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Delivering on the Paris Agreement in a fragmenting world

PARIS REINFORCE final event, Sorbonne, Paris, November 15, 2022

Walking out of a pandemic and into an energy crisis

Dr. Dirk-Jan van de Ven (*BC3 Basque Centre for Climate Change*)



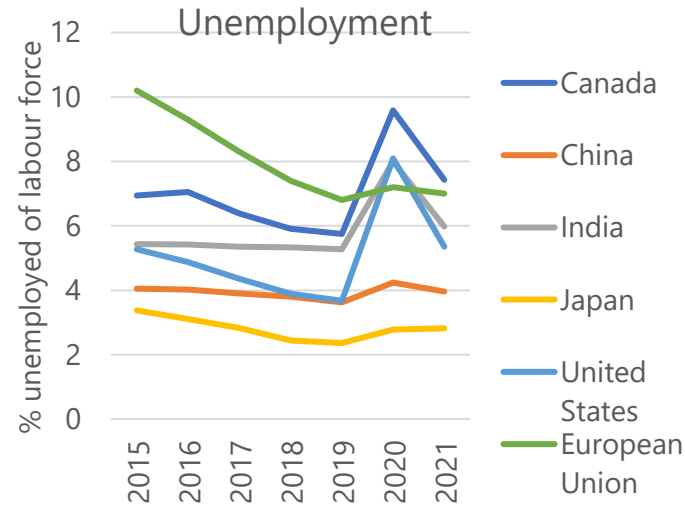
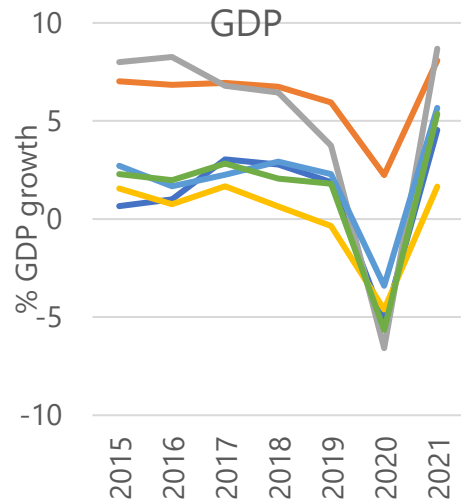
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- Introduction on COVID-19 green recovery packages
- Methodological approach
- Impacts of recovery packages throughout the globe
- Deep-dive into EU green recovery portfolios

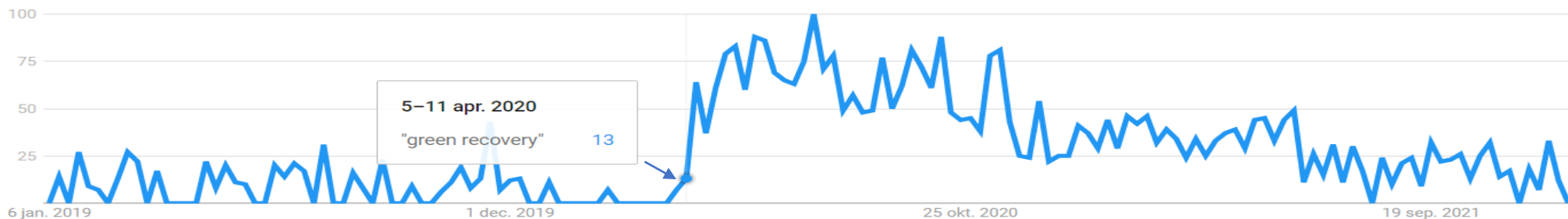


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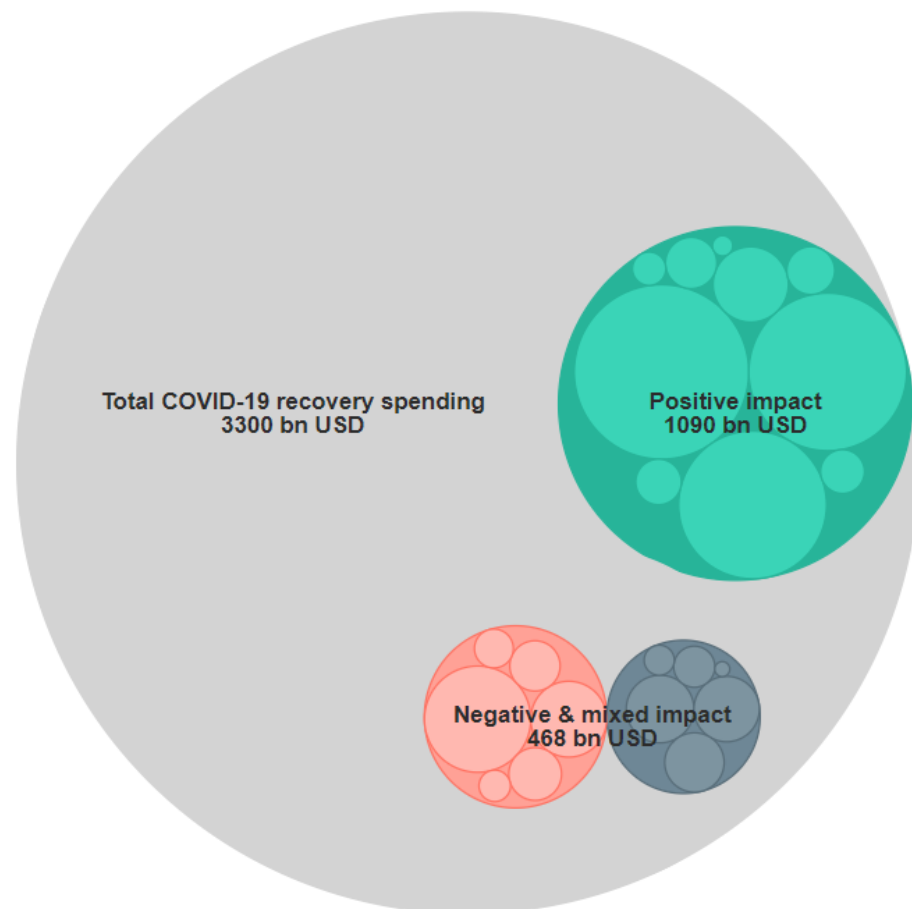
Introduction on COVID-19 green recovery packages



"Green recovery" Google search term



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NEXT GENERATION EU

For a more digital and green generation



GRANTS **€ 750 billion**

€672.5 billion
Recovery and Resilience
Facility

37% of the Recovery and
Resilience Facility will go to **Green
Deal** objectives.

20% of the fund will go to the **Digitalization
of Europe** and 30% will be obtained
through green **bonds**.

€47.5 billion
React EU

€7.5 billion
Rural development

€10 billion
Just transition Fund

€1.9 billion
RescEU

€5 billion
Horizon Europe

€5.6 billion
InvestEU

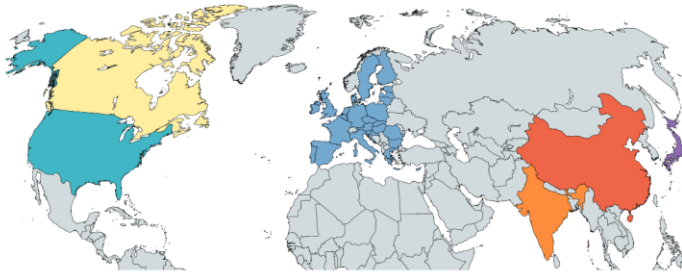
Source: [OECD Green Recovery Database \(2022\)](#)



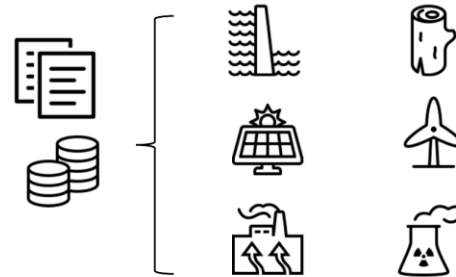
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Announced COVID recovery packages towards clean energy projects

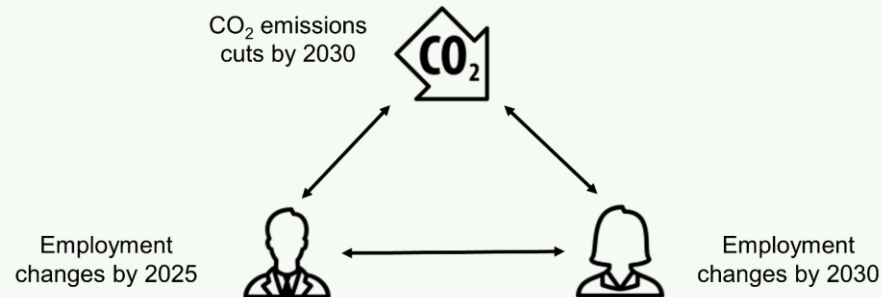
From six major emitters: Canada, China, EU (including the UK), India, Japan, USA



Clean energy technologies: PV, CSP, onshore and offshore wind, geothermal, nuclear, biomass, hydro, biofuels



Optimal allocation of recovery packages in terms of:



Model	Model type	Temporal solution dynamic	Technology choice mechanism	Technology dispatch	Technology representation ^b								
					Solar PV	Solar CSP	Onshore wind	Offshore wind	Geothermal	Nuclear	Biomass	Hydropower	Biofuels
TIAM-Grantham	Partial equilibrium	Inter-temporal optimisation	Winner-takes-it-all	Flexible capacity factors	✓	✓	✓	✓	✓	✓	✓	✓	
GCAM-PR	Partial equilibrium	Recursive dynamic	Logit choice	Constant capacity factors	✓	✓	✓	✓	✓	✓	✓		✓
GEMINI-E3	Computable general equilibrium	Recursive dynamic	Nested CES function	Constant capacity factors	✓		✓				✓		

- Current policies scenario as baseline in all three models (Sognnaes et al 2021):
 - The most relevant pre-pandemic national energy and climate policies explicitly modelled
 - “Fixing in” policies before applying additional recovery subsidies (e.g. ETS Price)

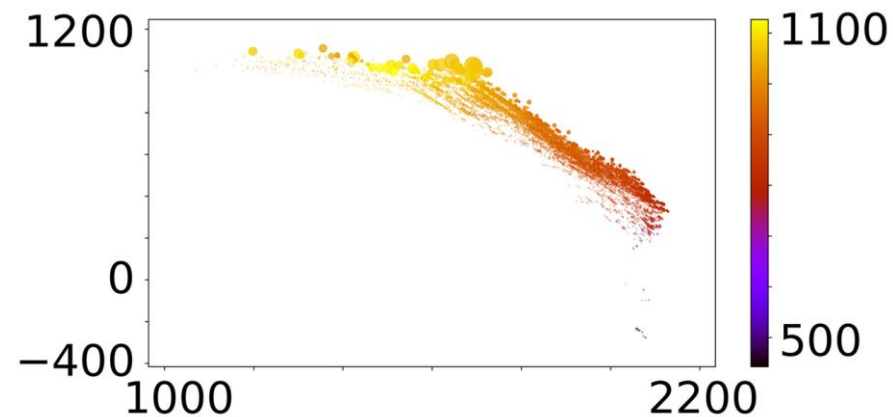
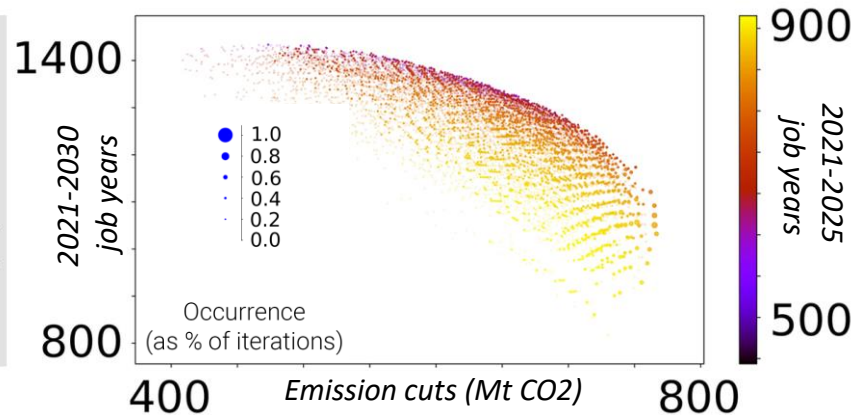
→ Assures CO₂ and energy impacts of subsidies entirely additional to pre-pandemic policies



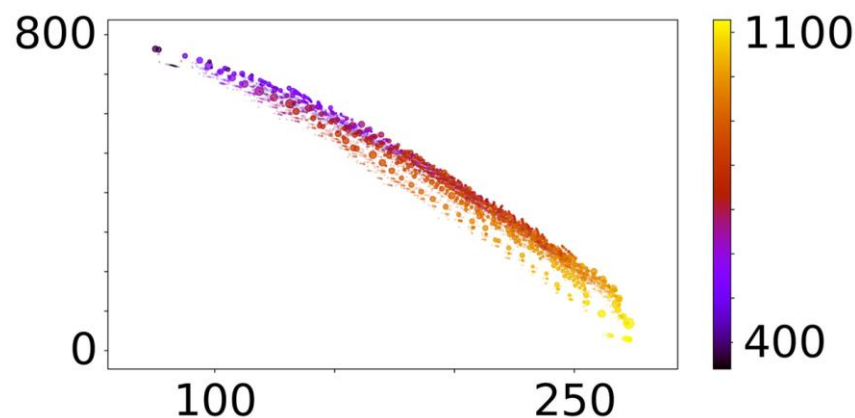
(i) GCAM

(ii) TIAM

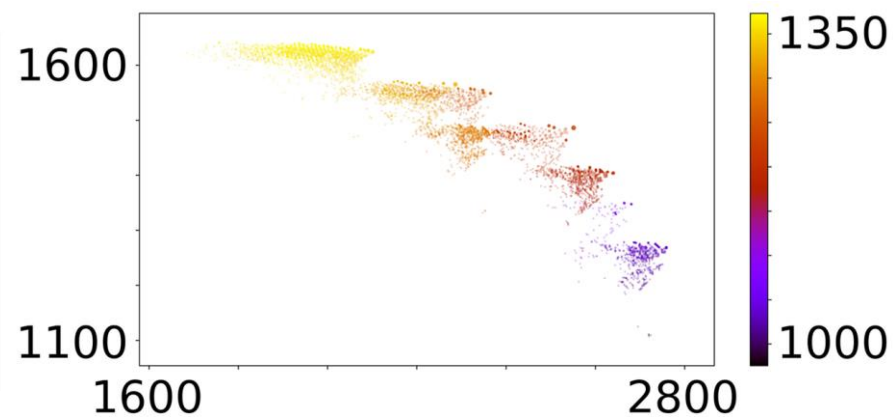
(a) EU



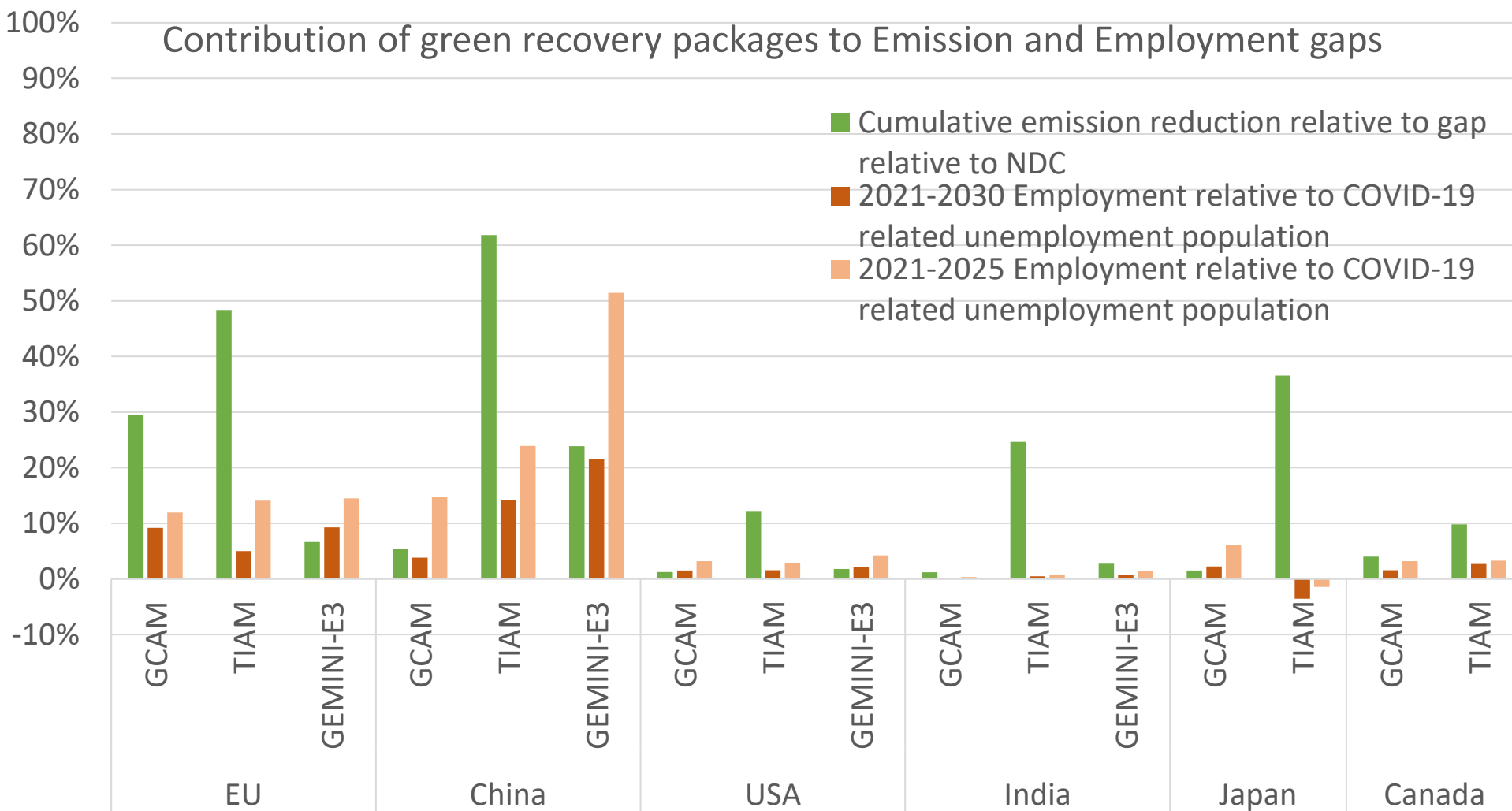
(b) China



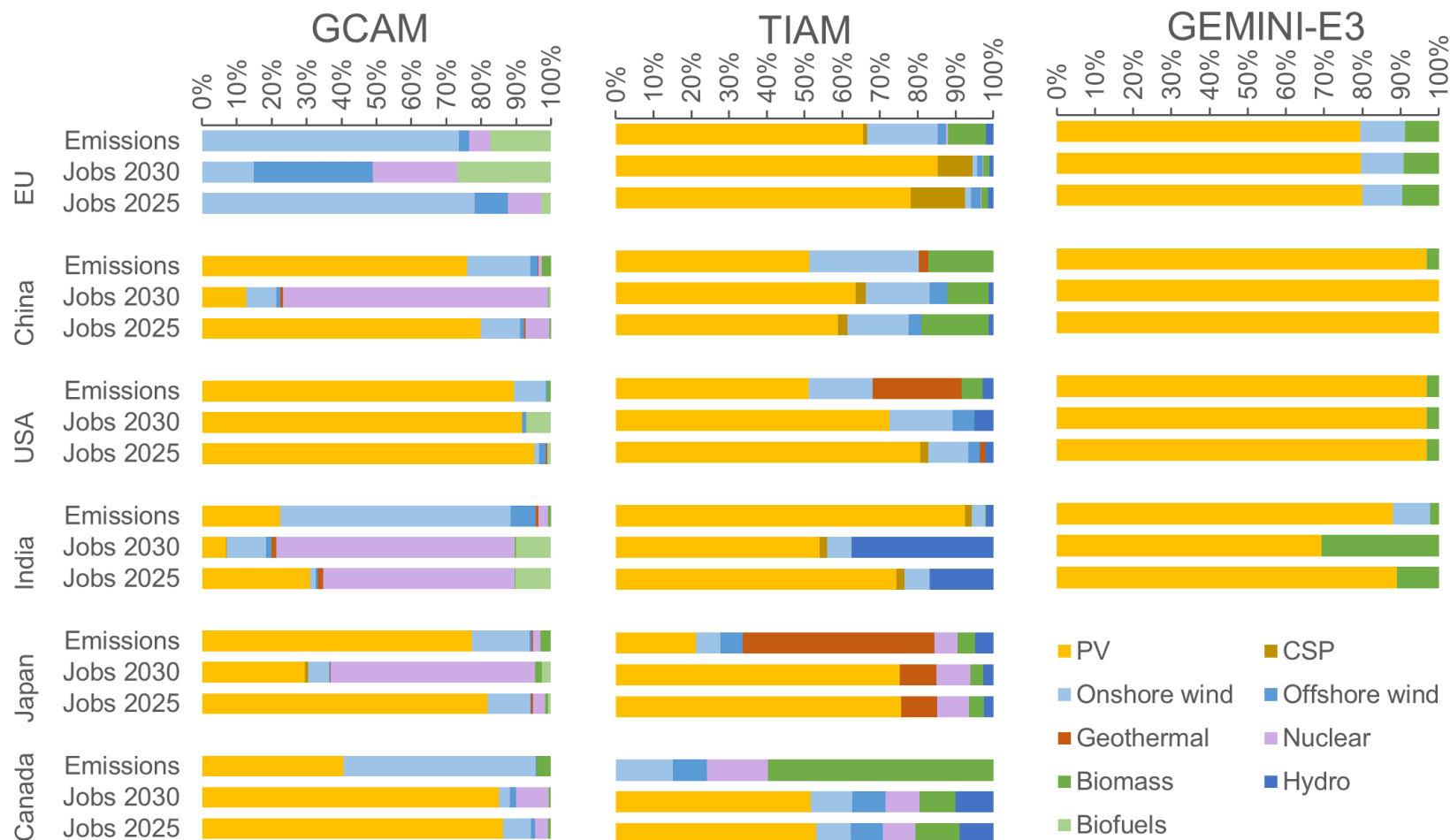
(c) USA



Impacts of recovery packages throughout the globe



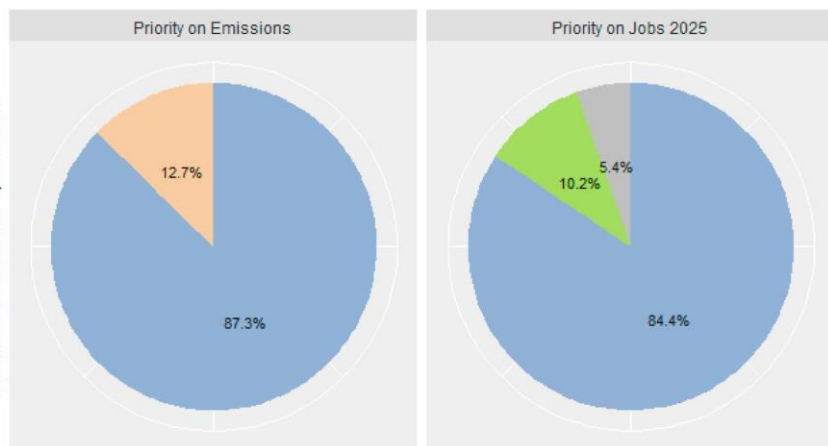
Impacts of recovery packages throughout the globe



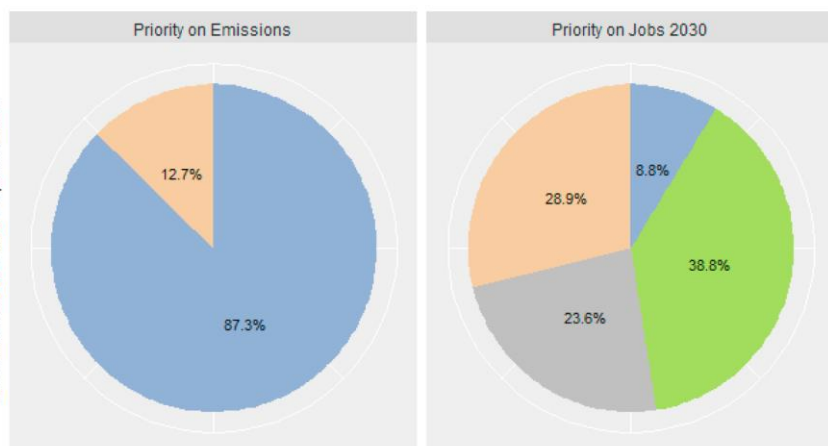
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Deep-dive into EU green recovery portfolios

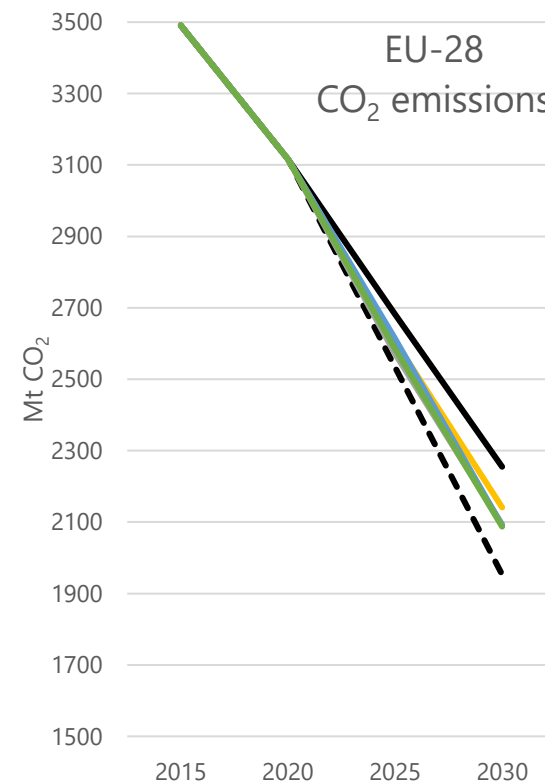
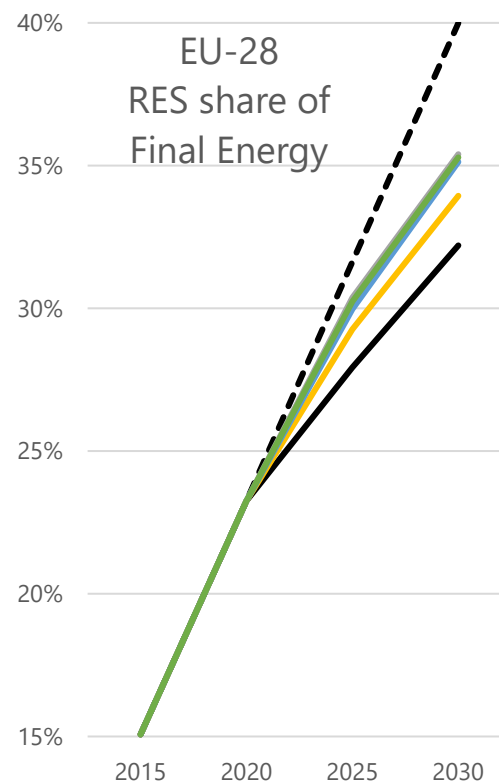
Emissions/Jobs 2025 optimisation



Emissions/Jobs 2030 optimisation



Technology Biofuels Nuclear Offshore Wind Onshore Wind



- Fit-for-55 target
- Pre-pandemic policies
- Portfolios prioritising emission cuts
- Portfolios prioritising 2025 jobs
- Portfolios prioritising 2030 jobs
- Weighted average of all portfolios



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- Results show packages in the EU and China can contribute significantly to emission and employment goals. Packages in other economies have only incremental impacts.
- PV preferred technology for most optimal green recovery portfolios, although strong model diversity is reflected in technological breakdown.
- Green budget in European RRF is projected to bring the European around half-way towards fit-for-55 targets on renewables and emissions.
- Quick response to crisis key in European's relatively impactful green recovery: potential lesson for current energy crisis.





Thank you!

Dirk-Jan Van de Ven (BC3)
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Global COVID recovery study

van de Ven, D. J., Nikas, A., Koasidis, K.,... & Gambhir, A. (2022). COVID-19 recovery packages can benefit climate targets and clean energy jobs, but scale of impacts and optimal investment portfolios differ among major economies. **One earth**, **5**(9), 1042.

EU deep-dive of COVID recovery study

Koasidis, K., Nikas, A., Van de Ven, D. J., Xexakis, G., Forouli, A., Mittal, S., ... & Doukas, H. (2022). Towards a green recovery in the EU: Aligning further emissions reductions with short-and long-term energy-sector employment gains. **Energy Policy**, **171**, 113301.

AUGMECON-R

Nikas, A., Fountoulakis, A., Forouli, A., & Doukas, H. (2022). A robust augmented ϵ -constraint method (AUGMECON-R) for finding exact solutions of multi-objective linear programming problems. **Operational Research**, **22**, 1291-1332.

Portfolio analysis framework

Forouli, A., Nikas, A., Van de Ven, D. J., Samp Pedro, J., & Doukas, H. (2020). A multiple-uncertainty analysis framework for integrated assessment modelling of several sustainable development goals. **Environmental Modelling & Software**, **131**, 104795.

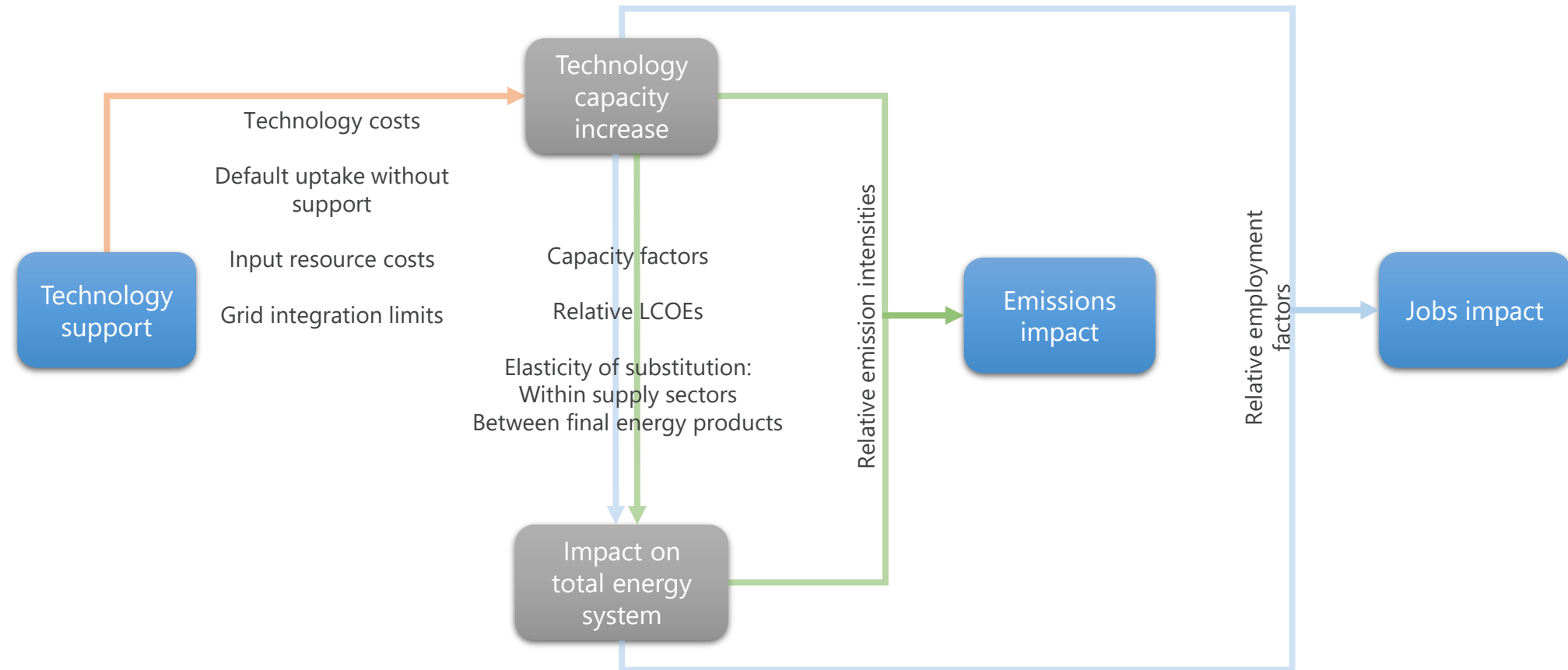
Global analysis of 'where are we headed?'

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.

EU-level analysis (co-creation)

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.





Appendix: Cumulative emissions cuts by 2030

