



PARIS
REINFORCE



PARIS
REINFORCE

Switzerland Stakeholder Workshop

Insights from existing EU modelling studies

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www.paris-reinforce.eu

- ❖ Overview of the I²AM PARIS Platform

 - ❖ www.i2am-paris.eu

- ❖ EU modelling exercises:

 - ❖ Where is the EU headed?

 - ❖ A modelling exercise done with the Paris Reinforce models' ensemble

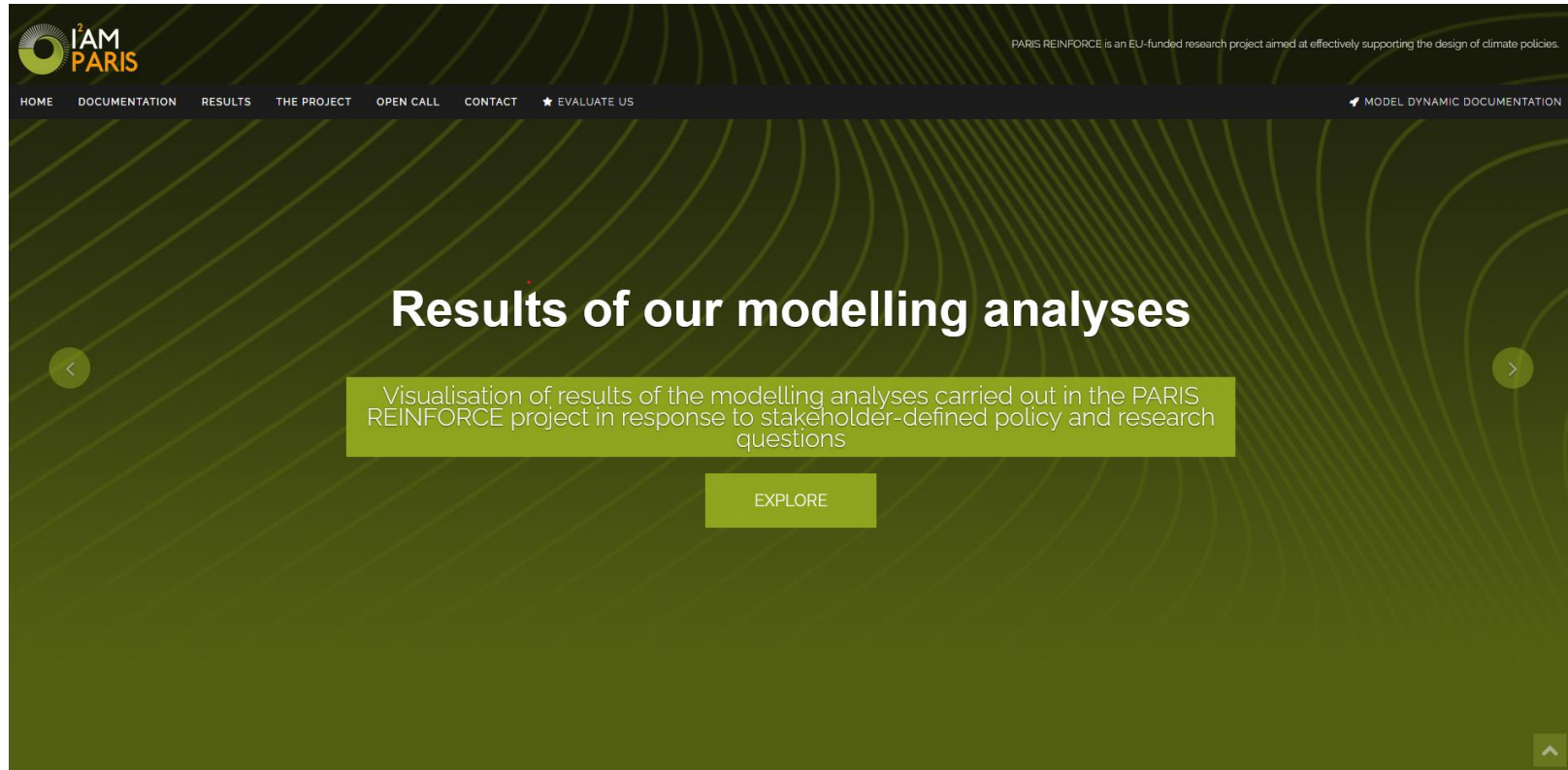
 - ❖ Deeper decarbonization in EU

 - ❖ A GHG reduction of -80% in 2050

 - ❖ First insights on post-COVID and EU Green Deal scenarios



❖ www.i2am-paris.eu

A screenshot of the I2AM Paris Platform website. The page has a dark green background with a pattern of thin, curved lines. At the top left is the I2AM PARIS logo. To the right, a small text line reads "PARIS REINFORCE is an EU-funded research project aimed at effectively supporting the design of climate policies." Below the logo is a navigation menu with items: HOME, DOCUMENTATION, RESULTS, THE PROJECT, OPEN CALL, CONTACT, and EVALUATE US. On the far right of the menu is "MODEL DYNAMIC DOCUMENTATION". The main content area features the heading "Results of our modelling analyses" in large white text. Below this is a light green box containing the text: "Visualisation of results of the modelling analyses carried out in the PARIS REINFORCE project in response to stakeholder-defined policy and research questions". Underneath this box is a green button labeled "EXPLORE". There are also navigation arrows on the left and right sides of the main content area, and an upward arrow in the bottom right corner.

The PARIS REINFORCE project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 820846.

Where is the EU headed?



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❖ **Scenario logic: Where are We headed scenarios** (Sognnaes et al.)

❖ The scenario is designed to **reflect current levels of mitigation efforts in the EU**, considering current policies

❖ **Beyond 2030:**

- ❖ we use the carbon prices that, on their own (absent other current policies), achieve the same levels of emissions as current policies in 2030. We call these carbon prices: **equivalent carbon prices (ECPs)**
- ❖ We extend the ECPs in the EU, **growing at the rate of GDP per capita from 2030 onwards**, to represent a “constant” economic burden from carbon pricing, as proxied by the ratio of carbon price to per capita income over time.



❖ Modelling tools used

	Global	EU/EU-National
General equilibrium	GEMINI-E3 ICES (WPS 1.0)	
Partial equilibrium	GCAM (v5.3) TIAM (Grantham)	
Energy system	MUSE 42	EU-TIMES
Macroeconometric	E3ME (v6.1)	NEMESIS
Sectoral		ALADIN FORECAST

Models' documentation on the I²AM Paris Platform
<https://paris-reinforce.evu.ntua.gr/main>

The screenshot shows the I²AM Paris Platform interface. At the top, there is a navigation bar with the I²AM PARIS logo, a 'Layout' button, and a 'Back' button. Below this, the 'Models' section displays a grid of 42 model icons, including RICE, E3ME, GCAM, GEMINI-E3, ICES, MUSE, and TIAM. To the right, the 'Geographic Coverage of 42' section shows a world map with colored regions indicating the models' coverage. Below the map, there are sections for 'Sectors', 'Emissions', 'Mitigation-Adaptation Measures', 'Policy', 'Socio-Economics', and 'SDGs', each with a grid of corresponding icons.



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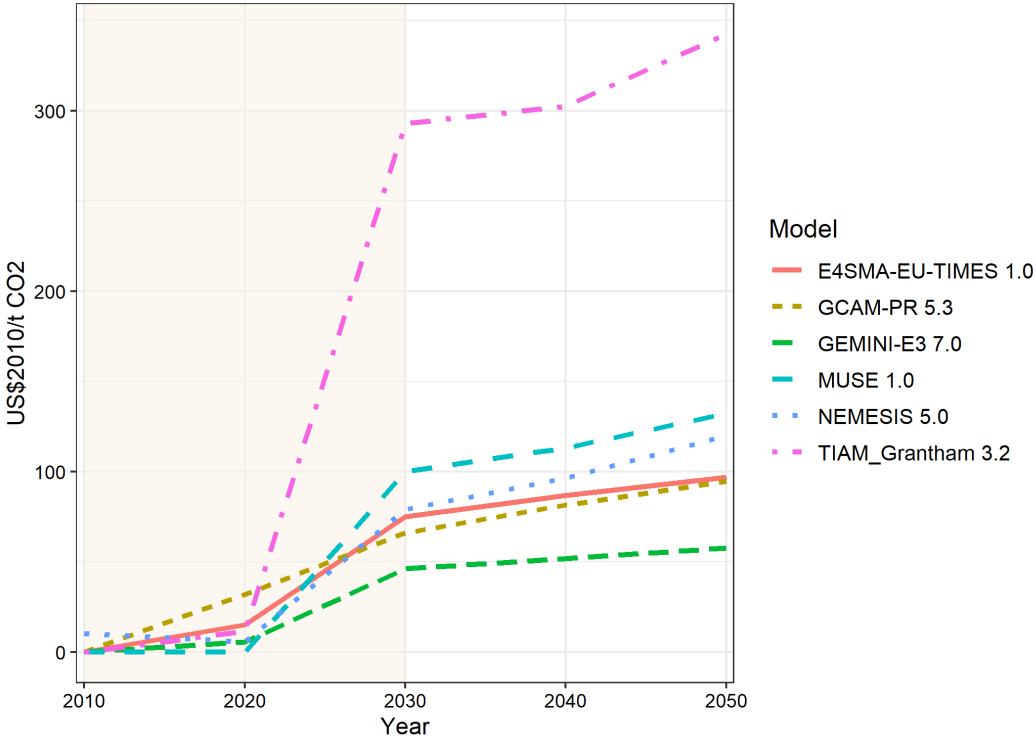


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❖ (Equivalent) Carbon prices



Carbon prices in EU models in 2030

	(US\$ ₂₀₁₀ /tCO ₂)	NEMESIS	EU-TIMES	Vielle (2019)
EU-ETS		80.8	79.7	54.8
ESR		77.0	70.6	249.2
		(0 - 416)	(0 - 616)	(0-661)

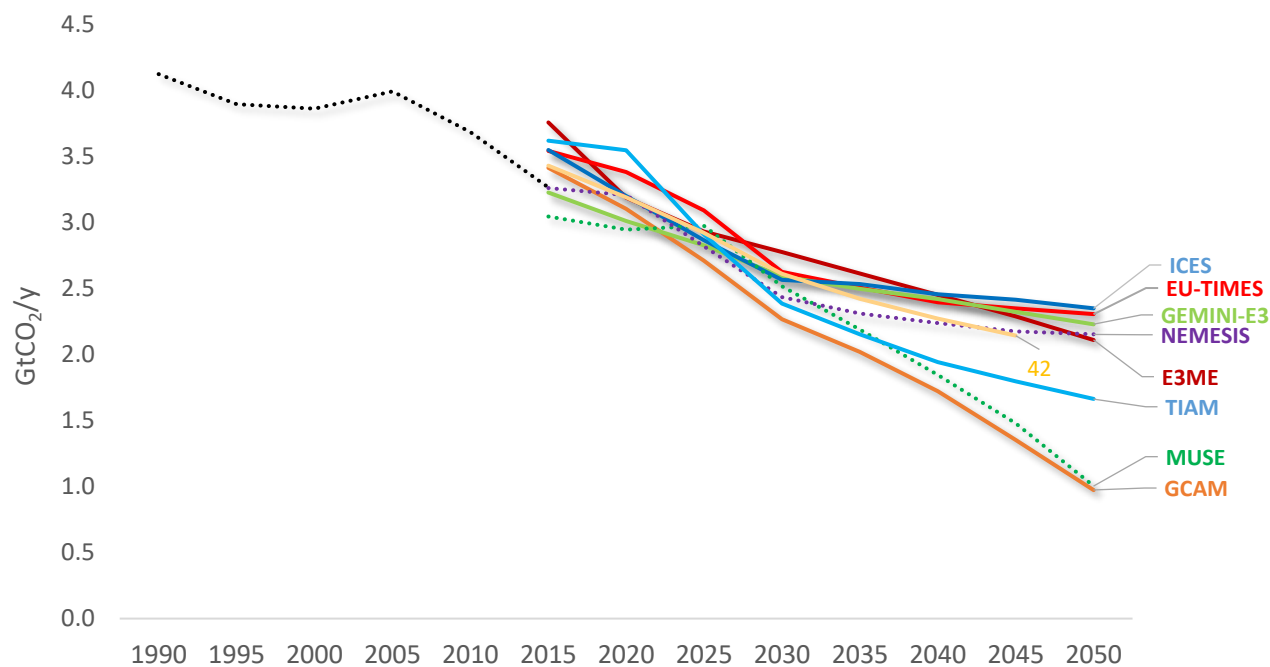
ESR: weighted mean, in brackets (min – max)

Source: Nikas et al. (in revision)



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❖ CO₂ emissions from Energy in EU until 2050



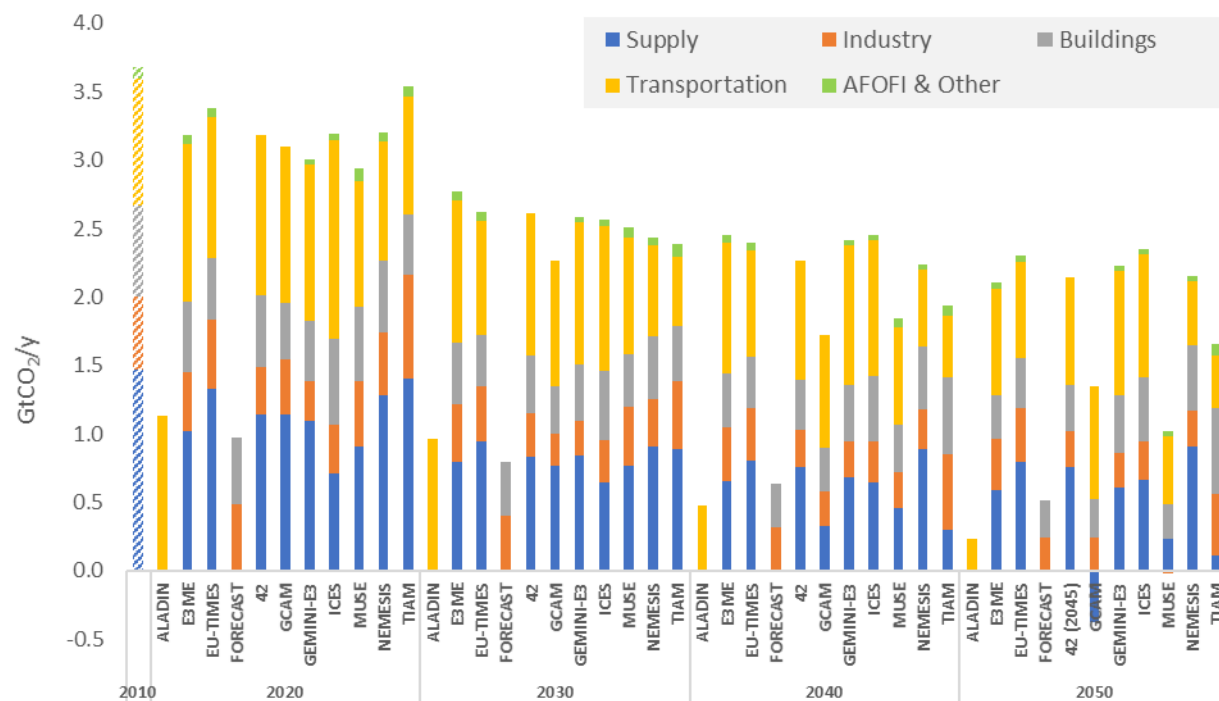
CO₂ emissions from energy in the EU across models total values until 2050—black dotted line: historical data from European Environmental Agency (2020)

Source: Nikas et al. (in revision)



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❖ CO₂ emissions from Energy in EU by sector

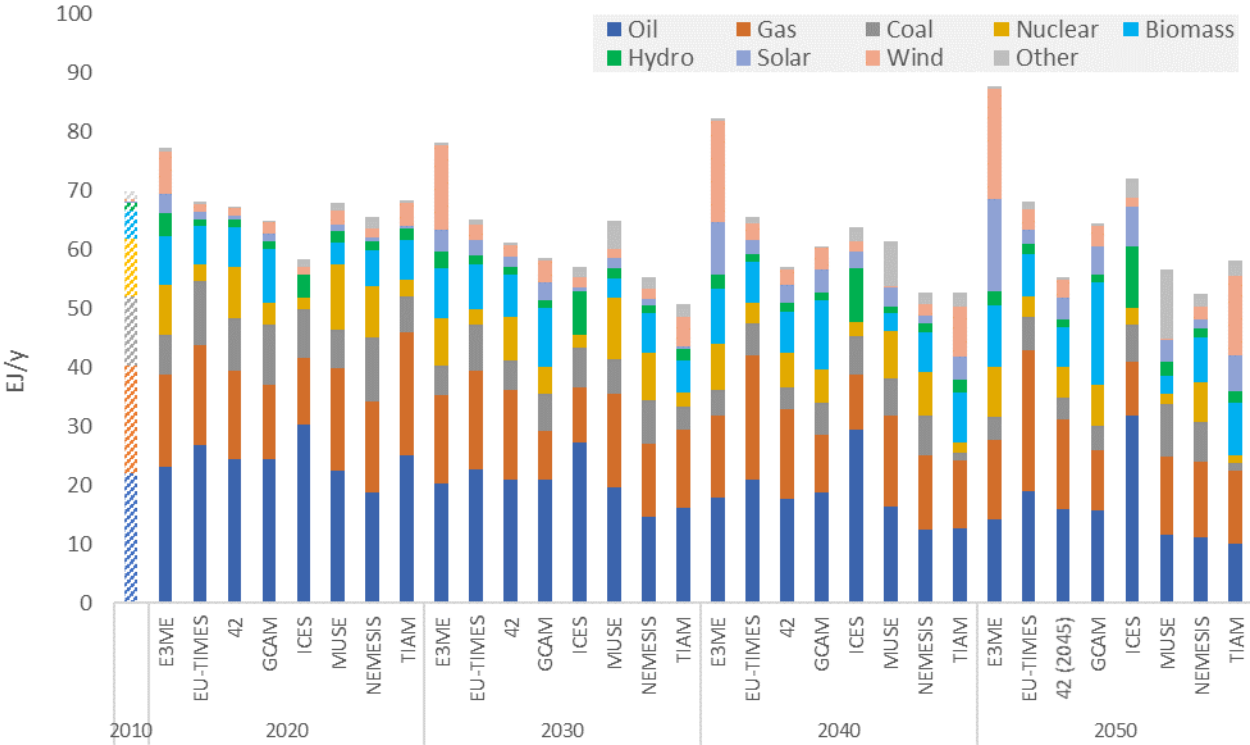


CO₂ emissions from energy in the EU across models total by sector — hatched bars: historical data from European Environmental Agency (2020)

Source: Nikas et al. (in revision)



❖ Primary energy in EU by fuel



Source: Nikas et al. (in revision)



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Deeper decarbonization

-80% in 2050



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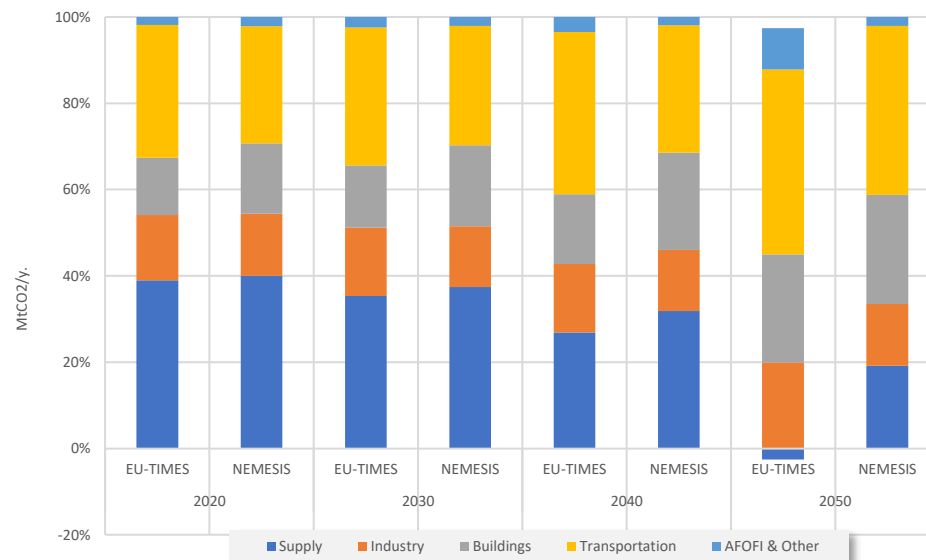
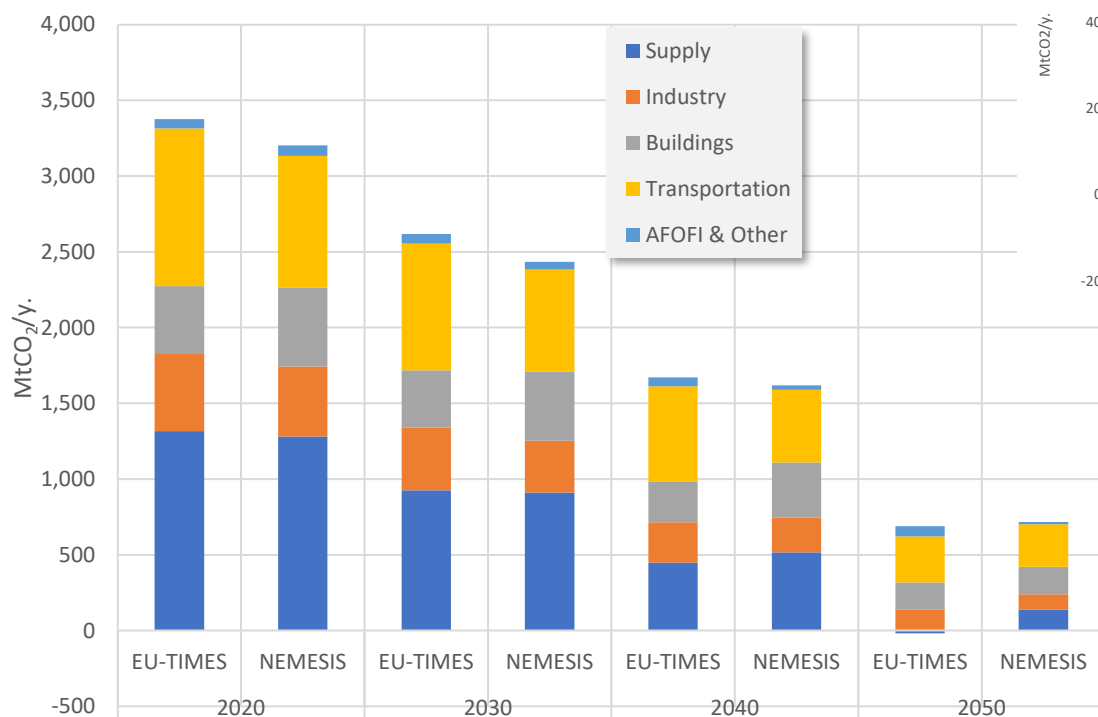
- ❖ One additional « where are we headed » ran for EU

		"Where are we heading" scenarios	
		Current Policies	NDCs
Climate change mitigation actions	up to 2030	EU policies as close as possible of legal texts	Reduction of EU GHG emissions by 40% in 2030 in comparison with 1990, following EU-ETS and ESR burden sharing
	After 2030	Project EU climate action using different metrics and/or scenario design	Prolongation of 2020-2030 EU climate change mitigation efforts (-20pp of GHG emissions per decade in comparison with 1990)

(Mt CO ₂ eq./y.)	1990	2005	2020	2030	2040	2050
EU-ETS*	--	2 340.30	1 848.80	1 334.00	782.9	242.6
ESR	--	3 021.70	2 729.50	2 110.60	1 506.30	901.9
Total	5 722.90	5 362.00	4 578.30	3 444.60	2 289.20	1 144.60
Reduction Total (w.r.t. 1990)	0%	-6%	-20%	-40%	-60%	-80%
Reduction EU-ETS (w.r.t. 2005)		0%	-21%	-43%	-67%	-90%
Reduction ESR (w.r.t. 2005)		0%	-10%	-30%	-50%	-70%

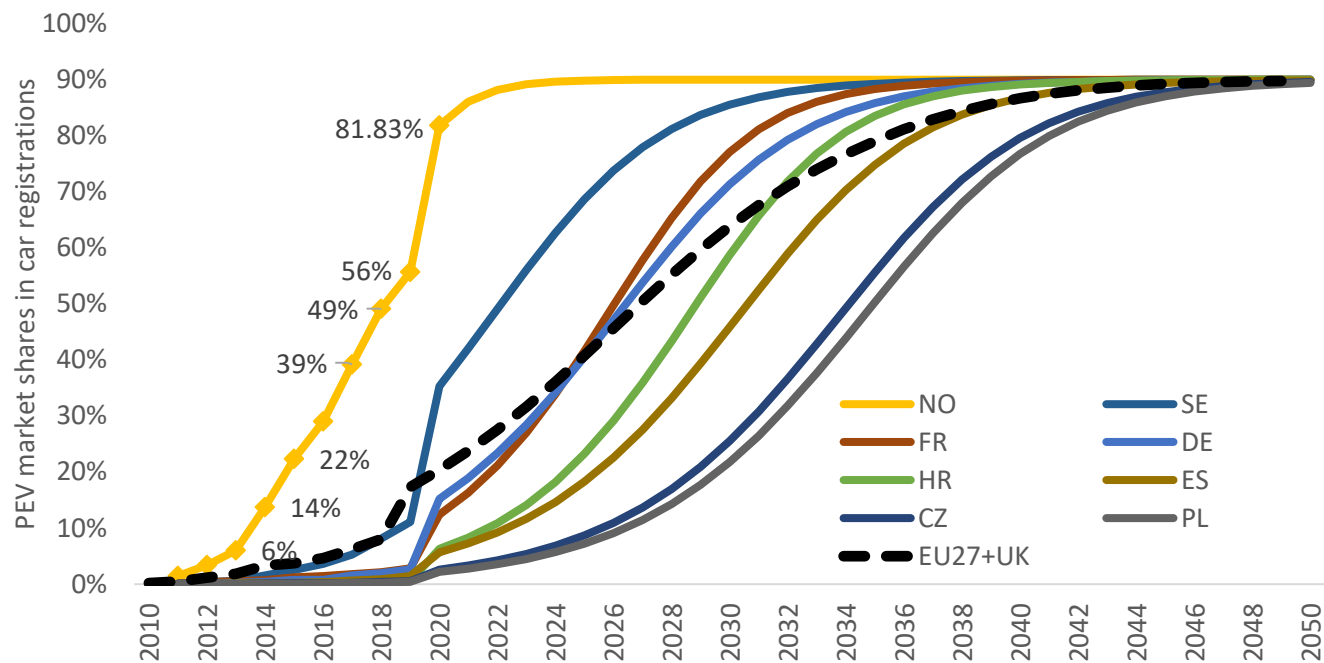


❖ CO₂ emissions from Energy in EU by sector



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❖ Market shares of PEV in car registrations by a selection of EU28+NO countries



Source: ALADIN model



Deeper decarbonization

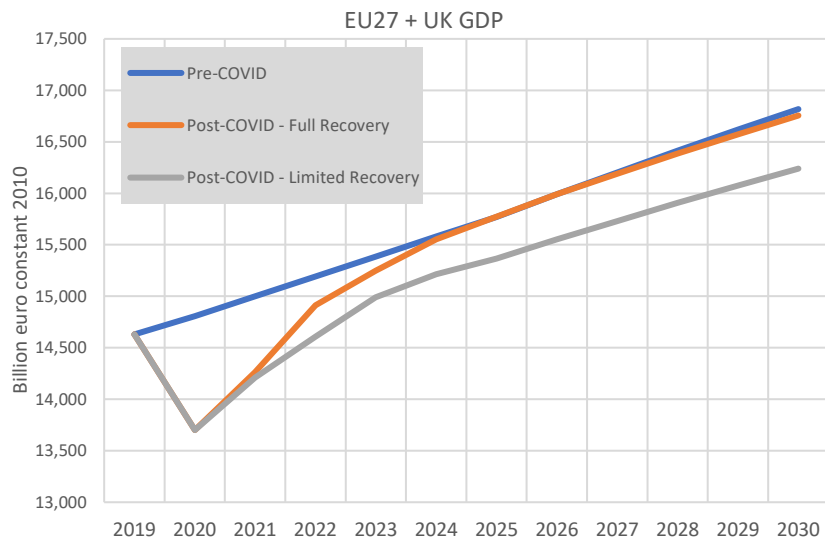
Post COVID 19 pandemic & EU Green Deal



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Deeper Decarbonisation Post-Covid & EGD (ongoing work)

- ❖ Scenarios based on three layers:
 - ❖ An economic layer:



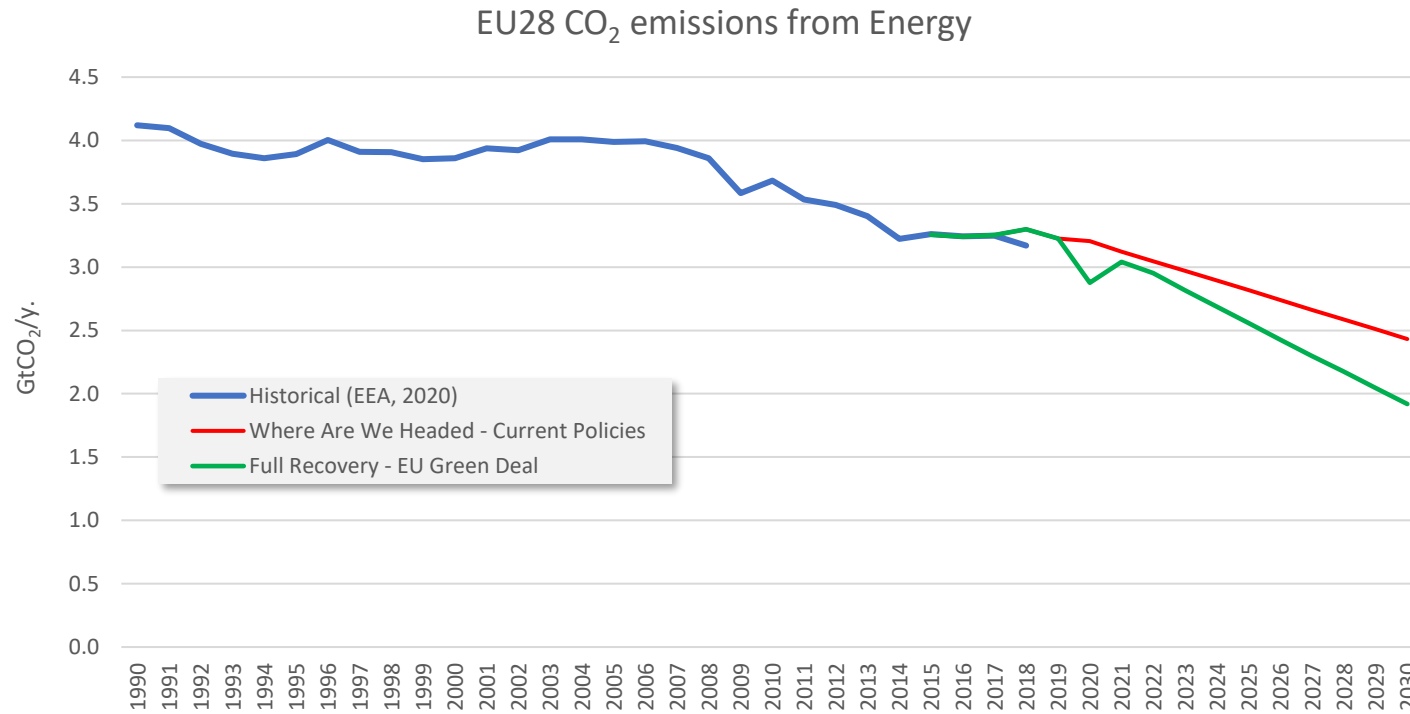
		EU GDP (bn€ ₂₀₁₀ /y.)			Average GDP growth rate (%/y.)		
		2020	2025	2030	2020-2025	2026-2030	2020-2030
Pre-Covid	WWH	14 806.9	15 771.5	16 817.6	1.3%	1.3%	1.3%
	Full Recovery	13 702.2	15 774.4	16 755.3	1.3%	1.2%	1.2%
Post-Covid	Limited Recovery	13 702.2	15 365.7	16 240.2	0.8%	1.1%	1.0%
		<i>-7.5%</i>	<i>-2.6%</i>	<i>-3.4%</i>			

Source: NEMESIS model; in italic percentage deviation with respect to the Pre-Covid WWH scenario.



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- ❖ Scenarios based on three layers:
 - ❖ A EU climate policy layer:



Source: NEMESIS model



COVID19 pandemic and the EU Green Deal

- ❖ Scenarios based on three layers:
 - ❖ A EU behavioural change layer:

<i>Transformation</i>	<i>Modelling interpretation</i>
Behaviour changes due to environmental concerns.	<ul style="list-style-type: none"> • Remote working: change is modelled by projecting 2% higher energy demand in the residential sector and the counter effect of 6% less private car commutes in the transportation sector. The percentage of workforce considered is 25% and the share of commutes to work is considered as the 40% of total passenger journeys for 3 days per week. The increase in energy demand of the residential sector is calculated as one third of the decrease in the transport sector. The same increase is accounted to electric consumption and to space heating demand [1]. The effect on the tertiary sector is not modelled in this work due to lack of estimates in literature to date. • Environmental concern and increase of prices in aviation sector: change is modelled by projecting 34% lower demand in the aviation sector in 2030.
Behaviour changes due to COVID-19 pandemic	<ul style="list-style-type: none"> • Remote working: change is modelled by projecting 3.3% higher energy demand in the residential sector and the counter effect of 10% less private car commutes in the transportation sector. The percentage of workforce considered is 40% and the share of commutes to work is considered as the 40% of total passenger journeys for 5 days per week. The increase in energy demand of the residential sector is calculated as one third of the decrease in the transport sector. The same increase is accounted to electric consumption and to space heating demand [1]. The effect on the tertiary sector is not modelled in this work due to lack of estimates in literature to date. • Teleconferences: change is modelled by projecting additional 10% lower energy demand in the aviation sector in 2030 compared to the reduction due to environmental concern.

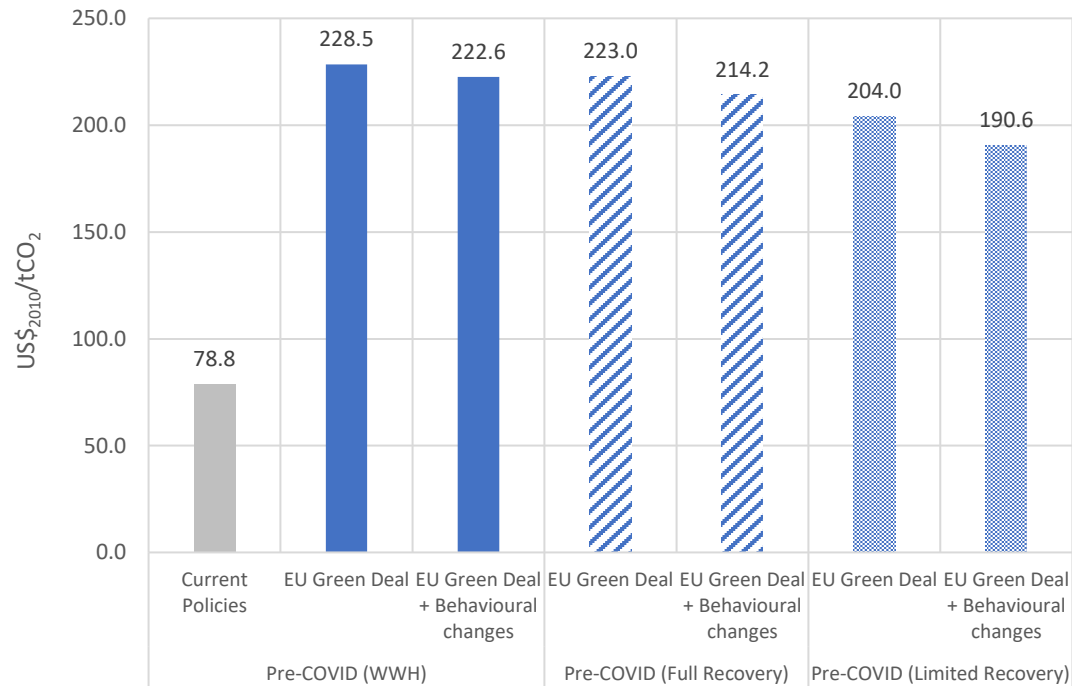
^[1] Estimates of behaviour changes from [1] are derived from NZE scenario

^[2] Estimates of behaviour changes from [1] are derived from NZE scenario



COVID19 pandemic and the EU Green Deal

❖ The carbon prices



Source: NEMESIS model



How to implement the -55% in 2030 in EU?

- ❖ Enlarging the EU-ETS sector?
 - ❖ *Extention to the Transport and/or the Buildings sectors*

- ❖ *Implement a common taxation in EU on the ESR sectors*
 - ❖ *Problem of unanimity*
 - ❖ *What about the use of the taxation revenues*

- ❖ *What about the national burden sharing of ESR sector?*

- ❖ *How should EU designed its Carbon Border Adjustment*
 - ❖ *Pricing: Link with EU-ETS or a specific carbon tax*
 - ❖ *Which sectors: EU-ETS or Energy Intensive and Trade Exposed sectors (cement, steel, etc...)*
 - ❖ *Which regions: all, excluding developing countries or based on environmental considerations*
 - ❖ *Etc..*



Thank You

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