A comparative analysis of modelling approaches to assess transition impacts
First insights from the NEMESIS models[1]

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- A **macroeconomic model for EU27 + UK + NO + IS (+ CH)** developed and managed by SEURECO.

- A **neo-keynesian** theorectical background

- A **detailed coverage**: 31 countries, 30 economic activities, 27 consumption purposes, 5 production factors: capital, labour (low- and high-qualified), energy consumption and other intermediate goods

- An **energy and climate module** covering 19 energy products and 7 GHG (only CO_2 covered in this exercice) and with a specific modelling of the power generation considering 15 different technologies.

- (An endogeneous growth module based on investments in innovative assets: R&D, training, software and ICTs, and knowledge spillovers - Not used in this exercice)

The NEMESIS model: track record

A long experience in **policy impact assessments**:

- **Taxation**: studies for the Haut Conseil du financement de la protection sociale (HCFi-PS, 2014[1]), as well as for the Direction Générale des Entreprises (ex DGCIS), and more recently for European Commission DG TAXUD and regular works for think tanks.

- **Environment**:
  - with the energy-climate module: EU research project AMPERE (Capros *et al.*, 2014[2]) or PARIS REINFORCE, on going (Nikas *et al.*, 2021[3]) , models' intercomparison (Boitier *et al.*, 2015[3]), carbon footprint and CBAM (Muller *et al.*, 2020a[5]; 2020b[6]) or the value of the climat action (Quinet *et al.*, 2019[7]) ;
  - linked with detailed energy-system model(s): several studies for the DGEC with the POLES model (MEDDE, 2015[8]), European Commission DG ENV on RES employment impacts in EU (Duscha *et al.*, 2016[9]) or H2020 research project SET-Nav (Crespo del Granado *et al.*, 2019[10]).

- **Innovation and research**: with ex-ante impact assessment of H2020 EU research programme (EC, 2012 – Annex 5[11]), Horizon Europe (Boitier *et al.*, 2018[12]; 2022[13] and Ravet *et al.*, 2019[14]), etc.

Climate transitions risk study: methodology

- Use IAMs/NIGEM outputs from NGFS scenarios:
  - **4 scenarios**: "Baseline", "NZE 2050", "Delayed", "Divergent"
  - **5 drivers**:
    - **Population and labour productivity** for the "Baseline" scenario (not for other scenarios)
    - A **carbon price** introduced as the unique climate policy instrument in the model (no cap and trade, EU-ETS, ESR, national carbon tax, etc, ...)
    - International **fossil fuels prices** (not included yet in standard case)
    - Change in **demand adressed from the RoW**
    - Change in **prices in the RoW**
- Recycling of carbon revenues to households (lump sum)

CO$_2$ emissions in France (Mt/y.)
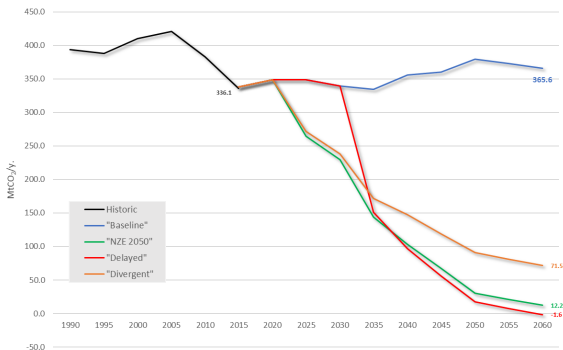
CO$_2$ emissions from fossil fuel combustion and industrial processes in France
Source: historical values fom EEA (2021[15]) and projections from NEMESIS model.
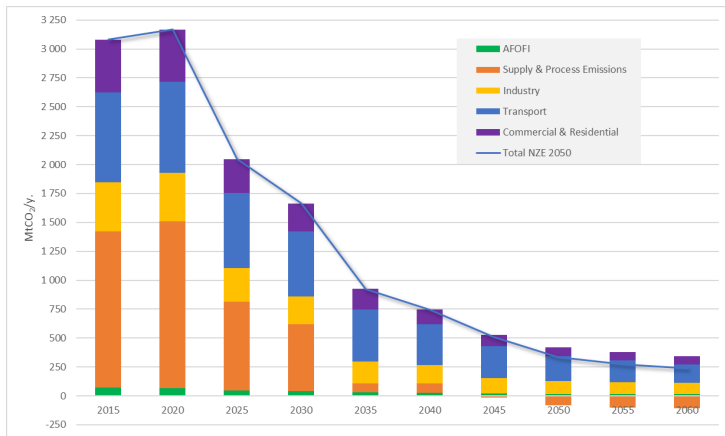
Draft results - do not quote

CO$_2$ emissions by sector in the "NZE 2050" scenario in EU27 (Mt/y.)

CO$_2$ emissions from fossil fuel combustion and industrial processes by sector in EU27.
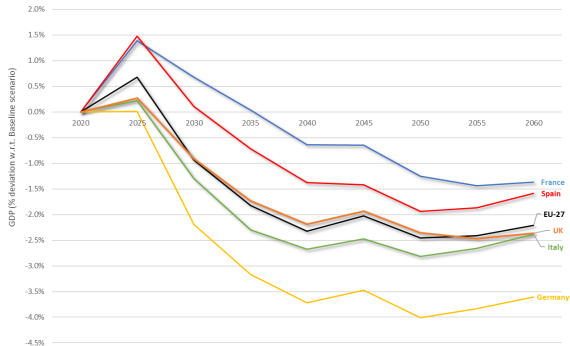*Source: NEMESIS model.*

Draft results - do not quote

Real GDP deviation in the "NZE - 2050" scenario in % with respect to scenario "Baseline".
Source: NEMESIS model.

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GDP components contribution to GDP deviation in "NZE 2050" in France
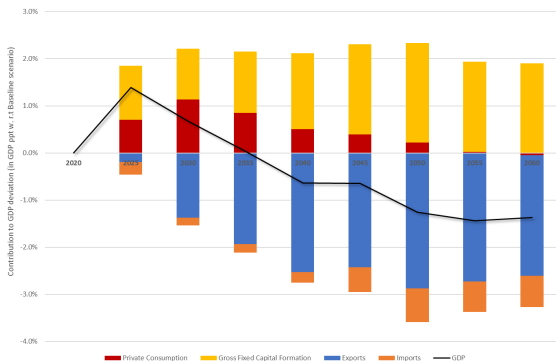
Contribution of GDP components to GDP deviation in the "NZE - 2050" scenario in GDP ppt with respect to scenario "Baseline" in France.
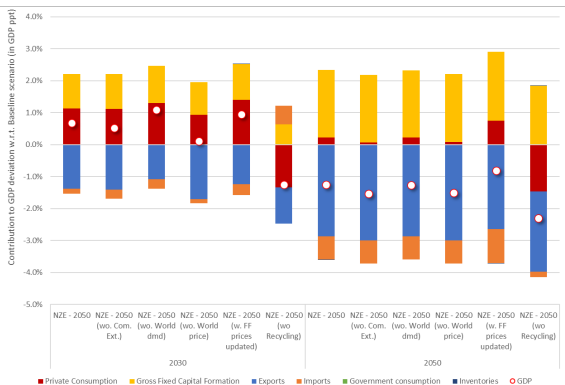*Source: NEMESIS model.*

Draft results - do not quote
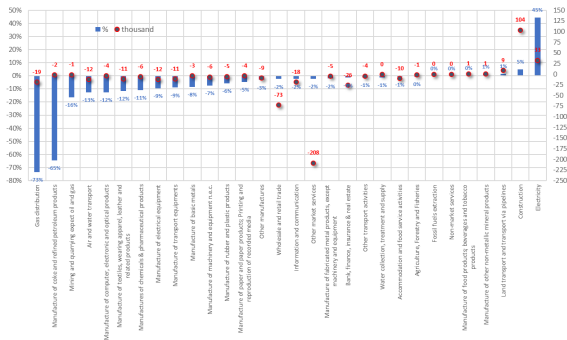
GDP deviation sensitivity to drivers in 2030 and 2050 in France

Contribution of GDP components to GDP deviation with respect to scenario "Baseline" in France in 2030 and 2050 according to "NZE -2050" divers inclusion or not.
Source: NEMESIS model.

Draft results - do not quote

Employment deviation by sector in "NZE 2050" in 2050 in France

Employment deviation by sector in France in the "NZE 2050" sceanrio (% and thousand with respect to "Baseline" scenario)
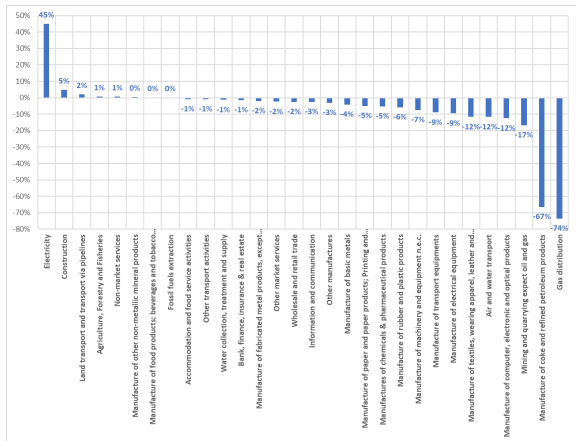*Source: NEMESIS model.*
Draft results - do not quote

Value-added deviation by sector in "NZE 2050" in 2050 in France

Value-added deviation by sector in France in the "NZE 2050" sceanrio (% with respect to "Baseline" scenario)
Source: NEMESIS model.

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- Raise capital cost of climate mitigation related investments
- Reinforce mis-matching in the labour market

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