Sectoral employment mutations in the socio-ecological transition

A modelling assessment

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SEVENTH FRAMEWORK
PROGRAMME

Caution

- This work is ongoing and the results presented in this document are prelimenary
- This document is insufficient by itself and the comments of the autors are essential to properly understand the results
- Do not quote

Outline

1. Context
   - A modelling exercise
   - Two global contexts = Two reference scenarios
   - Two policy responses

2. Results
   - How to reach the decarbonisation targets?
   - Carbon price
   - Some insights from energy consumption
   - Impacts on GDP
   - Impacts on Employment
   - Sectoral mutations induced by the decarbonisation

3. Conclusion

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Reference scenarios
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The NEMESIS model
To assess the potential impacts of the socio-ecological transition.

- One part of the **NEUJOBS**[1] project is the quantification of different scenarios on the future of employment in Europe and especially in the case of the socio-ecological transition (Fisher-Kowalski and Haberl, 2007[6])

- Use of the **NEMESIS model** developed by SEURECO[2] to quantify these scenarios.

- Translate the global storylines as well as the EU policy response scenarios developed within the NEUJOBS project (Fisher-Kowalski *et al.*, 2012[5]) into quantitative scenarios.

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[1]www.neujobs.eu
[2]www.erasme-team.eu

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The NEMESIS model
An overview of the Black Box (1/2)

- The NEMESIS model covers
  - each EU-27 countries
  - 30 production sectors
  - 27 consumption functions
  - 5 different inputs of which two kind of labour: low-skilled and high-skilled

- The NEMESIS model is a hybrid model combining short-term keynesian features with long-term equilibrium and new growth theory mechanisms[3]
  - Keynes said that in "*the long-run we are all dead*"
  - but in the NEMESIS model, "*in the long-run Schumpeter has killed Keynes*"

[3]See a detailed description of the model: http://bit.ly/SA8Q8z

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The NEMESIS model
An overview of the Black Box (2/2)

- The NEMESIS model also includes an energy/environment module that provides:
  - energy consumption by 10 different products
  - energy consumption by 5 different sectors
  - power generation mix with 8 different technologies
  - CO_2 emissions by sector and country
  - carbon prices

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Two global contexts
Overview of the main assumptions

Table: Summary of main assumptions

		Friendly	Tough
Societal	Demography (million)	+37M	-11M
	Old age dependency ratio (%)	26% to 38%	26% to 39%
	Working age population (million)	-4.5M	-29M
	- High-skilled	+36M	+11M
	- Low-skilled	-40.5M	-40M
Energy prices	Oil price ($US'10/bbl)	$78 to $117	$78 to $195
	European gas price ($US'10/Mbtu)	$7.5 to $11.7	$7.5 to $12.6
	European coal price ($US'10/t)	$99.2 to $109.3	$99.2 to $115.9
Financial	World GDP growth (AAGR)	3.80%	2.5
	European rate of interest (%)*	3.6 to 4.4	3.6 to 5.9
	€/$ exchange rate	1.3 to 1.3	1.3 to 1.4
	Public finance rule	Stabilisation of public debt	Stabilisation of public debt

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Two global contexts
"Friendly" vs "Tough": Some insights

- In the **"Friendly" scenario**[4]
  - **release of the long-run economic growth** of the European Union (+2.2% of GDP growth at the end)
  - re-balancing of the European economies and of their public finances
  - progressive return to long-run equilibrium, especially on the labour market (unemployment rate at 7.6% in 2030)
  - relatively strong improvement of the energy efficiency (+2.2%/year)

- In the **"Tough" scenario**
  - **EU GDP growth is penalised** by unfavourable external conditions
  - thus, re-balancing public finances is more penalising
  - and labour market remains depressed (unemployment rate at 12.1% in 2030)
  - relatively weak improvement of the energy efficiency (+1%/year)

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[4]See Boitier *et al.* (2013[1]) for details.

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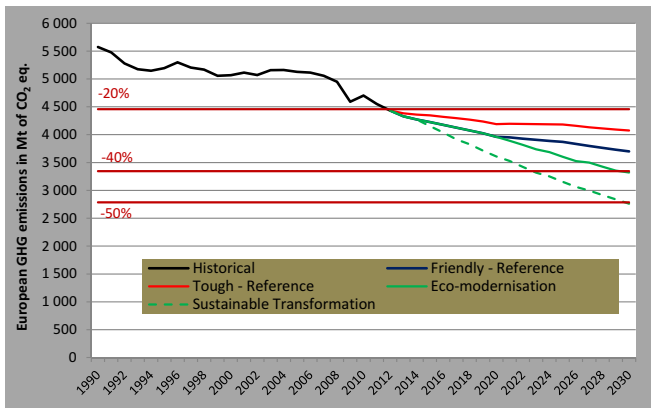- Sectoral mutations induced by the decarbonisation

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Alternative scenarios

- Two alternative scenarios:

  - **Eco-modernisation**, a scenario acheiving an eco-efficient production through market based instruments and price signals to "internalise externalities"
  - **Sustainable Transformation**, a scenario recognises that there are several transitions ahead and that a significant reduction in fossil fuel use is necessary.

- Implementation into the NEMESIS model:

  - A unique carbon tax in European Union with

    - recycling through lump sum to households
    - recycling through lower social contribution to firms

- **Doubling the labour demand elasticity** in all sectors (higher substituability) in order to favour the employment benefits
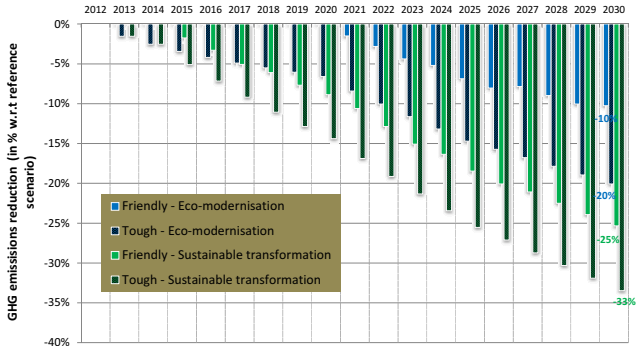
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EU policy responses
Decarbonisation: -40% or -50% in 2030

Source: EEA (2012[2]) and NEMESIS model.

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EU policy responses
How much should we reduce in each case?

Source: NEMESIS model

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Kaya identity

- The Kaya Identity (Kaya, 1990[9])

$$CO_2 = CO_2$$

$$CO_2 = \frac{CO_2}{E} * \frac{E}{GDP} * \frac{GDP}{POP} * POP$$

$$dln(CO_2) = dln(\frac{CO_2}{E}) + dln(\frac{E}{GDP}) + dln(\frac{GDP}{POP}) + dln(POP)$$

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How to decarbonise?
Energy efficiency and energy mix work together

	Energy Mix	Energy intensity	GDP
Friendly - Eco-modernisation	50.8%	44.2%	5.1%
Tough - Eco-modernisation	49.8%	48.7%	1.5%
Friendly - Sustainable Transformation	53.4%	41.2%	5.4%
Tough - Sustainable Transformation	55.2%	43.0%	1.8%

Source: NEMESIS Model

- The decarbonisation of the European economy will passe through:
  - change in **energy mix**
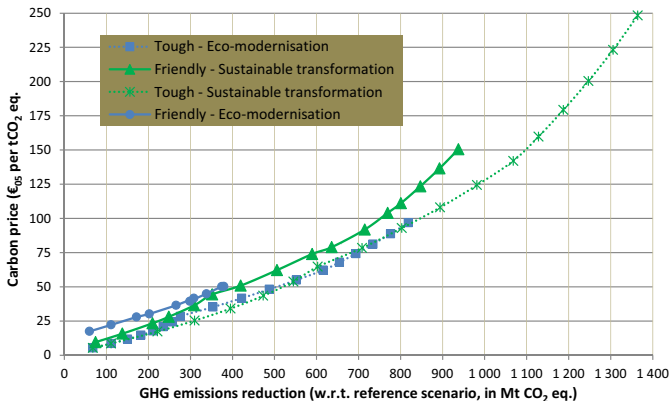 - **and** improvement of **energy efficiency**

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How to decarbonise?
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Carbon price
Carbon price matters!

Source: NEMESIS model

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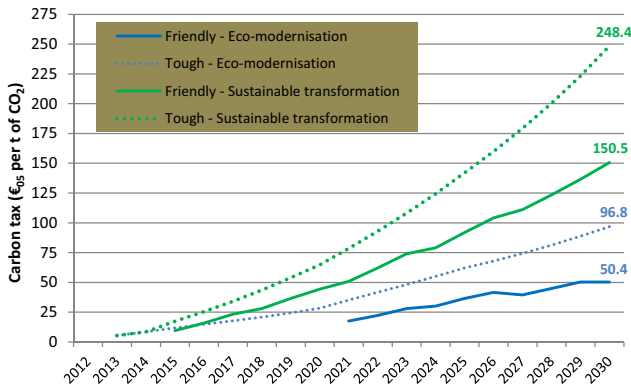
Carbon price
Marginal abatement curves

Source: NEMESIS model

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Share of RES in power generation
RES are drivers of the change in the energy mix

Source: NEMESIS model

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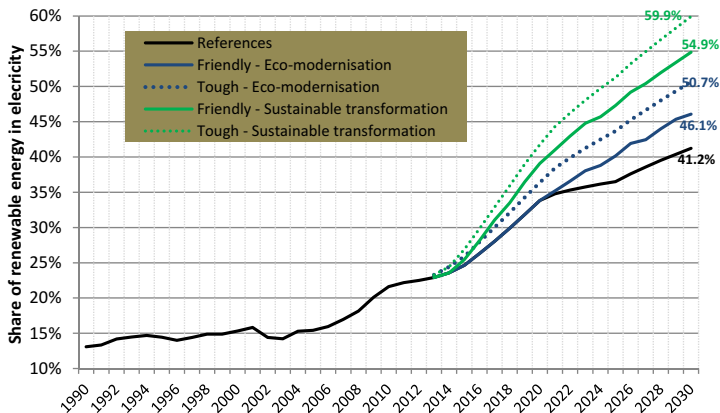
Share of RES
The 20% target is not easily reached!
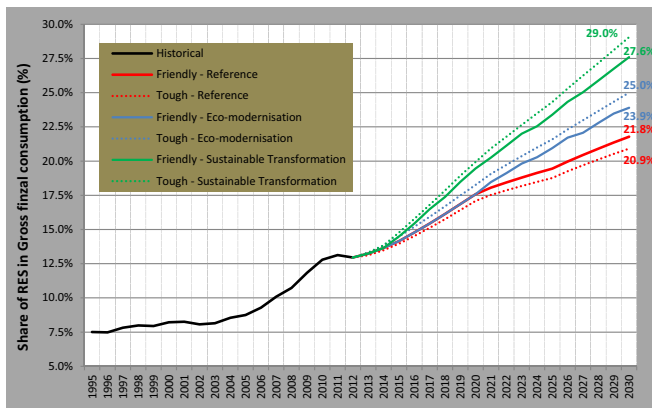
Source: Eurostat (2012[4]) and NEMESIS model

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GDP
A moderated impact on GDP

Table: GDP change w.r.t. reference scenarios (%)

	With recycling	Without recycling
Friendly - Eco-modernisation	-0.55%	-1.23%
Tough - Eco-modernisation	-0.35%	-2.13%
Friendly - Sustainable transformation	-1.57%	-3.08%
Tough - Sustainable transformation	-0.75%	-4.34%

Source: NEMESIS model

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Contribution to GDP change
Friendly - Sustainable transformation
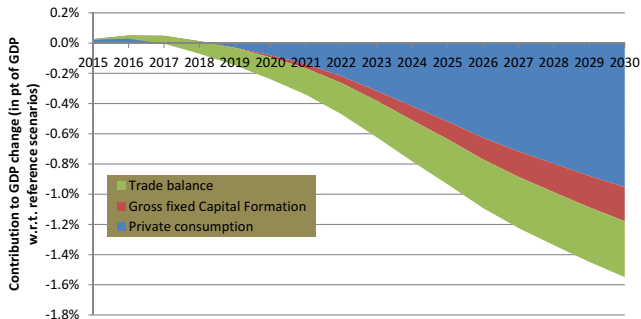
Source: NEMESIS model

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Macroeconomic employment
Take advantage of a depressed labour market

Source: NEMESIS model

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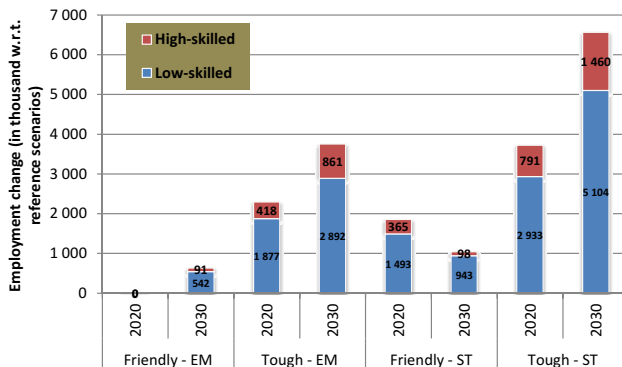
Macroeconomic employment
Sensibility analysis - Initial Employment Elasticity of Substitution (divided by 50%)
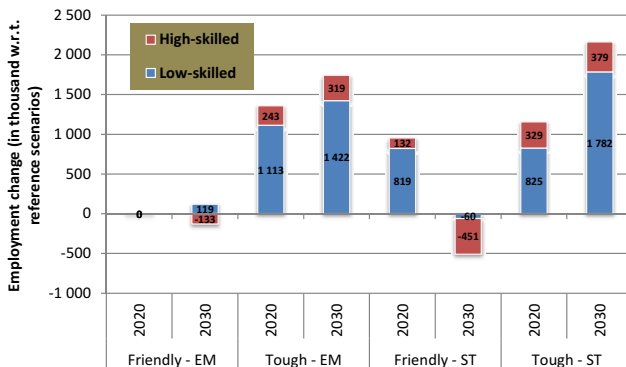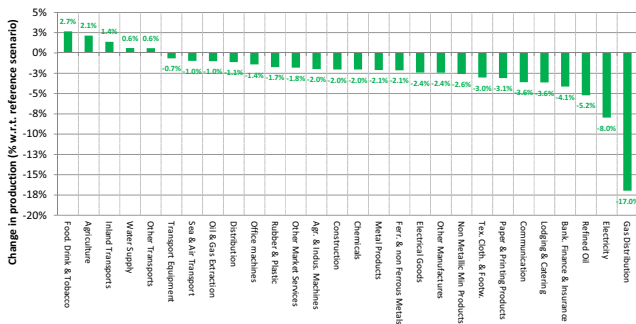

Source: NEMESIS model

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Production
Friendly - Sustainable Transformation

Source: NEMESIS model

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Production
A sectorial shift

Source: NEMESIS model

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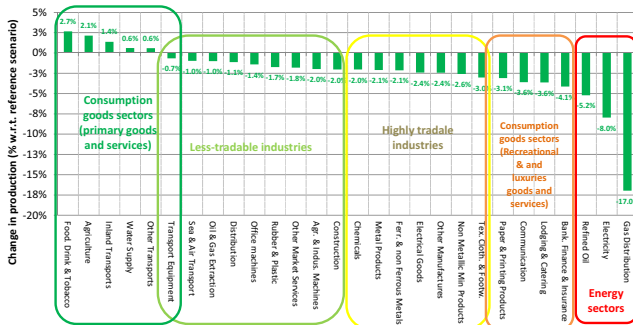
Employment
Friendly - Sustainable Transformation

Source: NEMESIS model

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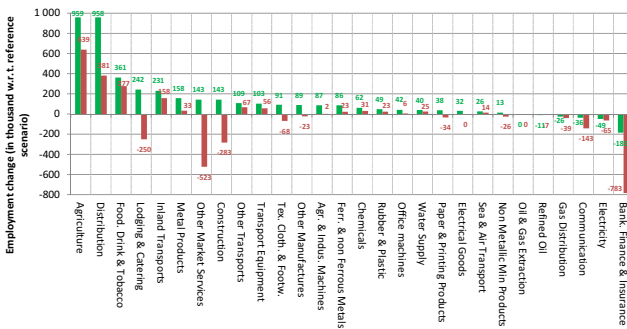
Employment
Jobs creations and destructions
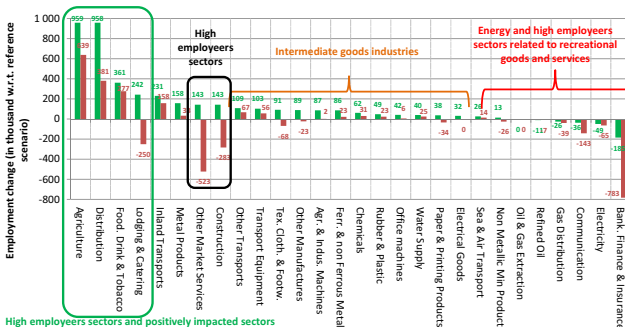
Source: NEMESIS model

Summary
Key points for 2030 European mitigation policy (1/2)

- The decarbonisation of the European economy should **combine change in energy mix and improvement of energy efficiency**
  - But, is it neccessary to impose a target on each?
- The **carbon price is an efficient economic instrument** to support the decarbonisation
  - But, as currently shonw by the EU-ETS market, cap-and-trade can nearly miss the role of carbon price, as signal
- Decarbonisation of the European Union could be done at a **weak economic cost**
  - Insomuch as revenues from economic instruments are suitably used to facilitate this transition

Summary
Key points for 2030 European mitigation policy (2/2)

- Transition to lower carbon intensive society could be a good opportunity to **create new jobs**
    - Especially in a context of a depressed labour market
- The decarbonisation of the European implies a **sectoral shift** opening a space for policy action:
    - to support penalised activities, sectors and employees
    - to promote and organise the development of related skills

Thanks

Thanks for your attention

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