PARIS
REINFORCE

3rd TUM Multidisciplinary Conference and Innovation Week

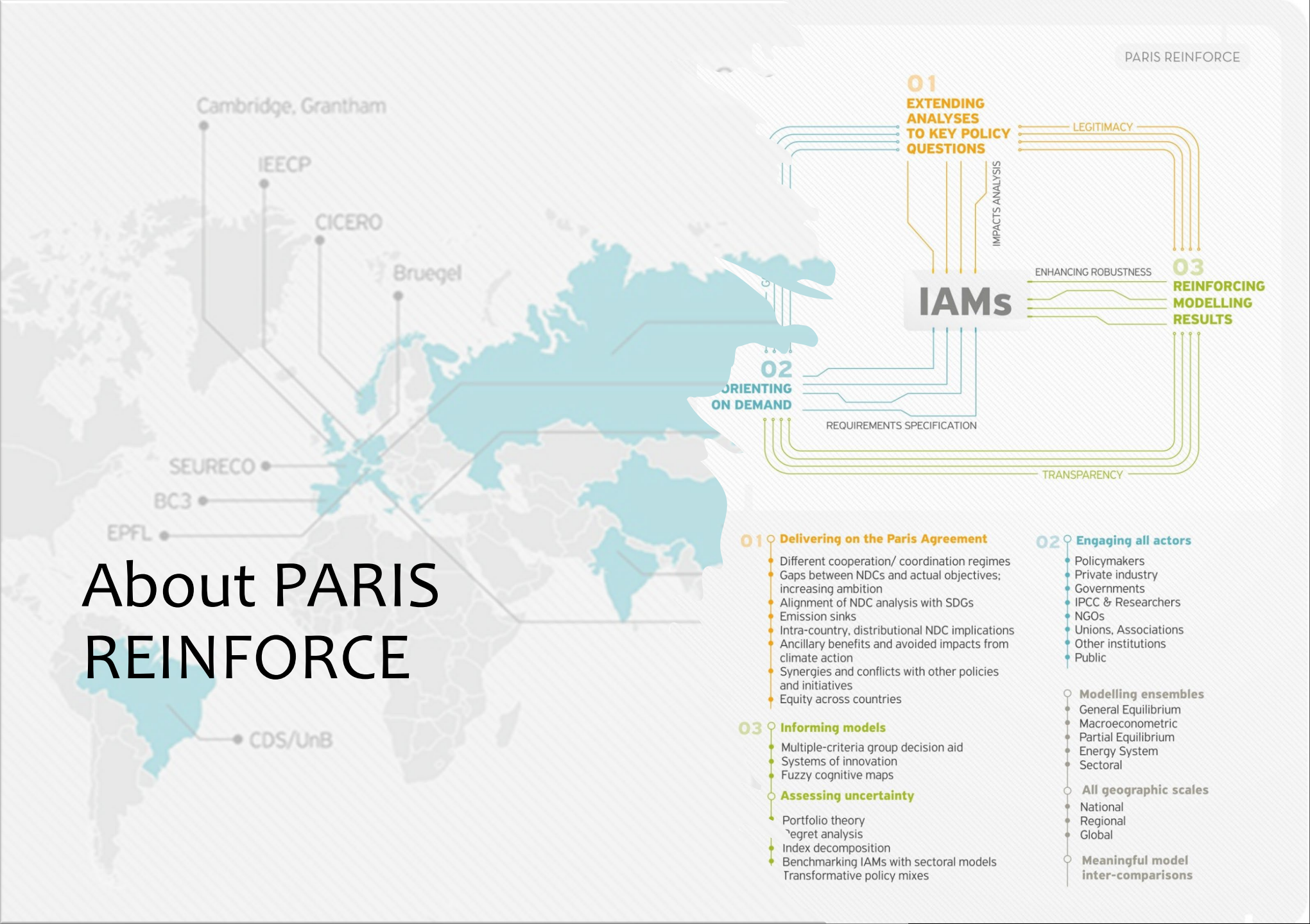
Where are we headed and how to make use of recovery funds?

Dr. Alexandros Nikas & Prof. Haris Doukas

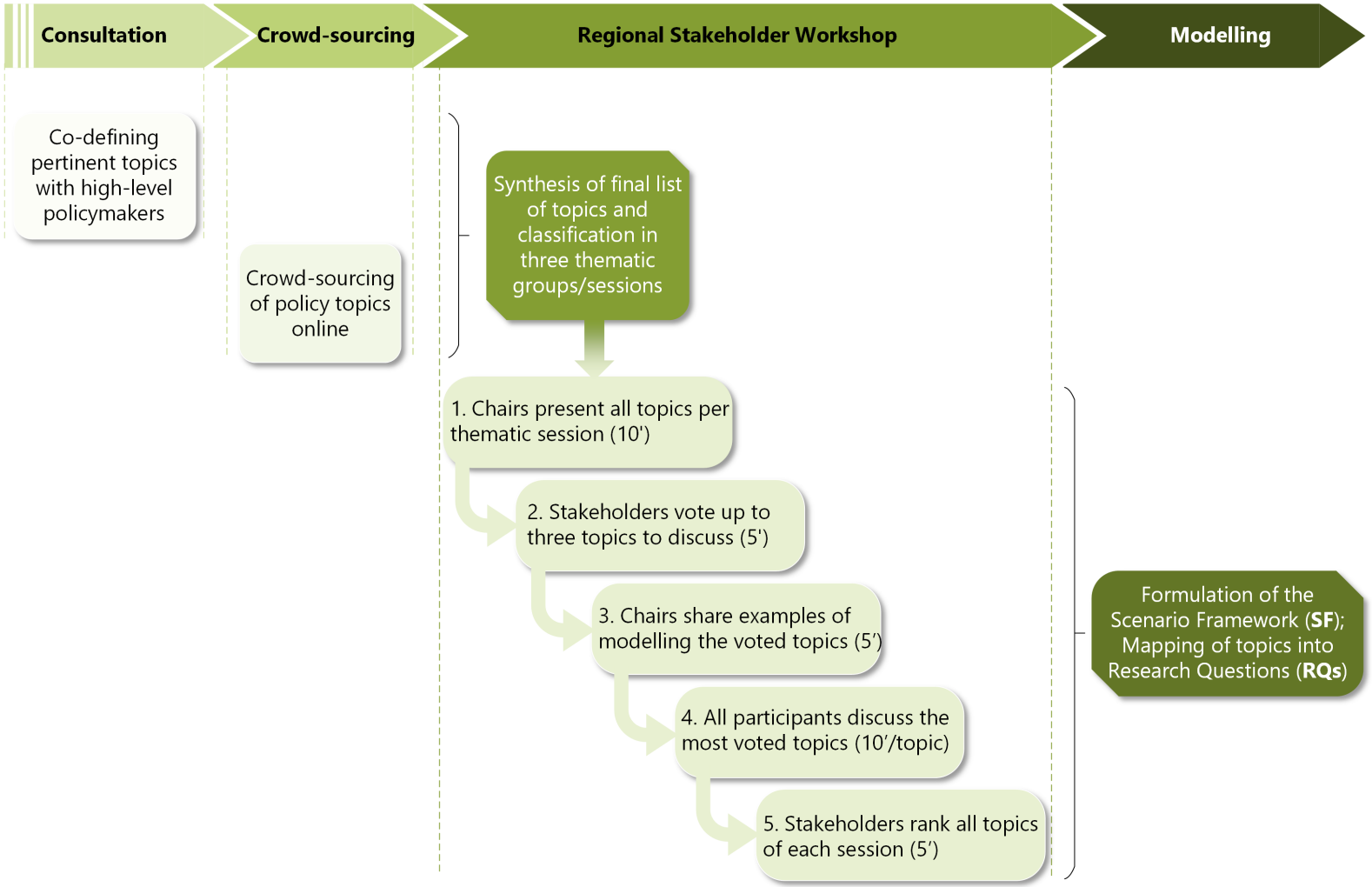
National Technical University of Athens

www.paris-reinforce.eu

About PARIS REINFORCE



Intro: co-creating with policy/stakeholders

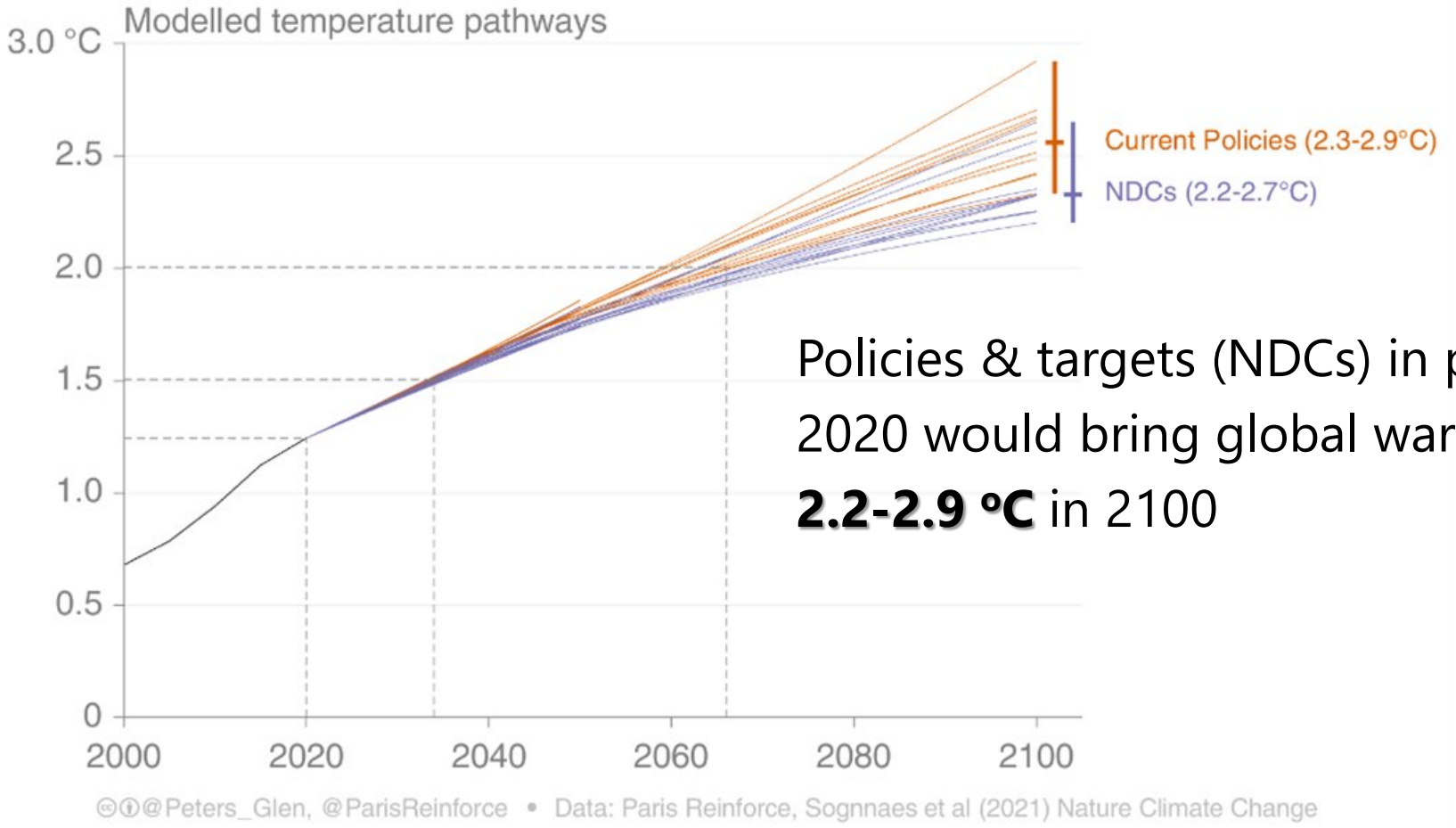


The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

"Where is the EU headed given its current climate policy? A stakeholder-driven model inter-comparison", ***Science of the Total Environment***, *793*

Where is the world headed?

Understanding **where we are** (defining a realistic baseline)



Policies & targets (NDCs) in place in 2020 would bring global warming to **2.2-2.9 ºC** in 2100

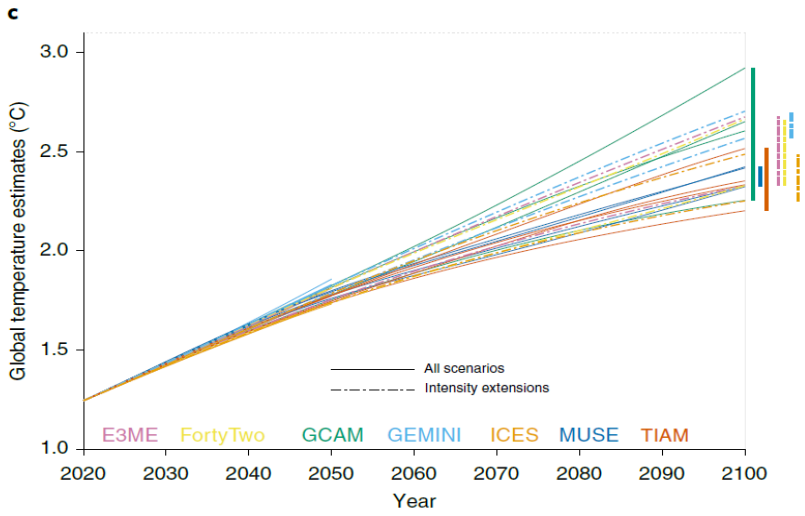
The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

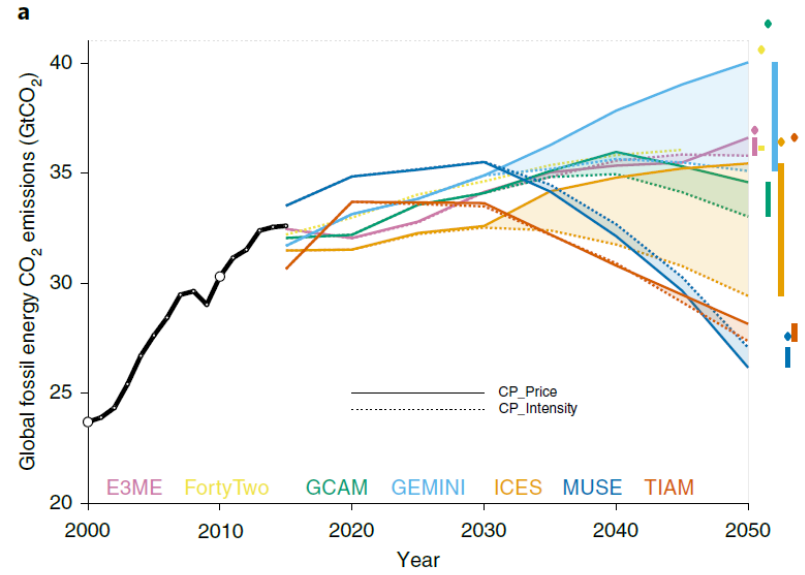
"A multi-model analysis of long-term emissions and warming implications of current mitigation efforts", ***Nature Climate Change 11***, 1055–1062

False precision to climate outcomes given during COP26 may lead countries to believe good progress is made. Our findings indicate current policies & policy pledges can still lead to **warming outcomes of 3°C** in 2100.

"A multi-model analysis of long-term emissions and warming implications of current mitigation efforts", ***Nature Climate Change 11***, 1055–1062

Where is the world headed?



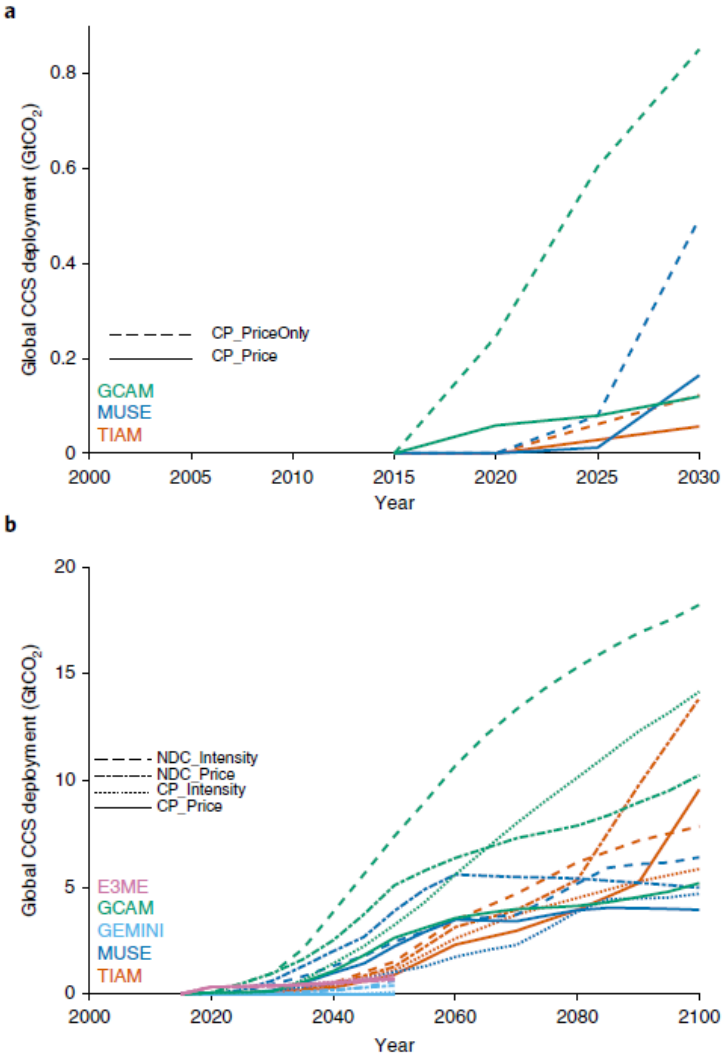


The large model spread highlights the important role of tools used to inform climate policies and pledges, and the critical need to **employ diversified toolboxes.**

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

"A multi-model analysis of long-term emissions and warming implications of current mitigation efforts", ***Nature Climate Change 11***, 1055–1062

Where is the world headed?



High use of CCS might be an outcome of the use of **carbon pricing** as a proxy for real-world policies

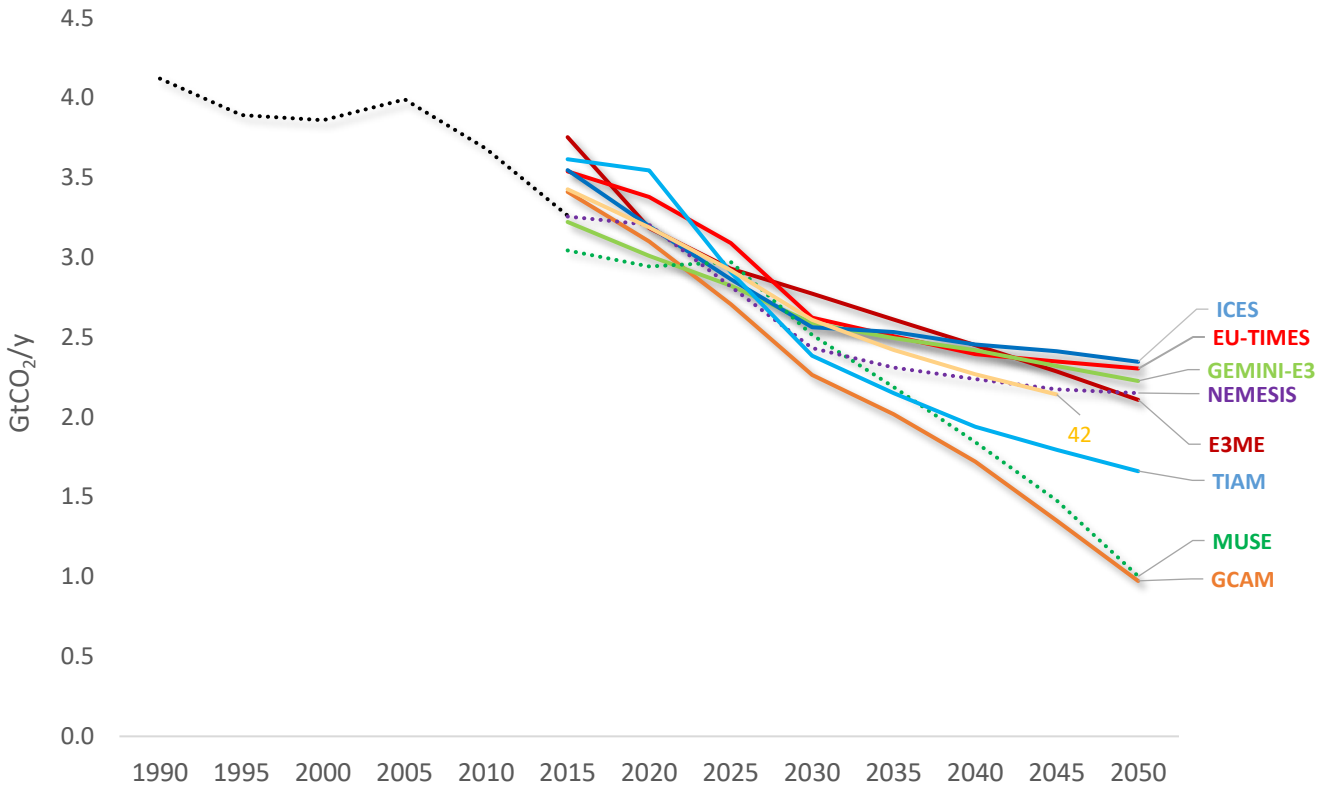
It is important to implement policies in models as they are implemented in the real world. **Real-world policies** may lead to different energy systems than **theoretically modelled policies**.

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

"A multi-model analysis of long-term emissions and warming implications of current mitigation efforts", ***Nature Climate Change 11***, 1055–1062

Where is the EU headed?

Co-creating a model inter-comparison with stakeholders: policies currently in place



GHG emissions 2030

- ✓ Previous target (-40% compared to 1990)
- x Green Deal (-55% compared to 1990): We calculate a -39% to -51% range

CO_2 emissions 2050

- x With negative emission technologies: 1.0 – 1.65 $GtCO_2$
- x Without negative emission technologies : 2.1 – 2.35 $GtCO_2$

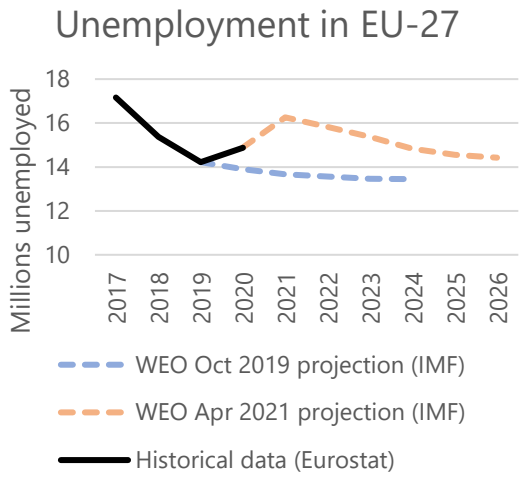
The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

"Where is the EU headed given its current climate policy? A stakeholder-driven model inter-comparison", ***Science of the Total Environment***, *793*

Policy question: green recovery and jobs

Upcoming economic challenges

Strong economic impacts from Covid-19 pandemic and measures:
- 1.8 million jobs lost in EU-27 between Sept 2019 and Sept 2020
- IMF expects >2 million additional unemployed in 2021 and no full recovery by 2025



Green Recovery Packages

Recovery and Resilience Facility (RRF) from EU recovery funds:
- €200-billion of RRF for green projects
- 29% expected for renewable energy generation *
- 3% for (non-electric) low-carbon mobility *

Also: £ 5 billion clean energy stimulus in United Kingdom

Emission reductions and job creation?

Transition from fossil to renewable energy usually creates net jobs (Markandya et al 2016), but potential differences between low-carbon technologies:
How to allocate short-term (2021-2025) recovery funds to maximise impacts in terms of both job creation and emission reductions within this decade?

* https://assets.ey.com/content/dam/ey-sites/ey-com/it_it/news/2020/ey-summary-report-green-recovery-v2.pdf

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

"Investigating Optimal Allocations for Green Recovery Funds". **Climate Action in the Post-COVID-19 World**. European Commission

Global Change Analysis Model (GCAM)

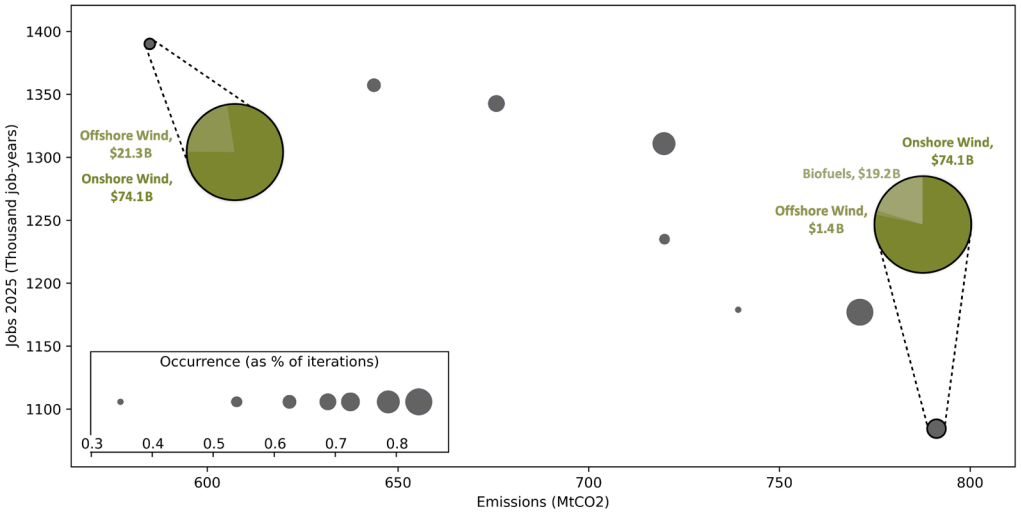
AUGMECON-R

1. Preparation of baseline with defined EU current policies: *where is the EU headed?*
2. Modelling impact of 10 subsidy steps for 7 low-carbon technologies
3. Abstracting modelling outputs and transform into portfolio inputs (employment factors)
4. Determination of (Pareto) optimal subsidy portfolios within selected budget
5. Robustness analysis of Pareto portfolios using Monte-Carlo simulations

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

"Investigating Optimal Allocations for Green Recovery Funds". **Climate Action in the Post-COVID-19 World**. European Commission

Results: employment gains in 2025, then 2030



Emissions cuts by end of decade vs. near-term employment gains

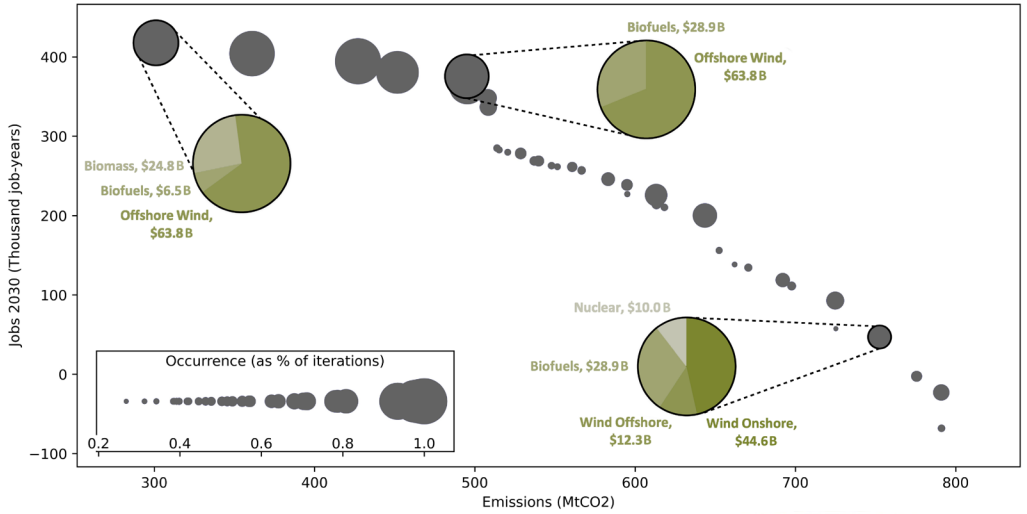
Onshore and offshore wind for employment. From offshore to biofuels for emissions cuts.

Portfolios of max. jobs lose momentum in 2030: *can employment gains be sustained in the longer run?*

Shifting the focus: emissions cuts vs. employment gains both by end of decade

Limited employment gains (in comparison): same spending period & different gains per project stage (more jobs in earlier stages)

Jobs: offshore wind, biomass, biofuels
Emissions: half budget in onshore wind

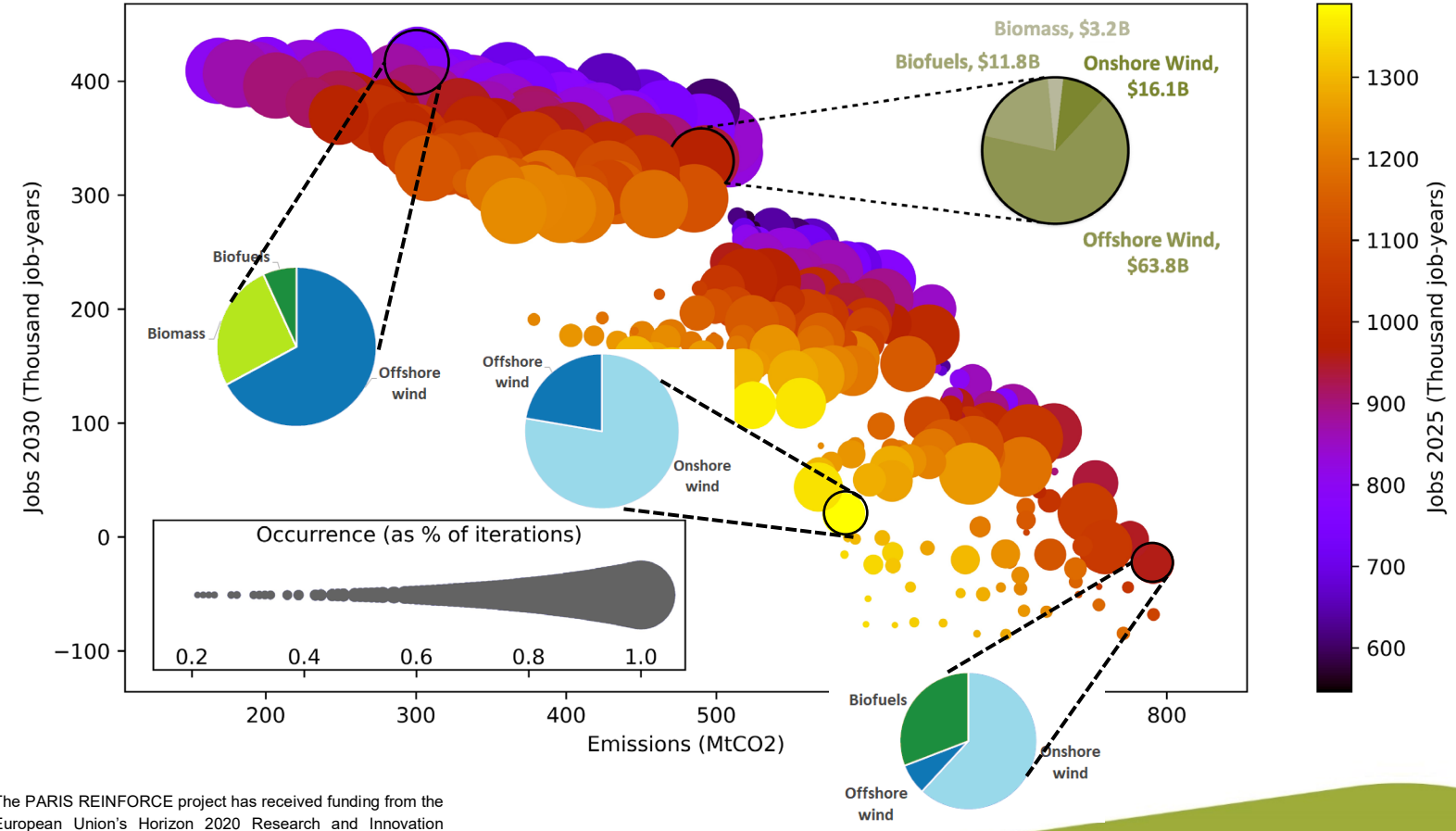


The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

"Investigating Optimal Allocations for Green Recovery Funds". **Climate Action in the Post-COVID-19 World**. European Commission

Emissions cuts by end of decade vs. employment gains (both near-term and longer-term)

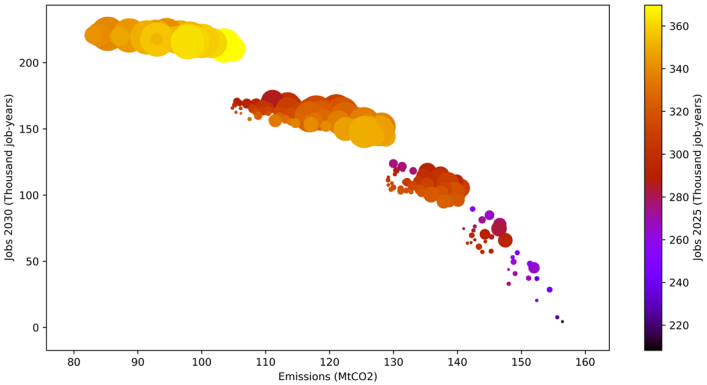
Can the technological mix be diversified for better balance between near- and longer-term employment gains, by aiming to optimise emissions cuts, employment by 2025, and employment by 2030 simultaneously?



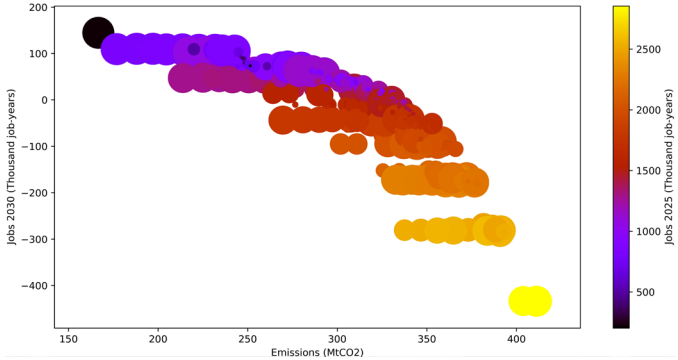
The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

"Investigating Optimal Allocations for Green Recovery Funds". **Climate Action in the Post-COVID-19 World**. European Commission

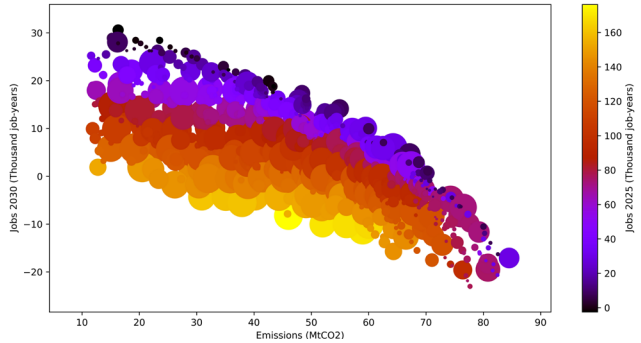
Both the EU and other major emitting countries would strongly benefit from **greener agendas**, on their way to recovering from the COVID-19 pandemic.



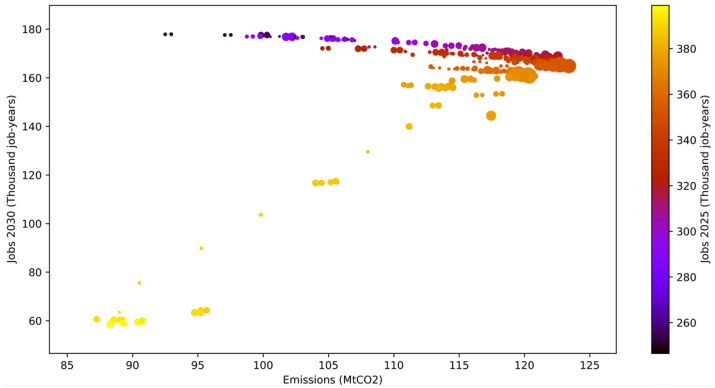
Canada



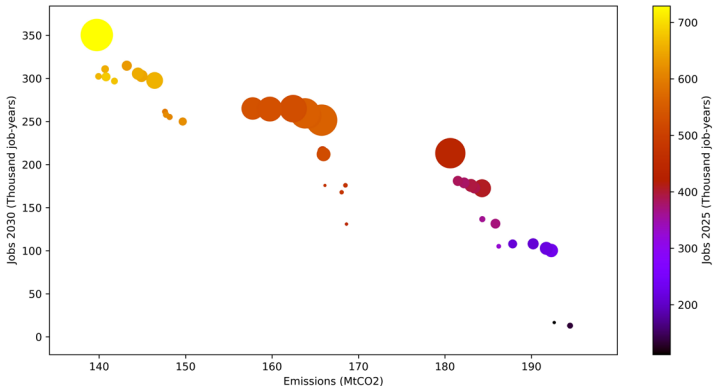
China



India



Japan



USA

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

"Investigating Optimal Allocations for Green Recovery Funds". **Climate Action in the Post-COVID-19 World**. European Commission

Selected References

Sognnaes, I., Gambhir, A., Van de Ven, D.J., Nikas, A., Anger-Kraavi, A., Bui, H., ... & Peters, G.P. (2021). A multi-model analysis of long-term emissions and warming implications of current mitigation efforts. ***Nature Climate Change 11***, 1055-1062.

Le Quéré, C., Peters, G. P., Friedlingstein, P., Andrew, R. M., Canadell, J. G., Davis, S. J., ... & Jones, M. W. (2021). Fossil CO 2 emissions in the post-COVID-19 era. ***Nature Climate Change, 11***(3), 197-199.

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

Nikas, A., Van de Ven, D.J., Koasidis, K., Forouli, A., Mittal, S., Gambhir, A., & Doukas, H. (2021). Investigating Optimal Allocations for Green Recovery Funds. ***Climate Action in the Post-COVID-19 World***. EC Policy Publication for COP26. European Commission

Hausfather, Z., & Peters, G. P. (2020). Emissions–the 'business as usual'story is misleading. ***Nature, 577***, 618-620.

Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J., Abernethy, S., Andrew, R. M., ... & Peters, G. P. (2020). Temporary reduction in daily global CO 2 emissions during the COVID-19 forced confinement. ***Nature Climate Change, 10***(7), 647-653.

van de Ven, D. J., Westphal, M., González-Eguino, M., Gambhir, A., Peters, G., Sognnaes, I., ... & Clarke, L. (2021). The Impact of US Re-engagement in Climate on the Paris Targets. ***Earth's Future, 9***(9), e2021EF002077.

Doukas, H., & Nikas, A. (2021). Involve citizens in climate-policy modelling. ***Nature, 590***, 389-389.

Nikas, A., Elia, A., Boitier, B., Koasidis, K., Doukas, H., Cassetti, G., ... & Chiodi, A. (2021). Where is the EU headed given its current climate policy? A stakeholder-driven model inter-comparison. ***Science of The Total Environment, 793***, 148549.

Giarola, S., Mittal, S., Vielle, M., Perdana, S., ... & van de Ven, D. J. (2021). Challenges in the harmonisation of global integrated assessment models: A comprehensive methodology to reduce model response heterogeneity. ***Science of the Total Environment, 783***, 146861.

Van de Ven, D. J., Sampedro, J., Johnson, F. X., Bailis, R., Forouli, A., Nikas, A., ... & Doukas, H. (2019). Integrated policy assessment and optimisation over multiple sustainable development goals in Eastern Africa. ***Environmental Research Letters, 14***(9), 094001.

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

Thank you

#parisreinforce

Dr. Alexandros Nikas anikas@epu.ntua.gr

Prof. Haris Doukas h_doukas@epu.ntua.gr

ParisReinforce

paris-reinforce

parisreinforce

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