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**D3.7 – Proceedings of the 2nd series of
national stakeholder workshops**

WP3 – Continuous stakeholder engagement

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EC Summary Requirements

1. Changes with respect to the DoA

No changes with respect to the work described in the DoA.

2. Dissemination and uptake

This deliverable serves as documentation of the proceedings of the second series of PARIS REINFORCE national stakeholder workshops. It reports particularly on the concept design, summary, and lessons learnt. Links to all material (including summaries, photos, presentations) are provided for each event. The report is targeted internally within the consortium to aid the ongoing dialogue towards ensuring ownership and relevance of the modelling exercises; and publicly to all relevant stakeholders to provide a better understanding of the practicalities behind the nature of PARIS REINFORCE stakeholder engagement and the final proceedings of this process.

3. Short summary of results

The PARIS REINFORCE project has held a second series of workshops in European and non-European countries to ensure relevance, as well as improve the quality and resilience, of the modelling process. The workshops have consisted of discussions with stakeholders on scenario analysis already undertaken; holding expert knowledge on potential challenges and opportunities of energy transition pathways in line with the Paris Agreement and taking into consideration present challenges, deriving from COVID-19, the Ukraine conflict, and the current energy price shocks; and co-creating views on the interplay between climate mitigation, and the role of technology innovation.

COVID-19 has significantly affected the project workshop process, although the amended timeline and adaptive planning allowed the delivery of some in-person events. Non-European workshops were organised in the virtual format, as per the first stakeholder engagement round, while several European workshops were hosted physically, while providing the option of virtual attendance (hybrid events).

Eventually, some tentative lessons are drawn from the project's experience so far. More concrete lessons learned will be produced for deliverable D3.8, toward the end of the PARIS REINFORCE project.









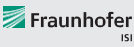









4. Evidence of accomplishment

Online records of events and the documentation in this report.



Preface

PARIS REINFORCE will develop a novel, demand-driven, IAM-oriented assessment framework for effectively supporting the design and assessment of climate policies in the European Union as well as in other major emitters and selected less emitting countries, in respect to the Paris Agreement. By engaging policymakers and scientists/modellers, PARIS REINFORCE will create the open-access and transparent data exchange platform I²AM PARIS, in order to support the effective implementation of Nationally Determined Contributions, the preparation of future action pledges, the development of 2050 decarbonisation strategies, and the reinforcement of the 2023 Global Stocktake. Finally, PARIS REINFORCE will introduce innovative integrative processes, in which IAMs are further coupled with well-established methodological frameworks, in order to improve the robustness of modelling outcomes against different types of uncertainties.

NTUA - National Technical University of Athens	GR	
BC3 - Basque Centre for Climate Change	ES	
Bruegel - Bruegel AISBL	BE	
Cambridge - University of Cambridge	UK	
CICERO - Cicero Senter Klimaforskning Stiftelse	NO	
CMCC - Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici	IT	
E4SMA - Energy Engineering Economic Environment Systems Modeling and Analysis	IT	
EPFL - École polytechnique fédérale de Lausanne	CH	
Fraunhofer ISI - Fraunhofer Institute for Systems and Innovation Research	DE	
Grantham - Imperial College of Science Technology and Medicine - Grantham Institute	UK	
HOLISTIC - Holistic P.C.	GR	
IEECP - Institute for European Energy and Climate Policy Stichting	NL	
SEURECO - Société Européenne d'Economie SARL	FR	
CDS/UnB - Centre for Sustainable Development of the University of Brasilia	BR	
CUP - China University of Petroleum-Beijing	CN	
IEF-RAS - Institute of Economic Forecasting - Russian Academy of Sciences	RU	
IGES - Institute for Global Environmental Strategies	JP	
TERI - The Energy and Resources Institute	IN	



1 Overview

A fundamental objective of the PARIS REINFORCE project is to enhance the legitimacy of the scientific processes in support of climate policymaking, by introducing an innovative stakeholder inclusion framework (co-design), aimed at improving the transparency of the respective models, ensuring policy/real-world relevance of science, and promoting co-ownership of scientific processes and results. To this end, the project has held two series of national workshops in European countries, as well as major and minor emitting countries outside of Europe. The summary of the first round of workshops has been reported in Deliverable 3.6. This report focuses on the second round, namely the set of stakeholder consultation held between May and October 2022.

The general objective of these workshops has been to work with key stakeholders, to:

- Receive targeted feedback on national and sectoral scenario analysis already undertaken
- Identify potential barriers and opportunities at the national, whole-system, and specific sectoral levels, to better inform further modelled analysis—certain workshops have placed particular emphasis on identifying challenges, options, and opportunities from the present turmoil, deriving from COVID-19, the Ukraine conflict, and the global energy crisis
- Co-create views on successful policy mixes to overcome barriers and maximise opportunities in low-carbon transition pathways.

The general hope has been that such engagement efforts will positively contribute to more effective engagement and collaboration between key national stakeholders committed to the energy and climate transition.

At the European level, workshops have been held in Berlin (Germany), Athens (Greece), and Venice (Italy); another (last) national workshop has been planned in London (UK), on October 7, 2022.

At the non-European level, workshops have been held in Brazil and Canada (both online).

1.1 COVID-19 and organisation

The COVID-19 pandemic put serious restriction to international travel and as a result it forced a rethink of all events.

Most PARIS REINFORCE first-round stakeholder events had had to move online. The absence of physical presence created difficulties in holding open and thorough discussions with stakeholders. On the other hand, it presented benefits of being able to hold events with participants from all corners of the globe, where access to a digital platform is available. Furthermore, the COVID-19 pandemic led to a delay in workshop schedules as workshops were initially postponed with the hope that they could be run physically once legal restrictions were removed.

The 2nd round of workshops was delayed in the hope of in-person events. Given existing difficulties and limitations, it was decided to keep non-European events online, with a similar approach as the one adopted in the previous round of workshops. Online survey pools and breakout rooms have been used, aiming to create more personal environments, where stakeholders may be more willing to discuss openly. European workshops were held physically. To minimise risks, these workshops have been established with a target of a limited number of expert stakeholders (10-50, depending on the scope and expected outcomes), and in rooms of suitable size to allow reasonable distancing. Also – to allow broader participation – the option for remote connection was made available to all interested stakeholders.

All workshops have been held under Chatham House rules.



1.2 Eliciting valuable stakeholder input

Model-based analysis can provide insights into the substitution options and challenges that are linked to the energy system transformations needed to deliver climate mitigation pathways. However, in order for scientific knowledge not to remain a purely academic exercise, it shall aim to consider different perspectives, expand its scope, and enhance its transparency, if it aims to provide valuable, comprehensible, and actionable support to decision-makers. This is the clear aim for this series of workshops, where stakeholders are asked to express their views, preferences, and perceptions—even their criticisms. These stimulating/interesting views do not necessarily produce useful modelling inputs, but rather contribute to expanding our understanding of challenges, bottlenecks, and opportunities of low-carbon transition pathways, which often cannot be fully captured by our modelling suite.

To make the best of stakeholder input/feedback, the project has designed a dual approach to workshops. This comprises open discussions, where stakeholders are actively engaged to raise their perspectives; and quantitative analysis/inputs, in which participants are asked to translate these perspectives into “quantifiable” indicators.

Open discussions were held through chaired round tables, where each participant was asked to provide a short speech, or open discussion sessions. For collecting quantitative inputs, the online voting tool *sli.do* and *Google* surveys were used as main tools in online workshops, allowing modelling teams to gauge the opinions of workshop participants after discussions were held, as well as providing a tangible input to modelling discussions. For in-person events more “traditional” approaches were adopted to elicit stakeholder opinions. Breakout groups (e.g., World Cafe format) with dashboards and *Post-it* boards were used as a tool for the identification of key transition bottlenecks. Fuzzy cognitive mapping exercises also took place (see D4.4), to better track perceptions of stakeholders on challenges and opportunities emerging from the current energy crisis and towards net-zero.

1.3 Stakeholder Identification and Snowball Sampling

Suitable stakeholders have been identified primarily on the basis of the PARIS REINFORCE stakeholder database as well as established contacts that project partners have in the regions of interest. For certain regions, particularly outside of Europe, the stakeholder database has limited coverage¹ and hence desk research has been an important complementary tool.

A key component for enhancing the reach of stakeholder identification has been snowball sampling. Snowball sampling consists of allowing suitable stakeholders to identify colleagues or acquaintances, who they view as suitable for participation in the workshop. In this way, stakeholder networks are leveraged, and the project is able to increase its reach. While snowball sampling has benefits of increasing stakeholder participation, the consortium is aware that this can lead to representation biases – e.g., lots of stakeholders from the same organisation/sector. For this reason, desk research was another important complementary tool. Additionally, care was taken to restrict attendance when considering multiple stakeholders from the same organisation and, less stringently, from the same stakeholder type.

¹ Deliverable D3.4 provides detailed coverage of the stakeholder database by geographic region, correct as of publication of the document on 31st May 2020.



2 Workshop Design Concept

The consortium drafted a concept note, which outlines the general ideas underpinning each workshop design. This note has been followed as a guide for each workshop but has been flexibly adjusted/tailored to the specific needs of each workshop and particularly the modelling partner most interested in the outcomes of the workshop. For example, while some workshops focussed more on discussing challenges of net-zero energy transitions in specific energy sectors (e.g., transport or industry) with stakeholders holding deep understanding of these, others took a holistic approach, discussing system-wide technical (e.g., role of key mitigation technologies) and non-technical (e.g., impacts on SDGs, jobs implications and energy poverty) challenges of a just energy transition.

For completeness, the design concept is provided below.

2.1 Design concept for PARIS REINFORCE national/regional stakeholder workshops

2.1.1 Context

PARIS REINFORCE will use stakeholder engagement to co-design feasible and preferred mitigation pathways in major economies both in (WP5) and outside of Europe (WP6). To capture and codify stakeholders' opinions and preferences in the models used to undertake national/regional mitigation analysis, they should be elicited in such a way that they can be directly or indirectly related/mapped to key model input parameters and scenario design protocols. This concept note sets out how a range of national/regional stakeholder workshops should *indicatively* be undertaken to achieve this aim.

2.1.2 Attendees

We should aim for a minimum of 10-20 stakeholders, drawn from a mixture of government, business, academia, and civil society. Ideally, this should consist of:

- Representatives at the civil service level from Environment, Energy, Industry, and/or Finance Ministries.
- Business representatives from the energy sector (both fossil and non-fossil) and/or industry groups and associations.
- Academics assessing energy, climate change and mitigation analysis, ranging from social scientists to physical and engineering disciplines.
- Civil society representatives such as NGOs or lay citizens.

2.1.3 Stakeholder identification resources:

- Regional modelling teams
- PARIS REINFORCE Stakeholder Council database, which has been enhanced through Deliverable D3.4
- Snowball sampling whereby suitable participants provide recommendations.

2.1.4 Workshop structure

To secure focused engagement from senior representatives of the organisations outlined above, the workshops will only take a half day. The approximate timing will be as follows:

1. Introduction to the project and its aims (15 mins)



2. Introduction to modelling and what insights existing mitigation scenarios have shown for the region (30 mins)
3. Facilitated breakout sessions (e.g., 45 mins), including an introduction (10 mins) summarising key themes that we think it is useful to tackle in our modelling, and then discuss (over 35 minutes):
 - a. Key socioeconomic and behavioural factors to capture in models.
 - b. Key technological developments.
 - c. Political and other barriers and opportunities to reflect in modelling.
4. Break (15 mins).
5. Breakout session feedbacks, each lasting 10 minutes, during which key opportunities and challenges are listed (40 mins).
6. Voting session to extract critical concerns (over uncertainties, bottlenecks, etc.) to consider in making mitigation pathways more feasible/real-world relevant (with live results display) (20 mins).
7. Wrap-up and next steps (15 mins).

2.1.5 Workshop Outputs

- Summary of key themes across socioeconomic, behavioural, technological, political, and/or other factors to capture in modelling if possible.
- Specific factors that could impact mitigation pathways modelling.
- Summary of uncertainties in key drivers of mitigation action.



3 Project Specifics

In this section, a brief overview is provided for each of the 4 European and the 2 non-European workshops carried out in this 2nd round. Additionally, links to detailed workshop summaries, presentations and agendas are included. The brief overviews are provided in chronological order.

Brazil – 2nd May 2022 (held online)

(Attendees: 7)

The PARIS REINFORCE project hosted a virtual stakeholder workshop focusing on Brazilian low-carbon pathways. The workshop involved key national stakeholders from the public and private sector as well as academia. Relevant stakeholders were identified by snowball sampling and desk analysis, with an emphasis placed on individuals deemed receptive of a climate-economy modelling theme. The workshop aimed to receive targeted feedback on national and sectoral scenario analysis undertaken by the project modelling teams, and to identify bottlenecks hampering the decarbonisation pathways and to co-create guardrails for a transformative policy mix that could overcome those bottlenecks, with a particular focus on the transport sector.

The workshop was structured around two sessions. In the first session consortium members – Dr. Alexandros Nikas (National Technical University of Athens), Dr. Sara Giarola (Imperial College London) and Dr Jakob Wachsmuth (Fraunhofer ISI) – provided introduction and overview about the modelling analyses uptake by the project. In the interactive second part of the workshop – chaired by Dr. Philine Warnke (Fraunhofer ISI) – participants assessed the importance of identified bottlenecks through online polling, specified how they hamper the decarbonisation of the transport sector, and discussed how they can be effectively addressed by a future policy mix. Discussions considered bottlenecks to decarbonisation around multiple dimensions and angles, including social, political, technical, economic feasibility, socio-economic and socio-ecologic impacts.

A full event summary (along with presentations) can be found [here](#).

Canada – 9th May 2022 (held online)

(Attendees: 12)

The virtual workshop, held on May 9th, 2022, aimed to engage with Canadian key stakeholders to receive feedback on bottlenecks hampering the decarbonisation pathways in Canada, and get views to co-create guidelines for a transformative policy mix that could overcome those bottlenecks, with a particular focus on the country's transport sector. The workshop, organised as a closed-door event, involved relevant actors from the national energy policy landscape from government, NGOs, academia, and business.

The workshop began with a session aiming to provide a common ground for discussion and engagement with stakeholders. This session provided perspectives—with presentations from Dr. Alexandros Nikas (National Technical University of Athens), Dr. Kathleen Vaillancourt (ESMIA) and Dr Jakob Wachsmuth (Fraunhofer ISI)—for the net-zero transition pathways for Canada, based on project modelling work. This was followed by an interactive second part—hosted by Dr. Philine Warnke (Fraunhofer ISI)—where participants assessed the importance of the different identified bottlenecks through online polling, specified how they could hamper the decarbonisation of the transport sector, and then discussed how they can be effectively addressed by a future policy mix. The most highly ranked in terms of importance were CCS-related uncertainties, lack of options for decarbonisation of freight, and urban planning failures, which were then discussed in more depth.



A full event summary (along with presentations) can be found [here](#).

Greece – 30th May 2022 (held physically, with option for remote connection)

(Attendees: circa 45)

PARIS REINFORCE hosted a national stakeholder workshop in Athens to discuss and refine the project's modelling results on low-carbon pathways for Greece, with stakeholders from the public and private sector as well as academia. The workshop, held back-to-back with the final project meeting of the H2020 project SENTINEL ([link](#)), aimed to receive feedback for the Greek whole-energy system low-carbon pathways modelling that the consortium had already undertaken. In addition, the workshop wanted to identify bottlenecks hampering the decarbonisation pathways in Greece and to co-create elements of a transformative policy mix that could overcome those bottlenecks, with a particular focus on the Greek power sector. To facilitate engagement of stakeholders the workshop was held in part in Greek.

The first part of the workshop focused on insight produced in the project. Introduction and quantitative modelling analyses of the Greek energy and power sectors were discussed, through presentations from Prof Haris Doukas, Dr Alexandros Nikas, Konstantinos Koasidis (National Technical University of Athens) and Dr Philine Warnke (Fraunhofer ISI). The session presented multiple energy scenarios and focused on impacts related to the transition. For example, the high employment potential of renewable energy projects vis-à-vis the challenge of reskilling people from carbon-based sectors were highlighted. The session finished with a first tentative list of bottlenecks for decarbonisation derived from the PARIS REINFORCE analysis, which in the following discussion stakeholders discussed and complemented. The second part of the workshop was held in a World Cafe format. In three rounds, participants specified the bottlenecks and then discussed how they can be effectively addressed by a future policy mix.

A full event summary (along with presentations) can be found [here](#).

Italy – 5th July 2022 (held physically, with option for remote connection)

(Attendees: circa 25)

This event was held in Venice at Ca' Foscari University with experts from NGOs, business, and research/academic sectors. The conversation was of technical nature, and for this reason the format was closed-door. The consortium reached out to established contacts in Italy that meet the following criteria: i) appropriate level of professional knowledge and skills in relevance to Italy's energy-sector decarbonisation and sustainability; and ii) sufficient knowledge of the English language. Four universities, seven research institutes, one economic thinktank, one association, two industries, and one energy poverty NGO took part. The intention was not to recruit vast numbers, but rather a variety of backgrounds and areas of expertise, to examine the broad possibility space.

The workshop had three primary objectives, namely to i) receive targeted feedback on net-zero pathways analysis for Italy and the EU already undertaken; ii) identify potential challenges and opportunities from energy transitions and present turmoil, deriving from COVID-19, the Ukraine conflict and energy price shocks; and iii) co-create views on the interplay between climate mitigation, broader sustainable development, and the role of technology innovation. The workshop was organised around three main sessions. The two morning sessions focused on the EU and Italian current performance on SDGs and the implications of deep mitigation scenarios on Sustainable Development path (Session 1); as well as on the status of key energy technologies needed for the transition (Session 2). They included a mix of presentations from the consortium—from Dr Alexandros Nikas (NTUA), Dr



Lorenza Campagnolo (CMCC), and Dr Alessandro Chiodi (E4SMA)—and from invited speakers—from ASviS and RSE—who expressed their organisation’s perspectives. In the afternoon session (Session 3) the workshop focus shifted from technological and security of supply aspects of the energy transition towards the affordability component of SDG7. The session started with a presentation on energy poverty from the Italian Observatory on Energy Poverty and continued in the form of roundtable discussion, aiming to bridge project findings with wider considerations regarding social and economic aspects of SDG7 in the light of recent economic and political turmoil that will certainly shape the transition in the energy sector. In the final part of the workshop, and considering all presentations and points raised, stakeholders participated in a fuzzy cognitive mapping (FCM) exercise, via a *Google* survey ([link](#)). To facilitate participants without access to a mobile phone or computer at the time, the questionnaire was also handed out as a printed table.

A full event summary (along with presentations) can be found [here](#).

Germany – 8th July 2022 (held physically, with option for remote connection)

(Attendees: circa 17)

The workshop—hosted in Berlin—presented and discussed the project’s modelling results on net-zero emission pathways for the EU industry and its implications for Germany. The key objectives of this engagement event were to i) raise awareness of the implications of the EU net-zero pathways for the German energy-intensive industries; ii) discuss mid-term bottlenecks at the EU and national level for a mutual learning of policymakers, stakeholders, and modelling teams; and iii) co-create views on successful policy mixes to overcome bottlenecks and maximise opportunities in the German energy-intensive industries. Invited stakeholders were from government, steel and cement industries, NGOs, and academia with a focus on actors driving the current transformation. The workshop was organised as a closed-door event, with relevant stakeholders reached out via the project’s Stakeholder Council as well as established contacts that project partners have in the region.

The workshop had two main sessions, after a brief introduction to the project (Dr Alexandros Nikas, NTUA). Session 1—held in English to facilitate the participation of all consortium members—discussed pathways towards a net-zero EU Industry and the implications for Germany. Presentations from consortium members focused on Paris-compliant EU industry scenarios (Khaled Al-Dabbas and Dr Andrea Herbst, Fraunhofer ISI), and on wider EU impacts (Dr Baptiste Boitier, SEURECO). Session 2—this time, held in German to facilitate interaction with national stakeholders—focused on the co-creation of a transformative policy mix. Sessions were structured with a mix of plenary sessions, where most relevant project work was presented and discussed (presentation from Dr Jakob Wachsmuth, Fraunhofer ISI), interactive sessions with live pooling, and breakout group discussions. Participants were then asked to vote bottlenecks of priority from their perspective, regarding infrastructure and demand-side challenges. As a result, two lists of bottlenecks were developed, which participants discussed in two small groups, first specifying each bottleneck and then outlining means to overcome it.

A full event summary (along with presentations) can be found [here](#).

UK – 7th October 2022 (held physically, with option for remote connection)

(Attendees: TBD)

The PARIS REINFORCE consortium has developed whole-system and sectoral net-zero pathways for Europe, and the relative roles of electrification and hydrogen. The workshop, to be held in London, aims to present and discuss these scenarios with key stakeholders in the UK, so as to highlight potentially new areas of demand for electricity,



hydrogen, bioenergy, and other low-carbon energy vectors, as well as implications for gas and other fossil fuel demand with a focus on the industrial sector.

The workshop has three primary objectives: (i) to raise awareness of the implications of the European net-zero pathways for key fuel demands in the industrial sector; (ii) to discuss challenges for the UK industry sector related to such changes in key fuels, in the context of the UK's and the EU's net-zero strategy; and (iii) to co-create views on successful UK policy mixes to overcome bottlenecks and maximise opportunities in the UK and EU industrial decarbonisation contexts.

The workshop will be organised as a half-day event structured around two main sessions. Session 1 (European low-carbon pathways) discusses key energy system transition pathways in the UK and EU, with a specific focus on electricity, bioenergy, hydrogen, and natural gas in industrial manufacturing. Session 2 (Co-Creation of a successful low-carbon strategy) is composed by a mix of plenary sessions (co-assessing the main challenges to the proposed low-carbon industry pathways, for the UK and EU) and small groups sessions, with active discussion on the opportunities and how to overcome challenges in the UK, through specific policy mixes.

Invited stakeholders are from government, energy-intensive industries, NGOs, and academia with a focus on actors driving the current transformation.

A full event summary (along with presentations) will be published in the PARIS REINFORCE website.



4 Lessons Learned

This section offers some brief thoughts on key lessons learned by the consortium from the 2nd series of national stakeholder workshops. This section reiterates some findings contained already in D3.6 as part of lesson learned from the 1st round of stakeholder workshops. These, where relevant for this round, are included for completeness. Under the project's scope, Deliverable D3.8 will provide a thorough explanation of lessons learned and hence this list is only a first indication.

Workshop Content

- It is important to tailor the workshop contents to the invited/participating stakeholders. It is a useful strategy to try to reach most suitable stakeholders and engage with them prior to a workshop to get their thoughts on optimal areas for discussion. This approach was adopted during the organisation of this second series. This means that each workshop was delivered with common principles but with a 'tailored' approach, allowing a deep dive into areas that are of interest for local stakeholders, leading to more engaged participants and more relevant outputs. Each workshop of this second round had, apart from general context findings, focused sessions on relevant topics for invited stakeholders and the host country, namely transport (Canada and Brazil), the power sector (Greece), industry (Germany and the UK), energy decarbonisation and affordability (Italy).
- The experience of this second round of workshops confirmed the finding that inviting stakeholders to present their own work is a sensible tool to create buy-in, improving the chances for active participation. Workshops of this second round exploited this idea to different extents, depending on time constraints, the envisaged type of events (in presence vs. online) and the type of stakeholders participating. Some workshops (e.g., Italy) organised the agenda around external keynote speakers and dedicated one or multiple sessions to a roundtable discussion. On the other hand, half-day events (given time constraints) were limited to more informal contributions, within the context of co-creation. One lesson is that having formal contributions from stakeholders outside the consortium adds value, although it may be applicable primarily to events with time flexibility and held in person.
- Compared to the first round of workshops, a more complete set of modelling scenarios and analyses were available from the project. This eased the interactions with stakeholders, who were able to discuss in practice deep mitigation trajectories and related transformations foreseen by a diverse model suite. On the other hand, this also represented a challenge for the organising partner, in terms of narrowing the focus of each event to a specific geographical context. This revealed the importance of synthesis, downscaling, and engagement with all (modelling) teams. Albeit time-consuming (and achieved often via regular virtual meetings), this contributed to the fine-tuning and improved understanding of the results delivered by each of the modelling teams.

Administrative/logistics

- Optimal workshop agenda design should involve regular back-and-forth between organisers and presenters (if not attendees too).
- While it is tempting to present all relevant project work at the beginning and only then give the floor to stakeholders, this appeared to discourage active participation. For this, workshops encouraged discussion already during the initial presentation-heavy sessions. In few cases at the end of each session, preliminary discussion, Q/A (e.g., Italy, UK) or live polling (e.g., Germany) sessions were included as part of the agenda.
- This second round of workshops were delayed compared to the original work programme. This delay was



mainly driven by the persistent travel restrictions due to COVID-19, which made the organisation of these events challenging. The project extension allowed a shift to more favourable conditions and permitted the delivery of at least part of them (i.e., Greece, Italy, Germany, and the UK) in person. This emerged as a key added value for this second round of workshops.

- The scientific/modelling part of the project consists in its exercises, which are ready to hold workshops at one point in time. However, this puts strain on organising events. Also, such an implementation strategy creates a lot of publicity about the project around a certain time period but then the project remains quiet (from a workshop standpoint) in the months around this. It is therefore attractive from a resource allocation and public attention maximisation view to spread events out over the course of a project. This series of workshops were organised across May-October 2022 trying to keep in mind this important aspect, as well as other relevant constraints, such as delays due to COVID-19-related restrictions, suitable timelines for stakeholders (e.g., avoiding holiday periods), and the project management schedule.
- The COVID-19 pandemic impacted the entire stakeholder engagement process of the project. Novel approaches to delivering, given the circumstances, stakeholder engagement via online platforms/tools mitigated the downturns and built an equally effective participation. Nevertheless, these approaches still did not supplement the originally intended approach of physical interactions, also considering that the informal interaction during in-person events is hardly replicable in online events. To overcome this, the preparation of online events needs a different preparation and organisation approach. From this experience we learned that more effort compared to traditional workshop preparation is needed for the preparation of presentation materials, which require a narrower focus, and online engagement platforms and/or tools. Furthermore, online events had better feature a limited duration (e.g., maximum half a day) to keep interest and interaction with remote participants. On the other hand, in-person events enabled broader discussions and eased discussion through group sessions (e.g., Greece and Germany) or round tables (e.g., Italy). In general, this workshop series showed that both online and physical events were able to provide valuable insights to the modelling work and the scientific community. For future applications, a balanced mix of online and in-person events may be the right recipe for effective stakeholder-driven modelling.
- Roundtable discussions proved to be another sensible option for receiving stakeholder views and insights. This option, such as the one in the Italian workshop, is more feasible in physical events and limited number of participants (e.g., up to 20-25), guided by an experienced chairperson/facilitator. Before opening a debate, each roundtable participant is asked to have a brief (e.g., 2-minute-long) speech on their perspective on the topic at hand. This approach resulted in a very interesting and engaging discussion. Potential risks to be considered are related to the possibility of getting off-topic comments unless concrete boundaries are properly established.

Online tools

- Using an online voting tool (e.g., *sli.do*) to elicit information from stakeholders was a positive experience. It proved useful for modelling teams to translate discussions into quantitative inputs. Brainstorming on a set of questions for stakeholders is also a useful process for helping workshop organisers to think through desired outputs of the workshop. Presenting the results back to stakeholders immediately following the vote was popular.
- Virtual breakout sessions are also a useful way of facilitating greater stakeholder interaction online. Certain stakeholders appear to feel more open to discuss when present in smaller groups, meaning there is less domination of discussion by one or two individuals (even though this can still be a challenge). Sensible



and supportive moderation of discussion is an important tool to partially alleviate this issue.

- Online instruments, such as *Google surveys* or *sli.do*, were useful tools not only for virtual events but also during in-person events. These instruments have the key advantage of providing immediate feedback and resulted also, given the availability, in clear stakeholder preferences. For example, while conducting the fuzzy cognitive mapping exercise for Italy, both printed tables and online questionnaire were provided. Almost all participants chose the online questionnaire.

