



PARIS  
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REINFORCE

30/11/2022

**D8.10 INFOGRAPHICS, VIDEOS AND  
PUBLICATIONS AIMED AT POLICYMAKERS AND  
STAKEHOLDERS – Update 1**

WP8 – Communication, Dissemination, & Exploitation

Version: 1.00

[www.paris-reinforce.eu](http://www.paris-reinforce.eu)



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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 public deliverable can be used by anyone interested in the PARIS REINFORCE scientific outputs, as it provides an overview of—and pinpoints—all relevant videos, newsletters, press releases, presentations, and other publications aimed at policymakers and non-scientific audiences that were produced in the context of the project, allowing them to explore and effectively exploit the project's outcomes.

### 3. Short summary of results (<250 words)

To mobilise acquired, processed, and accumulated knowledge for policy debate and informed business and civil society, PARISREINFORCE has ensured timely publications targeted at policymakers and stakeholders. This deliverable presents the most impactful means used in PARIS REINFORCE, namely the distribution of newsletters and press releases; the publication of commentaries and other publications in the press (e.g., non-scientific journals); policy briefs; videos; infographics; as well as presentations in policy events.

By November 2022, a total of 41 articles/commentaries have been published in the press and non-scientific news media (including New Europe, The Parliament Magazine, the Conversation, Nature, etc.), enhancing the visibility and outreach of the project to non-scientific audiences. Also, a total of 27 newsletters and press releases have been communicated by the project to a very large and diverse stakeholder pool, while 2 videos and 15 infographics (including two dynamic/interactive and customisable, hosted in the I<sup>2</sup>AM PARIS platform) have been created and shared. Finally, the project has produced or contributed to 3 targeted policy briefs, as well as presented outputs in 37 (policy) events and stakeholder workshops.









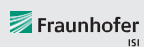









### 4. Evidence of accomplishment

This report, and all material in the listed links (in press, the website, YouTube, etc.), for each category of publication.



## 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 <sup>2</sup>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.

<b>NTUA</b> - National Technical University of Athens	GR	
<b>BC3</b> - Basque Centre for Climate Change	ES	
<b>Bruegel</b> - Bruegel AISBL	BE	
<b>Cambridge</b> - University of Cambridge	UK	
<b>CICERO</b> - Cicero Senter Klimaforskning Stiftelse	NO	
<b>CMCC</b> - Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici	IT	
<b>E4SMA</b> - Energy Engineering Economic Environment Systems Modeling and Analysis	IT	
<b>EPFL</b> - École polytechnique fédérale de Lausanne	CH	
<b>Fraunhofer ISI</b> - Fraunhofer Institute for Systems and Innovation Research	DE	
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## Executive Summary

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# 1 Introduction

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This is not an exhaustive final account, as many other publications and/or other material targeted at non-scientific audiences may follow after the official project end.



## 2 List of commentaries & other publications in the Press

Below, we list all commentaries published in the framework of the PARIS REINFORCE project.

### 2.1 Peters (2020), The Conversation

- Title:** How changes brought on by coronavirus could help tackle climate change
- Authors:** Glen P. Peters (CICERO)
- Medium:** The Conversation
- Abstract:** Stock markets around the world had some of their worst performance in decades this past week, well surpassing that of the global financial crisis in 2008. Restrictions in the free movement of people is disrupting economic activity across the world as measures to control the coronavirus roll out. There is a strong link between economic activity and global carbon dioxide emissions, due to the dominance of fossil fuel sources of energy. This coupling suggests we might be in for an unexpected surprise due to the coronavirus pandemic: a slowdown of carbon dioxide emissions due to reduced energy consumption. Based on new projections for economic growth in 2020, we suggest the impact of the coronavirus might significantly curb global emissions. The effect is likely to be less pronounced than during the global financial crisis (GFC). And emissions declines in response to past economic crises suggest a rapid recovery of emissions when the pandemic is over. But prudent spending of economic stimulus measures, and a permanent adoption of new work behaviours, could influence how emissions evolve in future.
- Keywords:** Climate change; Coronavirus; Air travel; Greenhouse gas emissions; COVID-19; Working from home; Coronavirus stimulus program
- Link:** <https://theconversation.com/how-changes-brought-on-by-coronavirus-could-help-tackle-climate-change-133509>
- First Online:** March 16, 2020
- Citation (APA):** Peters, G. (2020). How changes brought on by coronavirus could help tackle climate change. The conversation. <https://theconversation.com/how-changes-brought-on-by-coronavirus-could-help-tackle-climate-change-133509>.




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## THE CONVERSATION

Academic rigor, journalistic flair

COVID-19 Arts + Culture Economy + Business Education Environment + Energy Ethics + Religion Health Politics/Election '20  
Science + Technology



### How changes brought on by coronavirus could help tackle climate change

March 16, 2020 3:01pm EDT

David Suzuki/Pixco

- ✉ Email
- 🐦 Twitter 132
- 📘 Facebook 1.5k
- 🌐 LinkedIn
- 🖨 Print

Stock markets around the world had some of their worst performance in decades this past week, well surpassing that of the global financial crisis in 2008. Restrictions in the free movement of people is disrupting economic activity across the world as measures to control the coronavirus roll out.

There is a strong link between economic activity and global carbon dioxide emissions, due to the dominance of fossil fuel sources of energy. This coupling suggests we might be in for an unexpected surprise due to the coronavirus pandemic: a slowdown of carbon dioxide emissions due to reduced energy consumption.


*Read more: 'Cabin fever': Australia must prepare for the social and psychological impacts of a coronavirus lockdown*

Based on new projections for economic growth in 2020, we suggest the impact of the coronavirus might significantly curb global emissions.

The effect is likely to be less pronounced than during the global financial crisis (GFC). And emissions declines in response to past economic crises suggest a rapid recovery of emissions when the pandemic is over.

But prudent spending of economic stimulus measures, and a permanent adoption of new work behaviours, could influence how emissions evolve in future.

**Author**



**Glen Peters**  
Research Director, Center for International Climate and Environment Research - Oslo

**Disclosure statement**


Glen Peters receives funding from the European Commission (Horizon 2020) for the project 'PARIS REINFORCE' under grant agreement No. 820846.

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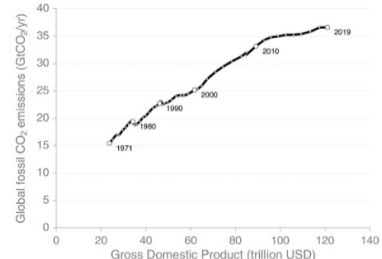
Bahasa Indonesia  
English



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Global fossil CO2 emissions (vertical axis) have grown together with economic activity (horizontal axis) over extended periods of time. [Glen Peters/CICERO](#)

**The world in crisis**

In just a few short months, millions of people have been put into

**Figure 1: Preview of article 'How changes brought on by coronavirus could help tackle climate change' in The Conversation**



## 2.2 Gambhir (2020), Grantham Institute

- Title:** Coronavirus and climate change: “There is much uncertainty, and much to play for”
- Authors:** Ajay Gambhir (Grantham)
- Medium:** Grantham Institute
- Abstract:** Coronavirus is here. Its impact on our health systems, economies and behaviours cannot yet be understood, but analogies have already been drawn between this immediate challenge and the more chronic, insidious climate change challenge.
- Any broader analysis of coronavirus, beyond that which centres around how to minimise and mitigate its impact, arguably risks being insensitive or inappropriate at this time. Millions of vulnerable people of all ages are in danger and the UK’s own perennially optimistic prime minister has said that we must be prepared to lose some loved ones before their time. However, it’s critical to reflect on any lessons we might learn from coronavirus so that we can tackle climate change as effectively as possible.
- Keywords:** Climate Change; Coronavirus; COVID-19
- Link:** <https://granthaminstitute.com/2020/03/17/coronavirus-and-climate-change-there-is-much-uncertainty-and-much-to-play-for/>
- First Online:** March 17, 2020
- Citation (APA):** Gambhir, A. (2020). Coronavirus and climate change: “There is much uncertainty, and much to play for”. Grantham Institute. <https://granthaminstitute.com/2020/03/17/coronavirus-and-climate-change-there-is-much-uncertainty-and-much-to-play-for/>





# CLIMATE & ENVIRONMENT AT IMPERIAL

Insights from staff and students across Imperial working in climate and environment related areas

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## Coronavirus and climate change: “There is much uncertainty, and much to play for”

Posted on MARCH 17, 2020



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The Grantham Institute’s [Dr Ajay Gambhir](#) blogs on how learning from the coronavirus crisis could help place the world on a firmer footing to tackle the multiple challenges we will face this century – including climate change.

Coronavirus is here. Its impact on our health systems, economies and behaviours cannot yet be understood, but analogies have already been drawn between this immediate challenge and the more chronic, insidious climate change challenge.

Any broader analysis of coronavirus, beyond that which centres around how to minimise and mitigate its impact, arguably risks being insensitive or inappropriate at this time. Millions of vulnerable people of all ages are in danger and the UK’s own perennially optimistic prime minister has said that we must be prepared to [lose some loved ones before their time](#). However, it’s critical to reflect on any lessons we might learn from coronavirus so that we can tackle climate change as effectively as possible.

First and most strikingly, experts are back on the agenda, and their place in informing public policy has been restored to some degree. In contrast to the low point of Michael Gove’s [comments](#) during the Brexit campaign, listening to experts is now widely recommended. There are few, if any, coronavirus deniers and we are for the most part turning to epidemiologists to inform public policy. This is welcome, and hopefully a lesson that will be retained for the climate challenge.

Secondly, the central importance of behaviour change has been brought to the fore. The ability of people and societies to respond to threats affecting their wellbeing – as is being demonstrated across the world – is a potentially powerful response mechanism. Although it’s still too early to say how persistent behaviour changes might be, it is important to capture the notion that such changes can occur when it’s

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Figure 2: ‘Coronavirus and climate change: “There is much uncertainty, and much to play for”’ in Grantham Institute



## 2.3 Koberle (2020), Grantham Institute

- Title:** Coronavirus: How we emerge from this terrible crisis could push us into a better future
- Authors:** Alex Koberle (Grantham)
- Medium:** Grantham Institute
- Abstract:** The COVID-19 global pandemic is pushing institutions and governments to their limits. People are worried about their health, their families, losing their jobs and the uncertainty the future holds. The economic fallout of this crisis is still uncertain too, and we may well wake up in a few months to a world completely transformed. While the current focus should be on minimising the loss of life, governments around the world are already responding to support a faltering, if not free falling, global economy. The stimulus packages provided will total in the trillions of dollars, euros, pounds, yen, yuan, pesos and many other currencies. This crisis has exposed many vulnerabilities that can be traced back to the unsustainable development that has ravaged the environment, and yet failed to eradicate poverty and hunger. Governments should take a moment to reflect, learn from past mistakes and redirect development towards a sustainable future. Medical professionals are putting their lives on the line to contain the virus; decision-makers owe it to them to rebuild the world in a way that makes it more resilient to similar situations in the future. Political and financial leaders, said International Energy Agency head Dr Fatih Birol, should consider directing economic stimulus packages that “shape policies ... to step up our ambition to tackle climate change.” How can the government response to COVID-19 help create a more sustainable, resilient, healthy future?
- Keywords:** Climate Change; Coronavirus; COVID-19
- Link:** <https://granthaminstitute.com/2020/03/25/coronavirus-how-we-emerge-from-this-terrible-crisis-could-push-us-into-a-greener-future/>
- First Online:** March 25, 2020
- Citation (APA):** Koberle, A. (2020). Coronavirus: How we emerge from this terrible crisis could push us into a better future. Grantham Institute. <https://granthaminstitute.com/2020/03/25/coronavirus-how-we-emerge-from-this-terrible-crisis-could-push-us-into-a-greener-future/>



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## Coronavirus: How we emerge from this terrible crisis could push us into a better future

Posted on MARCH 25, 2020



Engineers changing rotor blades on a wind turbine (c) Dennis Schroeder / NREL [CC BY-NC-ND 2.0](#)

The Grantham Institute's [Dr Alex Koberle](#) blogs on how the response to COVID-19 could help shape a sustainable, resilient future.

The COVID-19 global pandemic is pushing institutions and governments to their limits. People are worried about their health, their families, losing their jobs and the uncertainty the future holds. The economic fallout of this crisis is still uncertain too, and we may well wake up in a few months to a world completely transformed. While the current focus should be on minimising the loss of life, governments around the world are already responding to support a faltering, if not free falling, global economy. The stimulus packages provided will total in the trillions of [dollars](#), euros, [pounds](#), yen, yuan, pesos and many other currencies.

This crisis has exposed many vulnerabilities that can be traced back to the unsustainable development that has ravaged the environment, and yet failed to eradicate poverty and hunger. Governments should take a moment to reflect, learn from past mistakes and redirect development towards a sustainable future. Medical professionals are putting their lives on the line to contain the virus; decision-makers owe it to them to rebuild the world in a way that makes it more resilient to similar situations in the future. Political and financial leaders, [said International Energy Agency head Dr Fatih Birol](#), should consider directing economic stimulus packages that “shape policies ... to step up our ambition to tackle climate change.”

### How can the government response to COVID-19 help create a more sustainable, resilient, healthy future?

As central banks slash interest rates and inject cash into ailing economies, straight-up bailouts of firms should be subject to a minimum set of preconditions that help to build climate resilience.

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Figure 3: Preview of 'Coronavirus: How we emerge from this terrible crisis could push us into a better future' in Grantham Institute



## 2.4 Allan et al. (2020), COP26 Universities Network Briefing

- Title:** A net-zero emissions economic recovery from COVID-19
- Authors:** Jennifer Allan, Charles Donovan (Grantham), Paul Ekins, Ajay Gambhir (Grantham), Cameron Hepburn, David Reay, Nick Robins, Emily Shuckburgh (Cambridge), and Dimitri Zenghelis (Cambridge)
- Medium:** COP26 Universities Network Briefing
- Abstract:** This briefing identifies 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. It has been 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.
- Keywords:** Coronavirus; COVID-19
- Link:** <http://www.imperial.ac.uk/grantham/publications/a-net-zero-emissions-economic-recovery-from-covid-19.php>
- First Online:** April 15, 2020
- Citation (APA):** Allan, J., Donovan, C., Ekins, P., Gambhir, A., Hepburn, C., Robins, N., ... & Zenghelis, D. (2020). A net-zero emissions economic recovery from COVID-19. COP26 Universities Network Briefing, April. <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-01.pdf>



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**Summary**

**A COP26 Universities Network Briefing**

This briefing identifies 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.

It has been 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.

A background working paper to this briefing [is available to view here](#).

**Headlines**

- Economic growth will be a high priority for all countries in the months and years following COVID-19. The transition to net-zero emissions can significantly contribute to the recovery.
- Lessons can be learnt from the recovery packages introduced following the 2008 financial crisis, but the COVID-19 crisis is structurally different on the demand and supply side.
- In the lead up to COP26, the UK could provide guidance and methodologies to evaluate proposed recovery packages for consistency with the Paris Agreement and net-zero emissions.
- The UK could lead by example with a recovery package including components on net-zero buildings, energy storage, clean industry, transport and greenhouse gas removal.
- Institutionally, this could be supported by establishing a ministerial Climate Change Emergency Committee along with a Net Zero Delivery Body to implement a coherent response.
- Financially, a new National Investment Bank and focus on green financial instruments could enable the process.
- Building on these domestic efforts, as COP26 President, the UK could coordinate a global response through a new flexible intergovernmental Sustainable Recovery Alliance.

**Authors:** [Dr Jennifer Allan](#), Cardiff University | [Dr Charles Donovan](#), Imperial College London | [Professor Paul Ekins](#), University College London | [Dr Ajay Gambhir](#), Imperial College London | [Professor Cameron Hepburn](#), University of Oxford | [Professor David Reay](#), University of Edinburgh | [Nick Robins](#), London School of Economics and Political Science | [Dr Emily Shuckburgh](#), University of Cambridge | [Dimitri Zenghelis](#), University of Cambridge

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**Figure 4: Preview of 'A net-zero emissions economic recovery from COVID-19' in COP26 Universities Network Briefing**



## 2.5 Doukas et al. (2020), The Parliament Magazine

- Title:** Convergence between technological progress and sustainability is not that obvious
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA), and Ajay Gambhir (Grantham)
- Medium:** The Parliament Magazine
- Abstract:** The coronavirus pandemic, like climate change, teaches us about the importance of mitigating risk to ensure our future prosperity. Should we place all our hopes on technology to deliver this safer future?
- Keywords:** Sustainability; COVID-19; Coronavirus; Greenhouse gas emissions
- Link:** <https://www.theparliamentmagazine.eu/articles/opinion/convergence-between-technological-progress-and-sustainability-not-obvious>
- First Online:** May 6, 2020
- Citation (APA):** Doukas, H., Nikas, A., & Gambhir, A. (2020). Convergence between technological progress and sustainability is not that obvious. The Parliament Magazine. <https://www.theparliamentmagazine.eu/news/article/convergence-between-technological-progress-and-sustainability-is-not-that-obvious>



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## Convergence between technological progress and sustainability is not that obvious

The coronavirus pandemic, like climate change, teaches us about the importance of mitigating risk to ensure our future prosperity. Should we place all our hopes on technology to deliver this safer future?



Photo credit: Pixabay



By Assoc. Prof. Haris Doukas, Dr. Alexandros Nikas and Dr. Ajay Gambhir

06 May 2020

In 1865, economist William Stanley Jevons observed that technological advancements in coal burning failed to cut coal consumption, instead leading to a sharp increase. This observation, known in environmental economics as the Jevons paradox, was attributed to increased efficiency in resource use leading to cheaper goods, thereby boosting demand.

Three decades ago, Nobel Laureate Robert Solow made another important observation about technology's limits, this time in computer science: despite rapid progress in computing power, including economic sectors heavily investing in IT, overall productivity growth slowed down, owing to a significant lag before the new-found computing power was effectively integrated into economic activities.

Today, the world is pressingly faced with myriad technological challenges: the immediate focus is on developing a coronavirus vaccine, but in not too long we will be returning our attention to asking how modern technological advancements can deliver both climate action and sustainable economic development. So far, the results are mixed, to say the least.

Despite efforts to promote clean energy sources like solar and wind, the fossil fuel regime still retains a daunting 80 percent of final energy use globally. While energy efficiency is considered a top priority, over the last quarter century, energy use has instead grown (by over 50 percent) far quicker than population growth (35 percent).

Increasing Google services users tripled respective energy consumption during the past eight years; the annual footprint of cryptocurrency mining networks is now comparable to national economies; the majority of global bandwidth is consumed for video streaming, and so on.

Some of these services are readily available and freely accessible (e.g. YouTube); although such free access is socially beneficial and contributes to sustainability in various manners (e.g. by reducing inequalities), free-riding in highly energy-consuming lifestyles is not in keeping with the traditional climate policy model and required sustainability efforts.



"Despite efforts to promote clean energy sources like solar and wind, the fossil fuel regime still retains a daunting 80 percent of final energy use globally"

Digitalisation is, in the scientific community and otherwise, widely considered an enabler of behavioural change that can help materialise a low-carbon, less material-intensive future. But there is a very real possibility that people will instead give in to a society-wide rebound effect, where more energy is needed to use a larger number of higher efficiency services.

Think of the future smart household with multiple video screens, virtual reality terminals and any new number of electronic consumer devices mandated

**Figure 5: Preview of 'Convergence between technological progress and sustainability is not that obvious' in The Parliament Magazine**



## 2.6 Anger-Kraavi (2020), Estonian World

- Title:** Positive and negative effects of the coronavirus pandemic on climate change
- Authors:** Annela Anger-Kraavi (Cambridge)
- Medium:** Estonian World
- Abstract:** Annela Anger-Kraavi, a senior researcher in climate change policy and economics at the University of Cambridge, highlights three positive and three negative effects of the coronavirus pandemic on climate change.
- Keywords:** Coronavirus; Climate Change
- Link:** <https://estonianworld.com/opinion/annela-anger-kraavi-positive-and-negative-effects-of-the-coronavirus-pandemic-on-climate-change/>
- First Online:** May 9, 2020
- Citation (APA):** Anger-Kraavi, A. (2020). Positive and negative effects of the coronavirus pandemic on climate change. Estonian World. <https://estonianworld.com/opinion/annela-anger-kraavi-positive-and-negative-effects-of-the-coronavirus-pandemic-on-climate-change/>







## Annela Anger-Kraavi: Positive and negative effects of the coronavirus pandemic on climate change

By Annela Anger-Kraavi / May 9, 2020 / 0 Comments / Opinion

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Annela Anger-Kraavi, a senior researcher in climate change policy and economics at the University of Cambridge, highlights three positive and three negative effects of the coronavirus pandemic on climate change.

The crisis we are currently facing will not solve the climate crisis by itself. Even if we stopped adding greenhouse gasses to the atmosphere right now, the changes that have already begun will still cause a 1.5°C (2.7°F) manmade temperature increase by the end of this century.

During the current coronavirus crisis, emission levels have not fallen to zero. According to available data, it is thought that the amount of carbon dioxide released into the atmosphere in China decreased by as much as 25% in February. However, the economy there has now begun to recover, and emissions have again increased significantly.

The International Energy Agency predicts that the amount of CO2 emissions could fall by about 5% this year. If we want to limit human-induced global warming to 1.5°C – as we as mankind have promised ourselves – then we must cut yearly emissions by 50% by 2030.

Therefore, to limit climate change, we need to actively reduce greenhouse gasses in every area of our lives, develop new carbon free technologies and change our own behaviour. The coronavirus pandemic will not provide a magical solution to the climate crisis, we must act ourselves.

### What are the positive effects of the pandemic on the climate crisis?

There has been a partial decrease in the use of transport and electricity. In some cases, the amount of traffic has more than halved from its level prior to the crisis. As fewer fossil fuels are being burned, the air pollution levels in many places have

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**Figure 6: Preview of 'Positive and negative effects of the coronavirus pandemic on climate change' in Estonian World**



## 2.7 Doukas et al. (2020), New Europe

- Title:** Green glimmers of hope in climate action through a European, citizen-led transition model
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA), and Ioannis Tsipouridis (NTUA)
- Medium:** New Europe
- Abstract:** There is no space for “one crisis at a time”. And evidence suggests that behavioural changes have been instrumental in reducing the spread of COVID-19. The climate crisis is no different.
- Keywords:** Climate Change; Greenhouse gas emissions
- Link:** <https://www.neweurope.eu/article/green-glimmers-of-hope-in-climate-action-through-a-european-citizen-led-transition-model/>
- First Online:** August 27, 2020
- Citation (APA):** Doukas, H., Nikas, A., & Tsipouridis, I. (2020). Green glimmers of hope in climate action through a European, citizen-led transition model. New Europe. <https://www.neweurope.eu/article/green-glimmers-of-hope-in-climate-action-through-a-european-citizen-led-transition-model/>



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# Green glimmers of hope in climate action through a European, citizen-led transition model



By Dr Haris Doukas

Associate Professor of energy and climate policy at the School of Electrical and Computer Engineering, National Technical University of Athens



By Dr. Alexandros Nikas

Senior Climate Expert at the National Technical University of Athens



By Dr. Ioannis Tsiouridis

Renewables Consultant Engineer, Visiting Professor to the Technical University of Mombasa and Editor of e-mc2.gr Climate &amp; Energy portal.



Wind turbines near Angermünde, Germany.

May 2020

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**There is no space for "one crisis at a time". And evidence suggests that behavioural changes have been instrumental in reducing the spread of COVID-19. The climate crisis is no different.**

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The changes we have been witnessing in the climate system for decades, now rapidly culminating to a climate breakdown, constitute only one of a series of overlapping environmental crises. Extinction of species, deterioration of oceans, the proliferation of plastics, water scarcity and now pandemics, among others, clearly lead to a single conclusion: the planet has long left its comfort zone.

The emblematic IPCC 1.5°C Special Report spelt out that about a decade and (now less than) half a degree Celsius stand between us and a milestone temperature rise impacting nature and humans alike. The latest UN Environment Programme (UNEP) Emissions Gap Report indicated that global emissions need to be cut by 7.6% per year, starting now, to limit global warming to 1.5°C. This means a reduction target of at least 68% by 2030.

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**Figure 7: Preview of 'Green glimmers of hope in climate action through a European, citizen-led transition model' in New Europe**



## 2.8 Doukas et al. (2020), Africa Sustainability Matters

- Title:** How best to achieve a desirable transition to a low-carbon economy: the case of Sub-Saharan Africa.
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA), Michael Saulo and Ioannis Tsipouridis (NTUA)
- Medium:** Africa Sustainability Matters
- Abstract:** As there is no “one model fits all” approach, scientists need to employ a diversity of modelling tools, placing the human factor at the core of all scientific processes, towards enhancing the robustness of model-driven policy prescriptions through participatory frameworks.
- Keywords:** Climate Change; Co-creation; Stakeholders; Kenya; Sub-Saharan Africa
- Link:** <https://africasustainabilitymatters.com/how-best-to-achieve-a-desirable-transition-to-a-low-carbon-economy-the-case-of-sub-saharan-africa/>
- First Online:** October 24, 2020
- Citation (APA):** Doukas, H., Nikas, A., Saulo, M., & Tsipouridis, I. (2020). How best to achieve a desirable transition to a low-carbon economy: the case of Sub-Saharan Africa. Africa Sustainability Matters. October 24, 2020.





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# How best to achieve a desirable transition to a low-carbon economy: the case of Sub-Saharan Africa.

By External Source - October 24, 2020



**Scientific support to climate action is not only about exploring capacity of "what", but also about assessing desirability of "when", "where", and especially for "whom".**

The changes we have been witnessing in the climate system for decades, now rapidly culminating to a climate breakdown, constitute only one of a series of overlapping environmental crises.

Indeed, 2020 has been an unprecedented year for people and the planet. The Covid-19 pandemic has disrupted lives and economies worldwide. At the same time, the heating of our planet and climate disruption have continued apace. It has never been clearer that we need long-term, inclusive, decisive transitions to tackle the climate crisis and achieve sustainable development.

Climate action and sustainability commitments must, therefore, be at the forefront of recovery and reconstruction policy, and of the corresponding budgets, for the "Build Back Better" motto to have any substance.

In this direction, policy and business stakeholders alike are increasingly aware of the potential for behaviours and lifestyles to help or hinder the sustainability transitions, and of the need to understand them better before making respective investments. As such, scientific support to climate action should not only be about assessing the feasibility of low-carbon transition pathways in terms of exploring capacity of "what" (policies and technologies). It must also be about desirability, in terms of "when" (timings), "where" (contexts) and especially for "whom" (citizens and other stakeholders). Without the necessary behavioural and societal transformations, the

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- [TUM, Paris Reinforce Organize Virtual Workshop](#)

**Figure 8: Preview of 'How best to achieve a desirable transition to a low-carbon economy: the case of Sub-Saharan Africa.' in Africa Sustainability Matters**



## 2.9 Doukas and Nikas (2021), Nature

- Title:** Involve citizens in climate-policy modelling
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA)
- Medium:** Nature
- Abstract:** The latest draft of the working-group report on mitigating climate change is now open for review by governments and scientists, as part of the Intergovernmental Panel on Climate Change's Sixth Assessment. We think it is now time to include citizens' views.
- Despite some progress since the 2014 assessment, non-scientists are barely represented in the integrated modelling studies that underpin such reports. Their involvement has long been promised.
- Keywords:** Integrated assessment models, Stakeholders, Citizen participation
- Link:** <https://www.nature.com/articles/d41586-021-00283-w>
- First Online:** February 16, 2021
- Citation (APA):** Doukas, H., & Nikas, A. (2021). Involve citizens in climate-policy modelling. *Nature*, 590, 389.



CORRESPONDENCE | 16 February 2021

# Involve citizens in climate-policy modelling

[Haris Doukas](#) & [Alexandros Nikas](#) 

The latest draft of the working-group report on mitigating climate change is now open for review by governments and scientists, as part of the Intergovernmental Panel on Climate Change's Sixth Assessment. We think it is now time to include citizens' views.

Despite some progress since the 2014 assessment, non-scientists are barely represented in the integrated modelling studies that underpin such reports. Their involvement has long been promised.

The Paris agreement in 2015 was a great opportunity to bring the public into decision-making. But, despite consultations, there have been few mentions of citizens in the multi-model analyses published since.

As Andrew Isaac Meso has pointed out ([Nature 588, 220; 2020](#)), last year's US election highlighted a divergence in the opinions of scientists and those of the public. Researchers cannot afford to be seen as aloof and should include wider society in scientific processes: citizens must feel that they are heard.

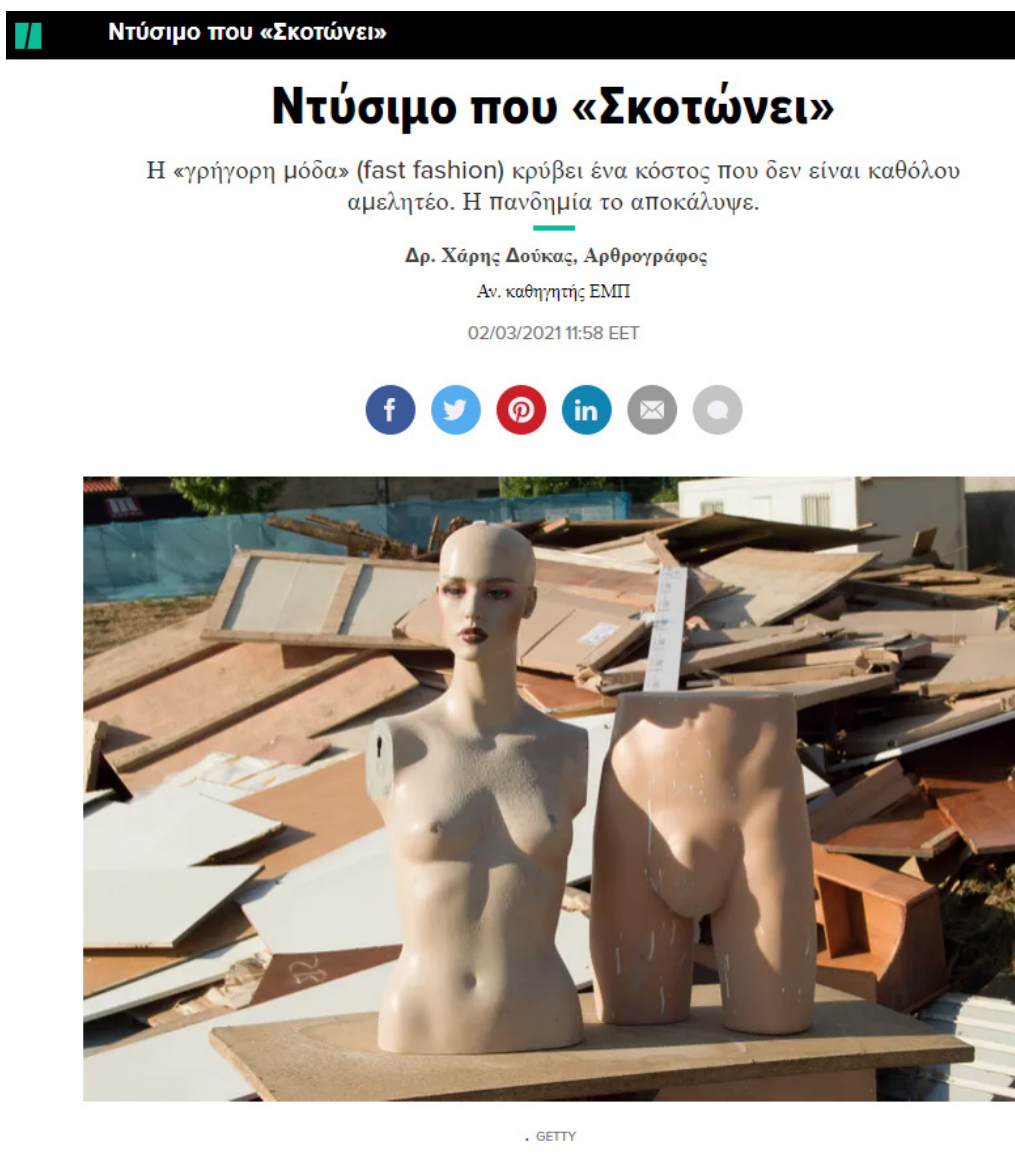
Promises to engage the public in inclusive and transparent dialogue are all very well, but we must now put these ideas into practice.

**Figure 9: Preview of Involve citizens in climate-policy modelling in Nature**



## 2.10 Doukas (2021), HuffPost

<b>Title:</b>	The environmental cost of fashion (in Greek)
<b>Authors:</b>	Haris Doukas (NTUA)
<b>Medium:</b>	HuffPost
<b>Abstract:</b>	The so-called “fast fashion” entails a cost that is not at all negligible. And the pandemic has highlighted it.
<b>Keywords:</b>	Fast-fashion, microplastics, water consumption
<b>Link:</b>	<a href="https://www.huffingtonpost.gr/entry/ntesimo-poe-skotonei_gr_603e0822c5b6ff75ac3f2d23">https://www.huffingtonpost.gr/entry/ntesimo-poe-skotonei_gr_603e0822c5b6ff75ac3f2d23</a>
<b>First Online:</b>	March 2, 2021
<b>Citation (APA):</b>	Doukas, H. (2021). The environmental cost of fashion. HuffPost. March 2, 2021 ( <i>in Greek</i> )



**Figure 10: Preview of The environmental cost of fashion in HuffPost**



## 2.11 Doukas et al. (2021), E-mc2 - Energy Matters to Climate change

- Title:** Climate injustice add more inequalities
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA), Ioannis Tsipouridis
- Medium:** E-mc2 - Energy Matters to Climate change
- Abstract:** The issue of climate justice is fundamental, as the least responsible for climate change are those to suffer its worst consequences. Climate crisis has resulted in “triple injustice”, since it is usually the most vulnerable that are affected by it, who are also the least responsible for its creation and whose already unlivable conditions are made even worse by climate change phenomena.
- Keywords:** Climate Injustice, Climate Change
- Link:** <https://www.e-mc2.gr/en/news/climate-injustice-adds-more-inequalities>
- First Online:** March 17, 2021
- Citation (APA):** Doukas, H., Nikas, M., & Tsipouridis, I. (2021). Climate injustice add more inequalities. E-mc2 - Energy Matters to Climate change. March 17, 2021.



# E=mc<sup>2</sup>





## ENERGY MATTERS TO CLIMATE CHANGE

Climate injustice adds more inequalities



17 03 2021 | 10:29 **Prof. Haris Doukas, Dr. Alexandros Nikas and Dr. Ioannis Tsipouridis**



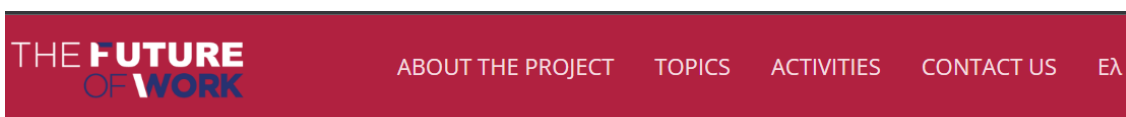
“We have collectively failed to engage with Nature sustainably”, “Our unsustainable engagement with Nature is endangering the prosperity of current and future generations”. These are some of the phrases from the latest ‘Economics of Biodiversity’ University of Cambridge report, known as the ‘[Dasgupta Review](#)’, which the UK Department of Economic Affairs approved in February. The report highlights the need for a new way of valuing progress, instead of the one-dimensional focus on GDP.

**Figure 11: Preview of Climate injustice add more inequalities in E-mc2 - Energy Matters to Climate change**



## 2.12 Doukas and Nikas (2021), The future of Work

- Title:** The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA)
- Medium:** The Future of Work
- Abstract:** Lignite production and use in Greece has been dropping in the last decade, marking a sharp decline during COVID-19. According to the country's National Energy and Climate Plan (NECP), lignite must be completely phased out by 2028.
- Keywords:** Greece, delignitisation, coal
- Link:** <https://republic.gr/futureofwork/the-delignitisation-roller-coaster-in-greece-an-old-car-and-a-steep-slope-ahead/>
- First Online:** April 27, 2021
- Citation (APA):** Doukas, H., & Nikas, A. (2021). The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead. The Future of Work. April 27, 2021



### The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead

Haris Doukas, Alexandros Nikas © April 27, 2021



Lignite has been exploited for electricity generation in Greece since the early 1950s and has been a major socioeconomic growth

**Figure 12: Preview of The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead in The Future of Work**



## 2.13 Doukas (2021), LiFo

- Title:** Climate injustices and the Climate Law in Greece (in Greek)
- Authors:** Haris Doukas (NTUA)
- Medium:** LiFo
- Abstract:** Assoc. Prof. Haris Doukas (National Technical University of Athens) responds to WWF's questions on climate justice, the need for a new and just Climate Law in Greece, and the PARIS REINFORCE project, in an interview in LiFo.
- Keywords:** Climate law, Greece, climate injustice
- Link:** <https://www.lifo.gr/now/perivallon/enas-ploysios-odigei-suv-enas-ftohos-hanei-spiti-toy-apo-plimmyra-oi-anisotites-tis>
- First Online:** May 15, 2021
- Citation (APA):** Doukas, H. (2021). Climate injustices and the Climate Law in Greece. LiFo. May 15, 2021. *(in Greek)*



HOME > ΕΙΔΗΣΕΙΣ > Περιβάλλον

### Περιβάλλον

«Ένας πλούσιος οδηγεί SUV, ένας φτωχός χάνει το σπίτι του από πλημμύρα»: Οι ανισότητες της κλιματικής αλλαγής

Ο δρ. Χάρης Δούκας, αναπληρωτής Καθηγητής στη Σχολή Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών του ΕΜΠ απαντά στα ερωτήματα του WWF για την ανάγκη ενός κλιματικού νόμου

 The LiFo team



17.5.2021 | 12:49



**Figure 13: Preview of Climate injustices and the Climate Law in Greece in LiFo**



## 2.14 Opinion Poll Survey (2021), Multiple Greek Media

In the context of PARIS REINFORCE, NTUA in cooperation with “Opinion Poll” took a survey, in which 1001 households participated, a respectable sample with proportionate representation across Greece. The results of this poll demonstrated that 98% of Greek citizens believe climate change is a serious issue for the planet, while among the young ones, the percentage reaches the absolute 100%. 92% of Greek citizens associate climate change with contemporary natural disasters increasing, whereas just 6% disagrees. Also of note that over 68% are not aware of the priorities of the energy design of our country, while only 25% has a rough understanding of it.

The results of this survey were published on various Greek Media websites (ANA-MPA, Skai.gr, tovima.gr, energypress.gr) on June 16, 2021. More info can be found in the following links (in Greek):

- <https://www.amna.gr/home/article/562078/Ereuna-To-98-ton-politon-theorei-tin-klimatiki-allagi-sobaro-planitiko-problima>
- <https://www.skai.gr/news/environment/ereyna-ti-pisteyoun-oi-ellines-gia-tin-klimatiki-allagi>
- <https://www.tovima.gr/2021/06/16/science/ereyna-ti-pisteyoun-oi-ellines-gia-tin-klimatiki-allagi/>
- <https://energypress.gr/news/dimoskopisi-opinion-poll-oi-fysikes-katastrofes-syndeontai-me-tin-klimatiki-allagi-kai-i-lysi>



**Ερευνα: Το 98% των πολιτών θεωρεί την κλιματική αλλαγή σοβαρό πληθυντικό πρόβλημα**

ΕΛΛΑΔΑ | 16 Ιουνίου 2021, 12:18:52 | Τηλε: ΑΠΕ-ΜΠΕ

Το 98% των Ελλήνων και των Ελληνίδων πιστεύουν ότι η κλιματική αλλαγή είναι ένα σοβαρό πρόβλημα για τον πλανήτη, ενώ μεταξύ των νέων, το ποσοστό φθάνει στο απόλυτο 100%, σύμφωνα με το ευρήματα έρευνας που πραγματοποιήσε η Opinion Poll. Μάλιστα σε ποσοστό 92% οι Έλληνες πολίτες πιστεύουν ότι οι φυσικές καταστροφές εξαιτίας της κλιματικής αλλαγής έχουν αυξηθεί τα τελευταία χρόνια στη χώρα μας, ενώ μόλις το 6% έχει αντίθετη άποψη. Αξίζει να σημειωθεί, ότι πάνω από το 68% των πολιτών δεν γνωρίζει για τις προτεραιότητες του ενεργειακού σχεδιασμού της χώρας μας, ενώ μόλις το 25% έχει μία σχετική σκέψη. Μάλιστα, οι γυναίκες και οι νέοι καθώς και οι πολίτες υψηλότερου μορφωτικού επιπέδου, έδειξαν ότι έχουν τη μεγαλύτερη ευαισθησία για το συγκεκριμένο θέμα.

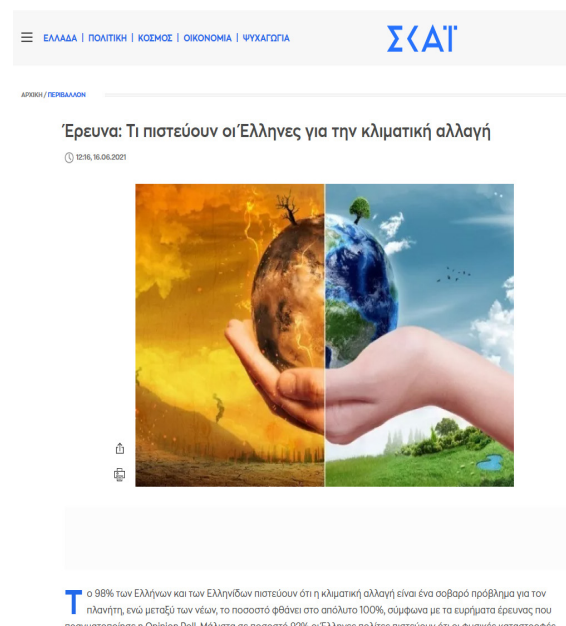
Όπως δήλωσε στο ΑΠΕ-ΜΠΕ ο Ζαχαρίας Ζούνης, διευθυντής Ερευνών της Opinion Poll, «η έρευνα πραγματοποιήθηκε σε 1001 νοικοκυριά, οπότε έχουμε ένα σοβαρό δείγμα, με αναλογική αντιπροσώπευση από όλη την Ελλάδα». Εξήγησε δε ότι «η έρευνα έδειξε ότι η συντριπτική πλειοψηφία αναγνωρίζει ότι η κλιματική αλλαγή αποτελεί μείζον πρόβλημα για το παρόν και το μέλλον».

«Παράλληλα», όπως επισημάνει «είναι ένα άλλο θέμα το βάθος της γνώσης όλων των παραμέτρων που αφορούν στο φαινόμενο της κλιματικής αλλαγής και στο άμεσο αποτέλεσμα που μπορεί να έχει».

«Χρειάζεται επομένως, μία συστηματική προσπάθεια μεγαλύτερης ενημέρωσης όπως και συμμετοχής επιστημόνων περιβαλλοντικών οργάνωσεων, ανθρώπων με ευαισθησία και γνώσεις για τα περιβαλλοντικά θέματα, στη διαμόρφωση του ενεργειακού σχεδιασμού της χώρας», υπογράμμισε στο ΑΠΕ-ΜΠΕ ο κ. Ζούνης.

Ειδικότερα, οι πολίτες κατά πλειοψηφία, θεωρούν ότι οι Ανατολιστές Πηγές Ενέργειας με πρώτη την ηλιακή και δεύτερη την αιολική συμβάλουν ελάχιστα στην επιδείνωση της κλιματικής αλλαγής και στην περιβαλλοντική ζημία (π.χ. ριποκυκλώτητα, δάση, υδροφόροι ορίζοντες, ατμοσφαιρική ρύπανση), ενώ, όπως ήταν αναμενόμενο, η παραγωγή ενέργειας από πετρέλαιο και λιγνίτη θεωρούνται οι πλέον βλαπτικές και μάλιστα με συντριπτικά ποσοστά.

Επίσης κατά πλειοψηφία θεωρούν ότι η χώρα μας πρέπει να επενδύσει στις εν λόγω μορφές ενέργειας για την αντιμετώπιση των επιπτώσεων της κλιματικής



**Ερευνα: Τι πιστεύουν οι Έλληνες για την κλιματική αλλαγή**

12:16, 16.06.2021

Το 98% των Ελλήνων και των Ελληνίδων πιστεύουν ότι η κλιματική αλλαγή είναι ένα σοβαρό πρόβλημα για τον πλανήτη, ενώ μεταξύ των νέων, το ποσοστό φθάνει στο απόλυτο 100%, σύμφωνα με το ευρήματα έρευνας που πραγματοποιήσε η Opinion Poll. Μάλιστα σε ποσοστό 92% οι Έλληνες πολίτες πιστεύουν ότι οι φυσικές καταστροφές

Science

**Ερευνα: Τι πιστεύουν οι Έλληνες για την κλιματική αλλαγή**

Όπως δήλωσε ο Ζαχαρίας Ζούπης, διευθυντής Ερευνών της Opinion Poll, «η έρευνα πραγματοποιήθηκε σε 1001 νοικοκυριά, οπότε έχουμε ένα σοβαρό δείγμα, με αναλογική αντιπροσώπευση από όλη την Ελλάδα»

ToBhima Team  
16/06/2021, 13:20



Κλιματική 1

Διεκρίθηκε μία από τις 40 «Προπορίες Μηχανικών Αεροσκαφών» της AEGEAN.

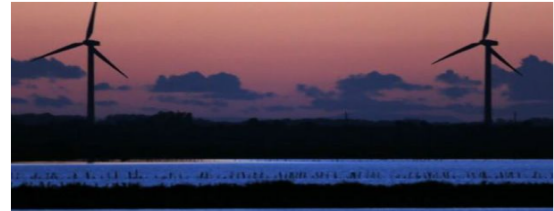
Μάθε περισσότερα

AEGEAN >

Έντυπη Έκδοση

**Οι υπόγειες συναλλαγές της μαφίας του Ζωγράφου**

**Δημοσκόπηση Opinion Poll: Οι φυσικές καταστροφές συνδέονται με την κλιματική αλλαγή και η λύση είναι η εγκατάσταση ΑΠΕ - Όχι σε πυρηνικά και υδρογονάνθρακες**



Θωδωρής Παναγούλης  
16 06 2021 | 07:45

Συντριπτικό, στα επίπεδα του 98% είναι το ποσοστό των πολιτών στη χώρα μας που αναγνωρίζει ως μέγιστο πρόβλημα την κλιματική αλλαγή και μάλιστα την συνδέει άμεσα με την αύξηση των φυσικών καταστροφών (92%). Πιστεύει ταυτόχρονα ότι για την αντιμετώπιση των συνεπειών της κλιματικής αλλαγής πρέπει να επενδύσουμε στην ηλιακή ενέργεια (78,4%) στην αιολική (60%) και στην υδροηλεκτρική (32%).

Αυτό προκύπτει από δημοσκόπηση που πραγματοποιήσε στη χώρα μας η εταιρεία Opinion Poll για το Ευρωπαϊκό

A A ΜΕΓΕΘΟΣ ΚΕΙΜΕΝΟΥ

ΕΚΤΥΠΩΣΗ

MAIL

Like 14 Share

Tweet

Figure 14: Preview of Opinion Poll Survey in Multiple Greek Media

## 2.15 Climate forecasts can be way off target (2021), Multiple International Media

In the context of COP-26, researchers participating in the PARIS REINFORCE project published a paper, including several IAMs, claiming that achieving the NDCs pledged in the Paris Agreement may not be sufficient to achieve our climate targets. Specifically, this paper proposes that current climate policies may lead to a temperature increase of 2.9 °C, way higher than the 2 °C target set by the Paris Agreement.

The results of this study were published on various Media websites (Forbes, Spiegel, Axios, franceinfo, Imperial College London website, Bloomberg, Scientific American, France24, energymag.gr, ecopress.gr, Nature, Canada's National Observer, cleantechnica.com, Newscientist.com) from November 22 to November 24, 2021, demonstrating the impact if this study.. More info can be found in the following links (in English, German, French, Greek):

- <https://www.forbes.com/sites/davidrvetter/2021/11/23/after-cop26-new-research-warns-climate-forecasts-could-be-way-off-target/?sh=1a86712943da>
- <https://www.spiegel.de/wissenschaft/mensch/modellierung-zum-emissionsausstoss-die-erde-koennte-sich-bis-2100-um-2-9-grad-erwaermen-a-b5641779-f1f7-4c2f-84d4-5aebc2cb203b>
- <https://www.axios.com/2021/11/22/warming-carbon-emissions-pledges>
- [https://www.francetvinfo.fr/monde/environnement/cop26/climat-les-projections-de-rechauffement-de-l-onu-sont-peut-etre-trop-optimistes-selon-une-etude-parue-dans-la-revue-nature-climate-change\\_4854885.html](https://www.francetvinfo.fr/monde/environnement/cop26/climat-les-projections-de-rechauffement-de-l-onu-sont-peut-etre-trop-optimistes-selon-une-etude-parue-dans-la-revue-nature-climate-change_4854885.html)
- <https://www.imperial.ac.uk/news/232079/large-uncertainties-over-warming-outcomes-from/>
- <https://www.bloomberg.com/news/articles/2021-11-23/making-sense-of-the-glasgow-climate-pact-at-cop26>
- <https://www.scientificamerican.com/article/climate-pledges-still-not-enough-to-keep-warming-below-2-degree-limit/>
- <https://www.france24.com/en/live-news/20211122-climate-warming-forecasts-may-be-too-rosy-study>
- <https://energymag.gr/news/perivallon/klimatiki-krisi-nea-meleti-amfisvitei-tin-apotelesmatikotita-ton-politikon-desmefseon/>
- <https://ecopress.gr/klimatiki-krisi-emp/>
- <https://www.nature.com/articles/d41586-021-03507-1>
- <https://www.nationalobserver.com/2021/11/24/news/rosa-galvez-calls-senate-declare-climate-emergency>
- <https://cleantechnica.com/2021/11/23/cicero-report-climate-modeling-is-hard-but-we-are-heading-for-disaster/>
- <https://www.newscientist.com/article/2299113-fix-the-planet-newsletter-can-small-nuclear-power-go-big/>



**Forbes**

SUSTAINABILITY

### After COP26, New Research Warns Climate Forecasts Could Be Way Off Target

David Vetter Senior Contributor @ Climate research, renewables and circularity

Nov 23, 2021, 9:50am EST

Runners pass a heat danger warning sign during the AdventureCORPS Badwater 135 ultramarathon race in ... [3] GETTY IMAGES

Confident claims that promises made by world leaders will drastically rein in global warming could be wildly off the mark, according to a new international study.

During the COP26 climate summit earlier this month, media included Forbes circulated figures published by Climate Action Tracker that

**SPIEGEL Wissenschaft**

Steuern sparen als Vermieter

vermieter.info

Neue Modellierung zum Ermissionsanstieg

### Die Erde könnte sich bis 2100 um 2,9 Grad erwärmen

Forscher haben den wahrscheinlichsten Verlauf der Treibhausgasemissionen bis Ende des Jahrhunderts berechnet, basierend auf heutiger Klimapolitik. Eine Erwärmung von weniger als zwei Grad ist bereits ausgeschlossen.

21.11.2021, 06:19 Uhr

**AXIOS**

Nov 23, 2021 - Energy & Environment

### Study casts doubt on climate emissions pledge estimates

Andrew Freedman, author of *Heat*

Heat-related flooding inundates homes and farms in New Zealand's North Island. Photo: Justin Sullivan/Getty Images

A new analysis casts doubt on whether scientists can precisely estimate how much a combined emissions-cutting pledges will stem global warming, instead showing a wide potential for overruns.

**franceinfo**

Réchauffement climatique : les projections de l'ONU sont peut-être trop optimistes, selon une étude

Malgré les engagements pris par les pays signataires de l'accord de Paris, les auteurs d'une étude parue dans la revue "Nature Climate Change" estiment que la température moyenne sur Terre pourrait augmenter de 2,2 °C à 2,9 °C d'ici 2100.

Transcript: AFP

Publié le 23/11/2021 à 14h 06 | 10/11/2021 07:03

**Bloomberg**

Green

### Large uncertainties over warming outcomes from current climate policies

by Conrad Chiu

22 November 2021

There is a risk that "false precision" in the reporting of climate policy outcomes could lead to complacency by governments, researchers have warned.

A new analysis by researchers from the EUI November 2021 report "Paris Revisited" including Imperial College London's Andy Cripps, has found that the impact of climate policies is more uncertain than often assumed by policymakers.

The study, published in the journal Nature Climate Change, looked at current policies and emissions pledges from 190 nations. Determined Contributions to reduce the carbon emissions that cause

**Bloomberg**

Green

### Making Sense of the Narratives After the Glasgow Climate Talks

Either the world is "treading in the right direction" or it's hurtling toward "hell in a handcart." It depends on who you ask.

Activists protest against the climate talks after the COP26 talks in Glasgow, Scotland, on Nov. 12, 2021. Photograph by Bill Branson/Bloomberg

By Richard Rubin

**SCIENTIFIC AMERICAN**

ENVIRONMENT

### Climate Pledges Still Not Enough to Keep Warming Below 2-Degree Limit

Current national targets to cut emissions could result in nearly 3 degrees C of warming

By Christopher Borel

19 November 2021

Climate Change: A house in the UK is surrounded by mud from a landslide. Photo: Chris Wedel/Alamy

Climate Change: A house in the UK is surrounded by mud from a landslide. Photo: Chris Wedel/Alamy

Climate Change: A house in the UK is surrounded by mud from a landslide. Photo: Chris Wedel/Alamy

**FRANCE 24**

Climate warming forecasts may be too risky: study

UN projections of how much current climate policies and national pledges to cut carbon pollution will slow global warming are more accurate than widely assumed, researchers report Monday.

Leading into the month's COP26 summit, the UK-led working group would see Earth's average surface temperature rise a "substantial" 2.7 degrees Celsius above preindustrial levels by 2100.

**energy mag**

Κλιματική κρίση: Νέα μελέτη αμφισβητεί την αποτελεσματικότητα των πολιτικών δεσμεύσεων

Κατά τη διάρκεια της διάσκεψης του ΟΗΕ για το Κλίμα (COP26) στη Γλασκώβη, παλαιά ενοχές έπαιξαν να αποδοθούν το φαινόμενο της κλιματικής αλλαγής, επιβεβαιώνοντας τη μέγιστη που προβλεπόταν σε κλιματικές μελέτες.

**ecopress**

EMU: νέα μελέτη ανατρέπει τις αναλύσεις για τις δεσμεύσεις της COP26

Η νέα μελέτη ανατρέπει τις αναλύσεις για τις δεσμεύσεις της COP26, υποστηρίζοντας ότι οι προβλεπόμενες μειώσεις των εκπομπών αερίων θερμοκηπίου είναι ανεπαρκείς για να περιορίσουν την αύξηση της θερμοκρασίας της Γης σε 2°C ή λιγότερο.

**nature**

Earth is headed for well over two degrees of warming

Modelers look at how climate policies might change with time – and find a wide range of possible outcomes, none of them good.

Stronger pledges will be needed from policymakers if dangerous levels of warming are to be prevented, research shows, study finds.

Humanity is not on track to keep global warming below 2°C, the target of the 2015 Paris climate agreement, according to a study that looks at how climate mitigation efforts might unfold between 2030 and 2050.

**NATIONAL OBSERVER**

Rosa Galvez calls for Senate to declare climate emergency

Building off a House of Commons Declaration from 2019, Independent Sen. Ben Ray Lujan wants the Senate to take the same step for the U.S.

**CICERO Report: Climate Modeling Is Hard, But We Are Heading For Disaster**

Climate Action Tracker

Climate Action Tracker (CAT) has published its annual report on global climate pledges and emissions trends. The report shows that current pledges are not enough to limit global warming to 1.5°C, and even 2°C is at risk.

**NewScientist**

Fix the Planet newsletter: Can small nuclear power go big?

Small modular reactors are being touted as an affordable and fast way to decarbonise power grids, but questions about the technology abound.

Small modular reactors (SMRs) are being touted as an affordable and fast way to decarbonise power grids, but questions about the technology abound.

**franceinfo**

Le réchauffement climatique : les projections de l'ONU sont peut-être trop optimistes, selon une étude

Malgré les engagements pris par les pays signataires de l'accord de Paris, les auteurs d'une étude parue dans la revue "Nature Climate Change" estiment que la température moyenne sur Terre pourrait augmenter de 2,2 °C à 2,9 °C d'ici 2020.

Figure 15: Preview of Climate forecasts can be way off target in Multiple International Media

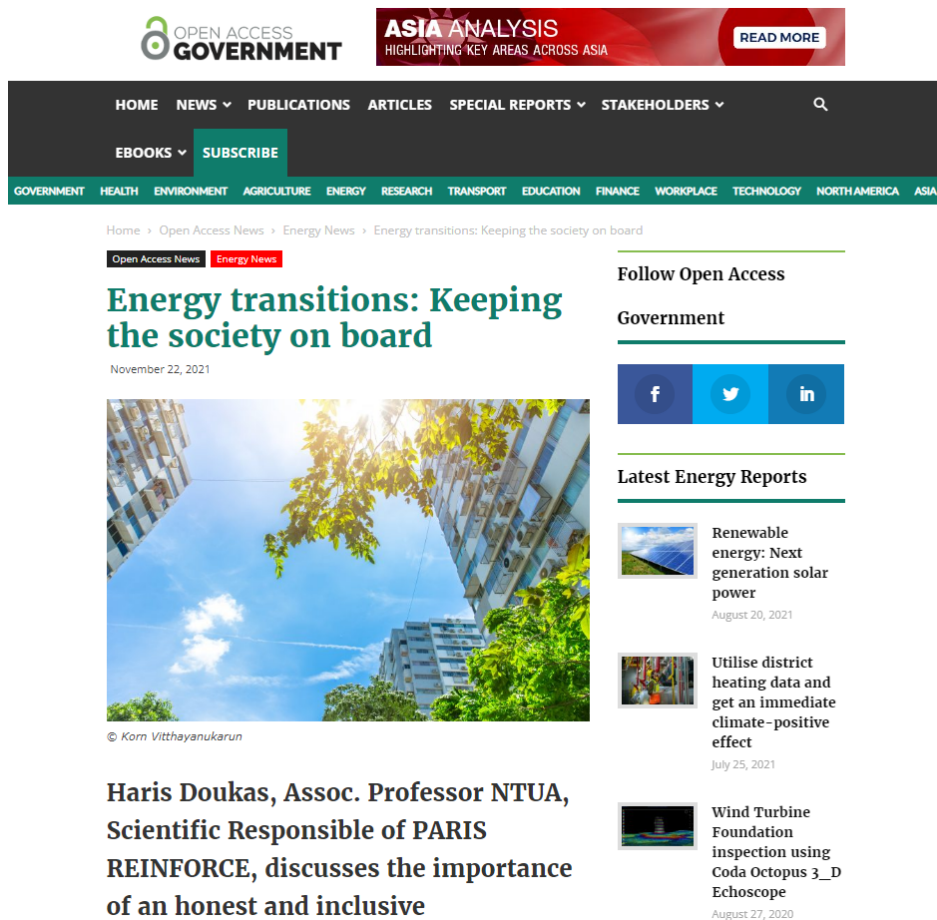


The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.



## 2.16 Doukas (2022), Open Access Government

- Title:** Energy Transitions: Keeping the Society on Board
- Authors:** Haris Doukas (NTUA)
- Medium:** Open Access Government
- Abstract:** Energy is a bigger story than carbon neutrality. It interconnects people and places, hopes and fears. If we want to shift towards a carbon-free economy, an honest and inclusive conversation is needed, in which considerably more groups of people are involved and represented.
- Keywords:** Carbon neutrality, just transition
- Link:** <https://www.openaccessgovernment.org/energy-transitions-keeping-the-society-on-board/124713/>
- First Online:** November 22, 2021
- Citation (APA):** Doukas, H. (2022). Energy Transitions: Keeping the Society on Board. Open Access Government, Issue of January 2022.



The screenshot shows the Open Access Government website interface. At the top, there is a navigation bar with categories like HOME, NEWS, PUBLICATIONS, ARTICLES, SPECIAL REPORTS, and STAKEHOLDERS. Below this is a secondary navigation bar with sub-categories such as GOVERNMENT, HEALTH, ENVIRONMENT, AGRICULTURE, ENERGY, RESEARCH, TRANSPORT, EDUCATION, FINANCE, WORKPLACE, TECHNOLOGY, NORTH AMERICA, and ASIA. The main content area features the article title 'Energy transitions: Keeping the society on board' with a sub-header 'Open Access News Energy News' and the date 'November 22, 2021'. A large image of a modern building is displayed below the title. To the right, there are sections for 'Follow Open Access Government' with social media icons for Facebook, Twitter, and LinkedIn, and 'Latest Energy Reports' which includes three report entries: 'Renewable energy: Next generation solar power' (August 20, 2021), 'Utilise district heating data and get an immediate climate-positive effect' (July 25, 2021), and 'Wind Turbine Foundation inspection using Coda Octopus 3\_D Echoscope' (August 27, 2020). Below the main article image, the author's name and title are listed: 'Haris Doukas, Assoc. Professor NTUA, Scientific Responsible of PARIS REINFORCE, discusses the importance of an honest and inclusive'.

Figure 16: Preview of Energy Transitions: Keeping the society on board in Open Access Government



## 2.17 Doukas (2022), New Europe

- Title:** Energy Citizenship – A new dimension in Energy Policy Making
- Authors:** Haris Doukas (NTUA)
- Medium:** New Europe
- Abstract:** Now is the right time to re-design the way we assess energy progress. Bringing together people from all layers of the energy ecosystem is vital to keep moving forward together within these multiple crises
- Keywords:** energy citizenship, Citizen participation
- Link:** <https://www.neweurope.eu/article/energy-citizenship-a-new-dimension-in-energy-policy-making/>
- First Online:** April 5, 2022
- Citation (APA):** Doukas, H. (2022). Energy Citizenship – A new dimension in Energy Policy Making. New Europe, New Europe. April 5, 2022

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PUBLISHED 15:09 APRIL 5, 2022 UPDATED 15:09 APRIL 5, 2022

### Energy Citizenship – A new dimension in Energy Policy Making



By Dr. Haris Doukas

Associate Professor of energy and climate policy at the School of Electrical and Computer Engineering, National Technical University of Athens



Figure 17: Preview of Energy Citizenship – A new dimension in Energy Policy Making in New Europe



## 2.18 Doukas and Nikas (2022), The future of Work

- Title:** Europe's energy crisis – climate community must speak up
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA)
- Medium:** Nature
- Abstract:** The REPowerEU plan spells out the need to accelerate the deployment of renewable energy sources, cut energy use and diversify supply. However, European leaders are now locked into infrastructure for mobilizing liquefied natural gas and other readily available fossil-fuel options, while remaining mostly silent on climate. The climate-science community must step up to help Europe navigate this energy crisis.
- Keywords:** REPowerEU, Ukraine, conflict
- Link:** <https://www.nature.com/articles/d41586-022-02199-5>
- First Online:** August 16, 2022
- Citation (APA):** Doukas, H., & Nikas, A. (2022). Europe's energy crisis — climate community must speak up. *Nature*, 608, 472.



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CORRESPONDENCE | 16 August 2022

### Europe's energy crisis – climate community must speak up

[Haris Doukas](#) & [Alexandros Nikas](#)

[Twitter](#) [Facebook](#) [Email](#)

The European Union's plan to eliminate its dependence on Russian fossil-fuel imports spells out the need to accelerate the deployment of renewable energy sources, cut energy use and diversify supply. However, European leaders are now locked into infrastructure for mobilizing liquefied natural gas and other readily available fossil-fuel options – while remaining mostly silent on climate (*Nature* 607, 8; 2022). The climate-science community must step up to help Europe navigate this energy crisis.

No research published before Russia invaded Ukraine in February this year considered the possibility of Russia cutting off gas deliveries to the EU, or the ensuing fossil-fuel rebound. That includes the studies that formed the bedrock of the Intergovernmental Panel on Climate Change's Sixth Assessment Report (see [go.nature.com/3szixnv](https://www.nature.com/3szixnv)) and that informed the 2021 Glasgow Climate Pact. Climate science urgently needs to adapt its approach to underpin Europe's latest bold energy-planning decisions.

For example, the socio-economic factors and techno-economic data sets that have shaped climate-science analysis, including fossil-fuel price projections and the extent of

**Figure 18: Preview of Europe's energy crisis – climate community must speak up in Nature**



## 2.19 Doukas and Nikas (2022), B2Green

- Title:** The fear of a cold winter
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA)
- Medium:** B2Green
- Abstract:** Prof. Haris Doukas and Dr. Alexandros Nikas participated in the B2Green Special Issue on heating and cooling, with an article on PARIS REINFORCE work on Greece's energy strategy to mitigate the impacts of the energy prices crisis as well as eliminate reliance on Russian fossil fuels.
- Keywords:** Ukraine
- Link:** <https://news.b2green.gr/24317/%cf%87%ce%ac%cf%81%ce%b7%cf%82-%ce%b4%ce%bf%cf%8d%ce%ba%ce%b1%cf%82-%ce%b1%ce%bb%ce%ad%ce%be%ce%b1%ce%bd%ce%b4%cf%81%ce%bf%cf%82-%ce%bd%ce%af%ce%ba%ce%b1%cf%82-%ce%bf-%cf%86%cf%8c%ce%b2%ce%bf%cf%82>
- First Online:** October 1, 2022
- Citation (APA):** Doukas, H (2022). The fear of a cold winter. B2Green.gr (in Greek).

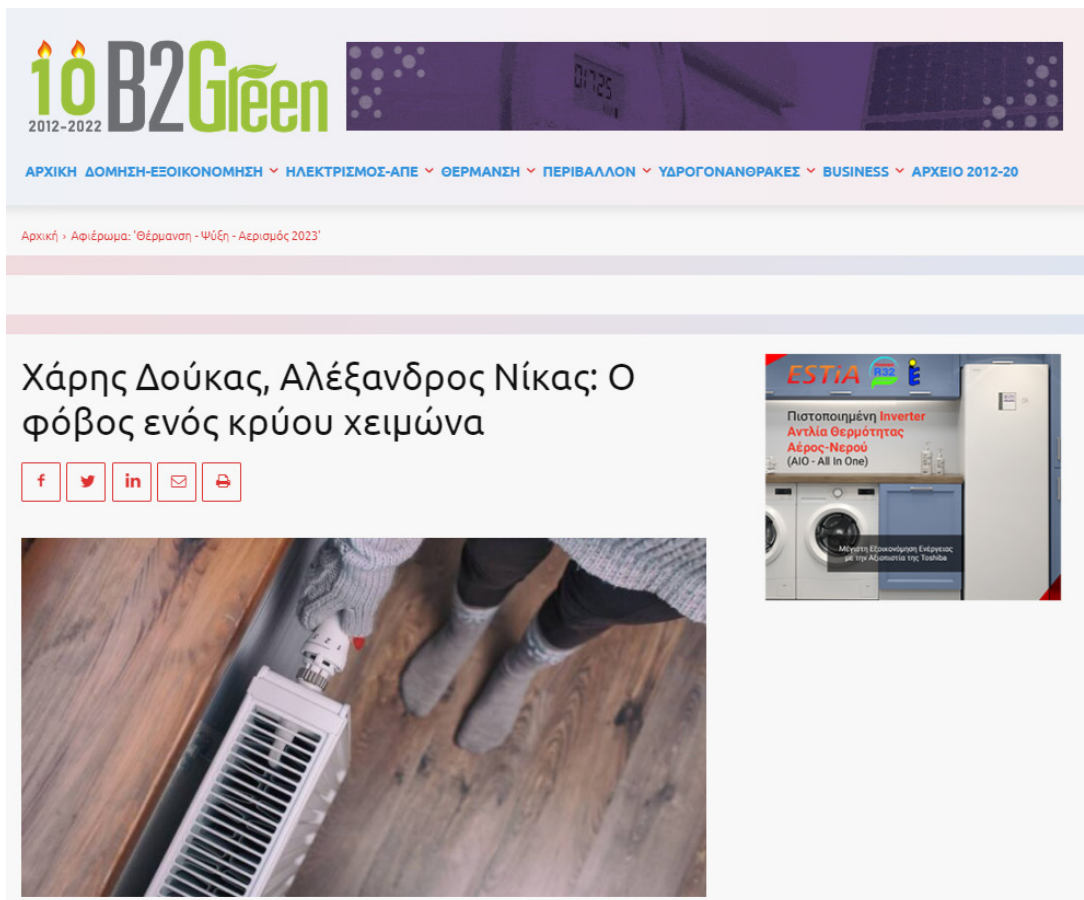


Figure 19: Preview of Fear of a cold winter



## 2.20 Research Highlight (2022), Nature

- Title:** Hydrogen could help China's heavy industry to get greener
- Authors:** N/A
- Medium:** Nature
- Abstract:** Providing the clean fuel to manufacturing plants would be a cost-effective way to tackle the country's climate goals. The PARIS REINFORCE study Yang et al. (2022) in Nature Energy earlier this month was selected as a Research Highlight in Nature.
- Keywords:** China, hydrogen
- Link:** <https://www.nature.com/articles/d41586-022-03084-x>
- First Online:** October 6, 2022
- Citation (APA):** Hydrogen could help China's heavy industry to get greener. (2022). *Nature*, 610(7931), 234–234.

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RESEARCH HIGHLIGHT | 06 October 2022

## Hydrogen could help China's heavy industry to get greener

Providing the clean fuel to manufacturing plants would be a cost-effective way to tackle the country's climate goals.



A factory cooling tower in the steelmaking city of Tonghua, China. Clean hydrogen fuel could eventually supply almost 30% of the energy needs of Chinese steel mills. Credit: Qilai Shen/Bloomberg/Getty

**Figure 20: Preview of Hydrogen could help China's heavy industry to get greener**



## 2.21 Greek stakeholder event at the Acropolis Museum (2022), Multiple Greek Media

In the context of PARIS REINFORCE, NTUA in cooperation with ELLET (Elliniki Etairia, Society for the Environment and Cultural Heritage), hosted a Greek stakeholder conference in the Acropolis Museum, Athens, in which many energy and environmental issues were discussed. The main issues discussed (in the form of sessions) were the REPowerEU programme, energy democracy and green transition, the energy crisis and its effects on entrepreneurship and the environment, and lastly the diffusion of wind energy to Greece’s energy system. The conference ended with the presentation of a PARIS REINFORCE opinion poll on citizens’ perceptions of the energy and climate crisis in Greece, in which 1026 individuals participated.

Insights from the event as well as results of this survey were published on various Greek Media websites (ANAMPA, Skai.gr, tovima.gr, energypress.gr) on November 5-8, 2022. More info can be found in the following links (in Greek):

- <https://www.ot.gr/2022/11/05/apopseis/experts/klimatiki-allagi-energeiaki-krisi-kai-elliniko-perivallon-poi-es-oi-epilog-es/>
- <https://www.cnn.gr/oikonomia/anaptyxi/story/336102/ti-pisteyoun-oi-ellines-polites-gia-tin-energeiaki-krisi-kai-tin-prasini-metavasi>
- <https://www.ot.gr/2022/11/08/energeia/energeiaki-krisi-epta-stous-10-kathysteroun-tin-pliromi-ton-logariasmon/>

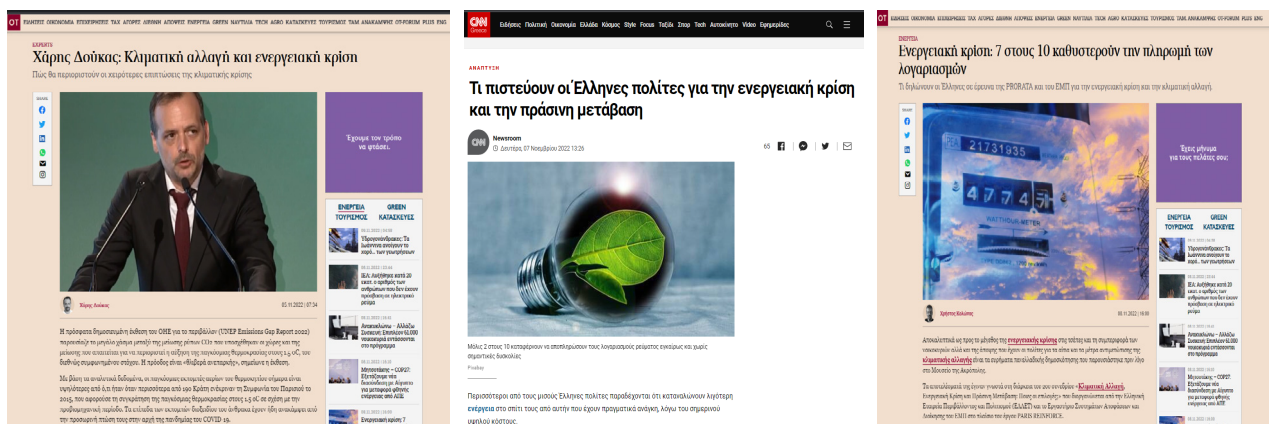


Figure 21: Preview of Greek stakeholder event in the Acropolis Museum

## 2.22 Zagamé (2022), La Revue de l'Énergie

- Title:** The power of shared knowledge
- Authors:** Paul Zagamé (SEURECO)
- Medium:** La Revue de l'Énergie
- Abstract:** A comment in La Revue de l'Énergie, on the PARIS REINFORCE final event at l'Amphithéâtre Liard de la Sorbonne, Paris, France, and on the value of stakeholder dialogue in climate science and policy, alongside some information on the project.
- Keywords:** Modelling, conference
- Link:** <https://www.larevuedelenergie.com/la-force-de-la-connaissance-partagee/>
- First Online:** November, 2022
- Citation (APA):** Zagamé, P (2022). The power of shared knowledge. La Revue de l'Énergie (in French).



**LA FORCE DE LA CONNAISSANCE PARTAGÉE**

N°663 / juillet-août 2022 - par Paul Zagamé

Tribune Modélisation

Le 15 novembre 2022 se tiendra dans l'Amphithéâtre Liard de la Sorbonne une conférence qui marquera la fin d'un réseau de recherche européen de 17 universités ou instituts consacré au programme « Paris Reinforce ». Ce programme a pour objectif de développer de nouveaux outils pour aider à la conception et à l'évaluation des politiques et des engagements climatiques de nombreuses régions du monde ; son originalité tient à ce que la recherche a été animée, non seulement par des scientifiques, mais également par les autres « parties prenantes » de la société, fonctionnaires, politiques, entrepreneurs, consommateurs et autres représentants de la société civile.

Cette originalité nous a incité à réfléchir, de façon plus fondamentale, sur l'utilité de ces échanges de connaissances entre scientifiques, d'abord, et entre scientifiques et parties prenantes, ensuite, c'est-à-dire à nous livrer à une approche très générale de cette question de transferts de connaissances. Quoi de mieux que de se référer à ce que dit la théorie sur ce transfert de connaissances, pour ensuite examiner les aspects qui nous paraissent les plus saillants de ces échanges entre scientifiques d'abord, puis entre scientifiques et parties prenantes ensuite ? Ce sont ces trois points que nous allons successivement envisager en mêlant des considérations générales et en l'appliquant, ensuite, à quelques exemples empruntés au fonctionnement du réseau de recherche Paris Reinforce.

**Figure 22: Preview of The power of shared knowledge**




## 2.23 Doukas (2022), World Energy News

- Title:** Climate change: from the political impasse in Sharm El Sheikh to the home of the Paris Agreement
- Authors:** Haris Doukas (NTUA)
- Medium:** World Energy News
- Abstract:** From the University of Sorbonne, an international team of leading scientists from the PARIS REINFORCE research project consortium explain where the planet is headed.
- Keywords:** Sorbonne, climate change
- Link:** <https://www.worldenergynews.gr/%CE%B1%CF%80%CF%8C%CF%88%CE%B5%CE%B9%CF%82/articles/539719/x-doykas-tria-xasmata-gia-tin-klimatiki-allagi-ti-anaferei-meleti-pou-parousiastike-stin-sorvonn>
- First Online:** November, 2022
- Citation (APA):** Doukas, H. (2022). Climate change: from the political impasse in Sharm El Sheikh to the home of the Paris Agreement. World Energy News (in Greek).

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Αργент	Ενέργεια	Ανοικτόμαρκετ	Περιβάλλον	Εξοικονόμηση	Επικρατούσα	Διεθνή	Βιομηχανία	Ναυτιλία	Επιχειρήσεις	Χρηματοπιστω	Στάθες	Ανοίγματα			
S&P 500	4027.26	DJ India	34194.06	DAX	14506.84	BRENT OIL\$	86.65	Natural Gas	7.515	GOLD	1750.5	EUR/USD	1.0406	ATHENS	916.54
▲	0.59% (23.68)	▲	0.28% (95.96)	▼	-0.22% (-32.72)	▲	1.45% (1.24)	▲	2.8% (0.21)	▲	0.28% (4.9)	▼	-0.06% (-0)	▼	-0.35% (-3.24)

Τελευταία Νέα 07:00 Ποιός είναι ο μοναδικός καλεσμένος στο Road Show της Morgan Stanley.

 Φυσικό αέριο...

**Αιχμή** Πέμπτη 24/11/2022 06:45

**Χ. Δούκας: Τρία χάσματα για την κλιματική αλλαγή - Τι αναφέρει μελέτη που παρουσιάστηκε στην Σορβόννη**

tags: PARIS, Σορβόννη, κλιματική αλλαγή, Σορμ Ελ Σέιχ, ΔΟΥΚΑΣ, ΠΑΡΕΧΟΜΕΝΑ ΓΕΩΡΓΙΟΣ ΚΑΡΑΓΙΩΡΓΗΣ




Figure 23: Preview of Climate change: from the political impasse in Sharm El Sheikh to the home of the Paris Agreement





### 3 Newsletters

To help spread the word about PARIS REINFORCE and its potential, our team is releasing regular newsletters. Below, we list all newsletters by date, along with the headlines of content included in each of them.

#### 3.1 July 2019

**Title:** PARIS REINFORCE News: July 2019  
**Content:** PARIS REINFORCE Kick-off Meeting  
**Link:** <https://preview.mailerlite.com/n0v4p6/>

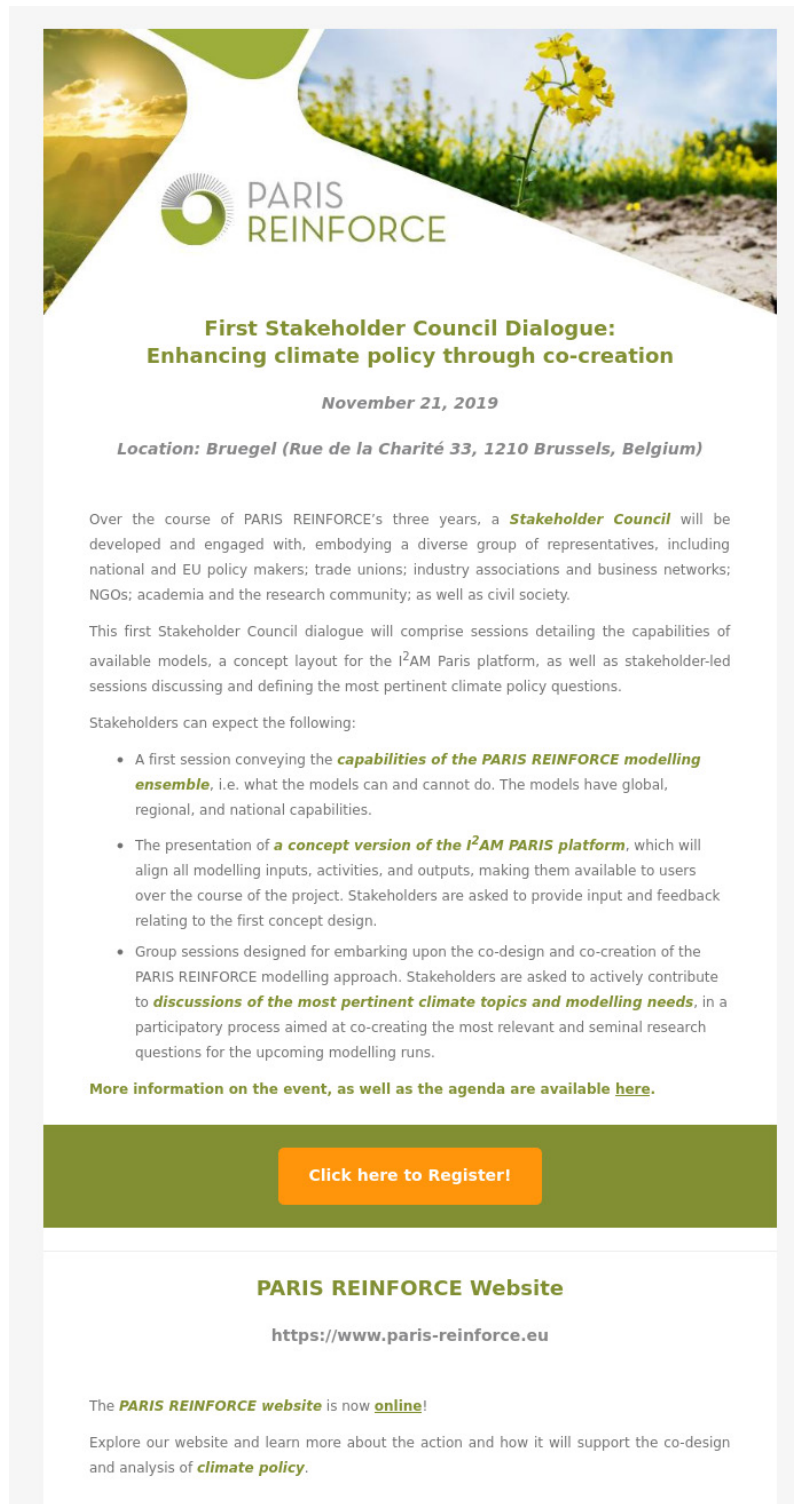


**Figure 24: Preview of July 2019 Newsletter**



## 3.2 October 2019

**Title:** PARIS REINFORCE News: October 2019  
**Content:** First Stakeholder Council Dialogue  
**Link:** <https://preview.mailerlite.com/y2d5g0>



The image shows a preview of a newsletter. At the top, there is a header with the PARIS REINFORCE logo and a background image of a field with yellow flowers under a sunset sky. Below the logo, the title of the newsletter is "First Stakeholder Council Dialogue: Enhancing climate policy through co-creation", followed by the date "November 21, 2019" and the location "Bruegel (Rue de la Charité 33, 1210 Brussels, Belgium)". The main body of the newsletter contains an introduction, a list of topics to be discussed, and a call to action to register. At the bottom, there is a link to the PARIS REINFORCE website and a note that the website is now online.

**PARIS REINFORCE**

**First Stakeholder Council Dialogue:  
Enhancing climate policy through co-creation**

*November 21, 2019*

**Location: Bruegel (Rue de la Charité 33, 1210 Brussels, Belgium)**

Over the course of PARIS REINFORCE's three years, a **Stakeholder Council** will be developed and engaged with, embodying a diverse group of representatives, including national and EU policy makers; trade unions; industry associations and business networks; NGOs; academia and the research community; as well as civil society.

This first Stakeholder Council dialogue will comprise sessions detailing the capabilities of available models, a concept layout for the I<sup>2</sup>AM Paris platform, as well as stakeholder-led sessions discussing and defining the most pertinent climate policy questions.

Stakeholders can expect the following:

- A first session conveying the **capabilities of the PARIS REINFORCE modelling ensemble**, i.e. what the models can and cannot do. The models have global, regional, and national capabilities.
- The presentation of **a concept version of the I<sup>2</sup>AM PARIS platform**, which will align all modelling inputs, activities, and outputs, making them available to users over the course of the project. Stakeholders are asked to provide input and feedback relating to the first concept design.
- Group sessions designed for embarking upon the co-design and co-creation of the PARIS REINFORCE modelling approach. Stakeholders are asked to actively contribute to **discussions of the most pertinent climate topics and modelling needs**, in a participatory process aimed at co-creating the most relevant and seminal research questions for the upcoming modelling runs.

**More information on the event, as well as the agenda are available [here](#).**

**Click here to Register!**

**PARIS REINFORCE Website**

<https://www.paris-reinforce.eu>

The **PARIS REINFORCE website** is now **online!**

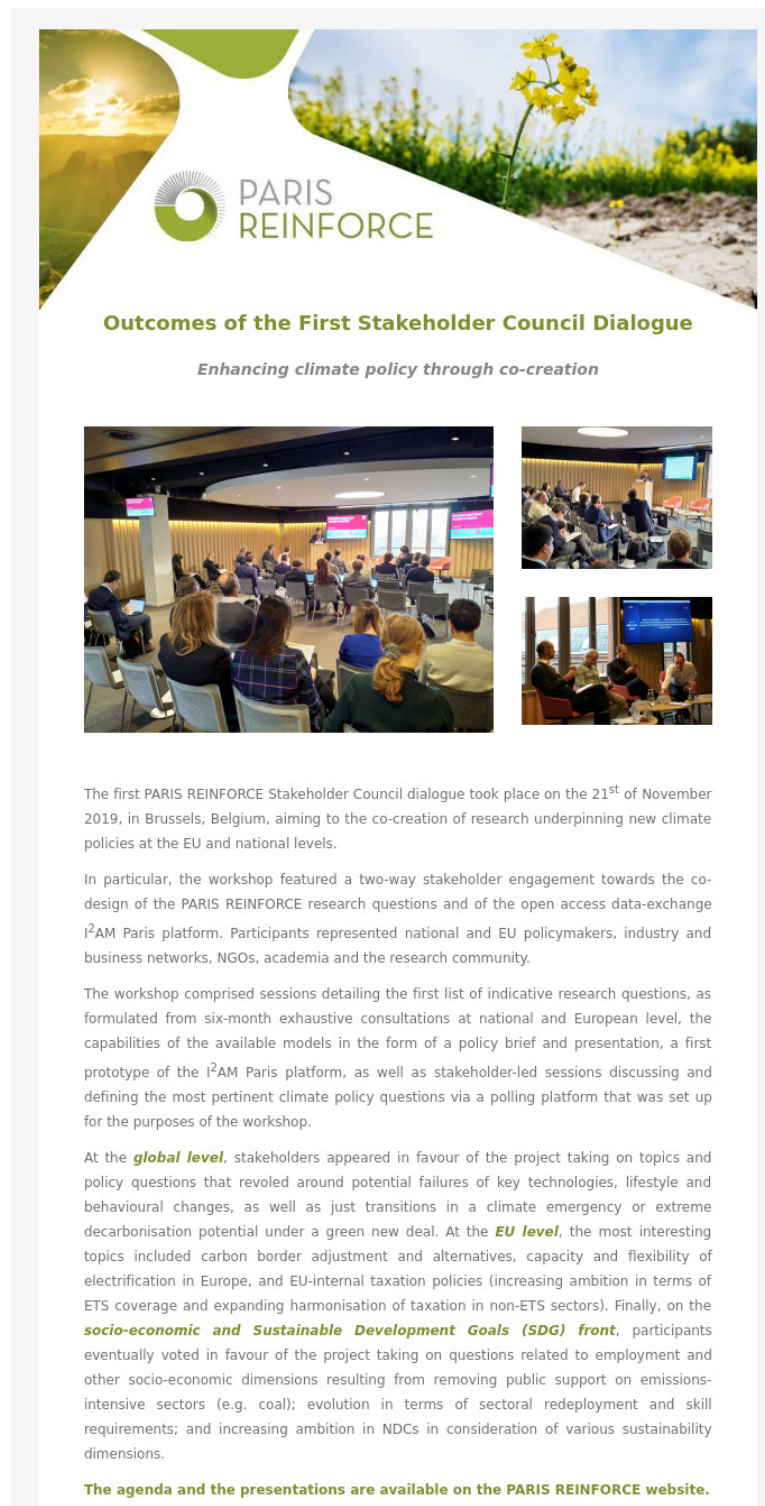
Explore our website and learn more about the action and how it will support the co-design and analysis of **climate policy**.

**Figure 25: Preview of October 2019 Newsletter**



### 3.3 December 2019

**Title:** PARIS REINFORCE News: December 2019  
**Content:** Outcomes of the First Stakeholder Council Dialogue  
**Link:** <https://preview.mailerlite.com/c7h1g0/>



**Figure 26: Preview of December 2019 Newsletter**



### 3.4 April 2020

- Title:** PARIS REINFORCE News: April 2020
- Content:** PARIS REINFORCE in the time of COVID-19  
PARIS REINFORCE National Stakeholder Workshops  
PARIS REINFORCE Participation in Conferences  
PARIS REINFORCE Deliverables  
PARIS REINFORCE Scientific Publications
- Link:** <https://preview.mailerlite.com/a9f7k9/>

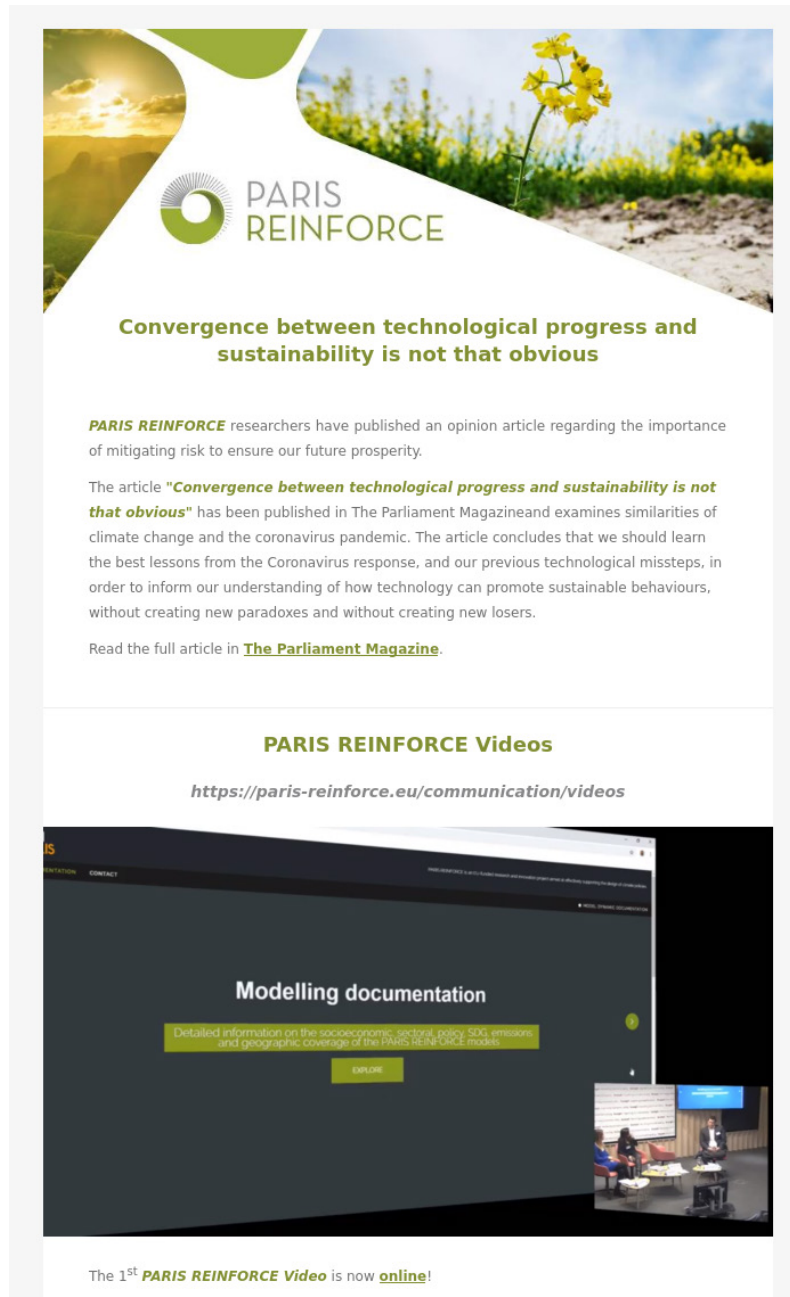


**Figure 27: Preview of April 2020 Newsletter**



### 3.5 July 2020

- Title:** PARIS REINFORCE News: July 2020
- Content:** Convergence between technological progress and sustainability is not that obvious  
PARIS REINFORCE Videos  
PARIS REINFORCE Commentaries  
PARIS REINFORCE Scientific Publications
- Link:** <https://preview.mailerlite.com/d0q1d0>



**Figure 28: Preview of July 2020 Newsletter**



### 3.6 September 2020

**Title:** PARIS REINFORCE News: September 2020

**Content:** Green glimmers of hope in climate action  
Expanding the I2AM PARIS Platform  
New PARIS REINFORCE Scientific Publications

**Link:** <https://preview.mailerlite.com/j8v712>

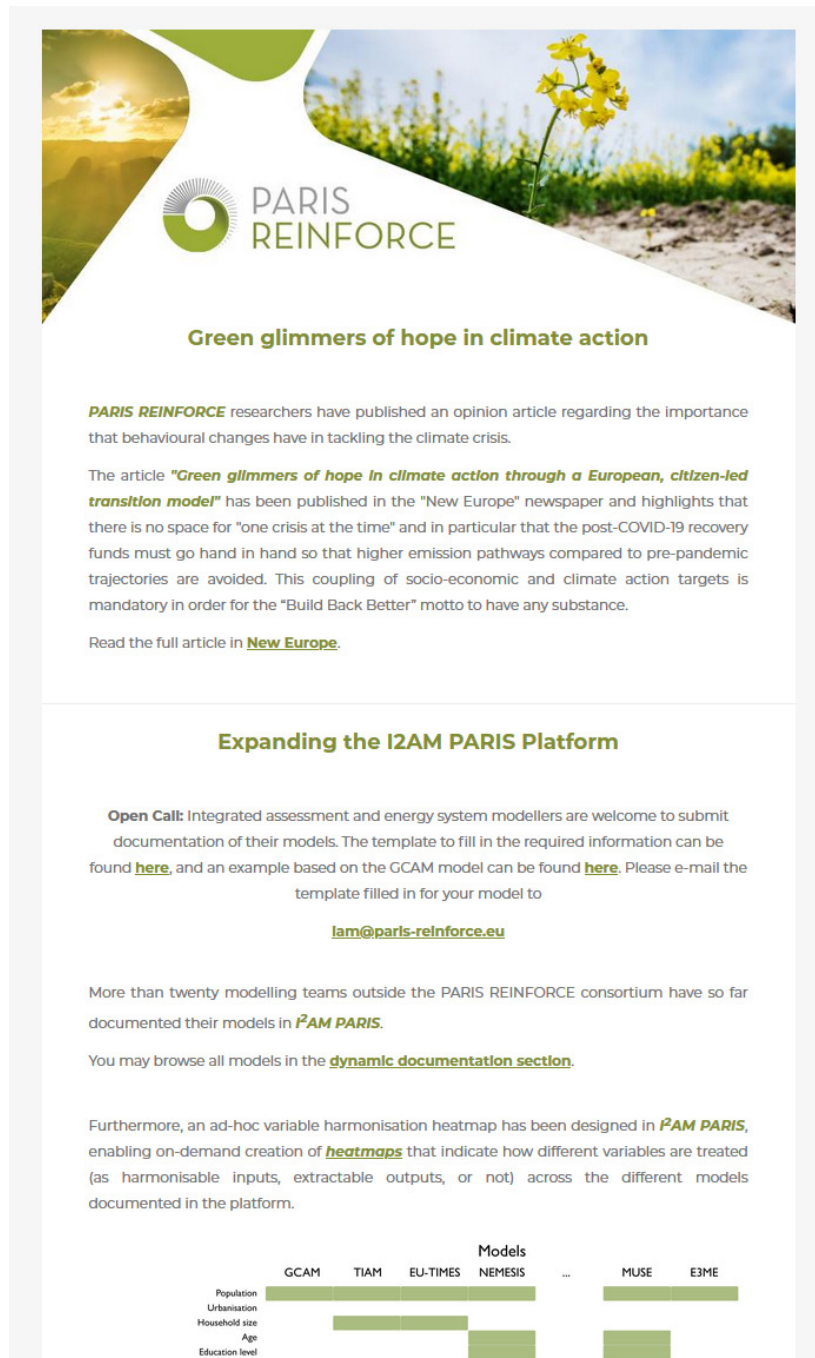


Figure 29: Preview of September 2020 Newsletter

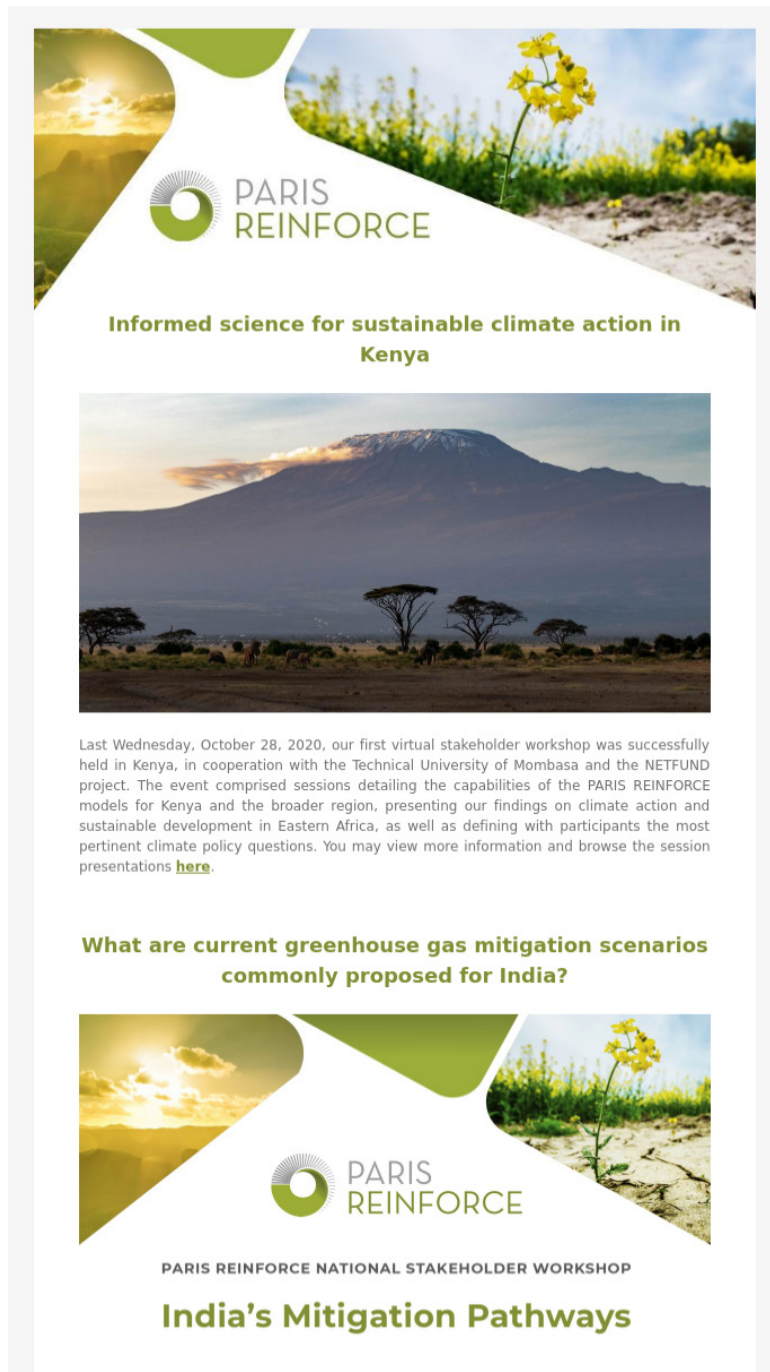


### 3.7 October 2020

**Title:** PARIS REINFORCE News: October 2020

**Content:** Informed science for sustainable climate action in Kenya  
 What are current greenhouse gas mitigation scenarios commonly proposed for India?  
 New PARIS REINFORCE Scientific Publications

**Link:** <https://preview.mailerlite.com/t6s6c0>



**Figure 30: Preview of October 2020 Newsletter**

### 3.8 November 2020

**Title:** PARIS REINFORCE News: November 2020

**Content:** Co-creating India’s mitigation pathways  
 Perspective of comprehensive and comprehensible multi-model energy and climate science in Europe  
 A series of infographics on how models represent climate, energy and economy

**Link:** <https://preview.mailerlite.com/z5e3r7>



Figure 31: Preview of November 2020 Newsletter





### 3.9 December 2020

- Title:** PARIS REINFORCE News: December 2020
- Content:** PARIS REINFORCE wishes you a Happy New Year!  
Decarbonisation in the Central Asian and Caspian region: a first of a series of workshops  
New interventions in scientific events!
- Link:** <https://preview.mailerlite.com/e3q2o1/>



**Figure 32: Preview of December 2020 Newsletter**



### 3.10 February 2021

- Title:** PARIS REINFORCE News: February 2021
- Content:** From consultation toward co-production  
Decarbonisation in the Central Asian and Caspian region: the second of a series of workshops  
Climate Crisis for Beginners  
New PARIS REINFORCE Scientific Publications
- Link:** <https://preview.mailerlite.com/w3f5p8/>



**Figure 33: Preview of February 2021 Newsletter**



### 3.11 April 2021

- Title:** PARIS REINFORCE News: April 2021
- Content:** PARIS REINFORCE Stakeholder Workshop: The role of electricity, manufacturing, and forests in Russia’s low-carbon transition  
Watch our new video about the project and our open data exchange platform  
New job opening on research in mitigation scenarios at CICERO, in Oslo, Norway  
PARIS REINFORCE hits 30 scientific publications!
- Link:** <https://preview.mailerlite.com/t8w8g1>

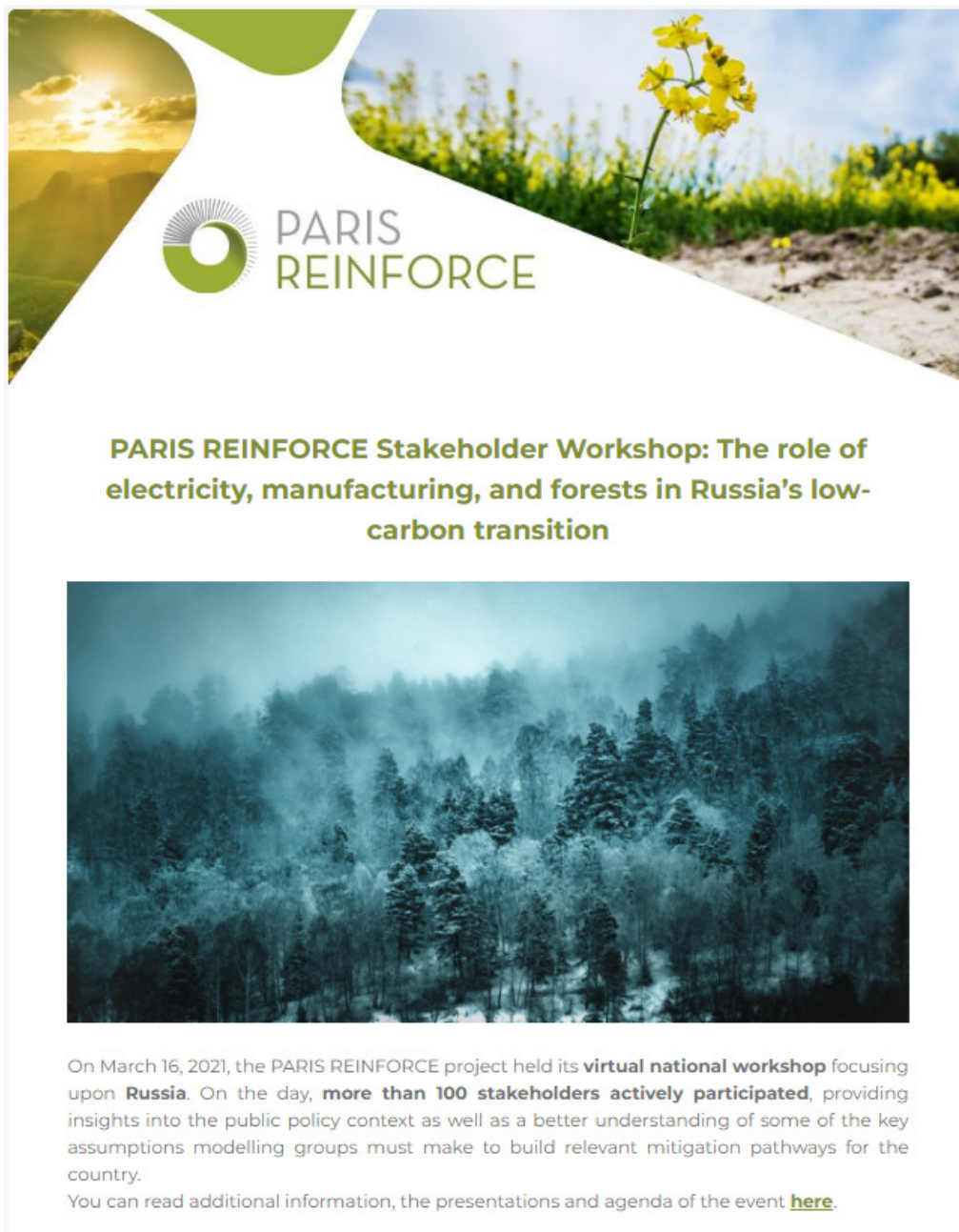


Figure 34: Preview of April 2021 Newsletter

### 3.12 July 2021

**Title:** PARIS REINFORCE News: July 2021

**Content:** From Numbers to Insights: How to Think about Economic-Climate Modelling  
PARIS REINFORCE held six national stakeholder workshops in May and June 2021.  
Deliberative dialogue in Spain as a driver of change  
Climate action and clean energy after COVID-19: What Greek Citizens think  
PARIS REINFORCE hits 40 scientific publications!  
Participation in Recent Conferences

**Link:** <https://preview.mailerlite.com/f5s5b0>

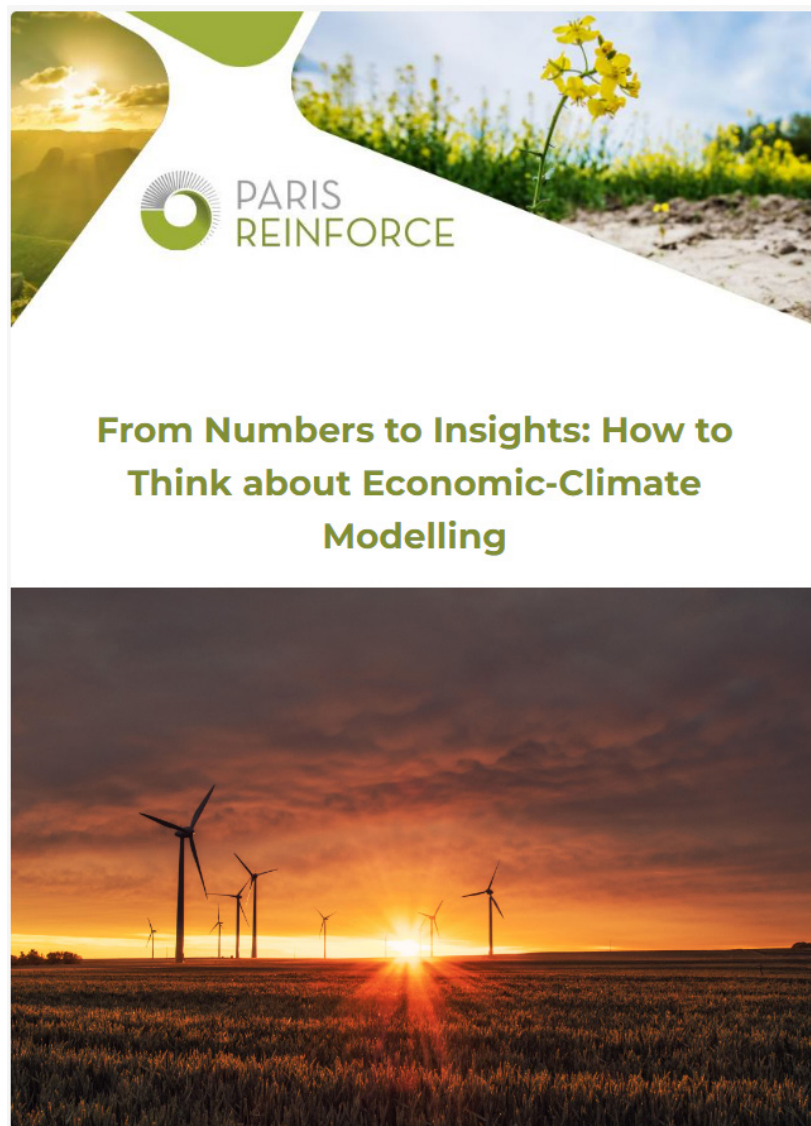


Figure 35: Preview of July 2021 Newsletter



### 3.13 November 2021

**Title:** PARIS REINFORCE News: November 2021  
**Content:** PARIS REINFORCE at COP26!  
**Link:** <https://preview.mailerlite.com/d6b7o9>



**Figure 36: Preview of November 2021 Newsletter**



### 3.14 December 2021

**Title:** PARIS REINFORCE News: December 2021

**Content:** PARIS REINFORCE wishes you a Happy New Year!  
PARIS REINFORCE at the Fourteenth Annual Meeting of the IAMC.  
PARIS REINFORCE has now published 54 scientific papers

**Link:** <https://preview.mailerlite.com/m4o6q3>



**PARIS REINFORCE wishes you a  
Happy New Year!**



Amidst a raging pandemic, 2021 has been another rough year for the globe. This includes the scientific community, which has been trying to adapt to, draw from, and analyse a new norm, especially when it comes to climate change and action. Hoping that 2022 reinforces the efforts for a green and sustainable recovery, **the PARIS REINFORCE consortium wishes you**

**Figure 37: Preview of December 2021 Newsletter**



### 3.15 March 2022

- Title:** PARIS REINFORCE News: March 2022
- Content:** Promoting sustainable transitions across the globe: Special Issue in Renewable & Sustainable Energy Transition  
Upcoming stakeholder workshops: Brazil and Canada  
Energy transitions: Keeping the society on board  
PARIS REINFORCE has now published 60 scientific papers
- Link:** <https://preview.mailerlite.com/r1y1u6z3u0>



Figure 38: Preview of March 2022 Newsletter

### 3.16 May 2022

**Title:** PARIS REINFORCE News: May 2022

**Content:** How do Brazilian stakeholders perceive the country's net-zero transition and potential bottlenecks?

Identifying bottlenecks to Canada's transport decarbonisation - a stakeholder workshop

Energy Citizenship – A new dimension in Energy Policy Making

New research available from PARIS REINFORCE

**Link:** <https://preview.mailerlite.com/x6o7m1d6b6>



**Figure 39: Preview of May 2022 Newsletter**



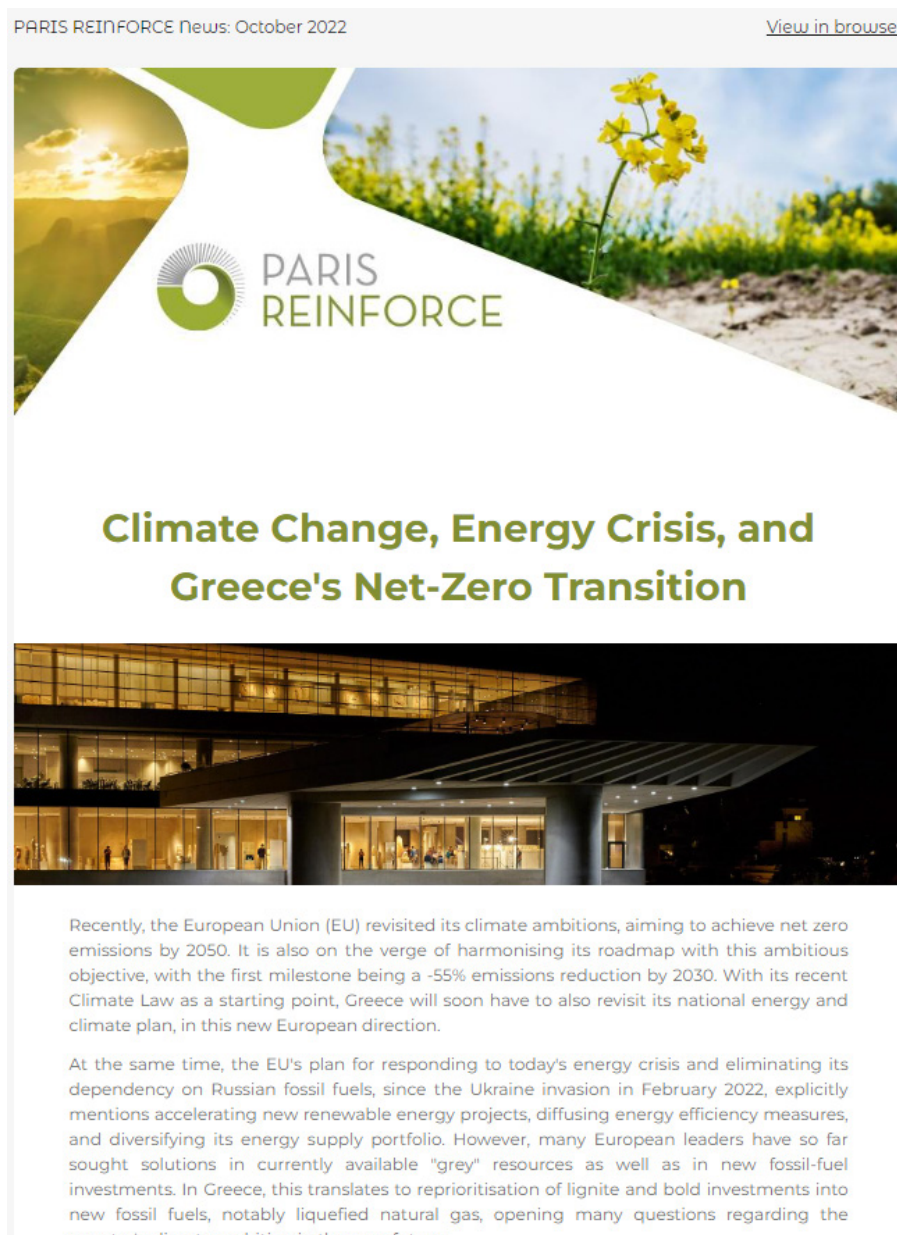


### 3.17 October 2022

**Title:** PARIS REINFORCE News: October 2022

**Content:** Climate Change, Energy Crisis, and Greece's Net-Zero Transition  
 ECEMP 2022 - Acting on the ambitions to a net-zero EU: roadblocks, challenges, and opportunities  
 Industrial decarbonisation in the EU and the UK: a stakeholder workshop in London  
 Letting it all out! PARIS REINFORCE at the Petrocultures 2022 conference in Norway  
 New research available from PARIS REINFORCE

**Link:** <https://app.mailerlite.com/y6p3m6r6n1>



**Figure 40: Preview of October 2022 Newsletter**



### 3.18 November 2022

**Title:** PARIS REINFORCE News: November 2022

**Content:** PARIS REINFORCE has come to an end!  
 Climate Change, Energy Crisis, and Greece's Net-Zero Transition  
 PARIS REINFORCE held its final event at Sorbonne, in Paris, on November 15  
 PARIS REINFORCE at the Fifteenth Annual Meeting of the IAMC

**Link:** <https://preview.mailerlite.com/p9f6t0a8c3>



## PARIS REINFORCE has come to an end!



After 3.5 very productive and scientifically exciting years, in which we worked with thousands of stakeholders to co-create modelled pathways for supporting climate action in Europe and worldwide, the PARIS REINFORCE research project came to an end, on November 30, 2022.

As a truly co-creative modelling research project, PARIS REINFORCE would not have produced as much as it did in these 42 months, if it weren't for our stakeholders. The consortium sincerely thanks all those that put their piece in the PARIS REINFORCE puzzle, however big or small, whether in a stakeholder workshop, a response to a survey or poll, a question raised in a policy event, or a message sent via this website.

In numbers: Over the course of these 3.5 years, the project has used over **20** different models to assess policies and develop realistic mitigation pathways at all geographic scales.

**Figure 41: Preview of November 2022 Newsletter**



## 4 Press Releases

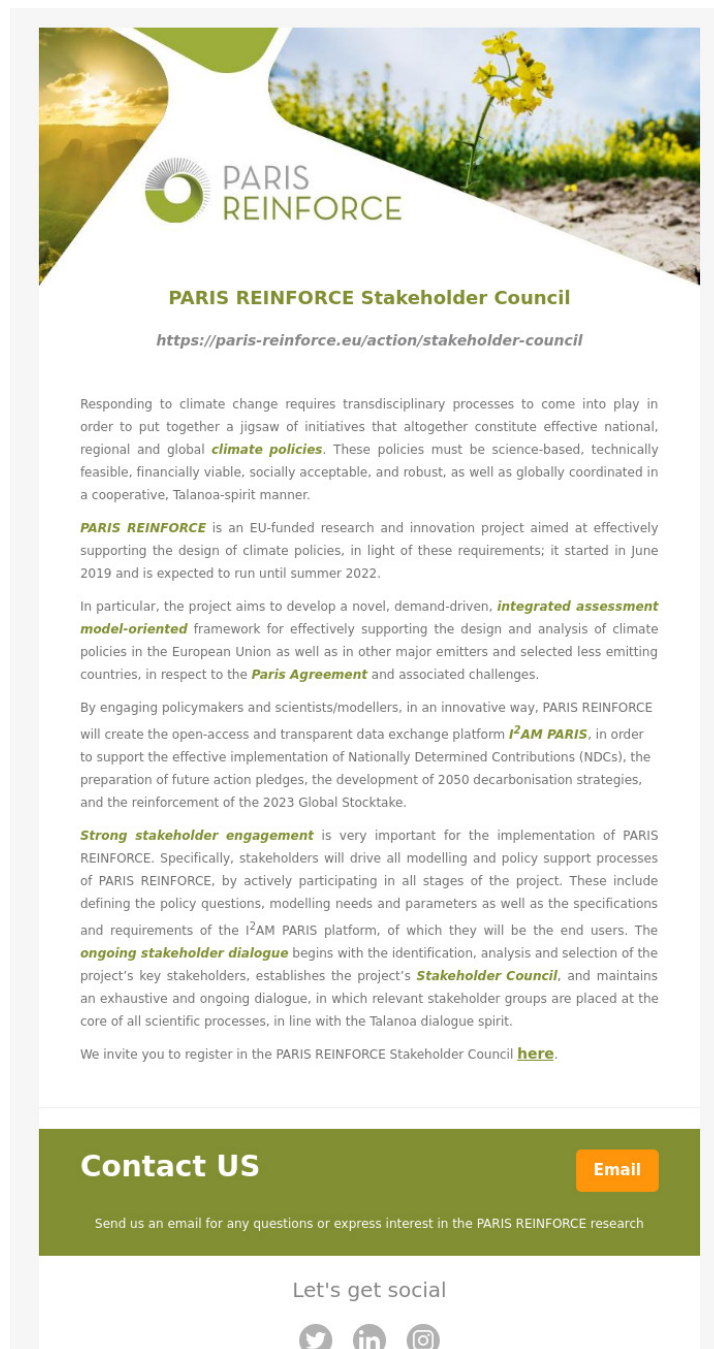
Three press releases were sent out to our newsletter subscribers to address significant updates, as of Nov 2020.

### 4.1 July 2020

**Title:** PARIS REINFORCE Press Release: July 2020

**Content:** PARIS REINFORCE Stakeholder Council

**Link:** <https://preview.mailerlite.com/l0w6z8/>



**PARIS REINFORCE Stakeholder Council**

<https://paris-reinforce.eu/action/stakeholder-council>

Responding to climate change requires transdisciplinary processes to come into play in order to put together a jigsaw of initiatives that altogether constitute effective national, regional and global **climate policies**. These policies must be science-based, technically feasible, financially viable, socially acceptable, and robust, as well as globally coordinated in a cooperative, Talanoa-spirit manner.

**PARIS REINFORCE** is an EU-funded research and innovation project aimed at effectively supporting the design of climate policies, in light of these requirements; it started in June 2019 and is expected to run until summer 2022.

In particular, the project aims to develop a novel, demand-driven, **integrated assessment model-oriented** framework for effectively supporting the design and analysis 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** and associated challenges.

By engaging policymakers and scientists/modellers, in an innovative way, PARIS REINFORCE will create the open-access and transparent data exchange platform **I<sup>2</sup>AM PARIS**, in order to support the effective implementation of Nationally Determined Contributions (NDCs), the preparation of future action pledges, the development of 2050 decarbonisation strategies, and the reinforcement of the 2023 Global Stocktake.

**Strong stakeholder engagement** is very important for the implementation of PARIS REINFORCE. Specifically, stakeholders will drive all modelling and policy support processes of PARIS REINFORCE, by actively participating in all stages of the project. These include defining the policy questions, modelling needs and parameters as well as the specifications and requirements of the I<sup>2</sup>AM PARIS platform, of which they will be the end users. The **ongoing stakeholder dialogue** begins with the identification, analysis and selection of the project's key stakeholders, establishes the project's **Stakeholder Council**, and maintains an exhaustive and ongoing dialogue, in which relevant stakeholder groups are placed at the core of all scientific processes, in line with the Talanoa dialogue spirit.

We invite you to register in the PARIS REINFORCE Stakeholder Council [here](#).

**Contact US** [Email](#)

Send us an email for any questions or express interest in the PARIS REINFORCE research

Let's get social

[Twitter](#) [LinkedIn](#) [Instagram](#)

Figure 42: Preview of July 2020 Press Release



## 4.2 October 2020

**Title:** PARIS REINFORCE Press Release: October 2020

**Content:** Kicking off an online series of co-creative stakeholder workshops!  
Informed science for sustainable climate action in Kenya

**Link:** <https://preview.mailerlite.com/j0b4k5>

**Kicking off an online series of co-creative stakeholder workshops!**

PARIS REINFORCE is getting ready to resume its national and regional stakeholder workshops, in the virtual domain.

Join our upcoming e-workshops in Kenya, India, the Central Asian/Caspian region, and the EU.

**Informed science for sustainable climate action in Kenya**

A PARIS REINFORCE e-workshop, aimed at capturing the Kenyan national context and stakeholders' perspective

**DATE: 28<sup>th</sup> October 2020 | TIME: 11.00 – 14.00 (GMT+3)**

Location: The virtual domain (link upon registration)

Online registrations [here](#)

**PARIS REINFORCE NATIONAL STAKEHOLDER WORKSHOP**

**Informed science for sustainable climate action in Kenya**

**DATE**  
October 28, 2020

**TIME**  
11.00 to 14.00 (GMT+3)

**REGISTER NOW**

In cooperation with the Technical University of Mombasa, Kenya  
Co-organised with NETFUND

**NETFUND**

**In collaboration with the Technical University of Mombasa**, and acknowledging that priorities and concerns of policymakers, industries and citizens largely differ across different

Figure 43: Preview of October 2020 Press Release



### 4.3 November 2020

**Title:** PARIS REINFORCE Press Release: November 2020  
**Content:** The first two series of PARIS REINFORCE infographics are out!  
**Link:** <https://preview.mailerlite.com/s3x1b1/>




**Figure 44: Preview of November 2020 Press Release**




## 4.4 January 2021

- Title:** PARIS REINFORCE Press Release: January 2021
- Content:** PARIS REINFORCE Special Issue of 'Energy Sources, Part B: Economics, Planning, and Policy' is here!
- Link:** <https://preview.mailerlite.com/d1z7f2>



**PARIS REINFORCE Special Issue of 'Energy Sources, Part B: Economics, Planning, and Policy' is here!**

We are very glad to announce that a **PARIS REINFORCE** Special Issue, "**Transdisciplinary Science in Energy Transitions: Thinking Outside Strictly Formalised Modelling Boxes**", has been published in **Energy Sources, Part B: Economics, Planning, and Policy**!



The Special Issue opens with a study by **Pizarro-Irizar et al.** who provide a novel experiment in which quantitative tools and stakeholder engagement are combined to identify the barriers between stakeholders and scientists concerning climate change mitigation aspects.

**De Oliveira-De Jesus et al.** discuss an alternative mitigation scenario for Latin America that seeks the compliance of both climate objectives and future energy requirements. This new scenario is based on the widespread integration of smart grids and renewable energies.

**Nikas et al.** investigate how the envisaged decarbonisation of the Greek energy system can be socially just and effective across multiple sustainability dimensions, by delving into the landscape that established lignite as the mainstream energy resource in Greece, as well as the factors sustaining its dominance despite niche technologies and innovations challenging

**Figure 45: Preview of January 2021 Press Release**



## 4.5 May 2021

**Title:** PARIS REINFORCE Press Release: May 2021

**Content:** The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead

**Link:** <https://preview.mailerlite.com/f1e6f1>



**Figure 46: Preview of May 2021 Press Release**



## 4.6 November 2021

**Title:** PARIS REINFORCE Press Release: November 2021  
**Content:** PARIS REINFORCE study on warming outcomes of current policies and pledges  
**Link:** <https://preview.mailerlite.com/i5f8m5>



### PARIS REINFORCE study on warming outcomes of current policies and pledges

Most of the integrated assessment modelling literature focuses on cost-effective pathways towards given temperature goals.

In our latest article in the journal *Nature Climate Change* ([link](#)), we use seven diverse integrated assessment models and project global energy CO<sub>2</sub> emissions trajectories on the basis of near-term mitigation efforts and two assumptions on how these efforts may continue from 2030 to 2100.

Despite finding a wide range of emissions by 2050, nearly all scenarios have median warming of between 2 and 3°C in 2100, implying possible futures with markedly different climate consequences.

This is an important finding in the aftermath of COP26, during which several studies confidently estimated a warming of 2.7°C or 2.4°C in 2100, if either current policies or NDCs respectively are projected into the future. Our study instead finds that the uncertainties are much greater, projecting a 2.3-2.9°C or 2.2-2.7°C of warming, respectively.

We furthermore highlight key modelling choices inherent to projecting where emissions are headed.

First, despite our efforts to reduce undesired model response heterogeneity, by harmonising inputs across models (see [here](#)), emissions are more sensitive to the choice of integrated assessment model than to the assumed mitigation effort, highlighting the importance of model intercomparisons. Differences across models reflect diversity in baseline assumptions and impacts of near-

**Figure 47: Preview of November 2021 Press Release**





## 4.7 July 2022

- Title:** PARIS REINFORCE Press Release: July 2022
- Content:** Co-creating with stakeholders: a series of PARIS REINFORCE national workshops for transformative climate action
- Link:** <https://preview.mailerlite.com/l8k5s2g3s7>



**Figure 48: Preview of July 2022 Press Release**



## 4.8 September 2022

- Title:** PARIS REINFORCE Press Release: September 2022
- Content:** Different shades of green: our new study on emissions and employment trade-offs from green recovery packages among major economies
- Link:** <https://app.mailerlite.com/y1q7y0p7r9>



**Figure 49: Preview of September 2022 Press Release**



## 4.9 November 2022

- Title:** PARIS REINFORCE Press Release: November 2022
- Content:** Join us at the final PARIS REINFORCE event at Sorbonne, Paris, on November 15
- Link:** <https://app.mailerlite.com/d3f8w6b0v5>



**Join us at the final PARIS REINFORCE  
event at Sorbonne, Paris, on November 15**



After 3.5 very productive years, which have been societally challenging yet scientifically exciting, and in which we worked with thousands of stakeholders to co-create modelled pathways for supporting climate action in Europe and worldwide, the PARIS REINFORCE research project is coming to an end. To

**Figure 50; Preview of November 2022 Press Release**



## 5 Policy Briefs

### 5.1 McWilliams et al. (2019), Modelling capabilities

During the first regional stakeholder workshop, held in Brussels, in November 2019, PARIS REINFORCE issued a policy brief on modelling capabilities, to share with the attendees and online participants before, during and after the workshop, in an effort to enhance understanding of modelling across non-expert audiences.

- Title:** PARIS REINFORCE: What can our models deliver?
- Authors:** Ben McWilliams (Bruegel), Georg Zachmann (Bruegel), Alevgul Sorman (BC3), Ester Galende (BC3), Ajay Gambhir (Grantham), Alexandros Nikas (NTUA), and Haris Doukas (NTUA)
- Abstract:** The fundamental aim of PARIS REINFORCE is to enhance and improve climate policymaking. In order to do this, the consortium has access to a range of sophisticated climate-economic scientific models. A key novelty of the project is its devotion to ‘demand-driven’ research. That is, the questions these models will provide insights into and the assumptions they will do this based upon are to be stakeholder-determined through an extensive and exhaustive process.
- Keywords:** Policy brief; Integrated assessment models (IAMs); Climate policy; Climate science; Co-creation; Policy questions
- Link:** <http://paris-reinforce.eu/sites/default/files/2019-11/PARIS%20REINFORCE%20Policy%20Brief%20What%20our%20models%20can%20do.pdf>
- Online:** November 2019





# Policy Brief

## PARIS REINFORCE: What can our models deliver?



### Key Points

**Detailed policy briefing on:**

- **Benefits of modelling**
- **How do the models work?**
- **What can the models do?**
- **What can the models not do?**
- **What have the models done before?**

**The PARIS REINFORCE modelling ensemble includes:**

- **5 national/regional models for Europe;**
- **9 models covering major and less emitting countries and regions outside of Europe; and**
- **8 global models.**

Thematic area:	Keywords:	Author(s):
Climate Change; Climate Policy; Low-carbon Transitions; Climate-Economy Modelling	Policy brief; Integrated assessment models (IAMs); Climate policy; Climate science; Co-creation; Policy questions	Ben McWilliams, Georg Zachmann (Bruegel) Alevgul Sorman, Ester Galende (BC3) Ajay Gambhir (Imperial College) Alexandros Nikas, Haris Doukas (NTUA)



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

**Figure 51: Preview of 'PARIS REINFORCE: What can our models deliver?' Policy Brief**



## 5.2 Doukas and Nikas (2021), Greek Delignitisation

- Title:** The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead
- Authors:** Haris Doukas (NTUA), Alexandros Nikas (NTUA)
- Abstract:** Lignite production and use in Greece has been dropping in the last decade, marking a sharp decline during COVID-19. According to the country's National Energy and Climate Plan (NECP), lignite must be completely phased out by 2028.
- Keywords:** Policy brief, delignitisation, Coal, Greece, NECP
- Link:** <https://paris-reinforce.eu/sites/default/files/2021-05/PR-Policy-Brief-Greece-Delignitisation-RollerCoaster.pdf>
- Online:** May 2021





## Policy Brief

### The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead



#### Key Takeaways

- Lignite production and use in Greece has been dropping in the last decade, marking a sharp decline during COVID-19.
- According to the country's National Energy and Climate Plan (NECP), lignite must be completely phased out by 2028.
- Delignitisation, irrespective of the speed in which it is attempted, is found beneficial for the wider economy in the long run – i.e. by the middle of the century.

Figure 52: Preview of The Delignitisation Roller Coaster in Greece: An Old Car and a Steep Slope Ahead

### 5.3 Nikas et al. (2021), Post-COVID 19

In the context of COP-26, PARIS REINFORCE contributed to the EU's Policy Brief regarding the recovery from the pandemic. In this endeavour, research partners of the PARIS REINFORCE consortium presented a paper investigating the optimal allocation of the Green Recovery Funds for various EU countries

**Title:** Climate Action in the Post-COVID 19 World: Investigating Optimal Allocations for Green Recovery Funds

**Authors:** Alexandros Nikas (NTUA), Dirk-Jan Van de Ven (BC3), Konstantinos Koasidis (NTUA), Aikaterini Forouli (NTUA), Shivika Mittal (Imperial), Ajay Gambhir (Imperial), Haris Doukas (NTUA)

**Abstract:** The PARIS REINFORCE project contributed to the COP26 European Commission's Policy Publication, "Climate Action in the Post-COVID-19 World", with its brief on "Investigating Optimal Allocations for Green Recovery Funds". The policy publication includes insights from the EU-funded projects CONSTRAIN, VERIFY, NAVIGATE, CASCADES/RECEIPT, ENGAGE, LOCOMOTION, and PARIS REINFORCE, on how to build forward better contributions.

**Keywords:** COVID-19, green recovery, COP26

**Link:** [https://paris-reinforce.eu/sites/default/files/2021-11/EC%20COP26%20Policy%20Publication%20-%20Climate%20Action%20in%20the%20Post-COVID-19%20World\\_0.pdf](https://paris-reinforce.eu/sites/default/files/2021-11/EC%20COP26%20Policy%20Publication%20-%20Climate%20Action%20in%20the%20Post-COVID-19%20World_0.pdf)

**Online:** November 2021







# CLIMATE ACTION IN THE POST-COVID-19 WORLD

Insights from EU-funded projects on  
how to build forward better



**Figure 53: Preview of Climate Action in the Post-COVID 19 World: Investigating Optimal Allocations for Green Recovery Funds**



## 6 Presentations in policy events and stakeholder workshops

PARIS REINFORCE has attended or (co-)organised several policy events and stakeholder workshops; here we list all presentations in such events, aimed at policymakers and stakeholders.

### 6.1 Networking and knowledge sharing event, September 05, 2019



PARIS REINFORCE coordinator Assoc. Prof. Haris Doukas (National Technical University of Athens), Maurizio Gargiulo (E4SMA) and Ajay Gambhir (Grantham Institute, Imperial College) participated in the 'Networking and knowledge sharing event for decarbonisation projects' & 'Coordinators' Day 2019' in Brussels, Belgium, which took place on the 5<sup>th</sup> and the 6<sup>th</sup> of September 2019 respectively.

PARIS REINFORCE representatives had the opportunity to meet with participants from other decarbonisation projects and discuss potential synergies towards climate change mitigation and adaptation research. In particular, a poster ([link](#)) showcasing the PARIS REINFORCE objectives and approach was put on display, while Prof. Doukas also delivered a presentation ([link](#)) on the policy, research and societal implications and expectations of the project, including its innovative stakeholder engagement module and the open-access data exchange modelling platform, as well as on the respective policy-relevant workshops through which stakeholders will be invited and able to provide their knowledge and expertise.



## 6.2 C-Track 50 EU roundtable, September 17, 2019



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

The EU roundtable's objective was to give the opportunity to national authorities and experts from the eleven C-Track 50 countries to exchange their experiences in their path to successful action plans. It included topics on EU climate and energy policy; data monitoring and sharing; potential decarbonisation scenarios for 2050; and challenges for carbon neutrality and the role of multi-level governance. It was attended by high-level stakeholders (i.e. representatives from the Greek Ministry for Environment and Energy, the Association of Spanish Agencies for Energy Management, the Unit for Sustainable Cohesion Policy for the Ministry of Innovation and Technology of Hungary, the Unit at the Department for Agriculture and Rural Development of the Marshal Office of the Wielkopolska Region, the German Society for International Cooperation (GIZ), the Romanian Energy Regulatory Authority, the North West Croatia regional energy agency REGEA, regional energy agency of Auvergne-Rhône-Alpes, etc.).

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 ([link](#)).

[C-Track 50 EU roundtable](#)



### 6.3 First PARIS REINFORCE Stakeholder Council Dialogue, Brussels, November 21, 2019



The 1<sup>st</sup> PARIS REINFORCE Stakeholder Council Dialogue workshop, entitled "Enhancing climate policy through co-creation", took place on the 21<sup>st</sup> of November 2019, at the premises of Bruegel, in Brussels, Belgium.

The workshop was a Pan-European initiative for the co-creation of research underpinning new climate policies at the EU and national levels, drawing from the results of six-month exhaustive consultations at national and European level, which followed innovative participatory processes, under the Talanoa Dialogue spirit also adopted in the recent UN Climate Change Conferences.

High level staff of the EC Directorates-General (DGs) for Energy, Climate, and Research, Ministries and climate-related governmental bodies from EU Member States, representatives of international organisations, scientists, and researchers representing relevant projects and initiatives attended the workshop.

During the morning sessions, and after opening remarks from Mr. Lukasz Kolinski (Head of Unit, DG ENER.A.4) as well as an introduction to the project by the Coordinator Dr. Haris Doukas (Assoc. Prof., National Technical University of Athens), a detailed policy brief on what the PARIS REINFORCE models can and cannot do was handed out, presented and discussed with stakeholders. Furthermore, the I<sup>2</sup>AM PARIS platform was thoroughly presented and discussed with the audience, with the session essentially showcasing the dynamic, detailed and comparative documentation component of the platform (to which the audience was provided access to) and leading to a large Q&A part, in which preferences over the content, design and directions for the modelling analyses visualisation



were gathered.

The afternoon consultation, broken down into three thematic sessions, resulted in the main policy questions to be further investigated by the ensemble of Integrated Assessment Models of PARIS REINFORCE, by participating stakeholders prioritising the topics they would like to discuss in detail with the consortium members and, after discussions, selecting the particular policy questions they would like PARIS REINFORCE to seek to address, via a polling and voting platform. The lists of suggested topics for each session were put together after discussions with high-level policymakers at the EU and European-national level as well as included one question (per session) that drew from recommendations from the public, in a crowdsourcing platform that was set up for the purposes of the workshop

At the global level, stakeholders appeared in favour of the project taking on topics and policy questions that revolved around potential failures of key technologies, lifestyle and behavioural changes, as well as just transitions in a climate emergency or extreme decarbonisation potential under a green new deal. At the EU level, the most interesting topics included carbon border adjustment and alternatives, capacity and flexibility of electrification in Europe, and EU-internal taxation policies (increasing ambition in terms of ETS coverage and expanding harmonisation of taxation in non-ETS sectors). Finally, on the socioeconomic and Sustainable Development Goals (SDG) front, participants eventually voted in favour of the project taking on questions related to employment and other socio-economic dimensions resulting from removing public support on emissions-intensive sectors (e.g. coal); evolution in terms of sectoral redeployment and skill requirements; and increasing ambition in NDCs in consideration of various sustainability dimensions.

This workshop was the first of a series of stakeholder events to be held over the next three years.

You may find the agenda [here](#), and download the presentations below.

[An introduction to PARIS REINFORCE](#)

[Can our models deliver what you need?](#)

[Co-designing the open-access, data-exchange I<sup>2</sup>AM PARIS platform](#)

[Global threat, global pathways: designing policy-relevant scenarios](#)

[A Paris-consistent Europe: aligning national \(NECPs\), regional \(EU NDC\) & global action](#)

[Sustainable climate action: socioeconomic implications, distributional effects & SDGs](#)

[Wrap-up & Next Steps](#)



## 6.4 EU-Japan Climate Change Policy Symposium, December 06, 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), Maurizio Gargiulo (E4SMA) and 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 6<sup>th</sup> of December 2019, at the [Delegation of the European Union to Japan](#) in Tokyo, Japan.

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 I<sup>2</sup>AM PARIS platform and the co-creation component of the project ([link](#)).



## 6.5 Climate Change, Energy and the Greek Environment, January 28, 2020



As the European Union moves forward with formulating the [European Green Deal](#), including a 2050 decarbonisation target, related reviews, ambition increases and updates of the 2030 National energy and climate plans ([NECPs](#)) are under way in EU countries. Greece is no exception as it moves ahead with its design and implementation of corresponding policies and measures.

However, these policies must promote a “just transition” and be socially accepted in order to be effective and robust. Ideally, citizens should take part in the selection of these policies, by being informed and expressing their preferences on the available options.

The PARIS REINFORCE project, along with the [Hellenic Society for the Environment and Culture](#) and the [Convergences Greece Forum](#), co-organised a national stakeholder workshop on climate change, energy and the national context, aiming to explore the available alternatives, on Tuesday, January 28, 2020, while giving the opportunity to stakeholders from industry, government and the civil society to get informed, discuss, raise concerns and help decide the way forward.

The workshop included 3 sessions on “Business, Energy & Environment”, “Sustainable Energy Planning - Technologies and Policies” and “Geothermal Energy”, as well as a roundtable discussion on “Sustainable Energy Sources: Economy, Society, Environment and the case of Wind Turbines”. After the latter an online voting took place in order to gather the stakeholders' perceptions on which topics they consider the most important to be further explored by PARIS REINFORCE and which factors they believe are the most impactful (either positively or negatively) towards a wide-scale deployment of renewable energy sources and the implementation of the Greek National Energy and Climate Plan.

The workshop's agenda is available in english [here](#).

Find below the workshop's presentations and stay tuned on the online voting results by subscribing in our [newsletter](#).

### Welcome - Introduction



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

[Costas Carras - Welcome speech](#)

[Haris Doukas - Welcome speech](#)

### **1<sup>st</sup> Keynote speech**

[Christos Zerefos - Climate Change in Greece from ancient times to the future](#)

### **1<sup>st</sup> Session: Business, Energy & Environment**

George Prokopiou

[Costantza Sbokou-Konstantakopoulos - Sustainable Tourism Development and Climate Change](#)

[Yannis Retsos - Tourism and climate change: adapting to the new era](#)

### **2<sup>nd</sup> Session: Sustainable Energy Planning - Technologies and Policies**

[Alice Corovessi - Energy savings in buildings in the light of the EU Green Deal and the Clean Energy Package](#)

[Dimitris Zontanos - Project Hellinikon Sustainable Energy Planning, Technologies and Policies](#)

[Athanasios Stoumbos - The prospects of hydrogen as an energy carrier](#)

[Xenophon Verikios - Hydrogen production for economic growth and climate change slowdown](#)

[Alexandra Sdoukou - The Decade of Green Development](#)

[Lampros Kontogeorgos - The EU Green Deal](#)

### **2<sup>nd</sup> Keynote speech**

[Alexandra Mitsotaki - The Convergences Greece Forum](#)

Kostas Synolakis

### **3<sup>rd</sup> Session: Geothermal Energy**

[Michalis Fytikas - The geothermal potential of Greece](#)

[Kostas Papavassiliou - Geothermal potential in Macedonia and Thrace - Prospects and potential for exploitation](#)

[Konstantinos Mavros - Geothermal energy as a baseload energy](#)

[Giannis Paleokrassas - Geothermal energy: Known in the past, Unkown today](#)

### **Roundtable discussion "Sustainable Energy Sources: Economy, Society, Environment and the Case of Wind Turbines"**

[Panayiotis Pafilis - Biodiversity and wind farms](#)

[Diletta Zeni - Wind power and the energy transition](#)

[Panayiotis Fokas - Pagoulatos - Degradation of the natural and cultural environment in the name of its protection? The problem of the placement of Wind Power Plants in protected, mountainous and island areas](#)

[Stephan Wrage - Skysails Power - Revolutionary Airborne Wind Energy System](#)

[Apostolis Kaltsis](#)

[Ioannis Georgizas - Sustainable Development and Local Communities](#)

Tim Salmon





## Voting Session

[Alexandros Nikas - Voting](#)

The workshop's page in Greek is available [here](#).



## 6.6 Zero carbon emissions in the Greek energy system, February 20, 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 20<sup>th</sup> 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 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 [I<sup>2</sup>AM 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.

The workshop's agenda is available [here](#) (in Greek).

Moreover, below are the workshop's presentations (in Greek).



[Workshop's Goals - Dr. Elena Georgopoulou](#)

[Long-Term Energy Planning in Greece - Prof. Dimitris Lalas](#)

["Green" Scenario for the evolution of the energy system till 2050 - Dr. Sarafidis Ioannis](#)

[Energy efficiency and Long-Term Energy Planning - Dr. Mirasgentis Sevastianos](#)

[Green vs. Green: The Necessary Transcends - Prof. Haris Doukas](#)



## 6.7 The Value of Energy Management Practices in the Business Sector, October 15, 2020



**INZEB**  
INSTITUTE OF ZERO ENERGY BUILDINGS

**The Hellenic-Dutch Association of Commerce and Industry**

15.10.2020  
THURSDAY

ONLINE EVENT  
14.00 - 15.30

THE VALUE OF ENERGY MANAGEMENT PRACTICES  
IN THE BUSINESS SECTOR

PARIS REINFORCE researchers participated in the “**The Value of Energy Management Practices in the Business Sector**” online event, organised by [INZEB](#) and [The Hellenic-Dutch Association of Commerce and Industry](#) (HeDA), which took place on the 15<sup>th</sup> of October 2020. The event presented the developments and benefits of an effective Energy Management System (EnMS) within organisational structures. Participants had the opportunity to discuss the importance of improving energy efficiency, which not only reduces capital expenditure but offers a number of additional benefits including reduced risk to energy compliance failures, improved facilities performances, increased competitiveness, and ROI.

On behalf of PARIS REINFORCE, the project coordinator, Assoc. Prof. Haris Doukas, participated in the event and presented “*Opportunities and Threats towards a Sustainable Transition of the Industrial Sector*”. The presentation discussed findings on industrial low-carbon transition potential in the iron and steel, cement and chemicals sectors, from the recent PARIS REINFORCE open access publication “[The UK and German Low-Carbon Industry Transitions from a Sectoral Innovation and System Failures Perspective](#)” in the scientific journal [Energies](#).

The event agenda is available [here](#).

The presentation can be found here:

[Opportunities and Threats towards a Sustainable Transition of the Industrial Sector](#)

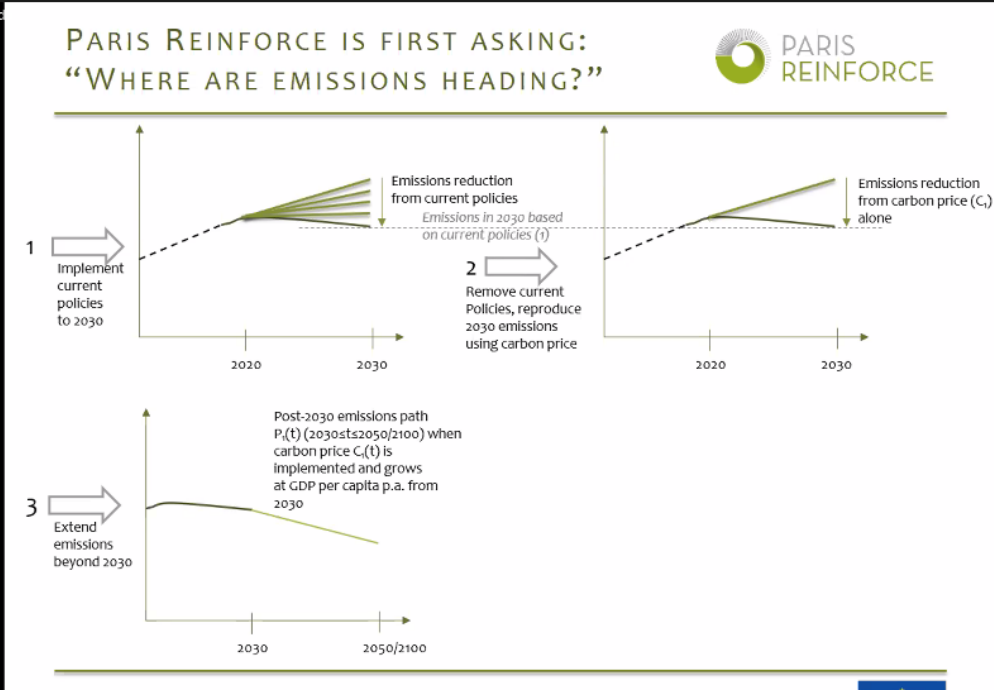


## 6.8 Informed science for sustainable climate action in Kenya, October 28, 2020

Zoom Meeting | You are viewing Kathleen Kirui's screen | View Options

Alexandros ... | Haris Doukas | IOANNIS TSI... | Ajay Gambhir | Shaun Micallef (...)

**PARIS REINFORCE IS FIRST ASKING: "WHERE ARE EMISSIONS HEADING?"**



1 Implement current policies to 2030

2 Remove current Policies, reproduce 2030 emissions using carbon price

3 Extend emissions beyond 2030

Post-2030 emissions path  $P_e(t)$  (2030 to 2050/2100) when carbon price  $C_e(t)$  is implemented and grows at GDP per capita p.a. from 2030

Unmute | Stop Video | Participants (41) | Chat | Share Screen | Record | Reactions | Leave

### A PARIS REINFORCE e-workshop, aimed at capturing the Kenyan national context and stakeholders' perspective

October 28, 2020

Location: Online

Responding to climate change requires transdisciplinary processes to work together in order to co-design robust national, regional, and global climate policies. Such policies must be science-based, technically feasible, financially viable, socially acceptable, and coordinated in a globally cooperative manner.

In an attempt to develop such policies, PARIS REINFORCE, an EU research and innovation project, aims to bridge the gap in the science-policy interface and underpin climate policymaking with authoritative scientific processes. Apart from calling upon its diverse modelling capabilities, the project introduces an innovative co-creation framework, through which it seeks to actively involve stakeholders in multiple aspects of the scientific processes, from the formulation of relevant policy questions to the definition of modelling assumptions.

**In collaboration with the Technical University of Mombasa**, and acknowledging that priorities and concerns of policymakers, industries and citizens largely differ across different countries in the world and across stakeholder groups, the project organised its first virtual, national stakeholder workshop in Mombasa, Kenya, aiming to mobilise knowledge embedded in individuals coming from governments, business, NGOs, academia, and the civil society; and to design well-informed and meaningful scientific activities in support of climate policymaking at the



national and regional level.

The workshop was chaired and coordinated by **Dr. Ioannis Tsipouridis** and **Prof. Michael Saulo** (*Technical University of Mombasa*) and comprised sessions detailing the capabilities of the PARIS REINFORCE models for Kenya and the broader region, presenting our findings on climate action and sustainable development in Eastern Africa, as well as defining with participants the most pertinent climate policy questions. The event included the following sessions (click on the session title to view the presentation):

- [Greeting speech](#) and event outline by **Dr. Ioannis Tsipouridis** (*Technical University of Mombasa*).
- [So, what is the PARIS REINFORCE project?](#) – A brief introduction to the project by the project coordinator, **Prof. Haris Doukas** (*National Technical University of Athens*).
- [The project's modelling ensemble and its use in informing Kenyan mitigation pathways](#) – The Horizon 2020 PARIS REINFORCE project brings together a wide range of integrated assessment and energy systems models to inform feasible and politically realistic mitigation pathways for a number of the world's major regions. The modelling ensemble includes representations of the world as a whole, the African continent, as well as some sub-continental African regions, and these regions' low-carbon transitions can be used to describe the opportunities and challenges for Kenya and the surrounding countries. This presentation, by **Dr. Ajay Gambhir** (*Imperial College London, Grantham Institute*), introduced the PARIS REINFORCE modelling suite, before discussing some emerging results of relevance to Kenya, Africa, and the globe.
- [Designing policies for achieving simultaneous progress in multiple SDGs: an integrated assessment modelling exercise for Eastern Africa](#) – Global climate modelling exercises often ignore regional and local realities. In the case of Eastern Africa, climate efforts will be inseparable from other major development challenges, such as reducing poverty and hunger, achieving universal access to clean energy, water and sanitation, reducing exposure to household pollutants, and more. On-ground knowledge is therefore of high value for calibrating integrated assessment models, in order to allow the design of realistic energy and climate policies that are beneficial on multiple scales. This presentation by **Dr. Dirk-Jan Van de Ven** (*Basque Centre for Climate Change*) showed the results of a recent study focusing on the effectiveness of residential energy policies for multiple SDGs and showcased modelling possibilities within the PARIS REINFORCE project.
- [Co-designing research questions and modelling parameters](#) – Polls designed for embarking upon the co-creation of the PARIS REINFORCE modelling approach for the country and the region, in terms of questions and modelling parameters. Stakeholders, facilitated by **Dr. Alexandros Nikas** (*National Technical University of Athens*), were asked to actively contribute to co-defining and communicate their preferences over the modelling approach, in a participatory process aimed at formulating the most relevant and seminal research questions as well as critical parameters for the upcoming modelling runs.
- [Low-emissions, resilient infrastructure: Paris and SDGs are inseparable](#) – A forum for discussing with the audience the topic of how to build the low-emissions, resilient infrastructure by 2050 of which 75% does not exist today also facing a USD 15 trillion global financing gap by 2040. The infrastructure challenge covers multiple Sustainable Development Goals (6, 7, 8, 9, and 11). Inherently linked with No 13 "Climate Action". This was chaired and coordinated by **Mr. Zsolt Lengyel** (*Institute for European Energy and Climate Policy*).
- [Interpreting the Paris Agreement](#) – The Paris Agreement is written in a way that allows for a broad range of interpretations. The many ways in which the Agreement can be interpreted can shape the



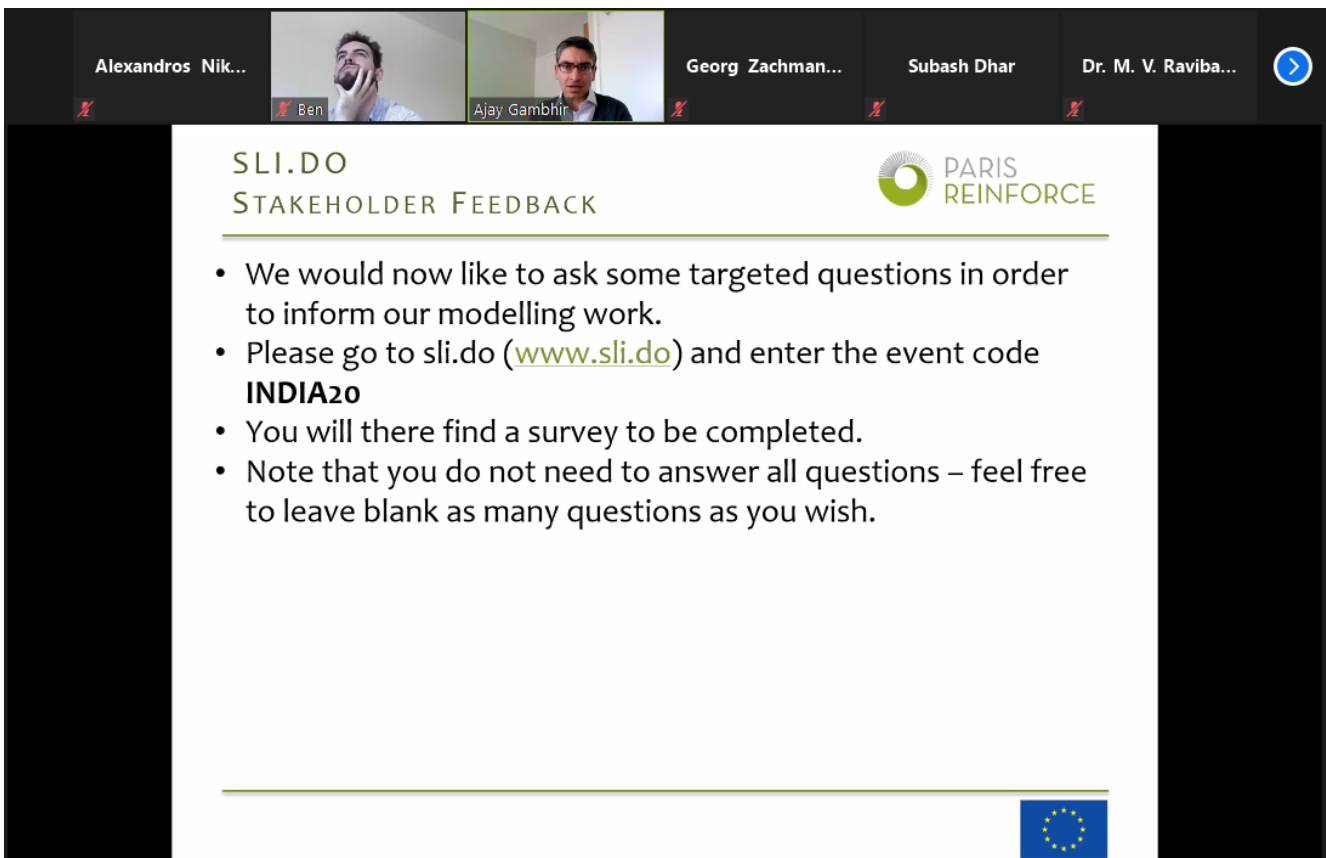
global/regional pathways and scenarios modelled within the PARIS REINFORCE project. In this session, stakeholders, facilitated by **Dr. Hannah Parris** (*Cambridge University*) explored the different interpretations of goals set out in the Paris Agreement text; for example, what is meant by the term "well below 2°C"? - with the aim of identifying the range of views. Stakeholders will be invited to anonymously share their views and identify core topics that will be explored further in the PARIS REINFORCE modelling scenarios.

### **Guidelines for dialogue and logistics**

- The event took place under Chatham House Rule.
- Live polls through audience interaction tools ([Sli.do](#)).
- The event ran from 11:00 to 14:00 (GMT+3).



## 6.9 Co-creating India's mitigation pathways, November 3, 2020



The PARIS REINFORCE project hosted a **virtual workshop**, on November 3, 2020, to discuss the project's Indian modelling pathways. The format of the event was to hold structured **discussions on the Indian energy transition with experts** from NGOs, academia, the private sector, and government. This was with the purpose of allowing modelling teams to develop **stakeholder-driven modelling scenarios**, as well as to **co-create** some of the core assumptions being fed into models.

The workshop began with a brief introduction from project coordinator, **Prof. Haris Doukas** (*National Technical University of Athens*). Following this, **Dr. Ajay Gambhir** (*Grantham Institute, Imperial College London*) gave an overview on what modelling studies have so far revealed about low-carbon transitions in India. Additionally, he offered an insight into what the modelling work of the PARIS REINFORCE project has so far achieved as well as the next steps it will take.

After these introductory sessions, participants were split into three breakout groups to allow for more intimate discussions. The themes of the three breakout groups were the Indian power sector, the Indian transport sector, and the theme of urbanisation in India. Each session was structured around gathering participants' understanding of the key themes driving modelling results, i.e. are assumptions too ambitious, too pessimistic, or unrealistic/infeasible in other ways?

The **power sector** session was chaired by **Dr. Alexandre Koberle** (*Grantham Institute, Imperial College London*). Key themes investigated were:

- The political feasibility of early retirement of coal plants in India. Particularly focussed on the chances of retirement during the period 2020-2030.
- The target of 450GW renewable electricity capacity in India by 2030. Discussion centred around whether





this target is realistic and the key support mechanisms that must be put in place to support such rapid renewable electricity deployment.

The session on **urbanisation** was chaired by **Dr. Ajay Gambhir**. Key themes investigated were:

- The evolution of building cooling demand (e.g. demand for air conditioning). What are the implications of increased urbanisation and incomes for this demand?
- Smart cities and the potential benefits of better public transport infrastructure and more energy efficient buildings that could result from them.
- Key innovations or disruptive technologies that could influence the development of sustainable urban living in India.

The **transport sector** session was chaired by **Dr. Shivika Mittal** (*Grantham Institute, Imperial College London*). Key themes investigated were:

- Feasibility of the government's 30% electric vehicle share by 2030 target.
- Implications for the electricity grid of a surge in electric vehicles.
- The role for hydrogen in decarbonising India's transport sector.

Following the breakout groups, representatives from each session informed the larger group on the issues they had discussed in their respective groups, coordinated by **Dr. Georg Zachmann** (*Bruegel*). An interactive sli.do voting session, managed by **Mr. Ben McWilliams** (*Bruegel*), then allowed participants to give their feedback on all topics before closing remarks.

The key outputs from the discussion, as well as the opinions expressed via the sli.do voting session, will now be used to design realistic yet stretching scenarios of how India's low-carbon development could proceed in the coming decades.

Presentations:

[Haris Doukas - Introduction](#)

[Shivika Mittal, Alexandre Koberle, Ajay Gambhir - Overview & insights](#)



## 6.10 Decarbonisation in the Central Asian and Caspian region: a first of a series of workshops, December 09, 2020



On December 9, 2020, the PARIS REINFORCE project held its virtual workshop focusing upon the Central Asian and Caspian region. The goal for the workshop was to receive insights from regional stakeholders into the public policy context as well as a better understanding of some of the key assumptions modelling groups must make regarding the region.

To this end, a range of stakeholders were invited from national governments, NGOs, the private sector, international institutions, and academia. On the day, stakeholders were in attendance from Kazakhstan, Uzbekistan, and Turkmenistan.

The workshop began with a brief introduction from project coordinator, **Assoc. Prof. Haris Doukas** (*National Technical University of Athens*). Then, during the first session of the workshop, **Mr. Rocco De Miglio** (*E4SMA*) introduced the TIMES-CAC model that the project uses to investigate the region in more detail. The presentation particularly delved into the structure of the initial exploratory scenarios used for analysis (designed to facilitate the first round of engagement), as well as the diverging pathways of key assumptions (e.g. the price of natural gas) under each scenario. Here, an emphasis was placed on the help that stakeholders can provide by allowing for more politically and contextually relevant policies and assumptions to define scenarios.

Additionally, an interactive dashboard was shared and demonstrated. This dashboard allows for a user-friendly visualisation of the key performance indicators relevant to the TIMES-CAC model.

Participants were then split into two breakout groups, in order to allow for more intimate discussion. The two topics for discussion were key policies and key data assumptions.



The session on **key policies** was chaired by **Mr. Rocco De Miglio** (*E4SMA*). Some of the main topics discussed were around water supply within the region (with respect to its integration with the energy chain), the capability to keep track of regional “strategic agreements”, as well as the deployment of renewable energy capacity with relation to targets set by national governments. Furthermore, additional regional studies and data sources were discussed.

The session on **key data assumptions** was chaired by **Mr. Gabriele Casseti** (*E4SMA*). During this session, the accuracy and reliability of different data sources were discussed in relation to the regional context. Discussions focused particularly on the effects of the COVID-19 pandemic on relevant economic drivers, oil price long-term projections, and costs of key energy technologies (e.g. PV, carbon capture and storage, etc.).

Key outputs from the session will be used to better design realistic decarbonisation scenarios for the region. Moreover, as indicated during the workshop, additional outreach activities to attending stakeholders are planned for the coming months; in this respect, **Dr. Alexandros Nikas** and **Mr. Konstantinos Koasidis** (*National Technical University of Athens*) facilitated a co-creative session via an online polling platform, before **Dr. Hannah Parris** and **Dr. Annela Anger-Kraavi** (*Cambridge*) hinted the next steps of co-designing scenarios to follow. Modelling teams hope to learn more from stakeholders following this initial introduction into the capabilities of the PARIS REINFORCE consortium in the region.

Presentations:

[Haris Doukas - Introduction](#)

[Rocco De Miglio - Presentation of the TIMES-CAC model and preliminary outputs](#)

[Alexandros Nikas - Co-designing research questions and modelling parameters](#)



## 6.11 Understanding regional aspects in the Central Asian and Caspian region: the second of a series of workshops, March 2, 2021



On March 2, 2021, the PARIS REINFORCE project held its second virtual workshop focussing upon the Central Asian and Caspian (CAC) region. The goal for the workshop was to inform regional stakeholders on the progress of the exercise presented during the 1<sup>st</sup> regional workshop (December 9, 2020) and receive a second round of insights from regional stakeholders.

To this end, stakeholders attending the first workshop (including from national governments, NGOs, the private sector, international institutions, and academia) were invited once again. Some stakeholders participating for the first time were also present. On the day, stakeholders from Azerbaijan, Uzbekistan, and Turkmenistan attended.

The workshop began with a brief introduction from project coordinator, **Prof. Haris Doukas** (*National Technical University of Athens*). Then, during the first session of the workshop **Mr. Rocco De Miglio** (*E4SMA*) introduced the progress of TIMES-CAC model exercise. He presented how the first round of stakeholders' insights were elaborated in the storylines and the structure of the new exploratory scenarios developed for analysis, as well as the diverging pathways of key assumptions under each scenario. Emphasis was placed on the topics investigated in the second phase of the analysis: foreign investments in the region (e.g. Belt and Road Initiative) and hydrogen chain development.

The interactive dashboard already used in the first workshop was shared and demonstrated. This dashboard allows for a user-friendly visualisation of the key performance indicators relevant to the explored storylines for the CAC region.

Participants were then invited in a discussion session to allow for more focused discussion.



The session was chaired by **Mr. Rocco De Miglio** (*E4SMA*). Some of the main topics discussed were around water consumption within the region along the energy chain, the capability to manage/analyse tariff reforms as well as international topics such as carbon border adjustment. Furthermore, the possibility to open the technology portfolio to additional solutions (e.g., nuclear for Uzbekistan) was discussed.

During the session **Mr. Gabriele Cassetti** (*E4SMA*) described the hydrogen chain included in the model, as it represented one focus of the analysis.

Key outputs from the session will be used to design further more robust and co-designed decarbonisation scenarios for the region, in view of the upcoming, final PARIS REINFORCE CAC workshop planned in May 2021. Moreover, as indicated during the workshop, additional outreach activities to attending stakeholders are planned for the coming weeks/months. Modelling teams hope to learn more from stakeholders following this discussion series on the project capabilities in the region.

Presentations:

[Haris Doukas - Progress since CAC workshop #1](#)

[Rocco De Miglio - Modelling progress following CAC workshop #1 & second round of TIMES-CAC explorations](#)



## 6.12 PARIS REINFORCE in Kazakhstan's Nauryz Celebration - NU Green Campus Nature Day, March 15, 2021



Nauryz is a holiday for celebrating the beginning of spring, the awakening of nature.

The week before Nauryz, the Nazarbayev University (Nur-Sultan, Kazakhstan) holds a series of events that commemorate the life of nomads in ancient times. The Program of celebration includes presentations and contributions about sustainable development, climate change, and biodiversity in Kazakhstan.

On March 15, 2021, PARIS REINFORCE member **Rocco De Miglio** (*E4SMA*) was invited to take part in the discussion about "Kazakhstan's way to a carbon-neutral future", a "vision" sponsored by the British Embassy in Nur-Sultan.

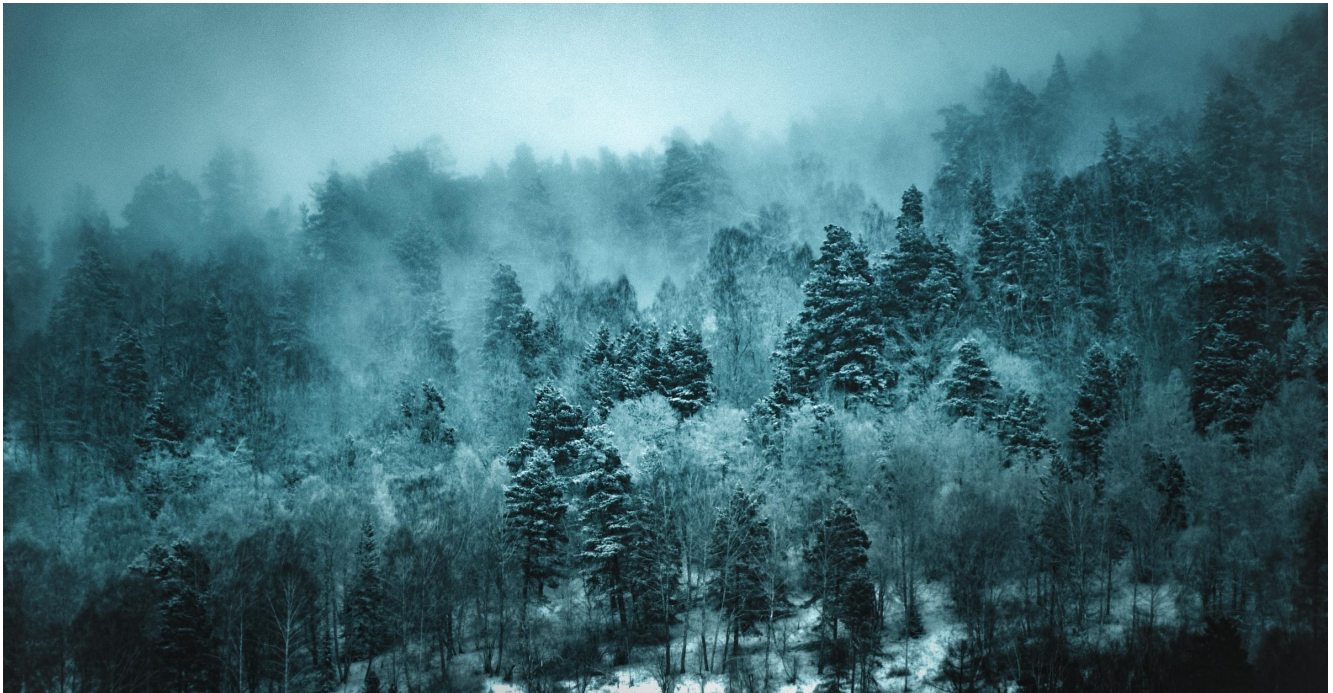
The experience of the PARIS REINFORCE project, with our workshops in the broader Central Asian and Caspian region as a reference point (see more [here](#), and [here](#)), was shared with the participants.

The presentation can be found here:

[Kazakhstan's way to carbon neutral future - Experiences, keywords, issues, and more for an open discussion \(Rocco De Miglio\)](#)



## 6.13 The role of electricity, manufacturing, and forests in Russia's low-carbon transition, March 16, 2021



On March 16, 2021, the PARIS REINFORCE project held its virtual national workshop focusing upon Russia. The goal for the workshop was to receive insights from local stakeholders into the public policy context as well as a better understanding of some of the key assumptions modelling groups must make to build relevant mitigation pathways for the country.

To this end, a range of stakeholders were invited from NGOs, academia, business, and government. On the day, **more than 100 stakeholders** actively participated, providing feedback on the development of effective and realistic measures in the Russian national context to mitigate climate change.

The workshop began with a brief introduction from project coordinator, **Assoc. Prof. Haris Doukas** (*National Technical University of Athens*) ([presentation](#)). Then, during the first session of the workshop, **Dr. Alexandre Koberle** (*Grantham Institute, Imperial College London*) presented preliminary insights from the global modelling activities of the project and elaborated on the low-carbon development of Russia by delving into the current status of the country, its NDC pledges, as well as an estimation of where Russia is headed based on the “where we are headed” scenario logic of PARIS REINFORCE ([presentation](#)). Following this, **Dr. Alexander Shirov** and **Dr. Andrey Kolpakov** (*IEF-RAS*) introduced the model system of IEF RAS dedicated to modelling the low-carbon development of Russia ([presentation](#)). The presentation particularly examined the potential for mitigating GHG emissions in the country, as well as the long-term national mitigation scenarios currently being explored alongside their impact on emissions reduction, economic dynamics, energy efficiency, and investments. Emphasis was placed on the importance of the carbon sink potential from the Russian forests, which is currently underexplored in the established scenarios. Both presentations placed emphasis on the help that stakeholders can provide by allowing for more politically and contextually relevant policies and assumptions to define scenarios.

Participants were then split into three breakout groups, to allow for more detailed discussion with stakeholders themselves. The three topics for discussion were:

- Perspectives on the structure of electricity generation in Russia.



- Ways to decarbonise the manufacturing sector of the Russian economy, including businesses exporting goods to the EU.
- Carbon sequestration potential of Russian forests and ways to maximise it.

Some of the main topics discussed in session on the power sector ([here](#) and [here](#)) revolved around the electricity mix and emission intensity, with emphasis on the role of nuclear energy, natural gas-based generation and renewable energy considering different policy scenarios like carbon regulation measures, direct limits on CO<sub>2</sub> emissions and carbon prices. Discussions focused on the economic and financial evaluation of each technology, with cost-effectiveness being expected to influence the diffusion levels of each technology in decarbonisation plans.

In the manufacturing sector session ([here](#) and [here](#)), main topics discussed included among others the activities Russian businesses have implemented in the past to reduce emissions, as well as future plans and how these plans are expected to affect the competitiveness of Russian companies. Key part of the discussion orbited toward opportunities and threats of the manufacturing sector brought from the climate agenda including the possible expenses from the introduction of a carbon border adjustment mechanism.

Hot topics in the forests session ([here](#) and [here](#)) included how to assess and maximise the carbon sequestration potential of Russian forests. Different estimations of the Russian forest carbon budget and ways to improve them were discussed, as well as strategies to maximise the carbon sequestration potential by improving the control for forest disturbances, forest management techniques, and by promoting forest conservation projects.

Finally, an interactive sli.do voting session, managed by **Mr. Ben McWilliams** (*Bruegel*) allowed participants to give their feedback on the level of emission targets they consider to be realistic and ambitious, their estimations on the rate of GDP energy and carbon intensity improvement, the shares of key low-carbon technologies in the future, the level of carbon sinks, as well as their evaluation of key restrictions that could slow down the low-carbon transition of the country. Key outputs from the session will be used to better design realistic decarbonisation scenarios for the region.

Agenda

[RussiaStakeholderWorkshop\\_Agenda\\_0.pdf](#)





## 6.14 Decarbonisation in the Central Asia and Caspian region: the third (final) of a series of workshops, May 18, 2021



On the 18<sup>th</sup> of May 2021, the PARIS REINFORCE project held its third and final virtual workshop focussing upon the Central Asian and Caspian region. The goal of this final workshop was to inform regional stakeholders on the progress of the exercise presented during the previous two regional workshops (9<sup>th</sup> December 2020 and 2<sup>nd</sup> of March 2021), and receive a final round of their insights.

To this end, stakeholders from the first and second workshops from national governments, NGOs, the private sector, international institutions, and academia were invited for the last meeting. Stakeholders were in attendance from Kazakhstan and Uzbekistan and Turkmenistan, and from the neighbouring Ukraine (IEA, EU4Energy).

In the first session of the workshop, **Mr. Rocco De Miglio** (*E4SMA*) introduced the latest progress in the TIMES-CAC modelling exercise. Stakeholders' insights collected during the previous workshops and in bilateral discussions were elaborated in three final storylines, including some variants: Where are We Headed, NDC-like, and Deep Mitigation.

The total number of scenarios developed in this last phase of the analysis was eight (all included in the dashboard).

The topics investigated were mainly about the “Watergy”, the correlation between power production and water consumption, and commodity tariffs phase-outs, in combination with GHG reduction targets.

“Watergy” has been quantitatively analysed by activating part of the “water module” for the TIMES-CAC model. The possibility to control water consumption improved the analysis and gave new elements to define scenarios, for example by analysing the response of the model to water-related constraints.

Tariffs have been investigated by cross-checking 2017-2020 end-use tariffs per country per sector, based on data



collected in documents from international organisations (e.g., IRENA, IEA, etc.) and Ministry publications from national and international websites, and by making assumptions about their evolutions and phase out.

In this session, **Mr. Konstantinos Koasidis** (*NTUA*) also presented the results of the stakeholder assessment on SDGs and climate action that were kindly provided by stakeholders during the first workshop, and then processed making use of a Multi-Criteria Group Decision and Consensus Analysis framework.

During the second session **Mr. Gabriele Casseti** (*E4SMA*) introduced the CAC Forum (<https://cac.tribe.so>), a tool built to continue the dialogue with stakeholders after the series of workshops. The main features of the forum were presented and described.

Participants were then invited in the final discussion session to allow for more focused discussion. The session was chaired by **Mr. Rocco De Miglio** (*E4SMA*). Some of the main topics discussed were around the possibility to simulate net-zero emissions in the region by 2050 (in particular in Uzbekistan), the capability to manage public funded / private investments (with different risks/discount rates), and define service-related, or consumption-related, tariffs for the energy commodities.

The dashboard used for the visualisation of the key performance indicators relevant to the TIMES-CAC model was illustrated, enriched with the new indicator of water consumption in the power sector for each scenario, and used to demonstrate the response of the underlying energy system model to the various scenario elements.

Key outputs from this last session will be used to further develop the analysis of the CAC energy system and continue sharing knowledge and experience, from now on by moving to the new channel of the CAC Forum.

Presentations:

[Rocco De Miglio - Modelling update following second stakeholder workshop](#)

[Konstantinos Koasidis - Results of the stakeholder-driven multi-criteria decision and consensus analysis](#)

Agenda:

Agenda

[CAC3 PARIS REINFORCE Agenda May 0.pdf](#)



## 6.15 European National Stakeholder Workshop Series: The case of Switzerland, 18 May, 2021



The PARIS REINFORCE European stakeholder workshop series continued with Switzerland, on May 18, 2021. The Swiss Stakeholder Workshop discussed EU current policy and mitigation pathways while gaining insights from Swiss stakeholders for effective decarbonisation policies in the regional and national context. It was held virtually, involving stakeholders from the government, academia, industries, and NGOs in Switzerland. **Prof. Philippe Thalmann** from EPFL (*École Polytechnique Fédérale de Lausanne*) moderated the event.

The workshop began with a brief overview presentation of the PARIS REINFORCE project, delivered by **Prof. Haris Doukas** of the National Technical University of Athens (*NTUA*) as the project coordinator. This opening session highlighted the core of the project and its objectives, mainly orienting on modelling work, the I<sup>2</sup>AM PARIS platform, as well as co-creation and transparency.

Next, modelling work completed or currently carried out for EU mitigation was presented by **Dr. Baptiste Boitier** from SEURECO (*Société Européenne d'Economie*). The presentation explored where current emissions and various socioeconomic indicators in the Union are headed, implied by its current policies projected forward to 2050. The feedback gained during the follow-up discussions substantiated the importance of the EU carbon budget for its long-term strategy, and the territorial concept to determine the future implementation of the Carbon Border Adjustment Mechanism (CBAM). Behavioral changes were discussed as equally critical to ensure EU climate neutrality as citizens' actions are driven by perception.

The next session focused on understanding the range of new technologies and lifestyle changes contributing to an economy with net-zero greenhouse gas emissions by 2050. **Dr. Marc Vielle** from EPFL presented the related issues of full decarbonisation in the light of Swiss Energy perspectives. Like other parts of the EU, the main challenges for deep decarbonisation in Switzerland remain transportation, buildings, and industries. The follow-up discussion underlined the vital role of synthetic and green fuels, the development of storage, and smart grids to intensify green energy electrification.



The workshop was concluded with an online poll with sli.do for gathering quantifiable stakeholder insights into the ambition of climate action and game-changing innovations for climate targets in the EU. Most stakeholders prioritised carbon capture and storage, e-mobility, expansion of renewables, and citizen behaviour, in achieving the ambitious net-zero target. The poll also showed the significance of expanding the EU ETS, implementing EU-wide carbon tax on the ESR with revenue return, and considering the implementation of a CBAM.

Presentations:

[Haris Doukas - Project Overview](#)

[Baptiste Boitier - Insights from existing EU modelling studies](#)

[Marc Vielle - From Deep to Full decarbonisation in the light of Swiss Energy perspectives 2050+ and Paris Reinforce scenarios](#)

Agenda:

[PR Swiss Stakeholder Workshop - Notes & Agenda.pdf](#)



## 6.16 A workshop on the US Long-term strategy towards net zero, 24 May, 2021



On 24<sup>th</sup> and 25<sup>th</sup> May 2021, the PARIS REINFORCE consortium helped to organise a virtual US workshop, in collaboration with key US partners: ClimateWorks, University of Maryland Center for Global Sustainability, Rocky Mountain Institute, World Resources Institute, and the University of Michigan's School for Environment and Sustainability. They convened US and international experts from a broad range of communities concerned with the US low-carbon transition, to discuss strategic, analytical, and implementation needs to achieve a successful US long-term strategy (LTS) to Net Zero.

These stakeholders included: climate change and energy analysts and strategists from academia, NGOs, think tanks, and businesses; policy and regulatory officials from the federal government; experts with on-the-ground experience of implementing low-carbon transitions, including amongst workers and communities. Together, they discussed a number of themes including:

- Strategic and analytical needs towards a successful LTS
- Challenges and opportunities to decarbonising whilst ensuring the transition is equitable
- Implications of the transition on the economy, including jobs and opportunities

The first day of the workshop opened with **Professor Leon Clarke** of the University of Maryland, a Scientific Advisory Board member of PARIS REINFORCE, setting out the context for US long-term decarbonisation action, in light of the US's recently updated NDC. There then followed introductory comments from a range of US policy and government officials on the opportunities and uses of additional analysis to help inform and frame long-term action in the USA.

A series of lightning presentations then followed on different groups' current analysis of long-term strategies both



in the USA and other countries. This included a presentation by **Dr Haris Doukas** (NTUA) and **Dr Ajay Gambhir** (Grantham Institute, Imperial College London) on the PARIS REINFORCE analysis around mitigation pathways in major emitting economies, and the related analysis around jobs and SDG implications. Other presentations highlighted the critical need to consider equity, jobs, and a range of non-climate concerns into account to achieve a workable long-term strategy. Comments highlighted that there must be greater analysis of local, community-level implications. In addition, to achieve Net Zero, all sectors and gases must be analysed in detail.

The second day of the workshop opened with a series of presentations on current analysis and future requirements to consider aspects of equity and jobs. This paved the way for two breakout discussions on jobs and equity respectively. The equity discussion highlighted that there is a need for better data to build appropriate metrics to highlight equity implications of the transition, and that without equity concerns at the core of a long-term strategy, it would not succeed. The jobs discussion highlighted how there needs to be better analysis that goes beyond jobs numbers, including on jobs quality, wages, contract length, and inclusivity.

A constant theme throughout the workshop was that stakeholder participation and inclusion is a central element of equity, and is essential in the design of the LTS and its sub-national elements.



## 6.17 European National Stakeholder Workshop Series: The case of France, 26 May, 2021



The PARIS REINFORCE project held a national stakeholder workshop in France, on May 26, 2021. After a presentation of the project and its first modelling results, we discussed key technologies for deep decarbonisation of the French economy with national stakeholders, including electricity (renewables, smart grids, and uses), hydrogen, and carbon capture, utilisation and storage (CCUS), which three French experts were invited to introduce. The discussions were held in French.

The workshop kicked off with a very brief overview of the project (sole part of the workshop in English), delivered by the Project Coordinator, **Prof. Haris Doukas** of the National Technical University of Athens (NTUA). This opening session highlighted the core of the project and its objectives, mainly orienting on modelling work, as well as co-creation and transparency. It was followed by an introduction of the goals of the workshop by **Prof. Paul Zagamé** from SEURECO (*Société Européenne d'Economie*).

Next, modelling work completed or currently carried out for EU mitigation was presented by **Dr. Baptiste Boitier** from SEURECO, who framed this presentation around the I<sup>2</sup>AM PARIS platform, showcasing its capabilities live, and explaining our expectations from the platform until the end of the project and afterwards. The presentation then explored where current emissions and various socioeconomic indicators in the Union are headed, implied by its current policies projected forward to 2050.

The first topics discussed, on *"the challenges of electricity: renewables, smart grids, and uses"*, was introduced by **Alain Burtin**, Director of Research and Development at Electricité De France (*EDF*). He explored the French context in terms of climate ambition, routes to decarbonising the French economy (energy substitution, decarbonisation of energy carriers, and energy efficiency), and the potential of electricity to support emissions mitigation in the country. Alain Burtin continued with the evolution requirements for the European and French electrical systems to support growth and the necessity to deliver carbon-free electricity, emphasising the role of smart grids. Following discussions questioned the role of electricity in the transport sector as well as the alternatives to electricity in long-distance transport (trucks, aviation, and maritime).

The second topic, *"hydrogen, between myth and reality"*, was introduced by **Jean-Eudes Moncomble**, Secretary



General of the Conseil Française de L'Énergie (CFE), the French branch of the World Energy Council (WEC). The WEC's work on establishing and comparing the current situation of national hydrogen strategies around the World was presented, and the objectives of these strategies were explored. Jean-Eudes Moncomble continued with the potential hydrogen needs by sector, the production technologies, and their costs including transport. He also pointed out the key questions about the future of hydrogen in Europe (domestic production vs. imports, investment and infrastructure requirements, and the need for intra-EU and international cooperation). The follow-up discussion underlined the importance of flexibility and the need of geographically detailed modelling exercises as well as of non-conventional storage associated with the question of the availability of critical materials.

The last topic, "*CO<sub>2</sub> capture and storage: more than a false good idea from "fossil" energy companies?"*", was introduced by **Dominique Copin**, an independent expert, recently retired from the company Total, for which he assessed the potential contribution of CCUS for climate change mitigation and its possible impact on the future of the oil and gas industries. Dominique Copin started by explaining the role of CCS in climate change mitigation and pointed out that the technology is already mature. He emphasised the difficulties for some industrial sectors to fully decarbonise their production (electricity, cement, or steel) and argued that CCUS has a role to play in these sectors. Dominique Copin concluded with existing obstacles to significant deployment of CCUS (supporting fossil industries, high costs, related risks, and storage potential). Discussions in this session focused on the importance of CCUS, or lack thereof in currently deployed decarbonisation pathways, and geological aspects of considerable CCUS deployment across the globe.

Finally, Prof. Paul Zagamé concluded the workshop by thanking all speakers, stakeholders attending the workshop, and the Conseil Français de l'Énergie for its support in this event.

Presentations:

[Haris Doukas & Paul Zagame - Introduction](#)

[Baptiste Boitier - The platform & work done so far](#)

Agenda:

[PR-France-26052021.pdf](#)





## 6.18 From Numbers to Insights: How to Think about Economic-Climate Modelling, 26 May, 2021



Climate-economy models are a powerful tool for providing insight into sensible climate policy choices and how they would impact our economy. As the EU announces stricter climate targets, there are an increasing number of modelling studies published attempting to do just so. However, these models are highly complex and largely inaccessible to wider audiences.

On May 26, 14.00 CEST, the PARIS REINFORCE project held an online webinar to discuss some of the key issues that policymakers should consider when confronted with new modelling studies. For example, why do different models provide very different perspectives when trying to answer the same question? Why is it that certain models are better suited to certain policy questions? How can we sensibly form our own opinions about how strongly to trust new modelling results?

The goal for the event was to hold a discussion on the sensible usage and interpretation of climate-economy models. The desired outcome from the workshop was a conversation, which would be informative for policy-interested stakeholders that are confronted with modelling studies. The core of the PARIS REINFORCE project is effectively incorporating stakeholders into modelling worlds. Such an event was therefore useful for the project's internal thinking and hopefully for a wider audience.

The event was broadcast live on the [Bruegel's website](#) and remains hosted online. This means that interested policymakers and other stakeholders are able to watch the event recording at any point in the future. The digital audience was able to pose questions/comments to the panel using the online tool, sli.do (a total of 33 questions/comments were posed through the platform).

### Opening presentation



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

The event began with a 30-minute presentation by **Georg Zachmann** (*Bruegel*). The title of the presentation was: *'From Numbers to Insights: Interpreting climate-economy modelling results for policymakers'*. The purpose of the presentation was to provide an overview on what economy-climate models are used for, and how non-modellers should approach modelling studies.

The presentation put forward the argument that models "are a useful tool to organise knowledge and build consensus". Economics seeks to translate impacts and constraints into numbers to establish the impacts of different decarbonisation pathways; however, achieving this perfectly is impossible. Models are able to provide arguments for action: they can highlight the requirements, obstacles, and trade-offs for meeting a certain goal. However, it was noted that understanding a model requires a huge time investment. Models are associated with lots of jargon and complex concepts. To derive useful information from a modelling study, it is important to consider results in the context in which they are produced, and this is difficult. Even experts commonly disagree on modelling choices and core assumptions.

The second half of the presentation then put forward some ideas around the following two themes:

1. How should policymakers look at modelling studies?
2. What questions should they ask modellers?

A checklist of proposed useful questions, which non-modellers should ask when confronted with a new modelling study, were discussed:

1. Who designed the questions? Questions already imply judgement and set agendas.
2. Which model is used to answer the question? If the model is too big for the question, then there is the risk of generating noise.
3. What is the baseline?
4. How strongly should we believe the results? This decomposed into the following elements: sensitivity analysis; differences across models; intuitive explanation of sign and size; and accessible methods for interacting with model scenarios.

### Panel discussion

The event then moved to panel discussion, among **Ewelina Daniel** (*European Commission, DG Energy, Unit A4 Economic analysis and financial instruments*) and two consortium members, **Ajay Gambhir** (*Imperial College London*) and **Glen Peters** (*CICERO*), moderated by **Georg Zachmann**. Each participant was given five minutes to offer initial remarks to the opening presentation.

During the discussion, a number of points were raised and discussed. Certain key points are summarised below:

- There are certain qualitative elements (e.g., political feasibility), which cannot be incorporated in models. How can such factors be considered alongside quantitative modelling output? During scenario design, qualitative features can be included. When designing scenarios, discussions with stakeholders can shed light on which technologies or behaviours can be assumed to be feasible within local contexts.
- In response to a discussion about the adaptability of modelling teams, the example was offered of the modelling community, which has been criticised in the past for excessive use of negative emissions technologies (like bioenergy carbon capture and storage, or BECCS) to achieve low emission pathways. This fact is now being addressed and studies are currently being produced, which are less reliant on BECCS.
- Regarding a question on whether policymakers derive more utility from models or modellers themselves, an analogy was put forward that 'models open the door' but then conversation is required. This was in



keeping with a main theme of the workshop. Models are not magic machines that provide answers. Instead, they can shed light on particular topics, but should be seen as the catalyst for further discussion and exploration.

- When reflecting on the future, it was noted that model improvements (enabled by faster computers) are likely to enable better predictions/simulations in the future. However, they will inevitably become more complex. It is critical that modelling teams not allow models to become self-defeating as they become too complicated for non-modellers to understand.

### Closing presentation

**Haris Doukas** (*National Technical University of Athens*) closed the event with remarks on what had been discussed as well as providing an outlook for the future of the PARIS REINFORCE project. He spoke to the fact that models must be considered within a broader framework of competing questions, and that nothing is implemented in isolation. For example, when deploying new renewable electricity generation, what are the effects on land use? Are there possible environmental consequences that in turn are perceived as social implementation barriers?

Drawing from project results and policy/academic publications, he also emphasised the role of 'game changing' technologies in modelling: it is important to develop better representation of emerging and early-stage technologies as well as large scale behavioural change. Closing remarks provided an overview of ongoing stakeholder dialogue and explained the future workshops that the project will hold, as well as the attempts through a series of workshops within and outside of the European Union to better incorporate sensible stakeholder preferences into models.

Research papers produced in the context of the project were also mentioned to support these points.

Link

[Click here to watch the event recording!](#)



## 6.19 Deliberative dialogue in Spain as a driver of change, 26 May, 2021



Stakeholder engagement and co-creation lies at the core of the H2020 PARIS REINFORCE project, aiming to include stakeholders' knowledge and expertise in the research process. Until now, the project has involved an important number of policymakers and other institutional stakeholders, at the EU level as well as at national level in Member States and major or less emitting countries across the globe, that have helped co-create research questions. Within the context of the project, policymakers and expert stakeholders in the UNFCCC process were also consulted to interpret the Paris Agreement text in light of future stakeholder lead scenario modelling.

Now, we aim to strengthen the co-creation process with the inclusion of the lay public. To pursue such an objective, project partner BC3, along with [40dB](#), have just kicked off a deliberative dialogue with 40 citizens representing all ages and regions of Spain, off to a three-week journey of deliberation on pertinent issues regarding the climate crisis. The deliberation focuses on Spanish citizens' perceptions and feelings on different behavioural changes regarding mobility, consumption, food and waste. Additionally, it will serve to connect people from different backgrounds and locations and reveal policies, interventions, and possibilities on climate action despite differing opinions or paths that were not evident to individuals alone prior to the debate.

The introduction session, conducted online on the 26<sup>th</sup> of May 2021, will be followed by break out sessions of 5 groups (of 8 citizens each) focusing on more detailed interventions over the next two weeks, giving the space to hear all voices present in the fora. Citizens also have the opportunity to debate on an online platform site with related questions.

The changes produced in citizens' opinions will be followed by a survey before and after the deliberation, and the results will be compared with a control group. We expect the deliberation process to have an impact on citizens' perceptions, presenting them with more knowledge on issues related to the climate crisis, but also improving their understanding about the current policies in place and those that are to be implemented in the future. While this



does not imply that everyone will adhere to or agree with every policy or behavioural change, it is important to give citizens a space and voice to express their concerns and visions.

Therefore, this dialogue is seen as a means of involving citizens in the discussion and listening to them in return for co-creating solutions to tackle the climate crisis.

Overall, we believe that this experiment could provide many important and interesting insights for the modelling work in PARIS REINFORCE, but also for those in charge of decision making especially in Spain in relation to the upcoming [Citizens' Assembly](#), expanding the impacts of PARIS REINFORCE outside the science-policy realm.



## 6.20 Carbon Neutrality and the Belt & Road Initiative: the PARIS REINFORCE China Workshop, June 8, 2021



The PARIS REINFORCE China stakeholder workshop was held online on June 8, 2021. The workshop discussed China's net zero emissions after its carbon neutrality goal, how to achieve it from policy to practice, and topics related to the energy system in the context of the Belt and Road Initiative. Stakeholders from the Chinese government, academia, and Chinese companies participated in the event.

First, Prof. **Haris Doukas** from the National Technical University of Athens introduced the background and objectives of the PARIS REINFORCE project, including the core content of the project, models used, the I<sup>2</sup>AM PARIS platform and details of recent and upcoming workshops.

Then, **Dr. QM. Chai** from China's National Centre for Climate Change Strategy and International Cooperation (NCSC) introduced his work related to supporting China's carbon neutral targets, focusing on the energy system optimisation. He discussed how to promote carbon neutrality from the perspective of the energy transition, and how to make China's policies promote realistic actions.

From the PARIS REINFORCE consortium, **Dr. Xi Yang**, from China University of Petroleum Beijing, introduced China's energy status and carbon neutral policy background, explained her current modelling work and initial results, with corresponding strategies proposed for different sectors. Next, **Dr. Drik-Jan Van de Ven** from the Basque Centre for Climate Change (BE3) presented his initial simulations of China's current policy, as well as mitigation scenarios, based on the GCAM model, to show how China could achieve net-zero carbon emissions by 2060.

Following these initial presentations, workshop participants entered into an open discussion session around China's net-zero target, coordinated by **Dr. Xi Yang**. Starting from Shanxi Province—China's largest coal power



production base—**Dr. XL. Yao** introduced how Shanxi should transform in the process of carbon emissions reduction, focusing on the energy-intensive industries of the province. Next, **Dr. XZ. Feng** from the Policy Research Center for Environment and Economy, Ministry of Ecology and Environment of China, explained the synergistic effects of pollution reduction and carbon reduction and the adjustment of industrial structure from the perspective of the coordinated control of pollutants and greenhouse gases. **Dr. CL. Zhang** from the National Grid Energy Strategy Research Institute discussed the challenges of reducing carbon emissions in the power system, including integrating renewable energy power, operation control technology, market mechanisms and policy incentives. Finally, **Prof. J. Pang** discussed how China's carbon market has a relatively significant development effect, but there are still many problems, such as high regulatory costs, quota allocation and other issues.

A second open discussion session on the Belt and Road Initiative, again coordinated by **Dr. Xi Yang**, included opinions and comments from industries and enterprises in China. **Ms. WQ. Lin** from Guangdong Energy Group introduced the company's renewable energy power generation transformation and the company's "Belt and Road Initiative" actions. **Ms. S. Guo** from Datang Group introduced the group's clean energy goals and ways to achieve it. **Mr. W. Han** from China Power Finance argued that financial resource allocation is indispensable in the green development and low-carbon transition. **Ms. S. Zhao** from Climate Change and Sustainability Division EY LLP discussed how companies can participate in the green construction of the Belt and Road Initiative through using green bonds or green credits as financial support.

Finally, participants were invited to vote online on sli.do, for the project to collect stakeholders' views on China's carbon neutrality and the Belt and Road Initiative, carbon emissions reductions, energy transition and development prospects, coordinated by **Mr. Ben McWilliams** from Bruegel. Stakeholder perspectives will be incorporated into the scenario design of national low-carbon pathways modelling in the current phase of the PARIS REINFORCE project.



## 6.21 European National Stakeholder Workshop Series: The case of the Netherlands, June 9, 2021



The Dutch climate policy and sectoral developments are characterised by a variety of divergent factors from the civil society-led court-cases obliging both the government and Shell to increase climate ambition, monetary and fiscal attention as captured by the Dutch Central Bank's (DNB) first TCFD (Task Force on Climate-related Financial Disclosures) report, accelerated fossil power station closures, intensive agriculture-driven environmental and climate challenges in parallel with the country's innovative finance and technology sectors venturing into hydrogen, electric-mobility, and renewables, as ABN-AMRO's journey on the road to Paris highlights.

On June 9, 2021 (10.00 - 12.30 CEST), the PARIS REINFORCE project held its online national stakeholder workshop in the Netherlands, motivated by this context. Key topics for discussion included implications of the EU's 2030 55% GHG reduction target, the effects of the COVID-19 pandemic and its corresponding recovery measures (NextGenerationEU / Recovery and Resilience Facility), as well as 'game-changing' technologies, such as hydrogen – as envisaged in the national hydrogen strategy - and the role of the finance sector in decarbonisation and achieving climate neutrality by 2050.

This online workshop aimed at creating an open discussion between a broad range of climate action stakeholders representing NGOs, Academia, Business, and Government. It used unique online engagement tools and techniques to allow for a pragmatic and informative discussion on the policies and technologies required for achieving the goals of the Paris Agreement.

The event agenda can be found here:

Agenda

[PR Dutch finance hydrogen-Event Agenda 09062021.pdf](#)





## 6.22 Modelling capacity building in Azerbaijan for long-term energy strategy development, June 10, 2021



On June 10, 2021, as part of a training program organised in the framework of an EU-funded technical assistance project supporting the Ministry of Energy in Azerbaijan to build in-house capacity for long-term energy planning and developing a new energy system model for Azerbaijan, **Mr. Rocco De Miglio** (*E4SMA*) was invited to give a presentation and share the experience of the ongoing PARIS REINFORCE project with a focus on the Central Asia Caspian - Azerbaijani modelling work and its co-creation process.

The lecture presentation is available [here](#).

Agenda

[DeMiglio Azerbaijan Lecture3 100621.pdf](#)



## 6.23 Climate action and clean energy after COVID-19: What Greek Citizens think, June 15, 2021



This is the first time a representative sample of the **Greek society answers questions about climate change, COVID-19, recovery, and our options moving forward.**

The results of the survey, which was held in **Greece** by [Opinion Poll](#) on behalf of [PARIS REINFORCE](#), were presented on Tuesday 19:00 – 20:35 EEST by **Mr. Zaharias Zoupis**, Research Director of Opinion Poll, and **Assoc. Prof. Haris Doukas** (NTUA), Project Coordinator of PARIS REINFORCE.

The results were discussed by a panel comprising:

- **Vlassopoulou Chloé**, Assoc. Professor, Department of Political Science, University of Picardie Jules Verne, Amiens, France
- **Ibrahim Dimitris**, Energy and Climate Policy Officer, WWF Greece
- **Nikas Alexandros**, Postdoctoral Climate Policy Researcher, National Technical University of Athens
- **Tsani Stella**, Assistant Professor, Department of Economics, University of Ioannina
- **Tsipouridis Ioannis**, Director of RECCReC (Renewable Energy & Climate Change Research Center) at the Technical University of Mombasa
- **Psarras Ioannis**, Professor and Director of Decision Support Systems Lab at the National Technical University of Athens

The live panel discussion was moderated by **Mr. Thodoris Panagoulis**, Director of Energy Press Gr.

The video of the event is available [here](#).

The results of the poll are available here:

Agenda

[POLL CLIMATE CHANGE.pdf](#)



## 6.24 Energy modelling workshop in Ukraine, June 29, 2021



On June 29<sup>th</sup> and 30<sup>th</sup>, 60 Ukrainian participants from academia, the government, private companies and public energy agencies joined Low Carbon Ukraine and the Kyiv School of Energy Policy for a workshop on energy and electricity system modelling. The event was co-organised with Bruegel and the PARIS REINFORCE consortium.

The participants learned about a variety of different energy models (TIMES Ukraine, PRIMES, TIAM, LEAP) and about their advantages and peculiarities. LCU also presented the in-house developed Optimal Dispatch Model of the Ukrainian electricity system.

Presenters included:

- Jan Abrell, ZEW – Leibniz Centre for European Economic Research
- Rocco De Miglio, E4SMA S.r.l (PARIS REINFORCE)
- Oleksandr Diachuk, Institute for Economic Forecasting
- Ajay Gambhir, Imperial College London (PARIS REINFORCE)
- Lukas Feldhaus, LCU Analyst
- Manuel v. Mettenheim, LCU Analyst
- Clemens Stiewe, LCU Consultant
- Rouven Stubbe, LCU Analyst
- Georg Zachmann, LCU Team leader (PARIS REINFORCE)

The target of the two days was for the participants to be able to look behind the curtains of modelling, in order to better understand and assess the validity of models' results. This is especially important, as Ukraine is currently laying out the path for the future of its energy system, with several competing plans and scenarios. Understanding what these scenarios imply and what their projections in terms of costs, energy consumption and emission levels actually mean is thus crucial for researchers and decision-makers.



Material:

[Approaching model-based scenario analysis “as a means of understanding” \(Rocco De Miglio\)](#)

[Documentation of LCU’s energy model of Ukraine](#)



## 6.25 PARIS REINFORCE at COP26: Towards an emission neutral society - challenges and opportunities, 1 November, 2021

# #COP26



With fellow H2020 research projects, PARIS REINFORCE co-organised an event, as part of the European Union's side events at the COP26 summit, in Glasgow, on Monday, 01 November 2021.

Projects NAVIGATE represented by Potsdam Institute for Climate Impact Research (PIK), PARIS REINFORCE represented by National Technical University of Athens (NTUA), LOCOMOTION represented by European Environmental Bureau (EEB), and VERIFY represented by Laboratoire des Sciences du Climat et de l'Environnement (LSCE) together organised the virtual side event "Towards an emission neutral society: challenges and opportunities".

The projects discussed challenges and opportunities on the way to an emission neutral society. These include the implications of the EU recovery funds on emissions and employment, social and resource implications of a fair renewable energy transition, transformative mitigation measures on the supply and demand side, and the need for independent verification of country emissions accounts.

The Project Coordinator, Assoc. Prof. **Haris Doukas** (NTUA), represented PARIS REINFORCE.

More information can be found [here](#).





## 6.27 PARIS REINFORCE at COP26!, November 12, 2021

# #COP26



PARIS REINFORCE attended COP26, in Glasgow, UK, 01-12 November 2021.

On Monday, 1 November 2021, **PARIS REINFORCE co-organised an event with fellow H2020 research projects**, as part of the European Union's side events at the COP26 summit. In particular, projects NAVIGATE represented by Potsdam Institute for Climate Impact Research (PIK), PARIS REINFORCE represented by National Technical University of Athens (NTUA), LOCOMOTION represented by European Environmental Bureau (EEB), and VERIFY represented by Laboratoire des Sciences du Climat et de l'Environnement (LSCE) together organised the virtual side event "**Towards an emission neutral society: challenges and opportunities**". The projects discussed challenges and opportunities on the way to an emission neutral society. These include the implications of the EU recovery funds on emissions and employment, social and resource implications of a fair renewable energy transition, transformative mitigation measures on the supply and demand side, and the need for independent verification of country emissions accounts. More information can be found here ([link](#)).

On Friday, 5 November 2021, at the Central Asia pavilion (blue zone) of COP26, PARIS REINFORCE had the opportunity to discuss the **role of regional and international cooperation in the framework of the "net-zero emissions vision to 2060" for Kazakhstan**. Organised as a multiplayer strategic game (with Kazakhstan as a "centroid" of the game), the presentation illustrated the possible space for synergies and cooperation with relevant actors (Central Asian region, Russia, China, and the EU) that can ease or trigger the climate neutrality ambition of Kazakhstan. More information, including a video and the presentation, can be found here ([link](#)).

PARIS REINFORCE also contributed to the **COP26 European Commission's Policy Publication, "Climate Action in the Post-COVID-19 World"**, with its brief on "**Investigating Optimal Allocations for Green Recovery Funds**". Our contribution focused on the dramatic economic consequences of the COVID-19 crisis in Europe.



Despite significant public interventions, more than 1.8 million jobs were lost in the EU up to September 2020. As fiscal stimulus measures continue to be announced, policymakers have an opportunity to ensure that the short-term stimulus points the economic recovery in a sustainable direction in the long term, considering the trade-off between these goals. The project brief investigated this trade-off between short-term economic gains, in the form of employment, and longer-term CO<sub>2</sub> emissions reductions from fiscal stimulus packages. Analysis was performed to identify the optimal energy investment mix of proposed fiscal programmes in terms of new energy sector jobs and CO<sub>2</sub> emissions cuts compared with a current policy baseline. More information, along with the entire policy publication, can be found here ([link](#)).

Finally, PARIS REINFORCE researchers, including **Dr. Hannah Parris** and **Dr. Annela Anger-Kraavi** (*Cambridge*), **Ms. Ester Galende** (*BC3*), **Dr. Ajay Gambhir** (*Imperial*), and **Mr. Rocco DeMiglio** (*E4SMA*), physically attended COP26 and followed climate talks closely. Among various project activities and presentations in targeted virtual and physical events, researchers in the consortium have had the opportunity to communicate the project's aims and disseminate its findings, also sharing dissemination material with COP26 attendees.





## 6.28 How do Brazilian stakeholders perceive the country's net-zero transition and potential bottlenecks?, May 2, 2022



The PARIS REINFORCE project hosted a virtual workshop, on May 2nd, 2022, to discuss and refine the project's modelling results on low-carbon pathways for Brazil with stakeholders from the public and private sector as well as academia. The workshop aimed to receive feedback for the Brazilian whole-energy system low-carbon pathways modelling that the project consortium had already undertaken, as well as identify bottlenecks hampering the decarbonisation pathways and to co-create guardrails for a transformative policy mix that could overcome those bottlenecks, with a particular focus on the transport sector.

The workshop began with a brief introduction on the overall aims and objectives of the PARIS REINFORCE project, from project coordinator **Dr. Alexandros Nikas** (*National Technical University of Athens*). Following this, **Dr. Sara Giarola** (*Imperial College London*) gave an overview on the modelled pathways for Brazil. A first aspect from stakeholder feedback was the need to take into account land use as a key element in Brazil's climate impact, through specifying what assumed contribution land-use sectors would make to net emissions in the coming decades. In addition, Brazilian stakeholders pointed to the available national models that should be taken into account for further analysis, including their treatment of land use and of sustainable biofuels. Further comments were made on the opportunities to integrate renewables into the electricity grid, using for example grid storage technologies. Finally, stakeholders highlighted that fast-growing sectors such as aviation and shipping should not be neglected in a path towards net-zero, despite the absence of ambitious climate policies. They also perceived that the absence of a regulatory framework for CCS may hinder the deployment of the technology.

**Dr Jakob Wachsmuth** (*Fraunhofer ISI*) complemented the modeling overview with a zoom-in on the sectoral analysis, including on CCS, bioenergy and electrification of transport and he concluded with a discussion on



tentatively identified and yet to be elaborated bottlenecks to decarbonisation.

In the interactive second part of the workshop, organised by **Dr. Philine Warnke** (*Fraunhofer ISI*), participants assessed the importance of identified bottlenecks through online polling, specified how they hamper the decarbonisation of the transport sector and discussed how they can be effectively addressed by a future policy mix.

### **Key takeaways:**

A number of important bottlenecks to decarbonisation were highlighted such as lack of unified definitions of advanced biofuels and lack of railway infrastructure expansion. Highest importance was assigned to barriers due to financing of transport electrification, namely: High price and scarcity of batteries, difficulty of access to credit and the fear of rising cost of mobility. Especially sensitive are Diesel price fluctuations correlated also with biodiesel mandates, and the lack of an open electricity market where consumers may decide which supplier to buy the electricity from. In addition, the resistance of powerful actors in incumbent industries such as oil and gas and hydropower was singled out as a key factor.

In the discussion of these bottlenecks it was emphasised that inequality and poverty and subsequent **lack of funds on individual and community levels** need to be taken into account for any climate policy, especially with currently rising interest rates and inflation. It was stressed that the focus of e-mobility efforts in Brazil needs to be on collective use (public transport, company car fleets) rather than pushing for increasing car ownership. Promoting collective e-mobility would promote infrastructure development; this may allow an uptake of electric cars in the private sector, although this is perceived optimistic and limited to a fraction of the wealthiest parts of the population. In general a complex mix of fuels, including biomethane, sustainable biofuels, hydrogen, and bio-electricity, will be part of the net-zero transition, as stakeholders pointed out. While the currently high prices for batteries contribute to the financing issues it was stressed that this is due to a global supply chain shortage issue rather than specifically Brazilian problem.

A second set of bottlenecks is associated with **resistance of powerful actors** and influence of lobbies. It was pointed out that legislation is not always driven by the best available science but prone to influence from various lobby groups. Consequently, there is too little momentum to overcome status-quo and delay of important legislation on decarbonisation. This situation is reinforced by the fact that climate policies do not play a major role in Brazilian election campaigns compared to other countries. Given the lack of interest from consumers also car companies that advocate e-mobility globally, there has been a focus on petrol-based SUV sales in Brazil. In general, there was a feeling that especially the wealthy part of the population does not care too much about **sustainable lifestyle choices** even if they agree with abstract sustainability targets.

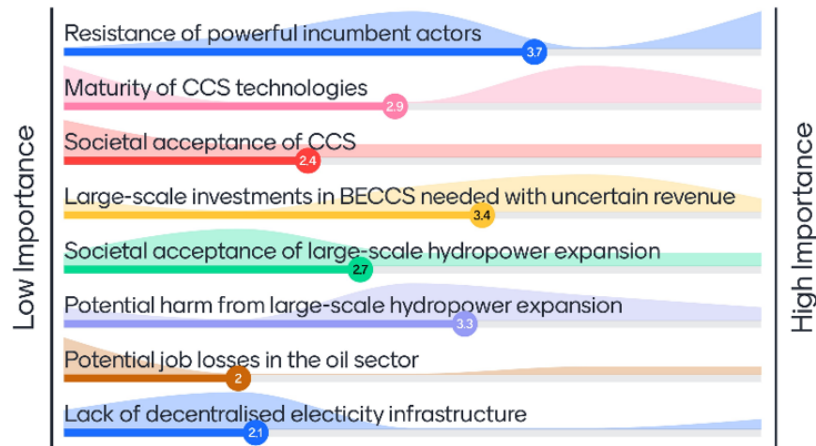
As key elements of a possible policy mix to support the transformation the following elements were discussed: Bespoke awareness-raising to increase public empathy towards climate change, long-term planning, target-oriented coordination of efforts between industry, civil society and government in dedicated spaces for dialogue, strict and science-based regulation and finally creation of open markets for renewables.

It was emphasised however that none of these measures on its own is a silver bullet but rather the **complex interplay of developments** needs to be focused on.



## How do you assess the importance of these bottlenecks to the realization of the deep mitigation scenario in Brazil?

Mentimeter



The workshop's presentation can be found here:

Agenda

[PARIS-REINFORCE Brazil-workshop\\_final.pdf](#)



## 6.29 Identifying bottlenecks to Canada's transport decarbonisation - a stakeholder workshop, May 9, 2022



The PARIS REINFORCE project hosted a virtual workshop, on May 9th, 2022, to discuss and refine the project's modelling results on low-carbon pathways for Canada with stakeholders from the public and private sector as well as academia. The workshop aimed to receive feedback for the Canadian whole-energy system low-carbon pathways modelling that the project consortium had already undertaken, as well as identify bottlenecks hampering the decarbonisation pathways and to co-create guidelines for a transformative policy mix that could overcome those bottlenecks, with a particular focus on the transport sector.

The workshop began with a brief introduction on the overall aims and objectives of the PARIS REONFORCE project, from the coordinating side (**Dr. Alexandros Nikas**, *National Technical University of Athens*). Following this, **Dr. Kathleen Vaillancourt** (*ESMIA*) gave an overview on the modelled decarbonisation pathways for Canada, developed using the North America TIMES Energy Model (NATEM). Key takeaways for continued modeling from stakeholder feedback included:

- The need for a multi-scalar perspective that takes into account the particularities of each province
- A suggested focus on modal shifts in the transport sector, rather than simply replacing existing fossil fuel vehicles with non-fossil (e.g. electric) vehicles

**Dr Jakob Wachsmuth** (*Fraunhofer ISI*) complemented the whole-system modeling overview with a zoom-in on the sectoral analysis, including decarbonisation of transport, the role of oil, electricity, hydrogen, and efficiency and he concluded with a discussion on tentatively identified and yet to be elaborated bottlenecks to decarbonisation.

In the interactive second part of the workshop, organised by **Dr. Philine Warnke** (*Fraunhofer ISI*), participants assessed the importance of the different identified bottlenecks through online polling, specified how they could hamper the decarbonisation of the transport sector and then discussed how they can be effectively addressed by a future policy mix.

### Key takeaways



A number of important bottlenecks to decarbonisation were highlighted: Limited decarbonisation options for modes other than road transport, uncertainties around (BE)CCS technologies, potential job losses in the oil sector, lack of tools to model transport reduction, demand for large-scale investment in infrastructure rollout, strong role of provincial governments, inadequate urban planning, lack of low carbon solutions for HDVs, consumer uptake of e-mobility. The most highly ranked in terms of importance were CCS-related uncertainties, lack of options for decarbonisation of freight, and urban planning failures, which were then discussed in more depth.

As one important group of bottlenecks for decarbonisation, stakeholders highlighted the substantial **uncertainties around CCS technologies**. While many actors in Canada place high hopes on CCS playing a major role for decarbonising both the oil sector and carbon-intensive industries, actual implementation of CCS is surrounded by considerable unknowns. These unknowns include the future cost reduction prospects of CCS, given that at this stage its costs remain high and there is thus a lack of confidence in how much CO<sub>2</sub> capture can actually be delivered by this set of technologies. Stakeholders emphasised that the lack of a clear taxonomy for acceptable CCS performance criteria (e.g. around acceptable capture rates to make it a genuinely low-carbon technology) as well as regulatory barriers (in particular around land tenure systems) have slowed capital allocation. Furthermore, it was pointed out that the geographical separation between capture sites and storage sites could also prove a hindrance to successful project deployment. Also, questions over longevity of policies and carbon price volatility were thought to hamper long term investment. Finally, lack of legitimacy of CCS especially in connection with enhanced oil recovery (EOR) and tax rebates for the oil industry was highlighted. There are fears that CCS may divert attention from transformative changes away from fossil fuel based economy and reduction of energy consumption. According to participants, many Canadians feel that powerful actors dominate the discourse and there is little space for alternative narratives. Accordingly, key elements of the transformative policy mix were a clear taxonomy and roadmap generating trust in truly effective decarbonisation technologies and guiding capital allocation. This would need to be complemented by a strong regulatory framework including clear property rights surrounding captured and stored CO<sub>2</sub>.

Regarding **decarbonisation of freight transport**, stakeholders pointed to the lack of roadmaps for modal shifts. In addition, it was felt that thorough analysis of alternative technologies for HDVs and rail transport, which is currently largely diesel based, is urgently needed.

A second group of key bottlenecks centred around **urban planning**. Stakeholders emphasised that current municipal plans are not all aligned with climate goals and the role of local governments in achievement of net zero/transport decarbonisation is unclear. Accordingly, urban planning is largely not conducive to lower and decarbonise transport activity. Attempts to curb urban sprawl and increase density of cities are scarce.

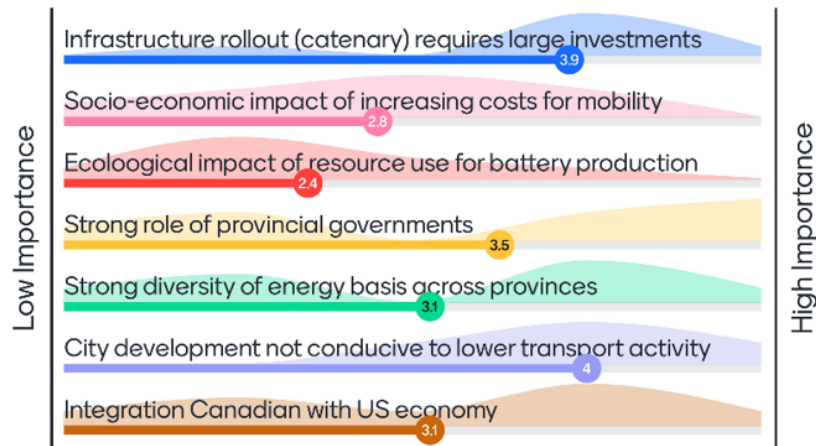
Participants highlighted that long-term planning and robust measures towards a just transition that focuses equally on innovation and exnovation are key for a successful transformative policy mix. An important element of this would be targeted support to transitioning of the workforce from the oil and gas sector within the affected regions. Differentiated modelling on a regional or even local level would be an important enabler for such tailored strategies. At the same time, the importance of intergovernmental coordination of efforts to decarbonise was stressed. Other key elements of a possible policy mix would be tax schemes to govern the use of roads.

Across all these themes, **governance issues resulting from multi-scalar structures** were emphasised as a key challenge to effective decarbonisation pathways. Another crosscutting issue was the need to **advance models by building bridges to advocacy and socio-technical analysis** communities and better incorporate also social and behavioural change.



# How do you assess the importance of these bottlenecks to the decarbonisation of the transport sector in Canada?

Mentimeter



The presentation is available here:

Agenda

[PARIS-REINFORCE Canada-workshop Bottlenecks final.pdf](#)



## 6.30 Pathways to climate neutrality in Europe with a spotlight in Greece - a Stakeholder Workshop in Athens, June 30, 2022

## 6.31 Pathways to climate neutrality in Europe with a spotlight in Greece - a Stakeholder Workshop in Athens



The PARIS REINFORCE project hosted a stakeholder workshop in Athens, on 30 June 2022, to discuss and refine the project's modelling results on low-carbon pathways for Greece, with Greek stakeholders from the public and private sector as well as academia. The workshop, which was held back-to-back with the final project meeting of another H2020 project, SENTINEL ([link](#)), aimed to receive feedback for the Greek whole-energy system low-carbon pathways modelling that the consortium had already undertaken. In addition, we wanted to identify bottlenecks hampering the decarbonisation pathways in Greece and to co-create elements of a transformative policy mix that could overcome those bottlenecks, with a particular focus on the Greek power sector.

The introduction to the PARIS REINFORCE project was presented by project coordinator **Prof. Haris Doukas** (*National Technical University of Athens*) while **Dr. Alexandros Nikas** (*National Technical University of Athens*) gave a brief introduction on the modelling results for Greece. He presented three scenarios: one reference scenario following the 2019 Greek national plan (NECP), one following the recently legislated Climate Law, and one high ambition scenario that reaches 100% decarbonisation by 2035 due to drastic measures, such as 100% RES penetration (with an 80% intermediate target for 2030), as well as faster electrification in transport and buildings, including bolder energy savings.

Following this, **Konstantinos Koasidis** (*National Technical University of Athens*) and **Philine Warnke** (*Fraunhofer ISI*) presented insights from the PARIS REINFORCE qualitative analysis of the Greek power sector. In particular,



the high employment potential of renewable energies but also the challenge of reskilling of people from carbon-based sectors were highlighted. The presentation finished with a first tentative list of bottlenecks for decarbonisation derived from the PARIS REINFORCE analysis: opposition to wind power expansion; target of the coal & NG phase-out not shared by all actors; regulatory hurdles to small-scale renewable electricity generation and inclusion of prosumers; potential Lock in due to high investment into (L)NG infrastructure; upscaling of technologies in unprecedented way required; solutions for non-interconnected islands needed; lack of green hydrogen infrastructure for storage; maturity & uptake of novel RES solutions (CSP, Ocean energy, offshore wind ...); high costs of grid adaption to RES requirements; expected job losses, esp. in lignite dependent regions; required reskilling of labour forces; and potential negative impacts of RES expansion on ecosystems.

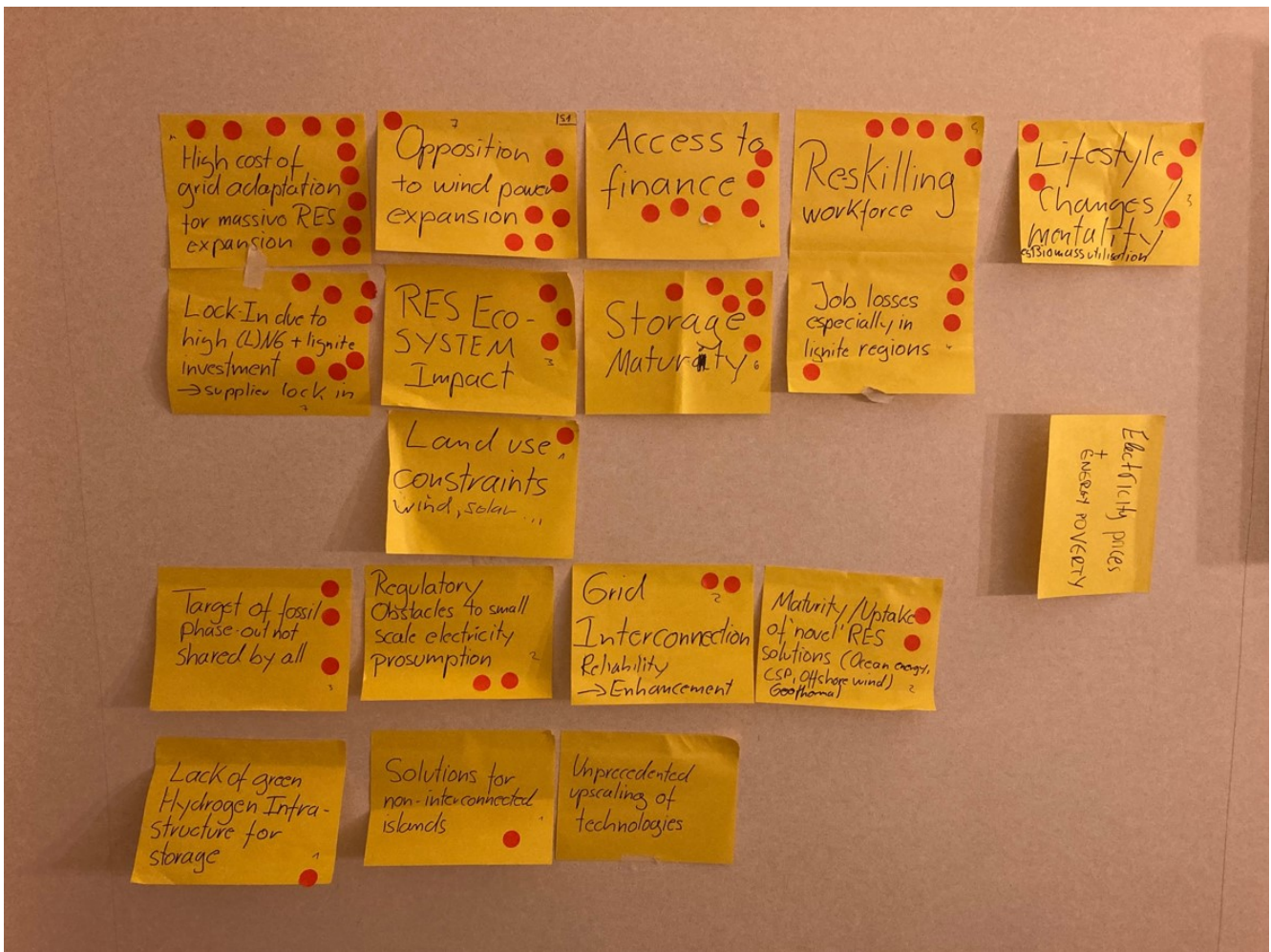
In the following lively discussion stakeholders confirmed many of the bottlenecks and complemented this list with further aspects, notably including access to finance, lifestyle changes/mentality, enhancement of international grid interconnection for better reliability, and land use constraints for renewables. Rising energy prices and subsequent energy poverty was deemed a highly important driver and framework condition that would need to be considered for any policy mix. Accordingly it was added as a crosscutting aspect.

Participants were asked to mark the three bottlenecks with highest relevance from their perspective. As a result the following bottlenecks were singled out for further discussion:

- High costs of grid adaption to RES requirements (11 Votes)
  - Access to finance (6 votes)
- Potential Lock in due to high investment into (L)NG infrastructure (7 Votes)
- Opposition to wind power expansion (7 Votes)
  - RES Ecosystem impact (3 Votes)
  - Land use constraints for RES (1 Vote)
- Storage Maturity (6 Votes)







The second part of the workshop was held in a World Cafe format. In three rounds, participants specified the bottlenecks and then discussed how they can be effectively addressed by a future policy mix.

### Key takeaways

**Table 1 (Philine Warnke, Fraunhofer ISI; Alexandros Nikas, NTUA)**

(A) Opposition to wind power expansion (incl. RES ecosystem impact and land use constraints for RES)

Wind turbines are widely disliked in Greece especially by people highly attached to nature. One common narrative is e.g. that forests are burned down in order to erect them. There are some legitimate concerns about impacts on ecosystems such as change of microclimate in some mountain areas and interference with beauty of some untouched nature (even though it was agreed that the sense of beauty is highly subjective). Also some wind power projects were indeed poorly conducted. At the same time in recent forest fires public authorities failed spectacularly. For some solar projects land was unnecessarily wasted. Unfortunately however, this legitimate frustration about few failures that could be easily overcome with proper planning of RES projects is used by populists and actors with interests (e.g. other forms of land use) to demonise wind power. The problems are generalised and several political actors including on local level try to capitalise on the resistance. The subsequent negative image has already slowed down the ramp up. Another problematic narrative is the connection of high energy prices and renewables. Nobody talks about the obvious fact that renewables are low cost energy and help to bring the price down.

There is an urgent need to find balanced solutions. Education about climate change and renewable energy should be started already in primary school (now often students learn about it at university for the first time), a change



of mentality could be achieved through positive narratives about renewables. Community-based business models that give back to communities such as the energy cooperatives spearheaded in Germany would certainly enhance buy-in; it is important, however, to make sure that energy communities are adequately set up as there is already misuse in party politics. This ties to the wider issue of climate democracy—i.e., including citizens in decision-making and communicating reasons for decisions in a transparent manner. The state needs to do its homework, by launching evidence-based, scientifically guided transparent decisions on RES projects. Environmental impact assessment and sustainable forest management would accompany each project along with strategies for dismantling, recycling and restoration. This would result, e.g., in sensitive placing of RSE projects (for example, along highways and with care to avoid offensive views as well as close to cities where the energy is needed and rather than in remote places with untouched nature).

### (B) Storage Maturity

Alternatives to rare earth-based storage technologies are urgently needed. There are many promising approaches such as kinetic storage and green hydrogen but the technologies are currently immature. There is a severe lack of data and evidence about storage alternatives. Costs seem to be extremely high. Also in Greece the development is stalled but recently a law was passed that should foster storage development.

This, first, includes promoting integrated regional smart grid solutions that use the grid as the storage; in such decentral microgrids devices provide storage. Also, energy could be transferred and stored across communities. Then, massive R&D funding must be undertaken to increase maturity of technologies, although it is important to mind the cost. Storage and demand solutions must be considered together, and it is vital to specify exactly which part of the demand requires storage. Finally, there should be efforts in distinguishing small- from large-scale solutions.



**Table 2 (Ben McWilliams, *Bruegel*; Konstantinos Koasidis, *NTUA*)**

### (A) Expansion/improvement of the electricity grid (including access to finance)

From a virtual microgrid perspective, and considering the importance for engaging consumers, digitalisation and the rollout of smart meters in Greece is very slow; this is a bottleneck to creating a digital grid and demand-side response from consumers. At the same time, use of market-based incentives for promoting self-generation (e.g.,



roof PV) in Greece (example of the UK FiT scheme in 2010) have been weak. Much like in many other EU countries, the Greek scheme collapsed, along with the expansion of the market. There is an unclear direction for TSO investments today in the power grid due to high uncertainties in the future; there is also a risk of ending up with stranded assets (i.e., interconnectors, if a decentralised grid emerges). Islands still consume diesel, which they should have replaced with renewables years ago from an economic perspective, while interconnection with the mainland is still pending; stakeholders also discussed special interest groups with vested interest in the export of diesel to the islands. There is an urgent need for power-sector system changes, mainly orienting towards market and institutional design (including role of actors in the grid). Stakeholders appeared not as concerned about the reliability of power supply in a decentralised grid, although access to finance was vividly discussed, particularly with regard to the lack in new low-TRL technologies (e.g., power storage) and the role of the public sector in de-risking and bringing in private finance.

#### **(B) Lock-in to fossil fuel infrastructure (lignite/LNG)**

New LNG terminals are controversial, particularly because they will largely serve Greece's neighbours in an attempt to wean them off Russian gas. Existing lignite plants are supposed to be ramped down, and that must be eventually completed to avoid lock-in. Stakeholder response to this bottleneck was to list many others, with a notable mention of fossil investments creating special interests, which in turn slow green policies ('we are full of (lobbying) monsters'). Finally, stakeholders wondered who will pay for building out the different stages of the hydrogen value chain; they also identified a coordination problem of ramping supply, demand, and pipelines at the same time.

All workshop presentations can be found here:

[Introduction to PARIS REINFORCE - Haris Doukas \(NTUA\)](#)

[Greek NECP & Climate Law: Are they ambitious enough? - Alexandros Nikas \(NTUA\)](#)

[Bottlenecks to the decarbonisation of the Greek power sector - Philine Warnke \(Fraunhofer ISI\) & Konstantinos Koasidis \(NTUA\)](#)

[Gas or electrification in the Greek residential sector? - Vassilis Stavrakas \(UPRC\)](#)

[Net-zero building sector: a European dream? - Souran Chatterjee \(CEU\)](#)



## 6.32 Challenges and progress towards SDG7 in Italy, in the light of today's energy crisis - a Stakeholder Workshop in Venice, July 5, 2022



PARIS REINFORCE held a stakeholder workshop in Venice, Italy, on July 5, 2022, at the premises of the Ca' Foscari University. The aim of the stakeholder workshop was to elicit experts' tacit knowledge, views, and perceptions of Italy's challenges and opportunities emerging from the current energy crisis towards net-zero and progress in SDG7 (including energy affordability, decarbonisation, and reliability). The event was also livestreamed to allow as large and diversified an audience as possible, considering also COVID-imposed difficulties to join in-person. Apart from partners NTUA, CMCC, Bruegel, E4SMA, and HOLISTIC, participants from 12 institutes physically joined the workshop, including universities (Ca' Foscari University, University of Brescia, and University of Padova), research institutes (Enel Foundation, European University Institute, Ricerca sul Sistema Energetico/RSE, Fondazione Eni Enrico Mattei/FEEM, and European Institute on Economics and the Environment/EIEE), one association (Italian Alliance for Sustainable Development/ASviS), one industry (Enel), and one energy poverty NGO (Banco dell'energia Onlus).

At the beginning of the event, Project Coordinator **Assoc. Prof. Haris Doukas** (NTUA) and event host **Dr. Lorenza Campagnolo** (CMCC) introduced the scope and objectives of the workshop; this was followed by a short introduction to the PARIS REINFORCE project by **Dr. Alexandros Nikas** (NTUA).

During the first session of the workshop, experts discussed the interplay between climate change mitigation and broader sustainable development from both an Italian and an EU perspective. This was kicked off by a presentation from ASviS on the current trends and progress of the country across all SDGs. **Dr. Lorenza Campagnolo** (CMCC) then offered a forward-looking study of climate policy implications for EU progress in several SDGs followed, based on the project's recent co-created integrated assessment modelling work. Experts highlighted hurdles and



delays, including poverty on the rise, agriculture-related pollution despite recent progress in the sector, limited progress in diffusion of renewables towards doubling their share in final energy consumption by 2030, and significant ground to cover in terms of unemployment and net income equality. Experts also dove into specific aspects, for example the role of overfishing in SDG14 (life below water). Apart from some positive signs in SDGs 7 (clean, reliable, and affordable energy), 13 (climate action), and 16 (peace, justice, and strong institutions) as well as relative stability in SDGs 2 (hunger elimination), 6 (clean water and sanitation), and 9 (innovation)—experts suggested that Italy has been displaying negative trends across the remainder of the sustainability spectrum. This was deemed to be notably the case for social and human development SDGs (including poverty, equalities, growth and employment, etc.). Other important insights stemming from this session include the need to holistically address the SDG spectrum, the lack of will from political agencies to implement existing measures, the limited national stakeholder ownership of EU-level decisions, and the need to restructure schemes to support energy efficiency such as the Ecobonus, whose budget has run dry.

The second session offered a deep dive into the role of key energy technologies, kicking off with a presentation by **Dr. Alessandro Chiodi** (*E4SMA*) focusing on the various shades (green, blue, grey) of hydrogen and the big question mark for CCS, as well as their rollout in sectors other than power generation. The second presentation from *RSE* delved into the national energy scenarios currently developed by the Italian government, with a focus on renewables, energy efficiency, and greenhouse gas emissions, as well as a technological discussion of the role of natural gas. The latter was primarily targeted as part of the broader discussion on Italy's near- and longer-term fossil fuel dependence. In the subsequent discussion, experts noted that the 'Fit for 55' package—when implemented—and the more concrete strategies stemming from REPowerEU are deemed to highly contribute to reducing reliance on Russian fossil fuel imports. However, RES expansion must really ramp up, with the necessary growth rate being questioned as unrealistic. One expressed concern was the exclusion of behavioural changes and circularity performance from the core national energy scenarios. Although all presentations highlighted the use of CCS, expectedly taking off post-2030 and making a big chunk of emissions cuts in 2050, it was stressed that Italian policymakers may not be enthusiastic over this technology (especially blue hydrogen, coming from natural gas with CCS). Although heavy LNG investments were widely seen as an unfavourable route, stakeholders also agreed on the need for diversification of fossil gas imports as a total gas phase-out until 2050 was contested. There was also consensus on the potential of small-scale (rooftop) solar installations, and the big role offshore wind can play in energy-system decarbonisation. Finally, nuclear was disregarded as a possible option for the Italian context, and experts saw possible trade-offs emerging among security of supply and emissions reductions, at least in the near-term.

In the third session, the workshop focus shifted from technological and security of supply aspects of the energy transition towards the affordability component of SDG7. The session started with a presentation on energy poverty from the Italian Observatory on Energy Poverty (*OIPE*), which offered various definitions and criteria for energy poverty (expenditure-based observations or theoretical modelling, self-reported assessments, or direct measurements from smart meters) that Member States are flexible to establish and use when reporting to the European Commission. In Italy, in particular, an alternative Low-Income, High-Cost approach was recently used in the INECP, accounting for household income, housing conditions, energy tariffs, behaviours, and special needs. Stakeholders highlighted that Italy has several contrasting policies, including discounts on energy bills per household income/wealth and other subsidies for tax exemptions and regional heating fuel price discounts, which are not well-targeted to address affordability issues. Insufficiently targeting energy-poor households, coupled with the bold tax exemptions stemming from existing policies, has recently led to considerable losses in public revenue flows. Another paradox discussed in the session was the performance of regulated prices after the beginning of the Ukraine conflict and in the light of the sharp energy prices shocks. Stakeholders observed that, in the first half of 2022 that was overshadowed by Russia's invasion of Ukraine and the energy price-related implications of



associated policy responses and developments, bold electricity demand cuts among households were inadequate to counterbalance the price shocks, which anyway led to considerably costlier utility bills. The session concluded that there is considerable need to rethink how to define and measure energy poverty, as well as to avoid rolling out contrasting policies and to better target redistributive effects, citizen behaviours, policy integration, and fiscal viability. Energy poverty was also approached from a macroeconomic perspective (financial system sustainability and broader economic independence, as well as caps on global-level financial speculations on energy and material supply), before notably linking affordability to the supply side. For example, the pressing need to invest in interconnections and concretely defining the role of hydrogen was emphasised to address energy price volatility both in the near-term and in the longer run; moreover, large reforms to the electricity market were not seen favourably, while experts also discussed the challenges for the upcoming winter, when scarcities in the European supply system may result in uneven races for fossil fuel imports and require activating as many system flexibilities possible, including readily available fossil-fuel levers that could force Europe to backslide on its climate pledges and progress.

In the final session of the workshop, and considering all presentations and points raised, stakeholders participated in a fuzzy cognitive mapping exercise, via a Google survey ([link](#)). To facilitate participants without access to a mobile phone or computer at the time, the questionnaire was also handed out as a printed table.

Consortium presentations are available below:

[Introduction to PARIS REINFORCE - Alexandros Nikas & Haris Doukas \(NTUA\)](#)

[ASviS SDG report 2021 \(ASviS\)](#)

[PARIS REINFORCE study on EU climate policy and SDGs - Lorenza Campagnolo \(CMCC\)](#)

[EU and Italian technological perspectives towards SDG7 - Alessandro Chiodi \(E4SMA\)](#)

[Policy support and scenario planning for Italy \(RSE\)](#)

[Energy poverty \(OIPE\)](#)

[FCM exercise - Alexandros Nikas \(NTUA\) & Georgios Xexakis \(HOLISTIC\)](#)



## 6.33 Bottlenecks to decarbonising German energy-intensive industries: A Stakeholder Workshop in Berlin, July 8, 2022



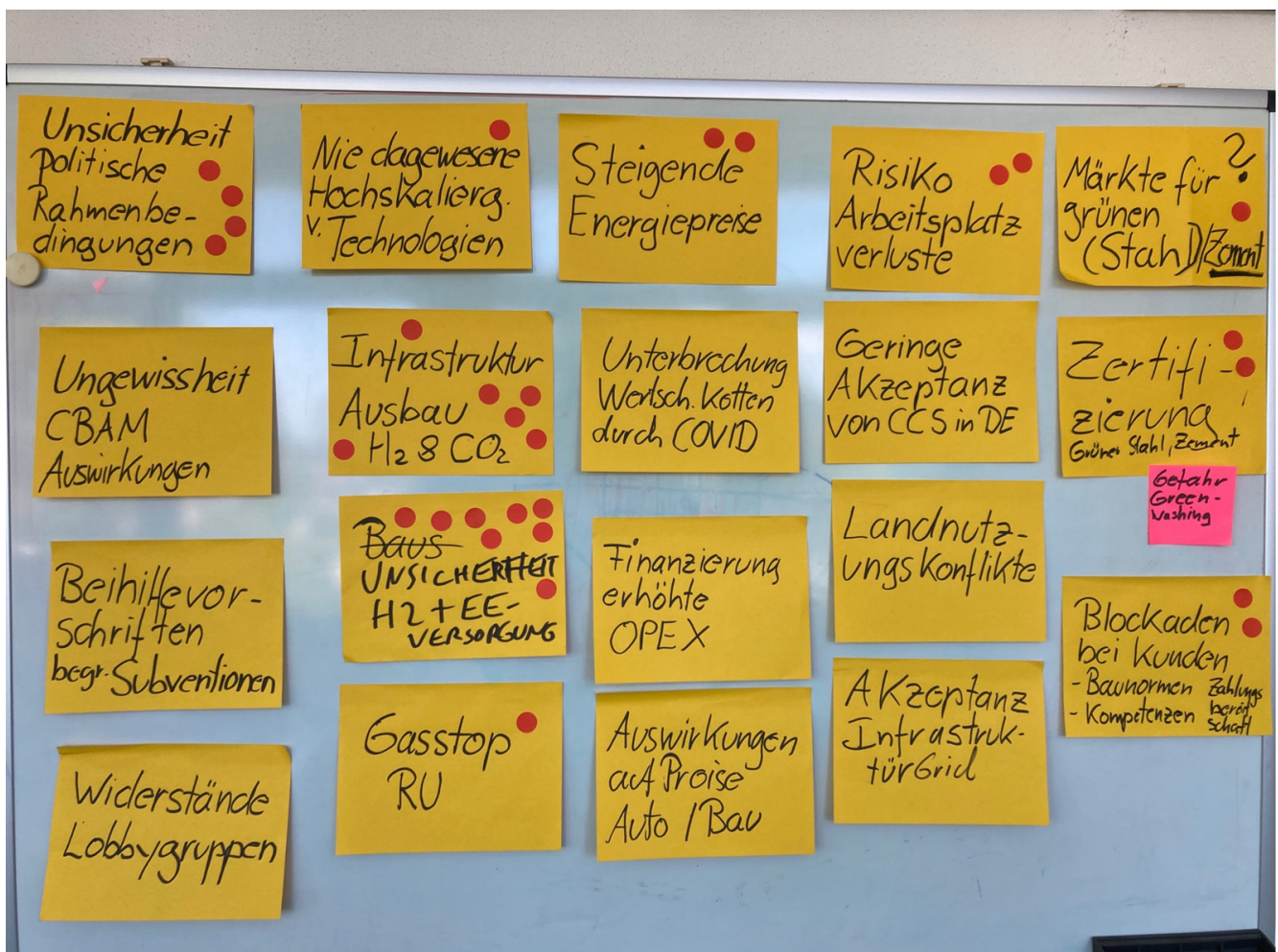
The PARIS REINFORCE project hosted a stakeholder workshop in Berlin, on 8 July 2022, to discuss and refine the project's modelling results on low-carbon pathways for Germany. Based on this feedback the workshop aimed to identify bottlenecks hampering the decarbonisation pathways and to co-create elements of a transformative policy mix that could overcome those bottlenecks. The workshop, which was coordinated by **Philine Warnke** (*Fraunhofer ISI*), focused in particular on the energy-intensive industry sectors of steel and cement and gathered stakeholders from academia, civil society, policy, and the private sector with particular insights on these sectors.

**Dr. Alexandros Nikas** (*National Technical University of Athens*) kicked off the meeting with a brief introduction of the project, highlighting in particular the I<sup>2</sup>AM PARIS platform ([link](#)) and the co-creative nature followed in PARIS REINFORCE. This was followed by input by **Khaled al-Dabbas** (*Fraunhofer ISI*), who presented three scenarios resulting from the project's modelling exercises on the German energy-intensive industries. The first scenario assumed implementation of current policies and strong diffusion of best available technologies in terms of energy efficiency as well as a continuation of the current recycling trend. The other two scenarios comprised more ambitious policy mixes with additional decarbonisation measures: one scenario prioritising electrification especially for process heating, and another one with hydrogen being the primary decarbonisation option. In the Q&A session, participants mentioned the need to have more detailed chemical recycling in the model result, with **Dr. Andrea Herbst** (*Fraunhofer ISI*) pointing out that this issue is well established and that the FORECAST modelling team is currently working on a more detailed presentation for the chemical sector. Furthermore, participants emphasised the importance of considering the whole energy-system perspective especially for hydrogen demand.



**Baptiste Boitier** (SEURECO) then presented insights on the wider implications of European climate action on different Member States, especially with regard to employment and GDP, based on a comparison of results of seven different models of the PARIS REINFORCE modelling ensemble. Via online polling, participants provided feedback on key aspects, such as the use of negative emissions technologies. **Jakob Wachsmuth** (Fraunhofer ISI) presented insights from the qualitative analysis of the German industry system and a first tentative list of bottlenecks for the decarbonisation of Germany's energy-intensive industries stemming from this analysis. Stakeholders questioned some of these bottlenecks, before eventually complementing this list with further aspects, including lack of acceptance for green steel/cement (danger of greenwashing), acceptance levels for different types of infrastructure expansion, and uncertainty revolving around availability of hydrogen and electricity from renewables.

Participants were then asked to vote up to three bottlenecks of the highest relevance from their perspective. As a result, two lists of bottlenecks were singled out for further discussion. From the perspective of infrastructure, uncertainty around availability of hydrogen and renewable electricity (8 votes), infrastructure expansion for hydrogen and CO<sub>2</sub> (6 votes), and uncertainty over political framework conditions (4 votes) were upvoted. From a demand-side perspective, stakeholders upvoted certification (2 votes) and markets (1 vote) for green steel/cement, as well as customer-related barriers such as norms and competences (2 votes).



In the second part of the workshop participants discussed these two areas in two small groups, first specifying each bottleneck and then outlining means to overcome it.

### Key takeaways





### Table 1 - Infrastructure

The uncertainty around availability of hydrogen and renewable electricity was characterised as having multiple, intertwined dimensions. In particular, the potential lack of truly additional renewable electricity increased the uncertainty about future supply with green hydrogen. This was perceived to be worsened by a lack of resources (e.g., rare earths) and capacities to build electrolyzers producing the desired green hydrogen. Other colours of hydrogen were expected to face limitations with regard to public acceptance. For blue hydrogen, the reduced viability due to higher gas prices was also considered critical and expected to lower its future relevance.

According to the participants, the need for additional renewable electricity for the green hydrogen production calls for further increased support for the expansion of renewable electricity production and grids, but also for more harmonisation between hydrogen production and renewable energy production. The use of renewable electricity for direct electrification of industry processes was considered of highest priority here, while clear rules for the production of green hydrogen were to be enforced. If blue hydrogen was to play a bridging role in certain areas, then either requirements for a transition to green hydrogen or at least additional benefits for green hydrogen, for instance based on its lower carbon footprint, would need to be established.

The bottleneck with regard to the build-up of a hydrogen infrastructure was seen as strongly related to the uncertainty about the future volume and distribution of production and demand. Moreover, participants identified a trade-off with the expansion of the electricity grid. Nevertheless, the installation of a hydrogen backbone network was seen as a no-regret measure. That is why a support scheme for such infrastructures was considered an important instrument, which would pay out at least in the longer term. In turn, the bottleneck with regard to the build-up of CO<sub>2</sub> infrastructure was assessed differently. The uncertainty about the desired volumes of carbon dioxide capture and storage (or further usage) was considered so high that participants considered it most important to develop a guiding vision for CO<sub>2</sub> circular flows and a carbon management strategy, before rolling out full-fledged infrastructure. Nevertheless, an early push for initial projects and the development of a regulatory framework were considered important to avoid a potential lock-in. Finally, participants considered important to avoid political uncertainty leading to harvesting only the low-hanging fruits in industry decarbonisation, as this might yield cost increases or skill shortages with regard to the more difficult processes. Therefore, they favoured a clear political agenda for full decarbonisation and an early development of the required skills and competences.





### Table 2 - Demand-side

It was agreed that, at the moment, there are still several hurdles on the market side of decarbonisation trajectories. Participants highlighted that the EU ETS free allocation for leakage does not provide the incentive for sectors such as cement to seriously explore low-carbon alternatives such as new binders and recycling solutions. There is no market-ready alternative and too little research into such alternatives. Evidence, data, and information for customers such as homebuilders is scarce. The question is what will happen if prices rise. As already seen in certain industries faced with the currently high gas prices, production could also be halted or transferred to other countries with lower costs. So far, cement is considered a local commodity due to the low profit margin and the high transportation cost. One could think that this might change under the current prices but most probably it will still be infeasible for all regions to import cement (specially for regions without direct access to water). Accordingly, measures are required to support low-carbon trajectories to take off. In the case of the building sector, this is challenging due to the conservative nature of the industry and the many layers of actors, from architects to construction workers; these need to be addressed simultaneously by regulatory and education measures. Also, the public sector as a major customer is under severe pressure to reduce costs.

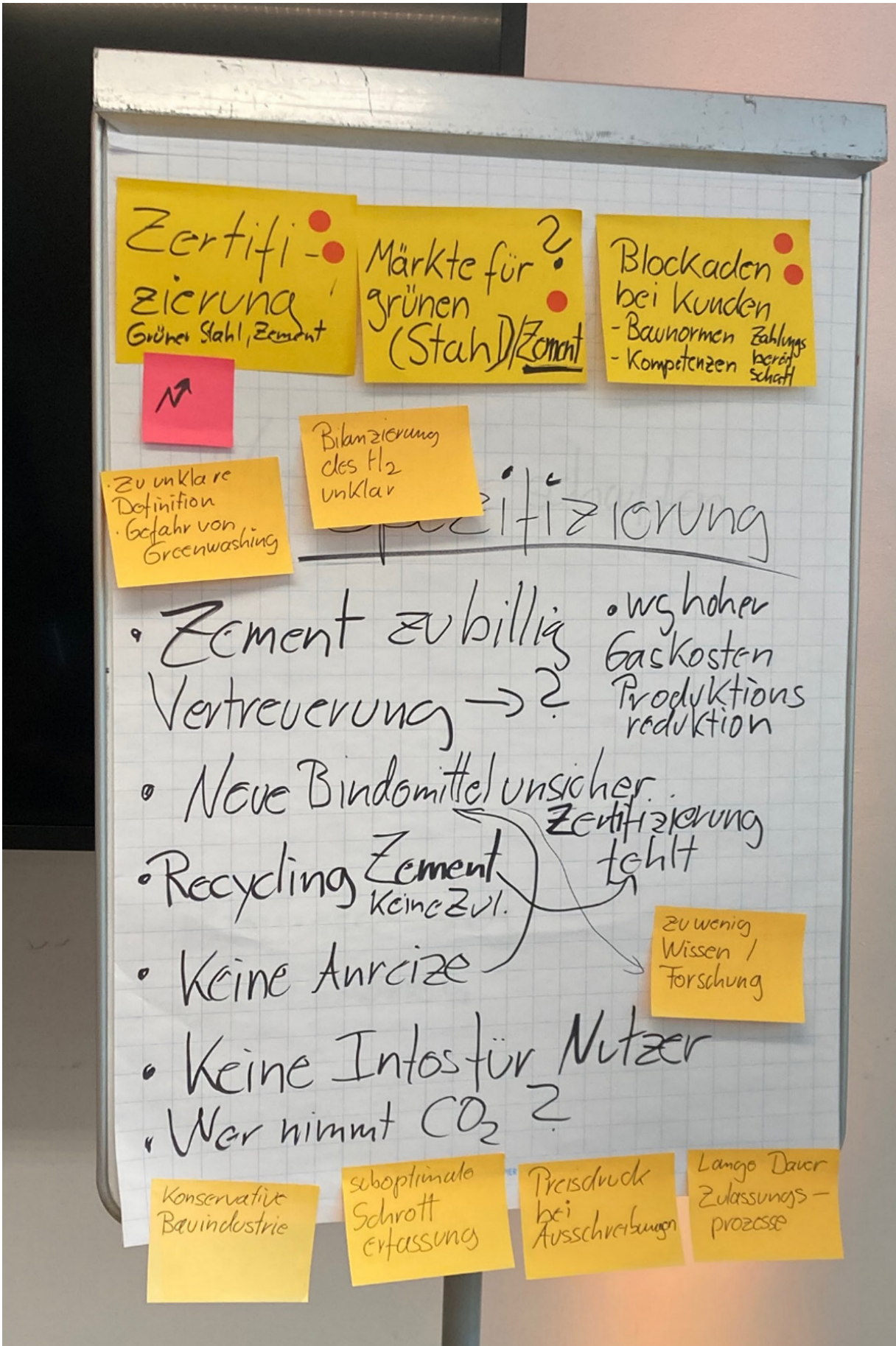
In addition, participants stressed the long time for reforming norms and standards to accommodate new construction materials as important barriers for market pull towards zero-carbon technologies. Another danger was seen in the availability of offset permits. Without proper regulation this could become an alternative to low-carbon pathways, e.g. the automotive industry could opt for such permits instead of paying higher prices for DRI



steel. This adds to the danger of increased greenwashing due to lack of clear definitions of both green steel and green cement. Last but not least, the willingness of customers/consumers to pay a higher price for green products (green premium) is far from certain especially in the long term. Participants therefore stressed the need to better define the role of demand-side measures within long term transitions. It was discussed that it is crucial to support the take-off of decarbonisation trajectories with dedicated demand-side measures, although in the long term the carbon price would need to be the main regulating mechanism. At the same time with increasing establishment the price premium will decrease.

Measures that were discussed to overcome the bottlenecks included green public procurement, reduction in material consumption through innovative building solutions, electrification of construction sites (following the example of Oslo), fostering of exchange of pioneering construction projects, strategies for upscaling from local projects, information campaigns for builders and architects and corporate sustainability departments, and finally research and innovation in support to low-carbon solutions, such as recycling in construction and alternative construction materials. For the steel sector, part of the discussion focussed on ways to strengthen the secondary steel route in Germany, which loses much of its steel through export. Scrap quality could be improved with better sorting, e.g., thanks to a digital product pass. This could make it easier to produce high-quality steel through electric furnace. In addition, metal scrap export could be reduced to increase the amount of scrap available.





All workshop presentations can be found here:

[Introduction to PARIS REINFORCE - Alexandros Nikas \(NTUA\)](#)

[PARIS REINFORCE Modelling insights for the industry sector - Khaled Al-Dabbas \(Fraunhofer ISI\)](#)

[Analysis of wider EU decarbonisation impacts \(NZE scenarios and CBAM analysis\) - Baptiste Boitier \(SEURECO\)](#)

[Preliminary analysis of bottlenecks - Jakob Wachsmuth \(Fraunhofer ISI\)](#)

[Menti voting results - Philine Warnke \(Fraunhofer ISI\)](#)



## 6.34 ECEMP 2022 - Acting on the ambitions to a net-zero EU: roadblocks, challenges, and opportunities



PARIS REINFORCE was among the ten H2020 research projects behind the organisation of this year's European Climate and Energy Modelling Platform (ECEMP), revolving around "ambitions to a net-zero EU: roadblocks, challenges, and opportunities", hosted online, on October 5-7, 2022.

The annual ECEMP conference brings together Europe's climate and energy modelling community over a three-day period in a forum for deep exchange of research and modelling practice and varied discussions. The event typically features a balanced mix of high-level panel discussions and interactive workshop sessions to enable a peer-reviewed digest of models and policy insights for the transformation of the European energy system. The ECEMP 2022 conference, in particular, was a platform for exchange among researchers and modelling teams from across Europe; from H2020 projects, representatives of the European Commission as well as partners from industry and civil society. It was planned as an online event, due to uncertainties regarding the possibility of physical meetings, although it was set up so as to enable interaction and ensure an engaging, policy-oriented, and enjoyable conference experience. The conference featured three themes, one per day:

- Day 1: Energy security and geopolitics for fossil and low-carbon fuels
- Day 2: Innovation, societal and technical changes for Net Zero
- Day 3: The latest IPCC findings and implications for national and short term policies

The event agenda can be found [here](#).

Apart from co-hosting the conference, PARIS REINFORCE also presented three studies:

October 5 (Day 1) - Energy security and geopolitics for fossil and low-carbon fuels: An integrated methodology for power generation planning decision support: the case of Greece's green hydrogen economy. By Koutsandreas, D., Trachanas, G.P., Pappis, I., Nikas, A., Doukas, H.. & Psarras, J.

October 6 (Day 2) - Innovation, societal and technical changes for Net Zero: What do experts perceive as critical



game-changing innovations to consider in modelling and policy? By Perdana, S., Xexakis, G., Koasidis, K., Vielle, M., Nikas, A., Doukas, H., Gambhir, A., Anger-Kraavi, A., May, E., McWilliams, B., & Boitier, B.

October 6 (Day 2) - Innovation, societal and technical changes for Net Zero: Stakeholder-informed modelling to decarbonise the Greek power sector in the light of today's energy crisis. By Koasidis, K., Karamaneas, A., Nikas, A., Koutsandreas, D., & Doukas, H.

You may read all about the project's presentations in international scientific conferences [here](#).

ECEMP is the rebranded Energy Modelling Platform for Europe (EMP-E), aiming to reflect the increasing role of climate policies and climate change and their impact on energy demand and supply planning. The original EMP-E was created in 2017 and has since been organised on a yearly basis by the H2020 Energy Modelling group – a group of projects funded by the European Commission's Research and Innovation Programme. This year, the event was coordinated by ECEMF – the European Climate and Energy Modelling Forum, and supported by the projects SENTINEL, NAVIGATE, WHY, OpenENTRANCE, PLANET, CINTRAN, PARIS REINFORCE, EMB3RS, and newTRENDS. The conference does not have a registration fee as it is funded by the European Commission. All ten projects contributing to the conference have received funding from the European Union's Horizon 2020 Research and Innovation programme.



## 6.35 Industrial decarbonisation in the EU and the UK: a stakeholder workshop in London



On October 7, 2022, the PARIS REINFORCE project hosted a hybrid stakeholder workshop at the premises of the Grantham Institute Imperial College London with some participants joining via Zoom.

The goal was to discuss and refine the results from the modelling and case study work on low-carbon pathways for the UK and the EU, together with stakeholders from the UK public and private sector, as well as academia.

We also aimed to identify bottlenecks hampering the decarbonisation pathways and to co-create solutions for a transformative policy mix that could overcome those bottlenecks, with a particular focus on energy-intensive industries.

The workshop began with a brief introduction to the overall aims and objectives of the PARIS REINFORCE project, from **Dr. Alexandros Nikas** joining from the coordinating side (*National Technical University of Athens*). Following this, **Ajay Gambhir** (*Imperial College London, Grantham Institute*) and **Baptiste Boitier** (*SEURECO*) provided an overview on key aspects of industrial energy system transitions in the UK and the EU emerging from both literature and the macro-economic modelling carried out in the project. In the Q&A session, some clarifications were discussed, including on the solution of the models used, the tech constraints on hydrogen in the modelling framework, the role of natural gas in the analysis as well as the limited policy context resolution at the national level, and the model assumptions regarding industrial growth and production.

**Dr Jakob Wachsmuth** (*Fraunhofer ISI*) complemented the modelling overview with a zoom-in on the sectoral analysis and the implications of mitigation pathways for energy-intensive industries (EIs). He concluded with a list of tentatively identified bottlenecks to decarbonisation of EIs in the UK.





On the modelling side of things, follow-up discussions tackled the sectoral use of CCS (lime and cement), the scenario setup on electricity vs. hydrogen, the role of biomass (which, in the UK, is currently all waste) in model projections of the current policy context as well as of a net-zero-compliant pathway, the distinction between assumptions and optimisation results, asset age and turnover in models, necessary grid infrastructure upgrades to support decarbonisation, and issues of network utilisation.

All presentations can be found [here](#).

A lively discussion emerged also around the bottlenecks, following the project's socio-technical analysis presentation. Issues raised included:

- Knowledge and understanding of the financial services sector, particularly in the light of investment cycles
- Price at which CCS and hydrogen will eventually be available to industry, as well as uncertainty over electricity prices
- Externalities to consider among investment prospects (and the importance of risk/cost analysis to help direct capital flows)
- Near-term investment decisions lock-into 2050 actions, in both the EU and the UK
- The need for a multi-national approach—with the UK risking ending up on the wrong side of the carbon border adjustment mechanism (CBAM) in the EU
- The value in defining blue and green hydrogen, coming from different sources, with a focus on feasibility, mechanisms triggering cost falls, CCS costs
- Re-thinking the energy/electricity market to fully reflect falling cost of renewables
- The assumption that supply will meet demand in the UK, with stakeholders particularly noting the lack of demand-pull policy in the country for industrial decarbonisation and the existence of industrial clusters where resource (e.g., heat) sharing is possible—which is typically not reflected in the models
- Public acceptance of technologies and processes as well as ISO/standards to meet the demands, and acceptance of other associated aspects (e.g., powerlines) acknowledging that public engagement takes time
- Consistency of net-zero policy with economic goals and the need for levelling up and for a just transition agenda, versus implications of climate inertia for growth
- Production capacity and skills, with a key question revolving around the possibility that resources and skills availability in the UK render it challenging to decarbonise, although the sector was argued to be very diverse, giving rise to new sunrise manufacturing industries
- Lead-in times for site appraisal, building infrastructure, including regulation and permitting

In the subsequent interactive session of the workshop participants added several bottlenecks and suggested modifications to some as illustrated in the slide below.



Bottlenecks	Overarching (literature-based, ELABORATED DURING THE WORKSHOP)	Energy-intensive industries (literature-based, ELABORATED DURING THE WORKSHOP)
<b>Social feasibility</b>	<ul style="list-style-type: none"> <li>Lower weight of industry sector due to strong shift to services sector</li> <li>Lack of public engagement strategy</li> <li>Public acceptance of the transition</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>Opposition to CCUS by NGOs due to continued use of fossil fuels</li> <li>Public acceptance of CCUS technologies</li> <li>...</li> </ul>
<b>Political feasibility</b>	<ul style="list-style-type: none"> <li>International trade regulations limit subsidies</li> <li>Uncertainty about continued support by new government</li> <li>Lack of demand pull policies</li> <li>Relation btw. decarbonisation, growth and climate impacts</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>Uncertainty about legal framework after Brexit</li> <li>Regulation and permitting processes + required capacities</li> <li>...</li> </ul>
<b>Technological feasibility</b>	<ul style="list-style-type: none"> <li>Upscaling of technologies in an unprecedented way</li> <li>Limited demonstration projects using hydrogen in UK</li> <li>Complex interaction between various technologies and processes at plant level</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>Hydrogen technologies not fully mature yet (blue vs. green)</li> <li>CCUS technologies not fully mature yet</li> <li>Potential lack of high-quality iron ore</li> <li>Lack of access to scrap</li> <li>Specification of standards and norms for CO2</li> <li>...</li> </ul>
<b>Economic feasibility</b>	<ul style="list-style-type: none"> <li>Value chain disruptions due to pandemics</li> <li>Strong increase of gas and electricity prices due to Russia-related sanctions</li> <li>Limited availability of financing (due to partial downturn of industry and high inflation)</li> <li>Knowledge and understanding in the public and private finance sector</li> <li>Complexity of investment decisions due to variety of risks</li> <li>Scale up of supply chains</li> <li>Dispersion of industries across the country</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>Investment cycles may require investments in processes not yet competitive</li> <li>Uncertainty about hydrogen supply</li> <li>Hydrogen infrastructure expansion and lead in times</li> <li>CO2 infrastructure expansion and lead in times</li> <li>Electricity infrastructure expansion</li> <li>No established business models for CCUS + hydrogen yet</li> <li>High electricity prices</li> <li>...</li> </ul>
<b>Socio-economic impacts</b>	<ul style="list-style-type: none"> <li>Risk of carbon leakage and resulting job losses</li> <li>Risk of lock-in into fossil technologies due to CCUS</li> <li>Skilling and engineering requirements</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>Price impacts for downstream industries</li> <li>No existing markets for green products</li> <li>...</li> </ul>
<b>Socio-ecological impacts</b>	<ul style="list-style-type: none"> <li>Potential impact of large-scale offshore CCS and RES expansion on marine ecosystems</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>...</li> </ul>

Through an online polling, participants then assessed the importance of the resulting 38 bottlenecks for the decarbonisation of UK industry (see voting results [here](#)). Based on this assessment three breakout groups were formed around the most important bottlenecks. Each group discussed what the main aspects of each bottleneck are and what strategies can be employed to overcome these bottlenecks.

In the first breakout room (which was held online, with the virtual participants), on **Infrastructure Expansion**, several aspects regarding the associated bottlenecks were raised, including the cost-effectiveness of technologies, the fact that investments carry higher risks from a finance perspective, the lack of perfect foresight on the optimal industrial decarbonisation route, the lack of cross-sectoral coordination (even in case of finetuned monitoring), possible underestimation of electricity demand for the sector, limited access to hydrogen for some regions of different socioeconomic background (with comparisons drawn to Germany), and the possible relocations/shifts the latter may result in within the country. Regarding strategies, clearing uncertainty in the net-zero strategy was explicitly mentioned as a way to secure sectoral investments, while stakeholders also touched upon the role of monopoly and government interventions. The need to send the right market signals in ETS and non-ETS sectors was also brought up, as well as the value in coordinating action (and incentives) at both national and regional level (and in making use of regional advantages, for example in regions with better access to hydrogen). Full cost accounting of fossil fuels against adaptation costs was found as a good signal for deciding on relevant subsidies. Much like regional coordination, industrial clusters were seen positively as a way to overcome discussed bottlenecks, and so was the prospect of using the existing gas infrastructure for hydrogen flows. Finally, technological diversification was also raised, and stakeholders especially discussed the need for industry-level stocktake for timely corrective actions. These discussions especially highlighted the value in a hybrid policy approach to design the hydrogen infrastructure strategy, by consulting regional stakeholders to get a better

overview of supply and demand needs, by exploiting existing networks/clusters, by providing incentives for private actors to invest. They also highlighted the need for clear policy-to-market signals on the direction of the net-zero policy, towards fostering more trust and confidence among investors, as well as the value of regional cooperation and existing infrastructure

A second breakout room discussed bottlenecks associated with **financing, investment cycles, and energy prices**. Stakeholders pointed out that there exists no financial structure to recognise net zero deals, while investors tend to avoid deals with no track-record. A key concern lies in the size of an investment: internal investments from balance sheet are easier, but anything requiring raising new capital is much harder, given the lack of track record and of information. Essentially, this is a question of how to make new investments look “boring” and reliable (easy to understand) for investors and thereby bankable. Overcoming this barrier and unlocking the much-needed investments requires simplicity and certainty in policy support and an intense discussion between actors from climate policy and the financial sector. One element to create stable investment models can be found in standards for financial investment, such as CBI certification. For some cases, subsidies are critical to reduce uncertainty. They are also much more effective at providing confidence in new investments than relief / avoidance of UK ETS costs. A lot of this means getting capital costs down, before removing any operational cost volatility created by fluctuating carbon and electricity prices. Then companies will need to ask who is going to buy their product if selling at a premium to current products (e.g., green ammonia versus current ammonia). Strong demand-pull policies were highlighted in this room too, towards creating certainty. Contracts for Difference were found favourable (e.g., for green ammonia). Introducing longer-term incentives, such as Feed in Tariffs for renewables, as well as public procurement measures, such as the “Breakthrough Agenda”, can also play a crucial role. Infrastructure for tomorrow is difficult to factor in, when investors/businesses must invest now. Manufacturing sites constantly ask, for instance, if new H<sub>2</sub> infrastructure is coming their way, but there is no certainty around that yet. And they are not prepared to pay a premium for H<sub>2</sub>-based processes if there is no guarantee this infrastructure is coming, so there is a risk of losing that window of opportunity. Also, a key infrastructure question remains around how to get CO<sub>2</sub> from capture site to storage site. Certainty is also key in terms of electricity prices, especially in the current situation, which highlights the need for electricity market reforms. Firms constantly wonder not just how to continue their operations, but actually whether to keep sites open or move somewhere else with better incentives and more certainty. A classic example is that of carbon leakage consideration; the example of an ammonia plant going to US, where incentives around CCUS (Q45 tax credit) are strong, was mentioned. Also, companies within track II clusters (e.g., in Scotland) face uncertainty about the planned timeline for support and wonder whether to continue their decarbonisation initiatives. Finally, in terms of leakage as well as product demand, multilateral initiatives that may even lead up to a global buy in were found promising among participants.

The third breakout room focused on **skills and upscaling of technologies**. With respect to upscaling of decarbonisation technologies, stakeholders considered it vital that there be a long-term industrial strategy and long-term government investment cycles to provide a stable environment for investments in innovative technologies and the required skilling. To achieve this, it was deemed necessary to build cross-party consensus through various stakeholder interactions. The lack of UK manufacturing capability for decarbonisation technologies and the dependence on interactions of/with global supply chains was considered an important bottleneck for successful upscaling of technologies. In this regard, participants mentioned the need to balance domestic production capacities with importing decarbonisation technologies by securing international supply while building national capacities. To achieve this, it was suggested that public support to highly innovative technologies (TRL 4) is key, via establishing national research centres, to improve international cooperation with selected EU Member States and non-EU countries, and to secure long-term local access to vital raw materials and energy. With respect to the required skills and engineering expertise, stakeholders expressed a growing demand for technical expertise both in the UK and worldwide. In turn, they perceived a lack of suitable technical skilling in



the UK due to a lack of interest by both firms and workers. To overcome this bottleneck, it was considered important to identify skill needs, to improve cooperation between SMEs and universities, to give value to technical trainings and improve their quality, to learn from other countries' best practices, and to strengthen industrial councils on skilling. Broader notes revolved around long-term government investment cycles (as 1-year cycles do not seem to work), international collaboration on technology development including sorting out UK access to flagship research programmes such as Horizon Europe, international cooperation beyond (and below) the EU level, ensuring secure long-term local access to vital raw materials and energy, effective future skill needs identification and prioritisation of technical training in firms to inter alia cultivate domestic expertise and availability, improving cooperation between SMEs and universities, as well as adopting best practices from abroad.

In the post-breakout session, final comments included the importance of creating long-term certainty as well as of considering the costs of business-as-usual when making cases of decarbonisation costs.



## 6.36 Climate Change, Energy Crisis, and Greece's Net-Zero Transition



Recently, the European Union (EU) revisited its climate ambitions, aiming to achieve net zero emissions by 2050. It is also on the verge of harmonising its roadmap with this ambitious objective, with the first milestone being a -55% emissions reduction by 2030. With its recent Climate Law as a starting point, Greece will soon have to also revisit its national energy and climate plan, in this new European direction. At the same time, the EU's plan for responding to today's energy crisis and eliminating its dependency on Russian fossil fuels, since the Ukraine invasion in February 2022, explicitly mentions accelerating new renewable energy projects, diffusing energy efficiency measures, and diversifying its energy supply portfolio. However, many European leaders have so far sought solutions in currently available "grey" resources as well as in new fossil-fuel investments. In Greece, this translates to reprioritisation of lignite and bold investments into new fossil fuels, notably liquefied natural gas, opening many questions regarding the country's climate ambition in the near future.

Any effort to respond to these questions, regarding national climate action and green transition in the light of today's energy crisis, must be socially acceptable. Ideally, citizens should be given the stand to co-produce the national strategy, be informed and express their views on the alternatives, and co-own Greece's green transition.

In the context of PARIS REINFORCE, the project coordinator (*National Technical University of Athens, NTUA*) and the [Society for the Environment and Cultural Heritage](#) co-organised a national conference on "**Climate change, the Energy Crisis and Greece's Net-Zero Transition**", on **Tuesday, November 8, 2022**, giving the opportunity to stakeholders from industry, academia, government, and the civil society to get informed, discuss, raise concerns, and help decide the way forward.

The conference included four sessions, during which the consortium presented findings from the PARIS REINFORCE project and discussed issues regarding the national plan towards dealing with the energy price shocks, the value of energy democracy in the long-term transition, the role of business in today's energy crisis, and the potential lying in renewables (and especially wind energy) in a socially just and environmentally effective pathway to net-zero.

[Here](#) you may find the event agenda, while the presentations are available below:

### Keynote speeches & Discussion

[-Athanasios Dagoumas \(RAE - Regulatory Authority for Energy\) - Climate change, energy crisis, and the green transition](#)

[-Haris Doukas \(NTUA - National Technical University of Athens\) - Confronting the energy crisis](#)

### Session 2: Energy Democracy and Green Transition

[-Dimitris Kollias \(PPC - Public Power Corporation\) - Energy democracy and the green transition](#)



[-Alice Corovessi \(INZEB - Initialising Energy Balance towards Zero\) - Energy poverty in Greece](#)

#### **Session 4: The diffusion of RES and the case of wind plants**

[-Vasiliki Pougakioti \(ELLETT - Society for the Environment and Cultural Heritage\) - In principle](#)

[-Alexandros Nikas \(NTUA - National Technical University of Athens\) - The role of RES in the green transition \(and recovery\) in Greece and the EU](#)

#### **Greek survey results**

[-Tasos Vasiliou \(Prorata\) - Greek perceptions, attitudes, and behaviour on climate change and the energy crisis](#)

*The header photo, by Giorgos Vitsaropoulos, belongs to the Acropolis Museum, straight from the museum's website (<http://www.theacropolismuseum.gr/>).*



### 6.37 Final PARIS REINFORCE event at Sorbonne, in Paris, on November 15



After 3.5 very productive and scientifically exciting years, in which we worked with thousands of stakeholders to co-create modelled pathways for supporting climate action in Europe and worldwide, the PARIS REINFORCE research project is coming to an end. To celebrate what we achieved and to effectively disseminate the knowledge co-/produced all these years, the PARIS REINFORCE consortium hosted its final event in Paris, France, on **November 15, 2022**.

The event, "**Delivering on the Paris Agreement in a fragmenting world**", held at the breathtaking **Salle Louis Liard de la Sorbonne** ([link](#)), was co-organised with the **Paris 1 Panthéon-Sorbonne** university and the **World Energy Council – France**. On the day, 61 participants attended the final conference and had the opportunity to learn about our key findings, ask their questions, and raise their concerns, allowing to discuss together on the future of the EU and the planet

The conference [agenda](#) included four main sessions, following some welcome notes and opening remarks by all co-hosts, as well as a brief overview of the project by Prof. Haris Doukas (*National Technical University of Athens*).

In the first session, "**Quantifying the road to Paris**", Dr. Shivika Mittal (*Imperial College London*) presented core PARIS REINFORCE outputs regarding global climate action, followed by a regional deep-dive with an explicit focus on all major economies by Dr. Lorenza Campagnolo (*Euro-Mediterranean Centre for Climate Change*). The panel discussion, chaired by Mr. Jean-Eudes Moncomble (*World Energy Council – France*), included a presentation from the International Energy Agency as well as a vivid discussion between Dr. Glen Peters (*CICERO*), Dr. Xi Yang (*Harvard University*), Mr. Apostolos Petropoulos (*International Energy Agency*), Mr. Bruno Ladsous (*Nos Energies - Occitanie Environnement*), and the audience.

In the second session, "**Towards Net Zero Emissions in the EU**", Mr. Baptiste Boitier (*SEURECO*) attempted a



detailed deep-dive into European Paris-compliant pathways and respective policy implications that were produced in the project, with Dr. Jakob Wachsmuth (*Fraunhofer ISI*) offering a further focus on bottlenecks to EU industrial decarbonisation. The panel discussion, chaired by Dr. Alexandros Nikas (*National Technical University of Athens*), included a heated debate among Jean-Eudes Moncomble (*World Energy Council – France*), Yves Marignac (*Negawatt*), Dr. Philine Warnke (*Fraunhofer ISI*), and Dr. Alessandro Chiodi (*E4SMA*), while the Q&A with the audience offered a more interactive setting.

Following the lunch break Dr. Alevgul Sorman (*Basque Centre for Climate Change*) in a targeted session, "**Enabling climate policy support**", offered a detailed presentation of how the project's flagship exchange platform, [I<sup>2</sup>AM PARIS](#), has facilitated decision-making, how it plans to secure sustainability beyond the project, and what critical lessons were learnt during PARIS REINFORCE. Dr. Alexandros Nikas (*National Technical University of Athens*) and Dr. Georgios Xexakis (*HOLISTIC*) joined her in a short panel discussion on the platform's next steps, chaired by Ms. Elin May (*Cambridge University*).

The final session, "**Planning in the light of today's threats to sustainability**", tackle all emerging challenges to EU and international sustainability, including a presentation on the optimal allocation of COVID-19 packages in major economies and a focus on the EU by Dr. Dirk-Jan van de Ven (*Basque Centre for Climate Change*), a take on today's energy crisis and what stakeholder-informed modelling exercises for Greece and Italy revealed by Dr. Georgios Xexakis (*HOLISTIC*), and a presentation of the prospect and costs of phasing out Russian fossil-fuel imports by Dr. Marc Vielle (*École Polytechnique Fédérale de Lausanne*). This session too was followed by a very interesting panel discussion among project members and external experts, in response to questions from the audience; this discussion was chaired by Prof. Haris Doukas (*National Technical University of Athens*) and joined by Dr. Georg Zachmann (*Bruegel*), Dr. Ajay Gambhir (*Imperial College London*), Prof. Jean-Luc Gaffard (*Université de Nice Sophia Antipolis – OFCE*), and Mr. Sylvain Herberg (*Independent expert*).

The central event page and registration was hosted by WEC-France ([link](#)).

The presentations are available below:

#### [I.1 Haris Doukas - A few words about PARIS REINFORCE](#)

II.1 Shivika Mittal - Where does the world stand and where does it need to be?

#### [II.2 Lorenza Campagnolo - Sustainable transitions in major economies](#)

#### [II.3 Apostolos Petropoulos - International Energy Agency](#)

#### [III.1 Baptiste Boitier - Transforming Europe](#)

#### [III.2 Jakob Wachsmuth - Bottlenecks to sectoral decarbonisation in Europe: national insights](#)

#### [IV.1 Alevgul Sorman - Enabling climate policy support: The I<sup>2</sup>AM PARIS platform](#)

#### [V.1 Dirk-Jan van de Ven - Walking out of a pandemic and into an energy crisis](#)

#### [V.2 Georgios Xexakis - Energy transitions following the Ukraine invasion: insights from Italy and Greece](#)

#### [V.3 Marc Vielle - The cost of phasing out Russian fossil fuels](#)

Slider item photo by *Second Half Travels* via Flickr ([here](#)), cropped.

Agenda

[PARIS REINFORCE - November 15, Paris Final Conference Agenda 0.pdf](#)





## 7 List of videos

One video has been published in the framework of the PARIS REINFORCE project, during the first 18 months.

### 7.1 Video 1: I<sup>2</sup>AM PARIS prototype

The video is a live demo of the I<sup>2</sup>AM PARIS prototype which was demonstrated during the first stakeholder dialogue in November 2019.

**Title:** I<sup>2</sup>AM PARIS prototype

**Description:** Live demo of the I<sup>2</sup>AM PARIS prototype, during our first stakeholder dialogue, Brussels, November 2019

**Link:** <https://www.youtube.com/watch?v=PJtwXEXuWHw>

**Online:** May 13, 2020



Figure 54: Preview of the video of the demonstration of the I<sup>2</sup>AM PARIS prototype



## 7.2 Video 2: The PARIS REINFORCE project and the I2AM PARIS platform

The objective of the Horizon 2020 PARIS REINFORCE Project is to develop a framework for supporting the design and evaluation of climate policies in respect to the objectives of the Paris Agreement, using Integrated Assessment Models.

Here, we briefly explain what these models do and introduce I2AM PARIS , an open-access data-exchange platform that was co-designed with stakeholders and developed by the project consortium.

**Title:** The PARIS REINFORCE project and the I2AM PARIS platform

**Description:** The objective of the Horizon 2020 PARIS REINFORCE Project is to develop a framework for supporting the design and evaluation of climate policies in respect to the objectives of the Paris Agreement, using Integrated Assessment Models.

Here, we briefly explain what these models do and introduce I2AM PARIS , an open-access data-exchange platform that was co-designed with stakeholders and developed by the project consortium.

**Link:** [https://www.youtube.com/watch?v=JrrAogEz\\_jQ](https://www.youtube.com/watch?v=JrrAogEz_jQ)

**Online:** April 20, 2021



**Figure 55: Preview of the video of The PARIS REINFORCE project and the I2AM PARIS platform**



## 8 List of infographics

Below, we list all infographics published in the project, including two interactive ones in I<sup>2</sup>AM PARIS and two series of totally thirteen infographics on model coverage and socio-technical innovation system maps on the website.

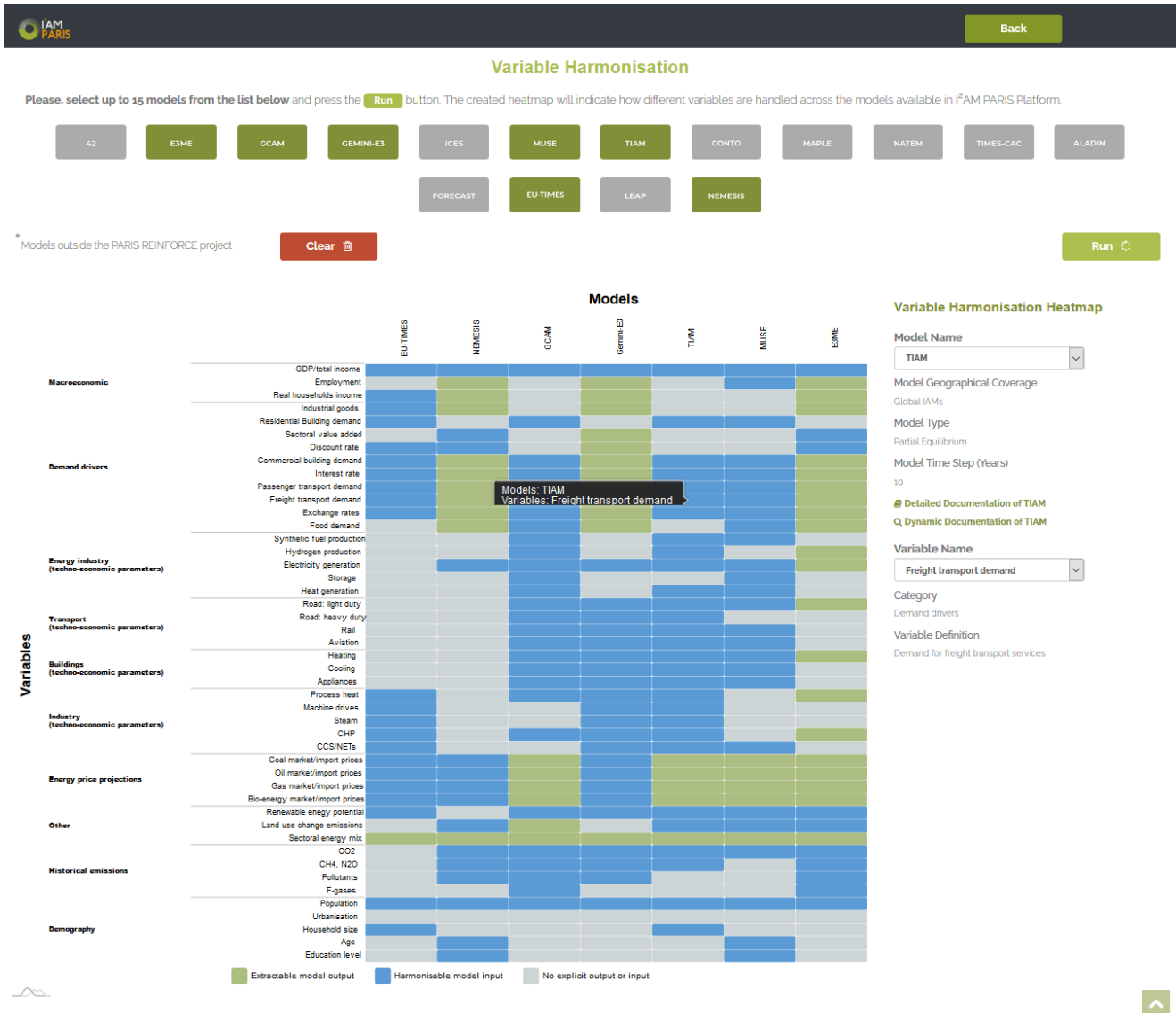
### 8.1 Interactive infographic 1: Dynamic documentation of models



Figure 56: Interactive infographic 1 – dynamic documentation of each PARIS REINFORCE model



## 8.2 Interactive infographic 2: Customisable variable harmonisation heatmap



**Figure 57: Interactive infographic 2 – Customisable variable harmonisation heatmap across all PARIS REINFORCE models**

It should be noted that a workspace-specific, more detailed variable harmonisation heatmap is provided for all participating models in the results workspace of each model inter-comparison documented in I<sup>2</sup>AM PARIS.

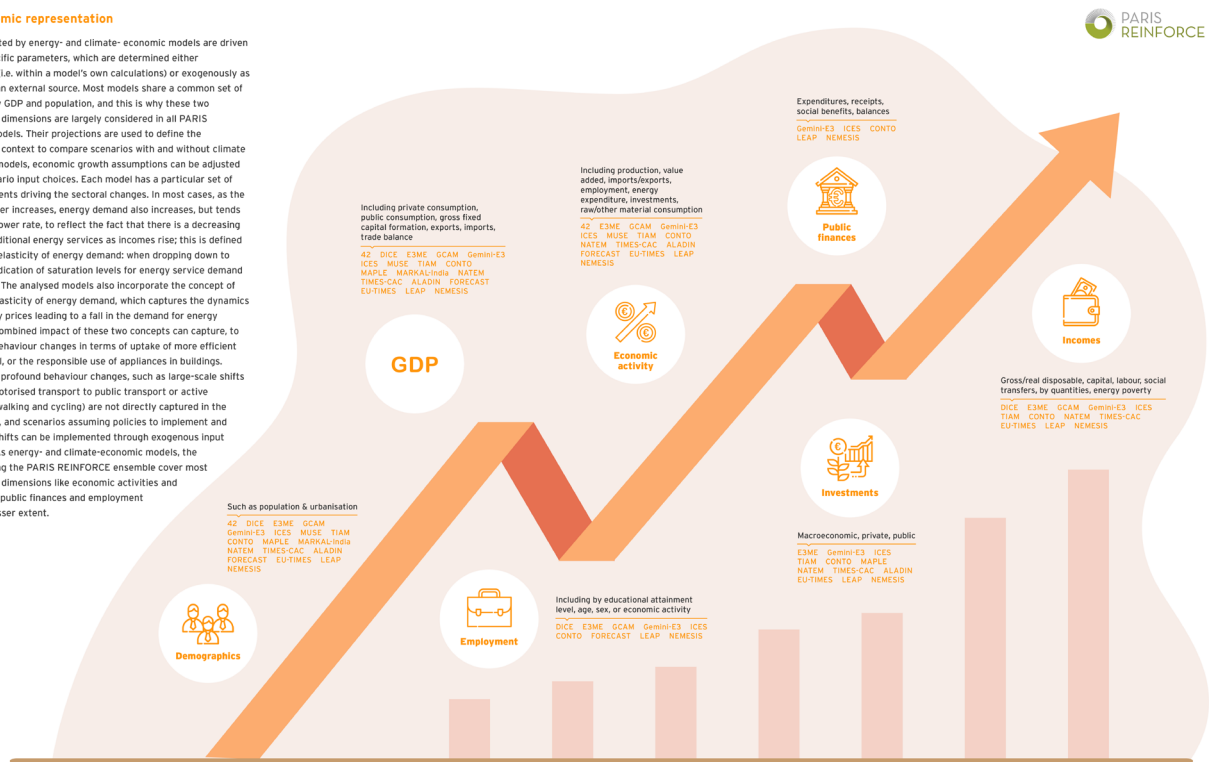


### 8.3 Infographic 1: Representation of socioeconomic in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how socioeconomic variables are represented in climate-economy and energy quantitative system models, and illustrates in a user-friendly way how each socioeconomic variable is represented in the PARIS REINFORCE modelling suite.

**Socioeconomic representation**

Results computed by energy- and climate- economic models are driven by certain specific parameters, which are determined either endogenously (i.e. within a model's own calculations) or exogenously as an input from an external source. Most models share a common set of drivers, namely GDP and population, and this is why these two socioeconomic dimensions are largely considered in all PARIS REINFORCE models. Their projections are used to define the socioeconomic context to compare scenarios with and without climate policies. In all models, economic growth assumptions can be adjusted to reflect scenario input choices. Each model has a particular set of input requirements driving the sectoral changes. In most cases, as the underlying driver increases, energy demand also increases, but tends to do so at a slower rate, to reflect the fact that there is a decreasing demand for additional energy services as incomes rise; this is defined as the income elasticity of energy demand: when dropping down to zero, it is an indication of saturation levels for energy service demand being reached. The analysed models also incorporate the concept of energy price elasticity of energy demands, which captures the dynamics of rising energy prices leading to a fall in the demand for energy services. The combined impact of these two concepts can capture, to some extent, behaviour changes in terms of uptake of more efficient modes of travel, or the responsible use of appliances in buildings. However, more profound behaviour changes, such as large-scale shifts from private motorised transport to public transport or active transport (i.e. walking and cycling) are not directly captured in the project models, and scenarios assuming policies to implement and support such shifts can be implemented through exogenous input assumptions. As energy- and climate-economic models, the tools comprising the PARIS REINFORCE ensemble cover most socioeconomic dimensions like economic activities and incomes, while public finances and employment metrics to a lesser extent.



**Figure 58: Infographic 1 – Socioeconomic representation in quantitative systems models and the PARIS REINFORCE modelling ensemble**

## 8.4 Infographic 2: Representation of sectors in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how economic sectors are represented in climate-economy and energy quantitative system models, and illustrates in a user-friendly way to what extent each sector is represented in the PARIS REINFORCE modelling suite.

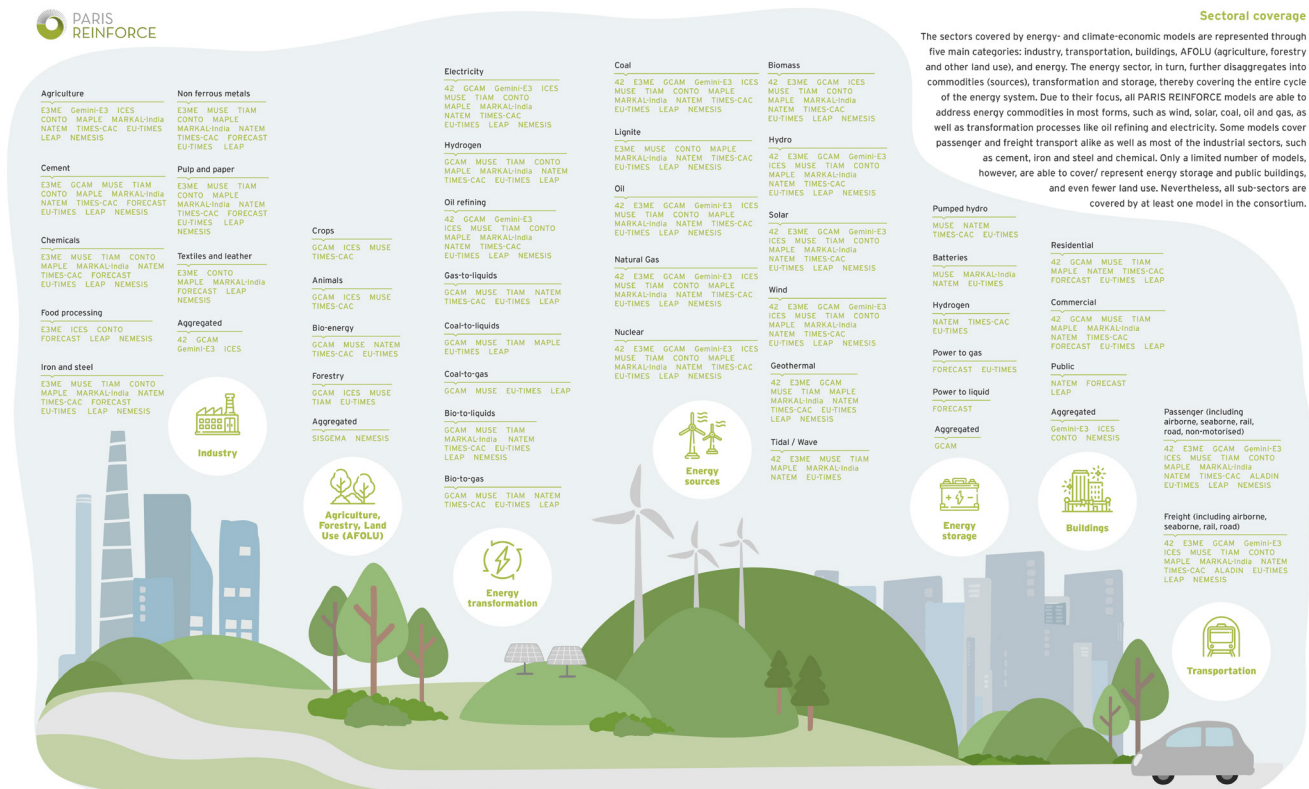


Figure 59: Infographic 2 – Sector representation in quantitative systems models and the PARIS REINFORCE modelling ensemble

## 8.5 Infographic 3: Representation of policies in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how different policy instruments are represented in climate-economy and energy quantitative system models, and illustrates in a user-friendly way to what extent each type of policy is represented in the PARIS REINFORCE modelling suite.

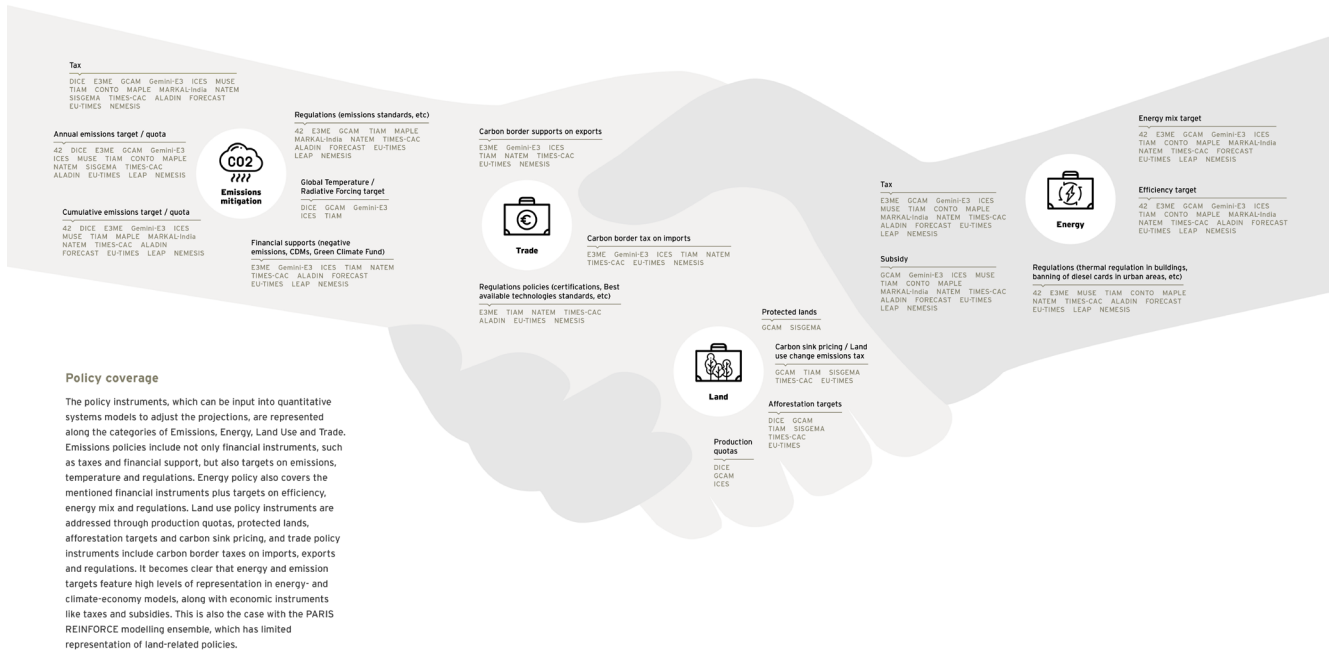


Figure 60: Infographic 3 – Policy representation in quantitative systems models and the PARIS REINFORCE modelling ensemble



## 8.6 Infographic 4: Representation of mitigation and adaptation measures in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how different mitigation and adaptation technologies are represented in climate-economy and energy quantitative system models, and illustrates in a user-friendly way to what extent each type of technological measure is represented in the PARIS REINFORCE modelling suite.

### Mitigation and adaptation measures

Models produce outputs to inform mitigation and adaptation planning. Mitigation concerns measures that look to directly reduce emissions whereas adaptation considers measures that may be implemented in order to maintain established standards of living in a changing climate. Mitigation and adaptation measures can be included in all models' simulations of low-carbon pathways through, for example, the inclusion of renewable energy technologies as alternatives for fossil fuels (mitigation), a shift towards less land use-intensive diets (mitigation and adaptation), or increasing cooling requirements for buildings (adaptation). Models have historically focussed predominantly upon mitigation measures, and this is also the case with the PARIS REINFORCE modelling capabilities; however, adaptation capabilities are being steadily introduced in line with their increasing relevance given ongoing climate change. Mitigation measures can be applied into a range of sectors; one can investigate the effects of interventions into sectors in isolation or as part of a broad-ranging economy-wide strategy, like the European Green Deal. These can include clean technologies in upstream technologies (e.g. blue and green hydrogen production), heat and electricity generation (e.g. renewables) and storage, new transportation alternatives (e.g. hybrid or electric vehicles, biofuels, etc.), buildings technologies (e.g. new appliances and energy efficiency), industrial innovation, or new technologies in agriculture and land use (e.g. animal husbandry, integrated manure management, and reimbursements for holding carbon stocks). Specific adaptation measures can also be implemented for some sectors, particularly relating to the management of land use, water systems, and urban environments (e.g. consequences of afforestation levels on land-use change).

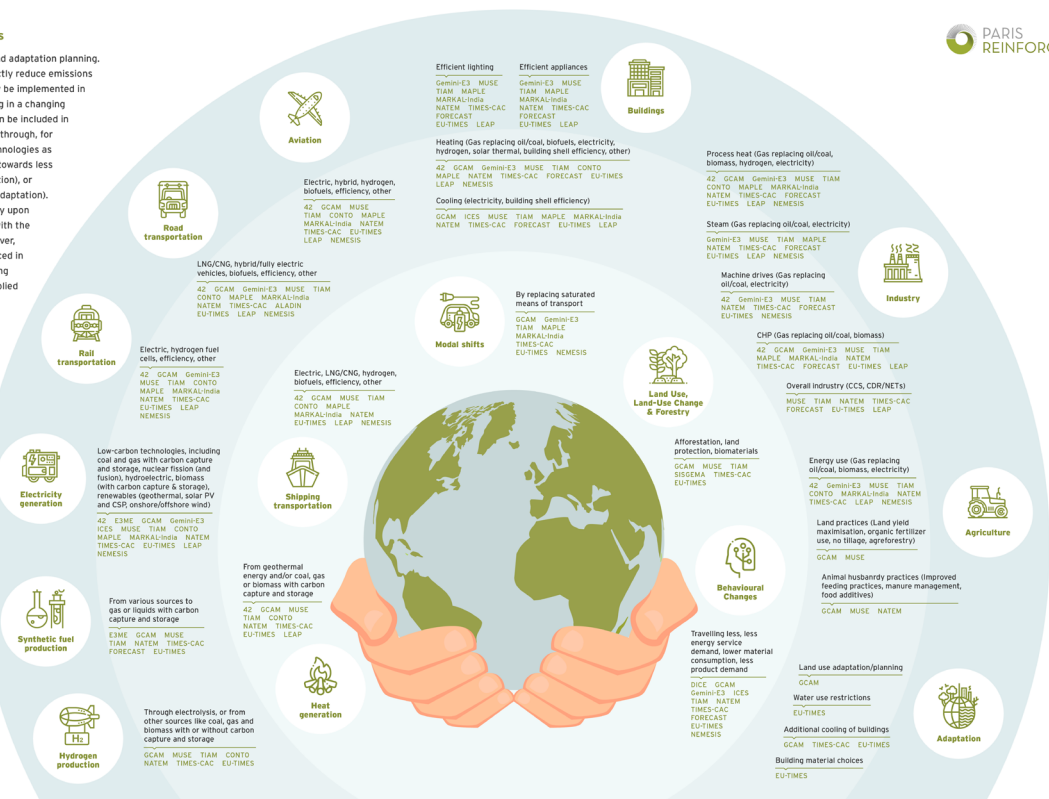


Figure 61: Infographic 4 – Mitigation and adaptation technological representation in quantitative systems models and the PARIS REINFORCE modelling ensemble



## 8.7 Infographic 5: Representation of emissions in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how Greenhouse Gas (GHG) emissions and other pollutants are covered in climate-economy and energy quantitative system models, and illustrates in a user-friendly way to what extent each emission is represented in the PARIS REINFORCE modelling suite.

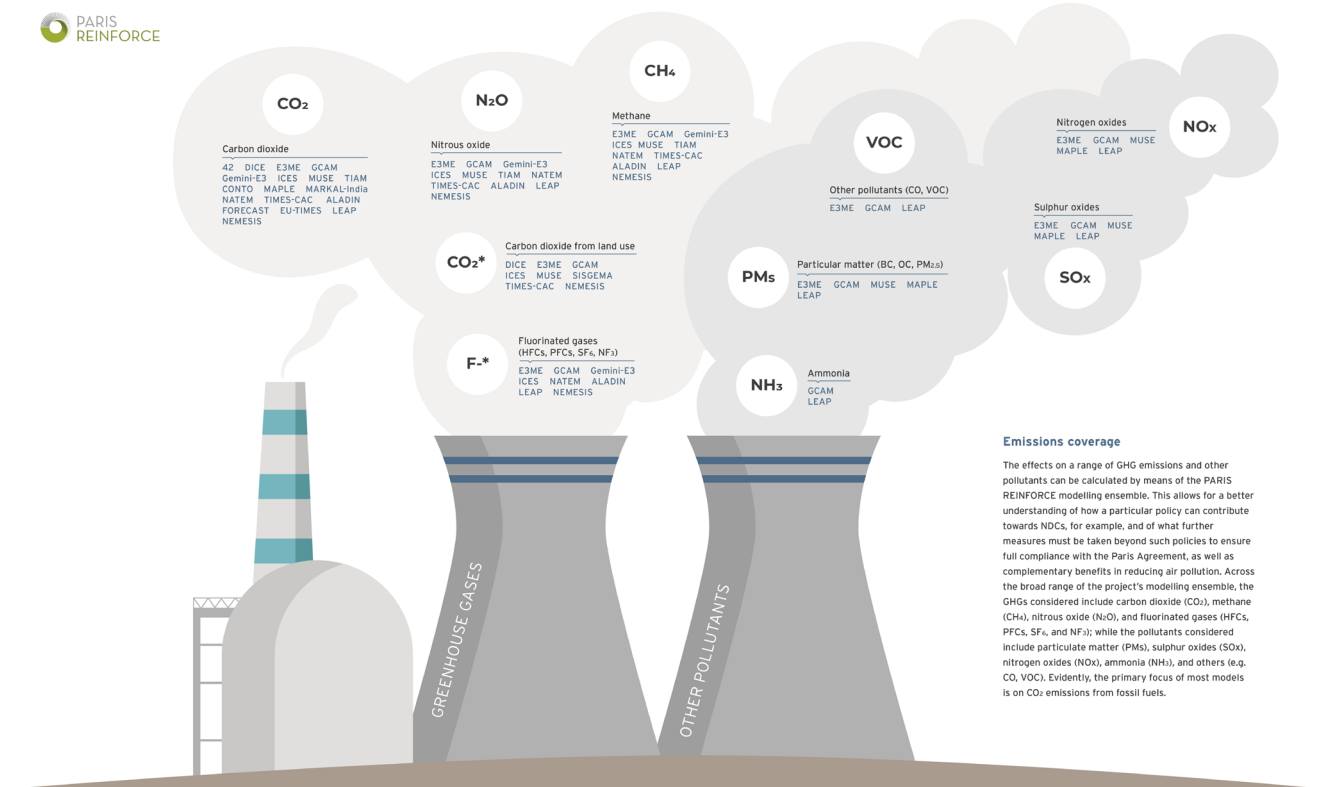


Figure 62: Infographic 5 – Emissions representation in quantitative systems models and the PARIS REINFORCE modelling ensemble

## 8.8 Infographic 6: Representation of Sustainable Development Goals in PARIS REINFORCE models

This infographic, published in the PARIS REINFORCE website, explains in non-technical detail how indicators relevant to Sustainable Development Goals (SDGs) are represented in climate-economy and energy quantitative system models, and illustrates in a user-friendly way to what extent an SDG is represented in the PARIS REINFORCE modelling suite and what specific indicators can be extracted in this respect.



### Sustainable Development Goals

The need to assess climate action in conjunction with other Sustainable Development Goals (SDGs) has in the modelling literature been addressed by means of treating SDGs as trade-offs of low-carbon mitigation pathways, either explicitly or implicitly. Despite having been designed and/or adapted to support climate policy, integrated assessment models like the ones used in PARIS REINFORCE have been found well-equipped to deal with most other goals of sustainable development, through their output metrics related to SDG targets. Each SDG has several metrics influenced by a range of factors, e.g. changes in energy prices are relevant to SDG7 (affordable and clean energy) and also indirectly to SDGI (eliminating poverty) if considered a driver of poverty. Additionally, the coverage of a particular SDG does not imply the use of the same metric, so different metrics can be used to cover the same SDG, e.g. mortality due to air pollutants and healthy life expectancy for SDG3 (good health and well-being) or access to electricity and renewable electricity share for SDG7. Evidently, global models used in the project have the capacity to provide some information relevant to most SDGs, with the exception of SDGs 14 (life below water) and 17 (partnerships for the goals), with ICES in particular having been explicitly designed to output information on most SDG indicators. Models focusing on the EU, on the other hand, focus on a subset of SDGs (6-13). Overall, models can output more information for SDGs featuring significant interactions with energy and economy.

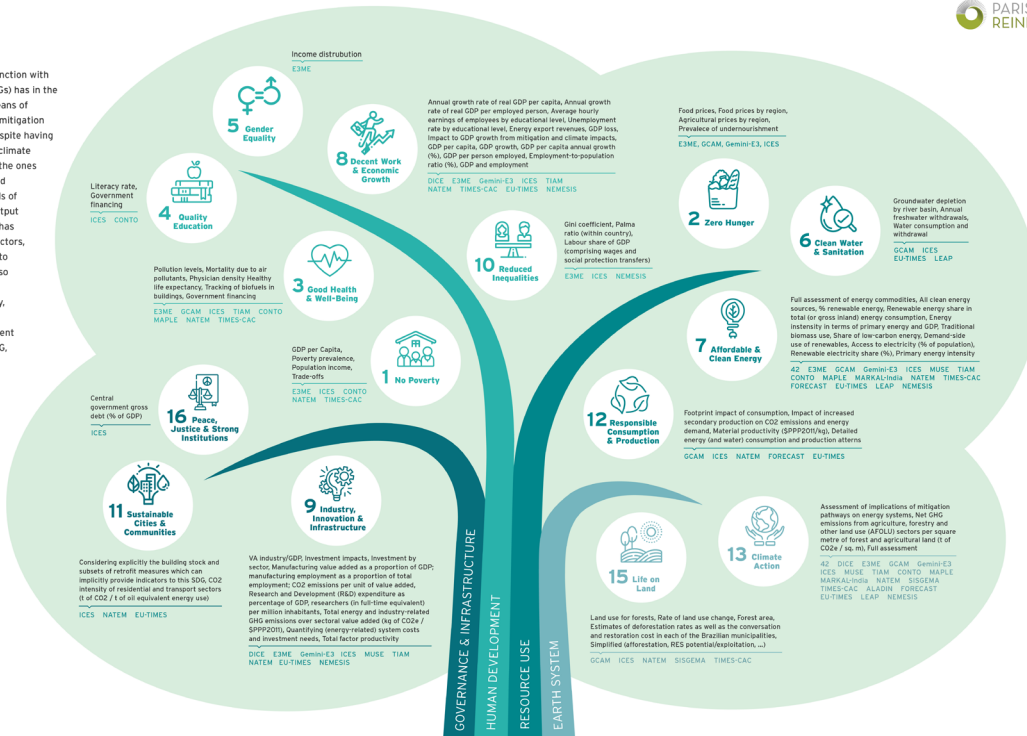


Figure 63: Infographic 6 – SDG representation in quantitative systems models and the PARIS REINFORCE modelling ensemble



## 8.9 Infographic 7: Sustainable and socially just transition to a post-lignite era in Greece: a multi-level perspective

This infographic, published in the PARIS REINFORCE website, builds upon the Multi-Level Perspective framework and further focuses on the phase-out of the dominant fossil fuel in the Greek electricity mix, rather than solely exploring the phase-in of new technologies. By delving into the landscape that established lignite as the mainstream energy resource in Greece, as well as the factors sustaining its dominance despite niche technologies and innovations challenging the regime, it discusses how the envisaged decarbonisation can be socially just and effective across multiple sustainability dimensions.

The infographic is based on:

Nikas, A., Neofytou, H., Karamaneas, A., Koasidis, K., & Psarras, J. (2020). Sustainable and socially just transition to a post-lignite era in Greece: a multi-level perspective. *Energy Sources, Part B: Economics, Planning, and Policy*, in press.

<https://doi.org/10.1080/15567249.2020.1769773>

### Sustainable and Socially Just Transition to a Post-Lignite Era in Greece: a Multi-Level Perspective

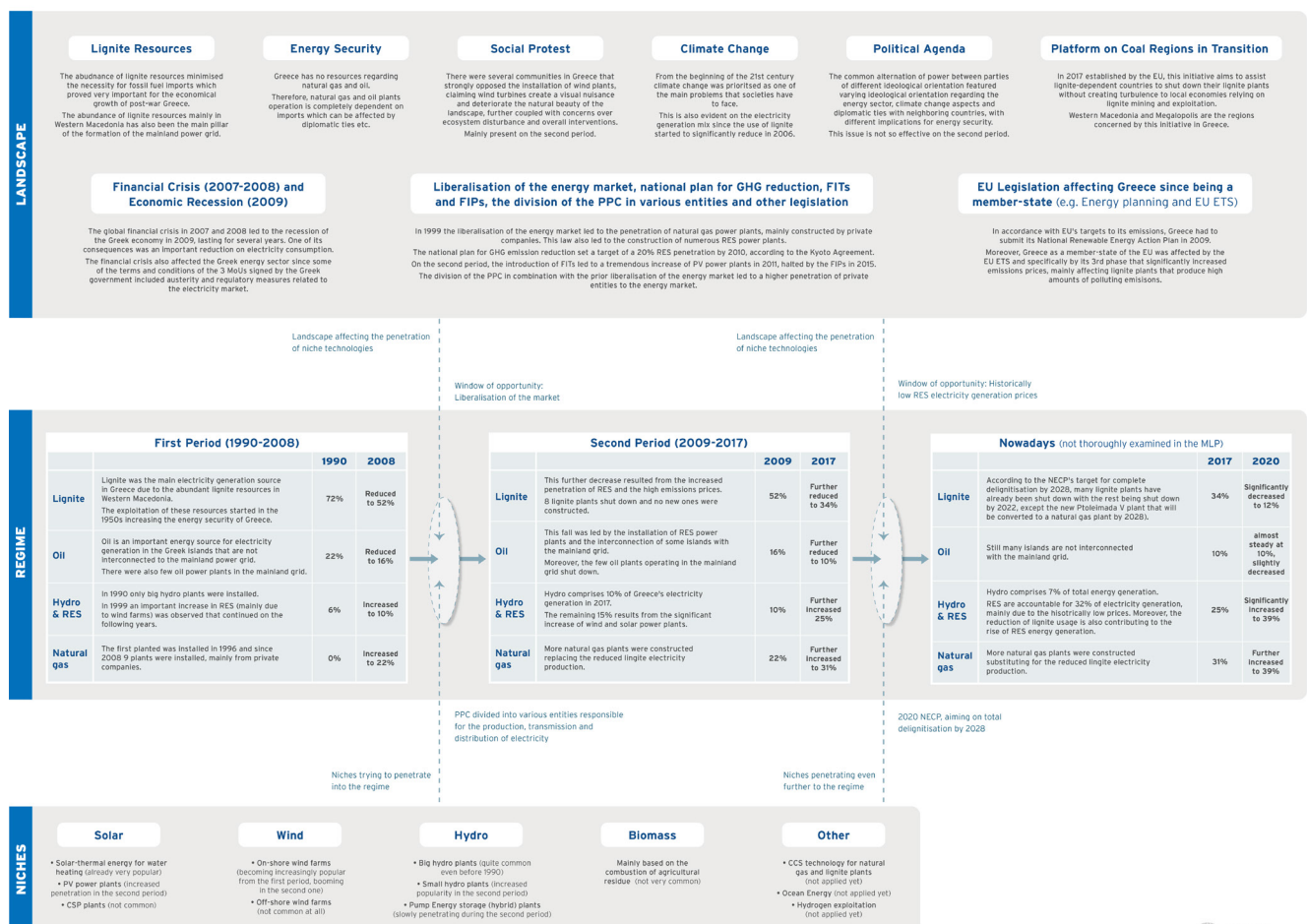


Figure 64: Infographic 7 – Sustainable and socially just transition to a post-lignite era in Greece: a multi-level perspective



## 8.10 Infographic 8: Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Norway in Light of the Paris Agreement

This infographic, based on the Sectoral Innovation Systems approach, published in the PARIS REINFORCE website, attempts to identify the elements enabling Norway to become one of the leaders in the diffusion of electric vehicles. By utilising the System Failure framework, bottlenecks hindering the decarbonisation of the transport system are identified. Results indicate that the effectiveness of Norway’s policy is exaggerated and has led to recent spillover effects towards green shipping. Insights into the effectiveness of previously implemented policies and the evolution of the sectoral system can help draw lessons towards sustainable transport.

The infographic is based on:

Koasidis, K., Karamaneas, A., Nikas, A., Neofytou, H., Hermansen, E. A., Vaillancourt, K., & Doukas, H. (2020). Many miles to Paris: A sectoral innovation system analysis of the transport sector in Norway and Canada in light of the Paris Agreement. *Sustainability*, 12(14), 5832.

<https://doi.org/10.3390/su12145832>

### Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Norway in Light of the Paris Agreement

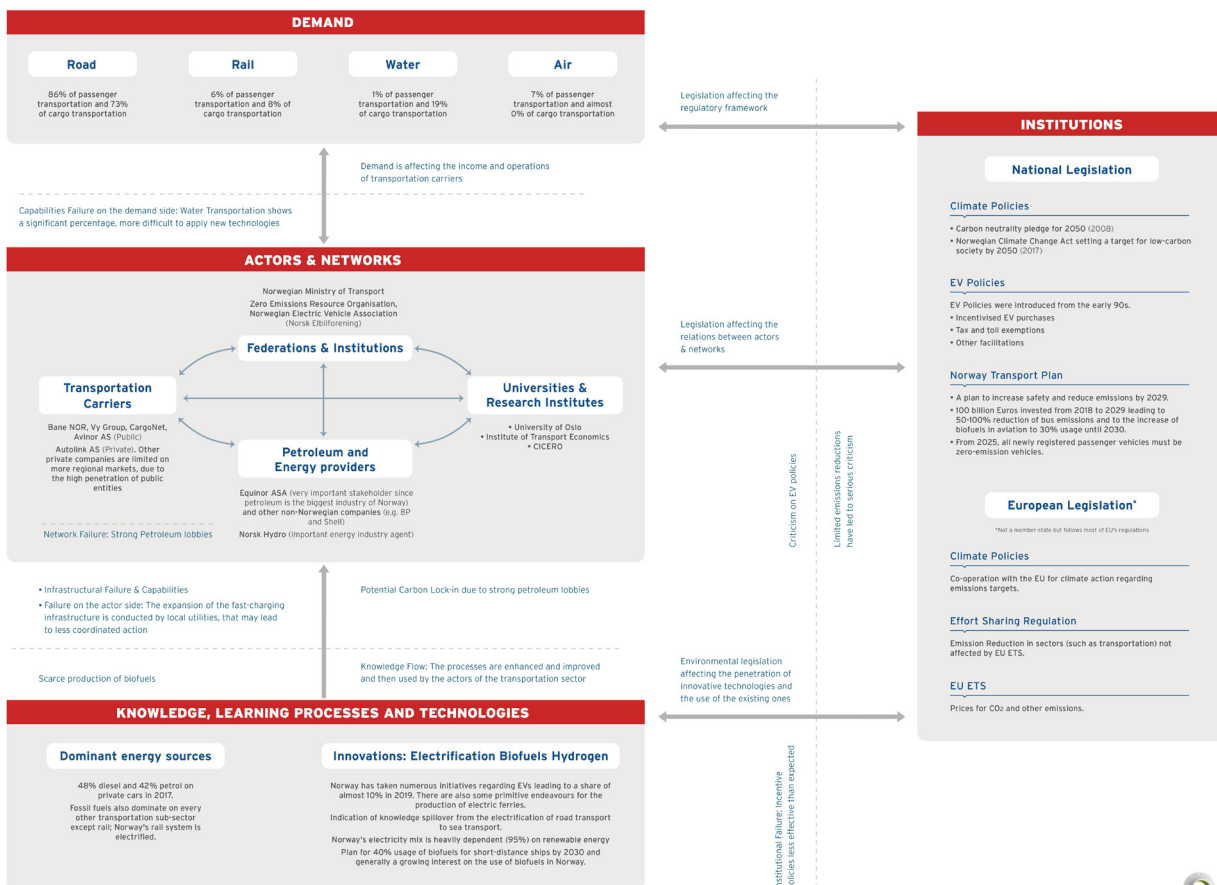


Figure 65: Infographic 8 – Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Norway in Light of the Paris Agreement



## 8.11 Infographic 9: Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Canada in Light of the Paris Agreement

This infographic, based on the Sectoral Innovation Systems approach, published in the PARIS REINFORCE website, attempts to identify the factors pacing down progress in the diffusion of electric vehicles in Canada. By utilising the System Failure framework, bottlenecks hindering the decarbonisation of the transport system are identified. The activity of oil companies, regional and federal legislative disputes in Canada and the lack of sincere efforts from system actors to address challenges lead to non-drastic greenhouse gas emission reductions, despite significant policy efforts. Insights into the effectiveness of previously implemented policies and the evolution of the sectoral system can help draw lessons towards sustainable transport.

The infographic is based on:

Koasidis, K., Karamaneas, A., Nikas, A., Neofytou, H., Hermansen, E. A., Vaillancourt, K., & Doukas, H. (2020). Many miles to Paris: A sectoral innovation system analysis of the transport sector in Norway and Canada in light of the Paris Agreement. *Sustainability*, 12(14), 5832.

<https://doi.org/10.3390/su12145832>

Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Canada in Light of the Paris Agreement

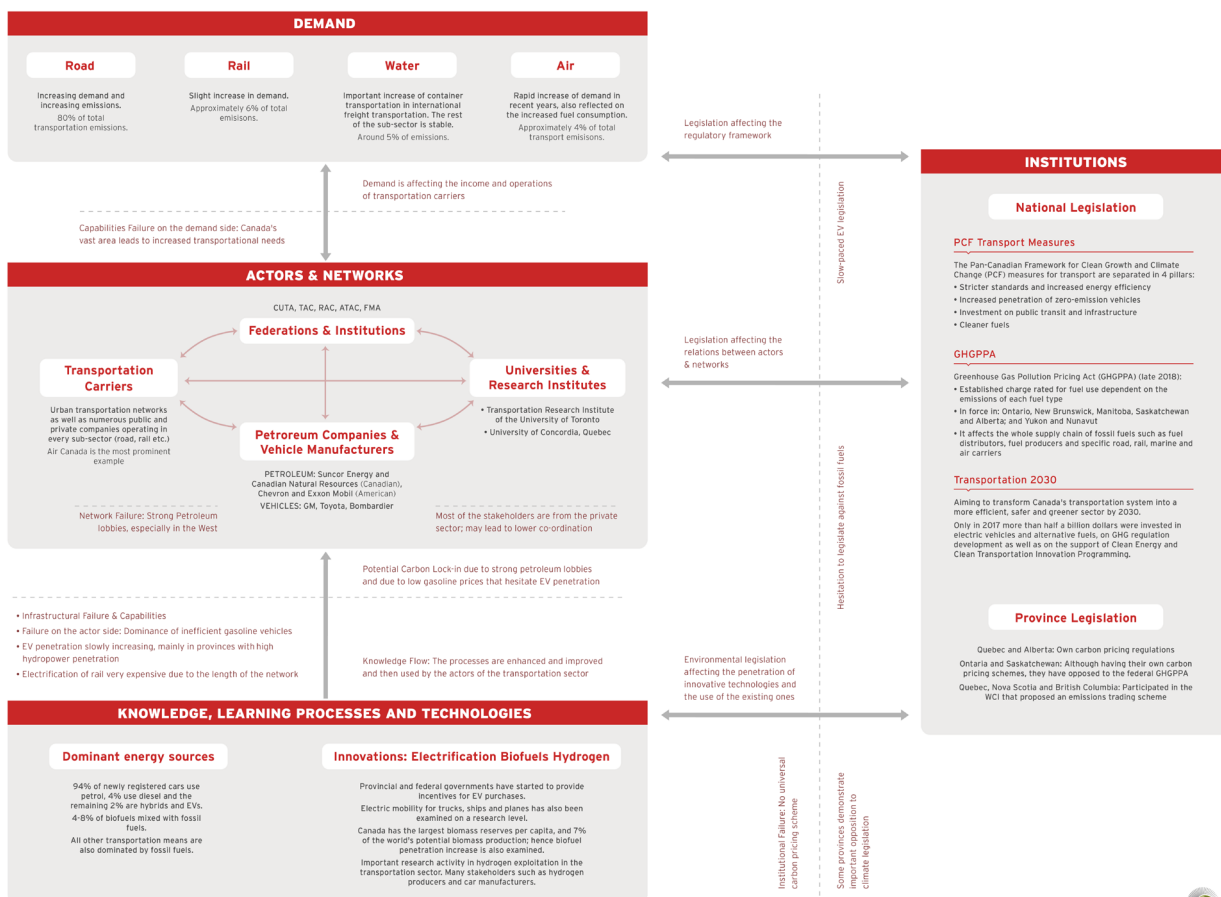


Figure 66: Infographic 9 – Many Miles to Paris: A Sectoral Innovation System Analysis of the Transport Sector in Canada in Light of the Paris Agreement



## 8.12 Infographic 10: The UK Low-Carbon Industry Transition from a Sectoral Innovation and System Failures Perspective

This infographic, published in the PARIS REINFORCE website, reviews the energy-intensive iron and steel, cement and chemicals industries of the United Kingdom, a major emitting country with significant activity. Based on the Sectoral Innovation Systems and the Systems Failure framework, it aims to capture existing and potential drivers of or barriers to diffusion of sustainable industrial technologies and extract implications for policy. Results indicate that actor structures and inconsistent policies have limited low-carbon innovation. A key to UK industrial decarbonisation is to drive innovation and investment in the context of an industry in decline and in light of Brexit-related uncertainty.

The infographic is based on:

Koasidis, K., Nikas, A., Neofytou, H., Karamaneas, A., Gambhir, A., Wachsmuth, J., & Doukas, H. (2020). The UK and German Low-Carbon Industry Transitions from a Sectoral Innovation and System Failures Perspective. *Energies*, 13(19), 4994.

<https://doi.org/10.3390/en13194994>

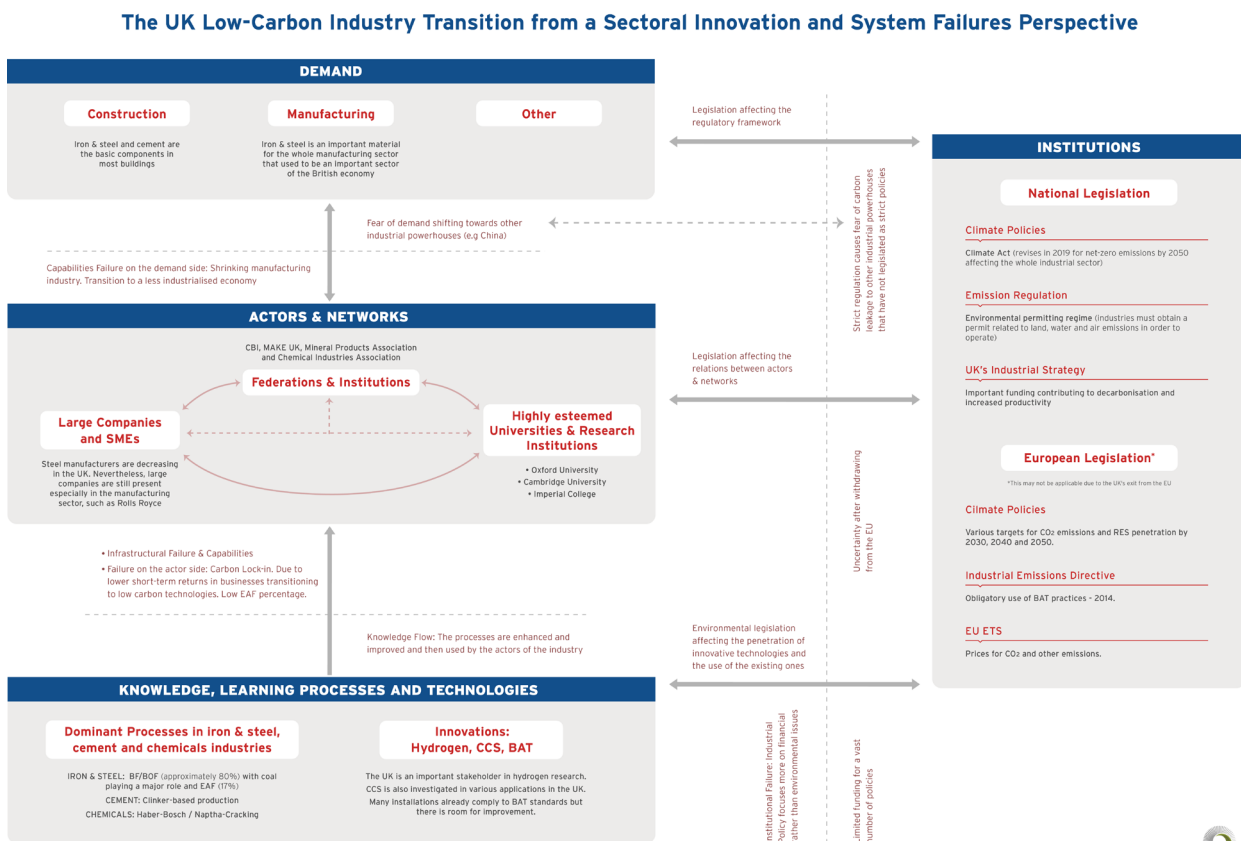


Figure 67: Infographic 10 – The UK Low-Carbon Industry Transition from a Sectoral Innovation and System Failures Perspective



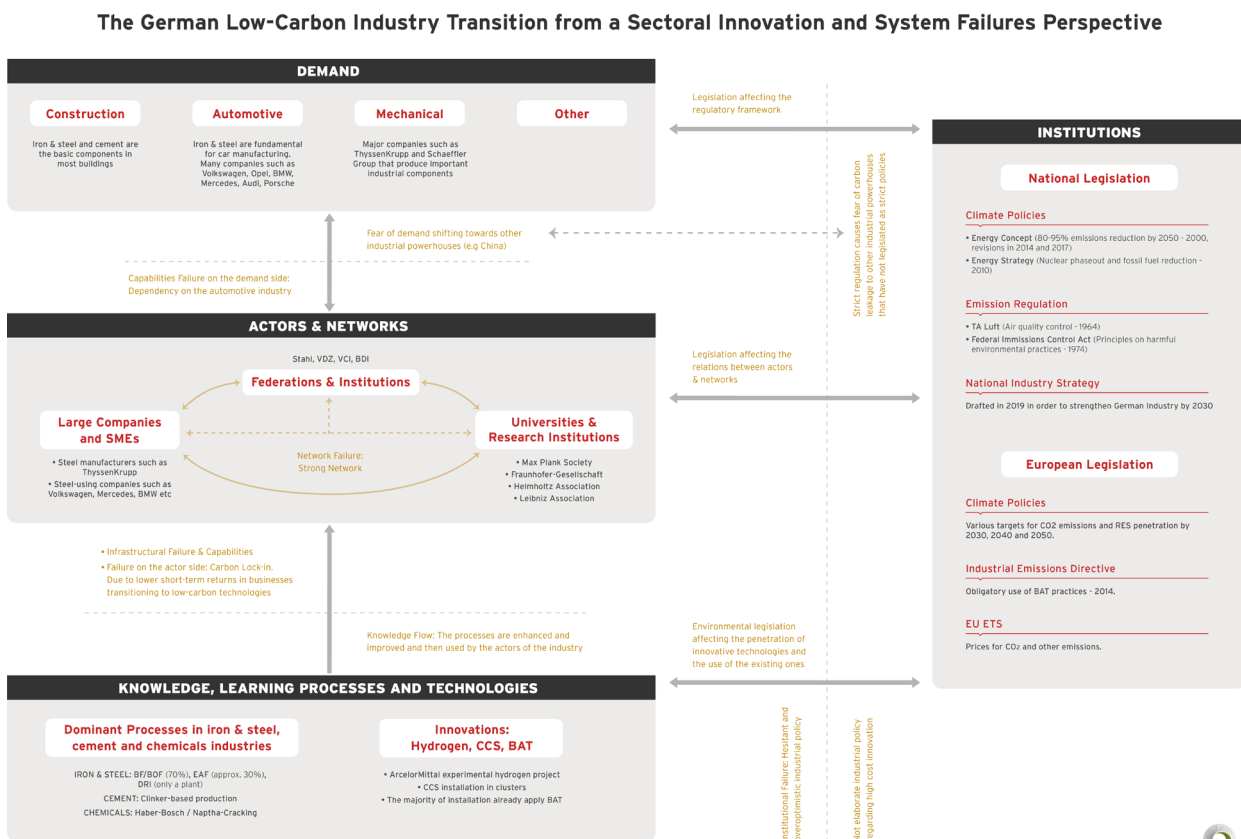
## 8.13 Infographic 11: The German Low-Carbon Industry Transition from a Sectoral Innovation and System Failures Perspective

This infographic, published in the PARIS REINFORCE website, reviews the energy-intensive iron and steel, cement and chemicals industries of Germany, a major emitting country with significant activity. Based on the Sectoral Innovation Systems and the Systems Failure framework, it aims to capture existing and potential drivers of or barriers to diffusion of sustainable industrial technologies and extract implications for policy. Results indicate that actor structures and inconsistent policies have limited low-carbon innovation. A critical factor for the successful decarbonisation of German industry lies in overcoming lobbying and resistance to technological innovation caused by strong networks.

The infographic is based on:

Koasidis, K., Nikas, A., Neofytou, H., Karamaneas, A., Gambhir, A., Wachsmuth, J., & Doukas, H. (2020). The UK and German Low-Carbon Industry Transitions from a Sectoral Innovation and System Failures Perspective. *Energies*, 13(19), 4994.

<https://doi.org/10.3390/en13194994>



**Figure 68: Infographic 11 – The German Low-Carbon Industry Transition from a Sectoral Innovation and System Failures Perspective**



## 8.14 Infographic 12: A Multi-Level Perspective of Brazil's Transport Decarbonisation Potential, Focusing on the Biodiesel Technological Innovation System

This infographic, published in the PARIS REINFORCE website, reviews the transport sector of Brazil and the emergence of biodiesel. Using the MLP and TIS frameworks, it sheds light on the historical evolution of the dominant regime of the Brazilian transport sector and helps understand how the dependency of fossil fuels was shaped in line with continuous pressures from oil, economic, and institutional crises from the landscape. It also highlights the emergence of the biodiesel technological system, its interactions with other technologies, and the progress that allowed it to break through from a niche and become part of the regime.

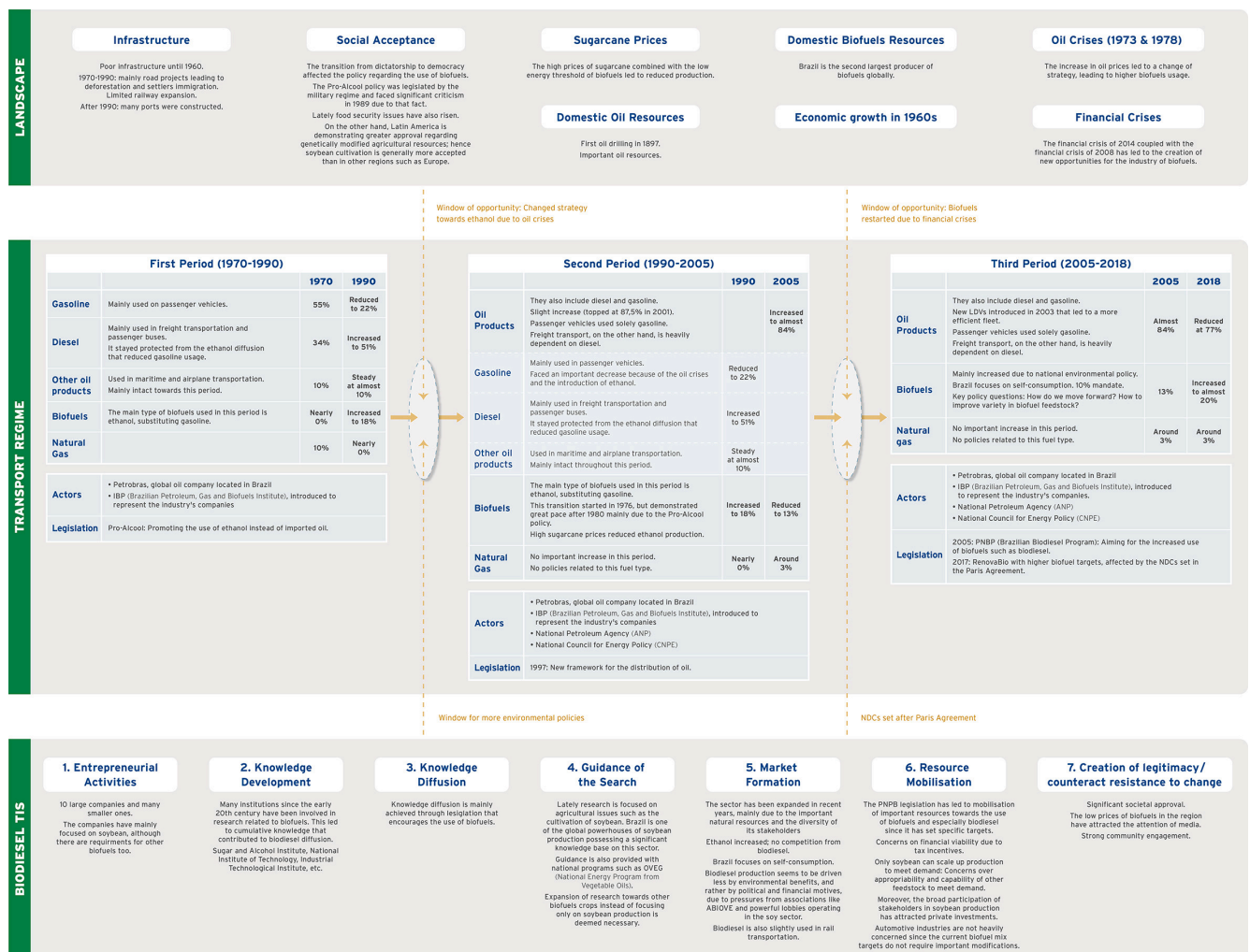


Figure 69: Infographic 12 – A Multi-Level Perspective of Brazil's Transport Decarbonisation Potential, Focusing on the Biodiesel Technological Innovation System



## 8.15 Infographic 13: A Multi-Level Perspective of Argentina’s Transport Decarbonisation Potential, Focusing on the Biodiesel Technological Innovation System

This infographic, published in the PARIS REINFORCE website, reviews the transport sector of Argentina and the emergence of biodiesel. Using the MLP and TIS frameworks, it sheds light on the historical evolution of the dominant regime of the Argentinian transport sector and helps understand how the dependency of fossil fuels was shaped in line with continuous pressures from oil, economic, and institutional crises from the landscape. It also highlights the emergence of the biodiesel technological system, its interactions with other technologies, and the progress that allowed it to break through from a niche and become part of the regime.

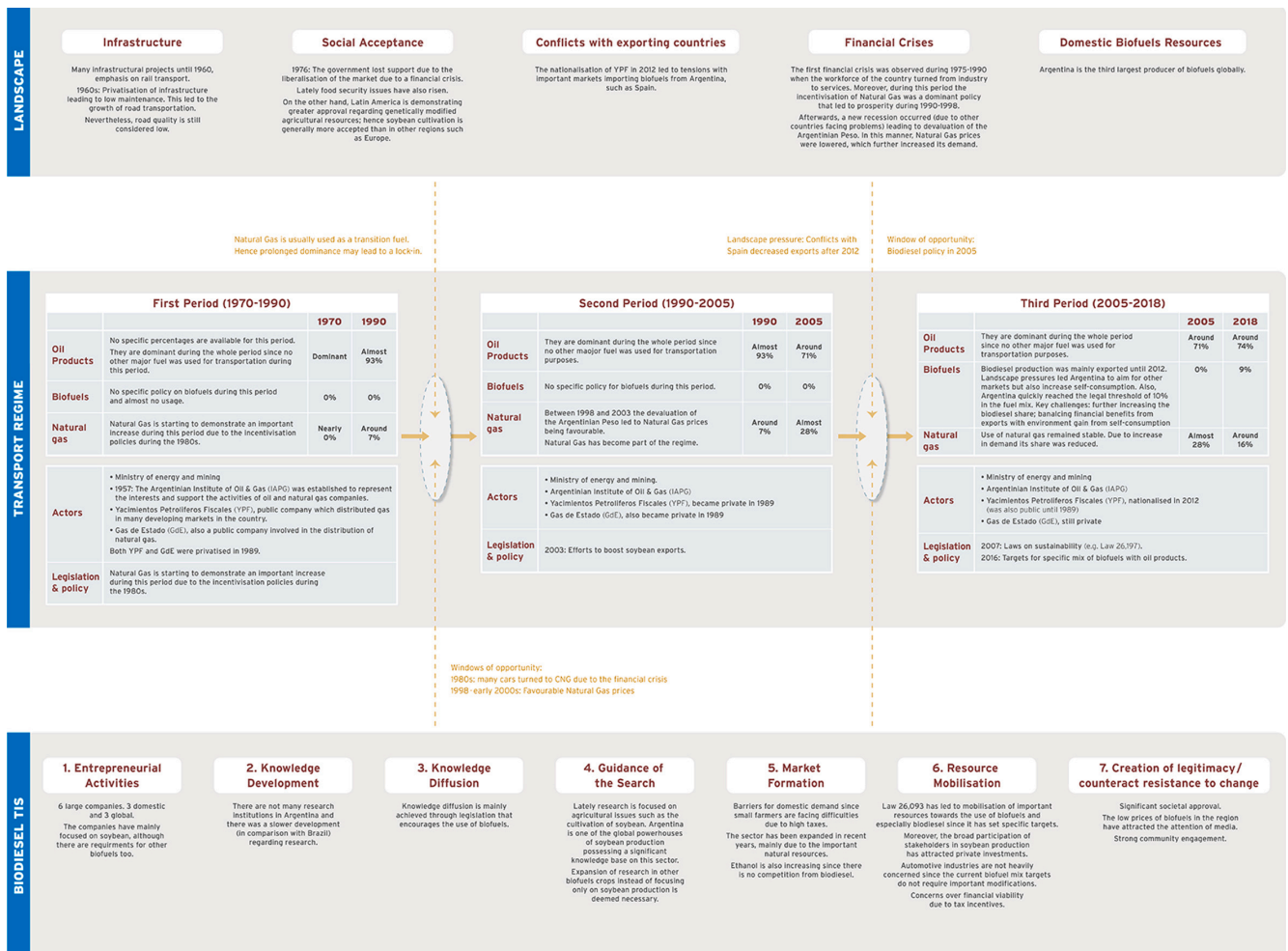


Figure 70: Infographic 13 – A Multi-Level Perspective of Argentina’s Transport Decarbonisation Potential, Focusing on the Biodiesel Technological Innovation System

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