FRANCE

Country Factsheet: 1.5°C Pathways for Europe

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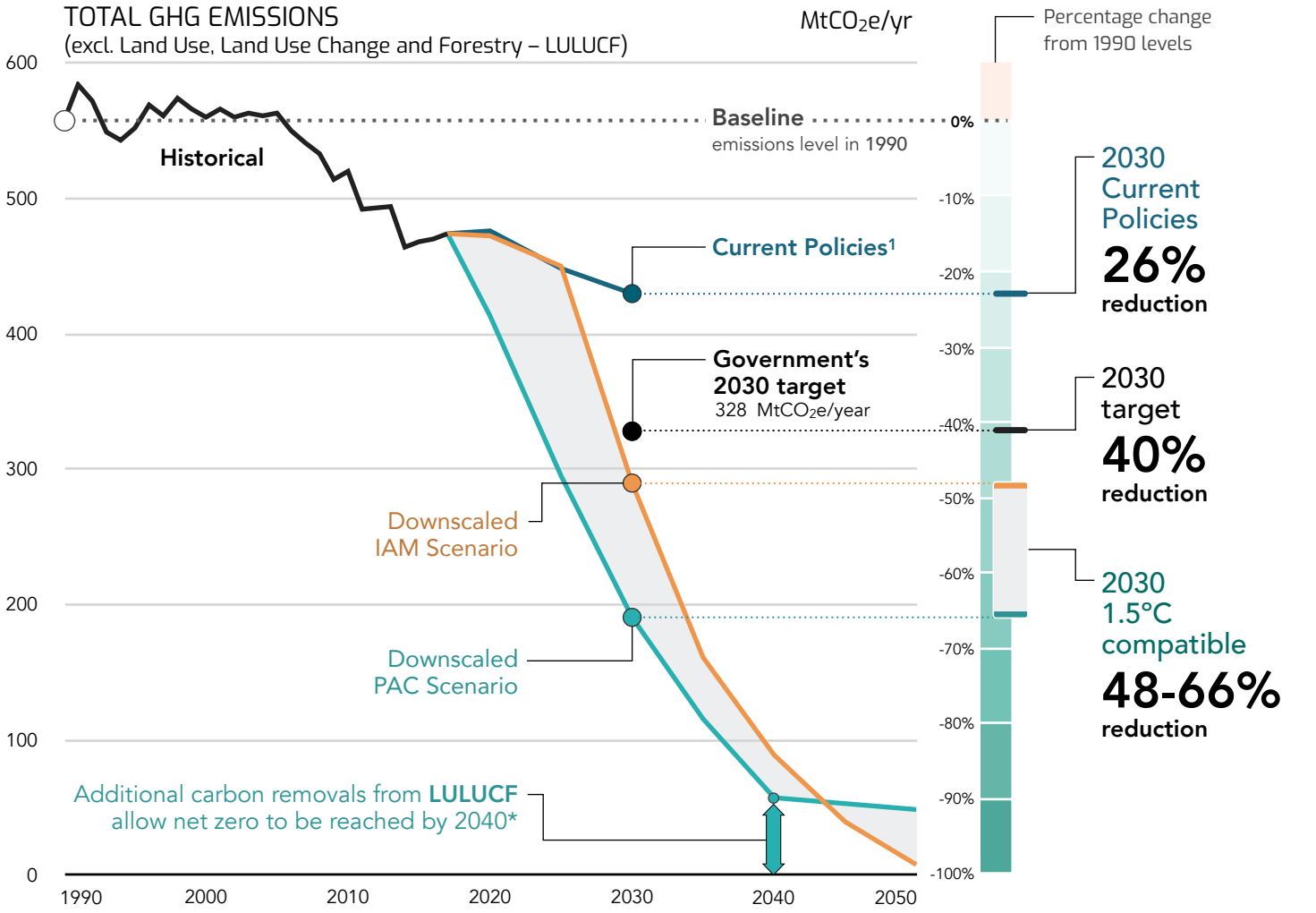
France's current 2030 emissions target is not 1.5°C compatible



*To achieve the net zero emission target, emissions from LULUCF need to be reduced while increasing the capacity of forests, wetlands, grasslands and farmlands to remove carbon. These carbon removals are not equal to emissions in other sectors and the two cannot simply be considered fungible.

France's current policies will fail to achieve its insufficient 2030 target

France's current suite of climate policies will fail to achieve its insufficient 2030 target, reflecting the **need for greater urgency across all sectors of the economy and a more ambitious target that guides such action.**[1] An emissions reduction target of 48-66% below 1990 levels (excluding LULUCF) would align with the range created by the two downscaled 1.5°C emissions pathways.† To ensure France is contributing its fair share to global climate mitigation efforts, additional emission reduction activities should be supported in less wealthy countries.[2]

† **Scope and limitations of downscaled emissions and energy mix pathways:**

- Pathways were downscaled using the SIAMESE model developed by Climate Analytics. See 1.5°C Pathways for Europe Report[3] for details
- Land use, land use change and forestry (LULUCF), and international aviation and shipping emissions are not covered by this assessment
- Detailed macro-economic modelling was not conducted as part of this assessment
- Historical and future energy imports and exports were not considered

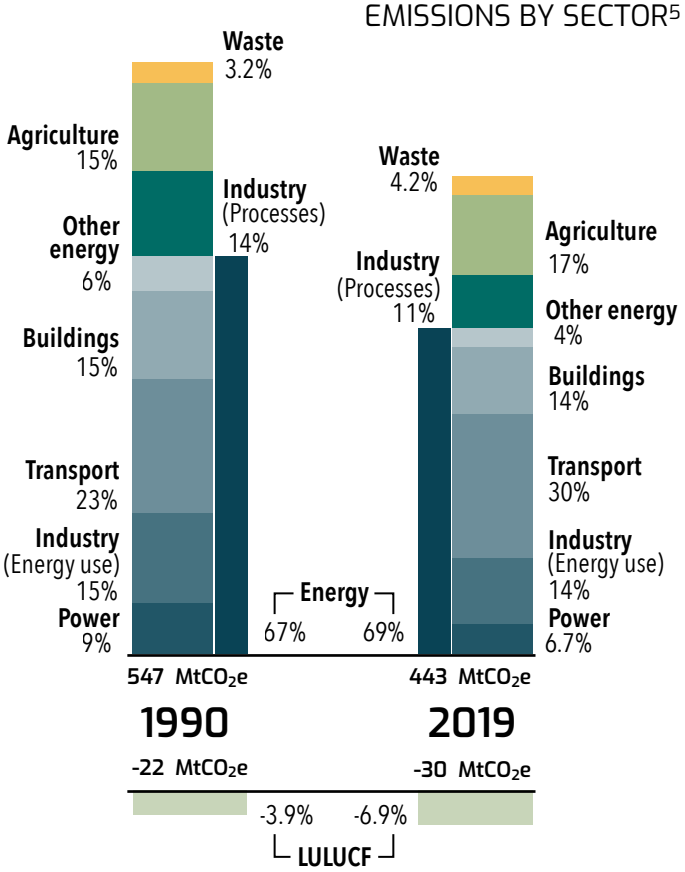
CURRENT SITUATION
Snapshot of France's emissions and energy system

Emissions profile

In France, the transport (29%) and industry (21%) sectors are the largest contributors to overall emissions, while buildings emissions made up 18% in 2018.[4] While emissions in most sectors have been declining in recent years, transport emissions remain stubbornly high, and only marginally below their 2004 peak. In contrast, industry emissions have fallen by almost 40% since their peak in 1991.

Agricultural GHG emissions also remain stubbornly high, of which almost half are methane emissions resulting from digestive processes of ruminant animals (enteric fermentation). Nitrous oxide emissions from cultivated soils made up the bulk of the remaining agricultural emissions in 2019. Currently, France's emissions are not aligned to meet their economy wide target of 40% below 1990 level.[1]

FRANCE
EMISSIONS BY SECTOR[5]



Energy overview and main policy gaps

Nuclear and oil account for almost 80% of the country's total energy supply, with nuclear power generating a majority of electricity and the transport sector consuming most of the oil.[6] The buildings sector followed by industry consumes a majority of electricity and natural gas supply. Increased district heating and cooling from renewable energy sources is targeted to reduce natural gas consumption in the building sector.[1] The French government has a target to reduce nuclear power generation to a 50% share by 2035, meaning it will need to replace this zero-emission power source with renewables to ensure power sector emissions do not rise. A 2022 coal phase out target is in place, meaning no new coal-fired power stations will be authorised. Focus now should turn to phasing out the remaining natural gas consumption.

Civil Society & Global Integrated Assessment Models
1.5°C energy and climate scenarios for Europe

The aim of the 1.5°C Pathways for Europe Project is to derive Paris Agreement compatible emissions and energy mix pathways for key European countries. The project seeks to highlight existing scenarios that demonstrate that **very high levels of ambition on climate and energy policy *is possible* for the European Union.** To reflect the varied methodologies employed to construct such scenarios, we assess the Paris Agreement Compatible (PAC) energy scenario, and a scenario from the global REMIND integrated assessment model (IAM), both embodying high levels of 2030 climate ambition in the European Union region. We use the SIAMESE model developed by Climate Analytics to create country level pathways, using the PAC/REMIND scenario results for the European Union as input and downscaling them based on demographic, economic, energy system, and policy heterogeneity between countries.[7] We outline key differences between the two scenarios used as input for the SIAMESE downscaling process below.

PAC [8]
Paris Agreement Compatible Energy Scenario

The PAC scenario for the EU28 was developed through a bottom-up collective research exercise involving energy and climate experts and incorporating findings from relevant scientific literature.

Around 150 stakeholders from member organisations of the European Environmental Bureau (EEB) and Climate Action Network (CAN) Europe, and from science and industry were involved in the scenario building process.

The PAC scenario is an attempt to construct a European-wide energy scenario which is aligned with the Paris Agreement's objective to limit global warming to 1.5°C and which embodies the demands of civil society.

In doing this it suggests a trajectory with:

- **100%** renewable energy supply by 2040
- **At least 65% GHG** emissions reduction below 1990 levels by 2030
- Net zero emissions by **2040**

Carbon Capture and Storage (CCS):

A key assumption underpinning the PAC scenario is that carbon capture and storage **will not be required** to achieve net zero emissions for the European Union.

Global IAM [9,10]
An integrated scenario reaching 1.5°C

We assess the global REMIND 1.7 CEMICS-1.5-CDR8 scenario as an additional line of evidence for pathways for the European Union to achieve the 1.5°C long-term temperature goal of the Paris Agreement. REMIND is a global energy-economy-climate model that maximises inter-temporal welfare. It contains macro-economic, energy system, and climate modules that are integrated to attain exogenously prescribed climate targets.[11]

Population and GDP growth are key drivers of future energy demand and, thus, GHG emissions in IAMs. In our SIAMESE-based downscaling approach, we therefore take growth rates from the shared socio-economic pathway (SSP) scenarios, specifically SSP2, a middle of the road scenario, in order to assess what the EU-region results of this scenario imply for country-specific energy system transformation.

Key outputs for the EU region from this scenario are:

- **90%** renewable energy supply by 2040
- **62% GHG** emissions reduction below 1990 levels by 2030 (excl. LULUCF)
- Net zero emissions between **2045-2050**

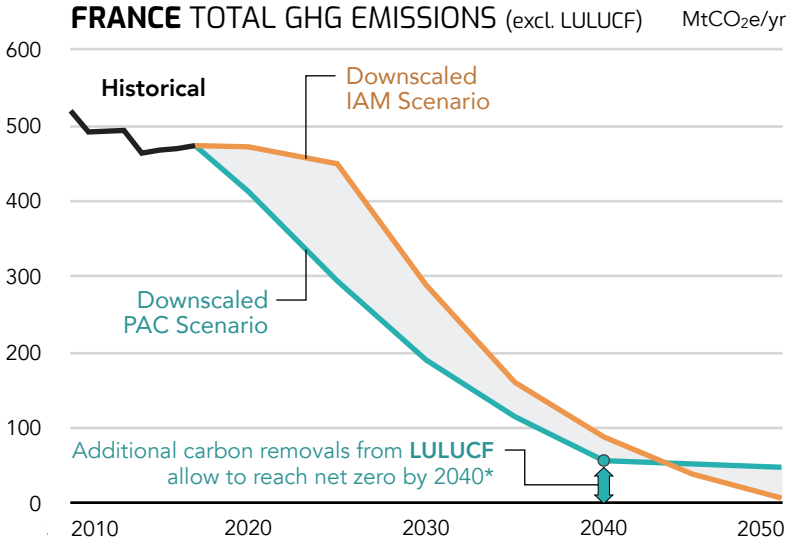
Carbon Capture and Storage (CCS):

This IAM scenario envisages some **natural gas and biomass** combustion with carbon capture and storage.

Economy-Wide 1.5°C Pathways

According to the analysis undertaken in this project, achieving a 1.5°C compatible economy for France requires a 48-66% reduction in total GHG emissions (excl. LULUCF) by 2030 and reaching net zero emissions between 2040 and 2050.

There are numerous different pathways to reaching net zero emissions in this timeframe. In the scenarios downscaled, a LULUCF sink of 8-49 $MtCO_2e$ would achieve net zero by 2050, while under the PAC scenario, a LULUCF sink of 57 $MtCO_2e$ would achieve net zero emissions in 2040. A LULUCF sink for France of up to 75 MtCO2e has been derived in recently published literature.[12]



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1.5°C Compatible 2030 primary energy mix*

	2017[6]	2030
Renewables incl. biomass	10%	**36–44%** PAC IAM
Fossil Fuels	48%	**30–42%** PAC IAM
Nuclear	42%	**13-34%**

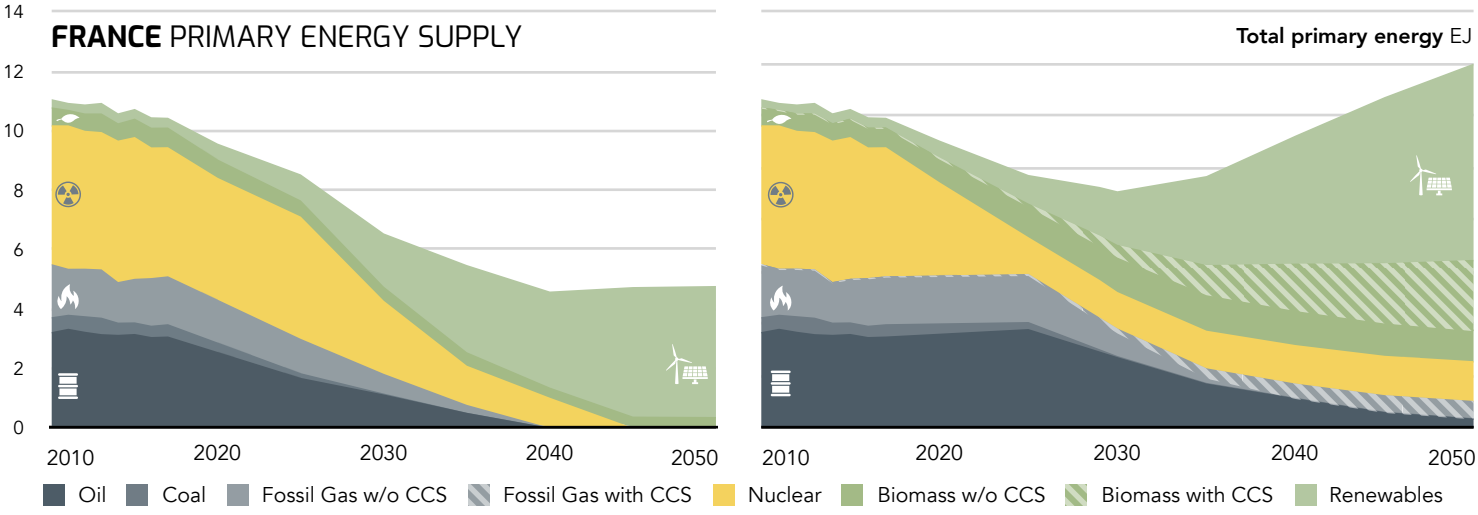
In the downscaled PAC and IAM pathways, the share of unabated fossil fuels in primary energy demand should be reduced to between 30-42% by 2030, whereas the share of renewables should climb to between 36-44% by the same date.

The transport and building sectors constitute a combined 47% of total GHG emissions in France, illustrating the need for strong policies to reduce the oil and natural gas demand that produce these sectoral emissions.[5]

*Primary energy supply includes losses that occur during the conversion of nuclear and fossil fuels to electricity, resulting in a higher proportion of both nuclear and fossil fuels than in total final energy demand

Downscaled PAC Scenario

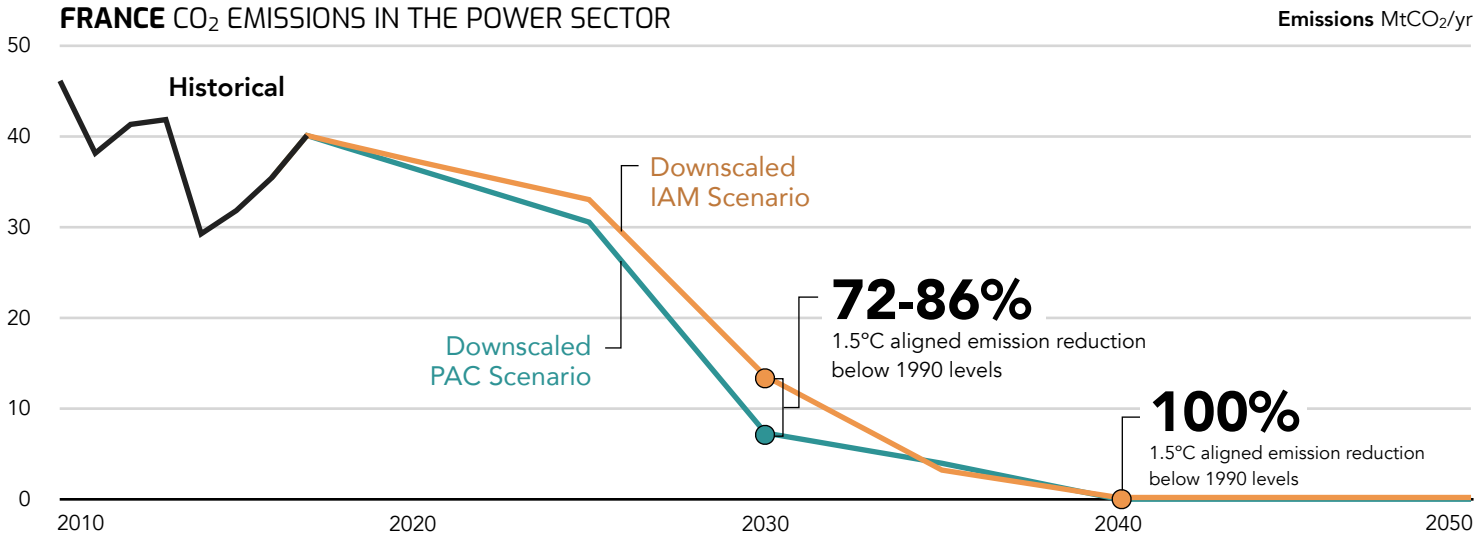
Downscaled IAM Scenario



The PAC scenario depicts a future where total energy use rapidly declines through efficiency gains, largely from switching fossil fuel consumption to renewables, increased rates of material reuse and recycling, and consumer demand reduction.

The IAM scenario also achieves efficiency gains, but assumes energy demand continues to rise over time in line with historical regional growth trends. The large increase in national total primary energy supply reflects the overall increase in the modelled Europe-wide scenario results.

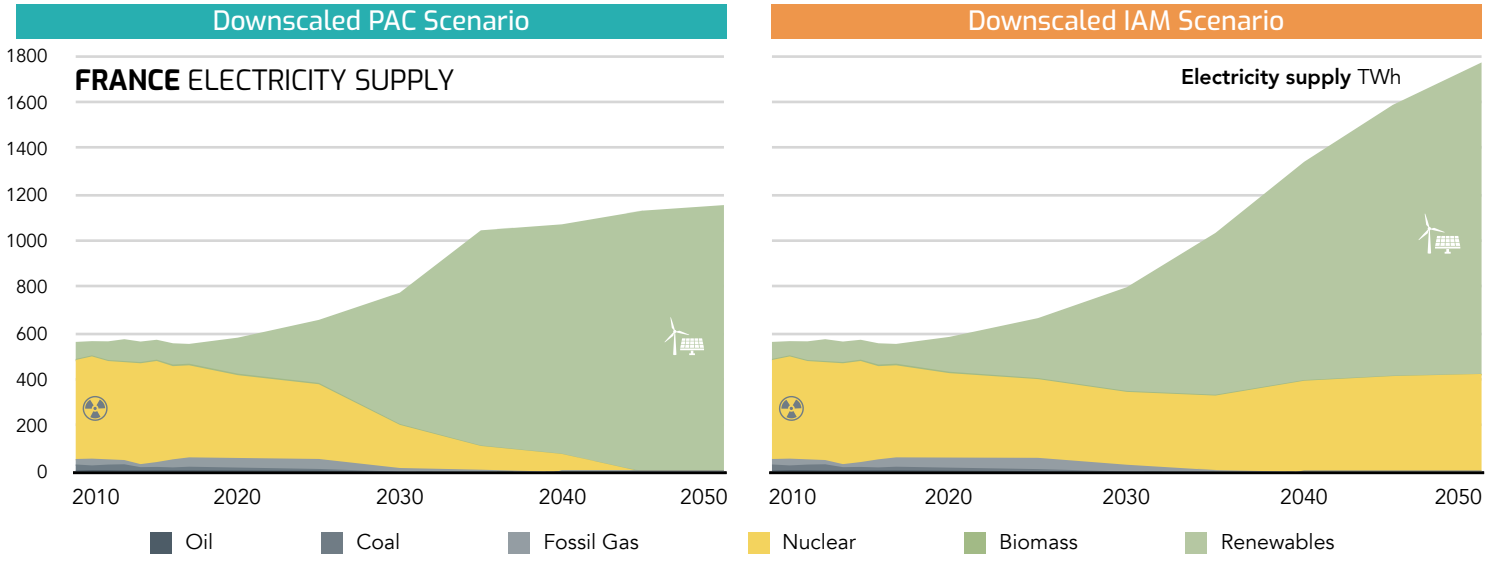
Sectoral decarbonisation: Power



1.5°C Compatible 2030 power sector fuel mix*

	Renewables incl. biomass	Coal	Fossil gas	Nuclear
2017 [6]	17%	3%	7%	72%
2030	57–74% IAM PAC	0%	2–4% PAC IAM	24–39% PAC IAM

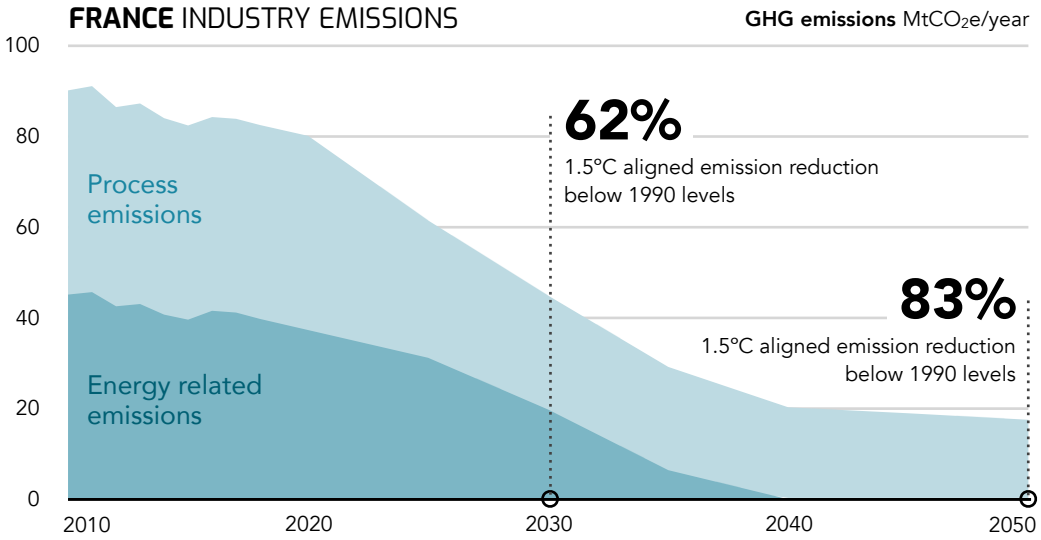
*No detailed wholesale electricity market modelling was undertaken for this assessment



Towards a fully decarbonised power sector

In order for France's power sector to be aligned with the 1.5°C compatible pathways downscaled in this project, the remaining natural gas consumption should be reduced over time to be phased out around 2035, and no new plants should be constructed. With a large uptick in total electricity demand projected due to widespread electrification throughout the economy, a steep increase in renewable energy capacity is required over the next two decades. The PAC scenario demonstrates that the French power sector can be decarbonised while also phasing out nuclear. Recently published literature also supports this finding.[12]

Sectoral decarbonisation: Industry



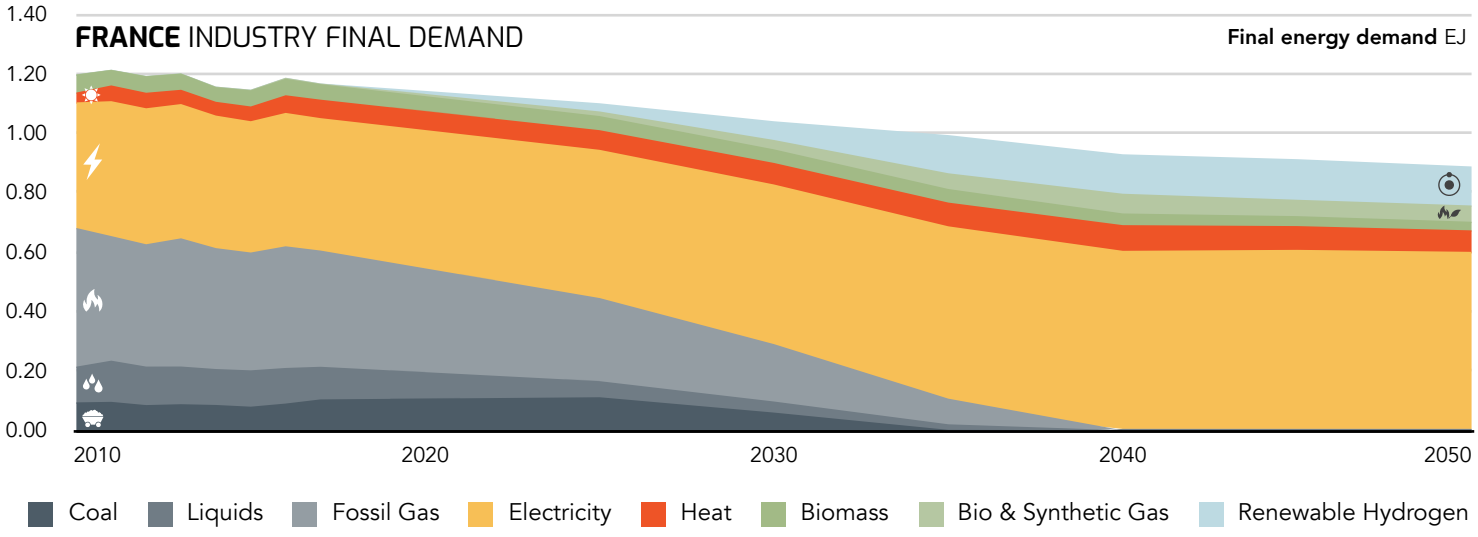
Emissions from industry decline significantly until 2040 in the pathway downscaled from the PAC scenario, whereby energy- related emissions reach zero, and further reductions occur more gradually. This is due to the nature of these residual (process) emissions that are harder to mitigate than those from fuel combustion.

It was not possible to downscale the chosen IAM scenario due to a misalignment of scenario and historical energy data.

1.5°C Compatible 2030 industry sector final energy mix

	Electricity	Coal	Fossil gas	Renewable Hydrogen
2017 [6]	38%	9%	34%	0%
2030	**52%**	**6%**	**21%**	**6%**

Downscaled PAC Scenario



Towards a fully decarbonised industry sector

While some French industries are already far more efficient than the G20 average, including cement and steel production, considerable coal and natural gas demand remains.[13] To align with the 1.5°C compatible pathway downscaled from the PAC scenario, the use of these fuels in the French industry sector would need to decline steadily, with coal and fossil gas consumption phased out by 2035. The PAC scenario envisages significant energy savings through material reuse and recycling.

Closing the Ambition Gap

Key characteristics of France's 1.5°C compatible pathways

	Historical	1.5°C compatible benchmarks		Country targets	
	2017	2030	2050	2030	2050 incl. LULUCF*
Total GHG excl. LULUCF	474 $MtCO_2e/yr$	191–290 $MtCO_2e/yr$	8–49 $MtCO_2e/yr$	328 $MtCO_2e/yr$	0 $MtCO_2e/yr$
	15 % below 1990	48–66 % below 1990	92–99 % below 1990	40 % below 1990	100 % below 1990
Emissions intensity of power generation**	72 gCO_2/kWh	9-17 gCO_2/kWh	0 gCO_2/kWh		
Share of renewable power	17 %	59–76 %	81–100 %	40 %	
Share of unabated fossil fuel in power	11 %	2–4 %	0 %		
Share of nuclear power	72 %	22–37 %	0–19 %		
Industry electrification rate	38 %	52 %	68 %		

* 2050 target is shown including LULUCF emissions due to the absence of government projections for these emissions to 2050
** Does not include upstream emissions

Raising Ambition

France's current 2030 target falls short of the 1.5°C compatible range of 48-66% below 1990 levels (excl. LULUCF) created by the two downscaled pathways. Ratcheting up its target to fall within this range and align with its net zero 2050 target should be a priority, as a strong 2030 target is just as critical as reaching net zero emissions in a timely fashion. Reaching net zero emissions by 2040 as depicted by the PAC scenario will require a rapid decarbonisation across all sectors including those outside of this analysis such as transport and buildings, and the achievement of a significant LULUCF emissions sink.

Other modelling results

Association NegaWatt: NegaWatt Scenario[12]

- 100% RES by 2050 is possible - nuclear phase out by 2035
- Net Zero emissions in 2050 with LULUCF sink
- LULUCF sink of up to 75MtCO2e in 2050 implies net zero emissions in PAC and REMIND scenarios well before 2050

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About the author

Supporting science-based policy to prevent dangerous climate change, enabling sustainable development.

Climate Analytics is a non-profit climate science and policy institute based in Berlin, Germany with offices in New York, USA, Lomé, Togo and Perth, Australia, which brings together interdisciplinary expertise in the scientific and policy aspects of climate change. Our mission is to synthesise and advance scientific knowledge in the area of climate change.

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