ITALY

Country Factsheet: 1.5°C Pathways for Europe

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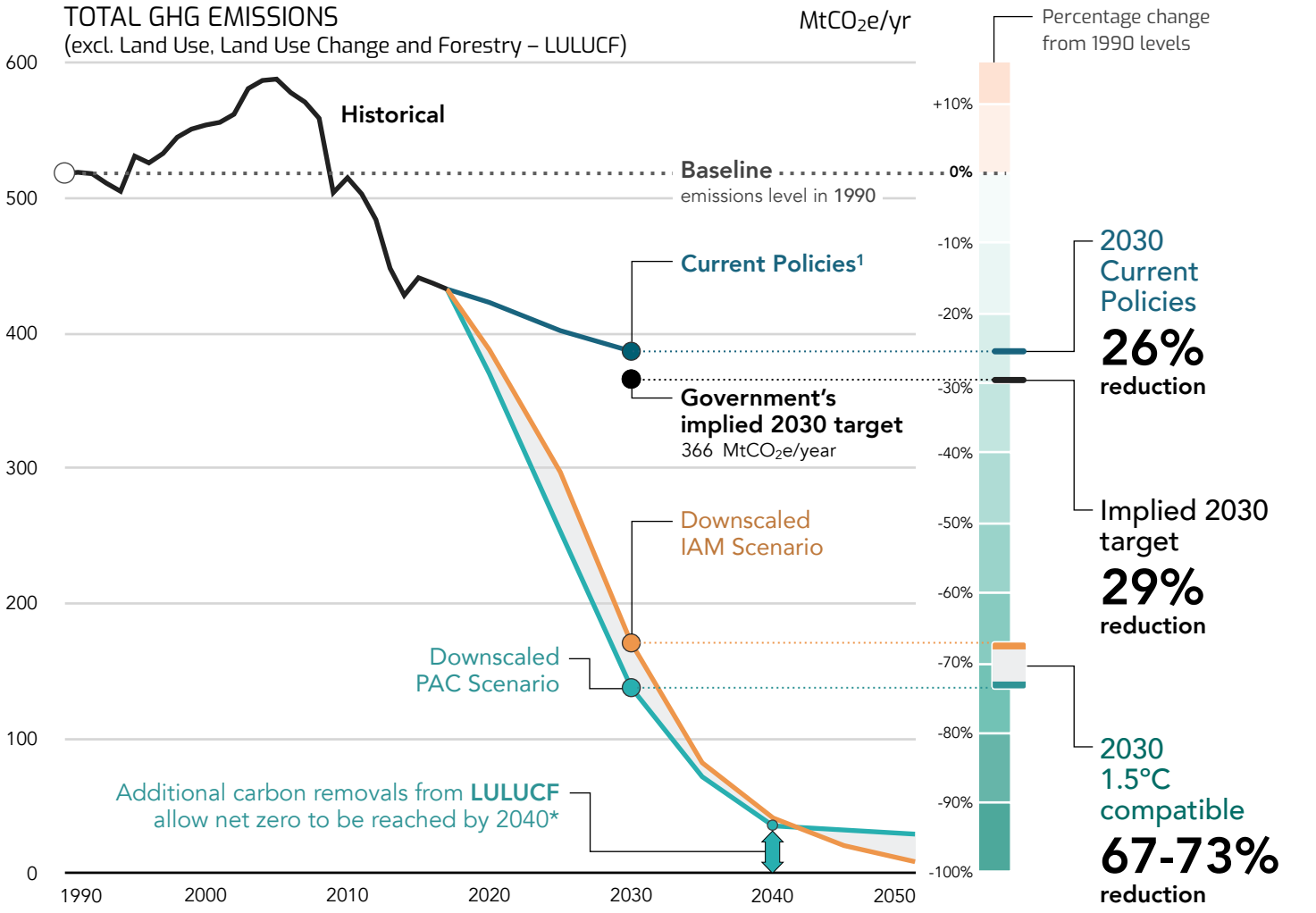
Italy's current 2030 emissions target is not 1.5°C compatible



*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.

Italy is not on track to reduce emissions and reach its modest 2030 target

Italy is currently not on track to achieve its modest 2030 emissions reduction targets; under current policies, **total Italian GHG emissions are expected to fall to only 26% below 1990 levels.**[1] Italy has no explicit economy-wide reduction target, but by combining its targets addressing its emissions covered by the EU ETS and non-ETS-related emissions, a 2030 target of 29% below 1990 levels can be derived. This is less than half as ambitious as the downscaled 1.5°C compatible emissions pathways suggest, which would be a range of 67-73% below 1990 levels (excl. LULUCF).† To ensure Italy is contributing its fair share to global climate mitigation efforts, additional emission reduction activities should also be supported in developing 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

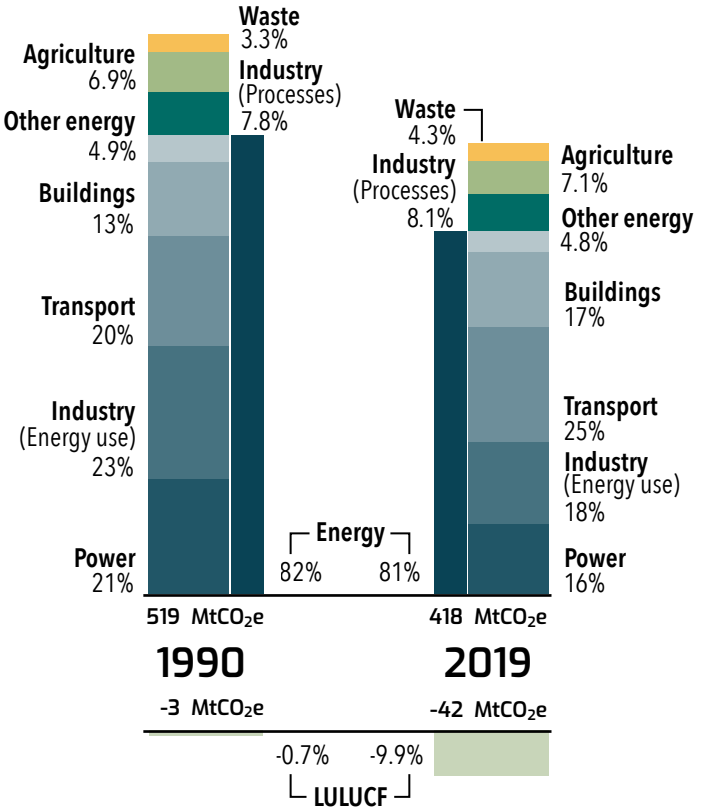
CURRENT SITUATION
Snapshot of Italy's emissions and energy system

Emissions profile

Italy's emissions peaked in 2005, well above 1990 levels, and then began to decline rapidly after 2008 due to the global financial crisis and an associated economic slowdown.[4] Under current policies, however, the projected decline in emissions over this decade is far more gradual, with 2030 emissions projected to be just 8% lower than 2019 levels.[1] Since their peak in 2004, power sector emissions have fallen five percentage points from a 21% share of total emissions, to 15% in 2019, primarily due to a steep reduction in the use of oil and coal.

Conversely, transport and buildings emissions have fallen more slowly (both -18%) than those in the power sector (-40%) between 2005 and 2019. The transport sector is the only sector with higher emissions in 2019 than in 1990. Emissions in the industry sector fell 42% between 2005 and 2019, mirroring a similar drop in energy demand that is a result of a decline in industrial capacity.[5]

ITALY
EMISSIONS BY SECTOR[6]



Energy overview and main policy gaps

Italy has achieved a steep reduction in total coal demand in recent years, reaching 71% below 2005 levels in 2019 while total energy use fell just 26% over the same period.[5] A 2025 coal phase out policy has been in place since 2017, which is aligned with the 1.5°C temperature goal.[1] Oil demand fell more rapidly than the overall drop in energy use between 2005 and 2019, primarily due to a decline in the industry sector and its use in the power sector being phased out.[5] Natural gas consumption fell just 13% over this time. Policies to rapidly reduce oil and gas consumption further are needed in particular for the transport and buildings sector respectively. Italy has very significant solar resources that it is seeking to tap with its 55% 2030 renewable generation target. There is as yet, no policy to phase out natural gas consumption in the Italian economy.

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 a **very high level 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**

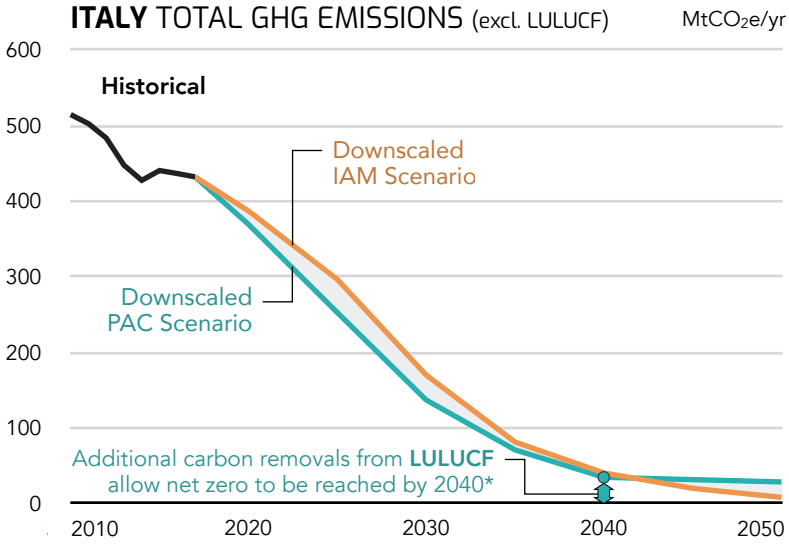
Carbon Capture and Storage (CCS):

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 Italy requires a 67-73% reduction in total GHG emissions below 1990 levels by 2030 (excl. LULUCF), 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 analysed, a LULUCF sink of 9-29 $MtCO_2e$ would achieve net zero by 2050, while under the PAC scenario, a LULUCF sink of 35 $MtCO_2e$ would achieve net zero emissions in 2040. This is roughly the size of Italy's current LULUCF sink.[6]



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1.5°C Compatible 2030 primary energy mix*

	2017[5]	2030
Renewables incl. biomass	18%	**57–63%** IAM PAC
Fossil Fuels	82%	**37–43%** PAC IAM
Nuclear	0%	**0%**

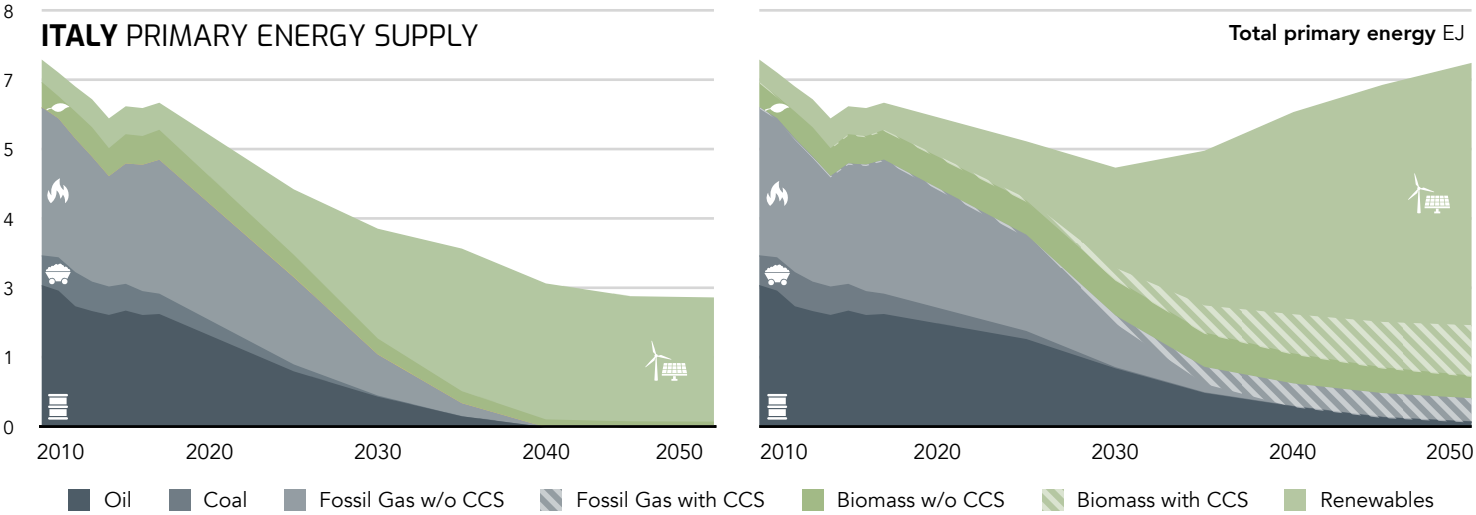
In the downscaled PAC and IAM pathways the share of unabated fossil fuels in primary energy demand is be reduced to between 37-43% by 2030, whereas the share of renewables including biomass reach between 57-63% by the same date.

The transport and building sectors constitute a combined 39% of total GHG emissions in Italy (2019), illustrating the need for strong policies to reduce the oil and natural gas demand that produce these sectoral emissions.[6]

*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

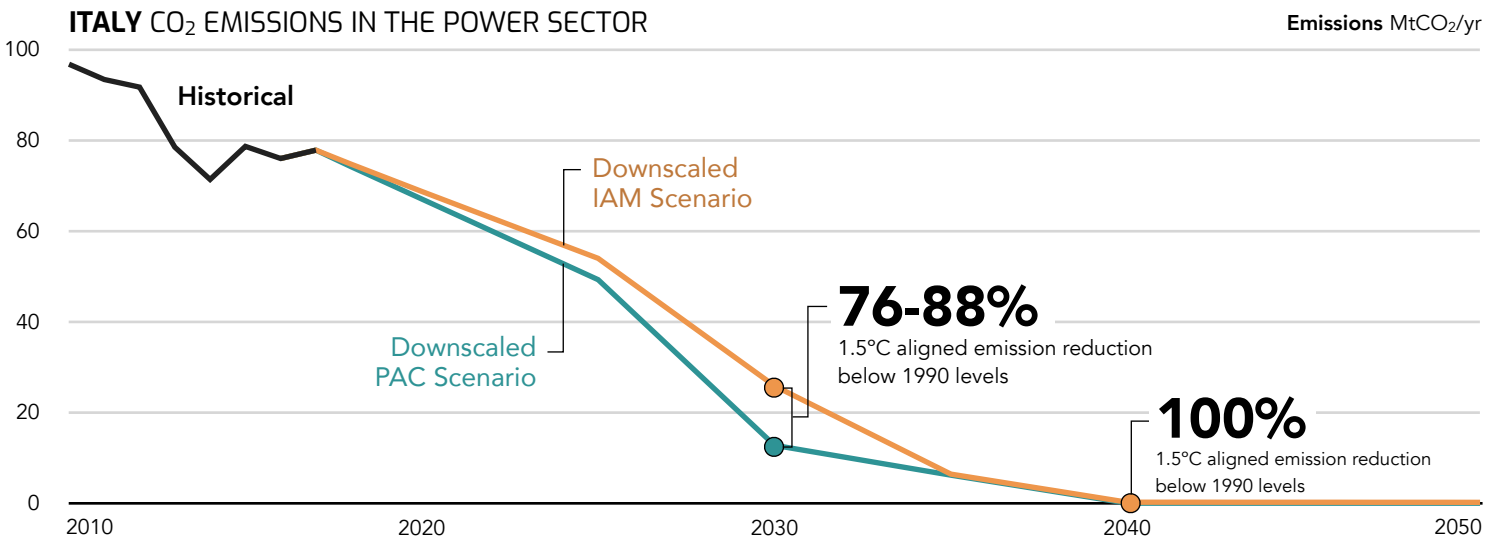
Downscaled IAM Scenario



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 growth trends. The large increase in national total primary energy supply reflects the overall increase in the modelled Europe-wide scenario results.

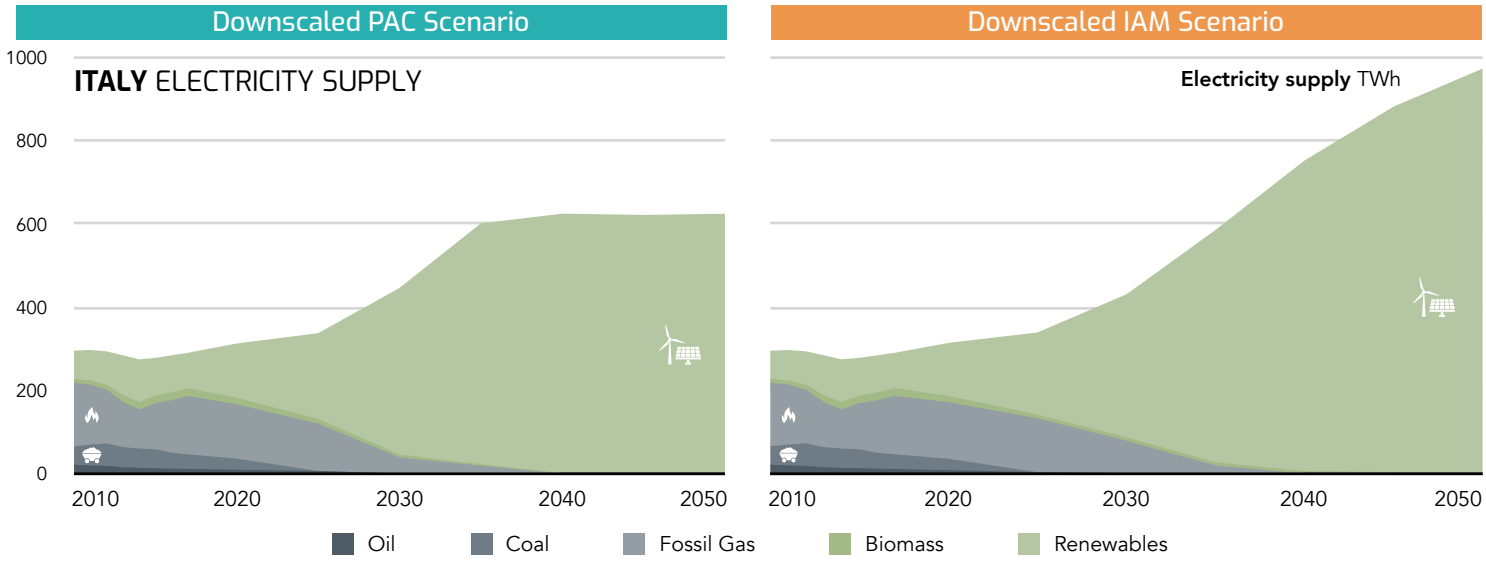
Sectoral decarbonisation: Power



1.5°C Compatible 2030 power sector fuel mix*

	Renewables incl. biomass	Coal	Fossil gas	Nuclear
2017 [5]	36%	12%	48%	0%
2030	82–91% IAM PAC	0%	9–18% PAC IAM	0%

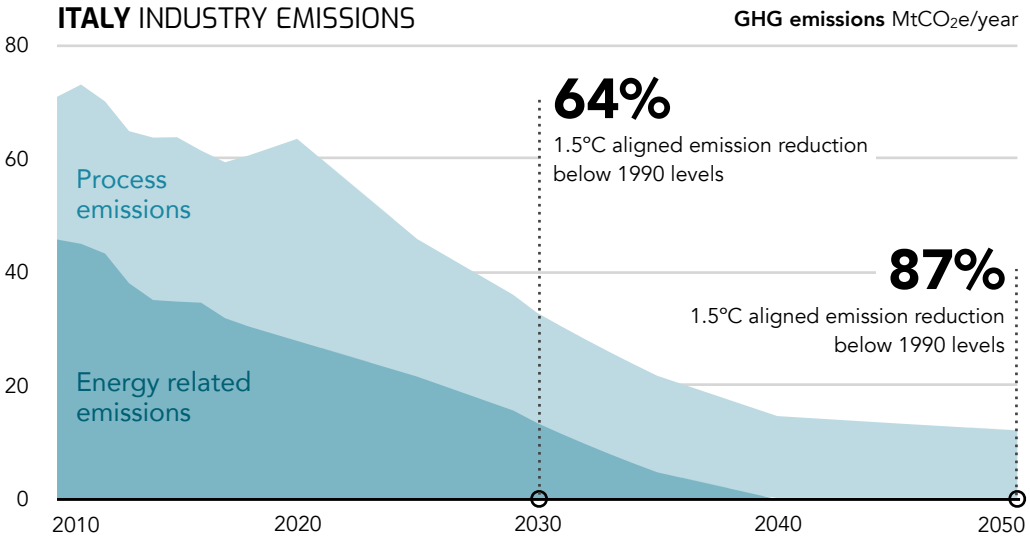
*No detailed wholesale electricity market modelling was undertaken for this assessment



Towards a fully decarbonised power sector

Following Italy's decision to phase out coal use by 2025, a natural gas phase out date of between 2035 and 2040 is needed to ensure the power sector is aligned with the 1.5°C compatible downscaled pathways. Steep increases in renewable energy generation will be needed, beyond the 55% renewable power generation target for 2030, and beyond even the 70-72% renewable power generation target suggested by the Italian Minister for the Ecological Transition in 2021 that would be needed to meet the EU's new emission reduction target of 55% by 2030.

Sectoral decarbonisation: Industry



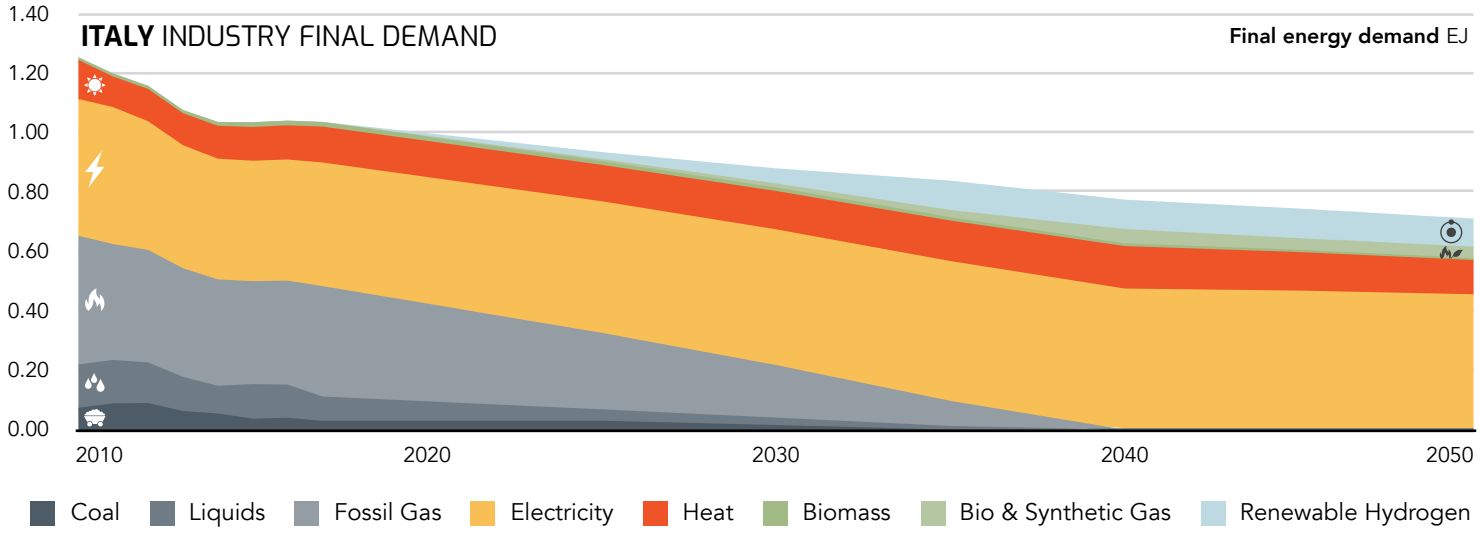
Emissions from industry decline significantly until 2040 in the pathway downscaled from the PAC scenario, whereby energy-related emissions reach zero and further reductions occur more gradually. This is due to the nature of these residual (process) emissions that are harder to mitigate than those from 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 [5]	40%	3%	36%	0%
2030	**52%**	**2%**	**22%**	**6%**

Downscaled PAC Scenario



Towards a fully decarbonised industry sector

Coal use in Italian industry fell twice as much as total industrial energy demand between 2005 and 2019, outpacing the sector's decline.[5] In 2019, coal made up just 3% of total energy demand, down from 10% in 1990. Oil demand in industry also fell dramatically over recent years, making up just 7% of total demand in 2019, compared with 24% in 1990. The remaining coal demand must be mostly phased out by 2030, with oil mostly eliminated by 2035 to align with the 1.5°C compatible trajectory downscaled from the PAC scenario. Natural gas consumption, which has mostly maintained its share in energy demand, must be eliminated by 2040 and begin to decline immediately.

Closing the Ambition Gap

Key characteristics of Italy's 1.5°C compatible pathways

	Historical	1.5°C compatible benchmarks		Country targets	
	2017	2030	2050	2030 (implied)	2050
Total GHG excl. LULUCF	433 $MtCO_2e/yr$	138–171 $MtCO_2e/yr$	9–29 $MtCO_2e/yr$	366 $MtCO_2e/yr$	
	16 % below 1990	67–73 % below 1990	94–98 % below 1990	29 % below 1990	
Emissions intensity of power generation*	268 gCO_2/kWh	29-60 gCO_2/kWh	0 gCO_2/kWh		
Share of renewable power	36 %	82–91 %	100 %	55 %	
Share of unabated fossil fuel in power	64 %	9–18 %	0 %		
Share of nuclear power	0 %	0 %	0 %		
Industry electrification rate	40 %	52 %	64 %		

* Does not include upstream emissions

Raising Ambition

Italy's current 2030 targets combined fall far short of the 1.5°C compatible range of 67-73% below 1990 levels (excl. LULUCF) suggested by the downscaled emissions pathways. Setting 2030 and 2050 economy-wide emissions targets that fall within this range should be a priority, as should raising its 2030 renewable power generation target to at least 82%. Reaching net zero emissions in 2050 will require a rapid decarbonisation across all sectors including transport and buildings, sectors to this date that have underperformed with regards to emissions reductions, and which are not covered by this analysis.

Other modelling results

University of Technology Sydney: 100% renewable energy - An energy revolution for Italy (ADV scenario)[12]

- 75% renewable energy generation by 2030, 100% by 2040
- 33% renewable share of primary energy by 2030, 96% by 2050

ESta: The Green Deal pays off. Benefits for economy and work in Italy by 2030[13]

- 100% renewable final energy consumption by 2050

Elemens: Decarbonisation Roadmap Italy 2030 (Legambiente Scenario)[14]

- 55% GHG emissions reduction by 2030, 95% by 2050
- 63% renewable share of electricity production by 2030
- 38% electrification of manufacturing by 2030, 65% by 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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