PARIS
REINFORCE

30/09/2019

D3.1 STAKEHOLDER ENGAGEMENT PLAN

WP3 – Ongoing stakeholder dialogue

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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 will serve as a reference document among consortium partners (experts and non-experts), to know about the stakeholder engagement processes of the project.

It will also be used by policymakers and other stakeholder groups as a documentation of the stakeholder inclusion component of the PARIS REINFORCE project.

3. Short summary of results (<250 words)

A fundamental objective of PARIS REINFORCE is to enhance the legitimacy of scientific processes in support of climate policymaking, by introducing an innovative stakeholder inclusion framework and subsequently improving the transparency of the respective models, methods and tools utilised. This inclusion framework will seek to involve stakeholder groups in all stages; from the formulation of policy questions and the definitions of modelling assumptions; to the design of the project's interactive interfaces and specifications. The process aims for the mobilisation of tacit knowledge embedded in stakeholders with the aim to bridge knowledge gaps.

The PARIS REINFORCE Stakeholder Engagement Plan is predicated upon the identification and subsequent engagement with the Stakeholder Council. This Council will embody a diverse group of stakeholders, including policymakers, trade unions, industry associations and business networks, national and international NGOs, academia and the research community, as well as the civil society. Membership of the Council will be dynamic and significantly enriched throughout the course of the project.

The process of engagement will begin with the creation of an enhanced database of all members of the Stakeholder Council. Mapping the characteristics of each stakeholder will facilitate the most efficient and inclusive engagement process possible. Over the course of the project a variety of tools will then allow for extensive stakeholder interaction in order to co-create scientific models and processes. Such tools will include academic workshops, formal meetings, public events, bilateral and multilateral interviews, focus group meetings, surveys and further forms of communication.

4. Evidence of accomplishment

This report.

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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 I^{2}AM 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 and Environment Systems Modelling 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	

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Executive Summary

A fundamental objective of PARIS REINFORCE is to enhance the legitimacy of scientific processes in support of climate policymaking, by introducing an innovative stakeholder inclusion framework and subsequently improving the transparency of the respective models, methods and tools utilised.

The inclusion framework will seek to involve stakeholder groups in all stages; from the formulation of policy questions and the definitions of modelling assumptions; to the design of the project's interactive interfaces and specifications. The process aims for the mobilisation of tacit knowledge embedded in stakeholders with the aim to bridge knowledge gaps.

This document presents the PARIS REINFORCE Stakeholder Engagement Plan, which is predicated upon the identification and subsequent engagement with the Stakeholder Council. This Council will embody a diverse group of stakeholders, including: policy makers, trade unions, industry associations and business networks, national and international NGOs, academia and the research community, as well as the civil society. Membership of the Council will be dynamic and significantly enriched throughout the course of the project.

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Contents

1 Introduction 8

2 Key considerations for stakeholder engagement: a review 9

2.1 Purpose of stakeholder engagement 9

2.2 Purpose of the project 10

2.3 Structure of the project 11

2.4 Objective of stakeholder engagement in PARIS REINFORCE 12

3 Principles of stakeholder engagement 14

3.1 Who is a stakeholder? 14

3.2 Stakeholder engagement considerations 15

3.3 Levels of stakeholder engagement 15

4 Development of the Stakeholder Council 19

4.1 Types of Stakeholder 19

4.1.1 Core policymakers group 19

4.1.2 Co-designers 19

4.1.3 Thematic focus groups 20

4.1.4 Self-identified stakeholders 20

4.1.5 Scientific Advisory Board 20

4.2. General structure of stakeholder engagement in PARIS REINFORCE 21

4.2.1 A demand-driven approach 21

4.2.2 Co-creation within the PARIS REINFORCE project 22

4.3 Enhanced database and stakeholder mapping 22

4.3.1 The identification of 'stakeholder gaps' 23

5 Stages of engagement within the Stakeholder Council 24

5.1 Identifying and acquiring the core policymakers group 26

5.2 Co-creating research questions 26

5.3 Co-designing the I²AM PARIS Platform 27

5.4 Co-designing modelling activities 28

5.5 Discussing draft results 29

5.6 Presentation of results 29

5.7 Example of stakeholder engagement 30

5.8 Tables 31

Bibliography 35

The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

Table of Figures

Figure 1: Managing the science-policy interface 10
Figure 2: The overall concept of PARIS REINFORCE 11
Figure 3: Relationship influence/interest/effort at different levels of engagement 16
Figure 4: Structure of stakeholder engagement 21
Figure 5: PARIS REINFORCE Roadmap 25

Table of Tables

Table 1: Levels of stakeholder engagement 16
Table 2: Engagement techniques 17
Table 3: Stakeholder group engagement methods 18
Table 4: List of variables to be contained within Stakeholder Database 31
Table 5: Stakeholder Engagement Plan 32

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1 Introduction

In order to provide practical value to today's policymakers and support the formulation of effective climate policies through genuinely useful policy advice, the PARIS REINFORCE objectives are aimed, inter alia, at bridging the existing gap in the science-policy interface. Indeed, reconnecting science and policy has been ranked fourth out of the twenty-one top challenges for the 21st century by the United Nations Foresight Report [UNEP, 2012]. Stakeholder engagement therefore lies at the core of the PARIS REINFORCE project and a fundamental objective will be to involve stakeholders in the co-creation of scientific processes. This places the project directly in line with the Talanoa facilitative dialogue, which established the need for a more collaborative and cooperative approach toward climate research and policy implementation.

The Grant Agreement (GA) succinctly sets out this desired process as follows: "Policy questions and requirements of climate action and respective support are co-designed with stakeholders from the earliest stages of the project".

The core objectives of stakeholder engagement within PARIS REINFORCE are:

- To ensure policy relevance, through continuous demand orientation of research activities.
- To ensure transparency, by making public all scientific and policy achievements and project results.
- To ensure stakeholder interest and participation, by making stakeholders an integral part of our processes.
- To tap into external knowledge, by making stakeholders a valuable external quality control.

In the next section we introduce some key considerations for stakeholder engagement derived from the growing literature and outline what stakeholder engagement sets out to achieve within PARIS REINFORCE. Section 3 explores in more detail the fundamental principles of a successful stakeholder engagement process. The principles from both sections are applied in section 4 with the explanation of the Stakeholder Council, through which dynamic stakeholder engagement will occur over the course of this project. The last section describes how stakeholder engagement will be concretely carried out within the Stakeholder Council.

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2 Key considerations for stakeholder engagement: a review

Traditional practice with model-based climate and energy policy research has been to either completely exclude stakeholders from modelling activities, or to include them only to a limited extent in an engagement process. This has led to a wide gap between the formal model-based representation of reality, and the real-life context in which decisions are made (Doukas et al., 2018).

There is a growing literature discussing the damaging consequences that this lack of stakeholder engagement has held for previous modelling exercises. Such literature has proposed certain processes and ideas for more effective inclusion and engagement with stakeholders. In this section, we will summarise some general findings which have been integrated into the PARIS REINFORCE Stakeholder Engagement Plan (SEP).

2.1 Purpose of stakeholder engagement

Societal challenges of the 21st century, such as decarbonisation and energy transitions, require researchers to interact with science's end-users in industry, government or civil society, and develop strategies which transcend their traditional disciplinary boundaries (Pade-Khene et al., 2013). Aimed at contributing to viable solutions for complex and interlinked problems, participatory modelling (PM) is becoming an increasingly common tool to enhance environmental planning and decision making. PM incorporates policy and values into ecological models in order to solve complex ecological resource questions. Participation from stakeholders and decision-makers can focus upon data integration or the development of policy scenarios (Gaddis and Voinov, 2008). Jordan et al. (2018) define PM as a "purposeful learning process for action that engages the implicit and explicit knowledge of stakeholders to create formalised and shared representations of reality".

Acknowledging the importance of engaging a wide spectrum of stakeholders and driven by a broad variety of digital tools available to facilitate such engagement, PM attempts to bridge the gap that exists within constrained and fragmented spheres of knowledge of different groups of stakeholders, thereby encompassing a diverse set of perspectives (Sterling et al., 2019). The primary benefit of PM is that the models developed and used are often more useful in informing decision-makers, though further benefits may include achievements in building consensus amongst diverse stakeholders (Gaddis and Voinov, 2008).

PARIS REINFORCE aims to incorporate aspects of PM in a thorough process of co-creation. Through a process of stakeholders helping to define modelling inputs and desired areas for investigation, co-creation will ensure that the project reaches outside of solely scientific processes and incorporates political and societal realities (Miller and Wyborn, 2018). Built on a cooperative basis spanning all sectors of industry, government and civil society, the research community supporting climate governance has to live up to the challenge of producing recommendations that are trusted by a majority of stakeholders within the climate science-policy interface (Lacey et al., 2018). Involving all relevant stakeholders in co-designing the strategies to promote socially acceptable, robust and sustainable transitions is proven to increase the level of trust on both ends (Doukas et al., 2018; Turnheim et al., 2015). Furthermore, such a process lives up to the essence of inclusiveness that the Talanoa facilitative dialogue, established by COP21-23, encouraged (Verkuijl, 2018).

Sterling et al. (2019) provide a storyline of the stages modellers have tended to go through in an attempt to achieve such desired levels of stakeholder interaction and subsequently policy relevance. A desire to provide policymakers with the 'right' information and the 'right' tools is the initial starting point. Faced with a lack of trust in such information, modellers have then shifted attention to conveying information in the 'right' way, with the

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result being that policymakers still do not feel empowered by the process due to a lack of ownership over results. Attempts should therefore be made to engage stakeholders in data collection/analysis/modelling. Within this engagement process, diversity must be encouraged in order to hear from a wide range of different perspectives. A valuable lesson is to foster ongoing dialogue and collaborative analysis that is 'adaptable'. PARIS REINFORCE will do this through a dynamic process of stakeholder engagement.

This lesson, and particularly the need for increased connection between modellers and society, is reiterated by Voinov et al. (2014), who argue "*modelling, and applied science in general, has to enhance its scope beyond the problem-solving stage, to do more on the problem definition and solution implementation phases. Modelling can be also used for identification of societal values and for setting purposes by appropriate communication of the modelling process and results. (…) Instead of being separated from the modelling process, the translation of results should be an intrinsic part of it*".

A criticism particularly of integrated assessment models (IAMs) has been the ineffective inclusion of policymakers and other stakeholders at the heart of the modelling process (Van Vliet et al., 2010). Literature has referred to the 'black box' of models into which it has historically been difficult for policymakers to gain access (Doukas and Nikas, 2020). Scepticism of modelling outcomes will naturally arise from a lack of familiarity with the underlying assumptions driving results. PARIS REINFORCE has both the ambition and capacities to open this "black-box"[1] of environmental and climate-economy modelling, by placing stakeholders at the centre of the project, moderating the interfaces of policymakers, scientists, and other stakeholders as illustrated in Figure 1.

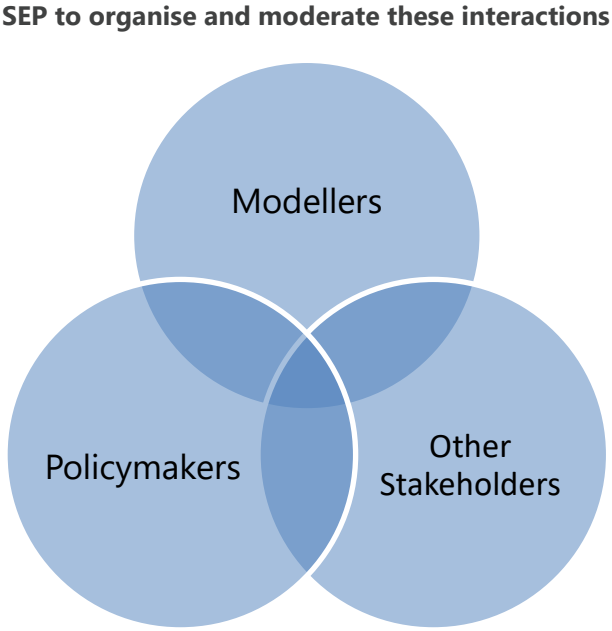

Figure 1: Managing the science-policy interface

2.2 Purpose of the project

PARIS REINFORCE is primarily designed to derive useful policy advice from a number of complementary

[1] Doukas et al., 2018.

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methodologies—most notably an ensemble of IAMs and other energy system and sectoral models. The main scientific aim of PARIS REINFORCE is not to develop new models, but to make use of existing ones, in an informed and targeted manner, in order to enrich the policy debate. Thereby, the purpose is not restricted to providing scientific answers to policy questions, but also to enabling and encouraging stakeholders to use the evidence provided in the political process. This requires a coherent strategy for initially (a) informing policymakers and stakeholders on our methodologies (models), including their strengths and limits, their robustness and how they relate to competing analysis (capacity building); and (b) building trust among stakeholders with respect to the strength of the offered modelling analysis. Both aspects can be most effectively addressed, by beginning extensive stakeholder engagement in the co-design of analysis from as early a stage as possible.

The broader purpose of the project, i.e. delivering on the Paris Agreement, is intrinsically dependent on effective stakeholder engagement. This is displayed in figure 2.

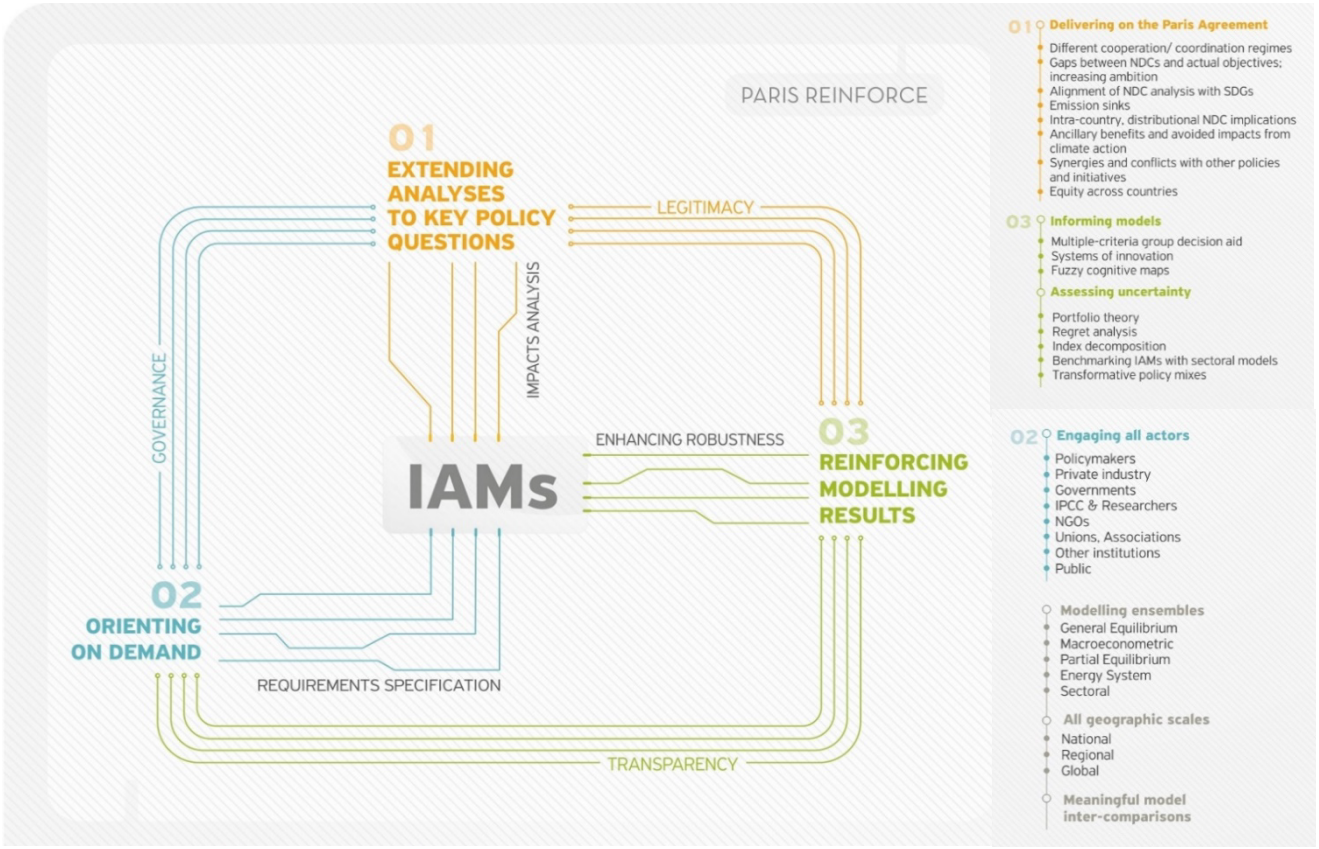

Figure 2: The overall concept of PARIS REINFORCE

2.3 Structure of the project

The PARIS REINFORCE project does not start with a blank sheet that would necessitate building stakeholder engagement from scratch, but it will build upon a number of established trust-relations and earlier works, while at the same time respecting a number of predefined constraints.

There are potentially thousands of stakeholders in different countries, sectors, and positions interested in PARIS REINFORCE, some of whom have already provided the consortium with a non-binding commitment to support the project. All (thirteen European and five international) partners will be to some degree responsible for stakeholder engagement given the variety of existing connections and areas of interest amongst partners.

The project's goal is to deal with very different policy questions ranging from land use in Brazil and co-benefits to

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global decarbonisation pathways. In order to do this, PARIS REINFORCE plans to use an already defined set of methodologies, including more than twenty already developed models (see project deliverables D5.1, D6.1 and D7.1). Stakeholder engagement work will feed into a very early stage of the policy process.

Whilst the literature on stakeholder engagement is often focused upon relatively narrow problems with a clearly limited number of stakeholders and centred on one methodology, PARIS REINFORCE needs to outline a plan that balances the involvement of a multitude of stakeholders with very different backgrounds, who are interested in very different policy questions, and willing to engage to very different levels. Finally, the project needs to be successfully finalised within three years. The purpose of the SEP is therefore to map out an informed, feasible, and useful stakeholder engagement plan that is consistent with the aforementioned context.

2.4 Objective of stakeholder engagement in PARIS REINFORCE

Stakeholder engagement is crucial to the aim of making scientific analysis useful for the policy process. The process of stakeholder engagement, particularly co-creation with stakeholders within the PARIS REINFORCE project, fundamentally aims to:

(i) ensure relevance of the results;

(ii) enhance the legitimacy of scientific processes, and;

(iii) provide inputs to make the analysis more robust.

Ensuring relevance of results

Engaging key stakeholders in the determination of the research questions, which we are going to analyse and attempt to respond to, will help to ensure that we address questions which have political relevance. Through the process of engagement, there is also a higher chance that those stakeholders will then be receptive of the results we produce, which in turn may also increase the incentives for other stakeholders to invest time in the stakeholder-process.

Enhancing legitimacy of scientific processes

PARIS REINFORCE seeks to enhance the legitimacy of scientific processes by engaging stakeholders and co-creating—based on stakeholder needs—the research questions as well as the scenarios to be used in the scientific processes with them, thereby improving transparency through the entire research process in light of the post-Paris Agreement and associated challenges.

Reflecting together with stakeholders on our premises and results enables us to ensure that we propose socially acceptable and robust policies to ensure a sustainable transition.

Moreover, co-creation helps stakeholders to better understand that the actual trade-offs and their longer-term involvement can generate some ownership of results they might otherwise discard as illegitimate.

Informing stakeholders

By involving stakeholders throughout the entire scientific process, from the determination of the research questions to the interpretation and communication of results, the involved stakeholders will develop a much deeper understanding of the used methodologies as well as of the wider field.

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Providing inputs to make the analysis more robust

Finally, stakeholders possess a much wider basis of formal and informal information that is crucial to sensibly analyse long-term decarbonisation pathways. Stakeholders will have a deeper understanding of model-relevant inputs due to the formal positions they hold but also importantly through the experiences they have accrued. The stakeholder process allows for tapping into this knowledge and thus complementing our understanding of the world.

PARIS REINFORCE will go beyond just communicating outputs to stakeholders by involving them in the scientific process from the very beginning to enhance the credibility and legitimacy of results, and to respond to their needs through an effective facilitative dialogue. Therefore, all modelling scenarios and resulting pathways will be co-developed with stakeholders, who will define the policy questions and modelling needs.

The broad scope of this project provides a remarkable opportunity to engage with a wide base of stakeholders. Attempts will be made to gather input from as many different and diverse stakeholders as possible in order to help facilitate the creation of socially acceptable, sustainable, and long term policies.

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3 Principles of stakeholder engagement

This section outlines the key principles of stakeholder engagement that PARIS REINFORCE will follow. The key areas for consideration initially include the identification of stakeholders and, building upon the identification of different groups of stakeholders, the establishment of a theoretical framework for differing methods of engagement with these groups. The consideration of these principles is of paramount importance for the development of the Stakeholder Council (Section 4).

Stakeholder engagement in the science-policy interface is usually informed by a set of principles defining core values underpinning interactions with stakeholders. Credibility, relevance, and legitimacy (sometimes referred to as the CRELE framework) are often cited as determinants of the effectiveness of interfaces between science and environmental policy and serve as criteria for their evaluation (Sarkii et al., 2013). There manifest trade-offs between the three factors, as one might slightly diminish the other. The challenge is to appropriately balance them according to specific issues at hand.

- **Credibility** is the quality and validity of the stakeholder engagement process and determined by the selection of participants. While PARIS REINFORCE has developed clear objectives and appropriate methods, our credibility is dependent upon participation of a representative selection of stakeholders. A balanced selection, the involvement of opposing views, transparency of the process, and some continuity of those involved are important to ensure our credibility.
- **Relevance** is the usefulness of the research outcomes to its end-users; in the case of PARIS REINFORCE that is mainly political decision-makers, acknowledging however that the research outcomes ought to be relevant for all other stakeholder groups (including NGOs, businesses, associations, academics, and the research society). To ensure relevance, we will ensure/adopt the use of understandable language adapted to the type of stakeholders engaged. This will be especially relevant, as IAMs are technically quite complex and most stakeholders will not have any prior knowledge on modelling. Moreover, relevance depends on appropriate timing of the engagement, particularly the outcomes of the engagement. Relevance is further achieved by ensuring effective engagement and communication with key decision-makers throughout the project lifetime. This will be of vital importance to motivate stakeholders to participate and ultimately have a real impact on climate policies.
- **Legitimacy** is gained through the fairness and balance of the stakeholder engagement process, which is particularly important when conflict occurs. A clearly defined process alongside the appropriate methods help manage stakeholder conflict and enhance legitimacy. Further, the inclusion of a balanced group consisting of both policymakers and a diverse set of selected stakeholders (coming from trade unions, industry associations and business networks, national and international NGOs, academia and the research community, the civil society, etc.), acting at all possible levels improves legitimacy. Enhanced stakeholder mapping will enable us to take into account and balance stakeholder interests. As a demand-oriented modelling project, early engagement of stakeholders in the co-creative "discursive space" of IAMs will lend legitimacy to our results.

3.1 Who is a stakeholder?

The first step in any process of stakeholder engagement is defining the stakeholders themselves. This can be a complicated procedure and necessitates some degree of objective selection on the part of the researcher. Weyer (1996) described stakeholder analysis as a "slippery creature" used by different people to mean different things. Reed et al. (2009) provide pertinent discussion on stakeholder identification; their concern with previous projects is that stakeholders are often selected on an ad hoc basis with the potential to marginalise certain groups.

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PARIS REINFORCE uses the broad definition of what constitutes a stakeholder as defined by the Intergovernmental Panel on Climate Change (IPCC): "a person or an organisation that has a legitimate interest in a project or entity or would be affected by a particular action or policy" (Parry et al., 2007). Thus, everybody could justifiably argue their case to be a stakeholder in the project. The different types of stakeholders are explored in section 4.1, with attention paid to the fact that PARIS REINFORCE will deal with such an extensive stakeholder base.

3.2 Stakeholder engagement considerations

From the perspective of both the modellers and stakeholders there are numerous considerations to be taken into account. Stakeholder engagement has costs and benefits for both the involved stakeholders and the organisers:

- **It takes time and resources**: Developing relationships based on trust takes time and effort. Among practitioners of participatory modelling, the consensus is that participants should be engaged as early as possible in the process and in as many phases of modelling as possible (Voinov and Bousquet, 2010). No willing stakeholder should be excluded from the process of engagement. In order to ensure that our objectives are met, the process of engagement will be set out clearly in advance. A clear plan will allow us to maximise engagement with as many relevant stakeholders as possible, given limited time and resources.
- **It raises expectations**: In many cases, stakeholders develop unrealistically high expectations of the impact their participation may have on the project, or the impact of the project on particular policy outcomes. When such unrealistic expectations cannot be met, stakeholders may disengage from participation. Therefore, and in order to best mitigate any potential dissent, PARIS REINFORCE will clearly explain to stakeholders both the role they are anticipated to play across the course of the project as well as the capabilities of the modelling exercises from the onset.
- **Securing stakeholder participation**: Institutional, economic or political responsibilities can prevent stakeholders from freely participating. This can be avoided by engaging local community liaison officers, who are sensitive to local power dynamics. PARIS REINFORCE will be aware of operating in different cultural environments, again community co-leads will be crucial partners in navigating social and political contexts (Sterling et al., 2019).
- **Consultation fatigue**: In various case, stakeholders easily tire of engagement processes, especially if they are lengthy and the results are not immediate. This will be anticipated in PARIS REINFORCE by clearly informing stakeholders about the modelling processes, our project timeline, and by looping stakeholders into our communication cycles.

3.3 Levels of stakeholder engagement

In line with the aforementioned considerations, the level of engagement of certain stakeholder groups will be based on a balanced approach, according to their interest in participating and their influence to contribute to our core objectives, namely to provide practical value to today's policymakers and support the formulation of effective climate policies through genuinely useful policy advice.

The use of tools to map the influence and interest of stakeholder groups is common practice in stakeholder engagement plans. Ackermann and Eden (2011) detail and advocate for the use of power-interest grids, in order to determine the abilities and enthusiasm of stakeholders to influence policy. Reed et al. (2009) define interest-influence matrices as a valuable tool for identifying stakeholders and their corresponding stakes. The use of such tools will ensure that stakeholder engagement and identification follows a transparent and coherent structure.

When deciding the frequency and appropriate engagement techniques used to consult a particular group of

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stakeholders, three criteria should be considered:

- The extent of interest of the stakeholder group in participating in the project
- The extent of influence of the stakeholder group on the project
- The appropriate engagement and knowledge elicitation methods

In general, engagement is directly proportional to impact and influence: as the influence of a particular stakeholder group on the outcomes of PARIS REINFORCE increases, engagement with that particular group should deepen accordingly. Naturally, the most important stakeholder group will be (climate) policymakers, hence it will be the group engaged most intensively—policymaker involvement will be essential for developing the interest of other stakeholders in our work. However, based on the principles and inclusiveness of the Talanoa Dialogue, PARIS REINFORCE will aim to actively engage all stakeholder groups. To facilitate maximum participation, all engagement will proceed on the basis of appropriate methods for each different stakeholder group. Figure 3 illustrates how the relationship of influence and interest manifests across different levels of engagement. Table 1 offers a more detailed explanation of the levels of engagement with each type of stakeholder.

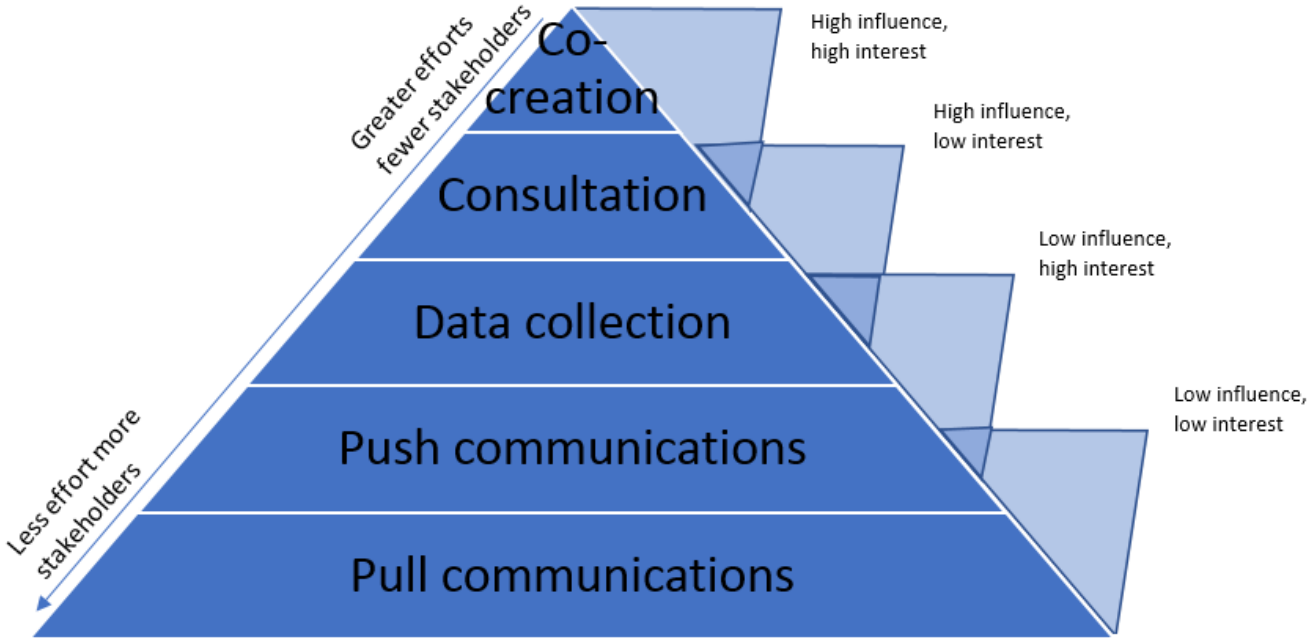

Figure 3: Relationship influence/interest/effort at different levels of engagement

Table 1: Levels of stakeholder engagement

Level of engagement	Description
Co-creation/Co-design	This group of stakeholders will co-create research questions, hence they will be involved from early stages. This entails redefining, together with researchers, the assumptions and value judgements underlying the models. Co-creation establishes a sense of ownership and encourages committed relationships. The group involves decision makers engaged in (national, regional, and EU) climate policymaking, high-level public administrators as well as high-level representatives from industry associations, the business sector, civil society groups, trade unions, but also academics and the research community. The benchmark for co-creation is willingness to participate, but also a certain level of influence and representativeness.

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Consultation	Stakeholders, who do have an influence and stake in climate policymaking, yet lack the willingness, resources, or ability to participate at co-creation level. This group still has the opportunity to participate via consultations, review of outcomes or participation in workshops.
Data collection	Collection and processing of data lies at the heart of the modelling process. Contributing to PARIS REINFORCE data collection (through surveys, crowdsourcing, workshops or interviews) offers the opportunity for stakeholders to influence model runs by supplying information otherwise overlooked.
Push communications	One-way engagement. Organisations may broadcast information using various channels, e.g. email, letter, webcasts, podcasts, videos, etc.
Pull communications	One-way information. Information is made available, and stakeholders decide whether to engage with, i.e. on websites, newsletters, publications etc.

There are a variety of engagement techniques to build relationships, gather information, consult, and disseminate project information with stakeholders. When selecting the appropriate engagement technique, the purpose of engaging with this stakeholder group should be considered. Table 2 provides a list of different engagement techniques and suggests the most appropriate application of these techniques. Table 3 presents a stakeholder analysis with respect to the appropriate levels of engagement of various stakeholder groups.

Table 2: Engagement techniques

Engagement technique	Most appropriate application of technique
Information board and contact points	• Establish contact points with each project partner in the local language
Correspondence by phone and/or email	• Distribute project information to government officials, organisations, agencies and companies • Invite stakeholders to meetings
Bilateral or multilateral interviews	• Solicit views and opinions • Enable stakeholders to speak freely and confidentially about controversial and sensitive issues • Build personal relations with stakeholders
Formal meetings	• Present project information to a group of stakeholders • Allow the group of stakeholders to provide their views and opinions • Build impersonal relations with high-level stakeholders • Distribute technical documents
Public events	• Present project information to a large audience of stakeholders, and in particular communities • Allow a group of stakeholders to provide their views and opinions • Build relationships with local communities • Distribute non-technical project information
Workshops	• Present project information to a group of stakeholders • Allow the group of stakeholders to provide their views and opinions • Use participatory exercises to facilitate group discussions, brainstorm issues, analyse information, and develop recommendations and strategies
Focus group meetings	• Allow a smaller group (e.g. of between 8 and 15 people) to provide their views and opinions of targeted baseline information on a specific thematic/regional issue • Build relationships with local communities or sectoral networks

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Survey, questionnaire	• Gather opinions and views from individual stakeholders • Gather baseline data • Record data • Develop a baseline database for monitoring impacts

Table 3: Stakeholder group engagement methods

Stakeholder group	Consultation method
Government officials, EU representatives, international public servants	• Phone/email • Interviews • Formal meetings • Conferences and closed-door events
Industry associations, business networks, trade unions	• Focus group meetings • Public events (conferences, workshops, etc.) • Interviews • Surveys • Specific webinars
Non-governmental organisations	• Focus group meetings • Public events • Interviews • Surveys • Specific webinars
Academia, the research community	• Academic journals • Academic conferences (symposiums, workshops, etc.) • Climate Action Conferences (e.g. UNFCCC Committee of the Parties) • Modelling/research consortia or for a (e.g. EMF, IAMC, etc.)
Local citizen groups	• Print media, online announcements • Public events • Focus group meetings • Surveys • Information boards

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4 Development of the Stakeholder Council

In order to achieve desired engagement, an innovative Stakeholder Council will be created to act as the primary point of co-creation, and to foster and encourage collaborative dialogue. The Council will consist of an extensive range of stakeholders (policymakers, trade unions, industry associations and business networks, national and international NGOs, academia and the research community, the civil society, etc.) who will all be invited to provide input at regular points over the course of the project. Membership is dynamic, and it is hoped that the Council will be enriched with significant expansion over time.

4.1 Types of Stakeholder

Within the Council, engagement will not take a one-size-fits-all strategy. Stakeholders have different regional and thematic focuses, strategies and motives, and some are more interested to provide inputs while others are more interested in the outputs of our work. A nuanced approach has therefore been developed consisting of different, non-exclusive subgroupings of stakeholders. These subgroups are described as follows.

4.1.1 Core policymakers group

The core policymakers group serves as a first inspiration for the research questions to address and as a main audience and discussion partner for ensuring policy-relevance of our work.

- Comprising a small group of high-level decision makers (5-10 individuals).
- Selected according to:
  - Personal, longstanding and trustful relationships with project partners.
- Selected in line with the following characteristics:
  - An active interest and ability to apply project outcomes into political practice.
  - A representation of geographic diversity particularly from areas where PARIS REINFORCE's models a) have operational capabilities, and b) are able to provide significant added value on top of already established modelling architecture.
  - A strong initial willingness to engage, as well as a commitment to remain available for engagement throughout the project lifecycle.
  - Technically competent (pragmatic), but able to have a reasonable perspective and see the bigger picture (historical relevance and pressing urgency of climate crisis).
- Central role to ensure policy relevance through demand orientation (identify the relevant questions).
- Their commitment to our project will lend legitimacy and credibility to our project and incentivise other stakeholders to become actively involved:
  - On top of this, core policymakers will be asked to provide information on who they identify as the important stakeholders in each area of discussion (geographic, sectoral), in a process of 'snow-ball sampling' [Reed et al., 2009].
  - In this way, core policymakers will act as a significant tool from which stakeholder outreach will be enhanced.

4.1.2 Co-designers

The co-designers serve as a large pool of stakeholders that bring specific knowledge into the project. Their strong involvement is important to give legitimacy to our work. Through the use of a variety of identification tools this group will be created to be as diverse and balanced as possible.

- This group will comprise a broad representation of:
  - National policymakers (e.g. ministries).
  - Regional policymakers (e.g. EC and DGs, like DG CLIMA, RTD, etc.).

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  - Academia, including/focusing on IPCC (lead) authors, climate system and climate-economy modellers, other scientists in the energy and climate policy field.
  - Representatives from big industries (including lobbyists, etc.).
  - Trade Unions (e.g. TUED Trade Unions for Energy Democracy).
  - NGOs (environmental, e.g. WWF and Greenpeace, and climate, e.g. CAN or Climate Group, etc.).
  - Banks and financial mechanisms (e.g. World Bank, Green Climate Fund, and national banks).
  - Civil society: we will consider smart ways to include them as 'lay' experts, e.g. through targeted surveys or other techniques.
- This group will be identified based on:
  - Dynamic input from all project partners (including existing stakeholders) in a process of snow ball sampling.
  - Internet and social-media analysis.
- Central role is to ensure policy relevance through co-creation.
  - Provide project partners with input data and feedback, to ensure high quality and relevance.
  - Be mobilised ad-hoc to support thematic focus groups with expertise in specific policy questions.
- Engagement methods:
  - Bilateral (interviews, phone calls, meetings).
  - Multilateral (surveys and questionnaires).
  - Workshop attendance.
  - Project communication (news, publications, draft results, commentaries and policy briefs).
  - Webinars.

4.1.3 Thematic focus groups

The thematic focus groups are a thematically focused subsample of the co-designers and relevant consortium partners. The nature of our database will allow us to filter stakeholders by particular categories, and we will do this in order to identify appropriate stakeholders to invite to particular focus groups. The focus group will then be led by the most topically relevant consortium member.

- A series of internal working groups, based on specific (regional-thematic) policy questions:
  - Consisting of a set of (thematically or regionally linked) project partners
  - Supported by input from a thematically and regionally linked set of stakeholders
- Providing a "discursive space" to (re-)evaluate value judgements and assumptions the models are based on according to stakeholder participation.

4.1.4 Self-identified stakeholders

In addition to the aforementioned groups, every interested person should be allowed to become a stakeholder in the project, through self-registration. Self-identified stakeholders will be able to co-design by participating in public events (such as stakeholder workshops and conferences) as well as providing structured input via surveys and questionnaires. To assess the relevance of the input, self-identified stakeholders will have to provide all information necessary for stakeholder mapping.

We will not close the stakeholder group at any point and will encourage additional stakeholders to join during the course of the project.

4.1.5 Scientific Advisory Board

To complement stakeholder input, a Scientific Advisory Board, consisting of key scientific and policy experts from the climate dialogue and broader context of climate change and policy, will be established. This group will be invited to collaborate with the PARIS REINFORCE consortium, particularly providing their inputs and expertise throughout the course of the project. There are at least three specific meetings planned with the SAB members.

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4.2. General structure of stakeholder engagement in PARIS REINFORCE

The stakeholder council will operate according to two main components of stakeholder engagement: 'demand-driven' (i.e. that our research is targeted to answer questions that are relevant for policy-making) and 'co-design' (i.e. that our research involves stakeholders in shaping the analysis in all stages of the process).

These two elements are complementary as illustrated by figure 4. Stakeholders must be confident that our results are relevant and have a chance to be of significant interest to policymaking for them to be willing to invest time in the stakeholder process. On the other hand, policymakers must perceive that our results are legitimised by an inclusive stakeholder process in order for them to be willing to take them into account.

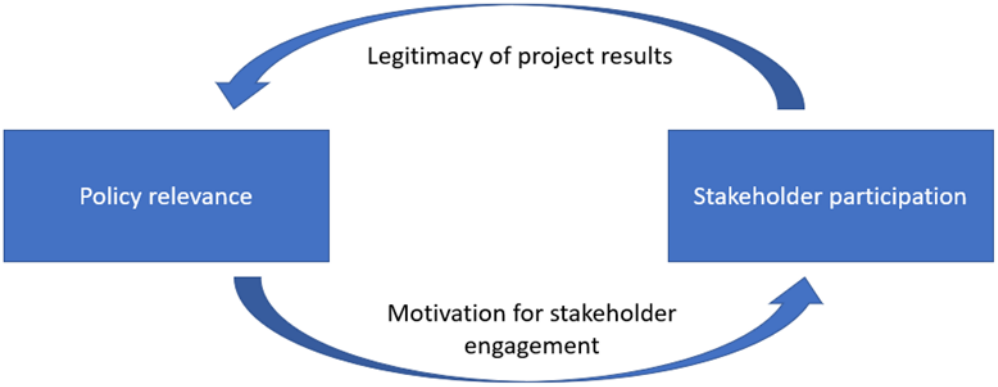

Figure 4: Structure of stakeholder engagement

4.2.1 A demand-driven approach

Policy relevance is the core criterion for our outputs, and it is also essential to motivate stakeholder participation. To produce demand-driven results, we plan the following activities:

- Small meetings with relevant policymakers to inform them on the abilities of our consortium and to discuss which will be the major policy questions that might become politically relevant in the next four years (i.e. until the global stocktake).
- Internal discussion within the consortium as to which of these questions we can sensibly address.
- Exchange between the relevant consortium members with the corresponding policymakers in further shaping the research questions.
    - Developing a sense of ownership from the policymakers for the results we prepare by prioritising our attention on the policy areas stakeholders propose.
    - This should stimulate interest from further groups of stakeholders.
- Presentation of a set of corresponding "research issues" in the first regional EU stakeholder workshop in Brussels on 21 November 2019 based upon discussions with core policymakers.
    - Assigning a responsible researcher for each issue within the consortium.
    - These research issues will be very broad, and stakeholder led discussions over all relevant aspects of the topics will be encouraged.
- Identification of a relevant core group of stakeholders for each "research issue" to regularly interact with the project consortium.
    - Ensuring balance.
    - Based on transparent criteria.
    - Commitment over the project life-time.

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4.2.2 Co-creation within the PARIS REINFORCE project

As an innovative and demand-oriented project, PARIS REINFORCE seeks to enhance the legitimacy of scientific processes by engaging stakeholders and co-creating—based on stakeholder and policy needs—the research questions as well as the scenarios to be used in the scientific processes with them, thereby improving transparency throughout the entire research process in light of the post-Paris Agreement and associated challenges.

All modelling scenarios and resulting pathways will be co-developed with stakeholders, who will define the policy questions and modelling needs. Co-creating research with stakeholders will encourage a sense of ownership of the project by those likely to benefit, be affected by, or interested in research outcomes.

Models will be employed to assess the impacts of climate policies and further reinforced and tested by robust tools and methodologies. This approach will serve the aim of meaningfully and successfully supporting the design of effective, robust, socially acceptable, financially viable and technically feasible climate action.

In practical terms, co-creation should mainly take place through the Stakeholder Council and a variety of engagement methods: physical and virtual workshops, surveys, questionnaires, interviews, webinars etc. The I2AM PARIS platform will then act as a point of innovative interaction with the project's tools, scenarios, assumptions and modelling results. The platform will be used as a tool for communicative purposes and should encourage further stakeholder engagement by bridging traditional gaps between science and the rest of the relevant stakeholder base.

While we plan to invite a well-targeted group of stakeholders to the respective workshops (e.g., not the EU nuclear expert to the Brazilian workshop) the participation in the Stakeholder Council is open to everyone. Appropriate tools will, however, ensure that the background of the stakeholder that provides input into the project is considered, when input is assessed.

4.3 Enhanced database and stakeholder mapping

To clearly structure and define the stakeholder groups that PARIS REINFORCE will be engaging with throughout its project lifetime, an important part of the Stakeholder Council will be the creation of an enhanced database of all stakeholders that declare an interest in participating in the envisaged co-creation. In full alignment with the essence, inclusiveness, and purpose of the Talanoa dialogue, PARIS REINFORCE will engage with a group as diverse and balanced as possible (by region, nationality, institution, function, gender, etc.) that can act as an interface and multiplier in their respective country or organisation.

To collect and store stakeholder information and allow for practical mapping functionalities we are evaluating the practicality of two different Customer Relationship Management (CRM) software tools:

- Salesforce: A cloud-based commercial customer relations platform, a version of which is already used at Bruegel, tailored to its needs. We therefore have to evaluate if the functionalities match the task requirements sufficiently.
- Hubspot: A free, user-friendly CRM software. Its basic features cover the needs of PARIS REINFORCE mapping exercises

Stakeholder information will be recorded in this CRM database alongside useful information to faciliate the most effective forms of stakeholder engagement. The full list of variables to be recorded are listed in Table 4. Some of the most important variables include: stakeholder category (e.g. government, NGO etc.), geographic area, partner reference (if any), level of activity, interest in the project, level of influence (within their level of activity), initial date of engagement, and any issues or concerns raised. Based upon this database, we will be able to analyse the role of each stakeholder by mapping their geographic level and sector of activity, interest and capacity to mobilise

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resources to facilitate or constrain decarbonisation. Mapping and comprehending the motives, concerns, targets, strategies, and expertise of actors on the ground is of vital importance to successful stakeholder engagement. It will allow us to draw the most relevant subsets of stakeholders for the different modes of stakeholder engagement. Furthermore, gathering not only contact details but also background information on interests and preferences will allow us to evaluate the input of different stakeholders in the research process.

Some database variables are subject to qualitative interpretation, e.g. influence in sector of interest. A more refined protocol for qualitative assessment will be developed, but essntially the responsibility will lie with the consortium member of connection. For example, for the variable *influence*, three available options are low/medium/high, and it is advised to input medium level of influence unless a consortium member has reasonable evidence to argue either way. The dyanmic nature of the database will ensure that such inputs can be changed as further evidence, including stakeholder feedback, is made available.

The methods used to ensure that we identify a diverse selection of relevant stakeholders will range from old-fashioned desk research to sophisticated web tools and the use of social media analysis. Social media analysis will be based on data from the Twitter API. It will provide an innovative tool for the identification of relevant stakeholders in geographical areas where PARIS REINFORCE does not have established strong connections. This data-driven approach, in combination with desk reseach, will ensure that the most valuable stakeholders are identified and approached. Involving such stakeholders will, in an iterative process, encourage the participation of broader groups of stakeholders.

We will further make use of natural language processing and network theory to try and understand the conversations (or lack thereof) between modellers and policymakers.

4.3.1 The identification of 'stakeholder gaps'

The consortium partners have many existing connections which will be invaluable for the success of the project. However, for PARIS REINFORCE to develop a truly innovative stakeholder engagement plan it will be important to broaden this outreach. In order to do so, an important tool will be the identification of stakeholder gaps facilitated by the use of a CRM database.

The mapping of data will allow us to ensure that for each geographical area of interest, PARIS REINFORCE engages with a sufficient number of relevant stakeholders in order to develop a holistic understanding of the required modelling needs. The use of either CRM tool (i.e. Salesforce or Hubspot) will allow for the use of filters according to all collected data to this end.

Stakeholder identification and engagement efforts can then be targeted to a particular area of low stakeholder engagement within the broader area (geographic) that PARIS REINFORCE hopes to develop useful policy outputs for. The use of social media analysis will be a truly innovative step forward in this direction. It provides an exciting opportunity for the consortium to expand knowledge and understanding of a region, building outwards from a few core contacts.

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5 Stages of engagement within the Stakeholder Council

This section outlines the more concrete plan for stakeholder engagement within the project. The key events for stakeholder engagement are outlined and explored in each of the sub-sections. Figure 5, the roadmap, offers a broad overview of the timeline across which these events will take place. An example is provided to illustrate how executing such a plan may look in practice, based upon a specific hypothetical example. Table 5 lists relevant activities, objectives and responsibilities across all work packages.

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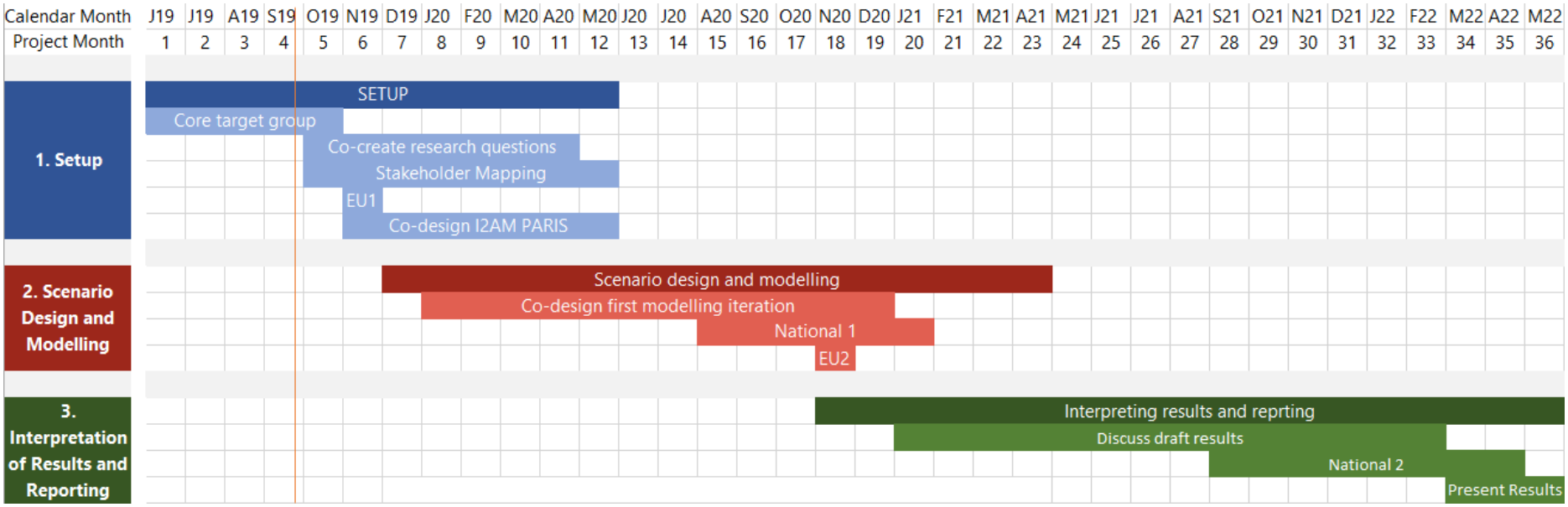

Figure 5: PARIS REINFORCE Roadmap

Note:

- Core target group refers to the identification and acquisition of the initial core group of policymakers
- EU1 refers to the first regional EU workshop // EU2 refers to the second regional EU workshop
- National 1 refers to the first series of national workshops // National 2 refers to the second series of national workshops

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5.1 Identifying and acquiring the core policymakers group

During the first stages of engagement, it will be crucial to determine the relationship between our project and the decision-making process, in order to clearly define our target group. Following our objective to produce genuinely relevant advice to support robust climate policies, the key recipients of which are primarily policymakers, we will include in this group about ten representatives of national governments and the EU, who are strongly involved in developing their respective climate strategies.

Whilst PARIS REINFORCE's programme of stakeholder engagement extends far beyond just policymakers, building constructive political partnerships at an early stage of the project will play a crucial role in providing legitimacy and attracting other stakeholder groups. The early idenfication and engagement with core policymakers will generate the incentives for much broader stakeholder participation and counteract tendencies of stakeholder fatigue.

By establishing trusted relationships and acquiring declarations of interest from policymakers, their involvement in co-creating modelling activities will invoke a sense of ownership of the results at a later stage. These early relationships will stem from the existing connections of all project partners and build on the already existing pool of stakeholders that have declared their interest at the proposal stage of the project. Core policymakers will be consulted for the identification of further relevant stakeholders within their local areas of expertise (e.g. geographic). Through this process of 'snow-ball sampling', PARIS REINFORCE, will be able to build a stakeholder base, built upon, but much larger than, the existing consortium connections.

These core policymakers will be invited to join, and engage with the project through a series of initial bilateral meetings. These meetings will allow PARIS REINFORCE to develop a broad initial understanding of the policy areas that will be relevant for modelling analysis. To this end, the meeting should be off the record in order to allow for discussion of as wide a range of topics as possible. Documentation of the points most important to the project (e.g. research questions and context) will be produced in an anonymised format in order to stimulate relevant discussion at future workshops.

For the sake of transparency and reproducibility, the meetings should have some basic structure, consisting of:

(i) the presentation of our project and the introduction to what our models can do based on a joint set of slides,

(ii) an expression of interest of cooperation by the stakeholder for the duration of the project, and

(iii) the elicitation of some first ideas for what research/policy questions are relevant for the partner.

(iv) a constructive conversation with the stakeholder in which they are asked for thoughts on whom else they believe should be involved as stakeholders in the project (based on their area)

5.2 Co-creating research questions

To ensure policy relevance, research questions will be co-created with stakeholders based on a flexible approach. Depending on the stakeholder availability, ability and willingness to participate, project partners will approach stakeholders with the following tools and methodologies:

- **Policy Briefing "What can 'our models' deliver" (D3.2)**:
  To be delivered in November 2019, this brief will outline in a clear and understandable way:
  i) which policy questions were addressed by each model in the past, who commissioned them and who they were targeting,

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ii) a brief description of key modelling features, and
iii) the level of transparency of the modelling exercise (assumptions, documentation, etc.).

- **Bilateral meetings and continuous communication efforts**:
  Based on our model stocktaking and at a very early stage, the core policymakers will be informed on the features and capacities of our global, regional and national integrated assessment, energy systems and sectoral models, as well as on what policy questions they have hitherto been used to answer. Based on that information they are asked to share research questions that are policy-relevant for their work and which we might help them to address.
- **First regional EU workshop on the 21st of November with policymakers and other stakeholders (D3.3)**:
  The workshop will focus on giving a group of relevant stakeholders selected from the database the floor so as to understand their concrete demands and promote a sense of ownership. The workshop will include a short presentation of our capabilities to frame the debate, followed by a moderated roundtable to explore the modelling needs, as well as specify the specification requirements for the I²AM PARIS platform (see Section 5.3). Based on the inputs from the core policymakers we will prepare a presentation on potential research questions and plan to use interactive tools (such as Slido) to engage all present stakeholders in the determination of the most relevant policy question. Furthermore, the desired format, prioritisation, and timeline of outputs should be discussed. A note on modelling needs and how PARIS REINFORCE will approach them will be published following the 1st workshop and in-depth bilateral interviews and meetings.
- **First series of national workshops in both European and other (major and less emitting) countries (D3.6)**:
  We will hold national workshops in at least four European and three non-European countries. Selection of countries is to be decided upon consideration of political partnerships, PARIS REINFORCE partners' capacities on the ground, and global relevance. Here, relevant stakeholders— that will again be selected from the database—will help prioritise national policies and technological options, as well as identify the timing of actions at the national level, contextual factors and key scenario specifications, based on the results of the first model inter-comparison exercise at the global level. It will include the presentation of the note (see previous bullet point); followed by a moderated roundtable to i) select relevant modelling tasks, ii) prioritise the modelling tasks, and iii) establish supplier-user relation for specific questions.

5.3 Co-designing the I²AM PARIS Platform

Stakeholders will also be involved in co-defining the specifications of and requirements for the design of the open access platform I²AM PARIS (Task 2.3). Task leader HOLISTIC together with NTUA and BC3 will prepare a first proposal of the design of the platform, given the requirements of Task 2.2, and with the clear objective of being visual, user-friendly and innovative in the design of a communicative platform of constructing shared understandings of I²AM PARIS.

After this first design, we will share mock-ups with all stakeholders from the database during the first regional EU workshop, in November 2019, to include their preferences and necessities in the co-creation of the second round of the improved platform. This first sketch is, however, important for stakeholders so they do not have to provide input from scratch. Based on this consultation, the final design will be decided and, after that, HOLISTIC and NTUA will start developing the platform. The platform will be flexible enough to easily include new parameters and outputs and to be expanded if more models or data are available along the timeline of the project and in the future. The platform will have the option to generate different types of graphs. All the data of the platform will be

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easily downloadable in different formats, including Excel and CSV. The open source platform will be operational for at least five years after the end of the project.

5.4 Co-designing modelling activities

There is ample literature highlighting that IAMs ought to feature a "discursive space", in which stakeholders can come together from different backgrounds to discuss the different value judgments and assumptions that make the models diverge [Voinov et al., 2016]. Models that are used for policymaking are supposed to come up with actionable answers to policy questions. If policymakers act accordingly, different answers will have different effects on some stakeholders. Thus, it is important to involve relevant stakeholders in the process, which will be organised, among others, through the following activities:

- The process will be guided by the "**Protocol for model use, scenarios and stakeholder engagement" (D2.2)**, to be delivered in December 2019. This features a detailed protocol for organising the quantitative and qualitative work to be carried out in PARIS REINFORCE, including stakeholder engagement, scenario creation and use of models. The protocol will also define the modelling work and model inter-comparison exercises that will be undertaken, how the stakeholder engagement plan will be implemented and which tools will be applied to modelling outputs. It will also define which IAMs can be compared for each country or region and how the rest of the models can contribute to the overall exercise by providing more comprehensive information on issues related to the synergies and trade-offs of the Paris Agreement implementation.
- **A series of working papers on the first modelling iteration**: the dissemination and publication of these papers and notes will act as a valuable starting point for wider stakeholder engagement.
- A **report aligning the global modelling activities** of PARIS REINFORCE with the Talanoa dialogue, starting from where we are in terms of knowledge (and knowledge gaps), in order to capture how stakeholders view "where we want to go"; and to finally outline "how we can get there".
- After its completion and activation , the **I²AM PARIS platform** will serve as a representation of the science-policy interface. Cohabited by both scientists and stakeholders (including all relevant groups, from policymakers to the civil society), though different interfaces, it is considered an innovative approach to yield significantly improved results, leading to valuable conclusions on our designed pathways.
- After selecting the key input parameters, appropriate **multiple-criteria decision aid (MCDA) methodologies** will be selected to support the elicitation and exploitation of stakeholders' preferences and expertise, tailored to fit the requirements of each task and the nature of each parameter. The analyses will be extended to capture the views of policymakers and other stakeholder groups with regard to risks associated with policy and technological options, as well as the different priorities.
- **Bilateral meetings and continuous communication efforts**: Based on our first modelling iteration, the resulting global, regional and national pathways will be communicated to stakeholders, including technological and energy mixes, specific timing of actions and respective implications for climate policy, SDGs and synergies/conflicts with other policies. Webinars can be used for constructive discussion over specific topics of interest.
- **Second Regional EU Workshop with policymakers and other stakeholders (D3.5)**: This workshop, in November 2020, will focus on receiving direct feedback on the first modelling iteration, including the results of the national and regional analyses and how these were guided by the first model inter-comparison exercise of the project. Through roundtable discussions, the main objective of the workshop will be to identify gaps between the two scales and readjust the global analysis in the 2nd iteration. Draft report(s) on modelling results will be elaborated in view of the 2nd regional workshop.

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- **Second series of national workshops in both European and other (major and less emitting) countries (D3.7)**: In at least six European and three non-European national workshops, stakeholders will be provided with the results of the first national modelling results and, based on the outcomes of the revised global model inter-comparisons, they will help identify new pathway choices, changes in preferences as well as requirements for further pathway options. Five of the national workshops (to be determined) will be tailored to accommodate the necessary discussions for developing long-term guiderails for transformative policy mixes.

5.5 Discussing draft results

The aim of the stakeholder engagement approach is not only to co-create knowledge, but also to provide the floor for readjusting work, based on stakeholders' feedback on initial research outcomes. Based upon this dynamic, the stakeholder engagement cycle might return to the previous step, i.e. to co-design modelling activities, after discussing the results from the first modelling iteration.

- **National and regional workshops** throughout the course of the project will present previous modelling runs, allowing for discussion of results, as well as structuring thoughts for proceeding with the next modelling runs. Workshops will encourage stakeholder conversations on as many details as possible with the desire to continue with the production of demand-driven modelling outputs.
- **Fuzzy cognitive maps (FCMs)** will be used, among other engagement and elicitation approaches, in order to evaluate different policy strategies from the stakeholders' point of view at the national level. Expert-driven evaluation of national and sectoral strategies is foreseen in between the two national modelling exercise iterations. Stakeholders will be asked to help identify new pathway choices as well as define the requirements for further pathway options. FCMs will help to better understand the thought processes of groups of stakeholders, developing common ground in future policy outcomes.

5.6 Presentation of results

The stages of stakeholder engagement described above are naturally accompanied by a set of dissemination and outreach activities, though a targeted communication strategy. These communication efforts generally run horizontally, throughout the project lifetime, complementing alongside each stage of stakeholder engagement. The visualisation of outcomes and publications is designed to inform and interest policymakers and other stakeholders through policy briefs, a series of working documents, commentaries and newsletters.

Moreover, results will be presented to the scientific community via open access, high-quality peer-reviewed journals and through participation of project partners at external conferences. Finally, the results will also be presented on the I^{2}AM Paris platform, where all information on our modelling activities will be integrated successively throughout the project. As a final deliverable the "lessons learned" from stakeholder engagement in PARIS REINFORCE will be compiled, so as to better inform future climate policy support and modelling projects (D3.8).

Lastly, stakeholders will be informed at a final EU conference in Brussels, on the revised global, regional and national pathways, including aggregate emissions, temperature changes and impacts, adaptation requirements, and clear policy implications. Everyone who has contributed to the success of the project will be invited to attend the conference, including project partners, EU and national policymakers, business-, civil society-, industry-, and trade union representatives, as well as researchers.

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5.7 Example of stakeholder engagement

To exemplify the, sometimes abstract, above description of how co-creation through participatory modelling will take place in reality, a step-by-step example is discussed below:

- We communicate our model capacities to all countries' governments, who are within our pool of interest, through the "What our models can deliver" paper and accompanying communication activities.
- Following bilateral discussions, the Brazilian Ministry of the Environment, communicates an interest in analysing the impact of different LULUCF scenarios for their 2050 emission pathway.
- After internal review of their request, the model teams decide that the request is feasible, for example based on the modelling tools of Grantham and CMCC.
- We present this topic at the EU workshop, with a proposal outlining our approach and models. Depending on the input from stakeholders, we then decide if/how we start this topic.
- We inform all relevant stakeholders from the Stakeholder Council about our intention and ask for declaration of interest in participating in co-creation.
- We start mapping additional, local and regional stakeholders to diversify our stakeholder pool within this sectoral and geographical area.
- Guided by D2.2, "Protocol for model use and stakeholder engagement", we start co-designing the modelling activities:
    - We receive input data on specific requirements and value judgements from relevant stakeholders (online questionnaire, bilateral discussion, thematic focus groups, etc.).
    - We hold a regional workshop to present draft results of the first national modelling iteration.
- Stakeholders review modelling results:
    - (Optional) Second national modelling iteration based on stakeholder input.
    - We discuss the results bilaterally with the members of the core policymakers group.
- Presentation of final results:
    - PARIS REINFORCE report on modelling result presented to the Brazilian Ministry of the Environment.
    - Invitation of all parties involved to the final conference in Brussels.
    - Final presentation of results at the final conference.

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5.8 Tables

Table 4: List of variables to be contained within Stakeholder Database

Variable	Categories	Notes
Stakeholder Name		
Organisation		
Individuals' position within organisation		
Stakeholder Category	• EU Policymaker • National government • International Institution • Private sector/industry • NGO • Labour/trade union • Academia • Other	
Country		
City		
Partner Reference		Which partner made first contact with the stakeholder (if any)
Field of activity/sector		Specific field of activity within which the stakeholder operates
Level of activity	• Regional • National • Global	At which level does the organisation predominantly operate
Interest in engagement	• High • Average • Low	To the best understanding of the consortium partner (to be updated upon stakeholder feedback): how interested is this stakeholder in engaging with the project?
Influence (within level of activity)	• High • Average • Low	To the best understanding of the consortium partner (to be updated upon stakeholder feedback): what is the stakeholders' influence within their stated level of activity?
Email		
Phone		
Twitter		
Focal point of contact		
Date of engagement		
Issues raised		Interests, motives, strategies

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Table 5: Stakeholder Engagement Plan

Activity	Targeted Stakeholder	Methodology / Tools	Objectives	Deliverable	Responsibility	Timeline	Input needed	Add tasks
Identify and acquire 'core' target group	Policymakers	Use existing connections	Create ownerships	D3.1	Bruegel (with support from all others)	M5	Tapping into partners' networks	Task 3.1
		Bilateral meetings					Presentation of the project; 5 structuring questions; procedural reporting sheet	
Stakeholder Mapping	All relevant stakeholders	Web-research	Create and map enhanced stakeholder database	D3.4	Bruegel (with support from all others)	M6-12		
		Social media analysis						
		Partners knowledge					Tapping into partners' networks	
Co-create research questions	All relevant stakeholders	Policy Briefing: What can 'our models' deliver?	Outline our model capacities	D3.2	Bruegel	M5	Model stocktaking (Task 2.1)	Task 3.2
	Policymakers	Bilateral Meetings	Ensure policy relevance through demand-drive research questions	D3.1	Bruegel (with support from all others	M8	Model description and protocol (Task 2.1; D2.1 and D2.2)	Task 3.2; Task 7.1 listening (global)
	All relevant stakeholders	First EU Workshop		D3.3	Bruegel (with support from all others	M6	Model description and protocol (Task 2.1; D2.1 and D2.2)	
		First series of		D3.6	All partners	M15-M20		

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		national workshops						
Co-design I2AM PARIS platform	All relevant stakeholders	Focus group at EU workshop	Develop final design based upon stakeholder input	D2.2	HOLISTIC; BC3; NTUA	M6-M12	First proposal of the design of the platform given the requirements of Task 2.2	Task 2.3
Co-design modelling	All relevant stakeholders	I2AM PARIS platform	Elicit structured information for modelling	D2.2	BC3	M12-M36		
		EU Regional Workshops 1 & 2	Elicit deep knowledge for modelling	D3.3; D3.5	Bruegel (with support from all others)	M8-M18		
		Working papers on first modelling iterations	Starting point for wider stakeholder engagement	D8.2-D8.4	IEECP	M6-M20		
	Internal	Reports on stakeholders needs and capacities	Capture stakeholders' view of desired outcomes	D7.3	CICERO	M14		
	All relevant stakeholders	Multi-criteria decision aid	Elicit stakeholders' preferences and expertise	D4.3	NTUA	M2-M20		
Discuss draft results	All relevant stakeholders	Fuzzy cognitive mapping (FCM)	Identify new pathway choices	D4.4	NTUA	M16-M30	Results from the first national/sectoral modelling iteration	Task 4.3

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Discuss draft results cont.		Second EU workshop	Feedback on the first modelling iteration	D3.5	Bruegel	M18		
		Second series on national workshops	Co-creation of national transformative policy mixes					
	Policymakers	Bilateral meetings			Bruegel (with support from all others)	M28-M34		
	All relevant stakeholders	Report on comparison of national/sectoral strategies		D4.4	NTUA	M30	Results from the first national/sectoral modelling iteration	
Present results	All relevant stakeholders	I2AM PARIS	Dissemination of final results	D2.4; D2.5, D2.6	BC3	M12-M36		
		Infographics, videos, publications aimed at policymakers		D8.8; D8.9	IEECP; HOLISTIC	M1-M36		Task 8.4
		Report "lessons learned"	Present enhanced stakeholder engagement module	D3.8	Bruegel	M34		Task 8.1/8.4 Communi-cation
		Final EU Conference	Dissemination of final results	D8.13	Bruegel	M36		

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Bibliography

Ackermann, F., & Eden, C. (2011). Strategic management of stakeholders: Theory and practice. Long range planning, 44(3), 179-196.

Carney, S., Whitmarsh, L., Nicholson-Cole, S. A., & Shackley, S. (2009). A dynamic typology of stakeholder engagement within climate change research. Tyndall Center for Climate Change Research, Working Paper, 128.

Doukas, H., & Nikas, A. (2019). Decision support models in climate policy. European Journal of Operational Research.

Doukas, H., Nikas, A., González-Eguino, M., Arto, I., & Anger-Kraavi, A. (2018). From integrated to integrative: Delivering on the Paris Agreement. Sustainability, 10(7), 2299.

Durham, E., Baker, H., Smith, M., Moore, E., & Morgan, V. (2014). The BiodivERsA stakeholder engagement handbook. BiodivERsA, Paris, 108.

Falconi, S. M., & Palmer, R. N. (2017). An interdisciplinary framework for participatory modeling design and evaluation—What makes models effective participatory decision tools?. Water Resources Research, 53(2), 1625-1645.

Gaddis, E & Voinov, A. Participatory Modelling. Encyclopedia of Ecology (2008). 2651 – 2655.

Gray, S., Voinov, A., Paolisso, M., Jordan, R., BenDor, T., Bommel, P., ... & Kolagani, N. (2018). Purpose, processes, partnerships, and products: four Ps to advance participatory socio-environmental modeling. Ecological applications, 28(1), 46-61.

Hall, D. M., Lazarus, E. D., & Thompson, J. L. (2019). Mediated Modeling and Participatory Modeling.

Hewitt, R. J., Winder, N. P., Jiménez, V. H., Alonso, P. M., & Bermejo, L. R. (2017). Innovation, pathways and barriers in Spain and beyond: An integrative research approach to the clean energy transition in Europe. Energy research & social science, 34, 260-271.

Jordan, R., Gray, S., Zellner, M., Glynn, P. D., Voinov, A., Hedelin, B., ... & Bommel, P. (2018). Twelve questions for the participatory modeling community. Earth's Future, 6(8), 1046-1057.

Lacey, J., Howden, M., Cvitanovic, C., & Colvin, R. M. (2018). Understanding and managing trust at the climate science–policy interface. Nature Climate Change, 8(1), 22.

Miller, C. A., & Wyborn, C. (2018). Co-production in global sustainability: histories and theories. Environmental Science & Policy.

Pade-Khene, C., Luton, R., Jordaan, T., Hildbrand, S., Gerwel Proches, C., Sitshaluza, A., ... & Moloto, N. (2013). Complexity of stakeholder interaction in applied research. Ecology and Society, 18(2).

Parry, M., Parry, M. L., Canziani, O., Palutikof, J., Van der Linden, P., & Hanson, C. (Eds.). (2007). Climate change 2007-impacts, adaptation and vulnerability: Working group II contribution to the fourth assessment report of the IPCC (Vol. 4). Cambridge University Press.

Purkey, D., Escobar Arias, M., Mehta, V., Forni, L., Depsky, N., Yates, D., & Stevenson, W. (2018). A philosophical justification for a novel analysis-supported, stakeholder-driven participatory process for water resources planning and decision making. Water, 10(8), 1009.

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., ... & Stringer, L. C. (2009). Who's in

The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

and why? A typology of stakeholder analysis methods for natural resource management. Journal of environmental management, 90(5), 1933-1949.

Sarkki, S., Niemelä, J., Tinch, R., Van Den Hove, S., Watt, A., & Young, J. (2013). Balancing credibility, relevance and legitimacy: a critical assessment of trade-offs in science–policy interfaces. Science and Public Policy, 41(2), 194-206.

Scherhaufer, P., Höltinger, S., Salak, B., Schauppenlehner, T., & Schmidt, J. (2018). A participatory integrated assessment of the social acceptance of wind energy. Energy research & social science, 45, 164-172.

Seidl, R. (2015). A functional-dynamic reflection on participatory processes in modeling projects. Ambio, 44(8), 750-765.

Sterling, E. J., Zellner, M., Jenni, K. E., Leong, K., Glynn, P. D., BenDor, T. K., ... & Olabisi, L. S. (2019). Try, try again: Lessons learned from success and failure in participatory modeling. Elementa: Science of the Anthropocene.

Talley, J. L., Schneider, J., & Lindquist, E. (2016). A simplified approach to stakeholder engagement in natural resource management: the Five-Feature Framework. Ecology and Society.

Turnheim, B., Berkhout, F., Geels, F., Hof, A., McMeekin, A., Nykvist, B., & van Vuuren, D. (2015). Evaluating sustainability transitions pathways: Bridging analytical approaches to address governance challenges. Global Environmental Change, 35, 239-253.

Alcamo, J., Fernandez, N., Leonard, S. A., Peduzzi, P., Singh, A., & Harding Rohr Reis, R. (2012). 21 issues for the 21st Century: results of the UNEP Foresight Process on Emerging Environmental issues.

van Vliet, M., Kok, K., & Veldkamp, T. (2010). Linking stakeholders and modellers in scenario studies: The use of Fuzzy Cognitive Maps as a communication and learning tool. Futures, 42(1), 1-14.

Verkuijl, C., Piggot, G., Lazarus, M., van Asselt, H., & Erickson, P. (2018). Aligning fossil fuel production with the Paris Agreement.

Videira, N., Antunes, P., Santos, R., & Lopes, R. (2010). A participatory modelling approach to support integrated sustainability assessment processes. Systems Research and Behavioral Science, 27(4), 446-460.

Voinov, A & Bousquet, F. (2010). Modelling with stakeholders. Environmental Modelling & Software 25, 1268-1281.

Voinov, A., & Gaddis, E. J. B. (2008). Lessons for successful participatory watershed modeling: a perspective from modeling practitioners. Ecological modelling, 216(2), 197-207.

Voinov, A., Jenni, K., Gray, S., Kolagani, N., Glynn, P. D., Bommel, P., ... & Sterling, E. (2018). Tools and methods in participatory modeling: Selecting the right tool for the job. Environmental Modelling & Software, 109, 232-255.

Voinov, A., Kolagani, N., McCall, M. K., Glynn, P. D., Kragt, M. E., Ostermann, F. O., ... & Ramu, P. (2016). Modelling with stakeholders–next generation. Environmental Modelling & Software, 77, 196-220.

Voinov, A., Seppelt, R., Reis, S., Nabel, J. E., & Shokravi, S. (2014). Values in socio-environmental modelling: persuasion for action or excuse for inaction. Environmental modelling & software, 53, 207-212.

Weyer, M.V. (2001). In an ideal world. Management Today September, 34–38.

Zellner, M., & Campbell, S. D. (2015). Planning for deep-rooted problems: What can we learn from aligning complex systems and wicked problems?. Planning Theory & Practice, 16(4), 457-478.

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