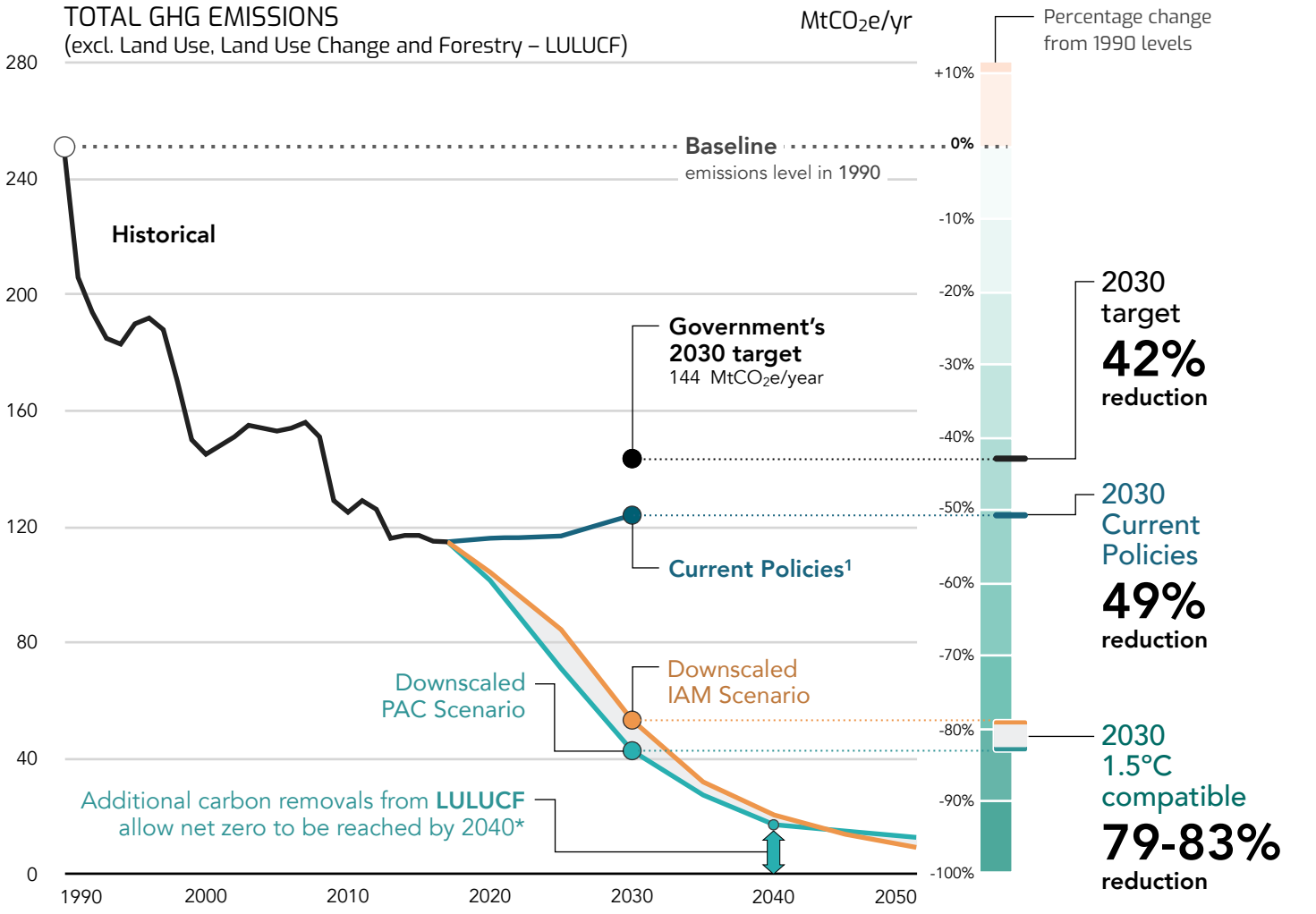
# ROMANIA

Country Factsheet: 1.5°C Pathways for Europe

EU DE DK ES FR IT PL PT **RO** SE

## Romania'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.

## Romania's 2030 target reflects higher emissions than under current policies

Romania's current 2030 emissions target fails to align with the 1.5°C compatible emissions range created by the two downscaled scenarios in this project of between 79-83% below 1990 levels (excl. LULUCF).† The current target reflects a higher emissions level than is projected under current policies, demonstrating that **there is significant scope for setting a more ambitious target, and implementing more stringent policies to achieve deeper emissions cuts.**[1]

Both the current target and projected 2030 emissions under current policies are above present emissions levels; implementing a target and policies that leads to rapidly falling emissions should be a priority for Romania.

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

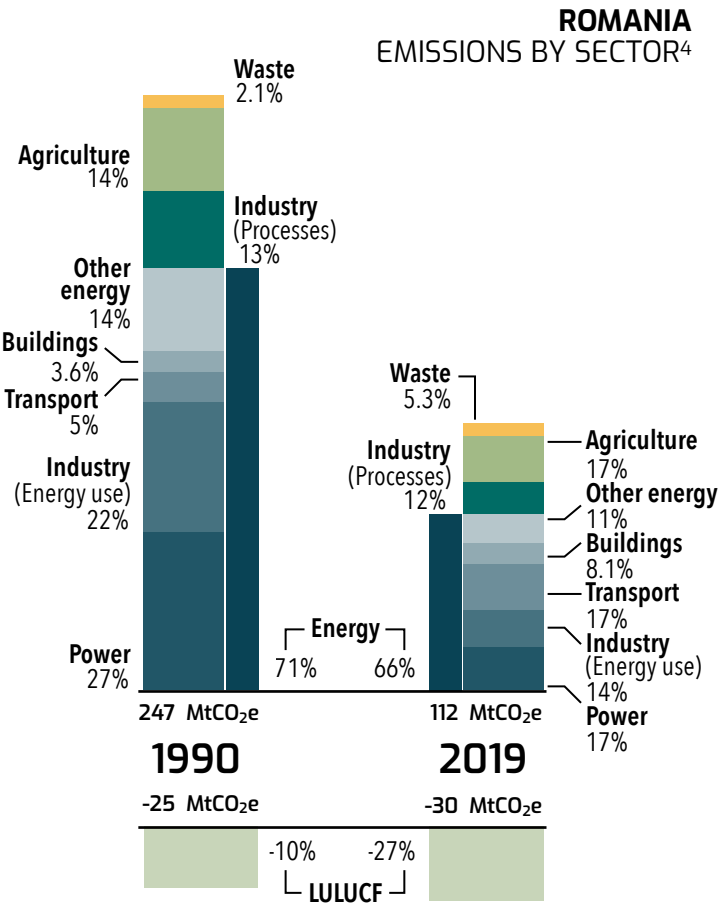
- Pathways were downscaled using the SIAMESE model developed by Climate Analytics. See 1.5°C Pathways for Europe Report[2] for details
- Land use, land use change and forestry (LULUCF), and international aviation and shipping emissions are not covered by this assessment
- Detailed macro-economic modelling was not conducted as part of this assessment
- Historical and future energy imports and exports were not considered

# CURRENT SITUATION
## Snapshot of Romania's emissions and energy system

## Emissions profile

Romania's emissions fell precipitously due to a structural change to Romania's economy beginning in the late 1980s and the subsequent decline in emissions-intensive heavy industry, experiencing a 42% decline in total emissions (excl. LULUCF) over just four years between 1989-1993.[3] Emissions have continued to fall since, reaching 64% below their 1989 peak by 2019 (55% below 1990 levels).

Since the more commonly used reference year of 1990, the industry and the power sectors have seen steep emissions reductions to 2019; 68% and 72% respectively. In contrast, buildings emissions were roughly at 1990 levels, while transport emissions (17% of total) have risen by 67%, outpacing a 55% increase in fuel combustion.[4] This is primarily due to a switch from gasoline to diesel fuel in road transportation, with demand for the latter increasing 244%, while gasoline consumption fell 41%.




## Energy overview and main policy gaps

Total energy demand in Romania was 47% lower in 2019 than in 1990, with especially steep declines seen in coal and natural gas demand (both -68%).[4] This was partially displaced by the introduction of nuclear power, which in 2019 made up 9% of total supply, while supply from renewable sources, particularly biomass (+573%), increased substantially, to make up 18% compared to just 3% in 1990. The decline of Romania's industry sector, which saw a 74% reduction in energy demand, is the primary cause of the overall drop in natural gas consumption, as it fell 87% in industry 1990-2019. Declining gas demand also occurred in the power sector over this time (-60%), while oil use has almost been phased out by 2019 after being 18% of supply in 1990. The recent closure of Romania's largest coal plant puts it well on the path to its announced 2032 coal phase out, but this is two years late to be considered 1.5°C compatible according to the downscaled emissions pathways. Steep increases in wind and solar generation from almost nothing in 2010 to 14% of supply in 2015 have since stalled. Effective policy intervention could help to spur investment and see a return of such strong growth.

# 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.[6] We outline key differences between the two scenarios used as input for the SIAMESE downscaling process below.

## PAC [7]
### 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 [8,9]
### 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.[10]

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**

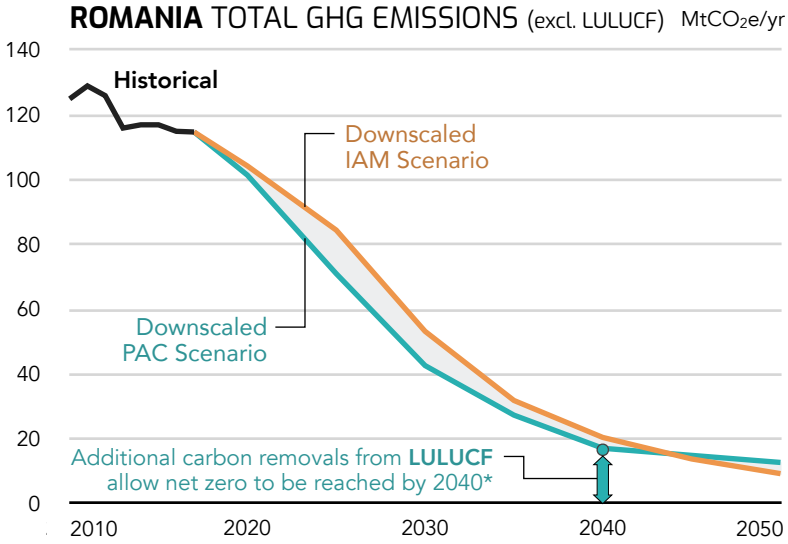
#### Carbon Capture and Storage (CCS):

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 Romania requires a 79-83% reduction in total GHG emissions by 2030 (excluding 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 sink of 9-13 $MtCO_2e$ would achieve net zero by 2050, while under the PAC scenario, a LULUCF sink of 17 $MtCO_2e$ would achieve net zero emissions in 2040. This is roughly equal to the level of projected negative emissions in the LULUCF sector under current policies in the latest year for which there is projection data (2035).[11]

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## 1.5°C Compatible 2030 primary energy mix*

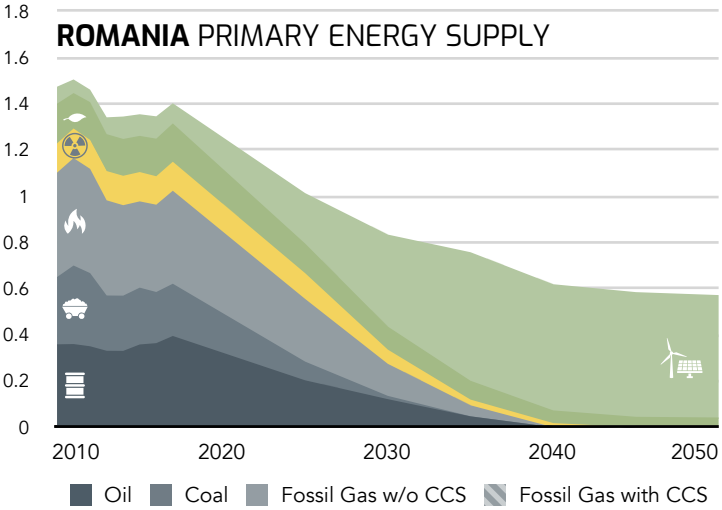
| | 2017[5] | 2030 |
|---|---|---|
| **Renewables** incl. biomass | 18% | **60%** |
| **Fossil Fuels** | 73% | **33–38%** IAM PAC |
| **Nuclear** | 9% | **2-7%** |

In downscaled PAC and IAM pathways the share of unabated fossil fuels in primary energy demand is reduced to between 33-38% by 2030, whereas the share of renewables including biomass reaches 60% by the same date.

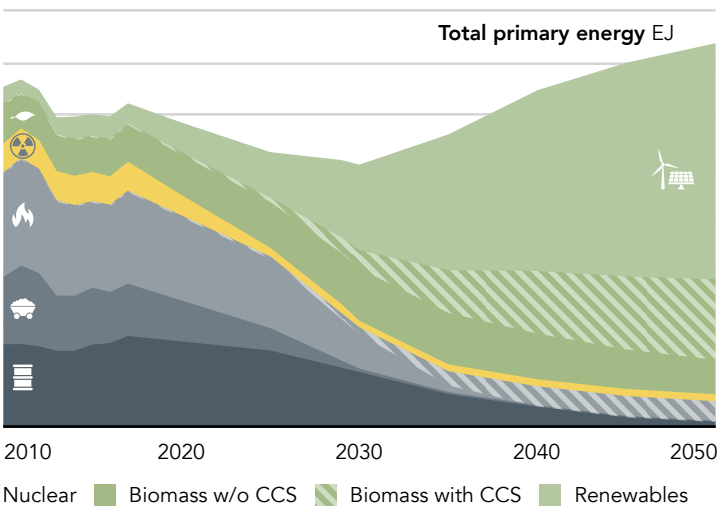
The transport and industry sectors constitute a combined 40% of total GHG emissions in Romania, illustrating the need for strong policies to reduce the oil and natural gas demand that produce these sectoral emissions.[5]

*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 demand40–46%

Downscaled PAC Scenario




Downscaled IAM Scenario

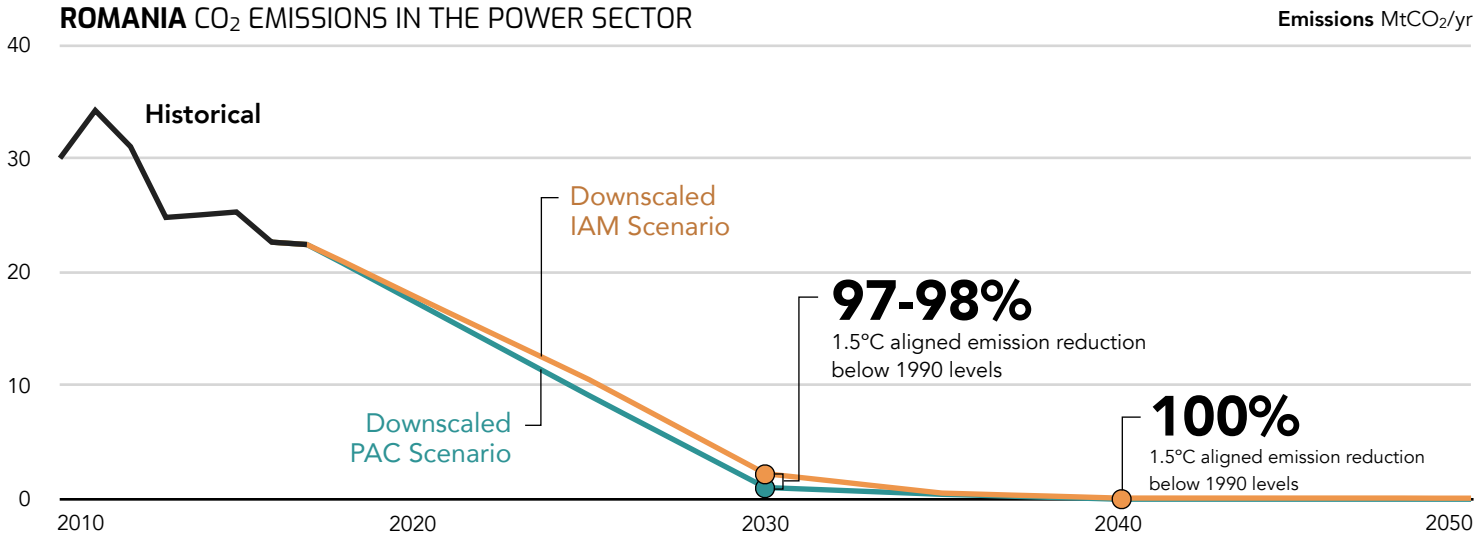



Oil | Coal | Fossil Gas w/o CCS | Fossil Gas with CCS | Nuclear | Biomass w/o CCS | Biomass with CCS | Renewables

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.

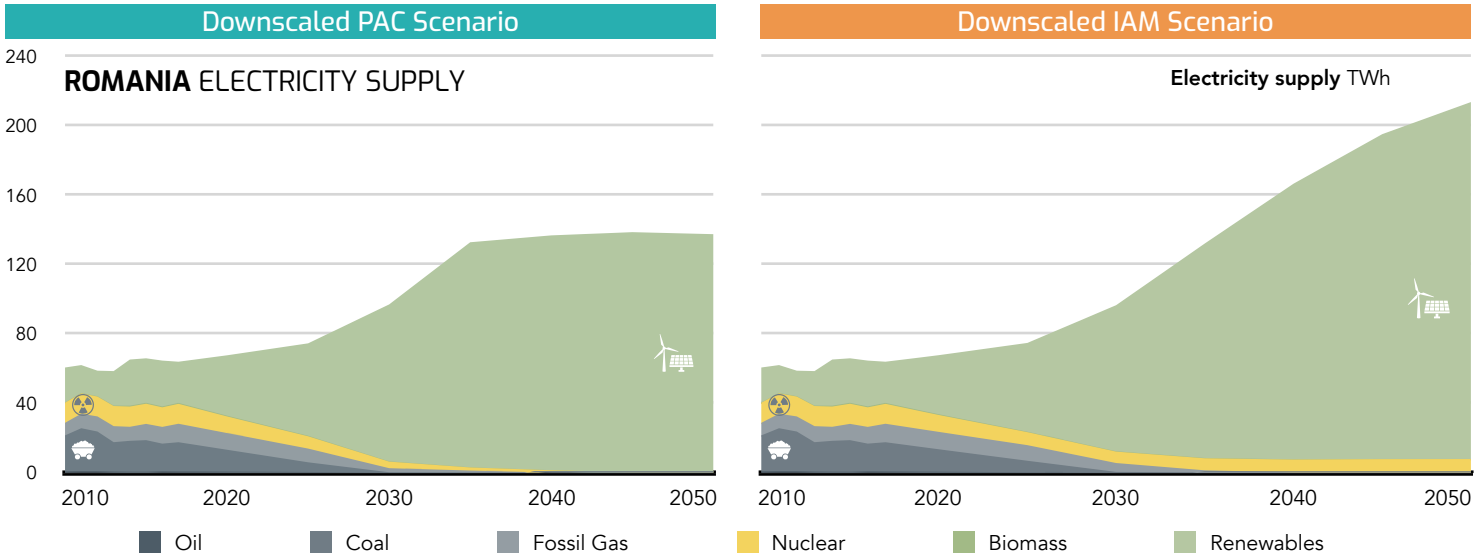
# Sectoral decarbonisation: Power




## 1.5°C Compatible 2030 power sector fuel mix*

| | Renewables incl. biomass | Coal | Fossil gas | Nuclear |
|---|---|---|---|---|
| 2017 [5] | 38% | 26% | 17% | 18% |
| 2030 | 88–94% IAM PAC | 0% | 2–5% PAC IAM | 4–7% PAC IAM |

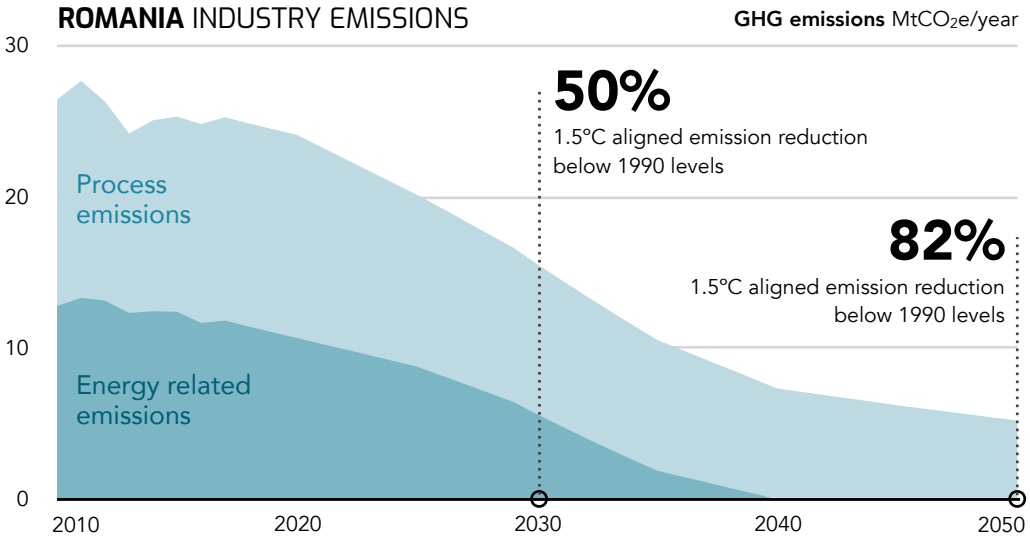
*No detailed wholesale electricity market modelling was undertaken for this assessment




## Towards a fully decarbonised power sector

Total electricity supply in Romania has only declined slightly since 1990 (-8% in 2019), though the composition of this supply has changed dramatically.[3] Generation from renewables has more than doubled since 1990, while coal and natural gas consumption has fallen by 26% and 60% respectively. The recently announced 2032 coal phase out is a positive development, but should be brought forward to 2030 to align with the two downscaled 1.5°C compatible energy mix pathways. Oil use for power generation has declined 95% since 1990, and been displaced almost entirely by nuclear generation, which was introduced in 1996 and has grown to a 19% share in 2019. Renewables growth has stalled since 2014, a development that requires urgent action to ensure Romania's power sector is mostly decarbonised by 2030.

# Sectoral decarbonisation: Industry



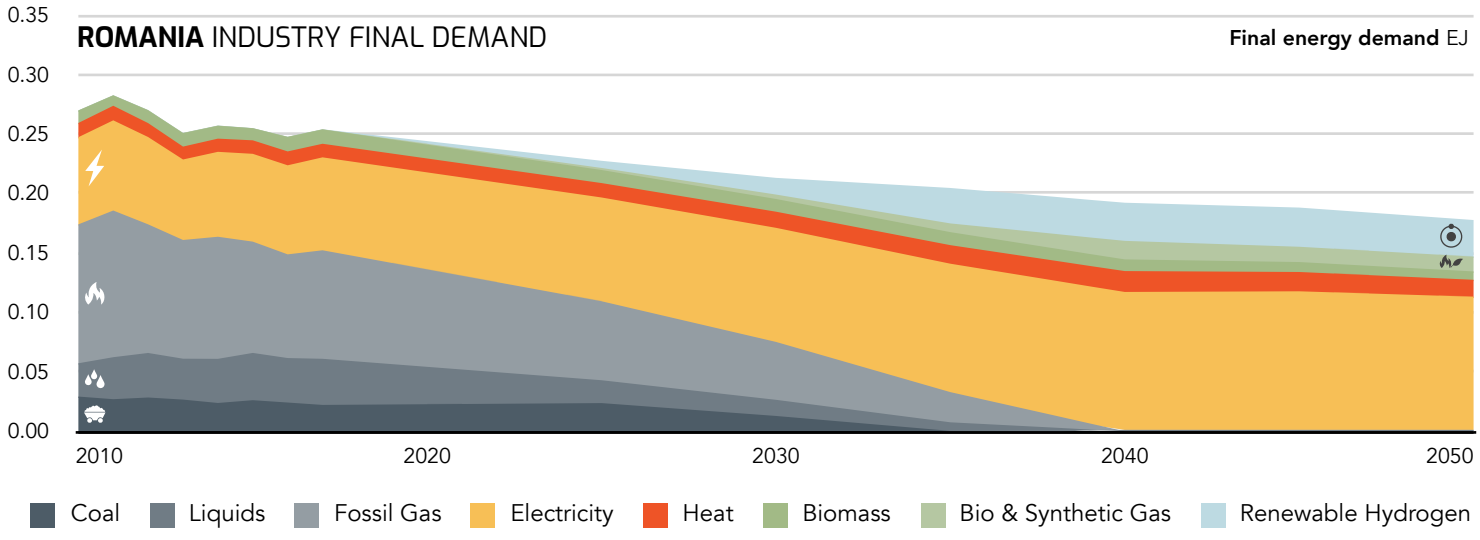

Emissions from industry decline significantly until 2040 in the pathway downscaled from the PAC scenario, whereby energy-related emissions reach zero and further reductions occur more gradually. This is due to the nature of these residual (process) emissions that are harder to mitigate than those from 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] | 39% | 9% | 36% | 0% |
| **2030** | **45%** | **6%** | **25%** | **6%** |

Downscaled PAC Scenario




## Towards a fully decarbonised industry sector

Total industrial energy demand in Romania plummeted due to a structural shift to Romania's economy beginning in the late 1980s when a large percentage of factories shut down.[3] It levelled out around 2009 after falling 75% from 1990 levels, staying relatively consistent for the following decade. The composition of this demand, though, has changed markedly, with fossil fuels falling to a 60% share in 2019 from 86% in 1990. Electricity's share more than doubled to 29% over this time, while biomass which was not used at all in 1990, made up a 4% share in 2019. Policies targeting energy efficiency gains and electrification are urgently needed to ensure the remaining fossil fuel use is phased out between 2035 and 2040.

# Closing the Ambition Gap

## Key characteristics of Romania's 1.5°C compatible pathways

| | Historical | 1.5°C compatible benchmarks | | Country targets | |
|---|---|---|---|---|---|
| | 2017 | 2030 | 2050 | 2030* | 2050 |
| **Total GHG** excl. LULUCF | 115 $MtCO_2e/yr$ | 43–53 $MtCO_2e/yr$ | 9–13 $MtCO_2e/yr$ | 146 $MtCO_2e/yr$ | |
| | 54 % below 1990 | 79–83 % below 1990 | 95–96 % below 1990 | 42 % below 1990 | |
| **Emissions intensity of power generation**** | 351 $gCO_2/kWh$ | 11–23 $gCO_2/kWh$ | 0 $gCO_2/kWh$ | | |
| **Share of renewable power** | 38 % | 88–94 % | 100 % | | |
| **Share of unabated fossil fuel in power** | 44 % | 2–5 % | 0 % | | |
| **Share of nuclear power** | 18 % | 4–7 % | 0–3 % | | |
| **Industry electrification rate** | 39 % | 45 % | 63 % | | |

* 2030 target excluding LULUCF calculated using the government's 'with existing measures' emissions projections submitted to the UNFCCC
** Does not include upstream emissions

## Raising Ambition

While Romania's emissions have already fallen further than many other European countries, this is primarily due to structural changes to the Romanian economy that began in the late 1980s rather than the implementation of climate policies. The current 2030 target allows emissions to rise from their present levels and is even above where emissions are projected to be under current policies.[1] A much stronger target, in the range of 79-83% below 1990 levels (excl. LULUCF) would be needed to align with the downscaled 1.5°C compatible pathways, together with a suite of policies affecting all sectors of the economy. The power and industry sectors are the top two emitting sectors, but policies targeting these, transport, and buildings emissions are urgently needed to ensure Romania's emissions continue to fall. Setting a net-zero target for 2050 at the latest should also be a top priority.

## Other modelling results

**Agora Energiewende: The Southeast Europe power system in 2030**[12]

- 50% renewable energy generation by 2030 for Southeast Europe (SEE)
- Coal generation to generate <25% of power in SEE by 2030

**CSD: Accelerated lignite exit in Bulgaria, Romania, and Greece**[13]

- Early coal phase out will not require compensation due to lignite plant losses

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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.

**climateanalytics.org**

# Acknowledgments

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# References and Data Sources

1. Integrated National Energy and Climate Plan 2021-2030
   Source: Government of Romania (2020).
   Link: https://ec.europa.eu/energy/sites/default/files/documents/ro_final_necp_main_en.pdf
2. 1.5°C Pathways for Europe: Achieving the highest plausible climate ambition
   Source: Climate Analytics (2021)
   Link:
3. National Inventory Report - Romania
   Source: Government of Romania (2021)
   Link: https://unfccc.int/documents/274077
4. Romania. 2021 Common Reporting Format (CRF) Table
   Source: Government of Romania (2021).
   Link: https://unfccc.int/documents/275942
5. World Energy Balances 2020
   Source: International Energy Agency (IEA) (2020).
   Link: https://www.iea.org/data-and-statistics/data-product/world-energy-balances
6. Towards Optimal 1.5° and 2 °C Emission Pathways for Individual Countries: A Finland Case Study
   Source: Sferra, F. et al, *Energy Policy,* (2018).
   Link: https://doi.org/10.1016/j.enpol.2019.04.020
7. Paris Agreement Compatible Scenarios for Energy Infrastructure
   Source: PAC Consortium (2020).
   Link: https://www.pac-scenarios.eu/
8. REMIND
   Source: Potsdam Institute for Climate Impact Research (2020).
   Link: https://www.pik-potsdam.de/en/institute/departments/transformation-pathways/models/remind
9. Potential and costs of carbon dioxide removal by enhanced weathering of rocks
   Source: Strefler, J., Amann, T., Bauer, N., Kriegler, E., Hartmann, J. (2018).
   Link: https://iopscience.iop.org/article/10.1088/1748-9326/aaa9c4
10. Description of the REMIND model (Version 1.6)
    Source: Potsdam Institute for Climate Impact Research (PIK) (2015).
    Link: https://www.pik-potsdam.de/en/institute/departments/transformation-pathways/models/remind/remind16_description_2015_11_30_final
11. Member States' Greenhouse Gas (GHG) Emission Projections
    Source: European Environment Agency (2020).
    Link: https://www.eea.europa.eu/data-and-maps/data/greenhouse-gas-emission-projections-for-7
12. The Southeast European power system in 2030
    Source: Agora Energiewende (2019).
    Link: https://www.agora-energiewende.de/en/publications/the-southeast-european-power-system-in-2030/
13. Accelerated lignite exit in Bulgaria, Romania and Greece
    Source: Center for the Study of Democracy (2020).
    Link: https://csd.bg/publications/publication/accelerated-lignite-exit-in-bulgaria-romania-and-greece/