positive dialogue among the different prize communities.
- **Events**: Info days in the form of **webinars** and similar events will play an important role in promoting the prizes. They will virtually gather relevant stakeholders and potential candidates. The webinars will provide an opportunity to gain insight about the prizes and address any queries they may have throughout the application process. Importantly, the aim of these events is to continue building a robust community around the prizes. We recommend hosting **1 webinar per prize with a duration of 1 hour and 30 minutes**. We suggest organising the events following these three main steps:
  - Identifying invitees: During the registration phase, the stakeholder mapping established in Work Package 4 can serve as an initial tool for identifying potential participants for the events. This can be increased by leveraging the internal networks of CINEA and DG RTD. Outreach efforts can include email campaigns, social media engagement, and other communication activities outlined in this section.
  - Concept and agenda: the agenda of the events could have the following structure:

- Introduction, which includes a welcome and an introductory overview of the webinar. It will provide participants with a brief insight into the prizes, setting the stage for the discussions to follow.

- Presentation of the prize details, should offer a comprehensive overview of the prize, encompassing its objectives, and target audience. Furthermore, it should delineate the formal criteria for applying to the prize, while also emphasising the benefits and opportunities associated with participation.

- Q&A Session where participants can have the opportunity to engage in an open dialogue, asking questions and seeking clarification on any aspect of the prizes.

Organising online events:

Opting for an online formal can expand engagement significantly. When organising an event, it's important to consider the online platform to hold the virtual event managing registrations, proving virtual support and assistance to participants, and following up with the post-event activities.

Before the event we suggest sending emails to participants containing general information about the webinar, practical details like the agenda, relevant information, registration links, including data processing and audiovisual recording information, along with necessary consent forms, and joining instructions for the event.

Following each event, a thank-you-email should be drafted and distributed to all participants. This email should include events details, information about recordings (if available) and a link to an online survey. This survey aims to gather feedback, providing a deeper understanding of the event's value and offering insights to implement any necessary changes in future events.

- Dissemination activities through existing events: European Commission events and events organised by stakeholders offer a valuable platform for introducing the prizes and their benefits. These events, such as Horizon Europe Info days, provide an ideal setting to induce the prizes to target audience networks. Securing speaking slots for presentations with accompanying PowerPoint slides could facilitate deeper discussions and networking opportunities, optimising the involvement in these events. This multifaceted approach aims to bolster visibility and position Horizon Europe renewable energy system prizes. Here are some examples of events where the prizes can be presented:

EU Events

- Horizon Europe Info Days

- European Research and Innovation Days (R&I Days)

- European Sustainable Energy Week (EUSEW)

- EU Industry Days

- EU Green Week

- EIT Innoenergy events
- EU Missions related events

External Events

- WindEurope Annual Conference
- Intersolar Europe – Exhibition for the Solar Industry
- Photovoltaic Solar Energy Conference & Exhibition
- European Biomass Conference & Exhibition (EUBCE)

Social media plan

social media plays a key role in enhancing the visibility and impact of the prizes among target audiences. Platforms such as X and LinkedIn, can swiftly disseminate information about the prizes, reaching a vast and diverse audience. Moreover, multipliers can contribute to the prize dissemination through social media.

The key owned social media channels proposed are:

- X: remains a significant channel for targeting multipliers. The platform can support with raising awareness about the prizes and reaching to a large audience with mass media messaging. This offers an effective avenue to disseminate information regarding the criteria and application rules, rewards, and to inspire and share knowledge about the prizes. The prizes can be promoted in the following accounts25:
  - @HorizonEU (179,1 K followers)
  - @cinea_eu (35,2 K followers)
  - @EU_ScienceHub (72,1 K followers)
  - @Energy4Europe (65,1 K followers)
- LinkedIn: LinkedIn is the world's biggest social network for professionals and could be used to specifically reach out to the desired campaign's target audiences. This could be done by joining closed-groups and actively promoting the prize in these forums or by targeting organic posts at specific professions, industries or job functions3. Engaging content will also be necessary to maximise the reach and engagement of the campaign. The prizes can be promoted in the following accounts:
  - EU Science, Research and Innovation (88 K followers)
  - CINEA - European Climate, Infrastructure and Environment Executive Agency (69 K followers)

Multipliers will also be encouraged to use their own social media profiles as channels for sharing information regarding the campaign using template posts which would be provided in the outreach toolkit for multipliers.

Find below examples of social media posts:

Table 41 Social media examples

Target Audience/ Objectives/	Primary audience: Industry (including SMEs), Research Community, Cities/local communities, Beneficiaries of EU-funded projects	Secondary audience: EU Associations, National Associations, International Organisations, Third sector organisations, Consultants and technical specialists	Tertiary audience: EU Citizens
Objective 1: Raise awareness about the prizes	Is your renewable energy solution making a positive impact on society? Apply now for the #HorizonResPrizes:	Do you know a research organisation or company is bringing an innovative solution on renewable energy? Nominate or spread the word for #HorizonResPrizes	🌍 Curious about the future of renewable energy? 🌿 Explore the innovative solutions coming from the #HorizonResPrizes:
Objective 2: Increase participation of the prizes	🚀 Calling all innovators. Don't miss the chance to be recognised for your contributions to renewable energy. Submit your applications now for the #HorizonResPrizes	Do you know a research organisation or company who is bringing an innovative solution on renewable energy? Nominate or spread the word for #HorizonResPrizes	NA
Objective 3: Promote the innovative solutions offered by the prizes	The #HorizonResPrizes supports innovative solutions and contribute to #EUGreenDeal. Explore them	📢 Attention all organisations and experts in #Renewableenergy! 🌍 Help us amplify the impact of the #HorizonResPrizes. Encourage your networks to apply	The #HorizonResPrizes are supporting renewable energy innovations like: ◈ Geothermal plants tapping deep Earth's heat to extract this battery metal sustainably ◈ Artificial photosynthesis advances, turning sunlight into renewable fuels to power

Target Audience/ Objectives/	Primary audience: Industry (including SMEs), Research Community, Cities/local communities, Beneficiaries of EU-funded projects	Secondary audience: EU Associations, National Associations, International Organisations, Third sector organisations, Consultants and technical specialists	Tertiary audience: EU Citizens
			◈Underground storage capturing summer warmth, heating homes cleanly throughout winter &more Explore them

Some elements of the social media plan can include:

- Engaging content: We will suggest using engaging posts, featuring visuals and appealing language to optimise the interaction and to facilitate meaningful discussion on the prizes, aimed at driving awareness and user traffic to information / online events / submission pages of the website. By using the targeted hashtags, we will target existing and new communities online, to increase stakeholder engagement.

- Hashtags: We propose creating a 'brand' hashtag to be utilised across all the prizes, aimed at engaging stakeholders and multipliers. We suggest using the hashtag of #HorizonResPrizes. Additionally, we recommend using existing, hashtags like #HorizonEU, #renewableenergy #renewables, #climate to support outreach. To expand the community further, we suggest employing a specific set of hashtags for each prize.

We recommend tagging relevant multipliers. Tagging multipliers is important because they are more likely to share or repost, increasing the visibility of the content of the prizes.

If resources allow, the use of brand hashtags can also be monitored through tracking tools such as Keyhole or Talkwalker, which offers an insight into:

- How many times the hashtag has been used.

- The reach of the hashtag and where it is being used most.

- How the hashtag is being used such as top platforms, days and times

- Most popular posts featuring the hashtag.

- An indication of sentiment around the hashtag, whether the conversation is positive or negative.

A **link with other European Union initiatives** will amplify the reach of the messages of the prizes, we suggest connecting the campaign with ongoing initiatives related to renewable

energy, such as the European Green Deal, EU Missions (Adaptation to Climate Change; Restore our Ocean and Waters; Climate-Neutral and Smart Cities and Soil Deal for Europe), or the European Climate Pact. Tagging and linking to those social media accounts would allow the administrators of theses account engage and share information on the prizes.

- **Content calendar**: The content calendar is a 'live' calendar detailing all key information and events to be promoted through social media and when it is to be promoted.

- **Paid campaign**: A paid social media campaign can be considered in the event resources are available. However, considering the usual practices of DG RTD/CINEA in social media, we assume this will not be pursued.

Website

We propose a site should be created for the prizes (in general) with subpages for each prize on the DG RTD/CINEA website. These dedicated pages will serve as the primary source for all information and updates on each prize, providing visitors with the information and resources they need to learn about and apply to the prizes. Newsletters and social media can be used to promote the pages and increase the visibility of the prizes.

We suggest that the section contain the following information:

- **Introduction**: This section would provide a brief overview of the prizes, their impact, and objectives. It would serve as a starting point for visitors who may be unfamiliar with the prizes.

- **Prize Information**: This section would contain detailed information about each prize, including its name, description, eligibility criteria, application process, deadlines, and awards. It would serve as a comprehensive resource for individuals interested in participating in the prizes.

- **News and Updates**: In this section, visitors would find the latest news, announcements, and updates related to the prizes. This could include information about past winners, upcoming events, changes to the application process, and any other relevant developments.

- **Resources and Materials**: This section would provide additional resources and materials to support applicants in their preparation for the prizes. This could include guidance documents, FAQs, templates, and links to relevant websites and resources. The outreach toolkit for multipliers can also be placed here.

- **Success Stories**: Here, visitors would find stories and testimonials from past winners. These success stories would highlight the impact of the prizes and inspire others to get involved.

- **Contact Information**: This section would provide contact details for individuals or teams responsible for managing the prizes. Visitors could use this information to ask questions, seek assistance, or provide feedback.

Award ceremony

we are aware that the **organisation of the ceremony** requires a substantial amount of work, including the design, preparation, execution, and management of the ceremony. We suggest that the event lasts approximately one hour and is carried it out in a hybrid or alternatively virtual format. We suggest some elements for a successful preparation of the ceremonies:

- **Concept note**, including a detailed script with the sequence of timings of each intervention (speeches and videos, if applicable).
- Identifying a **moderator**.
- **Invitations** for participants, including the winners, finalists, the juries and high-level EC representatives.
- **Role** of each of them in the ceremony, especially juries and high-level EC representatives.
- **Materials** for the ceremony, including roll-ups, trophies, certificates and a PowerPoint background, following the visual style of Horizon Europe.

Communication materials

Key Insight: Material development focuses on clarity, coherence, and appeal to effectively convey the value and opportunities of the prizes.

Channels recommended include:

- **Visual look and feel**: Use Horizon Europe's branding to ensure consistency and recognition.
- **Outreach Toolkit**: For multipliers to easily disseminate information.
- **Press Releases and Newsletter**: To announce prize launches, winners, and key milestones.
- **Videos and GIFs**: To visually engage and inform audiences about the prizes and their impact.

Visual ''look and feel''

We suggest ensuring **visual communication for the prizes** aligned with the Horizon Europe visual identity. This communication should clearly emphasise the prize with consistent use of the hashtag and imagery related to renewable energy. This approach will boost recognition of the prizes.

Media material

We suggest developing:

- An **outreach toolkit** for multipliers: Creating a communication kit for the presentation of the prizes is essential for their **promotion and dissemination**. The kit ensures consistency in messaging across various channels, maintaining a unified identity and

providing stakeholders with accurate and coherent information about the prizes. It offers clear and concise details about the prizes, including their objectives, eligibility criteria, application process, and benefits, facilitating understanding and encouraging engagement. By **compiling all relevant information in one accessible place**, the outreach toolkit makes it easy for stakeholders to access the information they need, thereby maximising participation in the prizes. Moreover, the kit serves as a promotional tool, providing materials such as a **backgrounder factsheet, social media templates, and short blurbs for inclusion in stakeholder newsletters and websites**. Additionally, it includes **FAQs** to address common queries and contact information for further assistance, ensuring stakeholders feel supported and informed throughout the process. This comprehensive approach aims to engage stakeholders, foster collaboration, and drive innovation in the renewable energy sector.

- Press release: we suggest creating press releases to highlight key information on the prizes, their objectives, eligibility criteria, and application processes, deadlines, and events. We suggest:
  - One press release to announce the launch of the prizes.
  - A press release to announce the launch of each of the five prizes (Five in total)
  - A press release to announce the results of each of the five prizes (Five in total)

They will serve as an instrument for bolstering visibility and reach a diverse audience including journalists, stakeholders, and the general public. To ensure effective dissemination, specific networks available at the national level will be utilised, including:

- National contact points, ministries, and national innovation agencies or equivalents.
- European Union representations in Member States and EU delegations in Associated Countries, involving information and communication officers and press officers.
- Relevant stakeholders for each prize, including relevant networks and EU and National associations.
- Videos: We recommend the creation of a minimum of one video for the launch of the prizes and a GIF for each of the five prizes. We suggest developing:
  - A 90-second version for the website, offering deeper insights into the prizes.
  - A 30-second version containing key details on the prizes for social media.
  - 5 GIFs with specific information on each of the five prizes

An engaging approach for producing the general video on the prizes could be to involve Commissioner to highlight how solutions can contribute to make Europe more innovative and sustainable.

Evaluation

Below, we provide a table outlining specific Key Performance Indicators (KPIs) for the recommended tools and methods detailed in the previous section. Our goal is to offer a

means of reporting on the prize communications campaign and assessing its impact post-competition.

Table 42 KPIs

Medium	KPIs and sources of verification
Applications	Number of valid applications submitted Source: filled application form received
Stakeholder engagement in communication activities	Number of stakeholders engaged (EU, national and regional bodies' e.g. University researchers, private sector companies, associations, national funding agencies etc.).
Website	Unique users, views, bounce rate Source: Website analytics
Social media organic content	• Impressions • Hashtag reach • Engagement metrics (likes, shares, follows, reposts, etc.) • Click-through rate (CTR) metric on social media accounts Source: Social media analytics platforms
Events	• Number of events organised; • Number of specific groups members reached; • Number of participants; • Percentage of participation at the event (number of participants/number of people registered); • Percentage of satisfied participants Source: Digital platforms analytics following the events
Webinars	• Number of webinar attendees • Levels of engagement during webinar • Number of 'follow-ups' recorded after each webinar (an email address and helpdesk contact number should be provided) Source: Participant satisfaction survey results
Press releases	Number of press releases provided to the EC/ finalised and reviewed. Press coverage (examples)
Outreach material	Number of toolkits downloaded Source: Website analytics and social media KPI as per above following distribution dates
Videos	Number of Views Source: Digital platform analytics

7. Conclusion

The primary outcome of the Study on Prize Development for renewable energy systems is the creation of five fully developed prizes for Renewable Energy Technologies (RET). These prizes have been consolidated from lessons learnt from past prizes, surveys, interviews, desk research, and have been validated through stakeholder consultations and webinars involving RET experts and potential applicants.

The study developed:

- **3 Inducement prizes:**

1. Lithium production from geothermal plants in Europe
2. Fuel from the Sun: further Advancing Artificial Photosynthesis for Renewable Fuel
3. Seasonal Thermal Energy Storage

- **2 Recognition prizes:**

1. RET Solutions in EU Energy Communities
2. Advanced Digital Solutions for improved maintenance processes for RET

Below are short descriptions of the five prizes developed during the study.

Lithium production from geothermal plants in Europe

This inducement prize aims to reward the on-site demonstration of lithium production from geothermal brines related to a geothermal plant, in order to stimulate further advancement of Direct Lithium Extraction (DLE) technologies, while contributing to meet the increasing EU's demand for a Critical Raw Material via its production domestically and sustainably.

RET solutions in EU Energy Communities

This recognition prize aims to reward different participatory and governance innovations within energy communities while operating a RET. It specifically seeks projects addressing common shortcomings, challenges like energy poverty, by showcasing examples of innovative governance structures, participation methods and social procedures implemented by Energy Communities.

Fuel from the Sun: further Advancing Artificial Photosynthesis for Renewable Fuel

The prize seeks to build upon the successful European Innovation Council (EIC) Inducement prize "Fuels from the Sun" awarded in 2022, reproducing the same concept as the previous Artificial Photosynthesis (AP) Prize and improving it as necessary. A review of the prize implementation process (e.g. earlier stage gates) and award distribution (e.g. awards also to placed competitors) are seen by consulted experts as two key areas for improvement.

Advanced digital solution for improved maintenance processes of RETs

This prize recognises and gives visibility to digital innovations, among them Artificial Intelligence (AI) solutions, to promote their contribution to improving maintenance challenges. Several types of software or hardware applications are addressed in the RET sectors. The prize will contribute to O&M's operational efficiency, reducing its costs, saving employees' working time, and improving the safety of working conditions, as well as enhancing the sustainability of the RET system.

Seasonal Thermal Energy Storage

The prize aims to reinvigorate interest in long-duration (seasonal) high-temperature thermal energy storage and its coupling with renewable energy sources (e.g. solar, biomass, waste heat). The focus would be on high-temperature systems (>45°C providing seasonal thermal energy storage in geological reservoirs (aquifers).

The majority of these prizes are cross-cutting, covering several RET types, except for the Fuel from the Sun prize, focusing on renewable fuels. As a result, the study didn't exclude innovations from any RET.

Each prize is accompanied by its own communication plan, which is crucial for a good implementation and reach of the prize, to garner enough participation, but also once important during the awarding phase to guarantee the visibility of the prize winners. The study provides specific communication elements tailored to the five prizes, as well as a broader communication strategy that can serve as inspiration for future prize initiatives.

In addition to the 5 prizes and their associated communication plan, the study also offers a methodology that can serve as a fundamental tool for designing and implementing future prizes. It notably includes an analysis of the drivers and barriers observed in past Horizon prize prizes. Desk research, a survey of past applicants, and interviews supported the analysis, leading to a set of recommendations for future prize designs. Among the findings about past prizes, it was noted the previous successful Horizon prizes, receiving the most engagement and results, involved thorough inception and design phases, while setting up clear target audiences.

The recommendations for prize design and implementation are:

- allow for sufficient time to design the RET prize;
- clearly assess and define the target audience and its needs;
- carefully consider the incentives for applying in the prize design;
- ensure that the targeted TRL matches the prize concept and research;
- ensure clear and balanced evaluation and award criteria;
- develop a communications strategy relevant to the target audience;
- ensure potential applicants have access to information;

- mobilise sufficient resources to implement a communications strategy and understand how limited resources will impact the final output;

- realise the full potential of prizes as a way to promote R&I.

Finally, the study introduced an initial longlist of prize concepts. The five prize concepts that didn't reach the finalisation stage may hold potential for development through additional research and consultations, and further adaptation to the needs of the RET-research and innovation field.

The additional five prize concepts are:

1. Application of green synthetic gases in the European glass sector

2. Responsible Manufacturers for RET Circularity

3. Building Integrated Photovoltaics (BIPV) products and services for facades in building stock

4. Innovative and efficient District Heating and Cooling (DHC) systems

5. Innovative mitigation measures to increase biodiversity hydropower schemes

ANNEX I – RATIONALE FOR THE SELECTION OF 5 PRIZES

Prize concept	Relevance, feasibility & challenges
Lithium production from geothermal plants in Europe	Selected Overall, there is interest in this prize. The prize is relevant and feasible (potential contestants, EU priorities, etc.). Particular attention should be paid to targeting the right audience and integrating an economic perspective on lithium extraction. Relevance and feasibility: • The concept has been relevant for the industry and interest has emerged in the past two decades. It is also highly relevant to EU priorities (CRM). • Not a limitation to focus only on the EU as long as is well argumented in the justification • Suggestion not to include battery and car manufacturers. However, it is missing mining companies because they will be interested in taking up the lithium, this will be a (part) of the target audience. • Award criteria to be included are safety issues since there are several environmental and health impacts, which should be addressed (plants are often close to local communities, and this is often an issue). • Inducement prize targeted to commercial application is interesting. • Numerous power plants in Europe that could apply for this prize. • The US already manages to do it, this prize would reward “Made in Europe” lithium. Challenges: • It is missing how to improve geothermal economics • It needs clear focus (criteria to be considered such as kgs produced, production rate). The prize could be framed around this, as well as how much energy is produced, and input and output concentration. Also, it could be narrowed down to a more small-scale dimension. • Fits within the timeframe of raw materials, but important to be precise on the objectives so the industry knows exactly for what they would be competing for.
Fuel from the Sun: further Advancing Artificial Photosynthesis for renewable fuel	Selected • Overall, there is still a significant relevance and interest in this field, and an inducement prize could further accelerate innovations from lab to demo (from ~TRL 2 to ~TRL 4). Launching a new AP prize, perhaps with adapted objectives and award criteria, would allow some limitations from the first prize to be addressed.

Prize concept	Relevance, feasibility & challenges
	Relevance and feasibility: • The target audience is clearly defined and is interested in such a prize. • The project team will need to work on adapting the previous prize rules to reduce perverse outcomes (i.e. diminish advantages of previous competitors) and to encourage new entrants (esp. novel systems based on e.g. genetic engineering). • Winner from the previous prize to be excluded automatically • Threshold measurement is something to be careful about during the design phase. Therefore, this time the criteria could be stricter (e.g. 4 years but including the building of a prototype. Challenges: • Specify the kind of fuel to be produced. Gas would be the best technology. • The prize team should revisit the prize objectives to justify the re-edition • The timeline should be adapted to allow shortlisted participants sufficient time to develop an operational device (while also avoiding advantaging previous competitors). • The communication strategy could be improved to support wider interest in the topic of AP and in technology prizes more generally
UTES: facilitating renewable heat generation through underground thermal energy storage	Selected Relevance and feasibility: • The high capital cost (CAPEX) makes the technology difficult to compete against low CAPEX instantaneous heating technologies as supplied by natural gas heaters and boilers. However, the Ukraine crisis has pushed up international natural gas prices and renewed Europe's interest in lowering its dependence on imported natural gas. As such, it may be a timely opportunity to explore long-term, high temperature, energy storage to support seasonal imbalances in renewable energy supply (esp. solar) • The high CAPEX of high-temperature aquifer energy storage systems (HT-ATES; high temp means >30ºC) would limit a prize to existing demonstrators and small-scale existing sites. • Central solar heating plants with seasonal heat storage (CSHPSS) may also be in scope (are these the same as HT-ATES?). The topic was a major focus area over the period 1990-2010, although has seemingly received less attention over the last decade or so. This observation notwithstanding, a number of demonstrators were developed over this period which may still be in operation today. • Low temperature (<30°C), shallow (~< 200m), and short-run (intra-day) storage would fall outside of scope. • A prize contest would offer a genuine possibility to reinvigorate interest in long-run (seasonal) high-temperature thermal energy storage and its

Prize concept	Relevance, feasibility & challenges
	coupling with renewable energy sources (esp., solar, but also waste heat from waste incineration or from biomass combustion). • Key award criteria have been scoped (efficiency, efficacy, durability, performance, usability etc), and would need to be refined based on further engagement with experts and operators of existing plants. • Inducement prize can target the failure of the technology that is missing Challenges: • Need to narrow the scope to target high-temperature seasonal applications (HT-ATES) and consider whether CSHPSS should also be in scope. • The concept would need to be refined and allow for fair competition. Perhaps it could be an inducement prize. • Since the field has a sort of failure because it has not been moving forward, it should be really researched: what is the failure? What is preventing them from moving forward? Is it the technology? • The scope is not entirely clear, and it is assumed it won't be for some time in the future, since it is not clear in general what is the problem. • Analysis of failures so far
Advanced digital solution to improve the maintenance processes of RETs	Selected • Overall, this prize is relevant it looks at improving the RET life-cycle thanks to the improvement of maintenance processes. It answers several challenges. Additionally, the target audience is known and interested. Adjustments will have to be made to the award criteria. Relevance and feasibility: • The target audience is clearly defined. SMEs in the digital and RE sector would be interested in such an inducement prize. Competition will not be opened to larger companies as it might produce unfair competition. • Award criteria such as cyber-security will ensure that this prize takes on key challenges on the market. Challenges: • A too-high TRL may hinder SME applications. It will be critical to target the right TRL. • It will be important to reward a solution with a good user experience. Perhaps the award criteria could include a condition on the use of the technology. • The software should be tested (virtually). There could be issues within the two years to have the acceptance of the owner of the plan with the new software (potential staff issue). • To be clear on what specific technology (so not and, but or)

Prize concept	Relevance, feasibility & challenges
RET Solutions in energy communities	Selected • Overall, this prize is highly relevant and would reward mostly social innovation. It could draw more attention to energy communities and reward not their set-up but the deployment of efficient solutions and business models. Additionally, the target audience is clearly established and interested. Relevance and feasibility: • If there is an inconsistent account of the current number of energy communities currently existing in Europe, there are at least 4000. The target audience is clearly defined. To be focused on specific size according to membership, therefore small (50 to 200 members) and medium (200 to 500 members) energy communities. • The award criteria will focus on the incentivisation of a full-scale solution looking at the business models, governance structure (involving several types of actors) and use of SMART tools within their activities. Challenges: • The definition of what an energy community is should be carefully selected and written out in the rules of contest. To be used the definition of the EU directives for the RE community. • To allow for fair competition, the prize should focus on energy communities of a given size. The project team leans towards small and medium ones. The award size will have to be adapted to the size of the target applicants. • The scope of the prize could include not only electricity generation but district heating as well, however, this can make the prize too broad. • Rentability of solutions to be included as award criteria, which will help showcase a high degree of replication.
Application of green synthetic gases in the European glass sector	Not selected While this topic is relevant and there is a market for this prize, the concept could be more ground-breaking, the incentives and the target audience are not fully clear, and challenges for the implementation of this prize are anticipated. Therefore, this prize does not seem as feasible as others. Relevance and feasibility: • Decarbonisation of European Energy Intensive Industries (EII) is among the main challenges to achieve the targets as laid down by the EU Green Deal. • The concept of retrofitting is aligned with the EU priorities and there is a market for green synthetic gases for applications in EII. • The glass sector is a very relevant field of application.

Prize concept	Relevance, feasibility & challenges
	Challenges: • The main challenge identified is the mobilization of a sufficient number of applicants. According to feedback from European and national glass sector associations, the interest of European glass manufacturers to use green synthetic gases is currently still hampered by the associated high costs. • Furthermore, innovative decarbonization efforts of EIIs are currently supported in several R&I programmes on the European and national level, and thus prize concept may not generate sufficient additional interest.
Responsible Manufacturers for RET Circularity	Not selected • Overall, the topic for this prize is highly relevant to EU priorities, however, it lacks the focus to be highly feasible. For the prize to be feasible the prize concept would have to focus on one of the aspects mentioned in the award criteria. Therefore, this prize is not as ready as others to be developed. Relevance and feasibility: • The topic of this prize is highly relevant to EU priorities. • Criteria on governance and participatory approach could be relevant to develop • This prize could operate as a label and firms would participate for prestige Challenge: • The concept is too broad and would need to be refined. It does not seem concretely feasible. • The TRL is too low, and capturing industry interest will have to be further reflected on. • Even though the topic is highly relevant, it is already invested in thanks to other programmes such as Horizon.
BIPV products and services for facades in building stock	Not selected • Overall, this prize is very interesting. However, it is not highly feasible as incentives for participation and selecting the right target audience will prove a challenge. The concept would have to be refined and the prize should allow for sufficient time regarding permit procedures. Relevance and feasibility: • This solution would have clear benefits for building owners that could produce electricity. Additionally, it addresses a need for innovation: for industry players to add such products to their portfolio. • There is a lack of awareness in the building sector that this solution could replace regular building materials, therefore it is relevant to draw awareness of the sector.

Prize concept	Relevance, feasibility & challenges
	Challenges: • While the solution and its impact are very interesting, it is unclear which target audience would have the right incentive to participate in such a prize. • For the solution to be highly relevant it should include additional qualities. • For the prize to be highly feasible, it should take into account the constraints of building owners to obtain permits to install such facades.
Innovative and efficient DHC systems	Not selected • Overall, this prize presents a lot of potential. There is a target audience for this prize and interest in these systems. The prize will reward holistic solutions addressing both technical (improvements on hydraulics, reduction of flow temperatures, integration of renewable energies and storages, application of digital management systems) and non-technical (company management, consumer collaboration, design of investment plans, business plans and financing models) aspects. Relevance and feasibility: • The target audience for this prize concept is DHC system operators and DHC system owners (e.g. cities and municipalities). Collaborations with research and innovation organisations and private companies are possible. • The award criteria will focus not only on the technological aspects (efficiency improvements, renewable energy sources) but also on non-technical aspects such as innovative business models, as well as on digitalisation for improved efficiency. • This prize is highly relevant for the decarbonisation of the European heating and cooling sector. It would recognise and put forward good practices ready to be deployed by other DHC systems operators. • Focusing on a smaller version of DH could be to show that this is an economic and viable solution. Challenges: • How to narrow down the target audience from the existing 17.000 DHC systems in Europe? The focus could be placed on fourth-generation district heating (4GDH), low-temperature district heating (LTDH), or fifth-generation DH (5GDH). • How to best establish different DHC categories (small (neighbourhood), medium (municipality), large), distinction by number of consumers or network length?
Innovative mitigation measures to increase biodiversity	Not selected • Overall, this prize concept would be relevant to bring awareness to a broad audience. However, it might not be as relevant to prioritise against other

Prize concept	Relevance, feasibility & challenges
hydropower schemes	prizes. Additionally, it might be challenging to operationalise and define clear and fair award criteria. Relevance and feasibility: • There is a need to increase awareness and tackle the misconception that RET hinders biodiversity. The prize could improve the broad audience perception while improving the negative impacts of RET on biodiversity. Challenges: • Looking at the award criteria it will prove challenging not to reward unfairly the participants that best communicated. Involvement and participation might be more relevant award criteria.

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This study aimed to design five innovation prizes for Renewable Energy Technologies (RET) suitable for launch under Horizon Europe or similar initiatives. Building on the lessons learned from past Horizon prizes, desk research, and consultations with past applicants and RET experts, we delivered the prize designs, their rules of contest, implementation strategies, and communication plans. Furthermore, the study provides recommendations for future prize designs.

Studies and reports

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