**INTELCOMP PROJECT**

**A COMPETITIVE INTELLIGENCE CLOUD/HPC PLATFORM FOR AI-BASED STI POLICY MAKING**

**(GRANT AGREEMENT NUMBER 101004870)**

# Report on Climate Change Living Lab

# D6.3

| Deliverable information | |
|---|---|
| Deliverable number and name | **D6.3 Report on Climate Change Living Lab** |
| Due date (adjusted) | December 31, 2023 |
| Delivery date | December 29, 2023 |
| Work Package | WP6 |
| Lead Partner for deliverable | ARC |
| Authors | Phoebe Koundouri (ARC)<br>Lydia Papadaki (ARC)<br>Charalampos Stavridis (ARC) |
| Reviewers | David Gago-Saldaña (SEDIA)<br>María Joaquina Barroso (SEDIA)<br>Asier Lopez Basterretxea (NTTDATA)<br>Daniel Jimenez Izquierdo (NTTDATA)<br>Utku Demir (ZSI)<br>Dietmar Lampert (ZSI) |
| Approved by | Jerónimo Arenas, Technical Manager (UC3M) |
| Dissemination level | Public |
| Version | 1.0 |

**Table 1. Document revision history**

| Issue Date | Version | Comments |
|---|---|---|
| **29 Sept. 2023** | v0.1 | Initial document structure created |
| **13 Oct.2023** | v0.2 | Introduction and methodology added |
| **18 Dec. 2023** | v0.3 | Ready for review |
| **21 Dec. 2023** | v0.4 | Review feedback incorporated |
| **28 Dec. 2023** | V1.0 | Final version approved by the Technical Manager |

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101004870.

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# ACRONYMS

**AI —** Artificial Intelligence

**CC —** Climate Change

**LL —** Living Lab

**PA —** Public Administrations

**PLL** – Preparatory Living Lab

**SME —** Small and Medium Enterprise

| List of the project's Work packages referred to the report | |
|---|---|
| WP Number | **WP Title** |
| WP1 | Evidence-Based Policy Modelling |
| WP2 | IntelComp STI Data Space |
| WP3 | NLP&AI for STI analysis and modelling |
| WP6 | Living Labs applied to AI, Climate Change and Health, IntelComp tools co-creation |

| List of Partners and their acronyms | |
|---|---|
| Acronym | **Full name** |
| ARC | ATHINA-EREVNITIKO KENTRO KAINOTOMIAS STIS TECHNOLOGIES TIS PLIROFORIAS, TON EPIKOINONION KAI TIS GNOSIS |
| BSC | BARCELONA SUPERCOMPUTING CENTER |
| CITE | COMMUNICATION & INFORMATION TECHNOLOGIES EXPERTS ANONYMOS ETAIREIA SYMVOULEFTIKON KAI ANAPTYXIAKON YPIRESION |
| FECYT | FUNDACIÓN ESPAÑOLA PARA LA CIENCIA Y LA TECNOLOGÍA |
| HCERES | HAUT CONSEIL DE L'EVALUATION DE LA RECHERCHE ET DE L'ENSEIGNEMENT SUPERIEUR |
| HFRI | ELLINIKO IDRYMA EREVNAS KAI |

| | |
|---|---|
| | KAINOTOMIAS |
| NTTD | NTT DATA |
| OPENAIRE | OPENAIRE I |
| SEDIA | SECRETARIA DE ESTADO DE DIGITALIZACIÓN E INTELIGENCIA ARTIFIC–AL - MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL |
| TGB | TECHNOPOLIS CONSULTING GROUP<br>BELGIUM |
| TILDE | TILDE SIA |
| UC3M | UNIVERSIDAD CARLOS III DE MADRID |
| ZSI | ZENTRUM FÜR SOZIALE INNOVATION GMBH / CENTRE FOR SOCIAL INNOVATION |

# EXECUTIVE SUMMARY

IntelComp project is a Horizon 2020 Innovation Action to build a platform that can analyse large volumes of textual data using Artificial Intelligence services. IntelComp adopts a Living Labs methodology and involves external Public Administrations and stakeholders (civil society organisations, academia, and industry organisations) (i) to co-design and co-create IntelComp tools and services; and (ii) to validate the resulting platform through the co-creation of Science, Technology and Innovation (STI) policies in three different domains: artificial intelligence, climate change and cancer.

This document constitutes the final report of IntelComp *Living Lab* (LL) Climate Change and aims to introduce the framework of the Living Lab, record its activities, and present the results.

The overall goals of the project driving the LL activities comprise the ambition to understand the challenges of STI policymaking and the development of a suite of AI models and tools for analysing STI data and validating STI policies; the proper exploitation of the projects' main results; and the creation of a data space containing both raw and processed data. These goals guided the LL planning and implementation, in addition to the main objectives stated above.

To meet those objectives and goals, IntelComp LLs followed a common methodological approach which was further tailored to the needs and context of the Climate Change LL. This includes concrete goals, policy questions and data considerations, a stakeholder engagement strategy, an alignment with the technical development, and a roadmap that captures the implementation path towards the set goals.

As Climate Change is a very broad theme, LL Climate Change decided to initially define its course and focus on the main topics that seem to interest more stakeholders from different backgrounds (academia & research, policymakers, industry & business, and society). To do so, LL on Climate Change has prepared and implemented a series of workshops, part of the "Preparatory Living Lab", which were attended by people mostly based in Europe, but also globally. The decision to deploy "open workshops accessible by Stakeholders of different backgrounds and broader geographic location" was made, since Climate Change cannot be restricted to a certain geographical area, thus, policies should not be drafted without considering their regional and global effects. The afore mentioned workshops allowed the LL, in cooperation with the technical team of ARC, to define two thematises of great importance: Energy and Agrifood, and to identify important data sources, that could be utilised for the scope of the project. The next steps included the organisation and implementation of the workshops of the LL, addressed to stakeholders related to Energy and Agrifood from the broader STI sector (Research/Academia, Policy Makers/Government, Business/Industry, Society/Community).

The participants were introduced to a demo version of the STI Viewer, one of the four IntelComp tools, and were asked to provide feedback and prioritise the expansion areas of the tool, giving the chance to the developers to understand what is needed by the end-users and further improve the designed tool. Furthermore, Stakeholders were informed about the development of the Participation Portal, a tool allowing Stakeholders belonging to Society/Community to comment on the results of the STI Viewer and express their opinions on its results, aiding policymakers (end-users of the STI Viewer) to understand how society sees STI Viewer results.

In general, LL participants expressed their enthusiasm with the project and recognised its value for not only improving policy-making but also understanding what is needed by society, whereas monitoring what is being researched in the academic sector in connection to what is being ultimately implemented in the industry. Although, it has to be noted, that as in every tool developed, the end users need more time to explore the tool and express their remarks on that. Thus, it would be helpful to allocate additional efforts to the testing and exploration of the tools in order to further improve them in terms of user needs, functionality and usability.

# 1. INTRODUCTION

IntelComp project is a Horizon 2020 Innovation Action to build a platform that can analyse large volumes of textual data using Artificial Intelligence services. IntelComp adopts a Living Labs methodology and involves as primary stakeholder group *public administrations* and *policy-makers*, as well as other relevant stakeholder groups (such as *civil society organisations*, *academia*, or *industry organisations*), to (i) co-design and co-create IntelComp tools and services and (ii) validate the resulting platform through the co-creation of Science, Technology, and Innovation policies in three different domains: artificial intelligence, climate change/energy and health/cancer, for specific use cases of the IntelComp tools and services.

This document captures the results of the IntelComp *Living Lab on Climate Change* and constitutes deliverable D6.3. The Preparatory Living Lab (PLL) and the Living Lab (LL) were implemented from Q2/2021 to Q4/2023, based on a joint approach outlined by D6.1 whose purpose was to ensure that the envisioned LL objectives will be achieved.

The deliverable captures the main results and activities of the LL on Climate Change. It starts with this introduction to provide the background and plan at the outset of the LL activities. Following the methodology which each IntelComp LL followed and tailored to their purposes, the main part of the report comprises the key results in terms of LL activities, as well as implications on the thematic domain of the LL and the technical development of the IntelComp tools. The fifth part shows the results of the Energy and Agrifood workshops, as well as the development and validation of the survey for the STI Participation Portal. The final part of the deliverable comprises the overall conclusion of the LL on Climate Change.

# 2. LIVING LAB GOALS

## 2.1. Project Goals

IntelComp as a project has been devised to build a platform that is capable of analysing large volumes of textual data using Artificial Intelligence services. It adopts an LL (Living Labs) methodology and involves external stakeholders[1] to co-create the envisioned tools and services, and to validate the resulting platform through the co-creation of Science, Technology and Innovation (STI) policies in three different domains: artificial intelligence, climate change, and cancer.

Apart from these overarching goals, several further goals of the project need to be stated here:

- The IntelComp platform shall be deployed in high-performance computing environment;
- a suite of AI Models and tools for STI analysis shall be developed;
- the exploitation of the results shall be achieved through adequate use of communication and dissemination processes;
- a data space of raw and processed STI sources shall be created;

[1] i.e. PA (public administrations) and stakeholders from civil society organisations, academia, and industry/business organisations

- the project strives to understand the challenges of STI policy-making; and that
- the project aims at analysing and validating STI policy models.

## 2.2. Goals of the Living Lab on Climate Change

The LL on Climate Change has the following objectives:

- Determine the principles and guidelines policymakers use to develop policies.
- Identify the needs of policymakers regarding the creation of IntelComp tools that will assist them in formulating better Energy and Agrifood policies.
- Validate early stakeholder feedback via tool trials and demonstrations (by observing and permitting users to utilise the tools, even as the development process progresses from prototype to actual use case demonstration)
- Identify the most important areas in which the IntelComp tools need to expand
- Feed these requirements into the development and expansion of the IntelComp tools.

## 2.3. Software Development Goals

The goals of the software development overlap partly with those of the LL. For instance, the collaboration with the project's stakeholders and aligning their interests with the interests and capabilities of IntelComp. The software development has two additional specific goals, namely (a) to build a timeline and a management structure for coordinating software production and delivery, and (b) to set the basis for ensuring the compliance of the project's outcomes with regulations, policies, and other common paradigms applied or enforced in the domains addressed by the project.

IntelComp software development envisions many services and four main tools that are of particular relevance, as the LL participants will have the opportunity to use them. The first one, the *Interactive Model Trainer* is an expert tool that makes it possible to (a) train new topic models, (b) edit and curate topic models, (c) train new classification models, (d) generate sub-corporified (e) evaluate models. The other three are mainly geared towards fulfilling the needs of the primary stakeholder of the LL – Table 1 characterises their main features.

**Table 1: IntelComp tools – their purpose for the primary Living Lab stakeholders**

| | STI Viewer | STI Policy Participation Portal | Evaluation Workbench |
|---|---|---|---|
| **Targeted Organisation** | Public administration (Ministry), funding agency | Ministry, Funding agencies, academic, business and citizen organisations | Funding Agency, Evaluation Agency (if independent of the Funding Agency) |
| **Targeted users** | Policy & STI analyst | Policy-officers, STI managers/agents for organisations, citizens | Call Manager |
| **Main Functionality** | Analyse, compare and visualise a comprehensive set of STI-related KPIs | To provide a synthetic list of measurements for participatory STI policy-making | To assist in the ex-ante evaluation of STI proposals for funding |
| **Stage of the policy-making cycle** | Agenda setting, monitoring and ex-post evaluation | Agenda setting, monitoring and ex-post evaluation | Implementation |
| **Tool predecessor** | Data4Impact | *(simplified)* STI Viewer | Corpus Viewer |
| **Interaction with the LLs** | LLs validated the base functionalities of the tool and ideated future updates taking into account stakeholder needs | *ARC developed a survey to be addressed to the citizen groups, which was then validated through the LLs* | The tool was not implemented and used in the scope of the Climate LL |

The development timeline of these tools was provided in the *Platform Development Plan*. The LL planning accommodates that timeline as much as possible by aligning its stakeholder engagement activities with the development phases laid out in that plan.

# 3. METHODOLOGY

Living Labs, as a concept, have long existed[2] but in recent years become popular in all kinds of research and innovation projects, including in public administration research (cf. Decker, Contreras, and Meijer, 2020). Especially in Europe, the concept has been further developed and adopted to

[2] on the origin of the concept, cf. Eriksson, Niitamo, Kulkki, et al. (2005); Dutilleul, Birrer, and Mensink (2010); or Hossain, Leminen, and Westerlund (2019)

the needs and setup of publicly funded projects (cf. Beaudoin at al. ,2022; Compagnucci, Spirgarelli, Coelho, and Duarte, 2020).

## 3.1. What is a Living Lab?

What a Living Lab (LL) is can be difficult to determine exactly because many – sometimes competing – definitions exist (cf. Compagnucci, Spirgarelli, Coelho, and Duarte, 2020; pp. 3). There are several key characteristics that are mentioned in most definitions, namely the relation to real-life environments, the focus on stakeholders, on collaborative activities such as validation, experimentation, or testing – sometimes, these are part of a co-creation approach. Another important characteristic is that LL are facilitated, not managed, i.e. the team behind a LL has no authority over the lab's participants (cf. Westerlund and Leminen, 2011). Sustainability is yet another characteristic that is often crucial (cf. Leminen et al., 2016).

As a work definition, IntelComp's understanding of LL largely matches the definition offered by Schaffers and Turkama (2012): *A living lab provides a setting for collaborative innovation by offering a collaborative platform for research, development, and experimentation with product and service innovations in real-life contexts, based on specific methodologies and tools, and implemented through concrete innovation projects and community-building activities*.

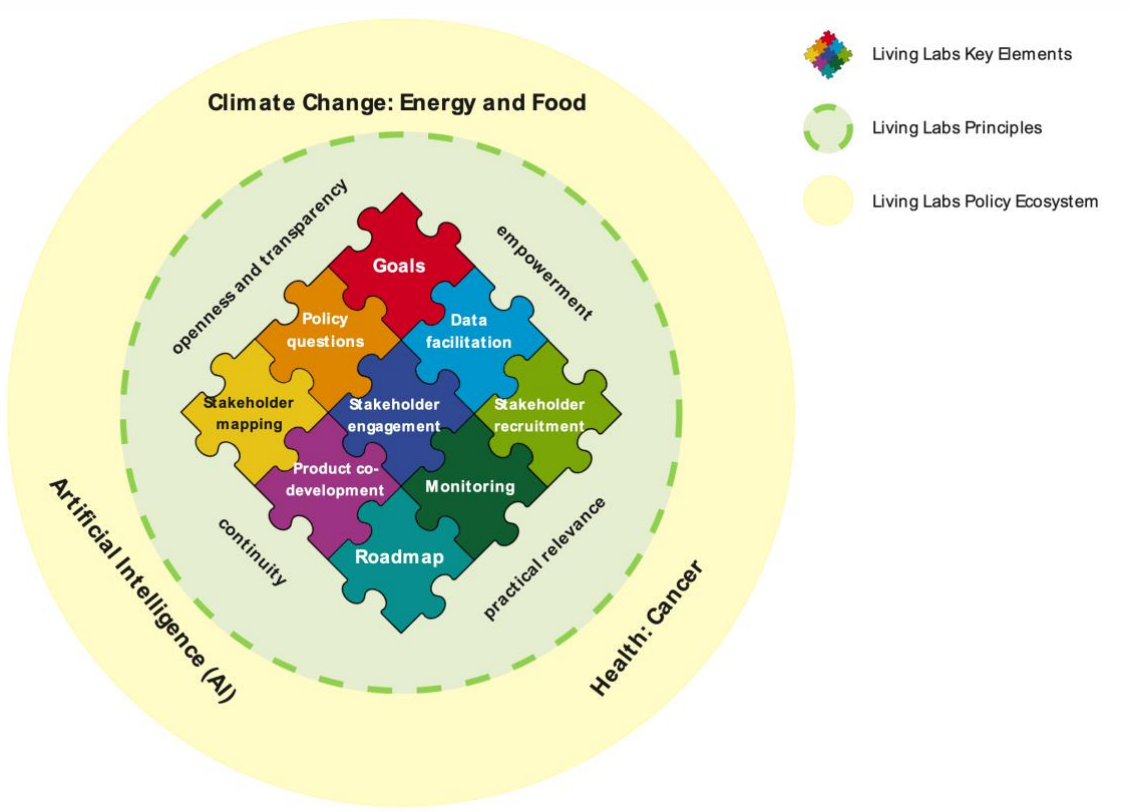
## 3.2. Overall IntelComp Living Lab Approach

IntelComp largely follows the general approach of a LL but tweaks it such that it fits the project's setting. This includes its **policy ecosystem** which, as the figure below shows, comprises **AI, Cancer, and Climate Change**; moreover, it follows the following four **guiding principles**[3]:

- **Openness and transparency** – open to participation of many stakeholders; open to perspectives, needs, expertise, etc.; transparency concerning goals (no hidden agenda) and expected outcomes, decisions, limitations, and expectations.
- **Empowerment** – empowering LL participants by taking their inputs and contributions seriously, by enabling them to engage in the LL activities, and by helping them find answers to their (policy) questions;
- **Continuity** – continuous (mutual) learning; continuous fostering of relations between participants; and
- **Practical relevance** – relevance of activities, outputs, and results for LL participants in their real-life setting; relevance of results and outcomes for IntelComp.

[3] Scholarly literature sometimes labels these differently and may include more such principles, but these are the ones that are most essential for the LL foreseen by IntelComp.

**Figure** Error! Unknown switch argument. **- Key elements and principles of living labs**




## 3.2.1. Key elements of the IntelComp Living Lab

While the policy ecosystem provides the context and the principles guide the IntelComp LL, it is the key elements that represent the building blocks of the LL. These key elements comprise the **goals**, specific **policy questions** and **data sources**, the **stakeholder** dimension (mapping, recruitment, engagement), the **co-development** of tools, the **implementation roadmap**, and the **monitoring** of the LL implementation (cf. figure above).

Although each LL will tailor those key elements to their own needs, the common methodology outlines them as follows:

| | |
|---|---|
|  | The previous chapter details the overall goals of the project that inform the LL planning. In addition, each LL sets its own **individual goals** that it tries to realise during its lifetime. Hence, the planning and implementation of its key elements needs to be tailored to each LL. |

| | |
|---|---|
|  | Each LL starts with its own set of domain-specific **policy questions**. During the LL preparation and planning phase, the LL teams provided key inputs–to WP1 - *Evidence-based Policy Modelling* – which collected them and triangulated them with the policy framework (Deliverable 1.2). The final selection of the Set of policy questions is done by WP1. Those questions inform the scope of the work of the technical teams, from data sources to AI services to the user interfaces of the IntelComp tools.<br><br>During the LL implementation, the initial set of policy questions needs to be expanded and refined, depending on the needs and interests of the engaged stakeholders. |

| | |
|---|---|
|  | Depending on and derived from the policy questions and indicators or measurements (also being developed by WP1), are the **data** that ought to be used, processed, and presented via the user tools.<br><br>However, there is a different aspect to it, in that users may be given the means to upload their own data and possibly have them enriched and processed, to eventually use them in the given user tool.<br><br>Several restrictions and preconditions can be expected to be in place and the timing of this feature to be linked to the maturity of the concerned tool. Still, it is necessary to plan for this ahead of time, in cooperation with the technical teams. |

The stakeholder dimension comprises three essential key elements of the LL[4]:

a) the mapping of potential stakeholders,

b) their recruitment as LL participants, and

c) the ongoing stakeholder engagement to generate the envisioned goals and keep the stakeholders intellectually and emotionally linked to The LL.

ad a) the goal of the mapping is to identify a large enough group of stakeholders to reach a critical mass of potential LL participants. This ensures that the ongoing participation in activities is adequately high, that the results are robust, and that the burden caused by the ongoing engagement can be made lighter by spreading efforts across different individuals over time. In practical terms, the mapping essentially prepares/collects data so that the answers to the following sentence can be determined for each potential stakeholder: *We want to recruit **whom**, **why**, **when**, **how**, and (i' we don't have direct access) **by whom***.

b) the stakeholder recruitment is a concerted effort to activate suitable individuals – identified via the above-mentioned mapping – who commit to becoming involved in the LL activities, ideally regularly and throughout the lab's lifetime. While it is ultimately up to each participant to determine their own degree of involvement, the LL will make a serious effort to keep their participants engaged, which leads us to the next point;

c) the ongoing stakeholder engagement is the core activity of the LL (Mastelic, Sahakian, and Bonazzi, 2015) that assumes both a longer-term perspective to ensure that the LL as a whole continues to work towards its goals and a short-term perspective in that it focuses on the implementation of individual lab activities, such as workshops or trainings. It is important to note that it is easy to lose sight of the overall goals because the attention often lies on the next activities to be implemented, which is why the *LL implementation monitoring* is an integral part of the LL activities (more on this below).


Co-creation is in IntelComp's DNA and therefore one of the key elements of the LL: the co-development of the project's tools. One out of the four envisioned tools will be fully co-created, the other three are being built on existing products but the basic idea is the same: the LL participants and potential users of the tools will have a big say in the development of those tools, i.e. the LL facilitators will listen to their needs, take their input seriously, transparently communicate decisions by the project partners that affect them, and in general live by the four guiding principles presented above.

In practical terms, the co-creation process is closely tied to the technical development of IntelComp's tools and services, which is why the timeline laid out in the Platform Development Plan is an integral part of – and visually present in – the roadmap of each LL.

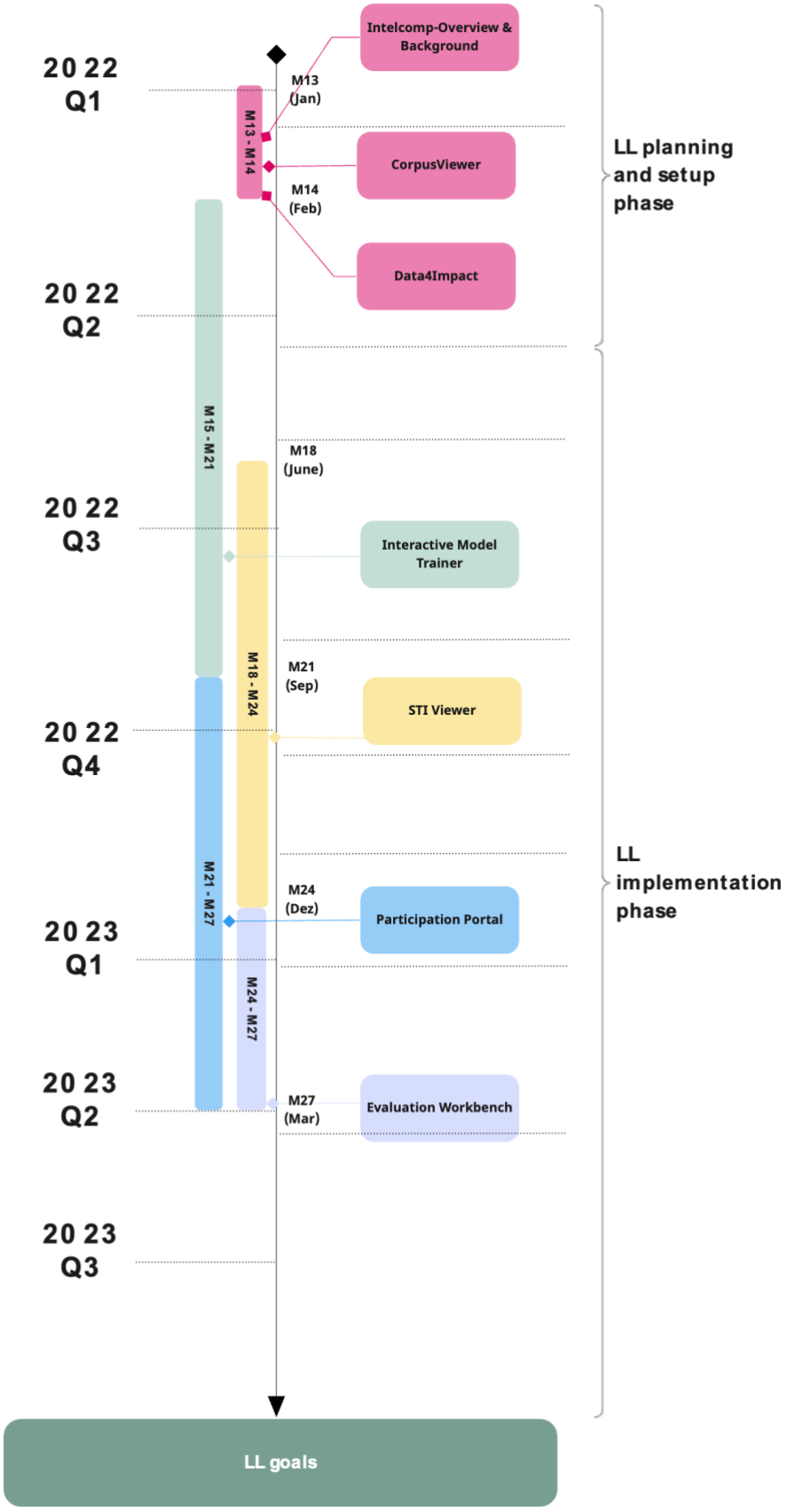
[4] Note that the list ordered chronologically, which reflects the work of the creation of the initial, preliminary list of stakeholders; the illustration keeps the stakeholder engagement at the centre and is flanked by the two other activities, because it is most central to the LL activities, in terms of required efforts. Also, stakeholders will be recruited on a continuous basis, i.e. the chronological order plays a negligible role.

| | |
|---|---|
|  | LL Roadmap is a visual representation of the major events planned for the labs' implementation. In parallel, it shows how those are connected and, in fact, aligned with the development process. Each roadmap is tailored to its LL in terms of the number, timing, and scope of the events, as well as their target audience.<br><br>The LL Roadmap serves as a guideline for the implementation process, as well as with communicating that process to third parties. |

## 3.3. Tailored Approach for Living Lab on Climate Change

IntelComp implemented **three distinctly different LL that are highly relevant for this day and age: AI, Cancer, and Climate Change**. Reflecting the common methodology, each LL – after a brief introduction, it states its primary goals, its initial set of policy questions, its stakeholder engagement strategy, its alignment with the technical developments, as Figure 2 shows, and finally the roadmap tailored to its planned setup. As stated in IntelComp D6.1 Living Labs Setup and Planning, the LL on Climate Change follows the approach of an LL (see Section 3.2).

**Figure 2: IntelComp Living Labs - overarching timeline**



# 4. LL CLIMATE CHANGE

## 4.1. LL Climate Change: Introduction

IntelComp proposes a framework for a co-creation ecosystem to make policies “with people”, seeking to bridge the gap in information flow and empower a broad group of stakeholders to actively participate in agenda-setting and policy-making, implementation, and monitoring. Instrumentally, Living Labs are proposed to implement this co-creation approach, engaging public policymakers, academia, industry, SMEs, local actors, civil society, and citizens to explore, experiment with and evaluate STI policies at all stages.

The Living Labs on Climate Change, which are run by ATHENA RC, will include two main elements: a real-life setting and a co-involvement process. The purpose of these Living Labs is to contribute to the innovation and development process, which is broken down in five sections, as follows:

1. Context research, where the participants investigate the context and focus areas (participatory living labs)
2. Discovery, where the participants are asked to provide insight into unexpected STI policy-based actions and new service opportunities provided by the IntelComp platform
3. Co-creation, where the users of the IntelComp platform are involved as co-creators
4. Evaluation, where the users evaluate and validate new solutions and services provided by the IntelComp platform
5. Technical testing, where the users experience technical testing in a (semi)realistic context of use.

## 4.2. LL Climate Change: Goals

The methodology used in the co-creation of tools is named a Design Thinking approach, which is linked to WP1 activities to understand and analyse the high-level needs (datasets and tools) of the Public Administrators (PAs) and the different stakeholders (Citizens, Academia, and Industry) and to implement the policy co-creation model. The central use case identified in Greece is supporting the Prime Minister High-Level Committee for Climate Change.

Based on the Living Labs classification of Leminen et al. (2012), there are four types of LLs, namely, utilizer-driven, enabler-driven living labs, provider-driven and user-driven living labs (see Figure 3). The work performed in Task 6.2. falls under the utilizer-driven categorization, the focus of which is defined as “developing and testing firm products and services”. Utilizers utilize living labs as a strategic tool to gather information on the users or user communities of their goods and services. In order to help the companies' long-term and short-term commercial development, user data on usage patterns, trends, and even rivals are gathered. The objective is to use assistance from people in the living lab's network to develop (or validate) new goods and services provided by the utilizer.

**Figure 3: Characteristics of different types of living labs (Leminen et al., 2012)**

| Characteristic | Type of Living Labs | | | |
|---|---|---|---|---|
| | *Utilizer-driven* | *Enabler-driven* | *Provider-driven* | *User-driven* |
| **Purpose** | Strategic R&D activity with preset objectives | Strategy development through action | Operations development through increased knowledge | Problem solving by collaborative accomplishments |
| **Organization** | Network forms around an utilizer, who organizes action for rapid knowledge results | Network forms around a region (regional development) or a funded project (e.g., public funding) | Network forms around a provider organization(s) | Network initiated by users lacks formal coordination mechanisms |
| **Action** | Utilizer guides information collection from the users and promotes knowledge creation that supports the achievement of preset goals | Information is collected and used together and knowledge is co-created in the network | Information is collected for immediate or postponed use; new knowledge is based on the information that provider gets from the others | Information is not collected formally and builds upon users' interests; knowledge is utilized in the network to help the user community |
| **Outcomes** | New knowledge for product and business development | Guided strategy change into a preferred direction | New knowledge supporting operations development | Solutions to users' everyday-life problems |
| **Lifespan** | Short | Short/medium/long | Short/medium/long | Long |

The Climate Change Living Labs aim to depict the Greek STI – Climate Change ecosystem starting with the Energy sector to optimise decision making. Thus, they aim to provide policy makers with information and insights on the impacts of the energy sector on climate change, looking into five areas, namely, science, industry, policy, environment, and society. To do so, the LL will seek to:

- increase the interest of the participants in the IntelComp platform ensuring that they will make use of this tool
- understand the role of the energy industry and policies relevant to the energy sector in the fight of climate change
- identify new technologies/innovations and how they affect policy making
- provide technology assessment and foresights
- assess the national plans as guides for policy actions
- make sure that the citizens are better informed, aware, and less resistant (especially in terms of Initiatives related to climate change technologies)

Through the Living Labs, the needs of the stakeholders will be identified, while regional, local and urban activities focusing on energy, legislation, policies, and major issues relevant to climate change will be recognised. This co-creation process will increase the interest of the participants to join the

platform, so that they will actively use it in the future, when the tools will be officially deployed. Through the Living Labs the following interlinkages are expected to be highlighted:

**Table 2: Living Lab Climate Change – tools, potential user groups, and key questions**

| | | |
|---|---|---|
| **Industry** (interests, needs, etc.) | Policies (regarding Climate Change) | What role does the Industrial sector play in policy formulation? |
| | Technology | How do the needs of industry affect the creation of new technologies? |
| **Society** (beliefs, acceptance, etc.) | Initiatives (regarding Climate Change) | Are new initiatives welcomed by the society (e.g. new RES establishments) |
| | Policies (regarding Climate Change) | Are new policies welcomed by society? |
| | Technology | How does society influence technology? Are new technologies emerging because o' people's choices? |
| **Technology** | Policies | How does technology influence policy-making? |
| | Industry | How does technology influence industrial development? |
| **Science** | Policies | How does science influence policy-making? |

To do so, the national and European legislature can be taken as guidance for policy actions.

## 4.3. Climate Change LL: Preparatory Living Lab (PLL)

Climate Change is a phenomenon that knows no national or regional limits. Its effects can be seen in both the natural and human spectra such as, human health, agriculture and food, forest fires, alterations in ocean salinity etc. On the one hand, human activities affect radically the progress of climate change and on the other hand, climate change progresses quickly, resulting in the need for climate adaptation and climate change mitigation measures. Considering the broad range of inputs, one should have to holistically develop a platform that will aid policy making related to climate change adaptation, the team of Climate Change LL has decided to begin earlier on the work, by utilising the Preparatory Living Lab approach. In total seven (7) workshops were organised, under the PLL, joining participants from the Mediterranean Sea, the Black Sea and the Caspian Sea to recognise the core needs of policy makers in these areas, list the different sources they use for their research and identify the focus area related to climate change.

The methodology used is explicitly presented in Section 3.2. The target groups of the PLL were stakeholders from the triangle of knowledge; namely, research, education, and innovation as well as from the civil society, private sector, and public and regulatory authorities from the Mediterranean, Black and Caspian Seas due to the fact that climate change as a phenomenon cannot be tackled only on a local basis-scale, as well as climate change policies are particularly affected by global trends and events.

The organisation of Preparatory Living Labs helped the team identify several sources and reports that could not be easily found without the help of the participants. It also aided in understanding the different ways countries approach climate change and it allowed the technical team to start working with the relevant data. Furthermore, the area that is found to be of great interest is the Energy sector, which will be the main focus of the Living Labs.

From June 2021 to February 2022, seven (7) workshops that were part of the Preparatory Living Lab aiming to unfold the main focus of the Climate Change case study of the IntelComp project took place, the results of which are presented below. In these workshops, stakeholders from both the Mediterranean and the Black-Caspian Seas took part (see Table 5), due to the fact that climate change cannot be addressed only locally and that policies drafted are particularly affected by global trends and events.

Participants were separated into two groups, with one group examining matters pertaining to the Black and Caspian Seas, and the other to the Mediterranean Sea, with the exception of the initial introductory workshop. The purpose of the initial workshop was to familiarise the attendees with the project's objectives and the consequences of climate change on marine ecosystems. In the subsequent two sessions, participants endeavoured to unravel the enigma pertaining to data mining, the foundational component of the platform. The participants engaged in a discourse regarding the accessibility and availability of widely utilised national, regional, and global datasets for policy analysis and research endeavours. Additionally, they exchanged national data sources that pertain to the maritime and marine domains. The objective of this phase of discovery was to comprehend the information and monitoring voids in Greece and its neighbouring countries.

As a result of this discourse, a consensus was reached regarding the definition and the foundation for subsequent analysis. In our particular case, it appeared that the majority of attendees

understood the gravity and intricacy of the data identification challenge and agreed with the majority of the numerous points and particulars presented throughout the Living Lab. The participants identified several shortcomings in the proposed data sources, including the absence of standardised file formats, daily and publicly available data, data validation procedures, accessible and dependable information, geospatial data, data on port facilities, and personnel possessing the requisite expertise to gather and analyse pertinent data.

In the 2nd and 3rd workshops, the energy and the agrifood sectors were identified as the principal areas of interest and with the greatest potential for exploitation as a response to climate change adaptation and mitigation. We also discussed the industrial side of the energy and agrifood sectors, unwrapping such things as how to integrate innovation into day-to-day business operations, where to find new research, how to remain current on evolving regulatory frameworks, and whether businesses have participated or not in EU-funded projects.

The 4th and 5th workshops, the energy sector was the focus of discussions, garnering significant attention from participants situated in the Mediterranean and Black Sea/Caspian Sea regions, with particular interest in offshore investments, emerging technologies, and wind power. They exchanged concerns regarding the identification of the optimal energy balance and the development of renewable projects, with an emphasis on the factors that must be considered when making energy investments. In the future, there is anticipated to be considerable interest in the evolution of the optimal blend in light of climate change, the impact of the seas, the development of new technologies, and infrastructure. The participants were afforded the opportunity to exchange viewpoints regarding LNG, hydrogen, methanol, ammonia, and nuclear energy, in addition to the analytical assessments that ought to be consulted prior to making investments in renewable energy sources such as solar, wind, geothermal, and hydropower.

The Agri-food sector, which comprises food production, distribution, and agriculture, and was the focus of the 6th and 7th workshops, is intricately connected to climate change in numerous ways. Participants highlighted the contribution of agriculture on greenhouse gas emissions, e.g. methane that is produced during digestion by livestock, the use of synthetic fertilisers also results in the emission of nitrous oxide, a highly potent greenhouse gas, and the operation of agricultural machinery, transportation, and food processing that utilise fossil fuels. They also showed interest in food security and distribution as well as in the strategies for adaptation and mitigation. Adaptive approaches encompass the utilisation of water-efficient irrigation methods, the adoption of climate-resilient crop varieties, and the modification of sowing schedules. Reducing greenhouse gas emissions via reforestation, enhanced land management, and sustainable agricultural practices constitutes mitigation strategies. Finally, they were also interested in getting insights regarding the mapping of the interplay between policy and innovation, the initiatives to reduce deforestation, the policies that promote sustainable agricultural practices, and the role of renewable energy in farming operations are all examples of measures taken to mitigate the sector's contribution to climate change.

The PLL facilitated the participants access to numerous resources and data that they might not have otherwise encountered and enhanced their understanding of the diverse strategies employed by other countries in their efforts to combat climate change. The energy and agrifood issues emerged as the subject of utmost significance in the area due to the research conducted in the PLL. In order

to facilitate better-informed decisions, the Living Lab on Adaptation to Climate Change intends to showcase the Greek STI-Climate Change ecosystem, focusing on the energy and the agrifood sectors. Consequently, their efforts are concentrated on the environment, society, science, industry, and policy in order to inform and enlighten decision-makers regarding the ramifications of these two areas on climate change.

In summary, the LL will endeavour to enhance participants' enthusiasm for the IntelComp platform, guarantee their utilisation of it, and educate them on the energy sector's contribution to climate change mitigation and any applicable regulations. Furthermore, they provide technological evaluations and projections, discern forthcoming advancements and technologies and their implications for policy formulation, and scrutinise national strategies that serve as the bedrock for policy choices to guarantee that the populace is more knowledgeable, vigilant, and receptive (particularly with regard to initiatives concerning climate change technologies).

## 4.4. LL Climate Change: Policy questions and data facilitation

LL on Climate Change is primarily focused on energy and secondarily on other aspects related to climate change, such as agriculture and food, transportation, manufacturing etc. Considering the broad aspect of climate change and the need for interdisciplinarity when tackling climate-related issues, the policy questions can be divided into two categories: 1. General Policy Questions that can be applied in all LL workshops and 2. Policy Questions specifically related to Climate Change. To identify the relative policy questions, the Policy Questions in Agenda Setting and the Evaluation Policy Questions developed by WP1 (D1.2) were used as a baseline. Furthermore, the abovementioned PLL waw delivered at the early stages of the project aiming to identify the preliminary needs and challenges of climate change and thus, the focus of the IntelComp platform. In the PLL, participants were mostly concerned regarding the optimal energy mix, the new technologies that are going to emerge, the accessibility of new innovative solutions as well as social accessibility of investments in RES. These initial concerns enabled the team of IntelComp to understand the leading role of energy in the wide sphere of climate change and so, target its focus on this thematic priority.

Policy Questions in Agenda Setting refer to the questions that reveal the situation of agenda setting in science, industry, environmental effects, and pathways in general. The identified questions regarding the agenda setting are presented in Table 3. The Evaluation Policy Questions refer to the impact policies have on society. Each question was connected to at least one core sector of climate change identified by the EU Taxonomy Report on Financing a Sustainable European Economy[5]. The questions referring to the Evaluation are presented in Table 4. The thematic areas regarding climate change adaptation are the following:

1. Electricity, gas, steam and air conditioning supply
2. Construction and Real Estate activities
3. Transportation and Storage
4. Water, sewerage, waste and remediation

[5] https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf

5. Manufacturing
6. Forestry
7. Agriculture
8. Information and Communication

The United Nations Environment Programme (UNEP) is focusing on six specific sectors regarding climate action: energy, industry, agriculture and food, forests and land use, transport, buildings and cities.

To collect the needs of the stakeholders, first we need to map the local, regional, national, and international initiatives on climate change and energy. These include policy documents (such as strategies and legislative tools), scientific documents, and innovation solutions, coming from the R&D of existing companies, start-ups and innovation projects.

**Table 3: Living Lab Climate Change – questions related to agenda-setting**

| Thematic (Climate Change) | Question related to the agenda setting |
|---|---|
| General | Are companies adapting to the sustainability trends in their respective sectors? How do they compare with major (international) competitors? |
| General | How many start-ups with a clear sustainability agenda were funded in the last three years? |
| General | Which companies are pioneers regarding climate resilience and climate action? |
| General | Are companies emerging, which gain international competitive advantages in technologies & actions related to climate change? |
| General/Energy | How many companies have issued Green Bonds? |
| General | Are scale ups leaving the country |
| General | Does the country/region/city attract entrepreneurial talent? |
| General | Who are the companies with persistent innovative activity in the country/macro-region/region/city? |
| General | In which R&D fields do the persistent innovators invest? |
| General | In which R&D fields is the highest share of all company R&D investments? |
| General | In which R&D fields is the country improving its revealed comparative advantage? |
| General | Which scientific fields demonstrate the highest growth in terms of publications/citations/patents globally? Distinction to be made between basic and applied research (distinction between interdisciplinary publications, basic research and applied research) |
| General | Which are the emerging interdisciplinary fields globally? |
| General | Which are the research teams in the country undertaking research in interdisciplinary fields? |
| General | Which are the research teams in the country undertaking research relevant to climate change mitigation measures and climate action in interdisciplinary fields? |
| General | Which knowledge diffusion channels work best in good practices per discipline at international level? |
| General | How many climate innovation hubs operate nationally per discipline? |
| General | Which climate innovation hubs operate nationally per discipline? |

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| General | What are the cross sectoral or cross technological collaborations occurring and among which actors? |
| General | What are the cross sectoral or cross technological collaborations related to climate occurring and among which actors? |
| General | To which global, EU societal challenges are research groups contributing? |
| General | To which global, EU environmental challenges are research groups contributing? |
| General | To which EU policy implementation regarding the environment are research groups contributing?<br>(e.g. Marine Policy, EU Green Deal, etc) |
| General | To which global, EU societal challenges are research groups contributing? |
| General | Are there specific national/macroregional societal challenges? |
| General | What is the content of policy papers related to the environment in general and climate change in particular? |
| General | What are the national/regional financial resources available in the country? Are there opportunities for EU financing related to Climate Action? |
| General | Is private funding utilised in actions regarding climate change adaptation and mitigation? |
| General | What is the public opinion regarding climate change? |
| General | What is the role of the press in topics addressed in policy objectives |
| General | Is resistance expected? Where? Why? How? |

**Table 4: Living Lab Climate–Change - questions related to evaluation**

| Thematic (Climate Change) | Questions related to the evaluation |
|---|---|
| Building Sector | How many people (technicians) were upskilled in the building sector in general? |
| Building Sector | How many citations in publications are associated with new technologies deployed in the building and urban planning sector? |
| Energy | What are the latest trends followed in the energy sector with respect to energy production? |
| Energy | What is the optimal energy mix? / Which factors affect the decision of the optimal energy mix? |
| Energy | How many patents were licensed in the field of energy innovation and in the energy sector in general? |
| Energy | What is the reduction of energy poverty in percentile and absolute values? |
| Energy | How many patents were produced (applications/grants) in the European Patent Office and in the US PTO related to the energy sector? |
| Energy | What innovations were developed by companies related to the energy sector? |
| Energy | How many people (technicians) were upskilled in the renewable energy sites? |
| Energy | How many citations in publications are associated with new technologies deployed in the energy sector? |
| Energy | Which are the Energy Producers per energy source in Greece? |
| Energy | Which are the Energy Suppliers in Greece? |
| Energy | What is the size of these companies in terms of sales revenues, market share and number of employees? |
| Energy | What is the status of the state-of-the-art research on the energy sector? |

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|---|---|
| Energy | Which technologies are used by the energy companies in Greece? |
| Energy | Which of the energy companies have a recorded innovation activity? If yes, when? |
| Energy | Which of the energy companies have R&D? If yes, what are the focus areas of their R&D? |
| Energy | Which of the energy companies have participated in innovation projects (funded from EU, National and Private funds)? If yes, what is their role in the project? |
| Energy | Which of the energy companies have applied for a patent (national or EU registry)? If yes, what type of patent? |
| Energy | How does the innovation activity of the companies relate to the science mapping? |
| Energy | Which companies produce an ESG report? |
| Energy | Do companies measure their Environmental and Social footprint? |
| Energy | Which of the companies collaborate with external institutions/NGOs etc? |
| Energy | What are the societal impacts of citizens on the energy trends? |
| Energy | Which EU policies are related to Energy? |
| Energy | Which EU policies are related to Energy in Greece? |
| Energy | Which local and regional policies are related to Energy in Greece? |
| Energy | How much does society accept an investment related to energy (wind power, solar power, oil production)? |
| Energy | How does the energy mix correlate with job creation? |
| Energy | What is the legal framework for an energy investment in Greece? |
| Energy | What are the economic incentives for investing in RES? |
| Energy | What are the environmental constrictions regarding energy? |
| Energy | What is the willingness to pay for greener energy? |
| Food Production | How many patents were licensed in the field of food production in general? |
| Food Production | How many patents were produced (applications/grants) in the European Patent Office and the US PTO related to the Food and Agriculture Sector? |
| Food Production | How many people (technicians) were upskilled in sustainable fisheries? |
| Food Production | How many people (technicians) were upskilled in food production and agriculture in general? |
| Food Production/Transport | How many patents were licensed in the field of maritime (shipping, ports, fisheries) in general? |
| Food Production/Transport | How many patents were produced (applications/grants) in the European Patent Office and the US PTO related to the Maritime Sector? |
| Food Production/Transport | What innovations were developed by companies related to the maritime sector? |
| Food Production/Transport | How many people (technicians) were upskilled in sustainable maritime practices? |
| Food Production/Transport | How many citations in publications are associated with new technologies deployed in the maritime field? |
| Food Production/Transport | How many citations in publications are associated with new technologies deployed in food production and agriculture? |
| Forests and Land Use | How many citations in publications are associated with new technologies deployed in forests and land use? |
| General | How many patents were used in-house? (EU & per country/per region) |
| General | What royalties did patents produce? |
| General | What was the uptake of scientific results in patents? |
| General | What were the social returns on investments? |

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|---|---|
| General | How many climate-oriented start-ups were developed in the last decade? |
| General | What innovations were developed by research centres on sustainability? |
| General | What innovations were developed by research centres on socioeconomics? |
| General | What innovations were developed by research centres on climate change? |
| General | What innovations were developed by research centres on the blue economy? |
| General | What innovations were developed by research centres on blue growth? |
| General | What is the total public funding regarding climate action mobilised? |
| General | What were the private returns on investment in the field of climate action? |
| General | What were the private returns on investment in the field of climate action? |
| General | How many jobs were created by renewable energy sites? |
| General | How many jobs were created from sustainable maritime practices? |
| General | How many jobs were created for sustainability officers in ports and public authorities? |
| General | How many jobs were created from sustainable fisheries? |
| General | How many research activities are focused on topics such as: climate change, new energy technologies, sustainable fishing and maritime, eco-transport, food production, industry, forest and land use, buildings and cities? |
| General | How many scientific publications have been diffused/simplified in public journals (e.g. economist, times, guardian, etc)? |
| General | How many research projects per country and per thematic area (Energy, Industry, Agriculture and Food, Transport, Forest and Land Use, Buildings & Cities) were funded at a national and EU level? |
| Transport | How many people (technicians) were upskilled in sustainability among officers in ports and public authorities? |

## 4.5. LL Climate Change: Stakeholders mapping and engagement

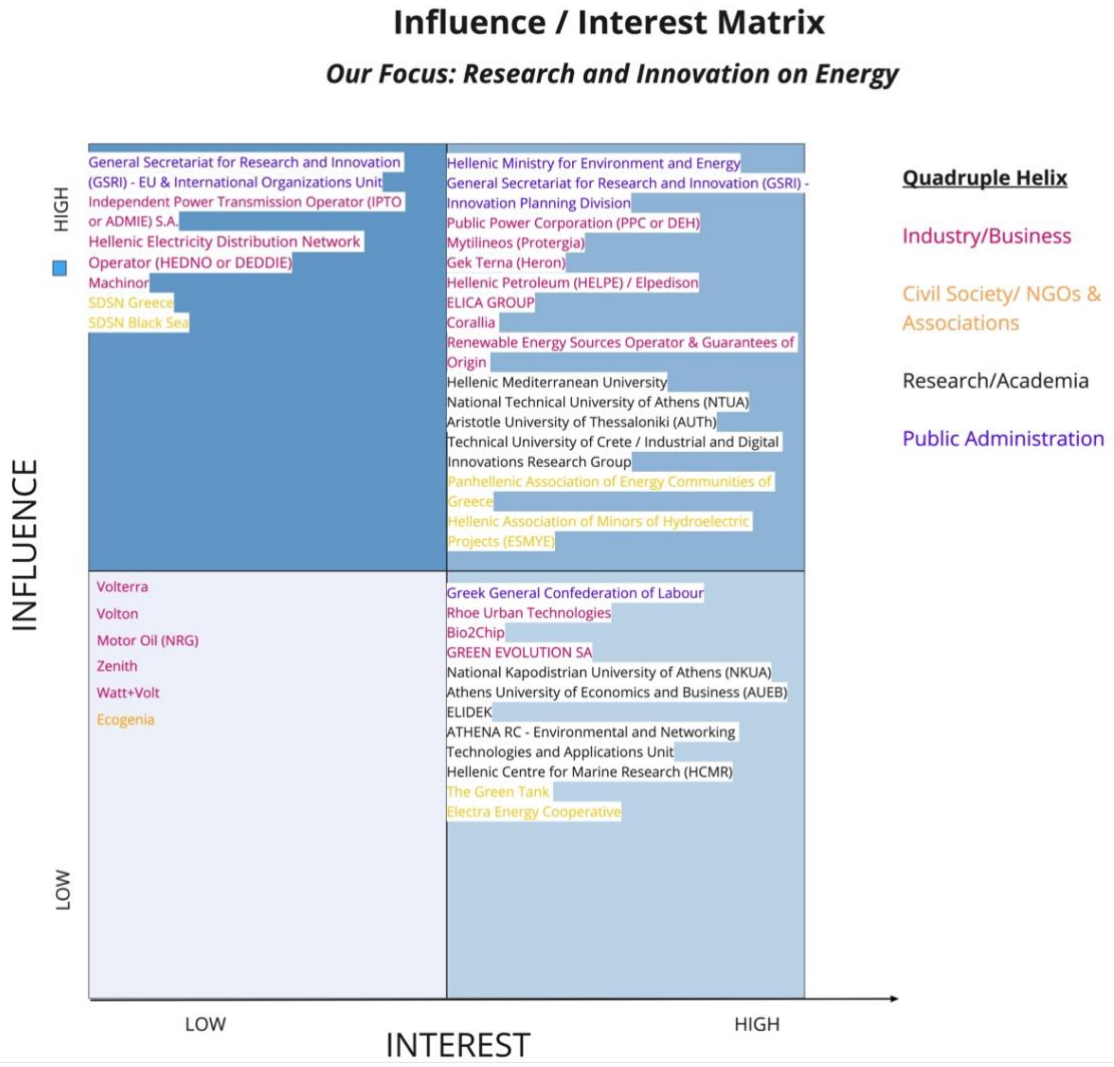
Living labs comprise four key actors, as follows (Leminen et al., 2016; see Figure 3):

- Enablers refer to the organisations that make it all possible, those that enable the activities of living labs and support them by promoting them or allocating financial backing or space for living labs. Enablers could be public actors, financiers, or non-governmental organisations (such as towns), municipalities, and regional development organisations.
- Providers, meanwhile, are development organisations such as educational institutes, universities, or consultants that bring knowledge and expertise, as well as innovation support activities
- Users represent the citizens or end customers, and they are active or passive actors that participate in living labs in various roles.
- Utilisers are the public or private organisations that will benefit from the results of innovation activities in many ways

First, we mapped the stakeholders per sector and type and created an extensive list of stakeholders relevant to the goals of the Climate Change Living Labs (one map for the Energy and one for the Agri-food sector). We used the Quadruple Helix (Industry/Business, Civil Society/ NGOs & Associations, Research/Academia, and Public Administration) to group the stakeholders. Then, we shortlisted this stakeholder mapping using tools, such as the influence-interest matrix (see Figure

4)' where 'influence' refers to how much power and capacity a stakeholder has to affect change, and 'interest' refers to how likely a stakeholder is to participate in activities or initiatives relevant to the case study's subject; this could be owing to a positive or negative impact (Eden and Ackermann, 1998). An external expert validated the map after it was plotted.

**Figure 4: Living Lab Climate Change: influence/interest matrix for the Energy sector**




This matrix enables the WP6 team, in partnership with experts and scientific advisers from Greece, to assess each stakeholder's position in relation to these two criteria to decide which sub-group of stakeholders is best suited to participate in the Living Labs. The core set of stakeholders from which the LL members will be chosen is those in the upper right quadrant (strong influence/high interest) (see Table 7 below). However, stakeholders from the top left and bottom right quadrants (i.e. high influence/low interest and low influence/high interest, respectively) are also considered, as the former group includes stakeholders who may be critical in implementing potential recommendations, and the latter group includes stakeholders with vast amounts of local knowledge but generally lacking in decision-making power (often the voices less heard).

Then, we highlighted in white colour the stakeholders who got invited to participate in the thematic workshops, i.e., those mapped for the energy sector (Figure 7) were invited either to the workshop

that took place on 12th of December 2022 and/or the one that took place on 3rd of Match 2023. This method of LL participant selection provides for the identification of stakeholders who are most interested in the work and are most likely to participate in the research process. While it is beneficial to use the LL to engage powerful decision-makers, examining 'interest' also enables the identification of those stakeholders who will devote time and effort to supporting the study (Brugha and Varvasovszky, 2000; Mendelow, 1981). Table 5 shows the stakeholders (on an institutional level, as participation feedback is anonymous) who attended each workshop (both for the PLL and the LL). These are the stakeholders who responded positively to our invitation to attend the LL workshop(s).

## Table 5: Climate Change Living Lab – Attendance (on an institution level)

| Date of Living lab | Preparatory or Regular | # Public administrators (ENABLERS) | organisations represented | # Industry participants (UTILISERS) | organisations represented | # NGO participants (USERS) | organisations represented | # Academic participants (PROVIDERS) | organisations represented | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 28 June 2021 (13-15 EEST) Kick-off | Preparatory | 4 | 1) European Commission, Belgium<br>2) General Secretariat of Research and Innovation, Greece<br>3) General Secretariat of the Government - Department of Sustainable Development, Romania<br>4) Project Office of the Prime-Minister of Kazakhstan, Kazakhstan | 3 | 1) Machinor, Greece<br>2) Solmeyea, Greece<br>3) Solar Power Association of Qazaqstan, Kazakhstan | 6 | 1) Conference of Peripheral Maritime Regions (CPMR), Belgium<br>2) Ecogenia, Greece<br>3) SDSN Europe, France<br>4) SDSN Greece, Greece<br>5) SDSN Black Sea, Greece<br>6) SDSN Kazakhstan, Kazakhstan | 32 | 1) Academy of Economic Science of Moldova, Republic of Moldova<br>2) Aristotle University of Thessaloniki, Greece<br>3) ATHENA RC, Greece<br>4) Athens University of Economics and Business (AUEB), Greece<br>5) Ban Ki-moon institute for sustainable development at KazNU, Kazakhstan<br>6) Basque Centre for Climate Change (BC3), Spain<br>7) Centre for Social Innovation, Belgium<br>8) Eurac Research, Italy<br>9) Hellenic Centre for Marine Research (HCMR), Greece<br>10) ICFAI Foundation for Higher Education (IFHE), Deemed University - Department of Economics, IBS Hyderabad, India<br>11) KWR Water Research, Netherlands<br>12) National Technical University of Athens (NTUA), Greece<br>13) Nazarbayev University, Kazakhstan<br>14) The Cyprus Institute, Cyprus<br>15) Università di Cagliari<br>16) Environment University of Plymouth, UK<br>17) University of Santiago de Compostela, Spain<br>18) UiT the Arctic University of Norway, Norway<br>19) Yeditepe University, Turkey | 45 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 30 Jul 2021 (13-15 EEST) | Preparatory | 3 | 1) European Commission, Belgium<br>2) General Secretariat of Research and Innovation, Greece<br>3) Ministry of Education, Research and Youth, Romania | 2 | 1) Rhoe Urban Technologies, Greece<br>2) Solmeyea, Greece | 2 | 1) Black Sea Universities Network, Romania<br>2) HELMEPA, Greece | 18 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Hellenic Centre for Marine Research, Greece<br>5) INRGREF, Tunisia<br>6) National Technical University of Athens (NTUA), Greece<br>7) Università di Cagliari, Italy<br>8) University of Santiago de Compostela, Spain<br>9) University of Siena, Santa Chiara Lab, Italy<br>10) Yeditepe University, Turkey | 25 |
| 08 Oct 2021 (12-14 EEST) | Preparatory | 0 | N/A | 0 | N/A | 1 | 1) SDSN Kazakhstan, Kazakhstan | 13 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Ban Ki-moon institute for sustainable development at KazNU, Kazakhstan<br>6) İstanbul Bilgi University, Turkey<br>7) Nazarbayev University, Kazakhstan<br>8) Environmental Centre for Central Asia, Kazakhstan | 14 |
| 29 Oct 2021 (12-14 EEST) | Preparatory | 1 | 1) Ministry of Energy and Environment, Greece | 0 | N/A | 1 | 1) Black Sea Universities Network, Romania | 10 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Spain's National Foundation for Science and Technology (FECYT), Spain<br>5) Technical University of Crete / Industrial and Digital Innovations Research Group, Greece<br>6) Universitat Autònoma de Barcelona (UAB), Spain | 12 |
| 17 Dec 2021 (10-12 EEST) | Preparatory | 0 | N/A | 1 | 1) Agora Partners, Israel | 2 | 1) SDSN Black Sea, Greece<br>2) SDSN Kazakhstan, Kazakhstan | 12 | 1) Academy of Economic Science of Moldova, Republic of Moldova<br>2) Aristotle University of Thessaloniki, Greece<br>3) ATHENA RC, Greece<br>4) Athens University of Economics and Business (AUEB), Greece<br>5) Ban Ki-moon institute for sustainable development at KazNU, Kazakhstan<br>6) İstanbul Bilgi University, Turkey<br>7) Nazarbayev University, Kazakhstan | 15 |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 8) Environmental Centre for Central Asia, Kazakhstan<br>9) The Fagaras Research Institute - Center on Global Affairs and Post-development, Roma<br>10) Environment University of Plymouth, UK | |
| 28 Jan 2022 (10-12 EEST) | Preparatory | 2 | 1) General Secretariat of Research and Innovation, Ministry of Development Greece<br>2) Ministry of Development & Investments, Greece | 1 | 1) Thalassa Foundation, Switzerland | 5 | 1) Blue Growth, Greece<br>2) Solutions Power Partner (SPP), Lebanon<br>3) SDSN Greece, Greece<br>4) SDSN Black Sea, Greece | 12 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Basque Centre for Climate Change (BC3), Spain<br>5) Environmental Centre for Central Asia, Kazakhstan<br>6) Uit, The Arctic University of Norway, Norway<br>7) Yeditepe University, Turkey | 20 |
| 25 Feb 2022 (12-14 EEST) | Preparatory | 1 | Country Ambassador | 0 | N/A | 4 | 1) Association of environmental organizations of Kazakhstan, Kazakhstan<br>2) Black Sea Universities Network, Romania<br>3) SDSN Kazakhstan, Kazakhstan | 22 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Ban Ki-moon institute for sustainable development at KazNU, Kazakhstan<br>5) Institutul Național de Cercetare – Dezvoltare pentru Geologie și Geoecologie Marină, Romania<br>6) Lund University, Sweden<br>7) Nazarbayev University, Kazakhstan<br>8) Environmental Centre for Central Asia, Kazakhstan<br>9) Scientific and Technological Research Council of Turkey (TÜBİTAK), Turkey<br>10) TEPAV \| Economic Policy Research Foundation of Turkey, Turkey<br>11) University of National and World Economy, Bulgaria | 27 |
| 12 Dec 2022 (10-12 EEST) | Regular | 0 | N/A | 4 | 1) Elpedison<br>2) Hellenic Small Hydropower Association<br>3) Renewable Energy | 3 | 1) Electra Energy Cooperative<br>2) SDSN Greece, Greece | 10 | 1) Aristotle University of Thessaloniki, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece | 17 |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Sources Operator & Guarantees of Origin (DAPEEP SA)<br>4) Squaredev BV | | 3) SDSN Black Sea, Greece | | 4) Hellenic Centre for Marine Research (HCMR), Greece<br>5)–ELIDEK - HFRI Research Department, Greece | |
| 3 Mar 2023 (10-12 EEST) | Regular | 6 | 1) European Commission - Directorate-General for Research and Innovation. Unit B6. Common Data and Knowledge Management Service, Brussels<br>2) Hellenic Ministry for Environment and Energy, Greece<br>3) General Secretariat for Research and Innovation–(GSRI) - Innovation Planning Division, Greece<br>4) General Secretariat for Research and Innovation–(GSRI) - EU & International Organizations Unit, Greece<br>5) Greek General Confederation of Labour, Greece | 1 | 1) Renewable Energy Sources Operator & Guarantees of Origin, Greece | 2 | 1) The Green Tank, Greece<br>2) SDSN Greece, Greece | 6 | 1) ATHENA RC, Greece<br>2) Athens University of Economics and Business (AUEB), Greece<br>3) Hellenic Mediterranean University, Greece<br>4) Universidad Politécnica de Madrid, Spain | 15 |
| 6 Jun 2023 (12-14 EEST) | Regular | 1 | 1) OECD -Directorate of Science, Technology and Innovation (STI), Science Technology Policy (STP) Division, EU | 0 | N/A | 3 | 1) Foodscale Hub, Greece<br>2) SDSN Greece, Greece<br>3) SDSN Black Sea, Greece | 9 | 1) American Farm School, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Hellenic Agricultural Organization ”DEMETER", Greece<br>5) Hellenic Agricultural Organisation (HAO) - Soil and Water Resources Institute (SWRI), Greece<br>6) NTT DATA, Spain<br>7) University of Pisa, Italy | 13 |
| 5 Oct 2023 (12-14 EEST) | Regular | 1 | 1) General Secretariat for Research and Innovation (GSRI), Ministry of Development, Greece | 0 | N/A | 2 | 1) Foodscale Hub, Greece, 2) SDSN Greece, Greece<br>2) SDSN Black Sea, Greece | 6 | 1) American Farm School, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>3)–ELIDEK - HFRI Research Department, Greece<br>4) Hellenic Mediterranean University, Greece | 10 |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 5) Spanish Foundation for Science and Technology, Spain | |
| 20 Nov 2023 (17:45-18:30 EEST) | Training workshops (2) | 1 | 1) General Secretariat for Research and Innovation (GSRI), Ministry of Development, Greece | 12 | 1) DINTELLO Consulting, Greece<br>2) Ferro, Greece<br>3) ICL Group<br>4) KENICO, Greece<br>5) MONDELEZ international, Greece<br>6) Opix, Greece<br>7) Piraeus Bank<br>8) Symbiolabs Circular Intelligence, Greece<br>9) Business Daily.gr (journal)<br>10) Epixeiro.gr (journal)<br>11) Insider.gr (journal)<br>12) Kathimerini.gr (journal) | 3 | 1) Energizing Greece<br>2) HELISS, Greece<br>3) Minoan Energy, Greece | 12 | 1) Agricultural University of Athens, Greece<br>2) ATHENA RC, Greece<br>3) Athens University of Economics and Business (AUEB), Greece<br>4) Culturepolis, Greece<br>5) Hellenic Center of Marine Research, Greece<br>6) Hellenic Mediterranean University, Greece<br>7) National and Kapodistrian University of Athens (NKUA), Greece<br>8) National Observatory of Athens, Greece<br>9) University of Aegean, Greece<br>10) University of Crete, Greece<br>11) University of Patras, Greece<br>12) University of West Attica, Greece | 28 |

## 4.6. LL Climate Change: Alignment with technical development

The Climate Change LL Team worked closely with WP2 and WP3 teams to understand how the extraction of the relevant data will occur and the relevant KPIs will be identified. Specifically, regarding policy questions, meetings between WP1 and CC LL Team took place to see which of the identified WP1 domain-agnostic policy questions could be used for CC LL. Within this framework, several policy questions have been altered and new questions have been added, as presented in Subsection 4.4.

Moreover, during the ATHENA technical meeting in March 2022, a fully studied case study was showcased referring to the Energy Sector in Greece. Specifically, the State-of-Play of the Energy Sector in Greece was presented along with relevant questions and how they can be addressed, including the relevant KPIs, as follows.

**Table 6: Living Lab Climate Change - key questions and sources**

| Question | Sources/Comments |
|---|---|
| **Which are the players of the Energy Sector in Greece?** | |
| Which are the Energy Producers per energy source in Greece? | Electric Power Generation, Transmission and Distribution companies in Greece: https://www.dnb.com/business-directory/company-information.electric_power_generation_transmission_and_distribution.gr.html?page=1<br><br>Mining, Quarrying, And Oil and Gas Extraction Companies in Greece: https://www.dnb.com/business-directory/company-information.mining_quarrying_and_oil_and_gas_extraction.gr.html?page=1<br><br>ADMIE Report Dec 2020: https://www.admie.gr/sites/default/files/attached-files/type-file/2021/01/Energy_Report_202012_v1_0.pdf |
| Which are the Energy Suppliers in Greece? | Electric Power Generation, Transmission and Distribution companies in Greece: https://www.dnb.com/business-directory/company-information.electric_power_generation_transmission_and_distribution.gr.html?page=1<br><br>Natural Gas Distribution Companies in Greece: https://www.dnb.com/business-directory/company- |

| | |
|---|---|
| | information.natural_gas_distribution.gr.html?page=1<br><br>ADMIE Report Dec 2020: https://www.admie.gr/sites/default/files/attached-files/type-file/2021/01/Energy_Report_202012_v1_0.pdf |
| What is the size of these companies in terms of sales revenues, market share and number of employees? | Actual sales revenue, number of employees per company, market share in Greece (same sources as above) |
| **Technological Innovation System (TIS) of Greece** | |
| What is the status of the state-of-the-art research on the energy sector? | Scientific Documents on energy from the last 5 years |
| Which technologies are used by the energy companies in Greece | Mapping and classification of the companies based on the technical taxonomy for energy |
| Which of the energy companies have a recorded innovation activity? If yes when? | European innovation scoreboard 2021 per sector (not per company): https://ec.europa.eu/info/research-and-innovation/statistics/performance-indicators/european-innovation-scoreboard_el<br><br>Eco-Innovation in Greece (2018): https://ec.europa.eu/environment/ecoap/sites/default/files/field/field-country-files/eio_country_profile_2018-2019_greece.pdf |
| Which of the energy companies have R&D? If yes, what are the focus areas of their R&D? | Research and Development Expenditure and Personnel in Greece in 2018 – Main Indicators: https://metrics.ekt.gr/en/publications/421<br><br>Research and Development Expenditure and Personnel in Greece in 2018 – Preliminary Data: https://metrics.ekt.gr/en/publications/357 |
| Which of the energy companies have participated in innovation projects (funded by EU, National and Private Funds)? If yes, what is their role in the project? | European Commission - Funding & tender opportunities – Partner search: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/partner-search |
| Which of the energy companies have applied for a patent (national or EU registry)? If yes, what type of patent? | European Patent Office: https://www.epo.org/index.html<br>Greece Patent Office: http://www.obi.gr/obi/Default.aspx?tabid=125 |
| **Social impacts on the energy trends** | |

| | |
|---|---|
| Which of the scanned corporations produced an ESG report? | Check for ESG reports at the website of each company<br>Examples:<br>https://www.mytilineos.gr/interactive-document/csr-report-2019-eng/html/files/assets/common/downloads/Sustainable%20Development%20Report%202019%20.pdf?uni=5a262165ab6f74a39130ad34697d0930<br>https://www.dei.gr/media/ocvffrzl/ppc2020sr-en-20220202-2146.pdf<br>https://www.moh.gr/wp-content/uploads/2020/06/Sustainability-Report-Motor-Oil-2019.pdf |
| Do companies measure their Environmental and Social footprint? | Scan ESG and CSR Reports |
| Which of the companies collaborate with external institutions/NGOs etc? | Scan ESG and CSR Reports |
| What is the societal impact of citizens on the energy trends? | Collect data via Twitter |

Considering the above and, after closely studying the found sources, Key Performance Indicators (KPIs) were identified to granulate the needed information. Indicatively, identified KPIs include:

| **Key Performance Indicators (KPIs)** |
|---|
| • Graph with energy producers and energy suppliers in Greece per size of the company and per source of energy<br>• Share of companies with innovation activity per sector and time<br>• Share of companies with R&D Department per sector and time<br>• Share of companies that participated in innovation projects per sector and time<br>• Share of companies that have applied for a patent per sector and time<br>• Share of companies that produce an ESG report per sector and time<br>• Share of companies that collaborate with external institutions/NGOs per sector and time |

The above analysis, the questions and the sources identified were investigated by the technical development team under the prism of climate change and energy. Furthermore, research on patents regarding the RES field and the identification of technological and scientific advancements that are used/are planned to be used in Greece was undertaken.

Ultimately, the presented desk work, which has set the framework in the Energy sector, has opened the road for a similar approach to be followed in the Agri-food Sector. Specifically, the identified KPIs were generalised as such:

- Graph with companies in the Agri-food sector per market share
- Share of companies with innovation activity per sector and time
- Share of companies with R&D Department per sector and time
- Share of companies that participated in innovation projects per sector and time
- Share of companies that have applied for a patent per sector and time
- Share of companies that produce an ESG report per sector and time
- Share of companies that collaborate with external institutions/NGOs per sector and time

To further help the technical team, LL Climate Change also undertook Desk Research about the data sources and the categorisation of the Agri-food sector, through a holistic approach of the sector, which considers all its aspects:

- Sustainable Food Production, involving data on practices that are environmentally friendly, economically viable and socially fair
- Sustainable Food Processing and Distribution, referring to the transformation of raw agricultural products into foods and their distribution
- Sustainable Food Consumption, involving consumer choices
- Food Loss and Waste Prevention, regarding the strategies used to reduce the amount of food that is discarded or lost along the supply chain.

## 4.7. LL Climate Change: Roadmap

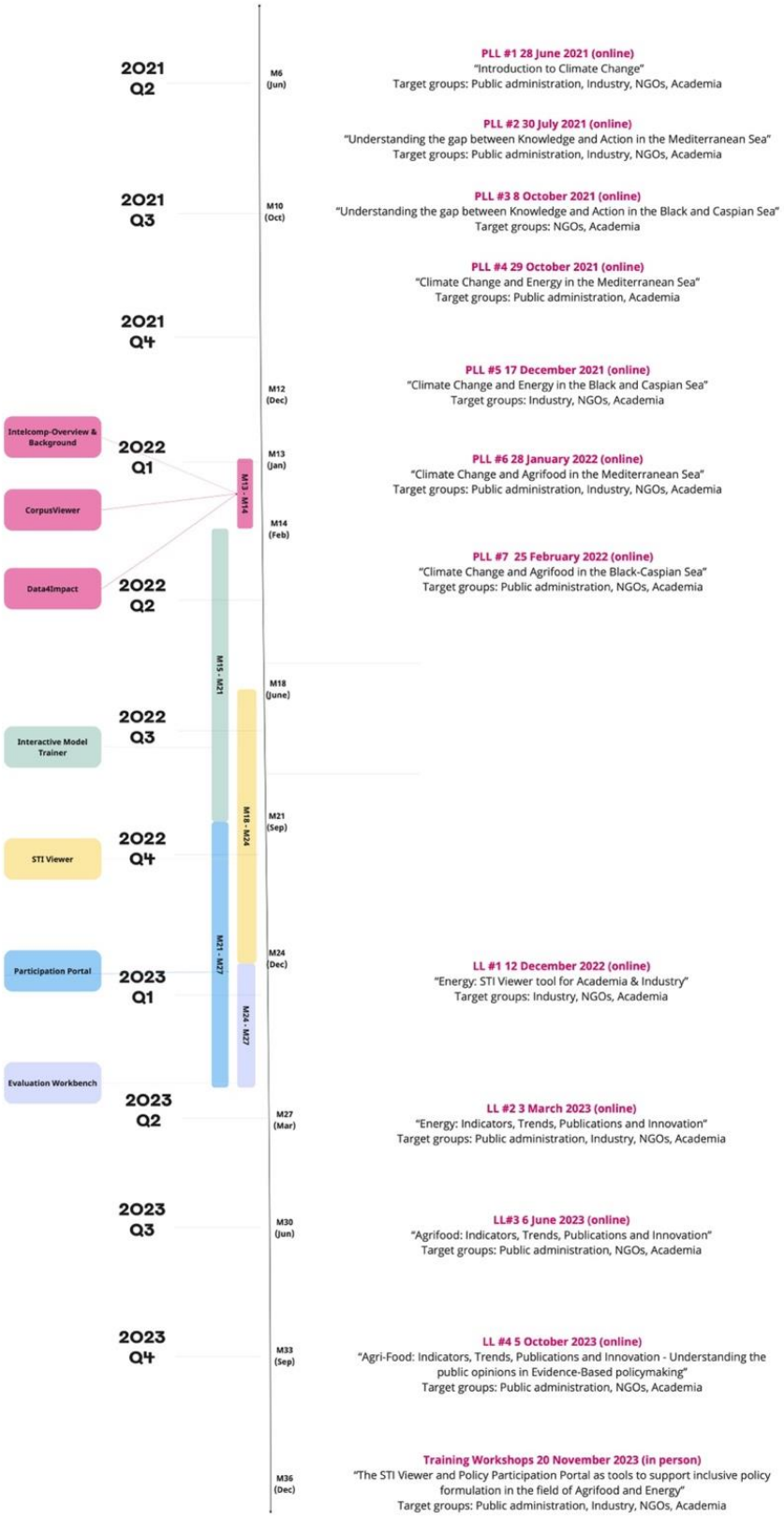
From June 2021 until February 2022, a series of workshops under the Preparatory Living Lab in the Mediterranean, the Black and Caspian Seas were organised aiming to feed into the first stage of the innovation and development process, the Context research (see Section 4.1). Table 7 presents all workshops as described in the previous sections, while Figure 5 presents a timeline with these workshops.

**Table 7: Living Lab Climate Change - All workshops [in Green are the Preparatory LL workshops and in blue colour the LL workshops]**

| | | |
|---|---|---|
| **28 June 2021 – PLL#1**<br>"Introduction to Climate Change" (online) | **30 July 2021 – PLL#2**<br>"Understanding the gap between Knowledge and Action in the Mediterranean Sea" (online) | **8 October 2021 – PLL#3**<br>"Understanding the gap between Knowledge and Action in the Black and Caspian Sea" (online) |
| **THE ENERGY & AGRI-FOOD SECTORS** | | |
| **29 October 2021 – PLL#4**<br>"Climate Change and Energy in the Mediterranean Sea" (online) | **17 December 2021 – PLL#5**<br>"Climate Change and Energy in the Black and Caspian Sea" (online) | **28 January 2022 – PLL#6**<br>"Climate Change and Agri-food in the Mediterranean Sea" (online) |
| **25 February 2022 – PLL#7**<br>"Climate Change and Agri-food in the Black-Caspian Sea" (online) | **12 December 2022 – LL#1**<br>"Energy: STI Viewer tool for Academia & Industry" (online) | **3 March 2023 – LL#2**<br>"Energy: Indicators, Trends, Publications and Innovation" (online) |
| **6 June 2023 – LL#3**<br>"Agri-food: Indicators, Trends, Publications and Innovation" (online) | **5 October 2023 – LL#4**<br>"Agri-food: Indicators, Trends, Publications and Innovation - Understanding the Public Opinions in Evidence-Based policymaking" (online) | **20 November 2023 – 2 Training Workshops**<br>"The STI Viewer and Policy Participation Portal as tools to support inclusive policy formulation in the field of Agri-food and Energy" (in person) |

From December 2022 until November 2023, 4 Living Lab workshops were organised on the topics of Energy and Agri-food aiming to unravel the gaps and needs of the various stakeholder groups from an early stage and take them into account during the development of the IntelComp platform. Then, two training workshops, one for the energy and one for the Agri-food, were provided as part of the IntelComp Info Day in Athens (20 November 2023), aiming to evaluate and validate new solutions and services provided by the IntelComp platform and allow the users to experience a technical testing in a (semi)realistic context of use.

**Figure 5: LL Climate Change – Timeline of preparatory and Living Lab workshops**



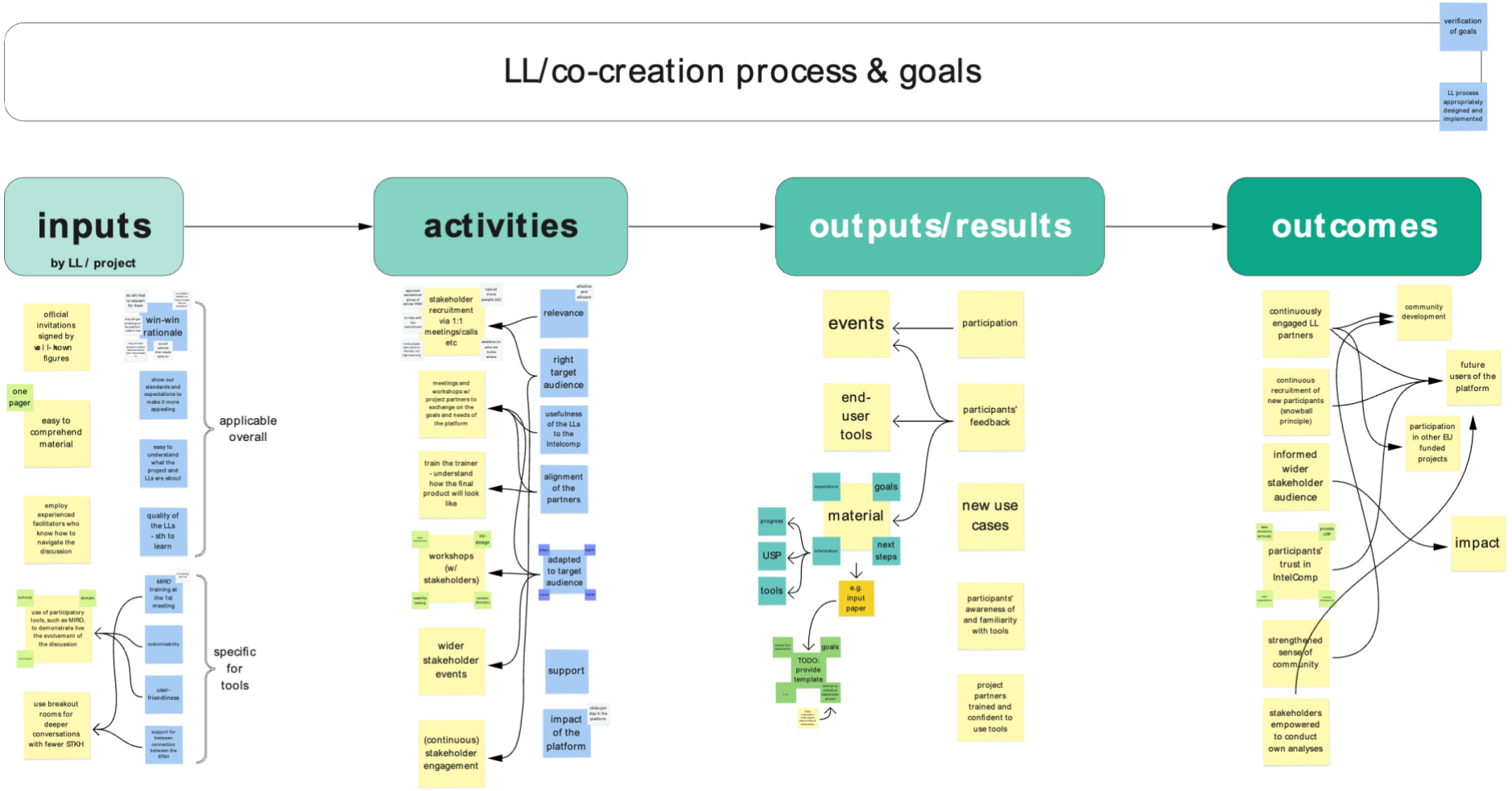
## 4.8. Potential Monitoring of the LL implementation

To ensure the implementation of the LL, within the works of WP6, a framework was created, that describes the overall process of the organisation of each LL and acts as a general guide. The Living Lab was divided into four (4) main processes/pillars:

- Inputs, which include the activities and the tools used to get in touch with the potential Stakeholders and engage them. For example, the following are categorised as "inputs":
    - Official invitations by esteemed and well-recognised researchers
    - Short brochures/One-pagers with easy to comprehend material
    - Experienced facilitators who know how to navigate the discussion
    - Use of participatory tools (e.g. MIRO) to demonstrate live the evolvement of the discussion
    - Breakout rooms (if needed) for deeper conversations with fewer Stakeholders
- Activities, which refer to the activities of the actual workshops taking place within the LL and how participants will stay in touch with the LLs. These include:
    - Stakeholder recruitment via e-mails and 1:1 calls
    - Meetings with the technical team to discuss and understand on how the final product will look like
    - Workshops with the stakeholders to present the progress of the project, identify their requirements, enable the co-design process of the tools and test their usability
    - Wider stakeholder events (e.g. Info Days)
    - Stakeholder engagement (continuous)
- Outputs/Results, which include:
    - The opinions expressed by the Stakeholders, granulated to be communicated to the Technical Team (participants' feedback)
    - The developed tools
- Outcomes, which refers to the aftermath of the Living Labs
    - Continuously engaged Living Lab partners
    - Continuous recruitment of new participants
    - Informed wider Stakeholder Audience
    - Stakeholders' trust in the Project
    - Strengthened sense of community
    - Stakeholders empowered to conduct their own analyses using IntelComp tools

The above were depicted in the graph below, developed in MIRO.

**Figure 6: Mapping of potential factors for the monitoring of the LL implementation**



# 5. LIVING LAB RESULTS

Stakeholders are more inclined to share feedback when they can clearly see that the demonstrator is a work in progress, rather than a nearly complete product, as the engagement and request for input is perceived as more genuine - with stakeholders actively collaborating in the development process, rather than participating in what appears to be a tokenistic consultation as an afterthought. Thus, following the seven (7) Preparatory Living Labs, four (4) Workshops on Energy and the Agri-food sector were organised (see Table 8) aiming to streamline the stakeholders' feedback into the development of the IntelComp tools.

**Table 8: IntelComp Climate Change Living Lab Workshops**

| Number | Topic | Date and Time<br>Location | Link |
|---|---|---|---|
| **Workshop No. 1** | Energy: STI Viewer tool for Academia & Industry | 08.12.2022 (10-12 EEST) online | link |
| **Workshop No. 2** | Energy: Indicators, Trends, Publications and Innovation | 22.03.2023 (10-12 EEST) online | link |
| **Workshop No. 3** | Agri-food: Indicators, Trends, Publications and Innovation | 06.06.2023 (12-14 EEST) online | link |
| **Workshop No. 4** | Agri-Food: Indicators, Trends, Publications and Innovation - Understanding the public opinions in Evidence-Based policymaking | 05.10.2023 (12-14 EEST) online | link |
| **Parallel Workshop No. 5** | The "IntelComp STI Viewer" and "IntelComp Policy Participation Portal" as tools to support inclusive policy formulation in the field of Energy | 20.11.2023 (17:45-18:30) in person | link |
| **Parallel Workshop No. 6** | The "IntelComp STI Viewer" and "IntelComp Policy Participation Portal" as tools to support inclusive policy formulation in the field of Agri-food | 20.11.2023 (17:45-18:30) in person | link |

## 5.1. STI Viewer & Energy Sector

Following the Preparatory Living Lab, Energy was identified as key sector, where IntelComp should focus on. The sub-sections below present in detail the workshops that were organised aiming to deep dipper into the sector and understand stakeholders' needs. First, we present the realised activities and format (including some screenshots), then, their feedback regarding the demo version that they were presented and finally, their priorities in terms of expansion of the tools. Both workshops were held online and consisted of three main activities: (a) energiser, (b) a short presentation of the project and a smaller (or bigger) presentation on the STI Viewer (depending on tool's development stage), and (c) a discussion on improving the STI Viewer tool, which was at a demo stage. Their objective was to familiarise Stakeholders from Industry and Academia (WS1) and policy officers & analysts (WS2) with the project in general and STI Viewer in particular.

### 5.1.1. Realised LL Activities and Events

As part of the Climate Change Living Lab, two online workshops were held in December 2022 and March 2023 regarding the Energy Sector, aiming to introduce the project to stakeholders, present them the STI Viewer, as well as register their feedback on the developed tool.

The first workshop took place on the 8th of December 2022 and was titled "IntelComp STI Viewer tool for Academia & Industry". Its goal was to familiarise participants from the industry and academia with the STI Viewer. After a brief warm-up activity, participants gathered to discuss their concerns about the energy transition. They articulated their requirements and aspirations, highlighting the functionalities they deemed instrumental in their day-to-day endeavours of providing policy recommendations and monitoring new technologies. Afterwards, they were introduced to the STI Viewer and were asked to provide feedback and offer suggestions for incorporating the STI Viewer into their work. Participants included a leading company in electricity production and supply (Elpedison), a certified social cooperative that supports the transition to a democratic, efficient and sustainable energy system (Electra Energy Cooperative), the RES market operator in Greece (DAPEEP), the Hellenic Foundation for Research & Innocation (HFRI) and the Hellenic Centre for Marine Research. Considering that participants were from Greece, the workshop was held exclusively in Greek.

Firstly, the energiser provided the opportunity to participants to shortly introduce themselves and their organisation. Next, a short presentation of the project and the goals of the workshop took place and then participants had the opportunity to discuss their concerns regarding the energy transition, demonstrate their needs and demands, and present what would be helpful in their day-to-day work in policy advice and new technology monitoring. To do so, participants were given some indicative starting questions such as:

- How is your organization leading the energy transition?
- What is needed to make the energy transition happen?
- What information is missing or complicated?
- What would make your job easier and faster?

Afterwards, Dr. Grypari demonstrated the –then – developed version of the STI Viewer with a short presentation of its scope. Next, participants were asked to provide their ideas how they might use and incorporate the STI Viewer into their work. The lively conversation revealed several ideas for how the tool could be improved. The discussion was guided by two indicative questions, if they would use the STI Viewer in their day-to-day activities and if so, how they imagined using it. During this activity, stakeholders highlighted the following:

- What do the legal texts (such as EUR-Lex) contain? How this could be captured in the KPIs?
- What policies have been set by the EU? and to what extent ELIDEK's programs respond to this?
- How the policy development affects technology, industry, R&D?
- How is the impact measured?
- What is being funded at what time?

Finally, after the presentation of the demo version of the STI Viewer, questions were raised on how the data are crawled and curated and which ESG reports are analysed, considering that the realisation of such tool requires big data and advanced ML techniques.

The second workshop was held on the 22nd of March 2023 under the title "Energy: Indicators, Trends, Publications and Innovation", specifically aiming policy officers and policy analysts in Greece and EU. This workshop not only served as an introduction to the STI Viewer, but also as a direct channel of open communication between potential end-users and IntelComp. It was attended by representatives from the Ministry of Environment and Energy, the Greek General Confederation of Labour, the General Secretariat for Research and Innovation (GSRI), the Hellenic Mediterranean University, the Renewable Energy Sources Operator and Guarantees of Origin, the Green Tank and the Unit B6 of the Directorate-General for Research and Innovation of the European Commission.

A brochure was handed out before the workshop, including the Agenda, the STI Viewer goals and some graphs produced by an early version of the STI, as an introduction to the capabilities of the project. The purpose of the brochure was to better prepare the participants before the workshop and to allow them to study the exported suggestive graphs. There was a short version dedicated to each participant, to introduce their organisation and themselves, as well as answer the short, but meaningful question, "What does data mean for you?". Answers included: "protected", "open", "essential", "exciting nightmare", "reliable", "powerful", "truthful", "robust", "important".

Afterwards, participants were informed, once again, that the workshop aimed to introduce them to the STI Viewer and to validate and improve the tool based on their needs. The STI Viewer was demonstrated by Dr. Grypari and participants were provided some time to re-read the booklet and to focus on the suggestive graphs derived from the –then developed- version of the STI Viewer. Both workshops were held online through Zoom, while the collaborative platform Miro was used to visually present the needed information and register users' feedback.

Figure 7: IntelComp Living Lab on Climate Change for the Energy sector, 08.12.2022

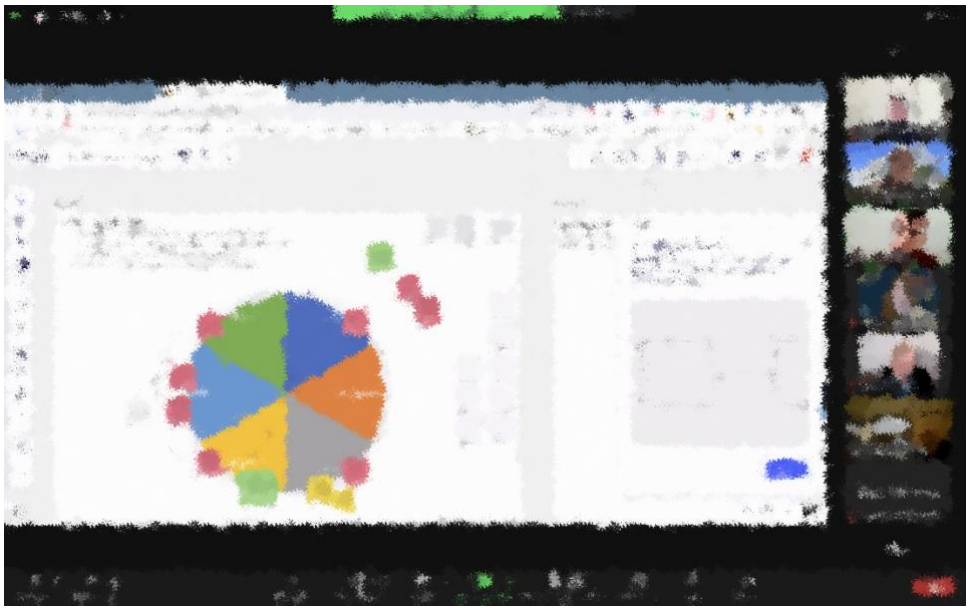
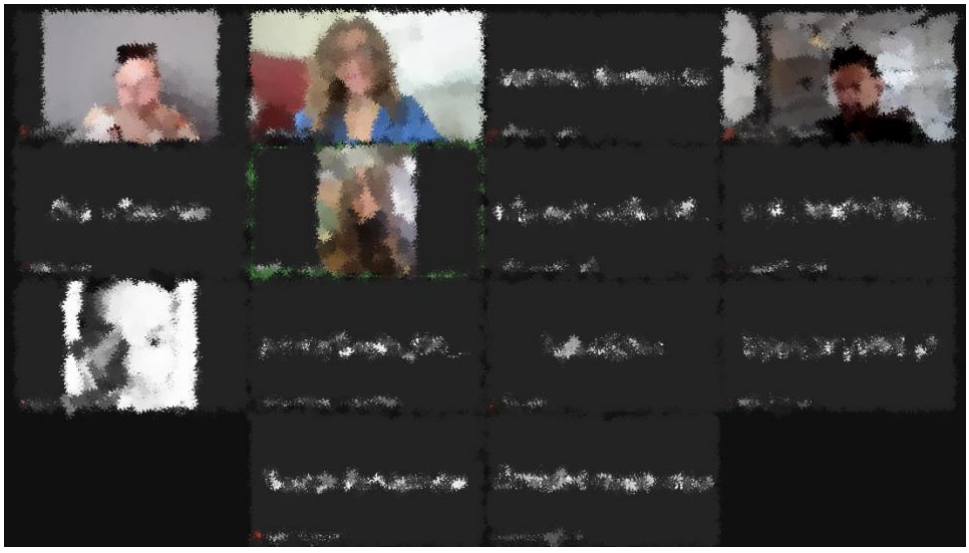


Figure 8: IntelComp Living Lab on Climate Change for the Energy sector, 22.03.2023



## 5.2. Participants'/users' experience regarding interactions with IntelComp / tools

In both meetings, participants were engaged and interested in the STI Viewer tool. This was expressed directly via commenting on the tool and indirectly, via openly discussing ways of how the tool could be utilised, as well as the importance of tracking innovation impact.

In particular, participants recognised, that measuring impact is a complex challenge, but STI Viewer provides a potential to identify correlations between different types of innovation and their impact on society. As a matter of fact, Energy Transition, which is much needed, is a complex interdisciplinary matter that requires dedication and lots of work from both the public and the

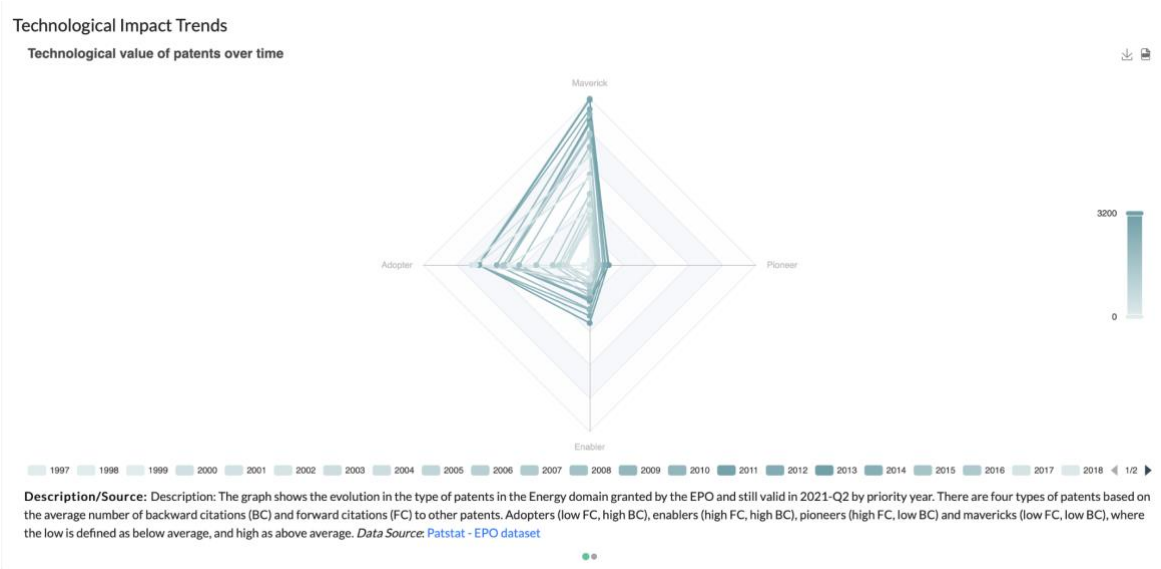
private sector. A tool as STI Viewer could potentially benefit policy makers in understanding what is produced at a research level and what is adopted in the end. It could potentially help bridging the gap between research/innovation and activities.

Several questions were raised regarding the data sources and the data sets that are used to produce the final graphs seen in the STI Viewer. Specifically, participants were eager to know if the EUR-Lex databased was used and which indicators were utilised to measure the impact of research adoption. Furthermore, they asked about the ESG reports of major companies and how they are integrated in the work of the project. Questions were also asked about how the links between different publications are created and how patents are registered and crawled.

They were also impressed with the potential of Natural Language Processing and the ability to analyse text of scientific publications and patents, as keywords and phrases identified could indicate emerging trends. Furthermore, the need for more informed decisions about funding and innovations was highlighted. Thus, the participants saw the potential of IntelComp project and the STI Viewer to help policymakers identify areas of research and innovation that could/should be prioritised.

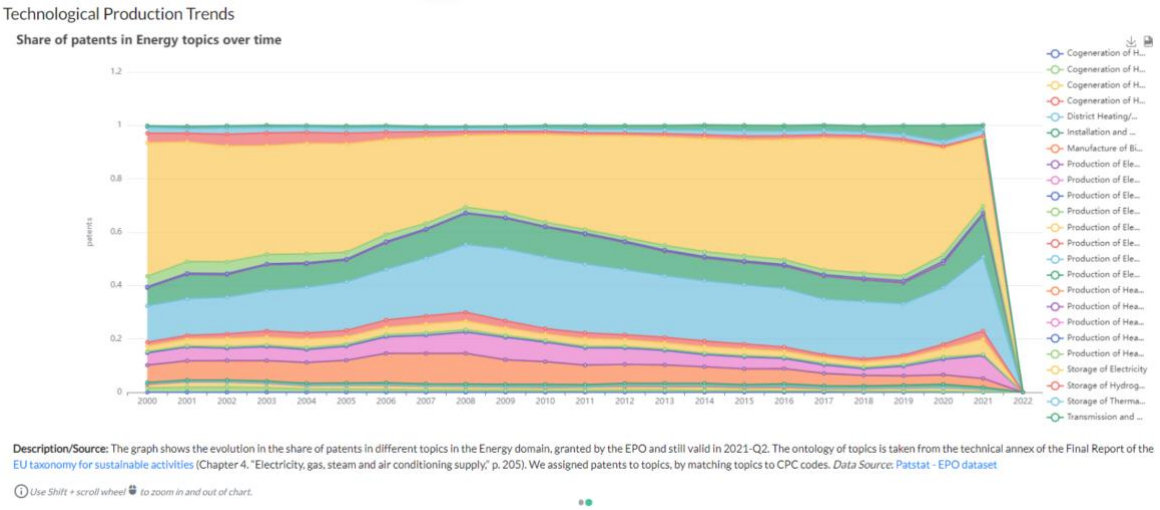
Especially during the 2nd workshop, participants were able to have an even closer look to the STI Viewer.

**Figure 9: STI Viewer, Domain: Climate, Geographic Coverage: EU, Category: Energy, Technological Impact Trends, Technological value of patents over time. Source: STI Viewer.**




In Figure 9, presented to the participants, one can see the evolution in the type of patents in the Energy domain granted by the EPO and that are still valid in 2021-Q2. The results are presented based on the average number of backward citations (BC), forward citations (FC) to other patents, revealing were industry/research stands in terms of adopting patents (technologies), pioneering (high FC, low BC), enabling the developed patents (high FC, high BC) or observing (low FC, low BC).

**Figure 10: STI Viewer, Domain: Climate, Geographic Coverage: EU, Category: Energy, Technological Production Trends, Share of patents in Energy topics over time. Source: STI Viewer**




They were very interested in the developed STI Viewer, which is proved by the questions asked about how the links and references between different publications are created, how is information being classified, and which data sets are used in order to produce the suggested graphs.

The discussion emphasized the need for tailored data access for different user profiles, acknowledging that diverse end-users have varying expectations and require customized granularity in the presented information. Additionally, given the immense challenge of sustainable energy, capturing societal and community sentiment is crucial for comprehensive decision-making. It was also mentioned that, as challenging as it is, the users should be able to "construct a narrative from the visualisations" and identify the impact of different productions, whether they have led to any patterns, companies developing products on these insights and whether the public is engaged with these issues. The conversation underscored the importance of balancing comprehensive data presentation with clear storytelling allowing users to extract meaningful insights from the vast amount of information. Linking industry and research, could be made by linking patents to publications, a participant expressed, as a policy maker could eventually see if research is being adopted by the industry or not, and if research funding is towards the right direction.

Finally, participants made a few more suggestions that could further improve the STI Viewer tool:

- The ability to filter data by additional criteria, such as the type of research organisation or the funding source
- The ability to download the data behind the visualisations in a more user-friendly format, such as CSV or Excel
- The ability to create custom visualisations based on the user's specific needs
- The ability to integrate with other data sources, such as industry reports and market data
- A filter per country, that would allow cross-examination between countries and between countries and EU.

Part of the feedback was addressed by the technical teams in terms of content and end-user requests. For instance, a holistic approach was followed to cover science, technology and innovation, by including research analysis, patents examination (i.e share of patents over time) and ESG analysis, as well as Green Skills integration. Graphs are easily adjustable and downloadable in various formats, filters were added, while data and data sources are available. Community is mostly represented by the Participation Portal, another tool developed within the scope of the project, which is analysed below. Some suggestions, however, were not implemented, such as the ability to have side-by-side comparisons of the results at a country level and an EU level, as well as to have different granularity in the end product based on the user category.

### 5.2.1. Results relevant for the thematic agenda setting

Participants did not only share their views on the STI Viewer, but also, expressed their considerations regarding Energy Transition and how this can take place considering economic, political, environmental, social, technological, and legal issues. The need for the expansion of the share RES have in the energy mix was highlighted, by several stakeholders, but with a different view. Those coming from community, believed that energy transition should indeed come from the expansion of RES but through the creation and support of existing and to-be-established energy communities. On the other hand, participants representing the industry, cared more on the numbers and to achieve the target of 60% RES in Greece by 2030. Major disagreements were also expressed about whether Natural Gas and Nuclear Energy should be considered RES or not or at least if they could be considered transitional energy sources (this was also a topic that was being discussed during December 2022 at a European Level). “In a just energy transition, Natural Gas does not have a place” a participant argued.

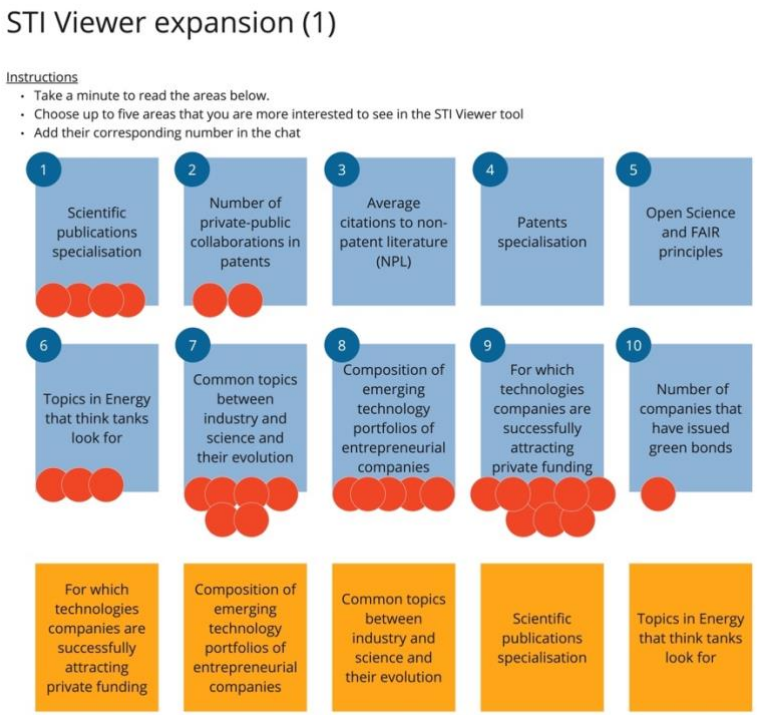
Furthermore, all stakeholders agreed that the Energy Transition should take place in a just and safe environment for the local communities and that all should work together bearing in mind society and not just economy. This could be materialised through including different energy sources in the energy mix and by promoting research on batteries and energy saving technologies, and by investing in battery deployment, that can make RES more competitive. All agreed that to make a just Energy Transition feasible, the need for upskilling and reskilling is eminent, suggesting that socio-economically the required skills should be recognised and programmes that aim at educating and training employees should be deployed.

During the 2nd workshop in June, the discussion focused on the STI Viewer expansion aiming to integrate more thematic areas for the agenda setting. Participants were asked to choose up to five areas, that they are more interested to see in the STI Viewer tool, using stickers and then elaborate on the most preferred topics. The thematic areas were identified during desk research, but are not part of the STI Viewer (i.e. number of companies that have issued green bonds).

Based on the results, participants expressed a keen interest in exploring which technologies are currently attracting significant private investments and the composition of emerging technology portfolios of entrepreneurial companies. Additionally, they sought insights into the common ground between industry and academia and how this relationship has evolved over time. Furthermore, they were eager to gain a better understanding of the topics Energy Think Tanks are

currently prioritising, and they requested a focus on scientific publications within the context of the energy sector.

**Figure 11: STI Viewer Expansion exercise results, 22.03.2023. Stickers were used to have a heat map on what participants would like to see in the STI Viewer**




In both workshops, the importance of society for Energy Transition was highlighted. Participants expressed that without considering the public, one cannot proceed in drafting just policies. This proved the need of establishing a tool that allows the indirect communication between policy makers and communities.

## 5.3. STI Viewer & the Agri-food Sector

Following the workshops on the Energy sector, two more workshops were planned focusing on the Agri-food sector, the second area that was identified as key sector during the PLL. The sub-sections below present in detail the workshops that were organised aiming to deep dipper into the sector and understand stakeholders' needs. Both workshops were held online and consisted of three main activities: (a) energiser, (b) a short presentation of the project and a smaller (or bigger) presentation on the STI Viewer (depending on tool's development stage), and (c) a discussion on improving the STI Viewer tool, which was at a demo stage. Their objective was to familiarise Stakeholders from the Agri-food Science-Technology-Innovation triangle in Greece and EU with the project in general and STI Viewer in particular. The structure of this sub-chapter is organised as follows: First, we present the realised activities and format (including some screenshots), then, their feedback regarding the demo version that they were presented and finally, their priorities in terms of expansion of the tools.

### 5.3.1. Realised LL Activities and Events

Two online workshops on the Agri-food sector, part of the Climate Change Living Lab, were organised between June and October 2023, aiming to reveal stakeholders' preferences and feedback regarding the development of the STI Viewer. The title of these workshops was "**Indicators, Trends, Publications and Innovation".** In both workshops, (**6th of June and 5th of October 2023**) stakeholders were presented the goals of IntelComp project and a demo of the STI Viewer tool, focusing on the graphs that were available at this time on the Climate Domain, for the Agri-food sector in the EU, e.g., Scientific Impact and Scientific Production and Collaborations (Science) and Technological Production trends, impact, and origins (Technology). Then, they were invited to participate in a moderated discussion on the usefulness of the existing indicators and future development of the STI Viewer tool.

**Figure 12: IntelComp Living Lab on Climate Change for the Agri-food sector, 06.06.2023**

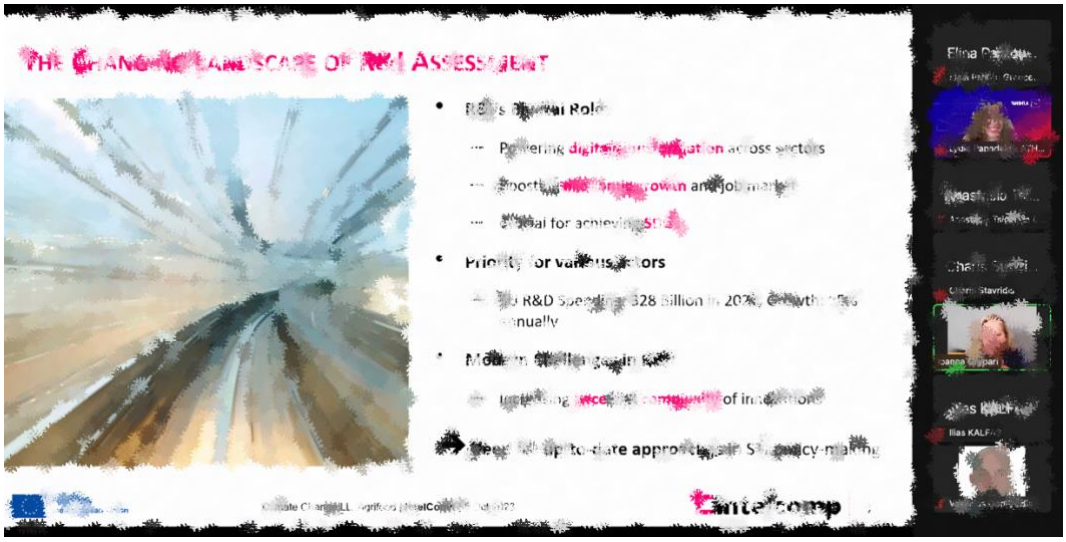
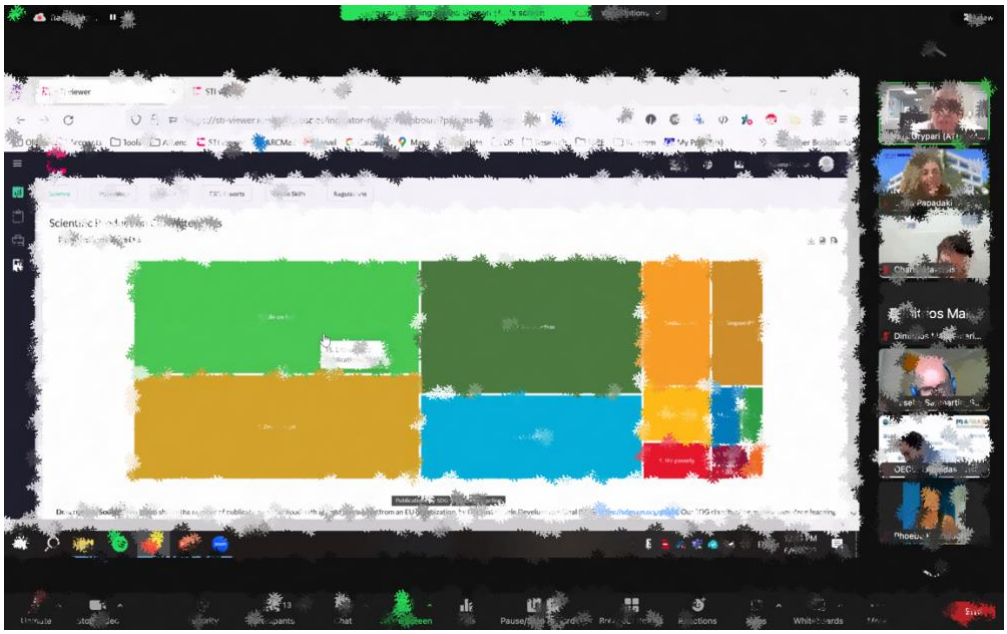


**Figure 13: IntelComp Living Lab on Climate Change for the Agri-food sector, 05.10.2023**



The workshops were attended by selected stakeholders who work on the Agri-food Science-Technology-Innovation triangle in Greece and EU. In detail the participants were from: (a) *policy sector*, e.g. the General Secretariat for Research and Innovation, Ministry of Development and OECD -Directorate of Science, Technology and Innovation, Science Technology Policy Division (EU); (b) *academia (research and education)*, such as from the Hellenic Mediterranean University (Greece), Hellenic Agricultural Organisation - Soil and Water Resources Institute (Greece), American Farm School (Greece), Hellenic Agricultural Organization "DEMETER" (Greece), ELIDEK - HFRI Research Department (Greece), ATHENA RC (Greece), Athens University of Economics and Business (Greece), NTT DATA (Spain), Spanish Foundation for Science and Technology (Spain) and University of Pisa (Italy); and (c) *NGOs and Civil Society*, such as from the Foodscale Hub (Greece), SDSN Greece (Greece) and SDSN Black Sea (Greece).

### 5.3.2. Participants/users' experience regarding interactions with IntelComp / tools

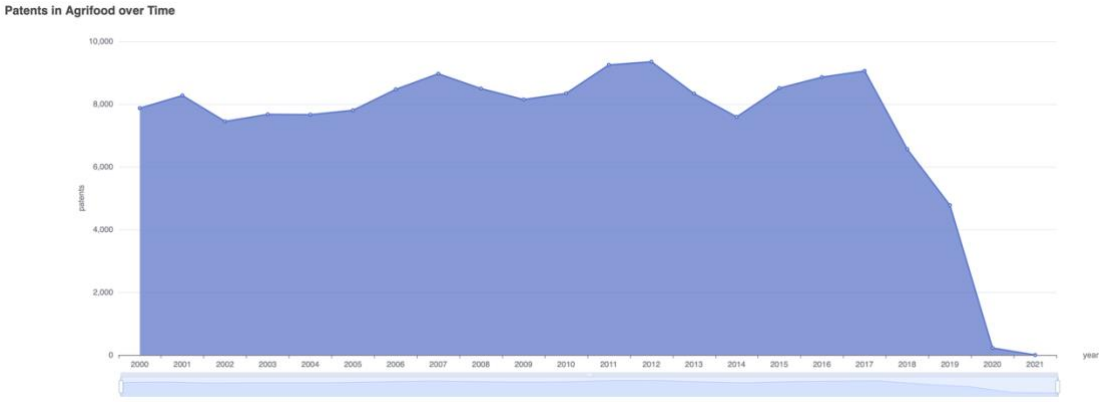
Participants were given a booklet to read before the workshop, which had the agenda, the STI Viewer goals, and some suggestive graphs. This booklet was handed to them so that they could be prepared before the workshop began (see

ANNEX 2 – Living lab on the agri-food sector). During the workshop, after Dr. Grypari demonstrated the current version of the STI Viewer, participants were provided some time to go through the graphs (using the booklets) from the "work in progress" STI Viewer and think about how they would use them in their day-to-day work and comment what could be improved. The output of this workshop helped development teams prioritise and update some functionalities. Indicatively, regarding the overall usability of the tool, they made the following comments:

- There is a need for more filters that would provide more clarity. Specifically, they suggested filters that were based on climatic zones, regions, certain nations, or even crops. If you want to find anything that interests you, you can't physically go through every publication. It is necessary to limit it down to a very specific point and identify exactly what is intriguing. It would be also helpful to have a filter to locate the most recent data for categorization or spatial extensification.
- They also requested the inclusion of time ranges, as well as the ability to export and distribute the results.

They also provided feedback regarding specific areas/graphs. During the workshop in June 2023, the stakeholders shared their thoughts regarding the STI Viewer graph on *Technological Production Trends* with title: "*Patents in Agri-food over time*" (see Figure 14), where they made the observation that the graphs are pertinent; nevertheless, it was not clear what is the exact focus of the patents. The emphasized that it is necessary to have a second level, such as anything that can restrict the search material and make it more accessible (for instance, industrial property regulations). Additionally, it would be of great assistance to determine which patents have already been commercialised (and who has invested in them), while they indicated that it is necessary to determine what is currently available on the market and is not just protected, but also where it was commercialised.

**Figure 14: STI Viewer, Domain: Climate, Geographic Coverage: EU, Category: Agri-food, Technology, Technological Production Trends, Patents in Agri-food over time. Source: STI Viewer**




Part of this feedback was addressed by the technical teams. For example, they added a graph with the share of patents over time and the number of patents per IPC (International Patent Classification) code in the Agri-food domain (see Figure 15 and Figure 16). However, the general abovementioned comments were not taken into consideration by the technical teams.

**Figure 15: STI Viewer, Domain: Climate, Geographic Coverage: EU, Category: Agri-food, Technology, Technological Production Trends, Share of Patents in Agri-food Topics over time. Source: STI Viewer**

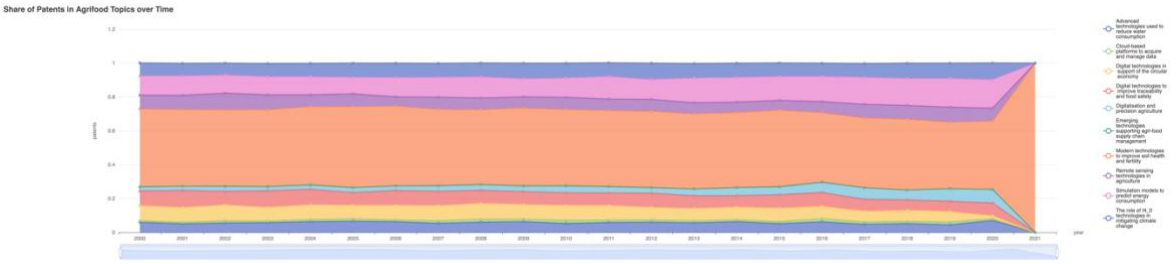
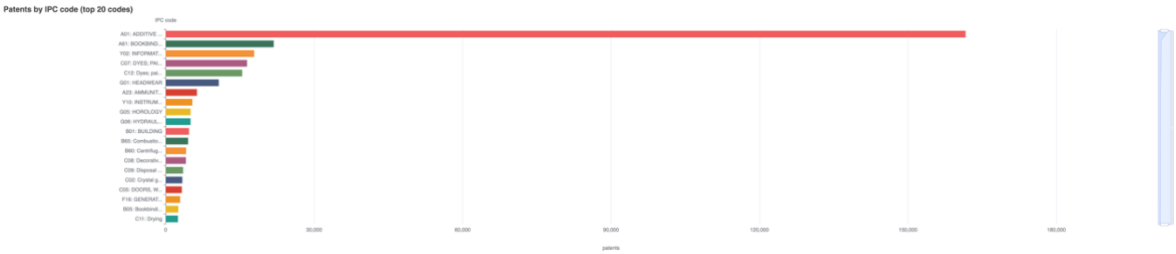



**Figure 16: STI Viewer, Domain: Climate, Geographic Coverage: EU, Category: Agri-food, Technology, Technological Production Trends, Patents by IPC code. Source: STI Viewer**




Additionally, during the workshop in October, stakeholders mentioned that in regard to the *patents section*, it is necessary to require all nations to develop strategies for specialisation. The graphs provide one dimension that relates to scientific production and institution-related activities. The essence of the matter is to integrate what is happening in terms of entrepreneurship. IntelComp technical teams had already started working on an industry analysis that is comparable to the one conducted in science, integrating indicators regarding the companies that are the most inventive in terms of their trademarks and the matters they address. However, stakeholders requested indicators that would show the comparative advantages of the industries in relation to the Smart Specialisation Strategies (https://gsri.gov.gr/ethniki-stratigiki-exypnis-exeidikefsis-2021-2027/), i.e., the comparative advantage will not be based on the quantity and quality of the publications in any given discipline, but rather on the entrepreneurial prowess, which aims to enhance through research endeavours. For example, there are some documents pertaining to the automobile; however, the automotive sector in Greece does not appear to be particularly developed; therefore, the nation would not invest in it. Thus, the industry section in the STI Viewer is a suitable starting point for someone who wishes to pursue further scientific knowledge and development.

In regard to the cutting-edge technologies designed to enhance the fertility and health of the soil, who could the farmers contact to seek collaboration? What is the definition of technologies? A more precise breakdown in the STI Viewer aiming to answer these questions would enhance the understanding and takeaways of the interested parties. Additionally, we need to know the matching of the Smart Specialisation Strategy priorities to the regional production outputs. E.g., If region of Crete makes for additional carobs and the STI Viewer has mapped the farmers who produce carobs, then a matchmaking could be achieved through the tool. In case, there is a demand for more carbos than what the region produces, farmers could get informed about this opportunity

and trained regarding the demand in the particular region, including specific quantities and crops, so that they may be assisted in changing crops by certifying it, cultivating it appropriately, and capitalising on the funds that flow through it. Gradually, appropriate cooperation should be established.

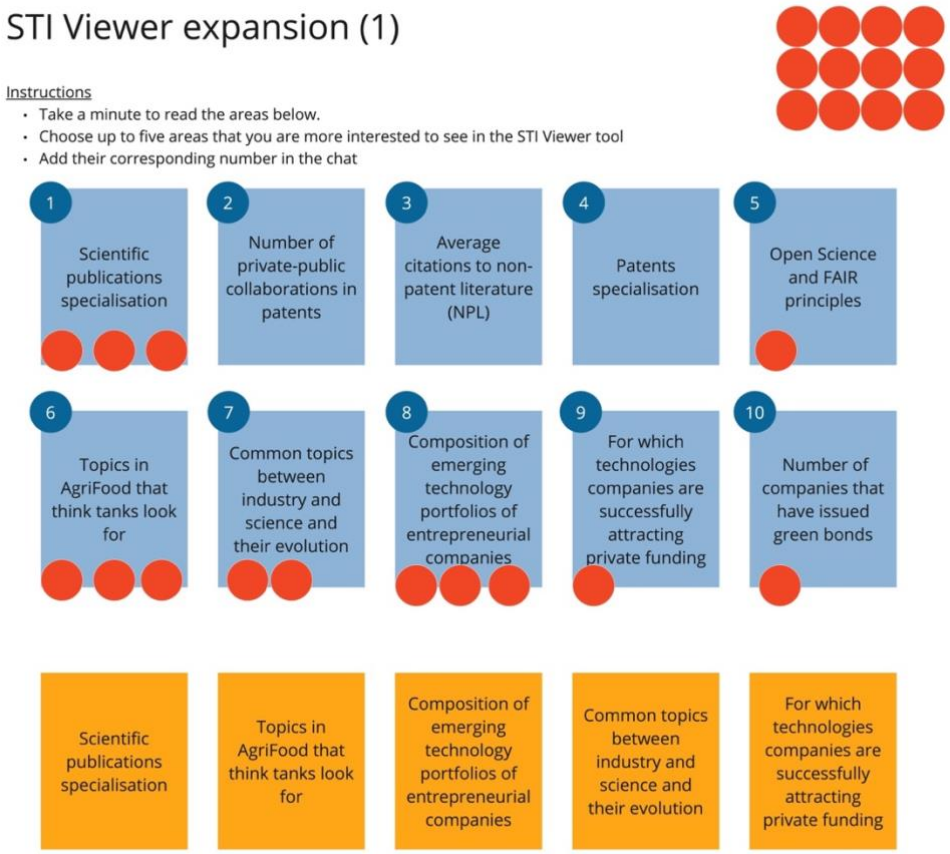
Stakeholders were also asked regarding the transparency and trust on the data and if and how they would use them in their work. They said that in general it is a user-friendly visualization They highlighted that a section that includes the Sustainable Development Goals (SDGs) are important on both the EU and international levels. The SDGs is yet another method for differentiating publications in a variety of subject areas. Therefore, they can also assist us in communicating in the same language, as an indicator that is applicable everywhere. Finally, they confirmed that the quantification and aggregation of the data would explain the reasons why certain decision have been taken on a top-down level.

### 5.3.3. Results relevant to the thematic agenda-setting

During the second phase of the workshop in June, the discussion focused on the STI Viewer expansion aiming to integrate more thematic areas for the agenda setting. Participants were asked to choose up to five areas, that they are more interested to see in the STI Viewer tool, such as *number of companies that have issued green bonds, open science and FAIR principles* etc (see Figure 17), using stickers and then elaborate on the most preferred topics. They identified the following areas:

- Scientific publications specialisation
- Topics in Agri-food that think tanks look for
- Composition of emerging technology portfolios of entrepreneurial companies
- Common topics between industry and science and their evolution
- For which technologies companies are successfully attracting private funding

**Figure 17: STI Viewer Expansion exercise results, 06.06.2023. Stickers were used to have a heat map on what participants would like to see in the STI Viewer**




After that, they were asked how they might implement these indicators into their daily work, if they have any additional suggestions for the tool and if such an analysis concerning funded programmes, such as Horizon 2020, pique their interest. They discussed their indications for the expansion of the STI Viewer.

They highlighted that “Scientific publications specialisation” is an excellent predictor of what science will or will not accomplish. Thus, it is prudent to determine what private companies are planning to invest in and reach a consensus on that point. Already, it is a sustainable entity. This will also affect job creation, as jobs will follow when there are clear opportunities.

The market products coming from technologies would be an interesting outcome of the “Composition of emerging technology portfolios of entrepreneurial companies”.

Regarding the “Topics in Agri-food that think tanks look for” would be interesting to be used in the research project, where we could know what the hottest topics are. Although society holds an opinion, it is not obligatory for it to do so on every matter (they lack the requisite expertise). It shall evaluate the outcomes. Its utility will elicit a favourable response. NGOs and think institutes do possess an understanding of societal requirements on occasion.

Most initiatives are centred on devising methods to establish sustainability. It is thus commendable to observe and advocate for this cause among policymakers. Thus, an indicator of the "Common topics between industry and science and their evolution" would bring significant value.

To discern that our trajectory is correct. Obtaining funding would indicate that we are proceeding in the correct direction. Consequently, it would be useful to have an indicator "For which technologies companies are successfully attracting private funding".

## 5.4. STI Participation Portal, Energy & Agri-food Sector

From April 2023, ARC developed the survey on climate change (see Annex 3) that would be integrated in the STI Viewer Participation Portal tool. The survey aimed to facilitate evidence-based policy making by providing STI policymakers with an understanding of public sentiments (rather than assisting in the development of the IntelComp tools). The target audience of the survey were representatives of NGOs, Cities, and Civil Society, in addition to Academic and Industrial Associations, who would be invited through personalised invitations to fill in the survey in the STI Participation Portal. While some survey questions are closed, others are based on the diagrams in the STI Viewer, which are incorporated into the survey. Thus, the focus of the survey were the 2 Climate Change areas, in which IntelComp STI Viewer and LL workshops were focused on, Energy and Agri-food. There were both general questions suitable for all individuals and tailored to particular non-governmental organisations. The questions raised, aimed to provide a brief profile of the questionee, give insights about the energy and/or the agrifood sector, and allow the questionee express their opinion regarding the end-results of the STI Viewer (graphs and data). The survey results will be integrated into the IntelComp platform, while through the STI Viewer, the survey responses will be transmitted directly to STI policymakers.

The survey was developed as follows:

- Part A: Demographics
- Part B: General
- Part C: Energy-related STI Policymaking (Renewable Energy, Energy efficiency, Nuclear Energy and Fossil Fuels)
- Part D: Agri-food-related STI Policymaking (Sustainable Food production, Sustainable Food processing & distribution, Sustainable Food consumption, Food loss and waste prevention).

The first draft of the survey was initially shared with the technical teams for feedback in May 2023 and explicitly presented at the technical meeting on 6$^{th}$ of July 2023, which took place at ATHENA RC. Further feedback from the IntelComp team was received by September 2023, while the questions were validated through 1:1 discussions with stakeholders on Agri-food and during the last LL workshop on 5$^{th}$ of October 2023. The last workshop, which took place on the 5$^{th}$ of October 2023, had a second goal of validating and improving the STI Participation Portal tool and thus, the survey related to STI policies based on stakeholder needs. Firstly, stakeholders were asked if the sub-categories used in the survey would fully cover the topic of Agri-food or if there was something important that had been omitted. Stakeholders confirmed that the sub-categories were indeed

representative, as long as chemical companies were part of the value chain for the Agri-food sector).

Then, they were asked how the four sub-categories could provide solutions to STI-related challenges and how charts could assist with these challenges, such as if the survey could disclose information regarding a scientific challenge pertaining to food production. Participants answered that the figure that illustrates a decrease in the output of scientific articles may be explained by the fact that there were no programmed activities. Greece's scientific community is organised into programmes. This is because there are just a few patents. Due to the fact that no businessman would work on anything that only he would know about, there are not many academics who are concerned in preserving their intellectual property.

Although there are policies that promote sustainable development, the real economy lags behind. Right now, waste goes back to the producer, and the seller is not interested in waste and food loss. Thus, more effort and budget should be spent on implementation and monitoring. For instance, the Smart Specialisation Strategy aims to reduce the costs of manufacturing and inputs while avoiding a fight back. How can we achieve that? How can we prioritize these needs? If you travel to Patras, a Greek city, how is it possible to get Dutch tomatoes at a lower price than those that are grown in its neighbouring city? To what extent does food go missing? How much is total consumption of food? When it comes to sustainable food production, how much is the production? These types of questions should be addressed to the citizen groups aiming to understand why application of smart and sustainable practices can be enforced in the Agri-food sector.

They also highlighted the need for an intermediary mechanism that would transfer scientific research into practical and useful tools for the people across the Agri-food value chain, as well as the need to transform entire supply chains in order to advance sustainability. In regards to the funding programs, they suggested that for the recipient to be eligible to receive the funds from any programme, it is imperative that they have participated in a designated training session with quantifiable outcomes. Funding programs that aim to boost the agricultural sector in the country shall not focus on the financing schemes, rather use a more participatory approach, where the farmers would not only voice their concerns, but also get informed regarding environmental challenges, e.g., that some chemicals are carcinogenic and should be eliminated from the production process, and how to apply for funding for sustainable practices. In such participatory process, after being fully informed, farmers should be asked, whether they need support to purchase a new tractor or an innovative solution, e.g., sensors. Collective effort is required to unite the entire globe. In addition, sustainable practices they are suggested to have higher rate of funding (e.g. 70%) and less for conventional technologies, e.g. new trackers etc (e.g. 30%).

In summary, ARC discussed which questions were required in order to depict the goals of the STI Participation Portal, which was to give the chance to society to converse with policy makers, but also combine the STI Viewer and have it act as an open window between the two stakeholder categories (policy makers and society). In this framework, stakeholders raised concerns that should be taken into account in the survey regarding the Agri-food breakdown that should include aspects, such as the chemical industries, emissions, and retail; as well as that policy makers need to map where we stand today, provide motives to farmers (such as financial aid, specific trainings,

connection with the innovation and scientific community) for implementing sustainability practices, and to sellers (such as redefining the producer's responsibility) to avoid food loss.

## 5.5. STI Viewer & STI Participation portal demo & final feedback

On 20th of November 2023, the National Greece Info Day of the IntelComp project (https://intelcomp.eu/events/national-greece-info-day) took place in Athens, at the National Library of Greece - Cultural Center Stavros Niarchos Foundation. The conference centred on the role and impact of Science, Technology, and Innovation (STI) in facilitating national adaptation and management strategies for climate change impacts. The primary objective of this gathering was to convene a diverse range of stakeholders, including policy-maker representatives, industry experts, environmental and technological experts, and societal impact stakeholders. Their purpose was to engage in a comprehensive discussion regarding the latest developments in STI and the pressing concerns associated with energy sustainability and the agri-food production model in light of CC.

During the Info Day, ARC organised 2 workshops on Energy and Agri-food, demonstrating the IntelComp tools. It gave the chance to participants to familiarize with the STI Viewer and the STI Participation Portal. The workshops were attended by stakeholders coming from the public sector (General Secretariat for Research and Innovation (GSRI), Ministry of Development), the business (DINTELLO Consulting, Ferro, ICL Group, KENICO, MONDELEZ international, Opix, Piraeus Bank, Symbiolabs Circular Intelligence), the mass media (Business Daily.gr, Epixeiro.gr, Insider.gr, Kathimerini.gr), the civil society (Energizing Greece, HELISS, Minoan Energy) and the academia (Agricultural University of Athens, ATHENA RC, Athens University of Economics and Business, Culturepolis, Hellenic Center of Marine Research, Hellenic Mediterranean University, National and Kapodistrian University of Athens, National Observatory of Athens, University of Aegean, University of Crete, University of Patras, University of West Attica) in Greece.

**Figure 18: Parallel workshop on Agri-food, 20.11.2023**

# 6. CONCLUSIONS

Implementing the Living Lab on Climate Change presented a dynamic process of collaboration and innovation, which can be both demanding and gratifying. Living Labs are settings in which tangible users engage in active participation to co-develop, evaluate, and authenticate novel concepts, technologies, or services. The process of coordinating a Living Lab frequently encompasses various critical elements.

To begin with, the establishment of a collaborative ecosystem engenders enthusiasm by uniting a multitude of stakeholders, including researchers, industry collaborators, policy analysts, the civil society, and end-users. It can be invigorating to foster an environment that encourages creative interaction and facilitates open communication. On the other hand, managing diverse perspectives and expectations can be difficult. The Living Lab's iterative process and perpetual feedback cycle facilitate swift prototyping and improvement. Observing the concrete results of user participation in the development process of the IntelComp tools can evoke immense gratification. On the contrary, the capacity to navigate unanticipated obstacles and adjust to changing conditions necessitates both flexibility and resilience. One of the greatest challenges that we had to deal with was engaging stakeholders in this process. Understanding the tools from an early stage, diverse interests and competing agendas were some of the barriers that were raised during the PLL and the LL workshops. However, though this long journey and the LL, we managed to collect feedback and needs from a diverse group of stakeholders, leading to a better understanding of the climate change insights that our society needs today.

Living Labs on CC started early aiming to narrow down the broad topic of climate change. During the Preparatory Living Lab (7 workshops in total), which took place from June 2021 until February 2022, almost 100 representatives from the academia, public and private sector, as well as from NGOs were engaged. In addition, approximately 50 Stakeholders from Greece and EU participated in the Living Lab (4 workshops in total, 2 on Energy and 2 on the Agri-food), which took place from December 2022 until October 2023, and around 60 in the final trainings that were organised during the National Info Day, on 20$^{th}$ of November 2023.

In summary, the Preparatory Living Lab showed that the energy and the Agri-food sector should be the centre of the IntelComp tools, while the Workshops on the Energy sector pinpointed several areas of improvement and expansion, such as the integration of the key messages of the policy documents using KPIs; the specific policies that have been set by the EU; the relation of policy development and technology, industry and R&D; which projects are being funded and at what time; insights regarding employment and future jobs; and dive deeper into the classification of the SDGs and not just in the upper level.

The first sector that was examined during the workshops was the Energy sector. During the two Workshops held in December 2022 and March 2023, stakeholders were introduced to the early stages of the STI Viewer, a tool that was welcomed by every category and that sparked very interesting conversations during the meetings. In the first workshop, Stakeholders had a brief introduction to the tool and were mostly asked to provide feedback on how they would like to see their expectations being materialised. After stating their considerations, discussion was focused on the Energy Transition and how it can take place smoothly and just. In the 2nd Workshop, participants were shown a -then developed- version of the STI Viewer and were asked to elaborate

on the usability of the tool and its expansion. After commenting on the importance of the tool, participants asked about different user profiles, highlighted the need to strike a balance between providing a thorough overview of data while crafting a compelling narrative and linking the industrial sector with research. Additional suggestions included the ability to filter data by more criteria (i.e. type of research institution, by country), the ability to create custom visualisations, to integrate other sources to the visualised data, and the ability to download data. In general, concerns were expressed, as expected, regarding the goal towards Sustainable Energy and its effects on society, highlighting its importance and proving that the opinion of communities should be heard carefully during policy making.

During the Workshops on the Agri-food sector, Stakeholders shared their views on the STI Viewer and on what should be done additionally to suit their needs. Among the key remarks were the following: The inclusion of more filters about Climate Zones, Regions, Specific Countries (or even Crops); the commercialisation status of the patents, as well as the investments that they received; and the integration of specific time frames and the possibility to export and share specific results. Stakeholders also exchanged ideas on specific graphs. Indicatively, regarding the scientific collaborations, they would be interested to see the countries/organizations that work on these topics, the technologies that these topics capture, the definitions of these topics, as well as the problems that these solutions that these technologies solve.

Participants also raised concerns that should be taken into account in the STI Participation Portal survey regarding the Agri-food breakdown that should include aspects, such as the chemical industries, emissions, and retail; as well as that policy makers need to map where we stand today, provide motives to farmers (such as financial aid, specific trainings, connection with the innovation and scientific community) for implementing sustainability practices, and to sellers (such as redefining the producer’s responsibility) to avoid food loss.

# ANNEX 1 - LIVING LAB ON THE ENERGY SECTOR (BOOKLET)


**CLIMATE CHANGE LIVING LAB**
**Topic: "Energy: Indicators, Trends, Publications and Innovation"**

**Wednesday 22.03.2023 (10-12 EEST) – online**

## Agenda

| | |
|---|---|
| **10.00 – 10.10** | **Welcome remarks**<br>Phoebe Koundouri, School of Economics and ReSEES Laboratory, Athens University of Economics and Business; Department of Technology, Management and Economics, Technical University of Denmark; Sustainable Development Unit, ATHENA RC; Sustainable Development Solutions Network-Europe; Academia Europea |
| **10:10 – 10:25** | **Get to know each other** |
| **10.25– 10.30** | **Short Presentation of the IntelComp project and goals of the workshop**<br>Lydia Papadaki, Researcher, ATHENA RC |
| **10:30 – 10:50** | **Presentation of STI Viewer tool**<br>Ioanna Grypari, Senior Researcher, ATHENA RC |
| **10:50 – 11:20** | **Discussion on the usefulness of the existing indicators and capacities of the STI Viewer tool** |
| **11:20 – 11:50** | **Prioritization and discussion of areas to be integrated in the STI Viewer** |
| **11.50 – 12.00** | **Concluding remarks and reflections** |

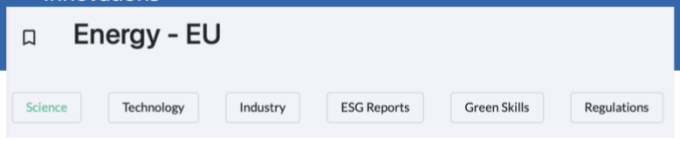
# This workshop aims to:

- **introduce you to the STI Viewer**, an interactive platform of data and visualization with the help of AI for the monitoring, evaluation and drafting of policies.
- **validate and improve the tool**, based on your needs

*STI Viewer is a set of well-documented, reliable and timely indicators that can be divided into multiple dimensions for an in-depth analysis. It is supported by automated text analysis workflows in HPC that rely (mostly) on open data sources.*

STI Viewer will aid in:

- ✓ in-depth information for a domain (in this case energy)
- ✓ quickly identifying the essence of data
- ✓ utilizing data that will help you in your day-to-day job
- ✓ identifying novel practices/solutions and research/technology innovations





**Policy Intelligence in IntelComp**

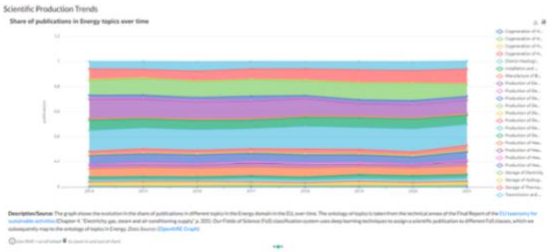
Help policy makers & administrators design policy by turning the large amounts of dynamic, multilingual and heterogeneous data into actionable insights and evidence-based policy-making using AI services and a human-in-the-loop approach

# STI Viewer improvement - Science (10')

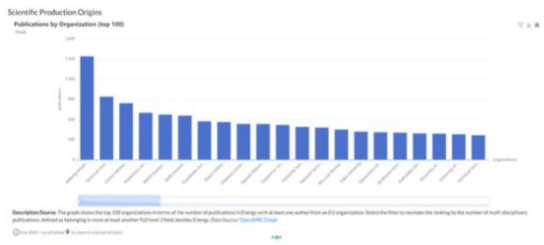
Instructions

- Take a minute to see again the graphs below.
- Does this representation make sense?
- How would you use this tool in your day-to-day job?
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

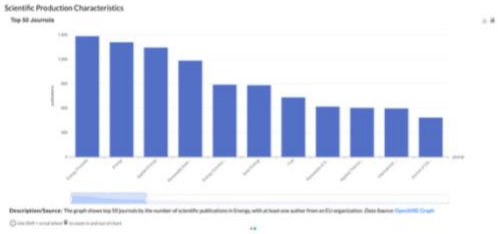
**- Scientific production trends**
**- Scientific production origins**
**- Scientific production characteristics**









# STI Viewer improvement - Science (10')

Instructions

- Take a minute to see again the graphs below.
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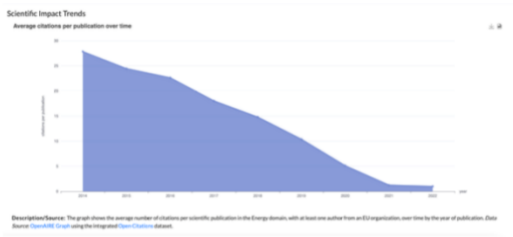
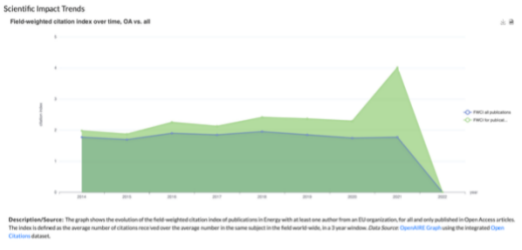
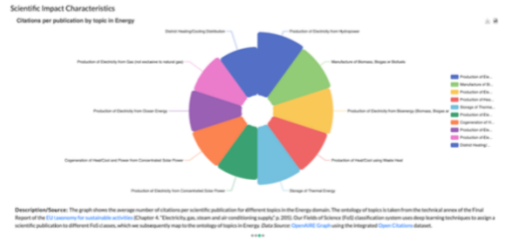
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

**- Scientific impact trends**
**- Scientific impact origins**
**- Scientific impact characteristics**
**- Scientific collaborations**





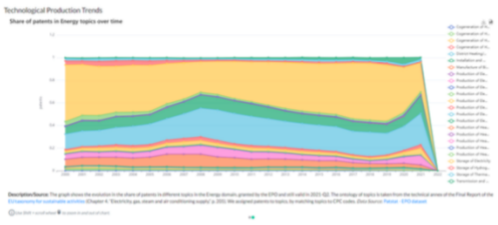



# STI Viewer improvement - Technology (10')

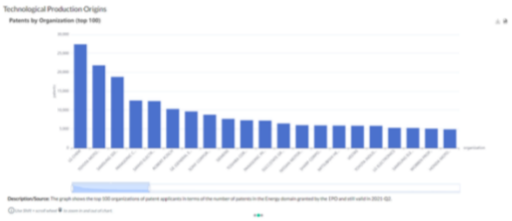
Instructions

- Take a minute to see again the graphs below.
- Does this representation make sense?
- How would you use this tool in your day-to-day job?
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

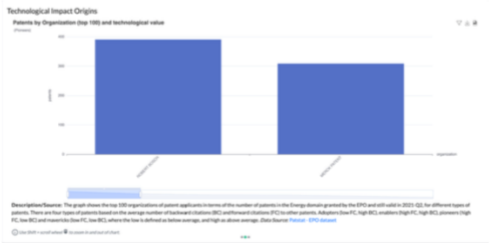
- Technological production trends
- Technological production origins
- Technological production characteristics
- Technological impact trends
- Technological impact origins
- Technological impact characteristics

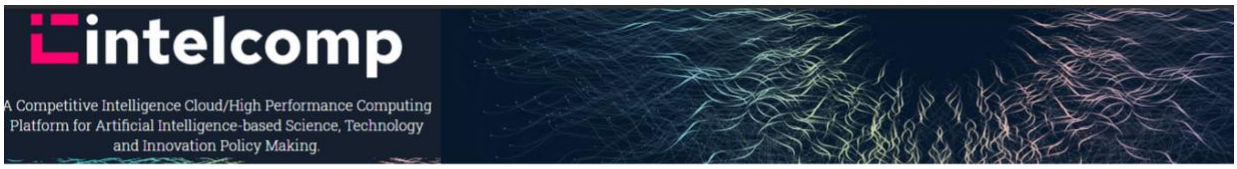







# ANNEX 2 – LIVING LAB ON THE AGRI-FOOD SECTOR (BOOKLET)




**CLIMATE CHANGE LIVING LAB**
**Topic: "Agrifood: Indicators, Trends, Publications and Innovation"**

**Tuesday 06.06.2023 (12-14 EEST) – online**

## Agenda

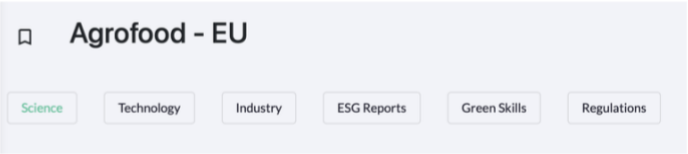
| | |
|---|---|
| **12.00 – 12.10** | **Welcome remarks**<br>Phoebe Koundouri, School of Economics and ReSEES Laboratory, Athens University of Economics and Business; Department of Technology, Management and Economics, Technical University of Denmark; Sustainable Development Unit, ATHENA RC; Sustainable Development Solutions Network-Europe; Academia Europea |
| **12:10 – 12:25** | **Get to know each other** |
| **12:25– 12:30** | **Short Presentation of the IntelComp project and goals of the workshop**<br>Lydia Papadaki, Researcher, ATHENA RC |
| **12:30 – 12:50** | **Presentation of STI Viewer tool**<br>Ioanna Grypari, Senior Researcher, ATHENA RC |
| **12:50 – 13:20** | **Discussion on the usefulness of the existing indicators and capacities of the STI Viewer tool** |
| **13:20 – 13:50** | **Prioritization and discussion of areas to be integrated in the STI Viewer** |
| **13.50 – 14.00** | **Concluding remarks and reflections** |

# This workshop aims to:

- **introduce you to the STI Viewer**, an interactive platform of data and visualization with the help of AI for the monitoring, evaluation and drafting of policies.
- **validate and improve the tool**, based on your needs

*STI Viewer is a set of well-documented, reliable and timely indicators that can be divided into multiple dimensions for an in-depth analysis. It is supported by automated text analysis workflows in HPC that rely (mostly) on open data sources.*

STI Viewer will aid in:
✓ in-depth information for a domain (in this case agrifood)
✓ quickly identifying the essence of data
✓ utilizing data that will help you in your day-to-day job
✓ identifying novel practices/solutions and research/technology innovations
✓ identifying popular/trending issues





**Policy Intelligence in IntelComp**
Help policy makers & administrators design policy by turning the large amounts of dynamic, multilingual and heterogeneous data into actionable insights and evidence-based policy-making using AI services and a human-in-the-loop approach

# STI Viewer improvement - Science (10')

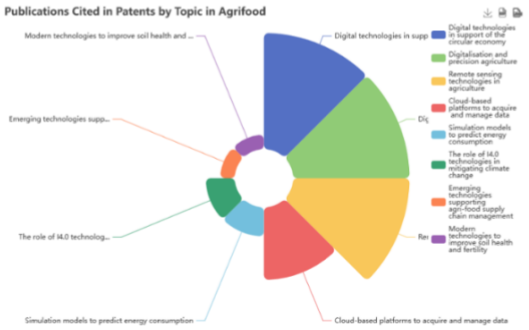
Instructions

- Take a minute to see again the graphs below.
- Does this representation make sense?
- How would you use this tool in your day-to-day job?
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

**- Scientific impact characteristics Two ways**

Scientific Impact Characteristics

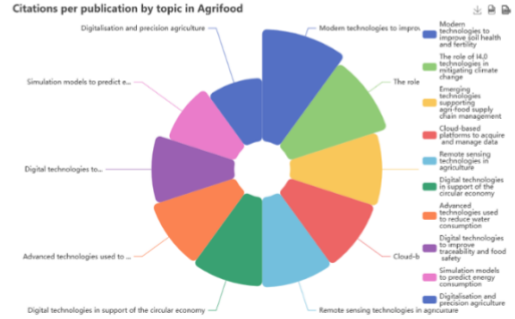
**Publications Cited in Patents by Topic in Agrifood**




**Description/Source:** The graph shows the number of publications cited in patents by topic within the Agrifood domain, both publications and patents are limited to the in the Agrifood domain in the EU. The assignment of topics is taken from Abbate, Centobelli, Cerchione (2023) ([https://doi.org/10.1016/j.techfore.2022.122222/](https://doi.org/10.1016/j.techfore.2022.122222/)) which we enhanced and mapped to topics in our Fields of Science (FoS) publication classification system ([http://doi.org/10.3389/frma.2023.1149834/](http://doi.org/10.3389/frma.2023.1149834/)). *Data Sources*: (OpenAIRE Graph), (Patstat - EPO dataset).

Scientific Impact Characteristics

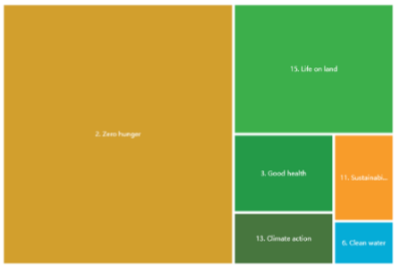
**Citations per publication by topic in Agrifood**




**Description/Source:** The graph shows the average number of citations per scientific publication for different topics in the Agrifood domain. The assignment of topics is taken from Abbate, Centobelli, Cerchione (2023) ([https://doi.org/10.1016/j.techfore.2022.122222](https://doi.org/10.1016/j.techfore.2022.122222)) which we enhanced and mapped to topics in our Fields of Science (FoS) publication classifcation system ([http://doi.org/10.3389/frma.2023.1149834](http://doi.org/10.3389/frma.2023.1149834)). *Data Sources*: OpenAIRE Graph using the integrated Open Citations dataset.

Scientific Impact Characteristics

**Publications cited in patents by SDG**




**Description/Source:** The graph shows the number of publications cited in patents by UN Sustainable Development Goal (SDG, [https://sdgs.un.org/goals](https://sdgs.un.org/goals)), both publications and patents are limited to the Agrifood domain in the EU. Our SDG classification system uses deep learning techniques to assign a scientific publication to the SDGs that are related to it. *Data Sources*: OpenAIRE Graph, Patstat - EPO dataset.

Scientific Impact Characteristics

**Citations per publication by SDG**

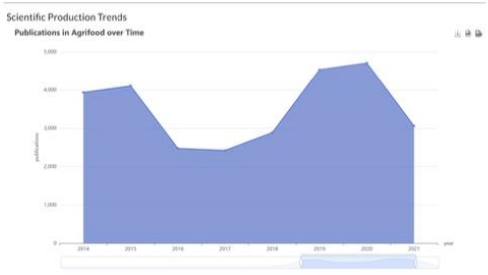

**Description/Source:** The graph shows the average number of citations per scientific publication in Agrifood, by UN Sustainable Development Goal (SDG, [https://sdgs.un.org/goals](https://sdgs.un.org/goals)). Our SDG classification system uses deep learning techniques to assign a scientific publication to the SDGs that are related to it. *Data Sources*: OpenAIRE Graph using the integrated Open Citations dataset.**

# STI Viewer improvement - Science (10')

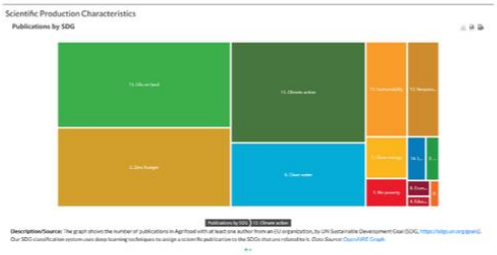
Instructions

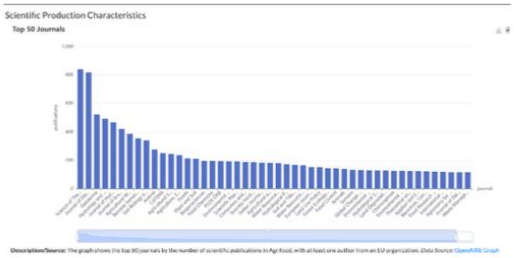
- Take a minute to see again the graphs below.
- Does this representation make sense?
- How would you use this tool in your day-to-day job?
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

**- Scientific production**
**- Scientific production origins**
**- Scientific production characteristics**
**- Scientific impact origins**
**- Scientific collaborations**

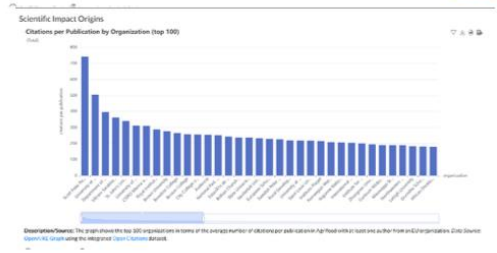


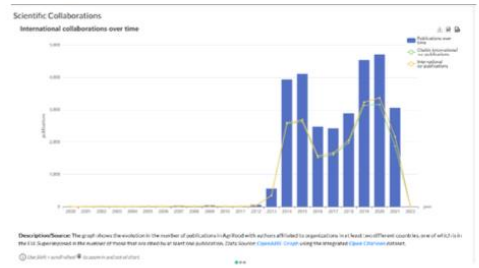


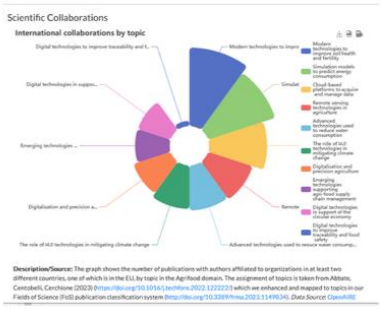






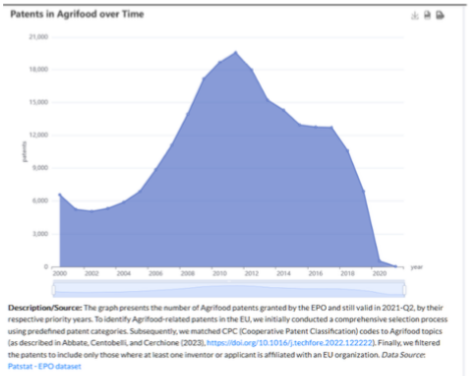



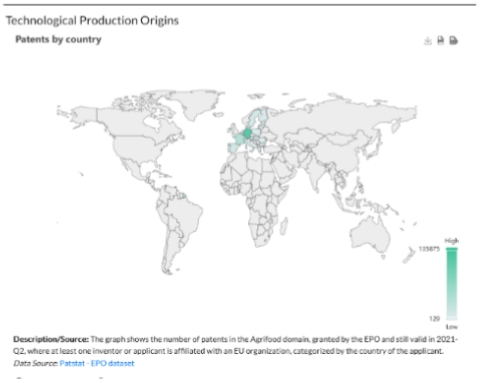
# STI Viewer improvement - Technology (10')

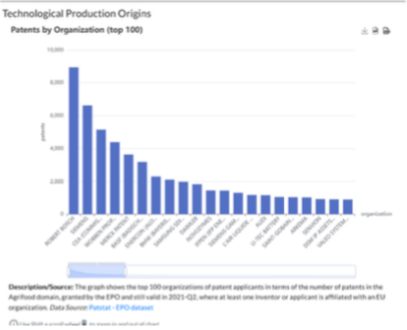
Instructions

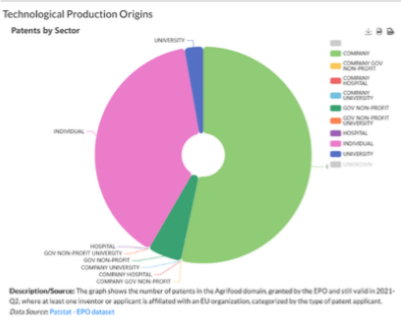
- Take a minute to see again the graphs below.
- Does this representation make sense?
- How would you use this tool in your day-to-day job?
- What else would you like to see here?
  - e.g. filters to narrow down specific datasets
  - e.g. graphs/trends per organisation

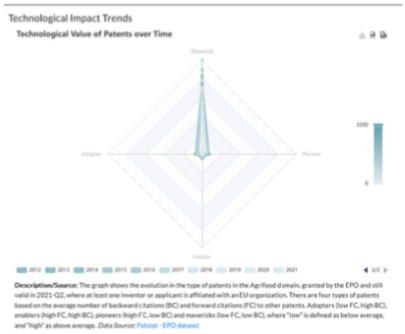
**- Technology**
**- Technological impact**
**- Technological impact characteristics**

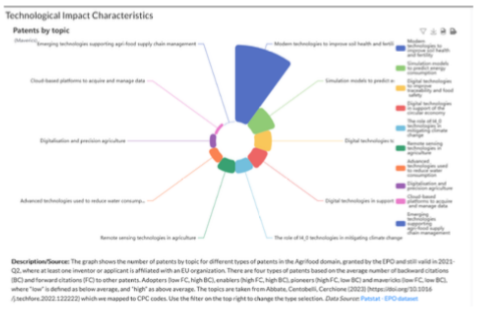


## STI Viewer expansion (1)

Instructions

- Take a minute to read the areas below.
- Choose up to five areas that you are more interested to see in the STI Viewer tool
- Add their corresponding number in the chat

1. Scientific publications specialisation
2. Number of private-public collaborations in patents
3. Average citations to non-patent literature (NPL)
4. Patents specialisation
5. Open Science and FAIR principles
6. Topics in Energy that think tanks look for
7. Common topics between industry and science and their evolution
8. Composition of emerging technology portfolios of entrepreneurial companies
9. For which technologies companies are successfully attracting private funding
10. Number of companies that have issued green bonds

## STI Viewer expansion (2)

Instructions

- How would you use these indicators in your day-to-day work?
- Is there anything else you would like to see in the tool?
  - Would you be interested to seeing such an analysis for funded programmes, such as Horizon 2020?

# ANNEX 3 – STI PARTICIPATION PORTAL SURVEY

## 6.1. Part A: Demographics

**A1: In which country is your organization based?**

[multiple choice – all countries in the world]

**A2: Which stakeholder group(s) would you attribute yourself to?**

[multiple choice]

- SME/Start-up
- Large company
- University/Research Institute
- Public institution
- NGO/CSO
- Other _____

**A3: What is your organisational position?**

- Top Management
- Middle Management
- Junior Management
- Administrative Staff
- Technician
- Researcher
- Trainee
- Other

**A4: What is the name of your organisation?**

[Open question]

**A5: How many employees are working in your organisation?**

[multiple choice]

- 1-9
- 10-49
- 50-249
- 250-999
- 1000+

**A6: How many years are you working in the area of the STI Policy?**

[multiple choice]

- 0-2
- 3-5
- 6-9

- 10-19
- 20+

**A7: What are your organisation's priorities regarding climate change?**

- Reducing emissions of greenhouse gases
- Adaptation to climate change impacts
- Ensuring fairness and social justice
- Mobilising public and private finance
- Fostering global collaboration
- Other_____

## 6.2. Part B: General

**B1: How interested is your organisation in Science-Technology-Innovation (STI) policymaking? Please give us your opinion using a score from 1 (NOT INTERESTED AT ALL) to 10 (VERY INTERESTED).**

[1-10 scale]

**B2a: How do you keep track of STI policy making updates?**

- Monitoring Government Websites
- Engaging in Stakeholder Consultations
- Networking and Partnerships
- Subscribing to Newsletters and Publications
- Monitoring Legislative Processes
- Engaging with International Organizations
- Building Relationships with Policy Makers
- Other_____

**B2b: How do you keep track of STI updates?**

- Research and Analysis
- Collaboration and Partnerships
- Networking
- Engaging with Experts and Professionals
- Monitoring News and Publications
- Engaging with Policy Processes
- Engaging with International Organizations
- Monitoring Funding Opportunities
- Other_____

**B3: Is there any stream of communication between your organisation and STI policymakers?**

Yes/No/Not sure

# ----------

*# If they answered "yes" in B3*

**B4: What are these channels?**

- Public consultations
- Stakeholder meetings
- Citizen panels
- Online platforms
- Other_____

**B5: Please list the forums that you are familiar with.**

[open-ended question]

**B6: How frequently do they occur?**

[multiple choice]

- Once per month
- Once every 3 months
- 2 times per year
- Once per year
- Other_____

**B7: Have you ever participated in any of these forums?**

Yes/No

# ----------

*# If they answered "yes" in B7*

**B8: Do you think your opinion was taken into consideration at the policymaking?**

Yes/No

**B9: What would you like to be different in these forums?**

[open-ended question]

*# If they answered "no" in B7*

**B8: Why did you not participate?**

[open-ended question]

**B9: What would you like to be different in these forums?**

[open-ended question]

# ---------- end----------

*# If they answered "no" or "not sure" in B3*

**B4: Do you believe that policy makers should consider scientific results in the decision-making process? Please give us your opinion using a score from 1 (I DO NOT AGREE) to 10 (I STRONGLY AGREE).**

[1-10 scale]

**B5: Would you like to have an open stream of communication with the STI Policy makers?**

Yes/No

**B6: What channels would you like this open stream to be?**

- Public consultations
- Stakeholder meetings
- Citizen panels
- Online platforms
- Other_____

**B7: How frequently would you like them to occur?**

[multiple choice]

- Once per month
- Once every 3 months
- 2 times per year
- Once per year
- Other_____

**B8: Would you like to monitor the consideration of your feedback in the policy making process? If yes, how?**

[open-ended question]

**B9: Would you consider taking a more active role in this process, such as feeding a citizens' observatory with the community view?**

[open-ended question]

# ----------end----------

**B10: In which area(s) are you interested?**

**[checkboxes]**

a. Energy (Greece)
b. Energy (EU)
c. Agri-food (Greece)
d. Agri-food (EU)

#If in question B10 they chose a or b

**B10a. Which Energy sector interests you more?**

**[checkboxes]**

- Renewable Energy
- Energy Efficiency
- Nuclear Energy
- Fossil fuels
- Other_____

#If in question B10 chose c or d.

**B10b. Which Agri-food sector interests you more?**

**[checkboxes]**

- Sustainable Food Production
- Food Loss & Waste Prevention
- Sustainable Food Processing & Distribution
- Sustainable Food Consumption
- Other_____

#If in question B10 they answered (a), go to Part C

#If in question B10 they answered (b), go to Part D

## 6.3. Part C: Energy-related STI Policymaking

**C1: What, in your opinion, are the most crucial issues pertaining to the Science-Technology-Innovation policy-making process for energy in your country? Please select up to 3.**

[checkbox]

- Mapping and understanding the status-quo
- Research and Development Funding
- Regulatory Framework
- Intellectual Property Rights
- International Cooperation
- Public Awareness and Education
- Market Incentives
- Other_____

**C2: How crucial do you believe it is for energy-related Science-Technology-Innovation policy to prioritize sustainability and environmental protection? Please give us your opinion using a score from 1 (NOT IMPORTANT) to 5 (HIGHLY IMPORTANT).**

[1-5 scale]

**C3: How can the civil society collaborate with governments to guarantee the transparency and accountability of energy-related STI Policymaking?**

- Advocacy and Public Awareness
- Monitoring and Research
- Policy Analysis and Recommendations
- Stakeholder engagement
- Capacity building
- Collaboration and Partnerships
- Independent Auditing and Verification
- Other_____

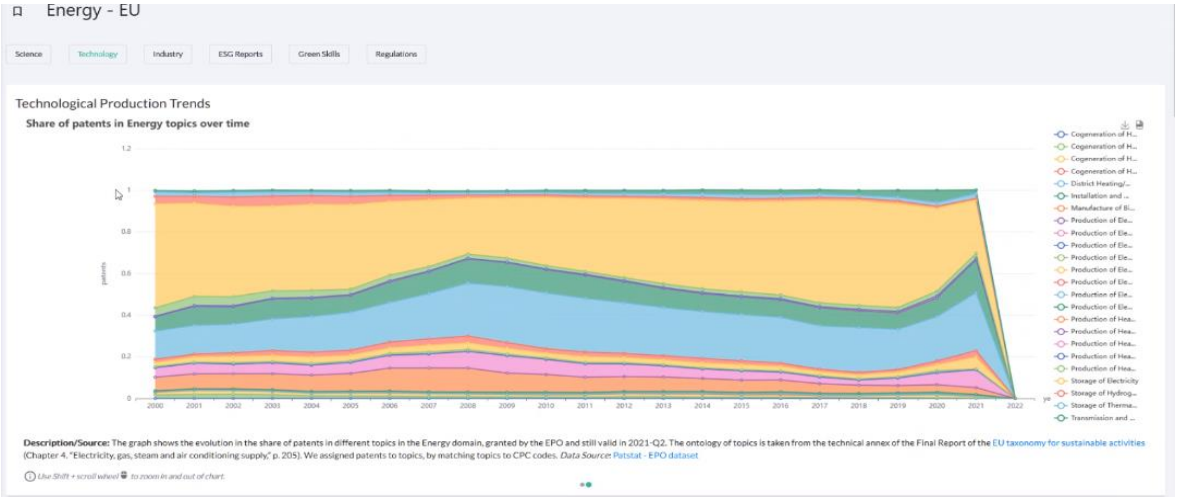
**C4: Please rank the following areas of of energy research based on their potential to significantly reduce greenhouse gas emissions in the coming decades?**

[multiple choice]

- Renewable Energy Technologies
- Energy Storage Technologies
- Advanced Nuclear Technologies
- Energy Efficiency Technologies
- Other_____

**C5: In the graph below, you see the trends in technology production in the Energy domain in the EU. Is there something odd that draws your attention? Did you expect to see something different?**

[open-ended question]




**C5a: Are you an expert on one of the graph's topics? If yes which one?**

#list the topics in appearing order

**C5b: Do you believe that technological production trends are in line with the societal challenges/needs?**

[open-ended question]

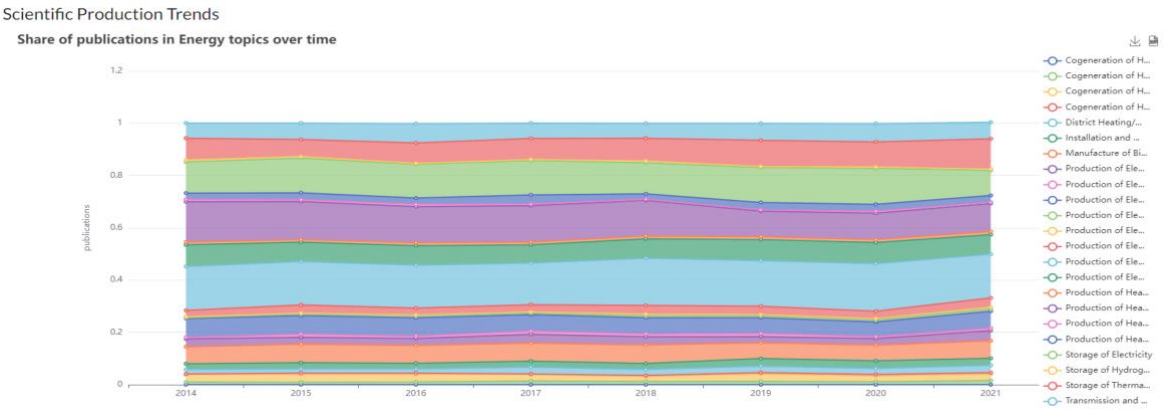
**C5c: Do you believe that technological production trends are in line with the private investments on these fields?**

[open-ended question]

**C5d: What is your opinion about social acceptance of the fields with the highest trends?**

[open-ended question]

**C6: Here is a graph that shows the evolution of publications on different topics in the Energy domain in the EU over time.**




**C6a: Considering your expertise, did you expect to see something different? Is there a specific topic that policy making should focus on and why?**

#list the topics as checkboxes

**C6b: Is technological research in line with scientific research? If not, why?**

[open-ended question]

**C6c: Is society ready for the implementation of the scientific trends, as presented in the graph?**

[open-ended question]

**C6d: Do you believe that scientific production is taking into consideration societal needs?**

[open-ended question]

**C7a: On the topic of your expertise, do you have any examples of successful energy research and innovation collaborations between government agencies, non-profit organizations, and private sector partners?**

[open-ended question]

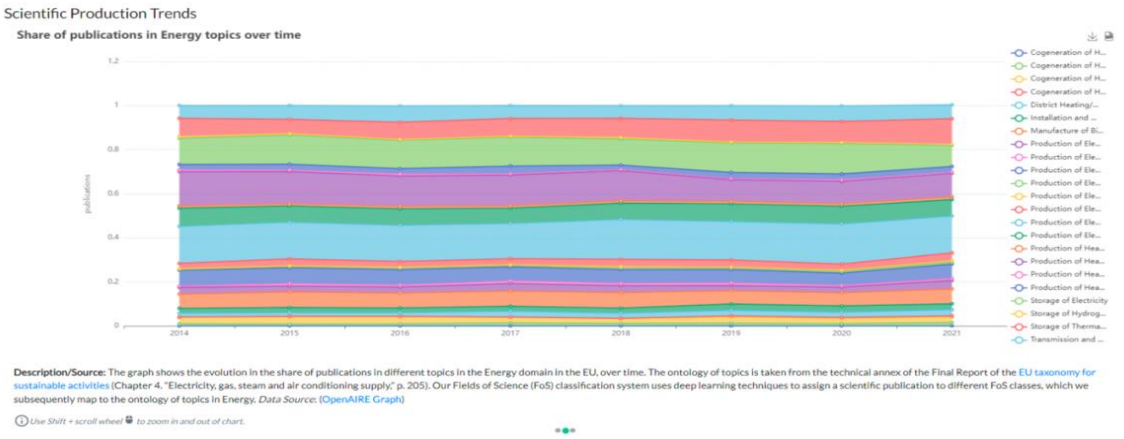
**C7b: On that topic do you have any successful collaboration in mind?**

[open-ended question]

## Renewable Energy

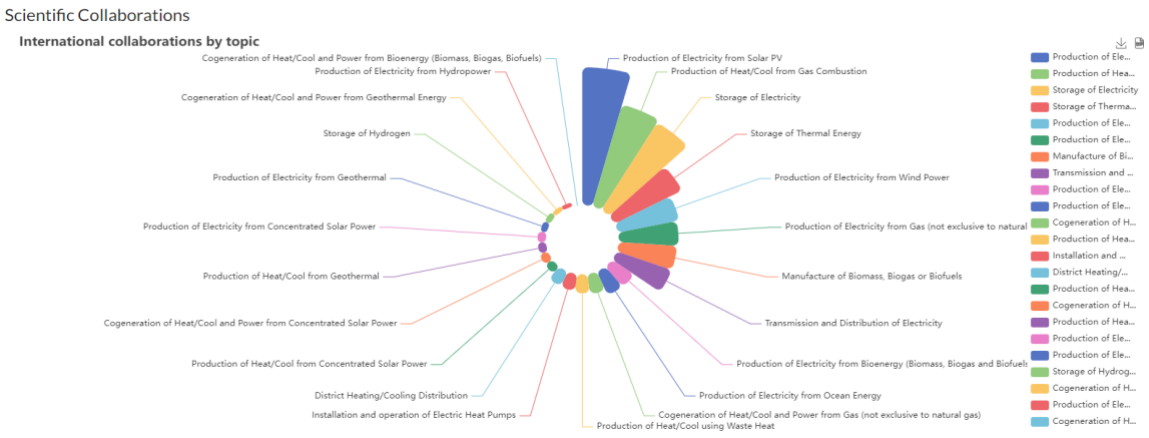
**C8: The graph below shows the evolution in the share of publications in different topics in the Energy domain in the EU over time. How can the government's research policy facilitate the development of state-of-the-art renewable energy technologies and hasten their adoption?**

[open-ended question]




**C9: Here is a chart presenting the international collaborations by topic. In this graph production of Electricity, production of Heat/Cool from Gas combustion and storage of electricity are the three top-collaborative topics. Is there something else you would expect?**

[open-ended question]




**C10: What are the most effective policy instruments and incentives for encouraging the development and adoption of renewable energy technologies? Please select up to three.**

[checkbox]

- Feed-in tariffs
- Tax incentives
- Renewable Portfolio Standards
- Public Investments
- Net metering
- Green bonds
- Other_____

**C11: What are some examples of effective use of any of these instruments that have led to substantial increase in renewable energy investments?**

[open-ended question]

## Energy efficiency

**C12: How can energy efficiency research be more effectively integrated into policy and practice, and what are the barriers to doing so?**

[open-ended question]

**C13: What policy instruments are effective for promoting energy efficiency? Please select up to three.**

[checkbox]

- Energy Efficiency Standards
- Building Codes
- Energy audits and labeling
- Financial incentives
- Public procurement
- Energy Performance Contracts
- Demand-side management
- Other_____

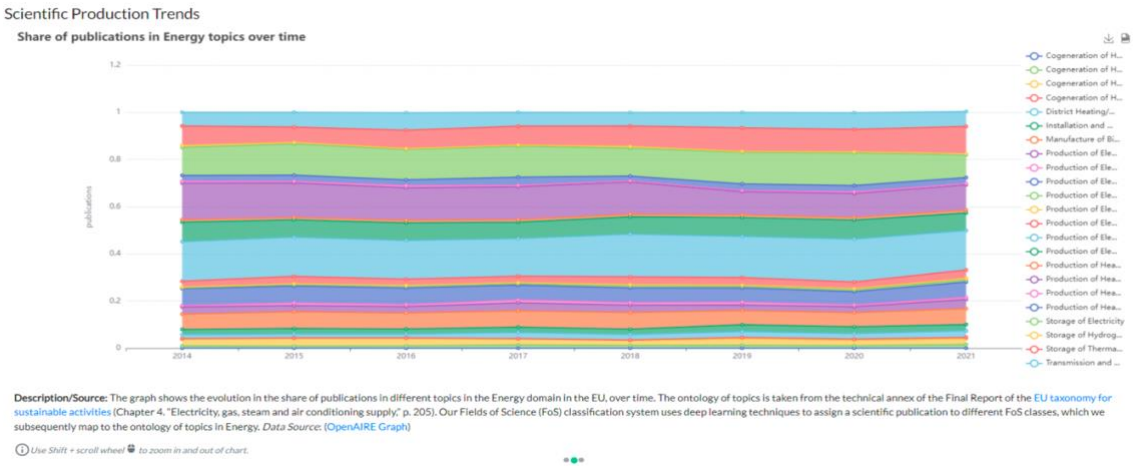
**C14: What are some examples of effective public-private partnerships that have led to substantial energy savings via efficiency measures?**

[open-ended question]

## Nuclear Energy

**C15: The graph below shows the evolution in the share of publications in different topics in the Energy domain in the EU over time. Do you believe that the scientific publications are in line with the development of nuclear energy over time? Is nuclear energy research underfunded?**

[open-ended question]




**C16: What policy tools are most effective for assuring the safety and security of nuclear facilities and materials? Please select up to three.**

[checkbox]

- Regulations and Standards
- Nuclear Safety Culture
- International Agreements
- International Monitoring and inspection
- Physical Security Measures
- Cybersecurity
- Emergency Preparedness and Response
- Other_____

**C17: How can civil society collaborate with governments to guarantee the transparency and accountability of nuclear energy policy?**

- Advocacy and Public Awareness
- Monitoring and Research
- Policy Analysis and Recommendations
- Stakeholder engagement
- Capacity building
- Collaboration and Partnerships
- Independent Auditing and Verification
- Other_____

**C18: What role can nuclear energy play in a decarbonized energy system, and how can governments and non-governmental organizations reconcile the benefits and risks of nuclear energy?**

[open-ended question]

## Fossil Fuels

**C19: How can government research policy facilitate the creation of carbon capture, utilization, and storage technologies to reduce greenhouse gas emissions from fossil fuels?**

[open-ended question]

**C20: What are some effective policy instruments for the transition from fossil fuels to renewable energy sources? Please select up to three.**

[checkbox]

- Renewable Energy Targets
- Feed-in Tariffs
- Net Metering
- Carbon Pricing
- Energy Efficiency Standards
- Research and Development
- Public-Private Partnerships
- Other_____

**C21: What examples of government-led initiatives that have successfully reduced fossil fuel use and emissions, such as carbon taxes or cap-and-trade systems, are there?**

[open-ended question]

## 6.4. Part D: Agri-food-related STI Policymaking

**D1: How interested are you in agri-food-related Science-Technology-Innovation policymaking? Please give us your opinion using a score from 1 (NOT INTERESTED) to 10 (HIGHLY INTERESTED).**

[1-10 scale]

**D2: How conversant are you with your country's current agri-food-related Science-Technology-Innovation policies? Please give us your opinion using a score from 1 (I KNOW NOTHING ABOUT IT) to 10 (I AM HIGHLY KNOWLEDGABLE ON THE TOPIC).**

[1-10 scale]

**D3: What, in your opinion, are the most crucial issues pertaining to the Science-Technology-Innovation policy-making process for agri-food in your country? Please select up to 3.**

[checkbox]

- Mapping and understanding the status-quo
- Research and Development Funding
- Regulatory Framework
- Intellectual Property Rights
- International Cooperation

- Public Awareness and Education
- Market Incentives
- Other_____

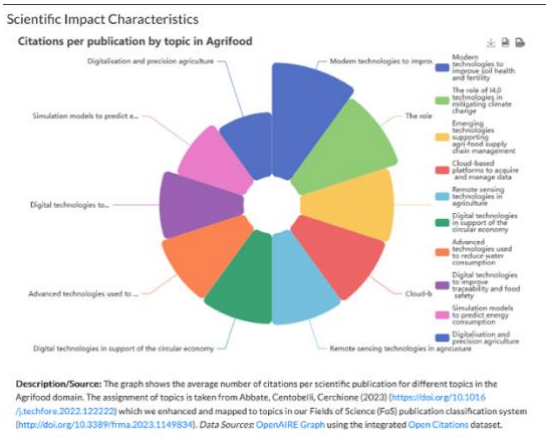
**D4: How crucial do you believe it is for agri-food-related Science-Technology-Innovation policy to prioritize sustainability and environmental protection? Please give us your opinion using a score from 1 (NOT IMPORTANT) to 5 (HIGHLY IMPORTANT).**

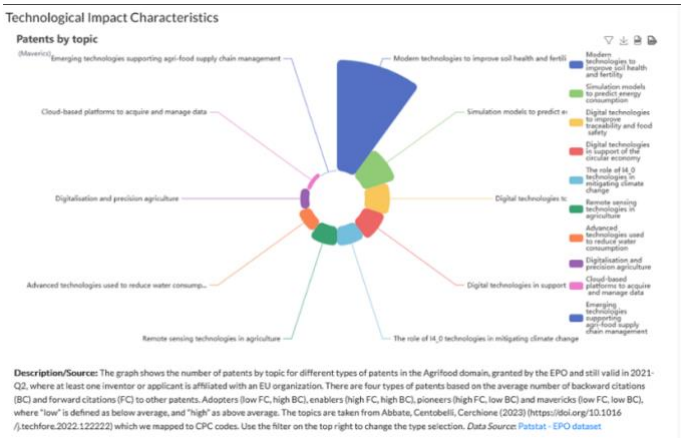
[1-5 scale]

**D5: How can civil society and businesses collaborate to promote sustainable food processing and distribution practices, such as reducing food waste, increasing energy efficiency, and utilizing renewable energy?**

- Advocacy and Public Awareness
- Monitoring and Research
- Policy Analysis and Recommendations
- Stakeholder engagement
- Capacity building
- Collaboration and Partnerships
- Independent Auditing and Verification
- Other_____

**D6: The graphs below show the average number of scientific citations and the number of patents for different topics in the Agri-food domain. Does this graph provide you with the necessary information for assessing the scientific and technological impact of agri-food research? If no, what else would you expect to see in it?**




**D7: Please rank the following areas of agri-food research based on their potential to significantly reduce greenhouse gas emissions in the coming decades?**

[multiple choice]

- Sustainable Food production
- Sustainable Food processing & distribution

- Sustainable Food consumption
- Food loss and waste prevention
- Other_____

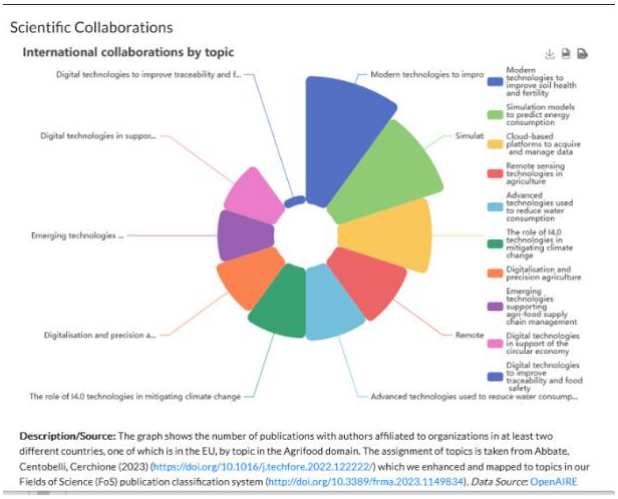
**D8: What are some examples of successful agri-food research and innovation collaborations between government agencies, non-profit organizations, and private sector partners?**

[open-ended question]

## Sustainable Food production

**D9: The graphs below show the scientific collaborations by topic in the Agri-food domain, and the number of patents granted in the EU. How can these publications and new technologies be of use for the adoption of sustainable practices by the farmers?**

[open-ended question]





**D10a: Do you think that the existing policies have taken into account the new technologies/patents and facilitate the development of sustainable food production practices and hasten their adoption and why?**

[open-ended question]

**D10b: Do you think that the upcoming policies are taking into account the new technologies/patents and facilitate the development of sustainable food production practices and hasten their adoption and why?**

[open-ended question]

**D11: What are the most effective policy instruments and incentives for encouraging the development and adoption of sustainable food production practices? Please select up to three.**

[checkbox]

- Conservation payments

- Agricultural subsidies
- Labelling and Certification Programs
- Research and Development Funding
- Education and Outreach Programs
- Taxes and Penalties
- Public Procurement Policies
- Zoning and Land Use Policies
- Other_____

**D12: What are some examples of effective use of any of these instruments that have led to substantial increase in sustainable food production investments?**

[open-ended question]

## Sustainable Food processing & distribution

**D13: How can sustainable food processing & distribution be more effectively integrated into policy and practice, and what are the barriers to doing so?**

[open-ended question]

**D14: What policy instruments are effective for promoting sustainable food processing & distribution? Please select up to three.**

[checkbox]

- Energy Efficiency Standards
- Renewable Energy Incentives
- Sustainable Packaging Requirements
- Sustainable Supply Chain Management
- Transportation and Logistics Efficiency
- Carbon Footprint Labeling
- Research and Development Funding
- Other_____

**D15: What are some examples of effective public-private partnerships that have led to substantial sustainable food processing & distribution via efficiency measures?**

[open-ended question]

## Sustainable Food consumption

**D16: How can policymakers encourage the consumption of plant-based and alternative protein sources in order to reduce the environmental impact of animal agriculture?**

**D17: What policy tools are most effective for assuring the increase in sustainable food consumption? Please select up to three.**

[checkbox]

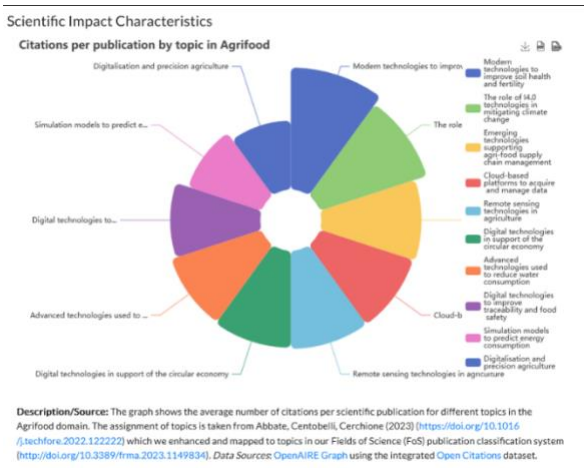
- Nutrition Education and Awareness Campaigns
- Food Labelling and Certification Programs
- Incentives for Sustainable Food Production
- Pricing Policies
- Food Waste Reduction Policies
- Community Gardens and Urban Agriculture
- Research and Development Funding
- Other_____

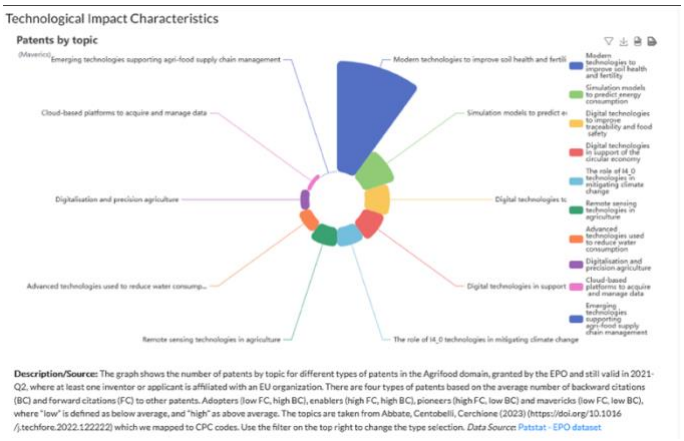
**D18: What are some examples of effective strategies that led behavior change increase in consumption of sustainable food?**

[open-ended question]

## Food loss and waste prevention

**D19: The graphs below show the average number of scientific citations and the number of patents for different topics in the Agri-food domain. Do you think that it provides insights for reducing food loss?**




**D20: How can government research policy facilitate the waste prevention coming from food loss to reduce greenhouse gas emissions from fossil fuels?**

[open-ended question]

**D21: What are some effective policy instruments for the transition from food loss to circular practices in the agri-food sector? Please select up to three.**

[checkbox]

- Food Waste Prevention and Reduction Targets
- Waste-to-Resource Programs
- Support for Sustainable Packaging

- Research and Development Funding
- Extended Producer Responsibility (EPR)
- Green Public Procurement
- Consumer Education and Awareness Campaigns
- Other_____

**D22: What examples of government-led initiatives that have successfully advanced the integration of circular economy practices in food waste, are there?**

[open-ended question]

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**During the IntelComp project, we will provide trainings aiming to familiarize you with the IntelComp tools, STI Viewer and STI Participation Portal. STI Viewer and and STI Participation Portal are a set of well-documented, reliable, and timely indicators that can be divided into multiple dimensions for an in-depth analysis. They are supported by automated text analysis workflows in HPC that rely (mostly) on open data sources. Would you like to be informed and get invited to the upcoming opportunities?**

Yes/No

**If yes, please leave your contact details so we can contact you for future activities.**

**Name and Surname** [Open question]

**Email** [Open question]

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