

# SET4BIO

## RENEWABLE FUELS AND BIOENERGY FOR A LOW-CARBON EUROPE - ACCELERATING THE IMPLEMENTATION OF THE SET-PLAN ACTION 8

Horizon 2020, Grant Agreement no. 884524

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**Task: Task 3.1 "Design SET4BIO Innovation Challenge"**

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## EXECUTIVE SUMMARY



This report provides an overview of the strategy used to elicit topics and engage participants to the SET4BIO Innovation Challenge. This with the aim to direct the challenge towards an objective without creating unnecessary restrictions in the open technology innovation driven by external innovators.

As the SET4BIO Innovation Challenge is an open innovation contest, directed towards creating innovations that stimulate increased production and use of bioenergy and renewable fuels, it sets out to engage innovators in developing innovative proposals for solutions that stimulate and increase the possibility of producing and using bioenergy and renewable fuels.

For the challenge to focus on relevant target groups, six+two value chains (i.e. bioenergy and biofuels, and hydrogen) were selected to provide the SET4BIO Innovation Challenge with the right scope and boundaries. The prioritised value chains should comprise the scope and boundaries to elicit topics and solution ideas and are focused on solutions developed beyond the research stage, i.e. TRL5-8, while not yet being established industrially. Each team that applies for participation in the SET4BIO Innovation Challenge anno 2021 should connect their solution idea to one (or several) of either the six prioritised value chains regarding bioenergy and fuels, or the value chains related to hydrogen.

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**Statement of Originality**

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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## Introduction

The aim of D3.4 “Identification of topics for SET4BIO Innovation Challenge” is to report the strategy that was selected in the project to elicit topics and engage participants to the SET4BIO Innovation Challenge anno 2021, with the aim to direct the challenge towards an objective without creating unnecessary restrictions in the open technology innovation driven by external innovators. The activities performed to select and operationalize the strategy was performed in Task 3.1.1 “Definition of goals” and Task 3.1.2 “Formalize SET4BIO challenge - Design contest”, within the overall Task 3.1 “Design SET4BIO Innovation Challenge”.

This document includes a brief account of the architecture of the SET4BIO Innovation Challenge, the design decisions that were made as well as the efforts performed to attract participants through systematic outreach activities. This description is based on the more comprehensive account of the SET4BIO Innovation Challenge provided in D3.1 “Innovation Challenge in SET4BIO”.

The report also includes a description of potential strategies to identify topics to proceed with in an innovation challenge. The three strategies are discussed in terms of strengths, weaknesses and appropriateness given the situation at hand. Based on this discussion the motivation for the selection of strategy for SET4BIO Innovation Challenge anno 2021 is presented. The operationalization of the strategy selected is concluding the report. The deliverable is finalised prior to the implementation of the challenge, and therefore does not include any account of the output from the challenge. It serves as a display of the SET4BIO Innovation Challenge anno 2021 with a focus on the strategy implemented to identify topics and to engage participants in the challenge.

## Chapter 1 - The SET4BIO Innovation Challenge anno 2021

The SET4BIO Innovation Challenge is described in-depth in D3.1 “Innovation Challenge in SET4BIO” and accessible via the ETIP Bioenergy webpage<sup>1</sup>. As an open innovation contest, the challenge is directed towards creating innovations that stimulate increased production and use of bioenergy and renewable fuels. It sets out to engage innovators in developing innovative proposals for solutions that stimulate and increase the possibility of producing and using bioenergy and renewable fuels by also implementing the EU Green Deal.

To selected innovators (i.e. participating teams or entrants), the SET4BIO Innovation Challenge will provide the following major opportunities:

- Accelerating the development of their solution via virtual events;
- An assessment of the solution with a final demonstration day;
- Opportunities of being matched with potential funding opportunities.

From mid-November 2020 the webpage will enable interested teams of innovators to submit applications for participation in the challenge. After submission deadline, these submissions will be reviewed using the three criteria of relevance of the concept to the challenge scope, its perceived potential and the innovators capacity to deliver and scale the solution. Selected teams

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<sup>1</sup> [www.etipbioenergy.eu/set4bio/innovation-challenge](http://www.etipbioenergy.eu/set4bio/innovation-challenge)

will be invited to the SET4BIO Innovation Challenge process, starting in April 2021.

As depicted in Figure 1, the challenge, taking place between April and November 2021, provides a set of virtual events to support participating teams to develop the concepts throughout the challenge process towards the final. Each Event is preceded by a preparation phase in which the teams work with their concepts in association to the theme of the event.

The Challenge is divided into three major phases: pre-challenge, accelerating phase and beyond-the-challenge. The first two contain the following major activities:

- Application for participation.
- Screening of applicants: A screening of concepts will be made by the Organisers to select the most promising concepts to be accepted to enter the Challenge.
- Virtual Kick-off: At this stage, information to the Entrants, including more information about the challenge to be addressed in the SET4BIO initiative, the value chains in focus, and general information about the challenge will be provided through a dedicated event.
- Virtual Events: Four virtual events to support the Entrants in developing the concepts will be scheduled. The Events are focused on value chain contribution, innovation height, business viability and scalability, respectively. Each virtual event is preceded by a preparation phase and followed by a post-event phase to ensure concept acceleration.
- Final Event: The presentation of concepts by the Entrants to the Jury will be done. The evaluation of best concepts will be performed by a Jury and the winners will be officially presented and communicated.

Continuously throughout the one-year process, the team will:

- receive feedback from key stakeholders within the sector, acting as board of mentors, in regard to their Solution,
- gradually receive relevant information in regard to funding, creating a basis for future matchmaking.

At the final event, the participating teams with their Solutions will be ranked and the top three will be awarded the so-called Seals of Excellence. The Seals of Excellence indicate the Solutions potential in terms of the four evaluation criteria: value chain contribution, innovation height, business viability and scalability. Aside from visibility of the teams in different media channels and communication material, the Seals of Excellence comprise important supporting documentation for the teams in continuous development of their offerings, for instance in relation to funding agencies, potential customers and partners.

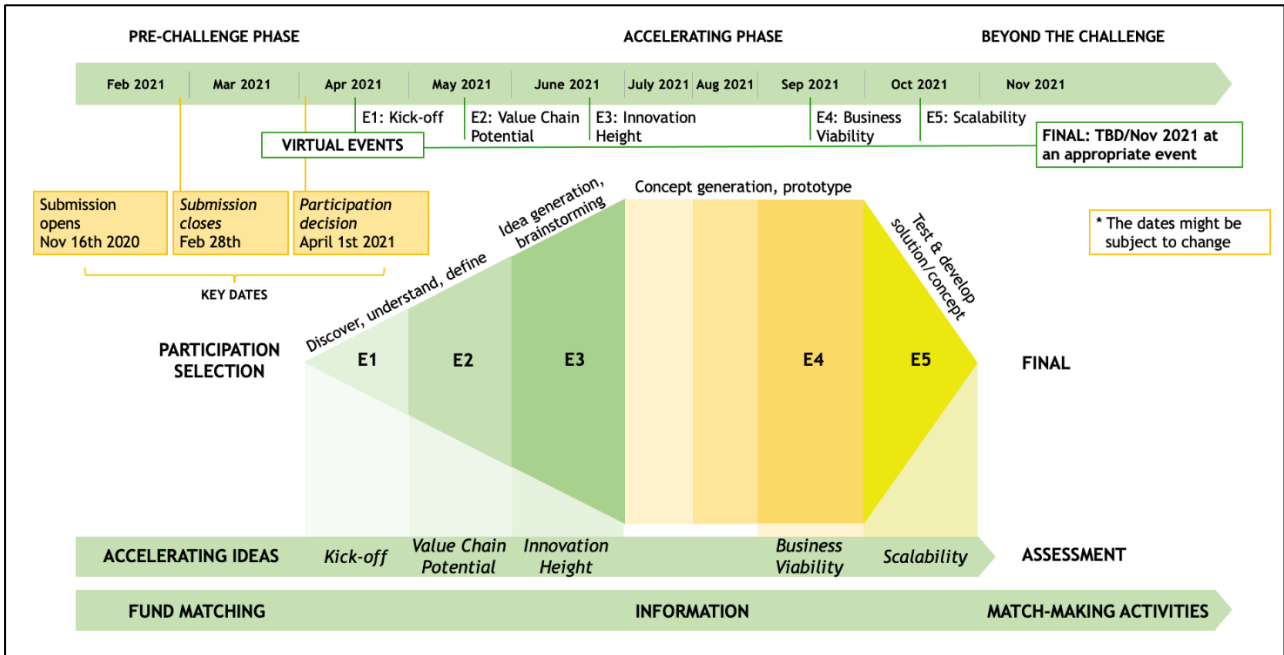


Figure 1 SET4BIO Innovation Challenge anno 2021

## Chapter 2 - Three strategies for identification of open innovation topics

Organisations arrange contest-driven innovation events for several reasons (Hjalmarsson et al. 2017). Certain formats can be used to generate ideas that can be transformed into products and services. They can help to select between competing ideas and filter out those that are most promising. They can also help to improve the visibility and image of the organiser by creating a buzz and drawing attention to the organiser and its brands. Yet another purpose is to strengthen the size and dynamism of an innovation community in which the organiser participates, or to utilize the contest to facilitate that new services, products or solutions reach a market.

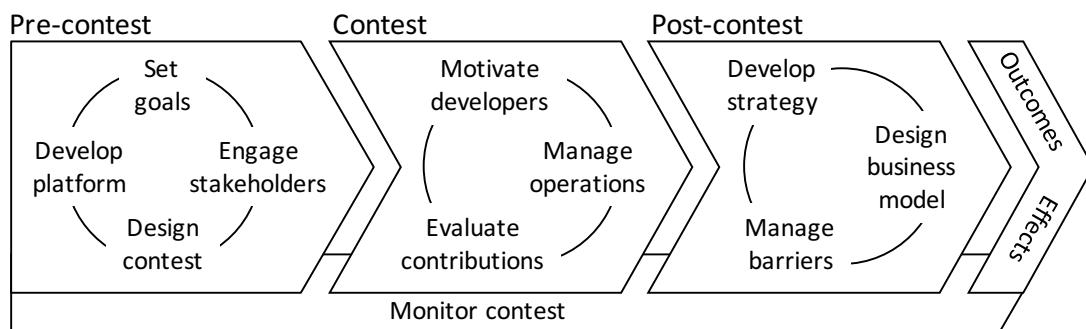


Figure 2 Approach for organising open digital innovation contests (Hjalmarsson et al. 2017)

To be able to set goals or objectives for the innovation challenge therefore becomes an important task in the pre-contest preparations (Hjalmarsson et al. 2017). Using the three open innovation process archetypes developed by Gassmann and Enkel (2004), different goals may be derived to direct an innovation challenge. The first type of goal relates to the outside-in process of bringing in external knowledge to support the organisation’s innovation. The second type of goal is

associated with the inside-out process of transferring ideas for exploitation outside the organisation. The third type of goal refers to the coupled process of innovating in alliances with complementary partners.

Using Gassmann and Enkel (2004) as inspiration, three possible strategies were derived in WP3 to define how the topics for the SET4BIO Innovation Challenge should be identified. The overall objective with the innovation challenge in M4 was in the project defined as to create innovations that stimulate increased production and use of bioenergy and renewable fuels. One approach to identify topics to operationalize this objective was to follow the outside-in approach discussed by Gassmann and Enkel (2004). Transformed into a strategy for topic identification means that the organisers enable interesting teams to both suggest the topic for innovation within the area, as well as the actual solution for addressing this topic. One anticipated advantage with this strategy is that one does not create a lock-in in terms of idea development and creativity by restricting the innovating teams with distinct requirements or promoted pains for the teams to solve. However, as depicted in Table 1, there might also be disadvantages with this strategy. One identified risk is that team-driven and proposed topics may lead to proposed solutions that are unrealistic in terms of implementation, that the solution proposed is impossible to implement and reach a potential market. Or that the topic identified is not perceived relevant for the organisers of the challenge. Given this, we propose that team-driven topic identification is appropriate for innovation challenges that focus on early-stage research within a field or sector that is not high degree charted by the organiser. By letting the innovators both propose topic and solution can be a way to support the organiser to both find novel solutions and also learn about the domain to better understand it and how to direct future innovation. This strategy was not determined as appropriate for the SET4BIO Innovation Challenge anno 2021.

The second derived strategy is labelled organiser-driven topic identification. This strategy is based on Gassman and Enkel's (2004) archetype inside-out. Transformed to a topic identification strategy this mean that the organisers behind SET4BIO should provide distinct topics to be solved by the teams entering the challenge. This in turn require that the organisers align and agree what the development topics are to be addressed during the challenge. Such an approach is appropriate when the organiser of the challenge has a clear and defined problem statement that if fixed will manage the challenges that organisers currently face. Such an approach strongly directs problem-solving and make it possible to create a formal and systematised assessment process that measure and compare proposed solutions from different teams in terms of for example efficiency. The strategy require that the organisers align and agree what development topics to propose, and that they possess an understanding to such level that a distinct set of requirements can be derived and communicated to teams. The organisers are displaying distinct topics, in addition to also indicating what they lack knowledge or capability in related to an area which could signal or display weakness.

The third, for SET4BIO deemed most appropriate, strategy to identify topics for an innovation challenge combines aspects of the two previous strategies. Topics is through this third strategy identified through the process by which organisers provide a scope and boundaries for the innovation challenge. In other words, they through the challenge invite team to provide solution ideas that are screened before the actual challenge given an explicit framing. The framing (scope and boundaries for solutions) or target area for solution ideas both act to stimulate teams to develop and shape their ideas prior to the challenge as well as enable for the organisers to create a direction for innovation based on previous knowledge and strategies, and to select whom to invite into the challenge process. The advantages are that a sector with multiple stakeholders through this approach can be mobilised towards a target area for innovation, also creating a mechanism to direct open innovation to a higher degree than the organiser-driven approach, but with lesser risk of pre-scribe innovation. A disadvantage is that scope and boundaries is harder to



communicate that a concrete topic or through letting the team suggest both topic and solution. Especially if the organisers do not have a common and shared knowledge base how to pursuit innovation and development in a certain sector or domain.

Within the sector of bioenergy and renewable fuel, ETIP Bioenergy has over the past decade charted different value chains with the aim to stimulate and increase the possibility of producing and using bioenergy and renewable fuels in Europe. Given this the project selected the combined team-organiser strategy to identify topics for the challenge. A selection of the defined value chains was thus used to provide scope and boundaries for the SET4BIO Innovation Challenge anno 2021.

Strategy	Team-driven topic identification (outside-in)	Organiser-driven topic identification (inside-out)	Combined team-organiser identification of topics
	The team suggest both the topic what solve and solution for how	Organiser provides distinct topic to be solved by the team	Organisers provide a scope and boundaries for the innovation challenge; teams suggest solution ideas that fit within the provided framing
Appropriateness	Early-stage research and innovation within a field or sector that is not to a high degree charted by the organiser.	When the organiser of the challenge has a clear and defined problem (i.e. “pain”) that should be addressed and solved during the challenge	When the field or sector is chartered but when the organisers do not possess or want to restrict the innovators by providing distinct topics to solve
Advantages	<ul style="list-style-type: none"> <li>- Avoid lock-in, promote creativity</li> <li>- Find disruptive solutions not anticipated by the organisers</li> <li>- Charter an unexplored domain or sector</li> </ul>	<ul style="list-style-type: none"> <li>- Directs problem-solving</li> <li>- Possibility of formal and systematised (even automated) assessment</li> <li>- Solves concrete pains</li> </ul>	<ul style="list-style-type: none"> <li>- Mobilize a sector to pursuit innovation</li> <li>- Create directions for sound innovation and creativity within the boundaries of implementation</li> <li>- Screening</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>- Unrealistic solutions</li> <li>- Re-inventing the wheel</li> </ul>	<ul style="list-style-type: none"> <li>- Requires the organisers align and agree what the development topics are</li> <li>- Might create lock-in</li> <li>- Lack of innovation hight</li> </ul>	<ul style="list-style-type: none"> <li>- More difficult to communicate</li> <li>- Entering barrier</li> <li>- Require multiple assessments</li> </ul>

Table 1 Three strategies to identify topics for an innovation challenge

### Chapter 3 - Topics for SET4BIO Innovation Challenge 2021

Bioenergy is considered a key source to meet EU 2020 and beyond renewable energy targets, and at the same time helping to ensure-green-house gas emission reduction, security of energy supply and supporting economic growth in Europe (European Commission 2018). In 2016, the European Technology and Innovation Platform Bioenergy - ETIP Bioenergy - was launched as a merger of the European Biofuels Technology Platform - EBTP - and the European Industrial Initiative Bioenergy - EIBI - (ETIP Bionergy 2018). The mission statement of ETIP Bioenergy became “to contribute to the development of cost-competitive, innovative world-class bioenergy and biofuels value chains,

to the creation and strengthening of a healthy European bioenergy industry and to accelerate the sustainable deployment of bioenergy in the European Union through a process of guidance, prioritisation and promotion of research, technology development and demonstration”

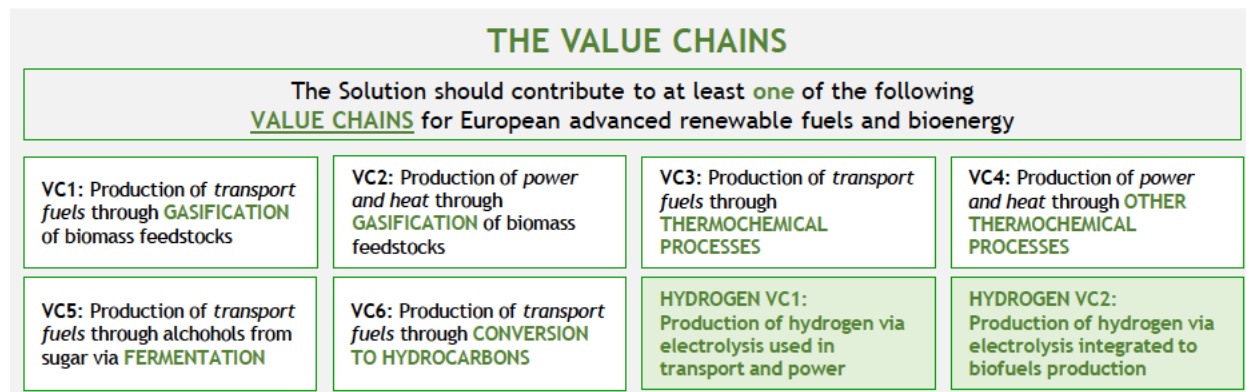


Figure 3 The six+two value chains selected as scope and boundaries in SET4BIO Innovation Challenge 2021

Within ETIP Bioenergy a value chain is perceived as a cluster of conversion technologies from a range of feedstocks to a range of products (ETIP Bioenergy 2019). The focus is on grouping by technologies, as to define research needs and Technology Readiness Level (TRL) for this group of technologies.

Two types of value chains are defined: *established value chains* that are at TRL9 and thus are broadly used on the market, and *priority value chains* i.e. chains that are developed beyond the research levels of TRL, usually at TRL5-8, but are not yet established industrially and on scale reached the market. Such priority value chains are in need of support and acceleration to scale in terms of value creation on markets.

A third type of pre-mature chain is labelled *development pathways*, that is chains still in research and development stage (TRL1-4) and consequently not so mature to define a proper value chain quite yet (ETIP Bioenergy 2019)<sup>2</sup>.

For SET4BIO Innovation Challenge 2021, the project consortium decided that prioritised value chains should comprise the scope and boundaries to elicit topics and solution ideas. These chains are value chains that are developed beyond the research stage, i.e. TRL5-8, while not yet being established industrially. Next generation technologies will allow the use of new and more sustainable feedstock sources in the short to medium term in these chains, which are converted to mainly biogas, biofuels and zero carbon fuel.

As displayed in figure 3 each team that apply for participation in the SET4BIO Innovation Challenge anno 2021 should connect their solution idea to one (or several) of either the six prioritised value chains regarding bioenergy and fuels, or the value chains related to hydrogen.

<sup>2</sup> An overview of the prioritised value chains is also provided on the ETIP Bioenergy web page: <https://etipbioenergy.eu/value-chains/conversion-technologies/advanced-technologies>

Please describe the problem addressed and the Concept to be explored in the SET4BIO Innovation Challenge 2021 (max 250 words):

\* Q1

Please provide a brief account for how the Concept can add value to one or several of the value chains (max 250 words):

\* Q2

Please provide a self-assessment of how close the Concept is to market introduction

\* Q3

An important feature of the SET4BIO Innovation Challenge 2021 is the opportunity to be matched to relevant funding opportunities. Please provide a brief account of your current idea to fund the implementation of the above-described solution. In particular, please specify whether you have already applied for funding, such as Horizon2020, EIC, EIB, venture capital, equity (max 250 words):

\* Q4

Account for relevant experiences and the competences of the team members in connection to the SET4BIO Innovation Challenge (max 75 words per member):

\* Q5

\*  I have read the Privacy Policy and hereby authorize the use and processing of my personal data in compliance with EU Regulation no. 2016/679 GDPR

The team should, as shown in the snapshot from the application form, do this when submitting their application prior to the challenge both through the description of the topic that the team should focus on during the challenge, as well through a description of the concept and how it can add value to one or several of the six+two value chains. To support the team at this stage, official material that explains each prioritised value chain are made available on e.g. the ETIP Bioenergy web page. The team should in addition self-assessment the level of maturity in the concept in relation to market introduction and also state current status in regard to funding and the team's capacity. The submitted application will be assessed after application deadline using criteria that especially focus on the relevance of the concept versus the prioritised value chains

with the aim to ensure that the teams enrolled in the challenge focus on a topic that have high capacity to advance the value chain in focus.

In order to further support the teams to create value and innovate within the boundaries of the challenge the first virtual event will focus on the prioritised value chains and through the board of mentors guide the teams further within their specific topic. In addition, the prioritised value chains will frame the events that focus on novelty, business viability and scalability and finally be assessed by the expert jury prior to final event of the challenge. By integrating the value chains in 1) the submission instructions, 2) screening criteria, 3) the virtual events that aim to accelerate the concepts initially submitted to solutions, and 4) through the final criteria, the strategy *combined team-organiser identification of topics* is implemented to support the SET4BIO Innovation Challenge 2021 to reach its objectives.

## Chapter 4 - Final notes

This report provides an account of the strategy selected to elicit topics and engage participants to the SET4BIO Innovation Challenge anno 2021, with the aim to direct the challenge towards a target without creating unnecessary restrictions in the open technology innovation driven by external innovators.

The report includes a description of three alternative strategies to adapt to identify topics to proceed in innovation challenges. The three strategies are discussed in terms of strengths, weaknesses and appropriateness given the situation at hand. This could in the future be used to guide how to create challenges that fit the chartering of what is labelled development pathways, or challenges that focus on solving critical pains in established value chains.

The deliverable is finalised prior to the implementation of the challenge and thus does not include any account of the output from the challenge. It serves as a display of the SET4BIO Innovation

Challenge anno 2021 with a focus on the strategy implemented to identify topics and engage participants to the challenge.

For preparing this report, the following deliverable/s have been taken into consideration:

D#	Deliverable title	Lead Beneficiary	Type	Dissemination level	Due date (in MM)
D3.1	Innovation Challenge in SET4BIO	RISE	Report	Public	M12

## References

ETIP Bioenergy (2018): ETIP STRATEGIC RESEARCH AND INNOVATION AGENDA 2018 - cost-competitive innovative world-class bioenergy and biofuel value chains

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Gassmann, O. & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. Proceedings of The R&D Management Conference, Lisbon, Portugal, July 6-9.

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## Appendix 1 – SET4BIO Innovation Challenge Flyer

**Transform your novel ideas into value adding solutions!**  
**Participate in SET4BIO Innovation Challenge 2021 to support the production and use of renewable fuels and biofuels in Europe.**

To selected teams, the SET4BIO Innovation Challenge will provide 3 major opportunities

**ACCELERATING**  
the development  
of the solution



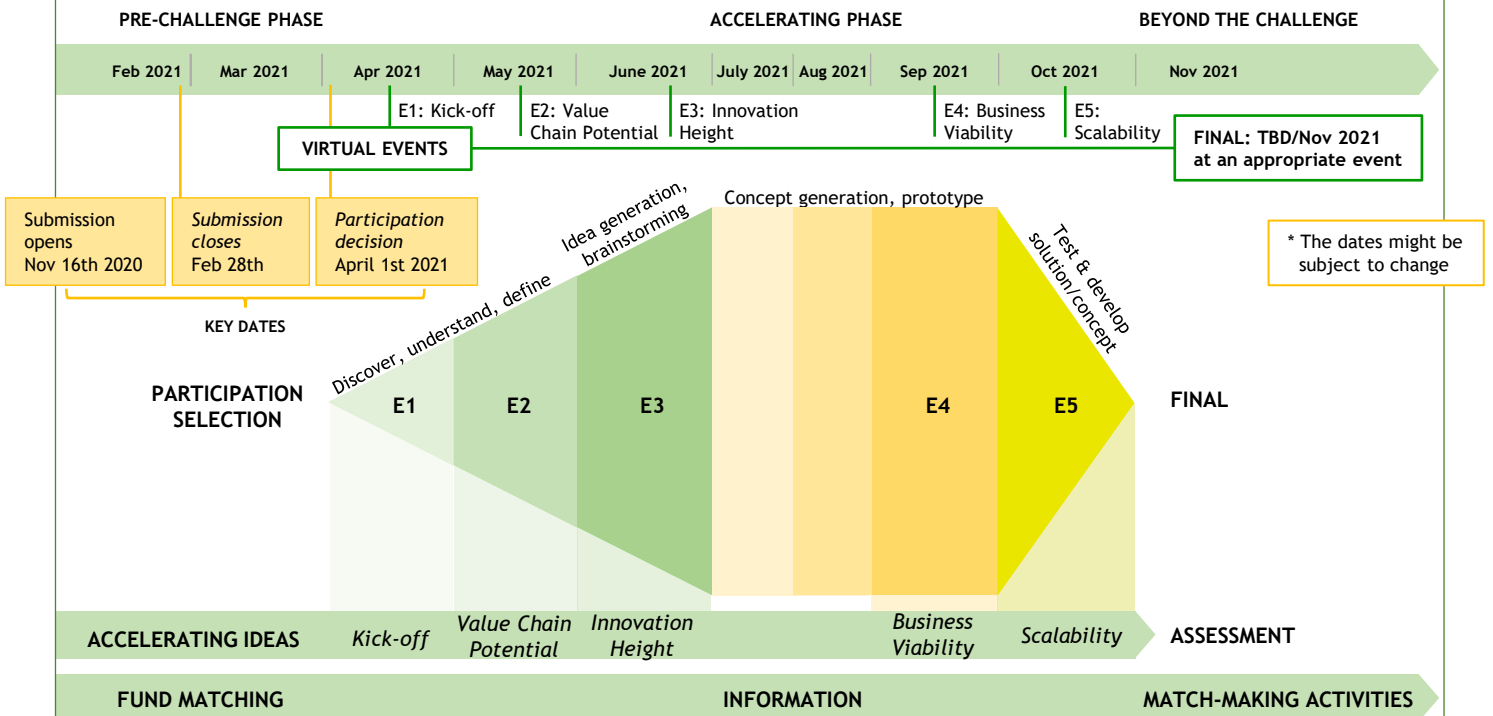
**ASSESSING**  
the solution with  
a final demo day



**MATCHING**  
the solution with  
funding opportunities

Contributing to **IMPLEMENT** the EU GREEN DEAL vision

## THE CHALLENGE PROCESS



## THE VALUE CHAINS

The Solution should contribute to at least **one** of the following **VALUE CHAINS** for European advanced renewable fuels and bioenergy

**VC1:** Production of *transport fuels* through **GASIFICATION** of biomass feedstocks

**VC2:** Production of *power and heat* through **GASIFICATION** of biomass feedstocks

**VC3:** Production of *transport fuels* through **THERMOCHEMICAL PROCESSES**

**VC4:** Production of *power and heat* through **OTHER THERMOCHEMICAL PROCESSES**

**VC5:** Production of *transport fuels* through alcohols from sugar via **FERMENTATION**

**VC6:** Production of *transport fuels* through **CONVERSION TO HYDROCARBONS**

**HYDROGEN VC1:** Production of hydrogen via electrolysis used in transport and power

**HYDROGEN VC2:** Production of hydrogen via electrolysis integrated to biofuels production