



LOCOMOTION

Low-carbon society:
An enhanced modelling tool for the transition to sustainability

Exploring synergies and trade-offs of policy interventions under the pressure of rapid climate change

European Climate Research Alliance's 'Climate Coffee'

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Popcorn Economics

At 170°C just 34% of maize seeds becomes popcorn, but at 180°C the 96% explodes!

So what? Little qt changes (in temperature) determine huge qualitative variations that are irreversible! We still have little time to change, and we need big interventions!

Stylized facts

- No decoupling (Wiedman, 2015) + planetary boundary (O'Neill, 2018; Hickel and Kallis, 2019) + more than 820 million people have insufficient food (Willet et al., 2019)
- Increasing Inequality: richest 2000 people hold more than half of the global poorer population
- Loss biodiversity: humans, along with the livestock we raise food for, make up 96% of the mass of all mammals; 70% of all live birds are mainly poultry

Climate change and increasing inequality have emerged as twin threats to contemporary standards of living, peace, and democracy.

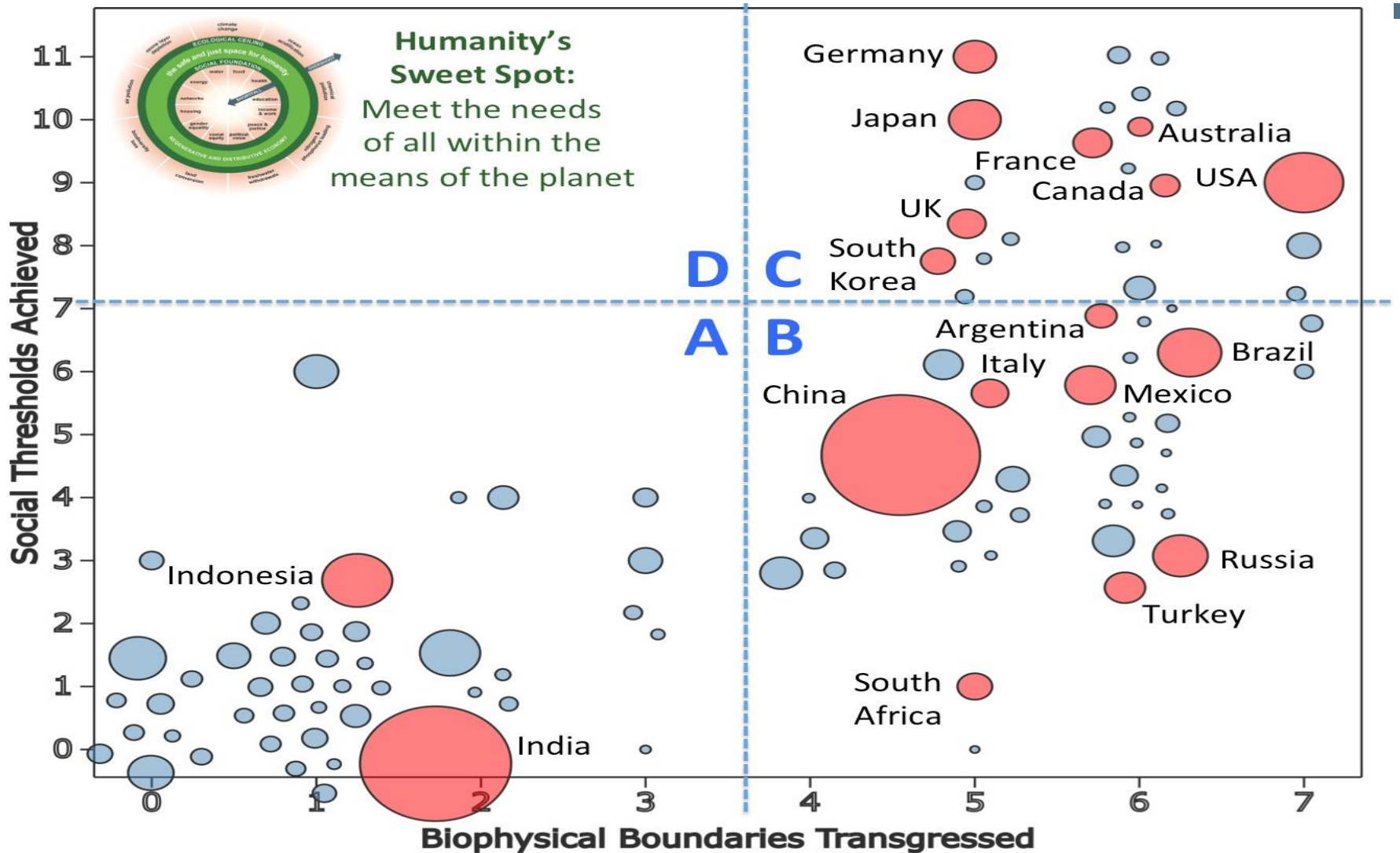
- ❖ How to face these challenges?

System thinking

SUSTAINABLE DEVELOPMENT GOALS



Sustainability?

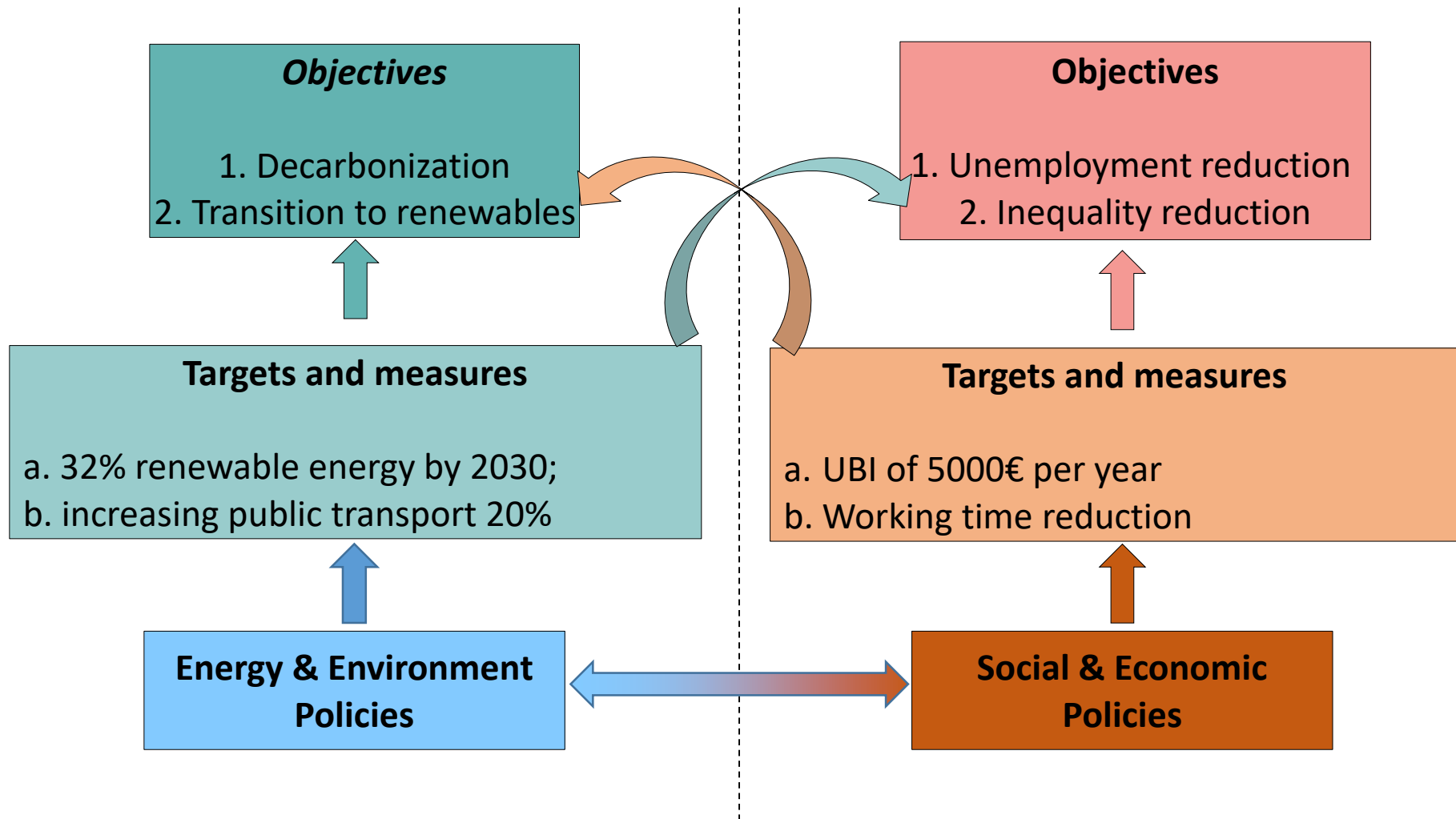


Theoretical background

Policy is defined as a set of ideas or a plan of what to do in particular situations that has been agreed by a group of people, a business organization, a government, or a political party.

- **Policy objective:** A generally formulated desired outcome of a policy.
- **Policy target:** The quantifiable intended effect of a given policy measure.
- **Policy measure:** A specific intervention in different parts of the system, and which can be specified through quantifiable targets and is implemented through policy instruments.

Theoretical background



What options on the ground

Baseline (SSP2)

fossil fuels, inertia, conflict of interests, climate impacts, continued today's trends on environmental degradation

Baseline with increasing inequality (SSP3)

SSP2 + protectionism, inequalities; national security, serious environmental degradation and population increase (but OECD)

Green Growth (market tools and technological development)

economic growth, absolute decoupling, global economic convergence; fast diffusion of low carbon technologies, sector coupling, efficiency improvements

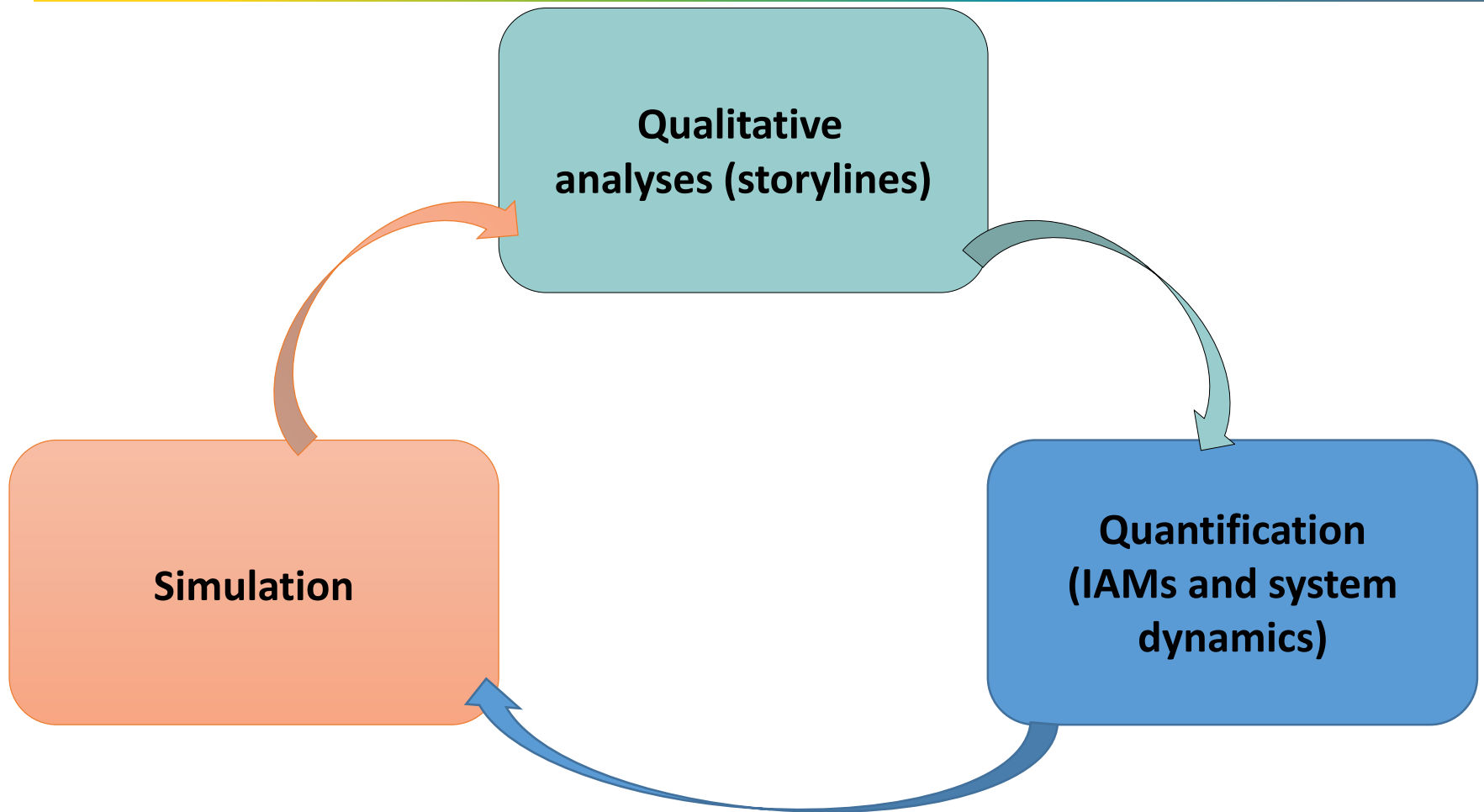
Green Deal (Green Growth complemented with social policies)

Features of Green Growth + social inequality reduction; public investments; welfare state; public ownership of energy utilities; job guarantee; public intervention

Post-growth (voluntary downscaling)

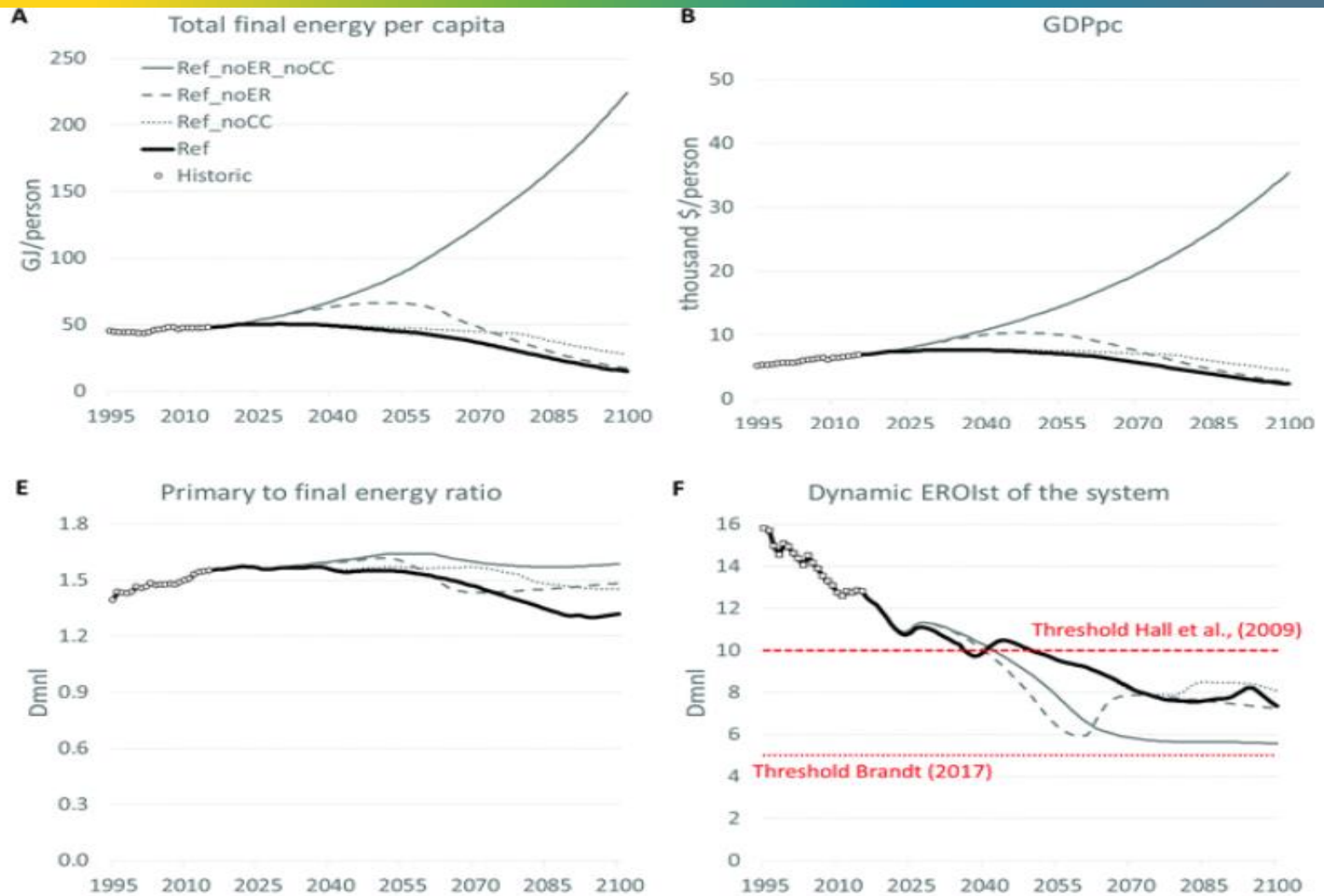
relocalization, sharing economy, self-organization, commons, conviviality, voluntary behavioural changes; sufficiency; reducing material throughput

How to support policy decisions

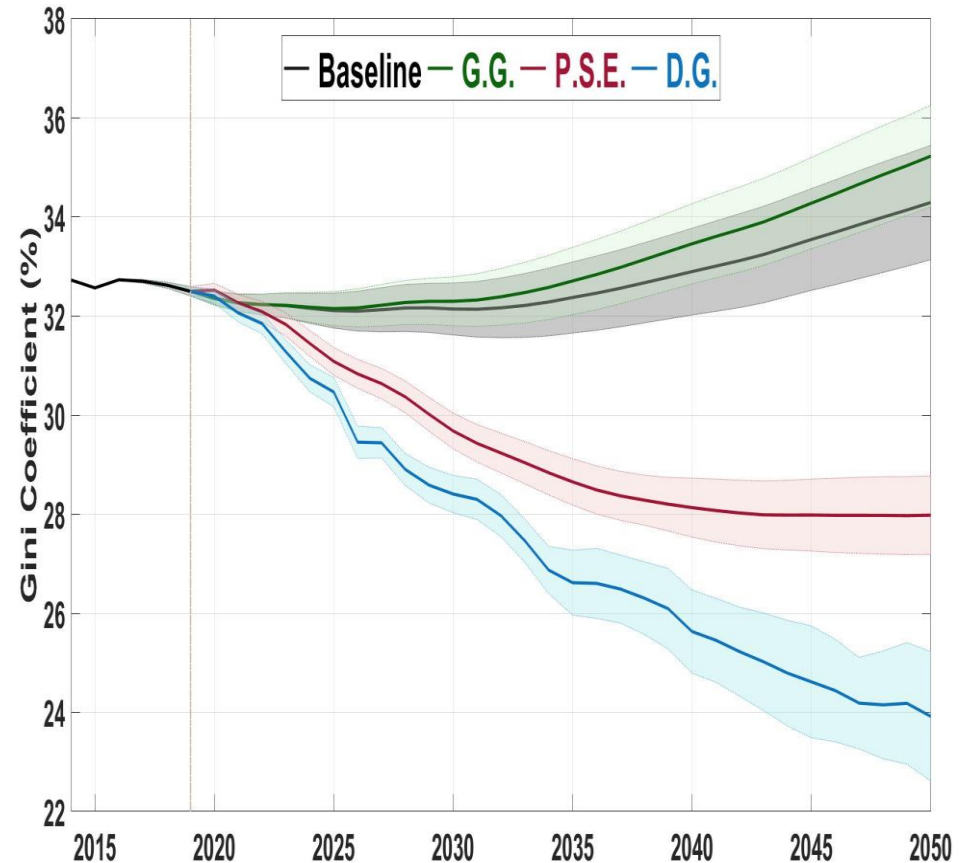
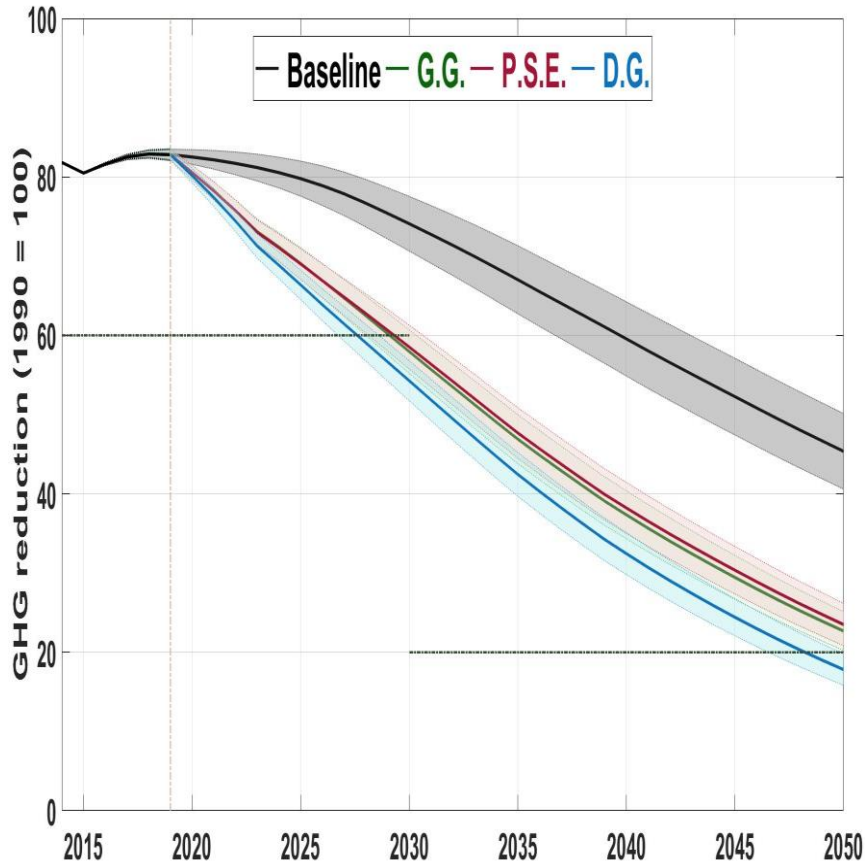


Results from the literature

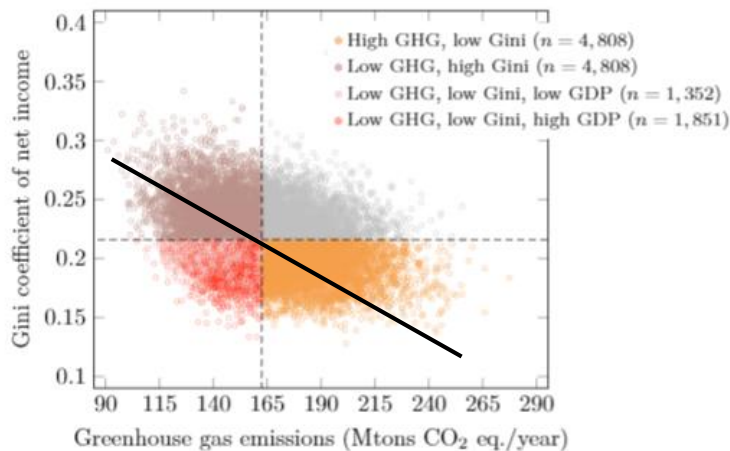
Energy challenges



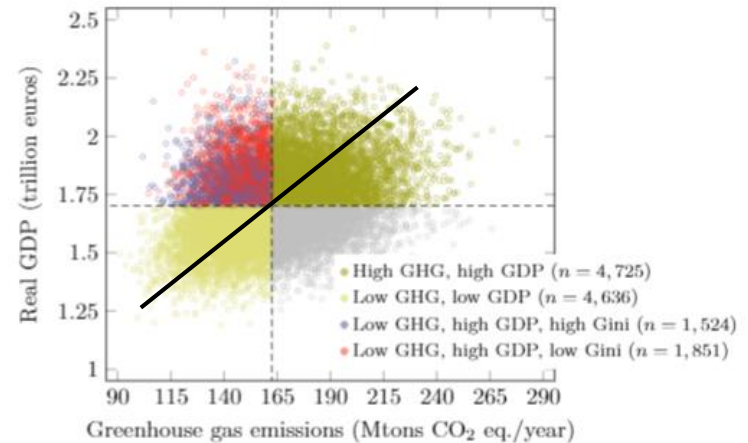
Policies: synergies and trade-offs



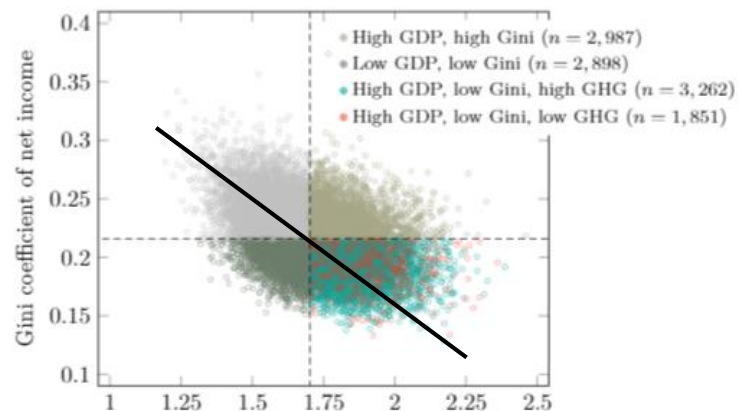
Little space for intervention



INEQUALITY vs GHG EMISSIONS



GDP vs GHG EMISSIONS



GDP vs INEQUALITY

Go and play!

France



Italy



RRI for policy design

inclusion | anticipation | transparency | responsiveness

Policy tips

Tip 1: No space for error

Solar installation should be integrated into the agricultural system instead of the current common practice of clearing the land.

Tip 2: More renewables, less energy

Reduce overall energy demand by encouraging sufficiency, given the low EROI of renewables and their high demand of raw materials

Tip 3: Navigating the future of electric vehicles

Investing heavily in *public transport* and car-sharing; haulage and long-distance travel should be mostly done on the railways.

Tip 4: Avoiding the inequalities of green growth

Introduce innovative *redistributive social policies* such as universal basic income, shorter working weeks, job sharing, job guarantee schemes

Tip 5: Remove carbon removals

Carbon removal needs to be pursued as secondary and complementary to, not substitute for, emissions reductions

Future steps

1. *Low spatial scale* studies to improve coordination between global goals and local actions
2. *Out-of-market* solutions
3. More focus on solutions in *poorer countries* where contrasts in goals (e.g., escape poverty, reduce deforestation, increase food production) are stronger
4. *Care* activities
5. *Integrating* scientific knowledge with policy actions

ESEE2022 PISA (<https://esee2022pisa.ec.unipi.it/>)



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Will Achilles catch up with the Tortoise?

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Will Achilles catch up with the tortoise?
It's high time for transformative action on sustainability

Call for abstracts

In June 1972 the environmental crisis was internationally acknowledged by the first UN conference on the Human Environment in Stockholm. Exactly 50 years will have passed when



Projects



www.locomotion-h2020.eu/



<https://rb.gy/yfppmh>



www.postgrowtheconomics.org/



<https://remarc.ec.unipi.it/>



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Thanks!
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