This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727114

MONROE - Modelling and evaluating the socio-economic impacts of research and innovation with the suite of macro- and regional-economic models

D6.3.4 Comprehensive set of model results from the PACE model

March 2019: Public

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727114

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Document Details

Authors	Theodoros Chatzivasileiadis, Sebastian Voigt
Creation Date	21.03.2019
Date of Last Revision	21.03.2019
Version	V1.0
Description	D6.3.4 Comprehensive set of model results from the PACE model

Version History

Version	Updated By	Date	Changes / Comments
V1.0	Theodoros Chatzivasileiadis, Sebastian Voigt	21.03.2019	First draft

Project Involvement

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1. Scenario Design

The PACE model is particularly appropriate to analyse macroeconomic and sector-level effects of EU climate and energy policies. Based on the extensions carried out within the MONROE project, specific R&I policies will complement this policy analysis. All policy scenarios assume public budget neutrality.

Similar to the scenarios designed for the E3ME model, the policy scenarios simulated with PACE have been constructed such that an additional policy is introduced on top of the central policy scenario S0 which is common to all models within the MONROE project.

S1: EU decarbonisation policy

The starting point is a scenario which assumes compliance with the 2030 Framework in the EU and with the Copenhagen Pledges in non-EU countries. It includes:

- In the EU: 40% carbon dioxide emissions reduction by 2030 compared to the 1990 level (corresponds to respectively 43% and 30% in the ETS and non-ETS sectors below 2005 levels) and 80% reduction by 2050 compared to the 1990 level,
- In the EU: Distribution of efforts in the non-ETS sectors among Member States according to the new Effort Sharing Regulation.
- In non-EU regions: Emissions reductions are implemented according to their NDCs up to 2030 and kept constant thereafter.
- Permits are fully auctioned in all sectors of all model regions. Auctioning revenues are handed back to the households as a lump-sum transfer.

The surplus of emissions allowances – which has accumulated in recent years – and the Market Stability Reserve are imposed in an exogenous manner.

The specific emission reduction targets for each model year are given in Table 4 and follow the EU Decarbonisation Roadmap.

Within the ETS sectors, full trade of allowances between all EU Member States is implemented such that the cost efficient allocation of permits to each member state and sector is eventually achieved. In order to mimic the Effort Sharing Regulation, carbon trading between Member States in non-ETS sectors is also implemented.

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Table 4: Pathway to achieve emission reduction targets in the EU

Year	Reduction targets vs. 1990 (%)
2005	7
2010	12
2015	18
2020	25
2025	33
2030	40
2035	49
2040	62
2045	73
2050	80

S2: Renewable energy targets

All targets from Scenario S1 hold. In addition, we implement in the EU a 20% renewable energy share in gross final energy consumption by 2020, which corresponds to 35% in the electricity sector. By 2030, renewable energy share in gross final energy consumption is 27%, which corresponds to 45% in the electricity sector. The targets are reflected at the Member State level by an increase in the share of renewable energy in the electricity sector (RES-E), in line with the potential contribution of the electricity sector to the overall RES share.

Table 5 summarizes the renewable energy targets for EU regions. These are translated targets for the electricity sector based on the EUCO30 Scenario.

Table 5: Assumed renewable energy targets in electricity sector based on EUCO30 Scenario

Model region	2020	2025	2030
France	31.5	36.4	37.2
Germany	34.9	37.6	45.6
Italy	32.5	44.9	51.9
Poland	14.3	20.7	26.5
Spain	38.5	54.9	68.8
United Kingdom	41.1	46.7	49.9
Rest of Western MS	47.5	53.1	62.1
Rest of Central and Eastern MS	23.0	28.3	36.3

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The following scenarios all build on Scenario S2. Only additional elements are described.

S3: Additional Public R&D investment

All assumptions from Scenario S2 hold. In addition, R&D spending of the government is raised in all EU Member States by an even larger amount than in the central policy scenario. This is modelled by increasing public R&I investments by a certain share, i.e. by 2030 we raise R&D spending by 0.5 percentage points above the country-specific shares of GDP that were applied in the central policy scenario. To this end, subsidies on R&D provided by the government are introduced. These subsidies increase in a linear fashion between 2015 and 2030 when the full amount is achieved.

S4: Investment composition away from fossil energy sectors

Public investments are directly linked to R&D policies. As such, we implement a scenario where the composition of public R&D investments move away from fossil-energy production sectors and move towards renewable energy sources. Given the lack of specific pan-European targets, we apply a 10% reduction in the direct investments to fossil-energy production sectors in the EU and direct them towards renewable energy sources. All other assumptions from Scenario S2 hold.

S5: Different subsidy mechanisms for renewable energy sources

All assumptions from Scenario S2 hold. In addition, the subsidies' stream switches from the public budget to the revenues from the EU ETS auctions. As subsidies are considered direct payments to the households, the freed resources from the public budget are expected to have both direct and indirect effects on the European economy, in particular on R&D investments.

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2. Results

The results are provided in the Excel file, to be found here:

https://1drv.ms/x/s!AhGJnmQoRRI_vQNms3mrXbPVBqLY