SURVEY REPORT

# SCIENCE–POLICY IN ACTION: INSIGHTS FOR THE GREEN AND DIGITAL TRANSITION

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# SCIENCE–POLICY IN ACTION: INSIGHTS FOR THE GREEN AND DIGITAL TRANSITION

# Table of Contents

**Foreword** 5

**Lessons Learnt and Recommendations** 6

**1. Introduction** 7

**2. Towards a Framework for Science–Policy Interfaces** 9

**3. Survey Results** 11

3.1. Methodology 11
3.2. Types of science–policy interface activity 11
3.3. Agenda setting 13
3.4. An appraisal of science–policy interfaces for the Green and Digital Transition 14

**4. Examples for the Green and Digital Transition** 17

4.1. Science–policy interactions from policy makers to researchers 17
4.2. Science–policy interactions from researchers to policy makers 19
4.3. Towards science–policy hubs 20

**5. Conclusions and Recommendations** 25

**List of References** 26

**List of Tables** 27

**Annex 1: Organisations Participating in the Survey** 28

**Annex 2: Survey on Science–Policy Interfaces for the Green and Digital Transition** 29

# Foreword

**Science can and shall contribute to improving our societies. It is part of the societal mandate for a better world. Science Europe members aim to improve how scientific research contributes to tackling the climate crisis and digital transition. Today's most crucial challenges are complex multidimensional problems with high degrees of uncertainty that require systemic thinking and radical changes. We all need to develop strategies for the Green and Digital Transition.**

Policy makers are aware of the importance of scientific contributions; researchers are already engaged in providing science-based policy advice. The COVID-19 pandemic crisis made clear to the broader public the importance of science–policy interactions. For decades, scientists have studied and raised awareness of the challenges of climate change. These experiences should reinvigorate new efforts to promote science–policy exchanges for all policy fields. The keyword is 'interaction': between researchers and policy makers, problem conceptualisations and collective actions, green and digital, individuals and organisations.

Based on a survey and qualitative insights, this report addresses these interactions focusing on how to identify, organise, and promote research–policy exchanges. The study provides evidence of science–policy activities and examples of strategies developed by Science Europe members, focusing on the organisational perspective. These interactions are of paramount importance for addressing societal challenges, and Science Europe Member Organisations want to improve them to better tackle societal challenges.

The challenge goes beyond bridging science and policy. Researchers are used to engaging with societal challenges, and policy makers know the importance of their contribution and increasingly look for it. Navigating the extreme complexity of the Green and Digital Transition requires strategies that promote, enable and support science–policy interactions. Science cannot renounce its societal role. On the contrary, we need to reflect on how to upgrade our ambitions making science–policy interactions even better.

We must better engage in decision making, provide scientific advice, and contribute to building trust among actors for more effective collective efforts in tackling societal challenges. This study contributes to the debate towards a framework for science–policy interfaces and how research organisations can support and promote them.

Dr. Marc Schiltz
*President of Science Europe*
*Chief Executive Officer of the Luxembourg National Research Fund (FNR)*

# Lessons Learnt and Recommendations

**This study aims to identify activities for science-informed policy making, map those funded and performed by Science Europe Member Organisations, and suggests recommendations. The lessons learnt and proposals are summarised here and explained in more detail in the rest of the report.**

Science–policy interfaces (SPI) aim to promote science-informed policy making, focusing on its organisational dimensions. Science Europe Member Organisations commonly act as enablers of science–policy interactions by funding or performing policy-oriented research studies, events, and briefings. SPI activities aim to review scientific knowledge to support decision makers in dealing with complex, knowledge-demanding societal challenges and test policy ideas and instruments discussing the implications and consequences of policy decisions.

These activities require expertise and resources and can be carried out internally by research funders and performers or in partnerships with other organisations. Fruitful SPIs require trust between engaged researchers and policy makers, maintaining the integrity of research and facilitating exchange and mutual learning.

The SPI activities can be organised in different ways: from ad hoc policy questions to researchers' bottom-up initiatives. In some cases, more structured science–policy hubs have been set up to provide timely, well-informed science-based contributions to policy makers, often based on longer-term policy agendas. Science Europe members apply these models differently, depending on each organisation's national institutional framework, disciplinary cultures, and mandates. In recent years, growing interest has determined a shift towards more organised SPI activities.

In the case of the Green and Digital Transition, SPI activities are reported to be well-established for the 'green' side, ie. climate and biodiversity policy areas. The 'digital' side is less structured, likely caused by its rapid evolution. Climate policy is often mentioned as a reference for SPI activities thanks to organisations like the IPCC (Intergovernmental Panel on Climate Change) that have been able to raise global awareness on the complexity of climate change for decades, while an equivalent for the digital side has yet to evolve. A general consensus exists on the importance of SPI activities when it comes to managing complex societal challenges.

Based on these lessons, three recommendations are suggested for Science Europe's Member Organisations (and other similar research organisations):

- **Recognise, assess, and support SPI activities.** Although the situation is strongly heterogeneous across Europe, Science Europe members should be compelled to promote, recognise, and, when relevant, reward those engaging in SPI activities. This support requires proper evaluation to assess the effectiveness of SPI activities.

- **Develop strategies for SPI activities.** These strategies require a long-term vision, resources to develop expertise, gathering data and methods for evidence reviews, and networking with similar organisations. SPI activities should be distinct from academic dissemination (ie. from scholars to scholars) and scientific dissemination (from scholars to the general public), as they focus on bridging the gaps between research activities and policy making.

- **SPI activities are relevant in all policy fields.** However, they are crucial in complex/multifaceted and knowledge-demanding societal challenges such as biodiversity changes, climate change, global health issues, digitalisation, and artificial intelligence. These societal challenges require policy makers and the engagement of all societal stakeholders. Trust and mutual respect between researchers and policy makers are crucial, shaping fruitful science–policy interactions.

# 1. Introduction

Scientific research has played a crucial role in identifying and understanding climate change and, more broadly, environmental and social changes, mobilising decision makers for today's most important societal challenges. More recently, digitalisation has emerged, radically changing our societies.

Both societal challenges are interconnected: digital technologies can reduce climate impacts by providing, for instance, online meetings instead of travelling, but the extensive use of digital equipment and data centres radically increases energy consumption. These complex, intertwined challenges of the so-called 'Twin Transition' requires concurrent scientific research to understand their implications and policy actions to support positive changes and reduce (or minimise) adverse effects. For these bidirectional interactions, a dialogue between researchers and policy makers is needed.

This report aims to contribute to a framework for science–policy interfaces (SPI) from an organisational perspective, maps the SPI activities of Science Europe Member Organisations, and suggests recommendations on how to improve them. The objective is to develop Science Europe's strategic priority to "strengthen the role and contribution of science in tackling societal challenges" (Science Europe, 2021a). Specifically, the report contributes to the strategic actions to "support transdisciplinary research (and Open Science) as key enablers for sustainable development" and to "promote the role of science in shaping input for sustainable development beyond 2030" (Science Europe, 2021b). This study is associated with a similar publication entitled 'Interdisciplinary research for the Green and Digital Transition' (Dotti & Mobjörk, 2022).

The specific objectives for this report are as follows:

1. Contribute to the development of a framework for science-policy interfaces as specific activities promoting and facilitating science-informed policy making.

2. Map the SPI activities carried out by Science Europe members, identifying main characteristics, experiences, practices, and results with a specific angle to the Green and Digital Transition.

3. Propose recommendations to Science Europe members (and similar research organisations) to promote, support, evaluate and, when relevant, reward SPI activities separately from research and academic dissemination or science communication and outreach activities.

Science–policy interactions are complex, and an extensive scientific and policy debate exists (Hoppe, 2005; Maas, Pauwelussen, & Esther, 2022; Gluckman, Bardsley, & Kaiser, 2021; MacKillop, Quarmby, & Downe, 2020; Oliver, Hopkins, Boaz, Guillot-Wright, & Cairney, 2022). Several reports and initiatives have recently been launched that react to the emergence of misinformation, fake news, and the so-called 'post-truth' politics that caused a period of discredit for science-based policy advice (SAPEA, 2019). On the contrary, the recent COVID-19 pandemic became a turning point that brought scientific advice back to play a crucial role in decision making; policy makers had to make rapid, complex decisions in extreme uncertainty (OECD, 2020).

In this field, the role of research funding and performing organisations should be discussed as they are part of broader science–policy ecosystems. The roles of research funders and performers also involve disseminating research findings and outreach to (potential) stakeholders, including policy makers. Policy makers are distinct as they are often a critical source for public research funding and have a central role in tackling common societal challenges, such as the climate crisis and digitalisation. Researchers can benefit from interacting with policy makers to align research and policy agendas, from providing a new understanding of societal challenges to contributing to addressing them. Nonetheless, the interactions between scientific research and policy making imply complex dynamics. This multi-faceted arena requires further elaboration, both theoretically and practically: the policy engagement of researchers might create tensions with scientific integrity, and policy demands might conflict with scientific rigour. For instance, the urgency of policy decisions might contend with the need to scientifically validate findings.

Furthermore, political decisions are based on multiple inputs, not only scientific evidence: collective values and individual motivations are also

relevant for decision making. These elements are part of the so-called 'Technocratic Dilemma' (Stern, 2022): science and expertise are requested and questioned at the same time. While scientific research is demanded, a discussion emerges on what type of (scientific) knowledge is needed. Providing knowledge to decision makers also questions the broader challenge of science and democracy: how to guarantee access to relevant knowledge for all stakeholders involved in democratic decision making processes. Finally, science does not always have immediate responses for every policy challenge, and other factors should also be considered.

The Green and Digital Transition case covers several knowledge-demanding societal challenges with emerging policy concerns, especially regarding climate change, loss of biodiversity and global health threats, and the impacts of rapidly developing digital technologies. This extremely high degree of complexity requires new scientific knowledge to tackle the (often extreme) uncertainty in policy decisions with relevant trade-offs, potential synergies and (unknown) feedback reactions. These 'wicked problems' call for enhanced science–policy interactions (Head, 2019). The Green and Digital Transition is a relatively new policy area with rapidly evolving aspects but evident long-term implications. Decision makers are aware of this extreme complexity and are looking for examples in related areas for scientific evidence to support policy making.

## Structure of this report

The following chapter contributes to the definition of a framework for SPI activities and existing models. Chapter 3 presents the results of a survey held among Science Europe Member Organisations on science–policy interfaces among Science Europe Member Organisations, while Chapter 4 discusses national cases from Science Europe Member Organisations. Finally, Chapter 5 concludes with policy lessons, limitations, and future venues for discussion.

# 2. Towards a Framework for Science–Policy Interfaces

Science–policy interactions are complex and multi-faceted (SAPEA, 2019). Science is particularly relevant to policy makers who face complex, uncertain situations. The COVID-19 pandemic is the most recent, striking example of a 'wicked problem' with extreme degrees of complexity and uncertainty. Societal challenges like the climate crisis, biodiversity changes, global health threats, digitalisation, and artificial intelligence call for science-informed decision making. While information about these challenges is readily available within a few clicks, scientific contributions to policy making are more complex as information should be understood, agendas aligned, and collective learning dynamics in place.

The field of science–policy interactions is the scene of a longstanding discussion (Hoppe, 2005) that recently received growing interest after a period of crisis caused by the dissemination of fake news, post-truth politics, and pseudoscience (SAPEA, 2019). New functions are emerging to navigate this complexity: the so-called 'knowledge brokers' aim to facilitate these interactions (MacKillop, Quarmby, & Downe, 2020). Specific attention is now being devoted to the co-production of knowledge by multiple actors, overcoming the simplistic, linear model of 'supply & demand' from researchers to decision makers (Maas, Pauwelussen, & Esther, 2022). Acknowledging this complexity is crucial to avoiding the 'technocratic dilemma' (Stern, 2022) with science (implicitly) 'replacing' democratic dynamics: scientific research can inform policy making processes, but it should be just 'one of' the input for decisions, not the only one. Furthermore, science does not always have all answers for the policy issues at stake.

In Europe, the European Commission has been particularly active, setting up SAPEA (Science Advice for Policy by European Academies), a structured mechanism for science-based policy advice that gathers evidence across the scientific community. Alongside this, the EU Joint Research Centre published a Handbook on 'Science for policy' (Šucha & Sienkiewicz, 2020) and organised several national workshops that culminated in the publication of a Commission Staff Working Document on 'Supporting and connecting policy making in the Member States with scientific research' (European Commission, 2022). Other relevant European actors are the European Academies' Science Advisory Council (EASAC) and the Young Academies Science Advice Structure (YASAS). Due to this growing interest, the International Network for Government Science Advice (INGSA) has become an even more relevant forum for science-based policy advice. These experiences show the growing interest and articulation of the science–policy sphere with new actors and practices emerging.

In this context, Science Europe aims to "strengthen the role and contribution of science in tackling societal challenges" (Science Europe, 2021a). Specifically, scientific contributions can support decision makers in tackling 'wicked' problems, such as the Green and Digital Transition, where the importance of science-informed contributions is crucial. However, science–policy interactions are a field that is not yet fully structured, and the terminology is not fully agreed (Šucha & Sienkiewicz, 2020). Therefore, this report proposes the following working definition to identify the activities and existing models of science-policy interfaces from an organisational perspective, as found in a dedicated survey among Science Europe Member Organisations:

**WORKING DEFINITION**

'Science–Policy Interfaces' refer to all the activities carried out by research organisations, such as those funded or performed by Science Europe's Members, that aim to promote science-informed policy making.

This proposed working definition, focused on the organisational perspective, acknowledges the complex processes of social interactions between research and policy making. In this perspective, Science Europe members (and other similar organisations) act as 'boundary organisations', actively bridging the gap between researchers

and policy makers (Hoppe, 2005). The dialogue between researchers and policy makers aims to co-produce policy-relevant research and support science-informed policy making (Maas, Pauwelussen, & Esther, 2022). The interaction between policy making and science requires an active role in making sure that policy questions are addressed by the relevant scientific community and that science is able to provide timely, relevant and rigorous contributions (MacKillop, Quarmby, & Downe, 2020; Gluckman, Bardsley, & Kaiser, 2021). This definition excludes unplanned, informal interactions between researchers and policy makers, which might be spontaneous or impossible to track. On the contrary, the objective is to provide evidence of those activities purposefully oriented to promote science-informed policy making.

Science Europe Member Organisations that have SPI activities are considered enablers of science–policy interactions, facilitating the exchange between researchers and policy makers. On one side, engaged researchers are interested in contributing to policy discussions; on the other, policy makers are keen on and looking for science-based contributions. This matching function differs from funding or performing research and communicating scientific results to a broad audience. It can be articulated around two main categories of activities acting 'in between' policy and research activities: a) synthesising technical/scientific evidence to review policy-relevant scientific contributions (Maas, Pauwelussen, & Esther, 2022) and b) testing policy ideas with international comparisons and feasibility studies (Oliver, Hopkins, Boaz, Guillot-Wright, & Cairney, 2022).

The first function, the most common, aims to synthesise scientifically produced knowledge on a selected topic by reviewing publications, reports and – possibly – other sources of information (such as by consulting experts). This activity requires expertise in the selected topic and an understanding of the policy challenges, and it might involve internal staff and external experts. The objective is to provide research-based, policy-oriented reports (see Chapter 4 for more details). The second function aims to integrate science-based approaches into policy making. While governments and parliaments are increasingly sought out for science-informed advice, the capacity to provide them should be built over time, acknowledging the specificities of the policy-making processes and the availability of policy-oriented research communities. As priorities in the two communities might change, specific attention should be devoted to the agenda-setting for science–policy interactions. Chapter 4 discusses some national examples from Science Europe Member Organisations.

Both functions can be carried out internally or in partnership with other organisations. This aspect introduces the importance of networking in SPI activities, as synthesising policy-relevant research should be more comprehensive than the national research system: policy-relevant findings might come from everywhere. This networking function is needed for both small and large countries as research, to a large extent, is undertaken in an international context. SPI activities are also context- and discipline-specific as they involve different cultures and norms, with some scientific or policy communities more accustomed to mobilising and engaging with each other. In the case of the Green and Digital Transition, previous reports have shown the importance of inter-/multi-disciplinary approaches (Dotti & Mobjörk, 2022). Finally, SPI activities require 'space and time': resources, organisations, and willingness to engage (European Commission, 2022).

A fundamental precondition for SPI activities is building respect and trust to enable exchanges between engaged researchers and curious-minded policy officers. Preparing policy briefs and organising 'closed-door' workshops or public science–policy conferences requires engagement and commitment from both sides. Even more, when policy makers ask scientists to 'test' policy ideas assessing feasibility or comparing with other countries, trust in their capacities is implied.

SPI activities are reported to have different degrees of effectiveness, depending on the level they happen at. The interactions between principal investigators, early-career researchers, and policy officers are reported to be particularly effective for policy making and implementation. In contrast, the involvement of senior academics and high-level public managers or politicians is reported to be more relevant for agenda setting.

Within this conceptualisation, the organisation of SPI activities can follow three fundamental models: 1) ad hoc policy questions, 2) bottom-up initiatives, and 3) structured science–policy hubs. In the first model, the political level asks specific policy questions to research organisations, which

are expected to provide science-based contributions based on existing knowledge. The initiative comes from decision makers and usually takes the form of a review of the scientific literature, eventually involving external experts. The second model starts with researchers proposing policy-relevant contributions to decision makers. This approach is the opposite of the previous one, as the initiative comes from researchers aiming to contribute to the public debate. In the third model, the interactions between policy makers and researchers are structured with hubs or platforms enabling multiple interactions in both directions. These interactions can take different forms, from funding for policy-relevant contributions to matchmaking events or exchange programmes. The underlying idea is to structure the science–policy interactions with dedicated resources, regular exchanges and, most importantly, a longer-term vision supporting and promoting science-informed policy making.

# 3. Survey Results

## 3.1. Methodology

This section presents a thematic survey of Science Europe's Member Organisations (see the list in Annex 1). It combined a questionnaire and a focus group.

The questionnaire was prepared by a thematic task force within the Science Europe Working Group on the Green and Digital Transition and ran from April to May 2022.

The focus group with respondents to the questionnaire and Working Group members took place in June 2022, and was based on preliminary findings from the questionnaire.

**Table A** **Profile of respondents**

| **Does your organisation fund or perform science–policy interfaces?** | | | |
|---|---|---|---|
| | YES | NO | TOTAL |
| Organisations with a research funding mission (RFO) | 14 | 3 | **17** |
| Organisations with a research performing mission or both (RFO+RPO) | 6 | — | **6** |
| **Total** | **20** | **3** | **23** |

As shown in Table A, the questionnaire was answered by 20 out of 38 Member Organisations,[1] mainly research funding organisations (RFOs). Three organisations declared not to have SPI activities; thus, they were excluded from the analysis. The total number of organisations surveyed was 20. The distribution of respondents between research funders and research performers is in line with the overall composition of Science Europe members.

## 3.2. Types of science–policy interface activity

The objective of the survey was to map the SPI activities of Science Europe Member Organisations. Table B shows a particularly rich and articulated landscape of SPI activities. The first aspect is that both RFO and RPO fund and perform SPI activities. This finding confirms the nature of SPI as 'in-between' activities where funders and performers can directly perform these activities or fund other actors in the science–policy ecosystem enabling multi-actor interactions.

1. Two organisations, the Science Fund of the Republic of Serbia and the National Research Foundation of Ukraine, joined Science Europe after the survey's launch; thus, they were not involved in the process.

**Table B** **Types of SPI activities**

| Does your organisation fund or perform the following activities as science–policy interfaces? | RFO (*n*=12) | | | RFPO (*n*=5) | | | ALL | | |
|---|---|---|---|---|---|---|---|---|---|
| | F&P | P | F | F&P | P | F | F&P | P | F |
| Policy-oriented research studies | 8% | — | 100% | 40% | 40% | 20% | **18%** | **12%** | **76%** |
| Policy-oriented events (workshops, seminars, conferences) | 50% | 8% | 33% | 80% | 40% | — | **59%** | **18%** | **24%** |
| Policy briefs/notes summarising scientific findings | 50% | 17% | 17% | 80% | 40% | — | **59%** | **24%** | **12%** |
| Training researchers to perform policy-oriented activities | 8% | 8% | 25% | 20% | 20% | 40% | **12%** | **12%** | **29%** |
| Exchange of staff between research-performing and policy organisations | 8% | — | 25% | 60% | — | — | **24%** | **—** | **18%** |
| In-house units proactively scanning available research to inform policy makers | — | 25% | 8% | 60% | 40% | — | **18%** | **29%** | **6%** |
| Scientific expert panels to perform policy-oriented activities or to directly inform policy makers | 17% | 8% | 8% | 40% | 40% | — | **24%** | **18%** | **6%** |
| Knowledge broker actors | 17% | — | 33% | 60% | 20% | — | **29%** | **6%** | **24%** |

*F = Funding* *P = Performing*

The most common activity is 'policy-oriented research studies', funded or performed by Science Europe members. The second most common activities are 'Policy-oriented events' such as workshops, seminars, conferences, and 'Policy briefings summarising scientific findings'. These activities are both funded and performed by research funders and performers, showing that different types of organisations carry out different types of SPI activities. While the staff exchange between research and policy organisations is the least common (see next section for some examples), one-third of respondents reported having in-house units scanning research for policy-relevant findings or acting as knowledge brokers. This set of activities provides a vibrant mix of instruments to promote science-informed policy making, whereas the testing of policy ideas seems less common.

Table C summarises the type of support by Science Europe Member Organisations. They mainly provide resources and administrative staff for SPI, not specialised scientific staff. Respondents could not provide exact figures about the staff and budget they devote to SPI activities as these are often streamlined across their organisations. Nonetheless, participants in the focus group reported that these activities are progressively being structured, especially after the COVID-19 pandemic when the demand for science-informed policy making grew substantially.

**Table C** **Support for SPI activities**

| What type of support do you provide to the scientific experts for working in science–policy interfaces? | | | |
|---|---|---|---|
| | **RFO** (*n* = 11) | **RFPO** (*n* = 5) | **ALL** |
| Administrative supporting staff | 4 | 4 | 8 |
| Scientific staff | 0 | 0 | 0 |
| Resources to perform policy-oriented studies | 10 | 3 | 13 |
| Resources to organise policy-related events | 8 | 3 | 11 |
| There is no support available | 3 | 0 | 4 |

Science Europe members have progressively structured the SPI activities, and this development is strongly diversified across countries. While these differences often depend on the institutional framework, an open question is about the role of experts: RFOs look for scientific experts acting on an individual basis, while RPOs aim to have experts representing the whole institution. Participants in the focus group pointed to the need to clarify the 'mandate' of SPI, which is vaguely defined in most countries.

## 3.3. Agenda setting

The definition of agendas has been identified as a crucial aspect of SPI activities. Table D shows the main types of actors interacting with Science Europe Member Organisations for this purpose: 'Ministries and other governmental bodies' (ad hoc policy questions) and 'researchers (bottom-up approach)' are the two main actors setting the agenda for SPI activities. This table shows a relatively limited role played by the political levels (minister's cabinets and parliaments), whereas one-third of respondents reported that they decide their SPI agendas. No significant differences are reported between the categories of respondents (RFO and RFPO).

Both research funders and performers encourage the bottom-up approach, though research-performing organisations are particularly likely to adopt this approach, led by researchers interested in contributing to policy making. The focus group reported that interactions among higher political and administrative levels and most senior scholars tend to focus on setting the agenda for SPI interactions. In contrast, the dialogue between the administrative staff and researchers enters more into the technical aspects of policy issues, specifically regarding implementation and evaluation. In this perspective, the SPI can be more comprehensive, covering all aspects of the policy making cycle and involving different types of scientific expertise.

**Table D** **Agenda setting for SPI activities**

| **Who decides the topics of science–policy interfaces?** | | | |
|---|---|---|---|
| | **RFO** (*n*=13) | **RFPO** (*n*=5) | **ALL** |
| Minister's cabinet(s) | 38% | 33% | 37% |
| Ministries or other bodies within the national government | 77% | 83% | 79% |
| National/federal parliament | 38% | 33% | 37% |
| Regional governments/councils | 23% | 33% | 26% |
| Local governments | 15% | 17% | 16% |
| International bodies (such as IPCC, UN) | 15% | 50% | 26% |
| Researchers (bottom-up approach) | 62% | 83% | 68% |
| Civil society/NGOs | 8% | 67% | 26% |
| Your own organisation | 31% | 67% | 42% |

## 3.4. An appraisal of science–policy interfaces for the Green and Digital Transition

**Table E** **Areas of the Green and Digital Transition where SPI activities are in place**

| **For which of the following areas in the Green and Digital Transition does your organisation have science–policy interface activities?** | | | |
|---|---|---|---|
| | **RFO** (*n*=12) | **RFPO** (*n*=4) | **ALL** |
| Climate-sustainable development | 9 | 4 | 13 |
| Ecological sustainable transition | 7 | 4 | 11 |
| Digitalisation for the green transition | 4 | 3 | 7 |
| Greening digital technologies | 4 | 2 | 6 |
| Human-centred digitalisation | 5 | 2 | 7 |

Table E shows the areas of the Green and Digital Transition where Science Europe members declare having SPI activities. These findings show that climate and ecology-related SPI activities are more common than those on the 'digital' side. The main reason for this difference is that climate change (and, in general, the environment) is a longstanding societal challenge with well-established science–policy interactions at least since the 1980s. The IPCC is often mentioned as the primary reference in this field. On the contrary, digitalisation is a far more recent societal challenge with an incredible speed of evolution for both the digital sphere (for example, internet and artificial intelligence) and the hardware component (supercomputing and diffusion of electronic devices).

The survey was also the opportunity to ask for a self-evaluation of funded and performed SPI activities targeting different aspects related to the Green and Digital Transition. The responses are shown in Table F and Table G. Respondents report general satisfaction with the usefulness of both funded and performed SPI activities. The 'green' themes, such as climate-sustainable development and sustainable ecological transition, tend to have higher results and the 'digital' transition lower. Participants in the focus group explained that environment-related SPI activities have been structured for decades, while digital ones are more recent and quickly evolving, thus yet to be structured. These findings are common between funded and performed SPI activities.

**Table F** **Appraisal of funded SPI activities for the Green and Digital Transition**

| To what degree does your organisation agree that the SPI activities it FUNDS contribute to having science-informed policy making for the Green and Digital Transition in the following areas? | | | |
|---|---|---|---|
| *n*=13 | (STRONGLY) AGREE | NEUTRAL | (STRONGLY) DISAGREE |
| Climate-sustainable development | 10 | 3 | 0 |
| Ecological sustainable transition | 10 | 2 | 1 |
| Digitalisation for the green transition | 8 | 4 | 1 |
| Greening digital technologies | 6 | 5 | 2 |
| Human-centred digitalisation | 8 | 3 | 2 |

**Table G** **Appraisal of performed SPI activities for the Green and Digital Transition**

| To what degree does your organisation agree that the SPI activities it PERFORMS contribute to science-informed policy making for the Green and Digital Transition in the following areas? | | | |
|---|---|---|---|
| *n*=5 | (STRONGLY) AGREE | NEUTRAL | (STRONGLY) DISAGREE |
| Climate-sustainable development | 5 | 0 | 0 |
| Ecological sustainable transition | 5 | 0 | 0 |
| Digitalisation for the green transition | 4 | 0 | 0 |
| Greening digital technologies | 3 | 2 | 0 |
| Human-centred digitalisation | 3 | 2 | 0 |

**Table H** **Most relevant activities for SPI**

| Please rank the most relevant SPI activities funded or performed by your organisation to promote science-informed policy making for the Green and Digital Transition? | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | FUNDED BY RFO | | | FUNDED BY RFPO | | | PERFORMED BY RFPO | | |
| | SCORE | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Policy-oriented research studies | **97** | 13 | 0 | 1 | 3 | 0 | 1 | 3 | 0 | 0 |
| Policy-oriented events (workshops, seminars, conferences) | **44** | 0 | 7 | 4 | 1 | 0 | 0 | 1 | 3 | 0 |
| Policy briefs/notes summarising scientific findings | **36** | 1 | 4 | 2 | 0 | 2 | 1 | 1 | 1 | 2 |
| In-house units proactively scanning available research to inform policy makers | **19** | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 0 |
| Scientific expert panels to perform policy-oriented activities or to directly inform policy makers | **18** | 0 | 2 | 4 | 0 | 0 | 4 | 0 | 0 | 4 |
| Exchange of staff between research-performing and policy organisations | **10** | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| Fund knowledge broker actors | **9** | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 |
| Training researchers to perform policy-oriented activities | **1** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

In Table H, respondents reported an overwhelming consensus on the importance of having 'Policy-oriented research studies'. This SPI activity is the most relevant to all respondents, RFOs, RFPOs, and RPOs. The second most relevant activity is 'Policy-oriented events', and then 'Policy briefs/notes summarising scientific findings'. These activities constitute the core of SPI according to all Science Europe members, whereas training, funding knowledge brokers and staff exchange are judged less relevant. These findings set a clear direction for Science Europe Member Organisations: funding and performing policy-oriented research studies gathering scientific evidence is the first of SPI activities, followed by related events and briefs.

# 4. Examples for the Green and Digital Transition

After the questionnaire, a qualitative analysis of SPI activities carried out by Science Europe members is presented in this section. Member Organisations have different mandates for SPI activities, and these examples aim to provide more qualitative elements of SPI activities chosen among those having more advanced and developed strategies. The objective is to present examples that can inspire other organisations, acknowledging the different contexts, mandates, and objectives.

The experiences provided by Science Europe members are grouped around three fundamental models of SPI activities: 1) ad hoc policy questions from policy makers to researchers, 2) bottom-up initiatives from researchers to policy makers, and 3) structured science–policy hubs enabling the interactions (see Chapter 2). The objective is to explain how these models work with some examples, although noting that the distinction is not always straightforward. Research organisations can combine the three models depending on their mandates, contexts and needs.

## 4.1. Science–policy interactions from policy makers to researchers

**The first model of ad hoc policy questions considers the case of specific policy questions from policy makers to research organisations, which are invited to gather existing, available scientific knowledge around the specific, societally relevant issue(s). This model allows for 'fast' and very flexible science-informed advice, as it aims to gather already existing knowledge. Thus it does not imply new research is being conducted. Specifically, in the case of RFOs, policy makers expect them to gather evidence starting from the research they funded, but not limit the analysis to that source. Similarly, RPOs are called based on the knowledge and experience they have acquired.**

This approach is adopted by, among others, the Independent Research Fund of Denmark (DFF) and the Croatian Science Foundation (HRZZ). The Danish national government and parliament requests the DFF to contribute to the debate with different types of policy advice/research: hearing statement for relevant laws and research-related questions; nomination and appointments to councils, boards and committees; consultancy on cases from other councils and foundations; international hearing cases. Similarly, the HRZZ presents its yearly activities, including those related to the Green and Digital Transition, to the national parliament (see the 2021 edition and the joint HRZZ–Elsevier report about funded research projects). Another example comes from the French National Research Agency (ANR), which regularly receives requests from the French national parliament to provide scientific expertise based on the funded research. ANR is requested to provide the research outcomes on specific topics to support, for example, the works of the Parliamentary Commission for sustainable development or related working groups such as the one for the French climate law. A common feature among these SPI activities is how they contribute to parliamentary discussions and decisions, including those related to the Green and Digital Transition, by summarising available research knowledge on topics requested by national policy makers.

The Science Foundation Ireland (SFI) has two main instruments for funding challenge-oriented research. First, the SFI Challenges programme aims to fund research to amplify Ireland's innovation capabilities to create sustainable, equitable, and

innovation-led growth. This programme follows up a bottom-up approach inviting researchers to address topics related to societal challenges, mainly linked to the UN's Sustainable Development Goals, such as 'AI for Societal Good Challenge', 'Plastics', 'Zero Emissions', 'Food', and 'Climate Actions'. Researchers should address these policy-oriented societal challenges with visionary, inspirational, but achievable projects.

Second, SFI recently launched the 'National Challenge Fund', providing ambitious researchers the chance to make a difference by developing solutions to key challenges in the areas of Green Transition and Digital Transformation. This second programme adopts a solution-focused approach to research funding that uses prizes, phases, defined timelines, teamwork, mentorship, and competition to direct research activity towards addressing pressing societal and economic problems. It encourages collaboration between government departments, agencies, enterprises, the academic research community, and societal stakeholders to identify challenges and enable action to address green transition and digitalisation targets set at the government level.

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

In Portugal, the Foundation for Science and Technology (FCT) developed fifteen thematic R&I agendas mobilising experts and companies to identify national challenges and opportunities in the medium and long term. Setting the agenda helps science–policy interactions by defining the societally relevant fields for research funding calls and orienting research activities towards policy-relevant topics. The current agenda includes areas related to the Green and Digital Transition, such as 'Climate Change', 'Circular Economy', 'Ocean', 'Cyber-physical Systems and Advanced Forms of Computation and Communication', 'Sustainable Energy Systems' or 'Labor, Automation and Job Qualification in Portugal'. Another example is INCoDe.2030, a national government's digital development strategy focused on promoting digital inclusion and literacy, which also involves FCT as a partner. The Portuguese examples show how a research funding organisation aligns the funded research activities to address policy-relevant topics at the national level.

ue-fiscdi

The Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) in Romania has the mandate from the national Ministry of Research, Innovation and Digitalisation (MCID) to participate in joint transnational funding initiatives. Among others, UEFISCDI addresses the topic of urban sustainable development and urban transformation, green energy transition, clean energy transition, biodiversity and climate change-related topics (see JPI Urban Europe and the Driving Urban Transitions Partnership, DUT). These initiatives aim to fund policy-relevant research and connect Romanian researchers with European counterparts. Since October 2022, UEFISCDI co-ordinates the Horizon Europe-funded CapaCITIES project, gathering more than 60 European partners. The ambition is to connect the ongoing and new initiatives that work towards supporting the implementation of the Horizon Mission 'Climate Neutral and Smart Cities' by building a trans-national mission alliance exchange space, transition lab workshops, thematic capacity-building activities for national authorities and mutual learning exercises and exchanges. Thanks to this experience, UEFISCDI hosts the MCID-led 'Mirror Mission Cities Hub Romania' (M100) to connect the national and regional authorities with academic and civil society organisations working to support the green transition at the city level. The objective is to develop science-based actions to achieve the climate neutrality objectives. Finally, UEFISCDI is actively participating in similar initiatives on the Clean Energy Transition Partnership (CETP) and BIODIVERSA+, together with other Science Europe members. These initiatives show how a research funding organisation supports policy makers by orienting research towards societally relevant topics and creating cross-border co-operations to enhance research capacities.

## 4.2. Science–policy interactions from researchers to policy makers

**The second model refers to the bottom-up initiatives led by researchers to promote science-informed policy making. This model is similar to the first one as the initiative comes from the research side towards policy makers, and it might not be easy to identify as initiatives happen thanks to personal contacts, specific opportunities, or different mandates. Nonetheless, many Science Europe members work to identify and support these initiatives, providing organisational support at various levels.**

Belgium's Research Foundation Flanders (FWO) is an example of a bottom-up approach. As a research funder, FWO has different schemes for policy-oriented research, including the matchmaking of researchers and policy makers and the engagement of stakeholders. However, these activities start from the research communities in a bottom-up approach, and then FWO supports them by providing funding for research performers and universities or directly organising ad hoc research–policy events. In this perspective, FWO supports SPI activities indirectly, starting from the researchers' initiative. Similarly, Luxembourg's Fund for National Research (FNR) has a bottom-up funding approach where beneficiaries are supported for their SPI activities. The main lesson from these examples is that SPI activities are recognised as not being part of research activities. Nonetheless, research funding agencies recognise and support them, making these expenditures eligible or organising them directly.

Both the Academy of Finland (AKA) and the British UK Research and Innovation (UKRI) have set up internal systems to promote the emergence of policy-oriented in-house expertise. The idea is to scan internal research activities providing incentives to bring them to the policy sphere. In this way, both organisations can valorise their knowledge and adjust SPI activities to disciplinary specificities, as some fields are keener on science–policy interactions than others. This scanning is part of the organisational structure, making SPI activities part of their mandate.

In Hungary, the ELKH's Centre for Ecological Research (CER) is part of the Eco Advance project to gather the research communities active in freshwater restoration. The project aims to 1) support public authorities and other organisations engaged in ecosystem restoration to implement and prioritise innovative restoration approaches; 2) increase evidence of the potential of innovative restoration approaches to halt biodiversity loss and contribute to carbon storage in sediments and soils; and (3) build the foundations for large-scale restoration projects and related investments. These initiatives come from research working to bridge the gap with policy makers in the crucial field of freshwater and wetland ecosystems, which have experienced severe degradation since the early twentieth century. CER is a member of the National Laboratory on Water Science and Water Security, which started in 2022, to improve water-management activities affecting Hungary's watercourses (rivers, lakes, floodplains and groundwater), supporting national and local policy makers.

In 2016, Croatia's HRZZ launched a one-off programme to support research and development activities in the area of climate change. HRZZ also manages regular scientific research programmes (for example, research projects and Installation Research Projects) that cover all scientific areas, including climate change-related topics. These programmes offer regular workshops for Croatian universities and stakeholders to provide necessary information and guidance on the funding schemes.

These programmes are further developed internationally with the ERA-NET BlueBio Project focused on aquatic bio-resources, in which HRZZ and Romania's UEFISCDI are involved. Among traditional research activities, this initiative includes courses and training to involve stakeholders, business sectors and policy makers.

## 4.3. Towards science–policy hubs

**The third model of science–policy hubs requires more strategic action plans and initiatives with longer-term (national) agenda of policy-relevant research objectives, devoted organisations and specific resources. The overarching goal is to co-create policy-relevant research and promote science-informed policy making. Depending on the mandate, objectives, and possibilities, these hubs can take different forms and instruments. The following cases present exemplary actions for the Green and Digital Transition, while Table I presents an inspiring case from the health and life science interactions in Ireland.**

Luxembourg National Research Fund

To promote exchanges between research organisations and policy makers, Luxembourg's Fund for National Research (FNR) has set up an exchange scheme between the government and researchers in Luxembourg called 'Policy meets research'. In this scheme, researchers and Members of the Parliament (MP) are paired and spend time together to foster a better understanding of their respective working environments. As a result of the pairing scheme, the FNR and Luxembourg parliament set up a research service within the parliament supporting MPs in their decision-making process by providing scientific evidence to politically relevant topics, including the fields of the Green and Digital Transition. This scheme facilitates science-informed policy making and policy-oriented research by promoting informal exchanges, thus building trust between national decision makers and researchers. Furthermore, the national Chamber of Deputies has established a new scientific unit, which organised a joint conference in May 2022 for science–policy exchanges. These SPI activities focus on personal exchanges between researchers and policy makers, including training and workshops.

The matchmaking between researchers and policy makers is further developed by the FNR taking a proactive approach to organising interactions among ministries, researchers and local stakeholders. FNR and Luxembourg's Ministry of Agriculture, Viticulture and Rural Development (MAVDR) have a joint call to support applied multidisciplinary research on innovative, resilient, sustainable farming practices and systems. Research applications should contribute to the national strategy for sustainable agriculture.

UK Research and Innovation

UK Research and Innovation (UKRI) has also set up several instruments for exchanges between research organisations and government departments. For example: 1) UKRI's Economic and Social Research Council (ESRC) has established a policy fellowships scheme for a regular call for early- and mid-career academics to work in government departments on, among other topics, the Net-Zero Transition. The Arts and Humanities Research Council (AHRC) and Biotechnology and Biological Sciences Research Council (BBSRC) have joined the scheme as partners, and there are ambitions to extend the scheme across UKRI. 2) UKRI's Natural Environment Research Council (NERC) set up the Knowledge exchange fellowships to "enable the sharing and flow of knowledge and expertise between NERC funded researchers and their stakeholders, partners and user communities." 3) The UKRI Policy Internships scheme is a funding instrument devoted to postgraduate students interested in pursuing three months in a selected policy organisation to produce briefing papers, participate in policy inquiries, or organise policy events. ESRC has worked closely with the Parliamentary Officer of Science and Technology (POST) to embed three Thematic Research Leads in the newly created thematic research hubs working across Parliament to increase access to scientific expertise and insights. As with the policy fellowships there is an ambition extend involvement across UKRI, with councils already expressing an interest in support thematic research leads in the second year of the project. These schemes support the intersectoral mobility between research and policy making, thus facilitating the exchange of knowledge, personal contacts and interactions between the two spheres.

In France, ANR created a specific funding instrument called "Flash" to fund policy-relevant research. This research funding instrument aims to respond to major emerging policy issues, such as the 2017 Flash call focused on hurricanes in the French Antilles and the Gulf of Mexico (more information) or the 2019 Flash call on the COVID-19 outbreak. This instrument includes a speedy research projects selection process and science–policy-society events allowing both a transfer of scientific outcomes to policy and society and to discuss how this knowledge can be used in decision making and management actions (for example, see the ANR conference on hurricanes in 2017, and the ANR conference on COVID-19. This experience is relevant because it goes beyond the ad hoc policy questions from national policy makers, and providing the opportunity to launch a call for proposals on emergency policy-relevant topics. The fact that calls are thematically articulated based on policy needs makes the instrument particularly flexible and adaptable to provide new policy-relevant research contributions for policy makers.

In the field of digital transition, Portugal's FCT has a funding programme in 'Data Science and Artificial Intelligence in Public Administration'. This programme includes several calls for research partnerships between public administration and research organisations oriented to deepen the use of public data and develop knowledge about the use of advanced technologies that are relevant to citizens. The central objective is to improve scientific knowledge and use of new digital technologies to assist public decision makers and deliver better public services in areas such as health, employment, education, sustainable development, and road prevention. This experience is an example of a co-creation/-production of knowledge promoting the digital transition in public administration in Portugal.

Formas, a Swedish research council for sustainable development, has the institutional mandate for science outreach of its funded research activities. First, Formas supports SPI activities in its general funding scheme in which societal relevance is a mandatory evaluation criterion of equal weight as scientific excellence. The review panels also consist of a combination of academics and societal actors aiming to strengthen society-relevant research. Second, Formas also has a specific mandate to enhance collaborations between researchers and stakeholders by hosting four national research programmes on climate, food, sustainable spatial planning, and oceans & water. These national research programmes are ten-year initiatives that will contribute to solving prioritised societal challenges and strengthening collaboration between funders, researchers and societal actors including decision makers. The funding activities in these national research programmes combine targeted aims with bottom-up processes. Besides funding research, the programmes also convene platforms fostering dialogue, knowledge provision and policy-relevant analysis. Third, Formas conducts systematic evidence syntheses to support the Swedish environmental objectives. The compilation of research focuses on areas where the state of knowledge is disputed or insufficiently known to guide decision making and future research activities. Formas' Council for Evidence-Based Environmental Analysis decides which questions to investigate and establishes the conclusions of each evidence synthesis for the Swedish government. Finally, Formas currently also explores new ways of promoting science-informed decision making. This development is part of a broader debate on societies' transformation towards sustainable development and includes an objective to enhance Formas' role as a 'knowledge broker'.

With the National Research Programmes (NRPs), the Swiss National Science Foundation (SNSF) and the Swiss federal government aim to support the development of knowledge relevant to decision making and practice. Interested parties are invited every 2 or 3 years by the Swiss State Secretariat for Education, Research and Innovation (SERI) to submit suggestions for new NRPs. On this basis, the SERI develops programme proposals and commissions the SNSF to conduct feasibility studies and prepare calls for proposals based on the findings. The Federal Council decides on the appropriateness of the calls, sets the budget and mandates the SNSF to implement the NRPs at the request of the Federal Department of Economic Affairs, Education and Research (EAER) (more information). This bottom-up procedure ensures that the NRPs contribute

to solving the most pressing societal and scientific challenges and serves as a basis for the later uptake of research results. Secondly, the SNSF engages in the dissemination of research findings to politicians and policy makers by offering traditional and social media training for researchers to empower them to bring relevant topics into the political discourse. These two aspects aim to bridge the gap between research and policy, aligning the different agendas and promoting exchange.


In Hungary, ELKH has the mandate to valorise research for addressing major global issues and to promote the use of research results for social, economic and environmental purposes, including the Green and Digital Transition areas. ELKH's SPI activities support the interactions between its research centres and policy makers. An example of a research hub aiming to engage with policy making comes from the ELKH's Biological Research Centre (BRC) in Szeged, Hungary. Members of this institute participate in developing a strategic plan for the BIOEAST program, which Hungary's Ministry of Agriculture co-ordinates. The foresight study aims to outline a strategy for the circular economy and bio-based economy in Central-Eastern Europe. Researchers are involved in developing new knowledge and cross-border co-operation while engaging with stakeholders, decision makers, business sectors, and civil organisations.

A different example comes from the ELKH's Centre for Ecological Research (CER), located in Budapest, Debrecen, and Vácrátót, Hungary. CER organises the participation of Hungarian experts in the Intergovernmental Science–policy Platform on Biodiversity and Ecosystem Services (IPBES), aiming to involve Hungarian researchers in providing science-based contributions to the national government while working in the broader IPBES network. Similarly, CER supports the national Ministry for Agriculture in mapping and assessing ecosystems and the 'green infrastructure' in the frame of the National Restoration Plan as part of Hungary's involvement in the EU Green Deal, EU Nature Restoration Law 2030 and pursuit of UN Sustainable Development Goals. Finally, CER participates in the 'Health Security National Laboratory', with leadership in the Division of Invasion Biology and Epidemic Ecology, working to build a scientific foundation for decision making at the intersection across healthcare, epidemic prevention, and ecological systems, and the 'National Multidisciplinary Laboratory for Climate Change', thematically devoted to the effects of climate change on human health, natural and economic systems and society, and social adaptation. The primary mission is to provide multidisciplinary contributions to decision makers and to involve citizens in research activities related to the Green and Digital Transition fields.


In the UK, there are examples of UKRI-related organisations working as science–policy hubs. First, UKRI funds the 'Centre for the Evaluation of Complexity Across the Nexus' (CECAN), hosted by the University of Surrey. CECAN is pioneering, testing and promoting innovative policy evaluation approaches and methods across Nexus domains, such as food, energy, water and the environment, through a series of 'real-life' case study projects. The team comprises social scientists, policy makers, policy analysts, and experts who share the common goal to improve policy evaluations. CECAN has been delivering a programme of evaluation methods through workshops, training courses, and specialist seminars delivered by international experts to encourage knowledge sharing and capacity building amongst those working in UK policy making. Second, the Research and Innovation for our Dynamic Environment (RIDE) Forum, supported by UKRI, comprises 24 UK public sector member organisations with a stake in environmental change research, innovation, training and capabilities, whether as funders, providers, or users. The specificity of this unique contribution lies in the capacity to gather multidisciplinary and complementary contributions needed to increase our understanding of the natural, social, economic, and technological systems that interact with environmental change and the activities to translate that knowledge into innovating policy and practice. The RIDE Forum enables members to align, leverage their resources, and avoid duplication through sharing and co-developing strategies, joint priority setting, and drawing out interdisciplinary partnership opportunities. These activities aim to make research funding more efficient while providing decision makers with the knowledge they need to respond to the challenges and opportunities presented by environmental change.

The case of Ireland's Health Research Board (HRB) is a specific, inspiring example. To complement its role as a funding agency that supports health and social care research, the HRB has developed a long-term strategy for SPI activities. The following inset presents the principles and main actions put in place by the HRB over the years to enable, support, and promote SPI. Even though these principles are specific to the HRB strategy, they are a good reference for other cases. Promoting the engagement of researchers and policy makers, building in-house capacity to gather science-informed policy-relevant evidence, investing in long-term data collection and rewarding SPI activities are principles that can be extended to other contexts.

## The Case of Ireland's Health Research Board

**The Health Research Board (HRB) has developed a mix of bottom-up and structured initiatives to build capacity for, and support programmes that generate evidence to support policy making. In addition to investments in the research system, the HRB purposefully invests in what it frames as the evidence and evidence support ecosystem.**

This includes the establishment of an in-house Evidence Centre, which conducts a suite of evidence reviews each year in response to a prioritised list of policy questions from the Irish Ministry for Health determines an annual list of policy questions for which the Health Research Board (HRB)'s Evidence Centre conducts evidence reviews. This list is prepared jointly by the Ministry and HRB and should be complementary to the research programme funded. The Ministry assures that policy questions align with the national government strategies, while HRB links them with current research trends in Ireland. Applicants for HRB research funding are asked to explain, among other requirements, the policy relevance of their proposals. Generally, HRB incentives exchanges and dialogues between policy makers and researchers within its funded activities. HRB explained its strategy for SPI activities in ten principles.

**a)** Incentivise, and sometimes require the engagement of researchers with policy and other decision makers (when appropriate) in grant programmes. This engagement is acknowledged and "counted" in HRB research assessment processes, following Buxton-Hanney's Payback Framework for Health Research (Donovan & Hanney, 2011). This framework includes a category for policy/health sector/public engagement (see a recent HRB report including policy-oriented outputs, outcomes and impacts).

**b)** Linked to the above, collate outputs, outcomes and impacts from HRB-funded grants using end-of-grant surveys and profile policy-relevant findings and case studies. These materials are collected in an annual report by HRB (see the 2021 edition).

**c)** Engage directly and support others to engage in priority-setting exercises. These activities aim to mobilise decision makers and other stakeholders/experts to identify emerging, growing trends to be addressed and to determine research agendas. This ensures clarity and relevance of research funded and enhances uptake of findings. This principle underpins a new 'Evidence For Policy' research programme being co-developed with the Ministry of Health, and which will respond to a recently published Statement of Research Priorities.

**d)** Provide support for integrated knowledge translation and dissemination awards for researchers. HRB has two funding schemes for (i) Conference and Event Sponsorship to enable knowledge sharing and networking of HRB-supported researchers; and (ii) the Knowledge Translation Awards for HRB grantholders for knowledge translation activities (such as co-design of questions, or communication of research findings to policy makers and the general public).

**e)** Short-term placements of researchers in policy organisations. The HRB provides support in many schemes to facilitate research–policy exchanges in both directions for science-informed policy making and policy-oriented research activities.

**f)** Acknowledge that there are always uncertainties, gaps and limitations in scientific evidence and that scientific advice for policy is typically based on assumptions. These should always be presented and communicated and decision makers should be supported in navigating this complexity. For this reason, HRB carries out its own synthesis and appraisal of bodies of scientific evidence (where issues like quality and certainty are addressed) as set out above.

**g)** Building an evidence-synthesis infrastructure. HRB carried out a significant, long-term investment with 'Evidence Synthesis Ireland' (ESI), a joint partnership with its homologue in Northern Ireland. This capacity-building infrastructure includes training for researchers, healthcare professionals, librarians and decision makers and it provides yearly fellowships to work on systematically reviewing policy-relevant scientific evidence. As many policy challenges are global and policy makers require local and global evidence, ESI partners with international evidence centres and networks worldwide (COVID-19 Evidence Network, the Global Commission on Evidence).

**h)** Recognising the importance of trials and intervention studies for decision making in health, the HRB invested in its own skills and capacity in this area and developed a large investment programme to establish and connect trials infrastructure and support services across the healthcare system and to develop Ireland's only funding programme to support multicentre and pan-European investigator-led trials.

**i)** National longitudinal studies. These long-term activities, carried out by HRB on behalf of the Ministries of Health and Children, monitor ageing in a cohort of persons with intellectual disabilities and other vulnerable groups.

**j)** As use and re-use of data is critical to support policy and planning, the HRB strategy focuses on investing in data infrastructure and skills development to ensure that health and social care data can be securely and safely collected, linked and shared for numerous purposes including policy, planning and research. This vision is very much aligned with developments in the European Health Data Space programme to facilitate secure sharing of data across borders.

# 5. Conclusions and Recommendations

This report has presented the results of a survey on Science Europe Member Organisations on science–policy interfaces for the Green and Digital Transition. The science–policy interface activities were defined as actions enabling, supporting, and promoting science-informed policy making. These activities usually aim to review the existing scientific knowledge and, in some cases, to provide new policy-relevant research or test policy ideas. The enabling role of promoting science-informed policy making aims to support the interactions between researchers and policy makers interested in accessing scientific findings. Science Europe members have in-house units for these activities and rely on partnerships with other organisations in the science–policy ecosystem. Specific resources are allocated for these activities with the overarching goal of building trust between researchers and policy makers.

Science-policy interface activities take different forms. Our survey showcased that the most common activities are to fund or perform policy-oriented research studies, research-policy events and briefings. These activities were found effective, especially in the field of the green transition (such as climate change adaptation and mitigation, biodiversity changes and global health challenges), and less for the 'digital' side (digitalisation, artificial intelligence and new IT technologies). Different models of science–policy interface activities exist, from ad hoc policy questions to bottom-up initiatives led by researchers, up to more structured science–policy hubs having longer-term strategies, allocated resources and operational activities. There are several examples of science–policy interface activities, mainly linked to the different mandates given to Science Europe Member Organisations.

A crucial aspect is a distinction between science–policy interfaces and science communication. The first targets policy makers, while the former is more general and devoted to all audiences. The appraisal of science–policy interface activities is challenging, though positive opinions are reported (especially in the case of tackling the climate crisis). The survey reported that science–poliyc interface activities are more structured for climate-related science–policy interactions and less for the digital transition, as this is a more recent and emerging field.

This report contributed to the definition of a framework for science–policy interfaces from an organisational perspective. An open challenge is identifying when these activities are 'successful', providing the right incentives and avoiding potential limitations that are not yet identified. The evaluation of science–policy interface activities will lead to discuss how to define, promote and incentivise them, leading to a general upgrade on the science–policy interactions in a mutually reinforcing process.

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# List of Tables


| | | |
|---|---|---|
| **Table A** | Profile of respondents | **11** |
| **Table B** | Types of SPI activities | **12** |
| **Table C** | Support for SPI activities | **13** |
| **Table D** | Agenda setting for SPI activities | **14** |
| **Table E** | Areas of the Green and Digital Transition where SPI activities are in place | **14** |
| **Table F** | Appraisal of funded SPI activities for the Green and Digital Transition | **15** |
| **Table G** | Appraisal of performed SPI activities for the Green and Digital Transition | **15** |
| **Table H** | Most relevant activities for SPI | **16** |

# Annex 1
## Organisations Participating in the Survey

| Country | Organisation | Participated in focus group |
|---|---|---|
| Belgium | Research Foundation Flanders (FWO) | √ |
| Croatia | Croatian Science Foundation (HRZZ) | |
| Czech Republic | Czech Science Foundation (GACR) | |
| Denmark | Independent Research Fund Denmark (DFF) | |
| Finland | Academy of Finland (AKA) | √ |
| France | French National Research Agency (ANR) | √ |
| Hungary | Eötvös Loránd Research Network (ELKH) | √ |
| Ireland | Health Research Board (HRB) | √ |
| Ireland | Science Foundation Ireland (SFI) | |
| Latvia | Latvian Science Council (LZP) | |
| Lithuania | Research Council of Lithuania (LMT) | |
| Luxembourg | National Research Fund (FNR) | √ |
| Norway | Research Council of Norway (RCN) | √ |
| Poland | National Science Centre (NCN) | |
| Portugal | Foundation for Science and Technology (FCT) | √ |
| Romania | Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) | √ |
| Spain | Spanish National Research Council (CSIC) | |
| Sweden | Swedish Research Council for Sustainable Development (FORMAS) | √ |
| Switzerland | Swiss National Science Foundation (SNSF) | |
| United Kingdom | UK Research and Innovation (UKRI) | √ |

# Annex 2
# Survey on Science–Policy Interfaces for the Green and Digital Transition

The term 'Science–Policy Interface' refers to any activity carried out by Science Europe Member Organisations that aims to promote science-informed policy making.

The objectives of this survey on such interfaces for the Green and Digital Transition are to:

- map the existing activities (types, resources, roles, and results) of science–policy interfaces carried out by Science Europe Member Organisations.
- identify how these activities contribute to science-informed policy for the Green and Digital Transition.
- propose recommendations to Science Europe Member Organisations to reinforce, develop or improve science–policy interfaces.

## General Information

* **Your name**

* **Your email address**

* **Which Science Europe Member Organisation do you represent?**

* **What is your job title in this organisation?**

* **Which of the following missions does your organisation have?**

  ○ A research funding mission
  ○ A research performing mission
  ○ Both a research funding and a research performing mission

## Types of Activities

* **Science–Policy Interfaces refer to all the activities carried out by Science Europe Member Organisations that aim to promote science-informed policy making.**

The societal challenges of the Green and Digital Transition require science-informed policy, specifically on the following areas:

- Climate-sustainable development
- Ecological sustainable transition
- Digitalisation for the green transition
- Greening digital technologies
- Human-centred digitalisation

* **Does your organisation fund or perform the following activities as science–policy interfaces?**

| | Funding Role | Performing role | Both funding and performing role | Do not fund or perform |
|---|---|---|---|---|
| Policy-oriented research studies | | | | |
| Policy-oriented events *(workshops, seminars, conferences)* | | | | |
| Policy briefs/ Notes summarising scientific findings | | | | |
| Training researchers to perform policy-oriented activities | | | | |
| Exchange of staff between research performing and policy organisations | | | | |
| In-house units proactively scanning available research to inform policy makers | | | | |
| Scientific expert panels to perform policy-oriented activities or to directly inform policy makers | | | | |
| Knowledge broker actors | | | | |

* **Are there any other activities that your organisation funds or performs as a science–policy interface (ie. to promote science-informed policy making), and in what capacity?**

Please write your answer here: _____

## Resources

* **Does your organisation have staff dedicated to science–policy interfaces, i.e. to promote science-informed policy making?**

○ Yes
○ No

**Please provide the total in FTE, if possible:**

Please write your answer here: _____

**Please provide an estimate of the yearly budget – excluding personnel costs for your organisation's staff – allocated (in Euro) to the following:**

- Policy-oriented research studies
- Policy-oriented events (workshops, seminars, conferences)
- Policy briefs/notes that summarise scientific findings
- Training researchers to perform policy-oriented activities
- Exchange of staff between research performing and policy organisations
- In-house units proactively scanning available research to inform policy makers
- Scientific expert panels to perform policy-oriented activities or to directly inform policy makers
- Knowledge broker actors

## Agenda Setting

* **For which of the following areas in the Green and Digital Transition does your organisation have science–policy interface activities?**

☐ Climate-sustainable development
☐ Ecological sustainable transition
☐ Digitalisation for the green transition
☐ Greening digital technologies
☐ Human-centred digitalisation
☐ None of the above
☐ Other: _____

**Who decides the topics of science–policy interfaces?**

☐ Minister's cabinet(s)
☐ Ministries or other bodies within the national government
☐ National/federal parliament
☐ Regional governments/councils
☐ Local governments
☐ International bodies (eg. IPCC, UN)
☐ Researchers (bottom-up approach)
☐ Civil society/NGOs
☐ Your own organisation
☐ Other: _____

* **Please describe how your organisation defines the topics to be addressed and actions that are taken by science–policy interfaces' activities (ie. to promote science-informed policy making)**

Please write your answer here: _____

## Role of Scientific Experts

* **Do the scientific experts in science–policy interfaces represent your organisation?**

○ Yes, scientific experts represent the organisation and are expected to gather internal information to provide science-informed policy advice.
○ No, scientific experts act on an individual basis.

* **What type of support do you provide to the scientific experts for working in science–policy interfaces?**

☐ Administrative supporting staff
☐ Scientific staff
☐ Resources to perform policy-oriented studies
☐ Resources to organise policy-related events
☐ There is no support available
☐ Other: _____

## Your Views on Science–Policy Interfaces

**To what degree does your organisation agree that the science–policy interface activities it funds contribute to having science-informed policy making for the Green and Digital Transition in the following areas?**

| | Strongy Disagree | Disagree | Neutral | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|
| Climate-sustainable development | | | | | | |
| Ecological sustainable transition | | | | | | |
| Digitalisation for the green transition | | | | | | |
| Greening digital technologies | | | | | | |
| Human-centred digitalisation | | | | | | |

**To what degree does your organisation agree that the science–policy interface activities it performs contribute to having science-informed policy making for the Green and Digital Transition in the following areas?**

| | Strongy Disagree | Disagree | Neutral | Agree | Strongly Agree | N/A |
|---|---|---|---|---|---|---|
| Climate-sustainable development | | | | | | |
| Ecological sustainable transition | | | | | | |
| Digitalisation for the green transition | | | | | | |
| Greening digital technologies | | | | | | |
| Human-centred digitalisation | | | | | | |

**What are the most relevant activities of science–policy interfaces funded by your organisation to promote science-informed policy making for the Green and Digital Transition?**

*Please number each box in order of preference from 1 to 8.*

*Please choose at least 3 items.*

- Policy-oriented research studies
- Policy-oriented events (workshops, seminars, conferences)
- Policy briefs/notes summarising scientific findings
- Exchange of staff between research performing and policy organisations
- In-house units proactively scanning available research to inform policy makers
- Training researchers to perform policy-oriented activities
- Scientific expert panels to perform policy-oriented activities or to directly inform policy makers
- Fund knowledge broker actors

**What are the most relevant activities of science–policy interfaces performed by your organisation to promote science-informed policy making for the Green and Digital Transition?**

*Please number each box in order of preference from 1 to 7.*

*Please choose at least 3 items.*

- Policy-oriented research studies
- Policy-oriented events (workshops, seminars, conferences)
- Policy briefs/notes summarising scientific findings
- Exchange of staff between research performing and policy organisations
- In-house units proactively scanning available research to inform policy makers
- Scientific expert panels to perform policy-oriented activities or to directly inform policy makers
- Fund knowledge broker actors

## Final comments

**Please describe any other activities promoting science-informed policy making that you would like to share with us**

Please write your answer here: _____

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