PARIS
REINFORCE

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D8.15 REPORT ON COORDINATION AND SYNERGIES

WP8 – Communication, Dissemination & Exploitation

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

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 be aware of and kept up to date with the project's coordination and synergies with other projects.

It can also be used by individuals outside the consortium, including policymakers and scientists, as a documentation of the efforts made towards ensuring synergies and collaborations with other research projects; as well as by the consortia of the research projects and other actions mentioned, including the PARIS REINFORCE sister projects (ENGAGE, NAVIGATE, and LOCOMOTION) and other initiatives, as a reference document of the expectations and ideas for joint actions and collaborations.

3. Short summary of results (<250 words)

PARIS REINFORCE has participated in the steering activities of its three sister projects (ENGAGE, NAVIGATE, LOCOMOTION), with project coordinator Prof. Haris Doukas joining their Scientific Advisory Board (SAB), and the coordinators of these three projects joining the PARIS REINFORCE SAB. Thematic complementarities have been identified and helped formulate the research questions of the project, mainly in respect to the EC's requests for research in emerging themes, like COVID-19. The project's flagship, the I^2AM PARIS open-access data exchange platform, has been established as an international modelling vessel, attracting the participation of more than twenty non-consortium modelling teams (including from sister projects), who have published their models' documentations. Various synergies have been established with other projects in terms of policy events, with PARIS REINFORCE co-organising or participating in four other projects' events, including C-Track 50, SPIPA, LOCOMOTION, and the "South East Europe Energy Transition Dialogue" project. Four papers in high-impact journals (Nature Climate Change, Nature Energy, One Earth, and Energy Research and Social Science) have been published by PARIS REINFORCE jointly with other projects (CHE, VERIFY, 4C, CAPaCITy, RESTORE+, and SHAPE-ID); while PARIS REINFORCE has also coordinated a collaboration with its sister projects NAVIGATE and LOCOMOTION as well as SENTINEL, in another high-impact joint publication in Energy. Finally, the project has contributed to a policy brief produced by a UK-wide university network; and has tried to share with its sister projects and actively update them on its progress. Efforts to establish synergies will continue during the second half of the project.

4. Evidence of accomplishment

This report and the reported activities (publications, events, material, etc).

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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 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	

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Executive Summary

Cooperation and coordination are key to combatting climate change: climate action can only be meaningful and effective in a globally coordinated, cooperative, Talanoa-spirit manner. This is also reflected in the global stocktake, which is expected to take stock of the global efforts towards achieving the Paris Agreement goals, not only in terms of the type and extent of mitigation and adaptation actions but also in the context of adequately transferring knowledge, technology, funds and policy lessons.

This notion of enhanced cooperation, in terms of climate policy, is reflected in the PARIS REINFORCE project, in the envisaged analyses of current and future action pledges of the EU (and Member States), of major emitting countries outside the EU as well as of selected less emitting and/or less developed countries; in the incorporation of finance, policy and technological exchange and of different international cooperation and coordination scenarios and mechanisms in the modelling analyses; and the ongoing stakeholder dialogue, along with the establishment of the respective Stakeholder Council body. But it is also reflected, in terms of cooperation in science: in the development of an open access, multi-model, data exchange platform, I^{2}AM PARIS; and in the synergies that the project actively seeks to create with relevant scientific efforts and research projects.

Synergies can come in many forms and have multiple aims, but given the objectives, scope and framework of the PARIS REINFORCE project, we distinguish two axes of synergies, both aimed at delivering high-quality, relevant and robust policy prescriptions: (a) joining scientific forces to promote science/evidence-based policy-formulation; and (b) broadening outreach to promote inclusiveness and stakeholder participation. There are research projects that are offered for establishing synergies in the first axis, projects offered for coordinating efforts in the second axis, and others that can be reached for both types of cooperation.

In this report, 29 H2020/ERC/ERCEA and 17 other EU and non-EU projects and initiatives have been mapped and potential collaboration/synergy activities have been identified for each one of them. During the first eighteen months of the project, PARIS REINFORCE has participated in the steering activities of its three sister projects (ENGAGE, NAVIGATE, and LOCOMOTION), with project coordinator Prof. Haris Doukas joining their Scientific Advisory Board (SAB), and the coordinators of these three projects joining the PARIS REINFORCE SAB. Thematic complementarities have been identified and helped formulate the research questions of the project, mainly in respect to the EC's requests for research in emerging themes, like COVID-19 recovery and the European Green Deal. The project's flagship, the I^{2}AM PARIS open-access data exchange platform, has been established as an international modelling vessel, attracting the participation of more than twenty non-consortium modelling teams, who have positively responded to its call and submitted their models' documentation. Various synergies have been established with other projects in terms of policy and stakeholder events, with PARIS REINFORCE co-organising or participating in four other projects' events, including C-Track 50, SPIPA, LOCOMOTION, and the "South East Europe Energy Transition Dialogue" project. Four joint papers in high-impact journals (including Nature Climate Change, Nature Energy, One Earth, and Energy Research and Social Science) have been published by PARIS REINFORCE and other projects (CHE, VERIFY, 4C, CAPaCITy, RESTORE+, and SHAPE-ID); while PARIS REINFORCE has also coordinated a collaboration with its sister projects NAVIGATE and LOCOMOTION as well as SENTINEL, in another high-impact joint publication in Energy. Finally, the project has contributed to a policy brief produced by a UK-wide university network; and has tried to share with its sister projects and actively update them on its progress. Efforts to establish synergies will continue during the second half of the project.

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1 Introduction

1.1 Purposes and scope

The main objective of PARIS REINFORCE is to underpin climate policymaking with authoritative scientific processes and results and to enhance the science-policy interface, in light of the Paris Agreement and associated challenges. Towards this notion, project activities revolve around a novel, demand-driven and robust Integrated Assessment Models (IAM)-oriented analysis framework for effectively supporting the design of climate policies in the EU as well as in other major emitters and selected less emitting/developed countries, in respect to the Paris Agreement, as well as to its objectives and associated challenges.

Cooperation and coordination are key to combatting climate change: climate action can only be meaningful and effective in a globally coordinated, cooperative, Talanoa-spirit manner. This is also reflected in the global stocktake, which is expected to take stock of the global efforts towards achieving the Paris Agreement goals, not only in terms of the type and extent of mitigation and adaptation actions but also in the context of adequately transferring knowledge, technology, funds and policy lessons.

This perceived notion of enhanced cooperation in climate policy is reflected in three core elements of PARIS REINFORCE.

First, and in addition to the analyses in the EU (at the national and Community level), the project carries out tailored modelling and respective analyses of current and future action pledges of major emitting countries outside the EU, including Brazil, Canada, China, India, Indonesia, Japan, Mexico, Russia and the United States of America; as well as of selected less emitting and/or less developed countries, including Kenya, the Gulf Cooperation Council (GCC) countries (Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain, and Oman), the Central Asian Caspian (CAC) region (Kazakhstan, Uzbekistan, Turkmenistan, etc.), etc. In this direction, the consortium comprises institutions across the globe, including thirteen European partners, and five international partners from major emitting countries (Brazil, China, India, Japan and Russia), with regional offices and outreach in numerous other (both major emitting and less developed) countries. The diverse consortium membership transforms the knowledge exchange process.

Second, all project tasks focus on promoting international cooperation, in terms of finance, policy and technological exchange: for instance, all modelling activities highlight respective Paris Agreement mechanisms, while regional and global analyses consider different international cooperation and coordination scenarios and mechanisms.

Last but not least, the project framework is demand-driven and based on a co-design principle, since in its development all different stakeholder groups—policymakers, climate system and integrated assessment modellers and scientists, industry representatives, NGOs, the civil society, etc.—are engaged. In fact, this ongoing stakeholder dialogue, along with the establishment of the respective Stakeholder Council body in which these stakeholder groups are engaged, constitute one of the three pillars of the project's concept.

These elements of PARIS REINFORCE only reflect the project's conceptual perception of cooperation in the policymaking world. Considering the new challenges brought about by both climate change and the Paris Agreement, the project acknowledges that successfully reshaping our world in sustainable pathways not only requires cooperative action but also dictates that scientific support to climate policymaking be revolutionised and carried out in an equally cooperative manner as well.

This second aspect of enhanced cooperation, i.e. cooperation in science, is reflected in two other elements of

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The first element lies in the development of an open access, multi-model, data exchange platform, I²AM PARIS, the core of which consists of all models and incorporates all modelling activities of the project. Its scientific interface enables exchanging and harmonising datasets, assumptions and scenarios used in modelling activities, thereby not only providing a common basis and reference point for all analyses but also making model inter-comparisons more meaningful and targeted at model-inherent features.

The second element traverses the consortium boundaries and constitutes the subject of this report: the project has actively sought to create synergies and establish ties with relevant scientific efforts and research projects in this domain. Synergies can come in many forms and have multiple aims, but given the objectives, scope and framework of the PARIS REINFORCE project, we distinguish two axes of synergies, both aimed at delivering high-quality, relevant and robust policy prescriptions: (a) joining scientific forces to promote science; and (b) broadening outreach to promote inclusiveness and stakeholder participation. There are research projects that are offered for establishing synergies in the first axis, projects offered for coordinating efforts in the second axis, and others that can be reached for both types of cooperation.

This deliverable reports on the coordination and joint activities among both sister projects and other research projects and climate action initiatives.

1.2 Structure of this document

This report has been structured based on the tasks/activities that have been implemented in line with the action plan described in D8.14 and summarised in the following Table (Table 1).

Table 1. Structure of the report on coordination and synergies, aligned with respective tasks

Section/Task	Description	Responsible(s)	Period
Section 2: Mapping relevant projects and possible synergies	Numerous projects had already been identified and listed in D8.14, by November 2019. Since November 2019, the list of projects has been expanded, and the new map is outlined in Tables 2-3, Section 2. including an assessment of the potential for synergies. However, this activity is still ongoing until the end of the project as new relevant projects (may) emerge (e.g. the new projects expected to begin in the topic LC-CLA-10-2020 or LC-SC3-CC-7-2020 next year). Between July 2019 and November 2019, consortium members screened other projects (regardless of their institute's participation in them or not), to assess whether they have common grounds with PARIS REINFORCE to be considered for synergies. This exercise revealed which of the listed projects are relevant to be contacted directly for further investigation of the potential and their willingness to coordinate their efforts with PARIS REINFORCE.	NTUA and all partners	Initial map: June 2019 – November 2019 Expanded map: December 2019 – November 2020 Still ongoing until May 2022
Section 3: Synergies with sister and other research projects and initiatives	Based on the original plan (D8.14) for synergies and overall coordination with other research projects, which clearly outlined possible coordination activities and/or collaborations, numerous joint actions have been implemented until November 2020. These actions, which PARIS REINFORCE has either participated in or coordinated, are reported in detail in Section 3.	All partners	June 2019 – November 2020 Still ongoing until May 2022

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Section 4: Brief evaluation of synergies	The assumptions outlined in the plan for coordination and synergies (D8.14) are evaluated, and the research questions posed are addressed.	NTUA	November 2020

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2 A map of research projects and initiatives considered

Starting from, and expanding, the map provisionally outlined in D8.14 (*'Plan for coordination and synergies'*), this section refers to the latest list of projects and initiatives that provide space for joining scientific forces to promote science and/or broadening outreach to promote inclusiveness and stakeholder participation, whether PARIS REINFORCE consortium members participate in these efforts or not. The starting point of this mapping exercise has been the group of the LC-CLA-01-2018 'sister' projects:

1. Supporting the design and assessment of climate policies
   - **PARIS REINFORCE** (01/06/2019 – 31/05/2022; 36 months) coordinated by NTUA (18 partners)
   - **ENGAGE** (01/09/2019 – 31/08/2023; 48 months) coordinated by IIASA (25 partners)
2. Improving Integrated Assessment Models (IAMs)
   - **LOCOMOTION** (01/06/2019 – 31/05/2023; 48 months) - coordinated by University of Valladolid (13 partners including PARIS REINFORCE partner BC3)
   - **NAVIGATE** (01/09/2019 – 31/08/2023; 48 months) - coordinated by PIK (17 partners including PARIS REINFORCE partner CMCC)

In particular, sharing a similar scope and approach with PARIS REINFORCE, **ENGAGE** aims to engage stakeholders in the co-production of a new generation of global and national decarbonisation pathways, supplementing natural science, engineering and economics that are traditionally represented in IAMs, with insights from social science, in order to reflect multidimensional feasibility of decarbonisation. This project aims to design pathways to minimise overshoot of the temperature target and analyse the timing of net-zero emissions to meet the Paris Agreement temperature target and reduce the reliance on controversial negative emissions technologies. The resulting pathways are expected to link national mitigation strategies of major emitters with the Paris Agreement's objectives, integrate potential game-changing innovations, and advance conceptually novel approaches to architectures of international climate agreements. The project also aims to quantify avoided impacts of climate change, co-benefits and trade-offs of climate policy, and identify the biggest sectoral opportunities for climate change mitigation. The ENGAGE consortium is also developing new pathways in an iterative global and national stakeholder process, ensuring their credibility and legitimacy. The project is coordinated by Dr. Keywan Riahi, Dr. Volker Krey, and Dr. Bas van Ruijven of the International Institute for Applied Systems Analysis (IIASA) and started in September 2019. It is not only a projected funded under the Horizon 2020 "LC-CLA-01-2018" topic, but also the single project sharing the same overall objective of PARIS REINFORCE, which is to support the design and assessment of climate policies. Through its remarkable consortium of 27 partners and collaborators, the project brings together expertise from several domains, including global integrated assessment modelling, national energy modelling, political economy of energy transitions, international collaboration and governance, policy design, atmospheric chemistry, land use, agriculture and water.

On the other branch of this topic (i.e. improving IAMs), **LOCOMOTION** aims to enhance existing IAMs. Building on the models developed in the MEDEAS European project and including knowledge from other relevant models (World6, TIMES, LEAP, GCAM, C-Roads), a number of improvements are foreseen with respect to the state-of-the-art in energy-economy-environment modelling, such as the expansion of the geographical coverage through the creation of a new worldwide multi-regional model with seven global regions and the integration of the 28 EU member states; the improvement of IAMs by increasing the detail and precision of existing modules and adding new ones; the integration of relevant functionalities from other models and the comparison of modelling results; the integration of demand management policies in scenario assessment; the representation and quantification of uncertainty; the improvement of the usability of the IAMs through the development of two interface levels

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(professional and educational); and the exploitation and dissemination of modelling results to policymakers and experts on strategic planning and/or IAMs, modellers and programmers, and to the civil society. The project is coordinated by Prof. Luis Javier Miguel González of the University of Valladolid, and started in June 2019

Similarly to LOCOMOTION but based on models to be used in ENGAGE, **NAVIGATE** critically improves the capability of IAMs by tackling existing weaknesses and lack of capabilities of the current generation of IAMs. With the aim to increase the usability, transparency, legitimacy and hence uptake of IAM results, NAVIGATE tries to foster a stakeholder dialogue to elicit user needs and engage in co-production of knowledge about IAMs and their uses, and to develop the methodologies to better assess the robustness of IAM results, by extending model documentation and new communication tools as well as by building capacity to lower the entrance barrier to IAM activities for other research teams, including research teams in less-developed countries. The project also aims to actively promote uptake of project results by policymakers and international assessments. The NAVIGATE project is coordinated by Dr. Elmar Kriegler of the Potsdam Institute for Climate Impact Research and started in September 2019.

Although the activities envisaged, implemented and outlined in this report have been motivated by the PARIS REINFORCE project's commitment to addressing the need for synergies and potential coordination of efforts in the implementation of the four research and innovation projects/components of LC-CLA-01-2018 topic, there is a multitude of relevant research projects, in the EU and globally. Tables 2 and 3 provide non-exhaustive lists of H2020/ERCEA/ERC projects and other (non-) EU projects, respectively, that have so far been and will keep being considered for coordination and synergies (italics signal projects that have ended by November 2020).

Table 2. Non-exhaustive list of Horizon 2020/ERCEA/ERC projects considered for synergies

Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
4C	New more accurate models of how carbon affects climate change	https://4c-carbon.eu/	6/2019 – 5/2023	University of Exeter, UK	Reducing uncertainty in the quantitative understanding of carbon-climate interactions and feedbacks	Joint research and publications in emissions trajectories at the global level
C-Track 50	Putting regions on track for carbon neutrality by 2050	www.c-track50.eu/	3/2018 – 2/2021	NTUA, Greece	Dialogue and planning for sustainable energy and climate action at local level	Stakeholder engagement (local and regional authorities), policy recommendations
CAPaCITy	Designing Conjugated Polymers for Photocatalysis and Ion Transport	N/A	10/2017 – 9/2022	Imperial College London, UK	Enabling the design and development of high-performance materials for energy conversion devices	Joint research and publications in energy technologies relevant for climate change mitigation
CHE	CO2 Human Emissions	https://che-project.eu	10/2017 – 12/2020	ECMRWF, UK	Coordinating efforts towards developing a European	Joint research and publications in emissions

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Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
					monitoring capacity for anthropogenic CO2 emissions	trajectories at the global level
CLARA	*Climate forecast enabled knowledge services*	*http://clara-project.eu*	*6/2017 – 5/2020*	*CMCC, Italy*	*Climate services building upon the newly developed Copernicus Climate Change Services near term forecasts and sectorial information systems (SIS)*	*Data (Copernicus) & climate services aspects relaxant for modelling; water & flood aspects*
COACCH	CO-designing the Assessment of Climate Change costs	https://www.coacch.eu	12/2017 – 5/2021	CMCC, Italy	Modelling assessments of climate change costs in Europe	Coordination on costs aspects of IAM modelling; stakeholder engagement; joint events
COP21 RIPPLES	*COP21: Results and Implications for Pathways and Policies for Low Emissions European Societies*	*www.cop21ripples.eu*	*12/2016 – 11/2019*	*IDDRI, France*	*Implications of COP21 for European pathways and policies*	*UNFCCC aspects; follow-up on actions/ recommendations*
DEEDS	*Dialogue on European Decarbonisation Strategies*	*www.deeds.eu*	*10/2017 – 9/2020*	*TNO, Netherlands*	*Dialogue on European decarbonisation strategies*	*Modelling inputs; stakeholder engagement; joint events*
ENEFIRST	Making Energy Efficiency First principle operational	https://enefirst.eu/	9/2019 - 2/2022	IEECP, Netherlands	Supporting further operationalisation of the """Efficiency First"" principle within the EU	Energy efficiency aspects of modelling; policy aspects; joint events
ENGAGE	Exploring National and Global Actions to reduce Greenhouse gas Emissions	http://www.engage-climate.org	9/2019 – 8/2023	IIASA, Austria	Co-producing mitigation pathways with stakeholders and insights from social sciences to reflect multidimensional feasibility of decarbonisation	Coordination of research (via steering committees), thematic/geographic complementarities in modelling and other analysis, inclusion of ENGAGE models in I^{2}AM PARIS, joint communication and dissemination activities, aligned

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Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
						stakeholder engagement
EUCalc	*EU Calculator: Trade-offs and pathways towards sustainable and low-carbon European Societies*	*http://www.european-calculator.eu*	*11/2016 – 10/2019*	*PIK, Germany*	*Delineation emission and sustainable transformation pathways at a European and member state scale*	*Engagement with the European Decarbonisation Pathways Initiatives (EDPI); follow-up on actions/ recommendations*
EU-GCC	EU GCC Clean Energy Technology Network	www.eugcc-cleanenergy.net	12/2015 – 12/2021	KOMIS, Belgium	Cooperation between EU and GCC on sustainable energy and climate issues	Stakeholder engagement (national authorities and business from the GCC), policy recommendations
INNOPATHS	*Innovation pathways, strategies and policies for the Low-Carbon Transition in Europe*	*www.innopaths.eu*	*12/2016 – 11/2020*	*University College London, UK*	*Innovation pathways for the low-carbon transition in Europe*	*Treatment of innovation in IAM; stakeholder engagement; joint events*
LOCOMOTION	Low-carbon society: an enhanced modelling tool for the transition to sustainability	https://locomotion-h2020.eu/	6/2019 – 5/2023	University of Valladolid, Spain	Enhancing existing IAMs to provide policymakers and stakeholders with a reliable and practical model system to assess the feasibility, effectiveness, costs and impacts of different sustainability policy options, and to identify the most effective transition pathways towards a low-carbon society	Coordination of research (via steering committees), thematic/geographic complementarities in modelling and other analysis, inclusion of ENGAGE models in I^{2}AM PARIS, joint communication and dissemination activities, aligned stakeholder engagement, platform development coordination
MAGIC-NEXUS	Moving Towards Adaptive Governance in Complexity: Informing Nexus Security	www.magic-nexus.eu	6/2016 – 5/2020	Universitat Autònoma de Barcelona, Spain	Policy at the nexus between water, energy and food resources	SDGs; water-energy-food nexus in modelling; stakeholder engagement; joint events

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Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
MEDEAS	Guiding European Policy toward a low-carbon economy. Modelling Energy system Development under Environmental And Socioeconomic constraints	https://www.medeas.eu/	1/2016 – 12/2019	ICM-CSIC – Institute of Marine Sciences – Spanish National Research Council, Spain	Energy system modelling under environmental and socioeconomic constraints	Modellers/modelling collaborations esp. Re energy aspects; follow-up on actions/ recommendations
MUSTEC	*Market Uptake of Solar Thermal Electricity through Cooperation*	*http://www.mustec.eu*	*10/2017 – 9/2020*	*CIEMAT, Spain*	*Solar power, electricity on demand, trading, CSP*	*Solar power's implication on modelling; stakeholder engagement; joint events*
NAVIGATE	Next generation of advanced integrated assessment modelling to support climate policy making	https://navigate-h2020.eu/	9/2019 – 8/2023	PIK, Netherlands	Improving the capability of IAMs to inform the design and evaluation of climate policies by advancing transformative change in the economy, technology, goods and services; and distributional impacts of climate change and policy	Coordination of research (via steering committees), thematic/geographic complementarities in modelling and other analysis, inclusion of ENGAGE models in I^2AM PARIS, joint communication and dissemination activities, aligned stakeholder engagement, coordination of platform development
openENTRANCE	open Energy Transition ANalyses for a low-Carbon Economy	http://www.openentrance.eu	5/2019 – 4/2023	SINTEF Energi AS, Norway	Integrated modelling platform, energy transition pathways in Europe	Modelling/modellers collaborations; joint events
REINVENT	*Realising Innovation in Transitions for Decarbonisation*	*www.reinvent-project.eu*	*12/2016 – 11/2020*	*Lund University, Sweden*	*Realising innovation in transitions for decarbonisation*	*Innovation aspects for modelling and policy formulation; stakeholder engagement; joint events*

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Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
SENSEI	Smart Energy Services Integrating the Multiple Benefits from Improving the Energy Efficiency of the European Building Stock	https://senseih2020.eu/	9/2019 – 8/2022	IEECP, Netherlands	Improving energy efficiency in the built environment sector within the EU	Energy efficiency aspects in modelling
SENTINEL	Sustainable Energy Transitions Laboratory	https://sentinel.energy/	6/2019 – 5/2022	ETH, Switzerland	Creation of a new modelling framework for energy transition	Engagement of members of the Modelling Forum
SHAPE-ID	Shaping Interdisciplinary Practices in Europe	https://www.shapeid.eu/	2/2019 – 7/2021	Trinity College Dublin, Ireland	Providing concrete guidance and practical recommendations (toolkit) for shaping future action, for efficiently achieving the best value from interdisciplinarity	Joint interdisciplinary and transdisciplinary research in the field of climate change and action
SIM4NEXUS	*Sustainable Integrated Management for the Nexus of water-land-food-energy-climate for a resource efficient Europe*	*www.sim4nexus.eu*	*6/2016 – 5/2020*	*Wageningen University & Research, Netherlands*	*Land, food, energy, water and climate nexus*	*SDGs; land -water-energy-food nexus in modelling; stakeholder engagement; joint events*
SocialWatt	Connecting Obligated Parties to Adopt Innovative Schemes towards Energy Poverty Alleviation	https://socialwatt.eu	9/2019 – 8/2022	NTUA	Obligated parties; energy poverty schemes; innovative financing; corporate social responsibility	Stakeholder engagement; joint events and joint policy recommendations
Triple-A	Enhancing at an Early Stage the Investment Value Chain of Energy Efficiency Projects	https://aaa-h2020.eu/	9/2019 – 2/2022	NTUA	Assessment of the financing instruments and risks for energy efficiency projects	Stakeholder engagement; joint events and joint policy recommendations

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Project (abbr.)	Full name	Website	Duration	Consortium leader	Focus/scope	Potential joint action(s)
VERIFY	Observation-based system for monitoring and verification of greenhouse gases	https://verify.lsce.ipsl.fr/	2/2018 – 1/2022	Commissariat à l'energie atomique et aux energies alternatives, France	Improving national inventories and delivering policy-relevant information to track progress of the EU mitigation efforts to meet the targets of the Paris Accord	Joint research and publications in emissions trajectories at the global level

Table 3. Non-exhaustive list of other EU and non-EU initiatives considered for synergies

Abbr. name	Full name	Website	Potential joint action(s)
Africa LEDS	Low Emissions Development (LEDS) in Africa (EC-UNEP)	https://africaleds.org	NDC update; policy/modelling support
ETS - China & Korea cooperation	Cooperation on carbon markets, alongside China's and Korea's nationwide emissions trading systems (EC)	N/A	Emission trading and energy/industrial aspects especially in China (policy/ modelling)
CLIMA MED	Clima-Med Acting for Climate in South Mediterranean	www.climamed.eu	Stakeholder engagement (local and regional authorities from the EU South Neighbourhood), policy recommendations
EU4CLIMATE	EU4Climat (supporting the six Eastern Partnership countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine) to develop and implement climate-related policies) (EC, implemented by UNDP)	https://eu4climate.eu/	NDC and potentially policy/modelling support in Eastern Partnership
TRATOLOW	Transition towards the low emissions and climate-resilient economy in the Western Balkans and Turkey	Not yet available	NDC and potentially policy/modelling support in accessions countries of the Western Balkans and Turkey; support for the implementation of the new "Green Agenda for the Western Balkans".
Euroclima+	Climate change regional cooperation programme (Latin America) (EC)	http://euroclimaplus.org/	cooperation in Brazil and Mexico (and Latin America)
GCCA+	The Global Climate Change Alliance Plus (EC)	http://www.gcca.eu	joint events globally; NDC update support

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Abbr. name	Full name	Website	Potential joint action(s)
GFDRR	Global Facility for Disaster Reduction and Recovery (World Bank)	https://www.gfdrr.org/	Disaster (risk) management aspects of modelling
IEA - Clean Energy Transitions Programme	Clean Energy Transitions Programme to support clean-energy development (IEA)	https://www.iea.org/cetp/	key emerging economies including Brazil, China, India, Mexico - modelling/ policy and energy sector aspects
NDC Partnership	Nationally Determined Contributions Partnership (WRI & UNFCCC)	https://ndcpartnership.org	NDC update support; modelling/policy aspects
NETFUND	National Environment Trust Fund	N/A	Joint policy events in Africa
PACT	Project for Advancing Climate Transparency (WRI; EC/EU MS funded)	https://www.wri.org/our-work/project/project-advancing-climate-transparency-pact/about	NDC updates and transparency in modelling/policy formulation
PCCB	Paris Committee on Capacity Building (UNFCCC constituted body)	https://unfccc.int/pccb	Modelling/policy capacity building aspects; joint events
RESTORE+	Addressing Landscape Restoration on Degraded Land in Indonesia and Brazil	http://www.restoreplus.org/	Joint modelling/policy research on negative emissions technologies
SEETD	South East Europe Energy Transition Dialogue	N/A	Joint policy events in the South East European region
SPIPA	Strategic Partnerships for the Implementation of the Paris Agreement (EC)	https://www.international-climate-initiative.com/en/details/project/strategic-partnerships-for-the-implementation-of-the-paris-agreement-spipa-17_I_364-2993	joint events & policy support activities in major and less emitting countries (Brazil, Canada, China, India, Indonesia, Japan, Mexico, Russia, South Africa, South Korea and the United States of America)
UNDP NDC	UNDP NDC support programme (UN/UNDP)	https://www.ndcs.undp.org/content/ndc-support-programme/en/home.html	joint events & NDC update support activities
URBAN-LEDS II	Urban Low Emission Development Strategies (ICLEI & UN Habitat)	https://urban-leds.org/	sub-national actions in the context of modelling (Brazil, India)

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3 Report on synergies, collaborations, and joint actions

3.1 Coordination with sister projects: steering the research

Very early, all four sister projects (PARIS REINFORCE, ENGAGE, LOCOMOTION, NAVIGATE) participated in the Networking and knowledge sharing event for decarbonisation projects and the Coordinators' Day 2019, which were organised by the European Commission and took place on the 5th and the 6th of September 2019 in Brussels, Belgium, respectively. There, the project coordinators proposed ideas and perceptions of coordination and synergies. This synergising mechanism has been collectively perceived to help build on the momentum developed within each of the Horizon 2020 "LC-CLA-01-2018" components, to ensure synergies in the modelling analyses and other scientific activities; and promoting communication, dissemination and exploitation activities, by cultivating a broader stakeholder buy-in.

Warmly encouraged by the Commission's, the coordinators of the four sister projects (Haris Doukas, Keywan Riahi, Luis Javier Miguel González, and Elmar Kriegler) agreed with one another to participate in the Scientific Advisory Boards (SAB) of the other projects. The SAB of each project serves as an advisory body to the project consortium, the collective expertise of which draws on a broad range of perspectives from the key scientific disciplines underlying climate change research and climate policymaking. It advises the consortium on matters related to the implementation and development of the project activities, including but not limited to the scope, transparency, and legitimacy of the activities and methods applied as well as the robustness and dissemination of the results produced. Prof. Haris Doukas, along with the three project coordinators, collectively found that participating in the steering committees of the other sister projects is beneficial for the research activities and outcomes of the four projects, encouraging projects to stay up to date with one another's results and to directly exploit one another's results, as well as to cover emerging knowledge/research gaps and unfold their activities in a complementary manner.

Although no in-person meeting to exchange ideas, progress, and data was possible after the September 2019 Brussels meeting due to COVID-19 and related confinements. Nevertheless, there have been meetings, discussions, and updates among the four projects. After their first meeting in Brussels in September 2019, PARIS REINFORCE invited the three sister project coordinators (along with all other SAB members) to the project's First Stakeholder Council Dialogue, again in Brussels, Belgium (November 21, 2019). Although the three could not attend, two members of the NAVIGATE and LOCOMOTION consortia attended and represented their projects, actively engaging in the dialogue and even discussing their own plans in respect to the PARIS REINFORCE activities and platform in progress. Not long later, PARIS REINFORCE representatives Prof. Doukas and Dr. Nikas met with Dr. Riahi and Dr. Kriegler during the 12th Annual Meeting of the Integrated Assessment Modeling Consortium (IAMC), in Tsukuba, Japan (December 2, 2019), in order to discuss possible collaborations and synergies among the four projects.

Ever since, coordination and active SAB membership has been impacted by the pandemic and therefore carried out online. In January 2020, Prof. Evelina Trutnevyte invited Prof. Doukas to the NAVIGATE expert workshop aimed to take place in France, in May 2020, which however was switched to the virtual domain due to the coronavirus with significant limitations to the timetable (rendering presentation of progress of projects infeasible). Finally, PARIS REINFORCE held an internal project meeting on November 24, 2020, to which all four project coordinators and other SAB members were invited to join, be informed on the project progress, and share feedback, impressions and expectations in an SAB-specific session. However, only the LOCOMOTION project coordinator responded positively but could only join for a few minutes eventually.

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With all projects having adapted to the coronavirus implications, we expect that better and closer communication and coordination, in the framework of the projects' SABs, will take place in the second reporting period.

3.1.1 Geographical and thematic complementarities

Among envisaged activities of the D8.14 coordination plan, PARIS REINFORCE has intended to investigate complementarities with the three sister projects, in terms of the envisaged modelling analyses. Although not significant progress has been done in this respect, based on regular communication and/or updates of one another's progress, PARIS REINFORCE decided early on to shift its global and regional multi-modelling focus to a scenario logic delving into where the world is headed given current policies and announced pledges, as part of its first modelling round. Furthermore, in response to the Commission's request to cover aspects of climate-economy aspects of a COVID-19 recovery in Europe, and exploring the three projects' intentions and scope in this respect, we decided to look into the underexplored topic of employment benefits from a green recovery in line with the financial planning/announcements, to present in the November 26-27 2020 EASME Knowledge Sharing Event. As the project dives deep into new scenario frameworks as well as national/regional analyses, more efforts will be put into securing envisaged thematic and/or geographic complementarities.

3.1.2 Open access to the modelling platforms: vessels for all

The PARIS REINFORCE project's flagship is the I^{2}AM PARIS open access, data exchange platform that is aimed at (technical and non-technical) documentation of the modelling ensemble and capabilities for all target audiences; streamlining modelling activities by harmonising and publicly providing all scenario inputs and assumptions; and visualising the outcomes in an exhaustive, policy-relevant and useful manner.

During the first Stakeholder Council dialogue in Brussels (November 2019), projects like NAVIGATE, LOCOMOTION and Drawdown Europe representatives participated, fostered, and engaged in fruitful technical and non-technical discussions towards finalising the specifications requirements of the I^{2}AM PARIS platform.

More importantly, in its aim to make I^{2}AM PARIS a Europe-wide and international modelling vessel, PARIS REINFORCE encouraged exploitation of the platform for the modelling documentation, scenario harmonisation and outcome visualisation of other research activities, communicating an open call to the international modelling community. As of November 2020, more than 20 modelling teams from different projects and non-consortium organisations have already responded positively to this open call, used the model documentation template available, and provided their models' features to be included in both the detailed and dynamic documentation sections of the platform. This includes:

- global integrated assessment, energy system or trade models with explicit focus on the European Union or continent: MEDEAS, WILIAM, E3ME-FTT, POLES, ETCU-RICE, OSeMOSYS/GLUCOSE, HEB, and WTMBT

- energy-economy, electricity and sectoral system modelling tools explicitly designed for the EU, with national level of detail: OSEMBE, Calliope, PSM-EU, EPMM, and EGMM

- energy, electricity and sectoral system models for national and sub-national (NUTS-3 and city-level) insights in the EU: EXPANSE, WISEE-EDM, WISEE-ESM, HU-TIMES, EnergyPLAN, MANAGE, PowerPlan and the TEEM suite [DREEM, BSAM, ATOM and AIM]

- and national or regional models of countries outside the EU (e.g. SAMBA, TEMBA, BLUES, MUSE-Brazil, etc.)

These models have been marked in the dynamic and detailed documentation sections with an asterisk. It is worth noting that some of these models have been provided by sister projects' consortia, such as MEDEAS and WILIAM (**LOCOMOTION**) or EXPANSE (**NAVIGATE**). This list also includes other leading projects in this area, like **SENTINEL**

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(including DREEM, BSAM, ATOM and AIM models of the TEEM suite, EnergyPLAN, HEB, etc.), an H2020 project proposing a co-creative modelling framework, with modularity to enable flexibility in using sub-models, connectivity between sub-models, and expandability.

We will maintain the open call for modelling teams to document their tools, and in the second part of the project kick off efforts for the other two major components of the platform: variable harmonisation heatmap, and results workspaces for different multi-model projects.

Going back to synergies with sister projects, the same efforts can also be pursued for the project's research activities in the IAM NAVIGATOR platform or LOCOMOTION's open-source modelling interfaces. This not only enhances the outreach of each project, but also traverses the project boundaries, by allowing for sharing common scenario frameworks among all projects as well as carrying out model inter-comparisons for countries/regions/the globe, where modelling analysis will be performed by more than one project. Besides, NAVIGATE and LOCOMOTION both seek to upgrade a set of models that are also part of the PARIS REINFORCE modelling ensemble (such as GCAM, LEAP, and TIMES); therefore, PARIS REINFORCE could take advantage of and make use of the improvements to these models.

3.1.3 A stakeholder internetwork

Key objectives aside, and albeit to a different extent, all four projects highlight stakeholder engagement. Although the idea of stakeholder representation is to make sure that all stakeholder groups are adequately involved in the process, there is only so many people a project can have ties with or reach out to. PARIS REINFORCE had planned to investigate the possibility of joining forces into one large stakeholder internetwork, acknowledging of course the limitations posed by the ethics requirements of each project and the European Commission. This idea has not progressed much, given also the COVID-related limitations. However, stakeholder interaction synergies have taken place with some research projects, during the first eighteen months of the project, as reported in Section 3.1.4.3.

3.1.4 Joint dissemination and exploitation activities

3.1.4.1 Joint academic publications

One of the PARIS REINFORCE priorities is to foster sharing of knowledge and research results among peers and other potential users. Sister and other research projects can join forces and disseminate results in joint papers, or actively organise co-editing and/or submitting to joint special issues.

So far, five joint papers have been published as a result of collaboration among the different projects. Some have fully or partly revolved around COVID-19, others on technological and modelling alliances, and others on interdisciplinary methodological perspectives.

1. Le Quéré et al. (2020), Nature Climate Change:

Citation: Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J., Abernethy, S., Andrew, R. M., ... & Friedlingstein, P. (2020). Temporary reduction in daily global CO 2 emissions during the COVID-19 forced confinement. Nature Climate Change, 10, 647-643.

Abstract: Government policies during the COVID-19 pandemic have drastically altered patterns of energy demand around the world. Many international borders were closed and populations were confined to their homes, which reduced transport and changed consumption patterns. Here we compile government policies and activity data to estimate the decrease in CO2 emissions during forced confinements. Daily global CO2 emissions decreased by –17% (–11 to –25% for ±1σ) by early April 2020 compared with the mean 2019 levels, just under half from changes

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in surface transport. At their peak, emissions in individual countries decreased by –26% on average. The impact on 2020 annual emissions depends on the duration of the confinement, with a low estimate of –4% (–2 to –7%) if prepandemic conditions return by mid-June, and a high estimate of –7% (–3 to –13%) if some restrictions remain worldwide until the end of 2020. Government actions and economic incentives postcrisis will likely influence the global CO2 emissions path for decades.

Synergies with: 4C, VERIFY, CHE

DOI: https://doi.org/10.1038/s41558-020-0797-x

2. Babacan et al. (2020), Nature Energy:

Citation: Babacan, O., De Causmaecker, S., Gambhir, A., Fajardy, M., Rutherford, A. W., Fantuzzi, A., & Nelson, J. (2020). Assessing the feasibility of carbon dioxide mitigation options in terms of energy usage. Nature Energy, 5(9), 720-728.

Abstract: Measures to mitigate the emissions of carbon dioxide (CO2) can vary substantially in terms of the energy required. Some proposed CO2 mitigation options involve energy-intensive processes that compromise their viability as routes to mitigation, especially if deployed at a global scale. Here we provide an assessment of different mitigation options in terms of their energy usage. We assess the relative effectiveness of several CO2 mitigation routes by calculating the energy cost of carbon abatement (kilowatt-hour spent per kilogram CO2-equivalent, or kWh kgCO2e–1) mitigated. We consider energy efficiency measures, decarbonizing electricity, heat, chemicals and fuels, and also capturing CO2 from air. Among the routes considered, switching to renewable energy technologies (0.05–0.53 kWh kgCO2e–1 mitigated) offer more energy-effective mitigation than carbon embedding or carbon removal approaches, which are more energy intensive (0.99–10.03 kWh kgCO2e–1 and 0.78–2.93 kWh kgCO2e–1 mitigated, respectively), whereas energy efficiency measures, such as improving building lighting, can offer the most energy-effective mitigation.

Synergies with: CAPaCITy

DOI: https://doi.org/10.1038/s41560-020-0646-1

3. Fuss et al. (2020), One Earth:

Citation: Fuss, S., Canadell, J. G., Ciais, P., Jackson, R. B., Jones, C. D., Lyngfelt, A., ... & Van Vuuren, D. P. (2020). Moving toward Net-Zero Emissions Requires New Alliances for Carbon Dioxide Removal. One Earth, 3(2), 145-149.

Abstract: The 1.5°C target will require removing at least some of the carbon dioxide (CO2) previously emitted. Knowledge on how this can be done has been increasing, though barriers remain concerning governance, policy, and acceptability. For the 26th session of the Conference of the Parties (COP26) to move beyond an academic debate on CO2 removal (CDR), a broader alliance of research and policy communities, industry, and the public is needed.

Synergies with: RESTORE+

DOI: https://doi.org/10.1016/j.oneear.2020.08.002

4. Nikas et al. (2020), Energy Research & Social Science:

Citation: Nikas, A., Lieu, J., Sorman, A., Gambhir, A., Turhan, E., Baptista, B. V., & Doukas, H. (2020). The desirability of transitions in demand: Incorporating behavioural and societal transformations into energy modelling. Energy Research & Social Science, 70, 101780.

Abstract: Quantitative systems modelling in support of climate policy has tended to focus more on the supply

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side in assessing interactions among technology, economy, environment, policy and society. By contrast, the demand side is usually underrepresented, often emphasising technological options for energy efficiency improvements. In this perspective, we argue that scientific support to climate action is not only about exploring capacity of "what", in terms of policy and outcome, but also about assessing feasibility and desirability, in terms of "when", "where" and especially for "whom". Without the necessary behavioural and societal transformations, the world faces an inadequate response to the climate crisis challenge. This could result from poor uptake of low-carbon technologies, continued high-carbon intensive lifestyles, or economy-wide rebound effects. For this reason, we propose a framing for a holistic and transdisciplinary perspective on the role of human choices and behaviours in influencing the low-carbon transition, starting from the desires of individuals and communities, and analysing how these interact with the energy and economic landscape, leading to systemic change at the macro-level. In making a case for a political ecology agenda, we expand our scope, from comprehending the role of societal acceptance and uptake of end-use technologies, to co-developing knowledge with citizens from non-mainstream and marginalised communities, and to defining the modelling requirements to assess the decarbonisation potential of shifting lifestyle patterns in climate change and action.

Synergies with: SHAPE-ID

DOI: https://doi.org/10.1016/j.erss.2020.101780

Perhaps most importantly, **PARIS REINFORCE coordinated a joint publication produced with NAVIGATE, LOCOMOTION, and SENTINEL**, discussing the perspective of comprehensive and comprehensible multi-model energy and climate science, towards bringing the fragmented European modelling landscape together, as follows. It is also noteworthy that this collaboration coordinated by NTUA led to **the development of a joint research proposal among the partners of the four projects**, for the topic LC-SC3-CC-7-2020.

5. Nikas et al. (2021), Energy:

Citation: Nikas A., Gambhir A., Trutnevyte E., Koasidis K., Lund H., Thellufsen J.Z., Mayer D., Zachmann G., Miguel L.J., Ferreras-Alonso N., Sognnaes I., Peters G.P., Colombo E., Howells M., Hawkes A., van den Broek M., Van de Ven D.J., Gonzalez-Eguino M., Flamos A., & Doukas H. (2021). Perspective of comprehensive and comprehensible multi-model energy and climate science in Europe. Energy, 215, 119153.

Abstract: Europe's capacity to explore the envisaged pathways that achieve its near- and long-term energy and climate objectives needs to be significantly enhanced. In this perspective, we discuss how this capacity is supported by energy and climate-economy models, and how international modelling teams are organised within structured communication channels and consortia as well as coordinate multi-model analyses to provide robust scientific evidence. Noting the lack of such a dedicated channel for the highly active yet currently fragmented European modelling landscape, we highlight the importance of transparency of modelling capabilities and processes, harmonisation of modelling parameters, disclosure of input and output datasets, interlinkages among models of different geographic granularity, and employment of models that transcend the highly harmonised core of tools used in model inter-comparisons. Finally, drawing from the COVID-19 pandemic, we discuss the need to expand the modelling comfort zone, by exploring extreme scenarios, disruptive innovations, and questions that transcend the energy and climate goals across the sustainability spectrum. A comprehensive and comprehensible multi-model framework offers a real example of "collective" science diplomacy, as an instrument to further support the ambitious goals of the EU Green Deal, in compliance with the EU claim to responsible research.

Synergies with: NAVIGATE, LOCOMOTION, SENTINEL

DOI: https://doi.org/10.1016/j.energy.2020.119153

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Regarding joint special issues, PARIS REINFORCE has already explored the potential of such a joint dissemination option in its Special Issue, entitled "Transdisciplinary science in energy transitions: thinking outside strictly formalised modelling boxes" in "Energy Sources, Part B: Economics, Planning, and Policy", to which Prof. Haris Doukas invited sister and other projects attending the "Networking and knowledge sharing event for decarbonisation projects" in Brussels (September 5, 2019) to submit.

3.1.4.2 Joint policy publications

The project envisages the production of a series of policy publications. In November 2019, PARIS REINFORCE shared its first Policy Brief on "What can our models deliver" with all three sister projects. It will do so with all other policy publications to follow.

Among its series of commentaries/articles in international press, blogs, etc., the project (through Dr. Gambhir) also contributed to the development of a briefing identifying key recovery policies that the UK government could introduce to both respond to the crisis of COVID-19, and support the country in meeting its commitment to reaching net-zero emissions by 2050. The brief was produced in association with the COP26 Universities Network, a growing group of more than 30 UK-based universities working together to help deliver an ambitious outcome at the UN Climate Summit in Glasgow and beyond, including the Universities of Cambridge, LSE Grantham Research Institute, Imperial College London Grantham Institute, Cardiff, Edinburgh, Oxford, and UCL.

3.1.4.3 Joint policy events

From an early stage, PARIS REINFORCE planned to engage beneficiaries of similar projects to its policy events, the aims of which include co-creation of research with stakeholders, as well as to participate in policy events of other projects. The following synergies in policy events have taken place:

1. C-Track 50 Roundtable, 17 September 2019

Researchers from PARIS REINFORCE participated in the **C-Track 50** EU roundtable, which took place on the 17th of September 2019, in Athens, Greece.

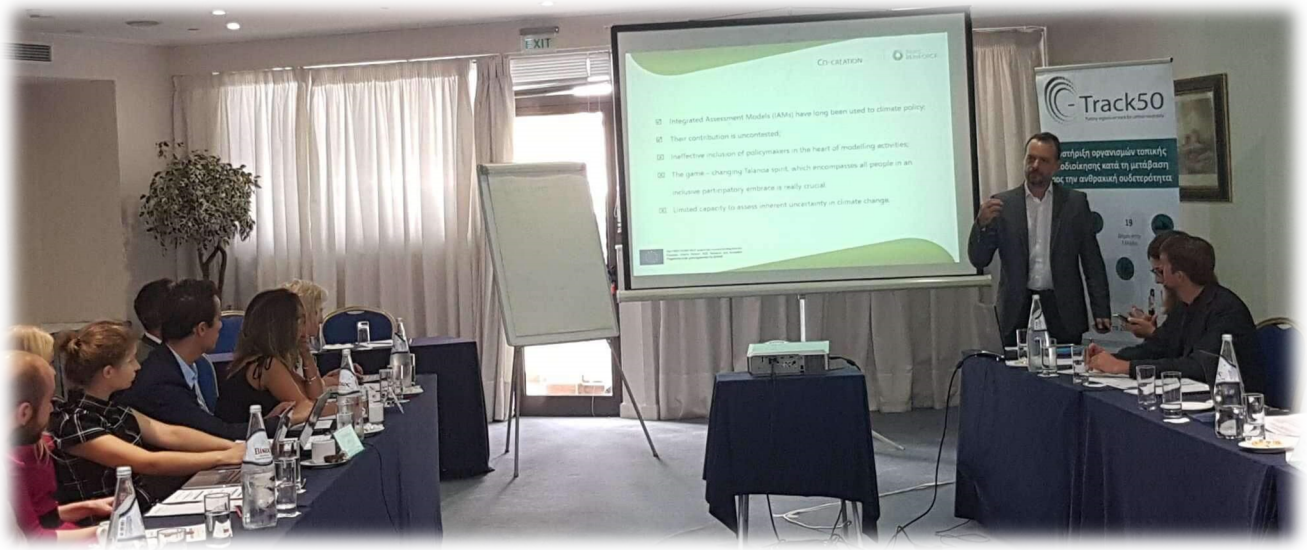

Figure 1. Prof. Doukas presenting PARIS REINFORCE in the C-Track 50 roundtable, September 17, 2019

Assoc. Prof. Haris Doukas (National Technical University of Athens), participated in the roundtable, with the aim to represent PARIS REINFORCE and present the project's objectives, approach and expected results.

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2. EU-Japan Climate Change Policy Symposium, 6 December 2019

PARIS REINFORCE researchers, including Assoc. Prof. Haris Doukas and Dr. Alexandros Nikas (National Technical University of Athens), Dr. Sara Giarola (Grantham Institute, Imperial College), Dr. Maurizio Gargiulo (E4SMA) and Mr. Ben McWilliams (Bruegel), participated in the "EU-Japan Climate Change Policy Symposium: Use of scenario analysis to form the long-term strategy under the Paris Agreement", which took place on the 6th of December 2019, at the Delegation of the European Union to Japan in Tokyo, Japan.

Figure 2. PARIS REINFORCE presentation in the SPIPA EU-Japan Policy Symposium, December 6, 2019

The symposium was organised by the Institute for Global Environmental Strategies (IGES) (partner to PARIS REINFORCE) in the context of the International Climate Initiative (IKI), and specifically the "Strategic Partnerships for the Implementation of the Paris Agreement (**SPIPA**)" project. It hosted presentations by (and vivid discussions among the audience and) representatives from DG CLIMA and the JRC research centre, the PARIS REINFORCE consortium, local authorities (e.g. city of Yokohama), industry (e.g. HITACHI and Deloitte), and the National Institute for Environmental Studies.

In particular, Assoc. Prof. Haris Doukas actively participated in the discussions hosted in the session entitled "The process for the EU vision for decarbonization and the role of scenario and model analysis", by also presenting the scope of PARIS REINFORCE, and highlighting details of the I2AM PARIS platform and the co-creation component of the project.

3. Zero carbon emissions in the Greek energy system, 20 February 2020

Researchers from PARIS REINFORCE participated in the "Zero carbon emissions in the Greek energy system: realism, opportunity or utopia?" workshop which took place on the 20th of February 2020, in Athens, Greece.

The workshop aimed to enable the National Dialogue for the decarbonisation of the Greek energy system. It was organised by the Institute for Environmental Research and Sustainable Development of the National Observatory of Athens within the framework of the "**South East Europe Energy Transition Dialogue**" project. Participants had the opportunity to take part in a constructive dialogue and exchange opinions and expertise towards answering

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the following critical questions.

- Do the Greek National Energy and Climate Plan (NECP) and the Long-Term Strategy for 2050 constitute a coherent framework of decarbonisation actions?
- Is it possible for Greece to achieve zero Greenhouse Gas (GHG) emissions until 2050?
- What policies are required in order to achieve zero GHG emissions?

On behalf of PARIS REINFORCE, Assoc. Prof. Haris Doukas participated in the workshop, presented the project's objectives and methodology and the progress so far. More specifically, the "co-creation" approach that PARIS REINFORCE applies in the formulation of climate action policies and the role of the Stakeholder Council in the climate scenarios modelling were highlighted. Furthermore, the I2AM PARIS platform which will enable the interaction and collaboration among climate modelling experts and policymakers, as well as stakeholders from the general public, was showcased.

4. LOCOMOTION Society stakeholder workshop, 20 October 2020

On behalf of PARIS REINFORCE, Dr. Alexandros Nikas participated in the **LOCOMOTION** online stakeholder workshop session on Society. The focus group meeting was held to identify the social and demographic factors affecting a low-carbon future for LOCOMOTION's models to achieve a sustainable society. The role of migrations was also discussed including its social interlinkages and impacts. The session was moderated by UNU-EHS and the EEB, and the results will be used to obtain a better understanding of the drivers of change in social systems and to include them in the WILIAM Integrated Assessment Model.

3.1.5 Joint communication activities

PARIS REINFORCE has tried and will keep on working to foster collaboration with other projects by:

- Following the other projects' social media accounts
- Inviting other projects (and project consortium members) to follow the PARIS REINFORCE social media accounts
- Examining the possibility for joint press releases and articles
- Examining the possibility for specific joint social media campaigns to improve the visibility of the results of the projects
- Inviting other projects to have a specific session in PARIS REINFORCE national/regional workshops and final conference
- Requesting from other projects a specific session in their conferences/workshops and other public events
- Investigating the possibility for a joint public event, probably on the occasion of the second regional EU workshop (November 2020)
- Publishing articles, publications, and news on the websites of other projects and publishing news about and research outputs of other projects on the PARIS REINFORCE website
- Investigating the possibility for joint participation in other meetings and events.

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4 Evaluation of the plan's questions and assumptions

4.1 Addressing original research questions

The main purpose of this activity has been and still is to plan and successfully implement an effective strategy for the coordination and communication elements among research projects, addressing the following questions:

Q1: How to raise awareness of projects and generate shared interest in looking beyond programme territory, thematic and partnerships?

We find that awareness of different research projects has significantly been enhanced through clusters of projects created/programmed by the Commission. Coordinators' days, Networking events, Knowledge Sharing Workshops, Webinars, and Discussions with DGs (e.g. over COVID-19 impacts) have been instrumental. Another factor that helped in this respect has been the activity of international scientific consortia, the events of which have brought projects closer, such as the Integrated Assessment Modeling Consortium (IAMC) meetings (e.g. IAMC12, in which many partners from all four sister projects participated), the Energy Modeling Forum (EMF) workshops (e.g. EMF35, in which NTUA got in touch with many other projects and modelling teams, as part of the Japan Model Inter-Comparison Project and had the opportunity to discuss with Stanford's Prof. John Weyant, member of the NAVIGATE SAB), etc.

Q2: How to ensure that requests for complementarities are a natural feature of projects?

Although not many requests for complementarities have been initiated by the projects themselves, this worked out very well in the case of COVID-19-related and European Green Deal-related research that the Commission additionally asked from all climate policy projects to contribute to.

Q3: How to establish coordination and cooperation between projects, the management models and methodologies of which differ to a significant extent?

It is true that, for example among the four sister projects, models and methodologies do not differ to one another significantly. However, effective synergies mainly in the form of joint research and publications have been established among vastly different projects, as in Nikas et al. (2020), Babacan et al. (2020), Le Quéré et al. (2020), and Fuss et al. (2020). On the other hand, in addition to joint publications (e.g. Nikas et al., 2021), different types of collaboration have been easier established in other aspects among similar projects, like joint policy events, platform development coordination, etc.

Q4: How to turn identified overlaps of project territories and/or themes into an opportunity, and build synergies across projects?

Again, this has worked well in requests that the Commission indeed coordinated, such as in the COVID-19 topic. Without central coordination, this has proved a challenging task, and hopefully this can improve in the future, e.g. in the Forum established in the LC-SC3-CC-7-2020 topic.

4.2 Validation of assumptions

The Plan for coordination and synergies document (D8.14) had a set of assumptions under which it was elaborated:

A1: Other relevant projects, including the three sister projects, have a positive attitude and show willingness to cooperate, and above all to share their knowledge, experience, and methodologies to be applied in their own projects, and to make themselves available

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Although to a different extent, it is true that sister projects and other research initiatives alike have been overall positive to our coordination requests. A highlight in this respect has been the numerous (20+) modelling teams joining the I^2AM PARIS platform. We hope that, eventually, and judging by the success of hitherto actions, the willingness to cooperate and share results, knowledge, experience, and breakthroughs will be enhanced in the near future, with significant impact during the second half of the project.

A2: If other projects should elaborate similar coordination and synergy plans, these plans are not substantially different from the present deliverable.

The three sister projects have mobilised a similar coordination and synergy plan; however, given that the three projects have a different duration and/or start date, these plans are not yet publicly released/available.

A3: The contracting authority, EASME, and in particular the PARIS REINFORCE Project Advisor promotes synergies among the projects funded under the same Unit, by sharing information and creating the spaces for collaboration.

We can confirm that both the Project Advisor and Project Advisors of the sister projects have been very active in this respect, warmly encouraging synergies and collaborations from the very beginning of the projects. This is also evident in the invitations to knowledge sharing events and webinars throughout.

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