How are the benefits of Europe‘s decarbonization distributed?

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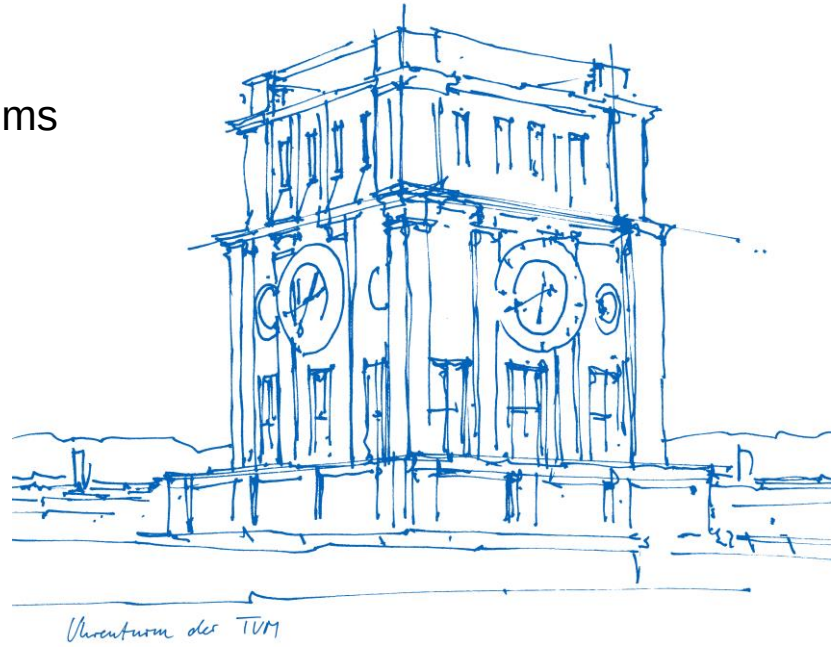


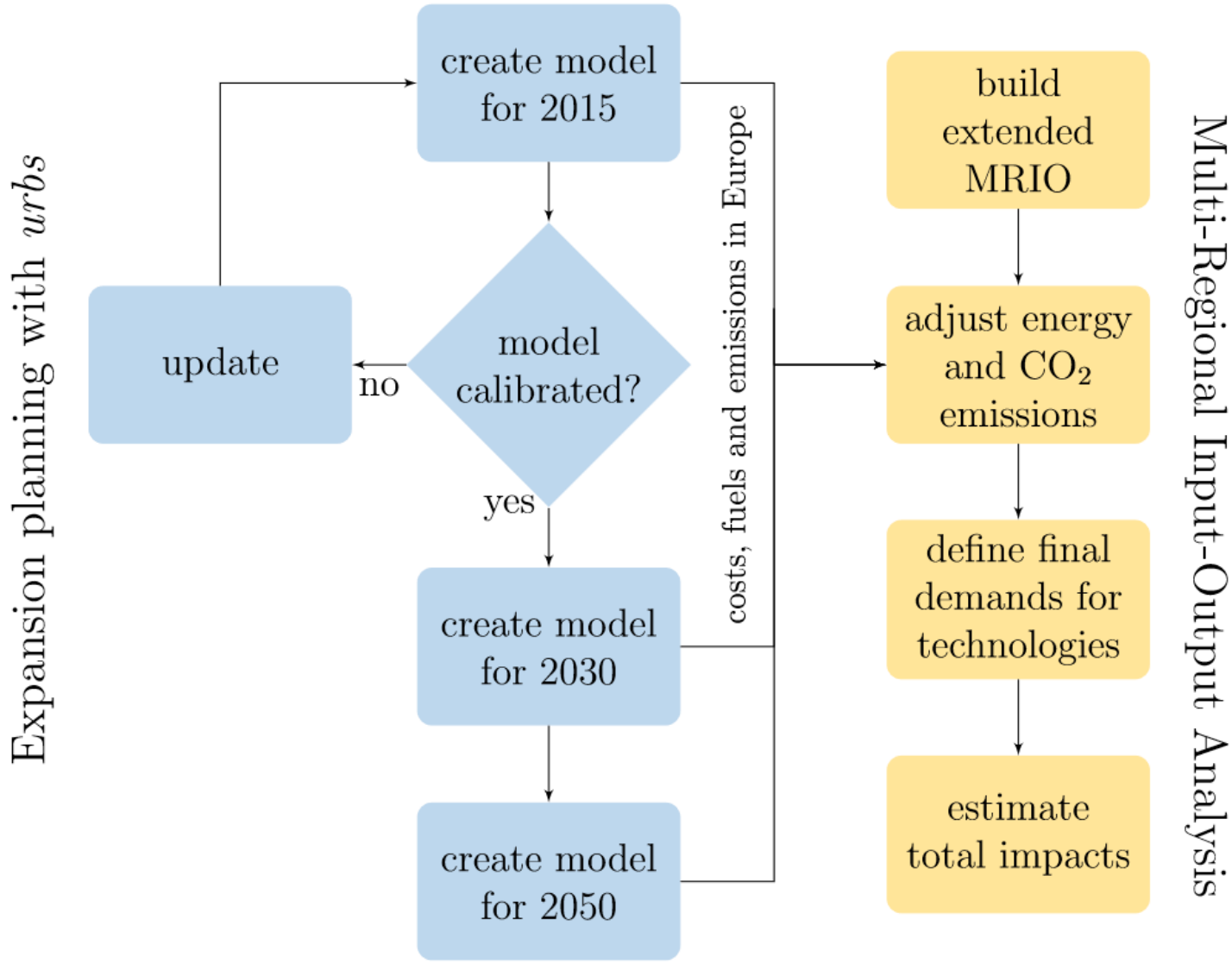
Motivation

Decarbonization of Europe‘s electricity system will lead to an unprecedented expansion of renewable energy capacity.

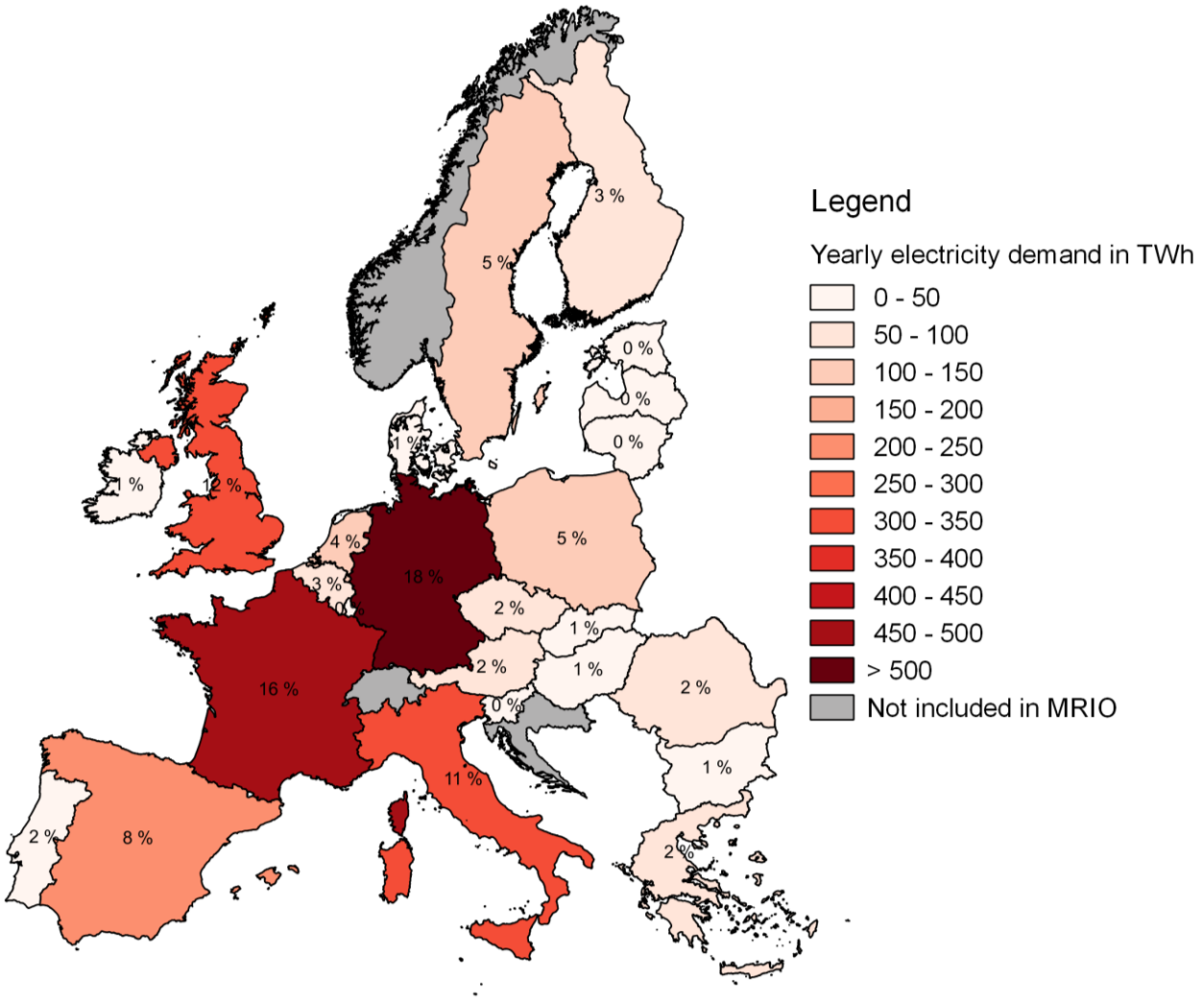
Cost-optimal expansion would probably favor areas with good potentials.

→ What are the implications of the geographic discrepancies on other aspects (direct and indirect emissions, jobs, value added, etc.)?

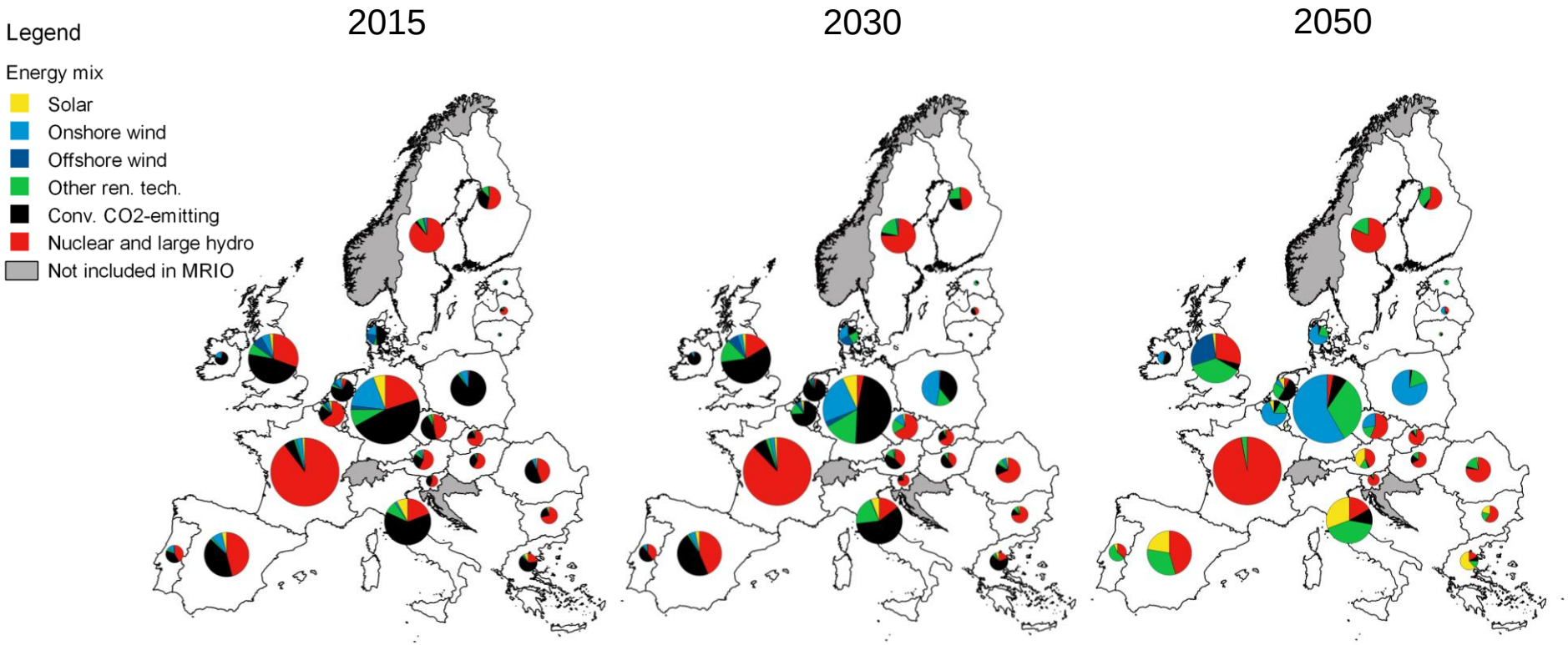
Workflow


Expansion planning with *urbs*
create model for 2015
model calibrated?
no
update
yes
create model for 2030
create model for 2050
costs, fuels and emissions in Europe
build extended MRIO
adjust energy and CO_2 emissions
define final demands for technologies
estimate total impacts
Multi-Regional Input-Output Analysis

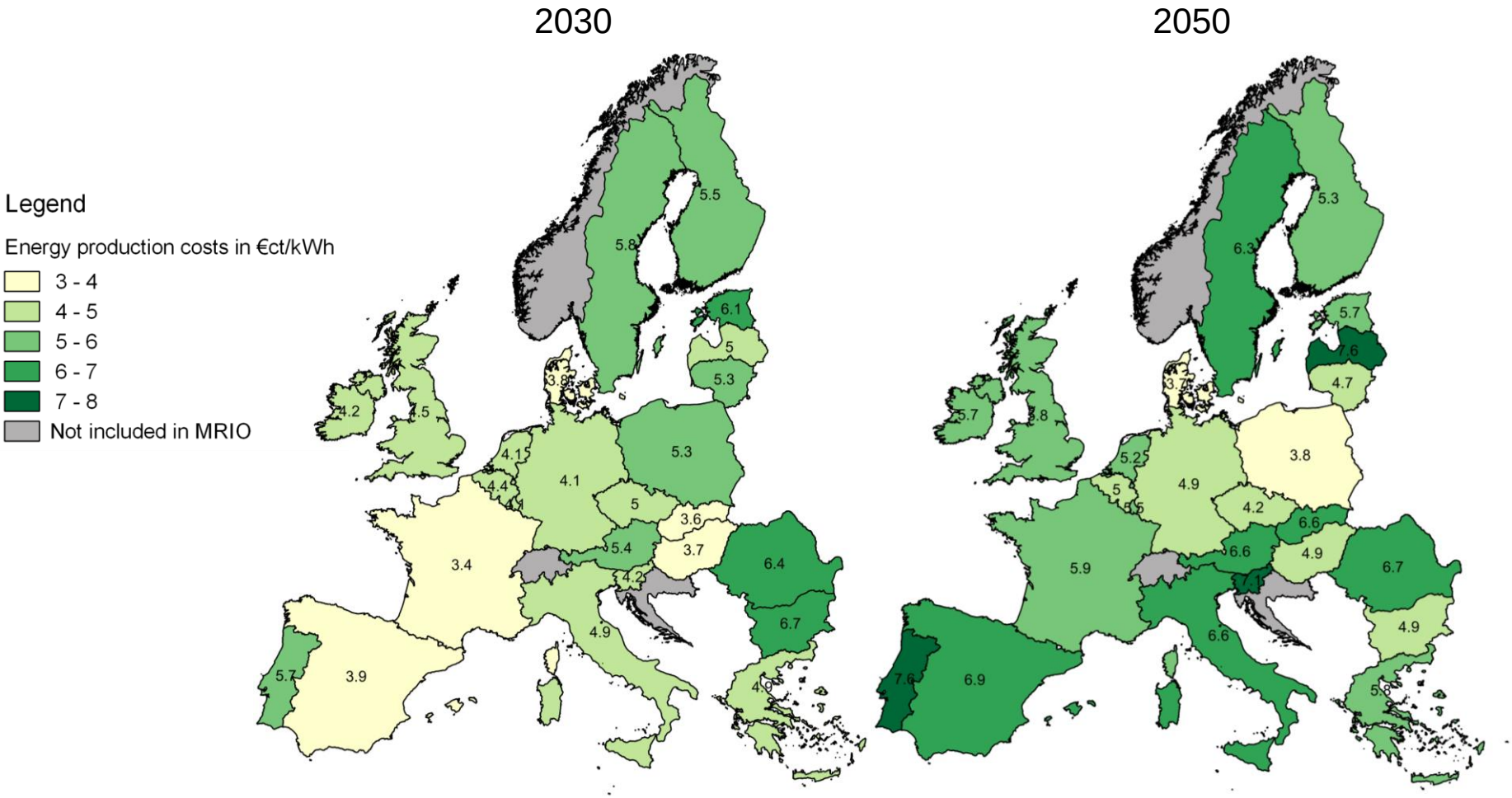
Electricity demand in 2015



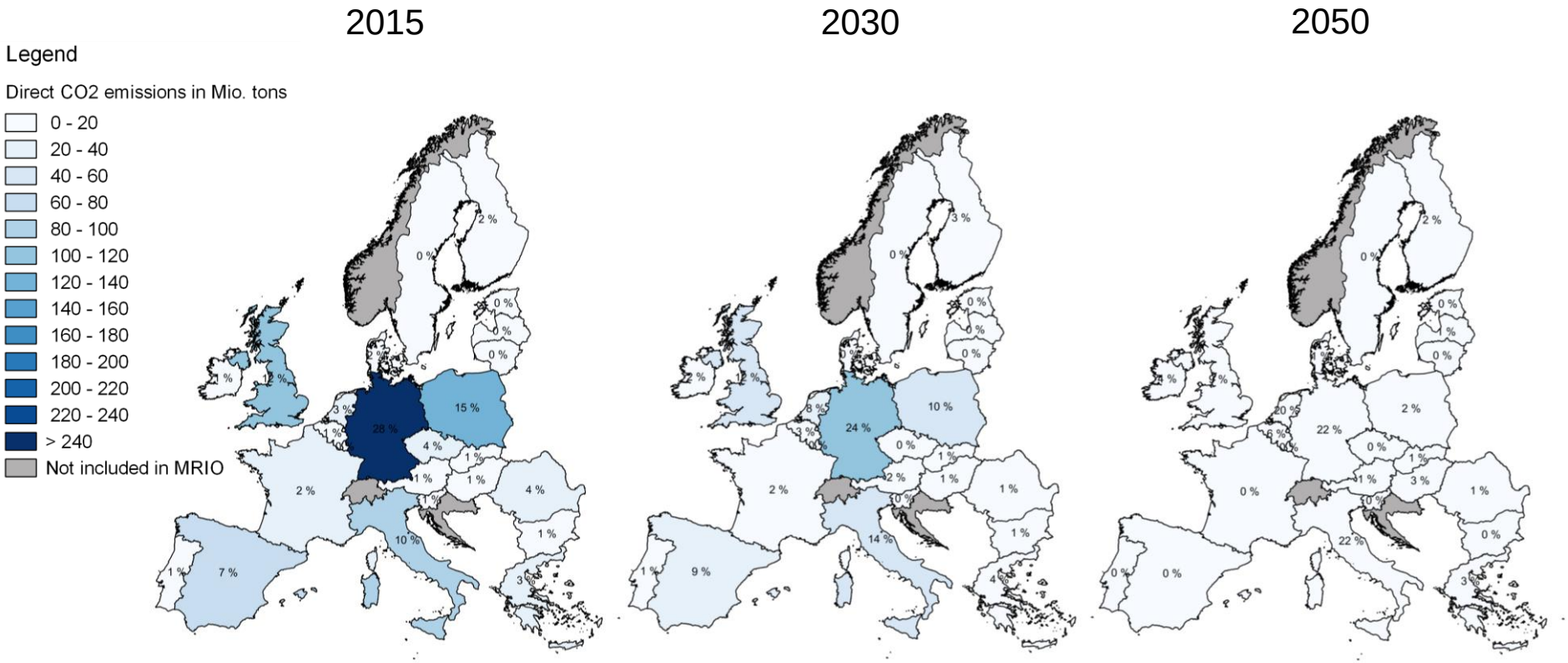
Optimization results: energy mixes



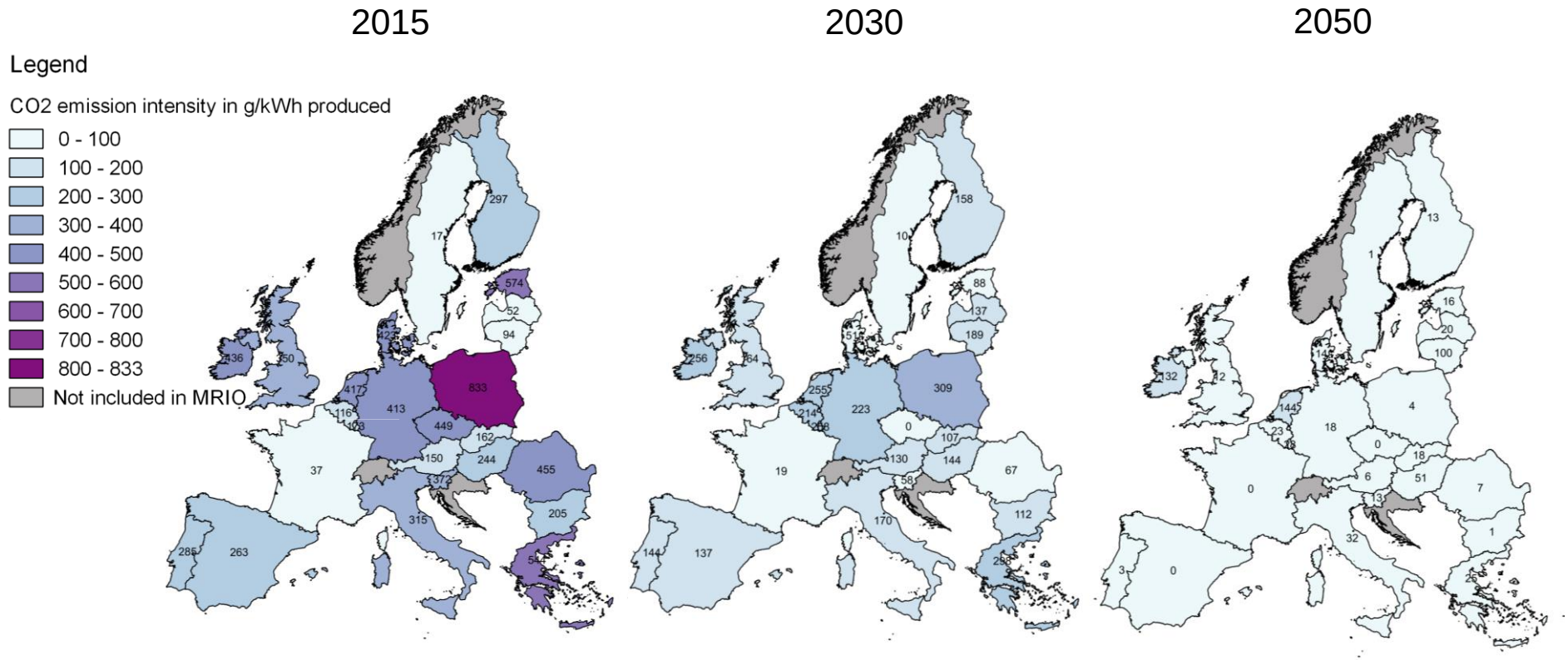
Optimization results: energy costs



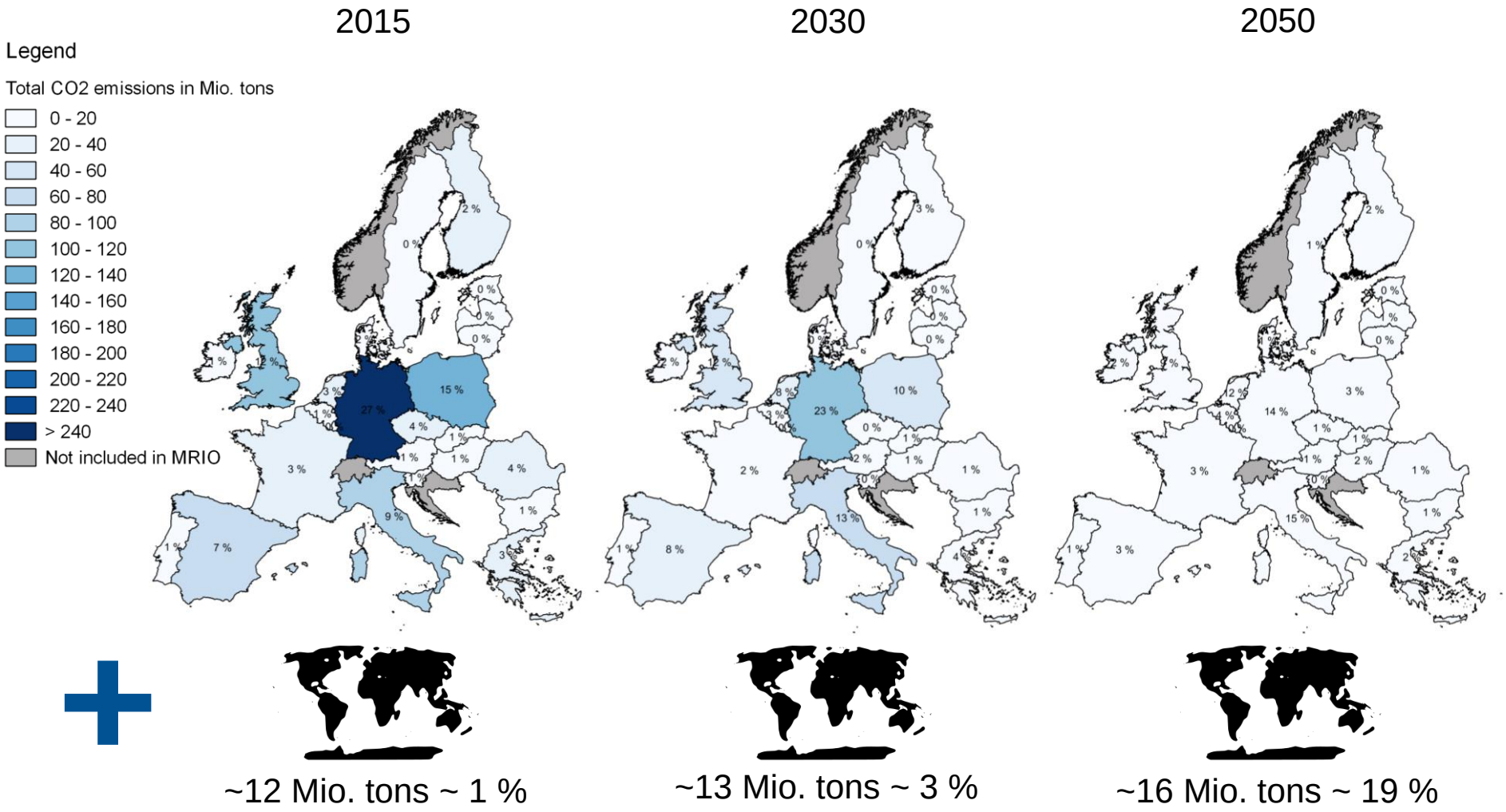
Optimization results: direct emissions



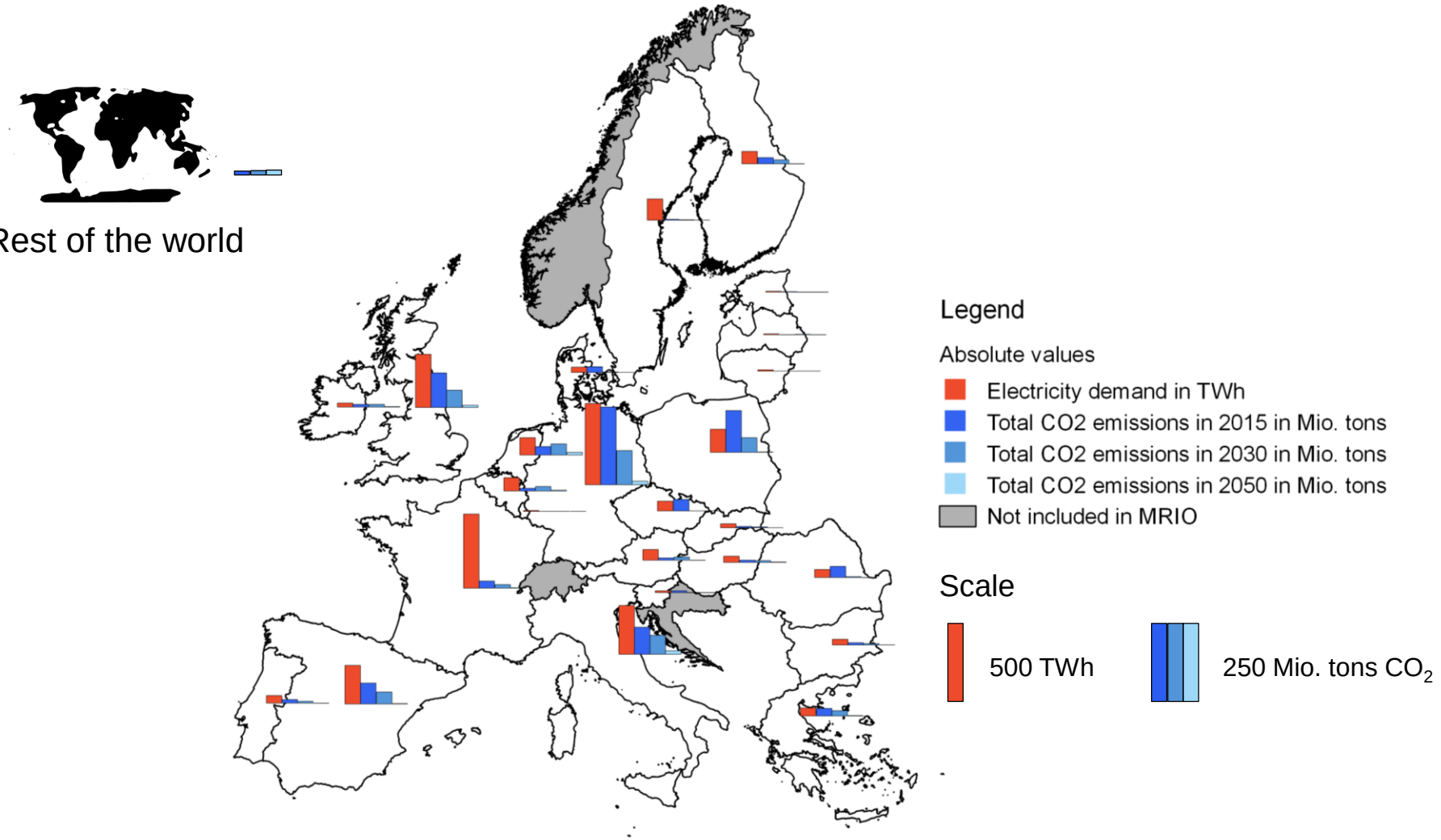
Optimization results: CO_2 intensity



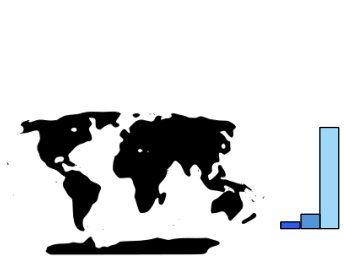
Coupling with MRIO: Total emissions



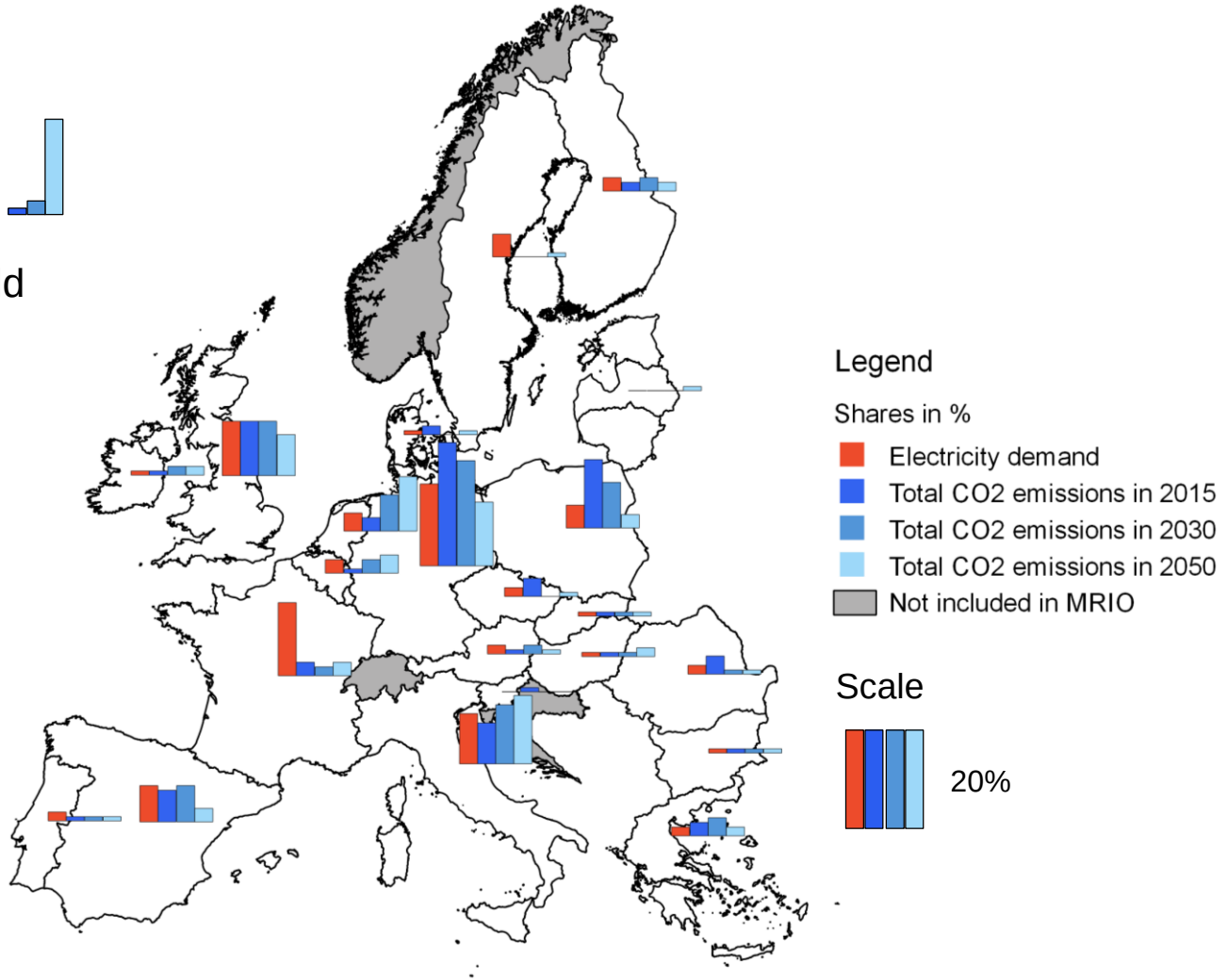
Coupling with MRIO: Total emissions



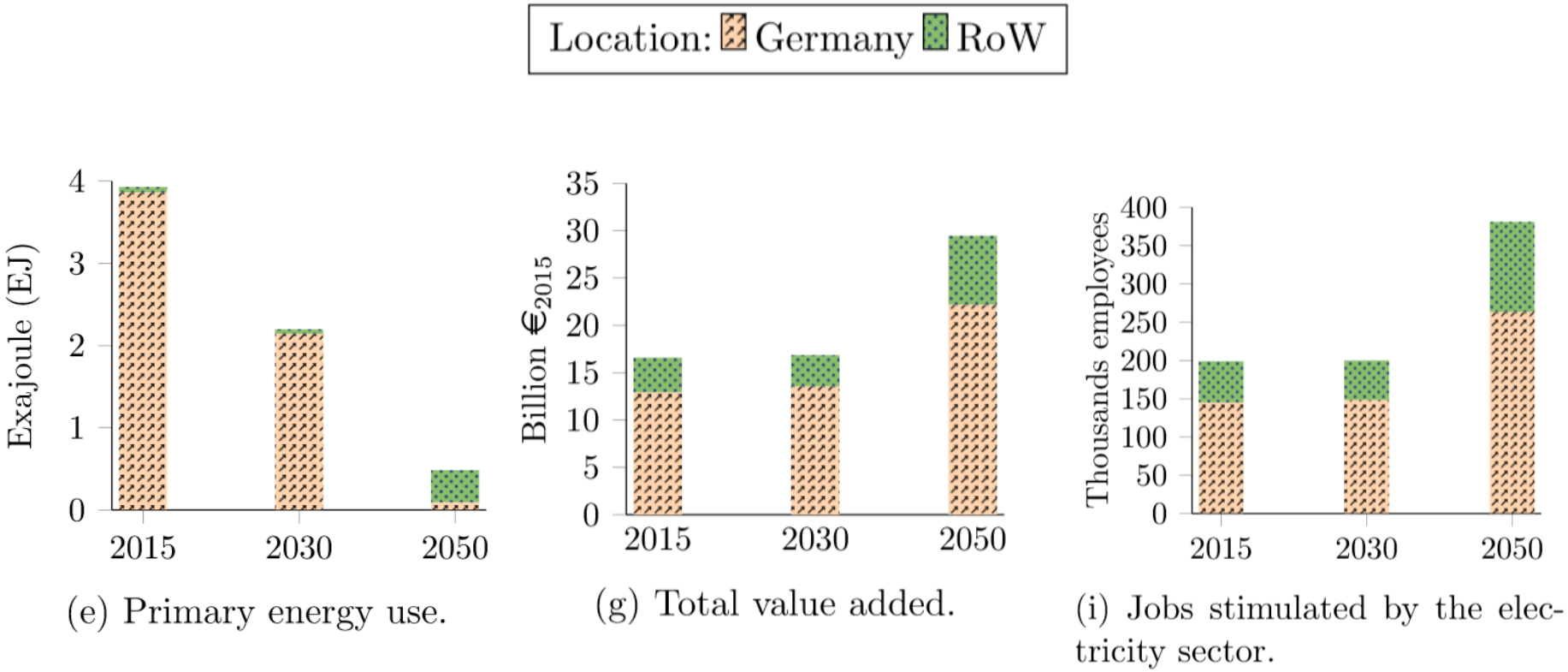
Coupling with MRIO: Total emissions



Rest of the world



Focus on individual countries



(e) Primary energy use.

(g) Total value added.

(i) Jobs stimulated by the electricity sector.

Source: Siala, K. et al.: Towards a Sustainable European Energy System: Linking Optimization Models with Multi-Regional Input-Output Analysis. *Energy Strategy Reviews* (under review).

Summary and next steps

Countries with high total emissions do not necessarily have the highest emissions intensities → how to share responsibility fairly?

A 95% reduction of (direct) CO_2 emissions would require higher indirect emissions outside of Europe.

In the near future: expansion of the analysis on other economic aspects (ongoing).