

Socio-economic and competitiveness impacts of EU Green deal and climate neutrality

EMP

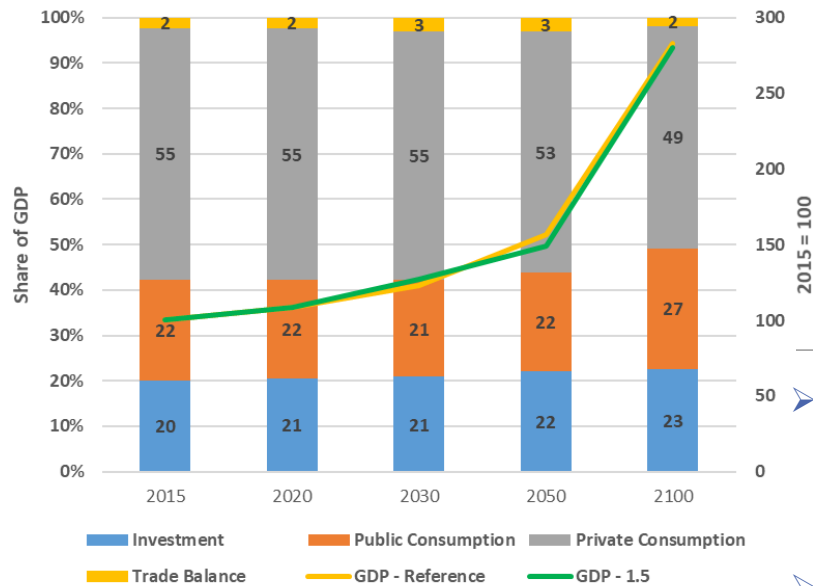
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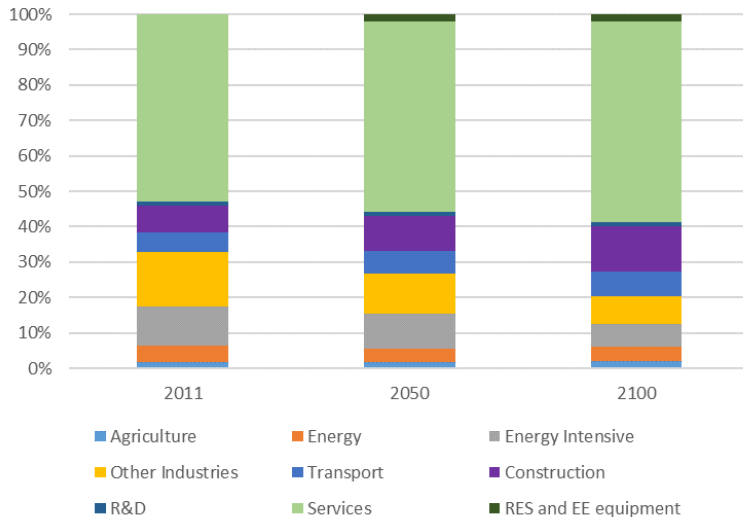
Energy system decarbonisation and growth determinants

- The clean energy transition is a **capital intensive** process that develops in a dynamic framework where prices, technology costs, production structures, consumer preferences and habits evolve requiring different and **new types of labour skills, infrastructure and materials**.
- At the early stages of the transition investment requirements are high while the technologies and skills required to make the transition have not yet reached full learning potential. This may exert a pressure on **capital the labour market and ultimately on production costs**
- Strong policies and measures may act as conditions enabling positive externalities, which bring cost reductions and **cost-efficient uptake of technologies** at an extent that is not available in the context of business as usual. This is a source of cost reductions in particular in the long term
- Competitiveness impacts are not static, as the industry transforms to produce the novel value-added products and materials. As for all technology-driven growth, **first-mover advantages** may drive competitiveness gains and export-driven growth.

Economy



Sectoral Production



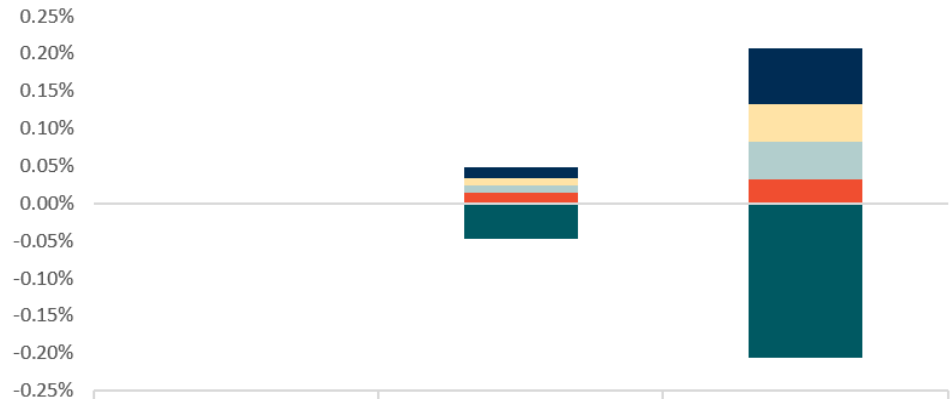
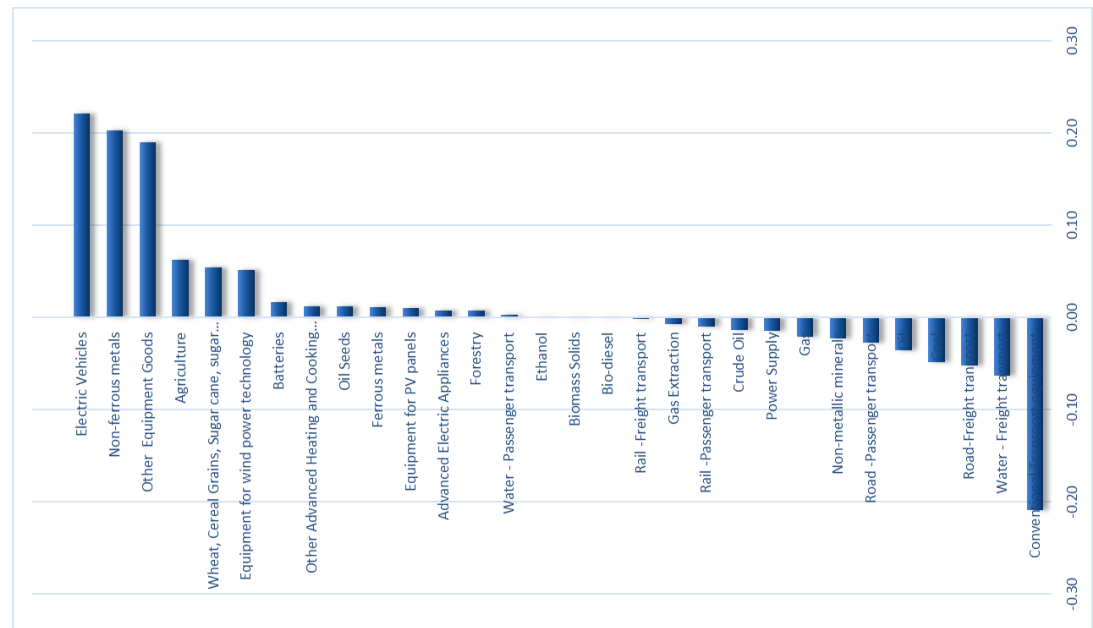
- The economic performance of the EU is driven both by the world economic growth (demand for EU products) and by factors affecting the EU internal market. The EU economy grows by an average of 1.2% per year over the 2010-2100 period
- The key feature of this long term sustained economic growth is the transition to a more capital-intensive structure (share of investment increases in burden of consumption). The surplus in the balance of trade is constant throughout the projection period.
- From a sectoral perspective the structure of EU economy becomes more services oriented and energy efficient.
- The production of RES and EE equipment increases over time in order to support the transformation of the energy system. Construction which is a key sector contributing to gross fixed capital formation increases steadily its share in the economy following the steady increase of investments.

Employment

The changes in skills composition are small but towards skilled labour

Overall Impact on employment greatly depends on recycling of ETS revenues

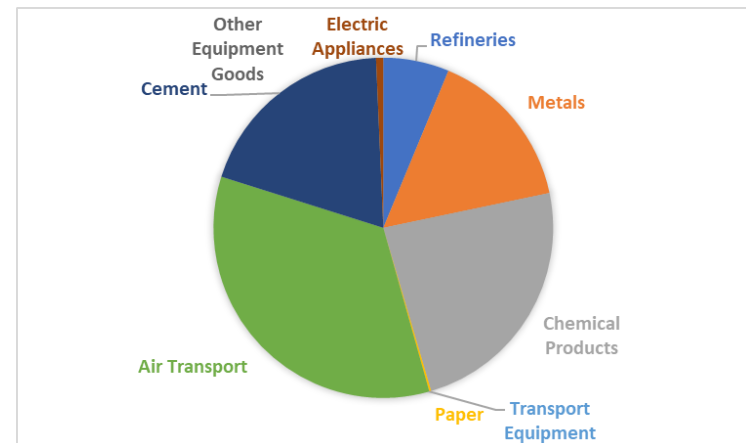
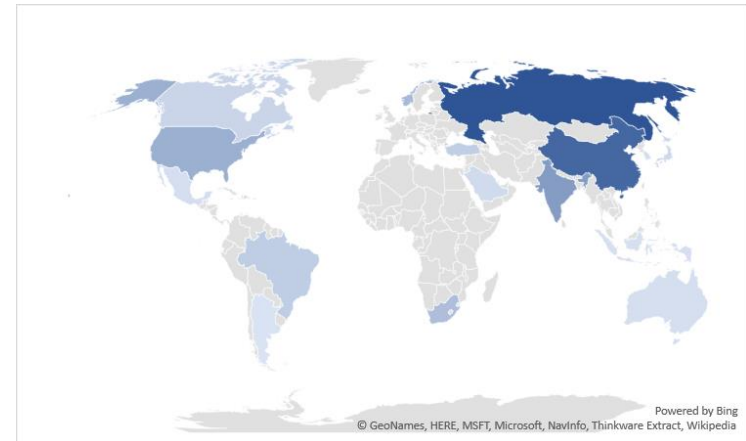
Sectoral impact differs according to the contribution of each sector in the decarbonisation process



	2020	2030	2050
Managers	0.00%	0.01%	0.07%
Clerks	0.00%	0.01%	0.05%
Technicians	0.00%	0.01%	0.05%
Service workers	0.00%	0.01%	0.03%
Low Skilled	0.00%	-0.05%	-0.21%

Carbon Leakage

- The average carbon leakage rate over different scenarios ranges from 30 to 14%
- The main countries where the leakage occurs are Russia, China, USA, India and Turkey
- Metals, chemicals and air transport are the most vulnerable sectors
- Refineries leakage reduces over time as the electrification of the system progresses



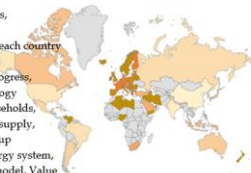
Thank you

QUESTIONS / CLARIFICATIONS
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Supporting Material

Model ID

Name:	GEM-E3
Type:	Macroeconomic, Structuralist, CGE
Countries:	46 countries/regions covering the whole world
Sectors:	Households, Banks, Firms, Government, RoW
Firms:	51 economic branches in each country
Time:	2015-2100
Distinctive Features:	Endogenous technical progress, Financial Sector, Technology diffusion, Multiple Households, Endogenous labour skill supply, Unemployment, Bottom up representation of the energy system, Soft Link with PRIMES model, Value Chains
Domain of Applications:	Economic and employment assessment of climate and energy policies, Energy taxation, Carbon leakage, Evaluation of R&I portfolios



GEM-E3 model features

- The GEM-E3 model is a global, multi-regional, multi-sectoral, recursive dynamic computable general equilibrium (CGE) model which provides details on the macro-economy and its interaction with the environment and the energy system.
- Technology progress is explicitly represented in the model depending on R&D expenditure by private and public sector and taking into account spill-over effects
- Explicit representation of a detailed financial sector for each country that includes agent specific debt profiles and market clearing interest rates
- Detailed representation of the power generation system (10 power generation technologies)
- Discrete representation of the sectors manufacturing clean energy technologies (Wind, PV, electric cars, Biofuels etc)
- EU IO tables are based on EUROSTAT
- Model manual available at www.e3modelling.com

GEM-E3 Sectoral Coverage

	GEM-E3 sectors		GEM-E3 sectors
01	Agriculture	27	Biomass Solids
02	Coal	28	Ethanol
03	Crude Oil	29	Bio-diesel
04	Oil (refined oil products)	30	Advanced Electric Appliances
05	Gas Extraction	31	Equipment for wind power technology
06	Gas	32	Equipment for PV panels
07	Power Supply	33	Equipment for CCS power technology
08	Ferrous metals	34	Advanced Heating and Cooking Appliances
09	Non-ferrous metals	35	Electric Vehicles
10	Chemical Products	36	Road-Freight transport
11	Paper Products	37	Rail -Freight transport
12	Non-metallic minerals	38	Rail -Passenger transport
13	Electronic Goods	39	Water - Passenger transport
14	Conventional Transport equipment	40	Coal fired power plants
15	Other Equipment Goods	41	Oil fired power plants
16	Consumer Goods Industries	42	Gas fired power plants
17	Air transport	43	Nuclear power plants
18	Road -Passenger transport	44	Biomass power plants
19	Water - Freight transport	45	Hydro electric power
20	Construction	46	Wind power
21	R&D	47	Solar PV plants
22	Market Services	48	CCS coal power plants
23	Non Market Services	49	CCS Gas power plants
24	Wheat, Cereal Grains, Sugar cane, sugar beet	50	Geothermal power
25	Oil Seeds	51	Batteries manufacturing
26	Forestry		