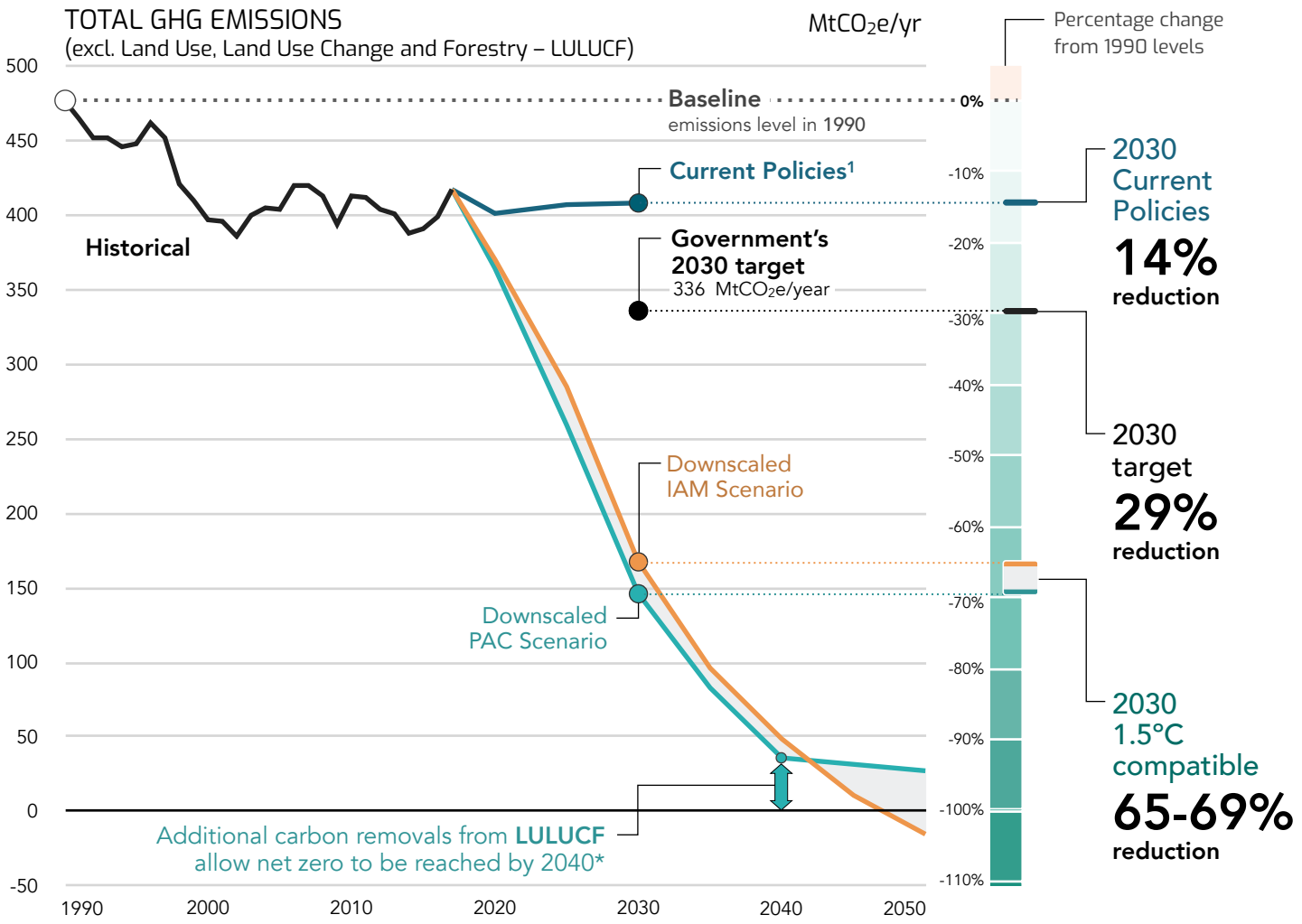
# POLAND

Country Factsheet: 1.5°C Pathways for Europe

EU DE DK ES FR IT PL PT RO SE

## Poland'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.

## Poland's 2030 emissions will fall very little under current policies

Under current policies, GHG emissions in Poland are set to fall only marginally below current levels until 2030.[1] **The modest 2030 target currently in place is not projected to be met, reflecting the need for greater urgency across all sectors of the economy and a more ambitious target that guides such action.** A reduction of 65-69% below 1990 levels (excl. LULUCF) would be a 1.5°C compatible 2030 domestic emissions target according to the downscaled economy-wide emissions pathways.†

To ensure Poland 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:**

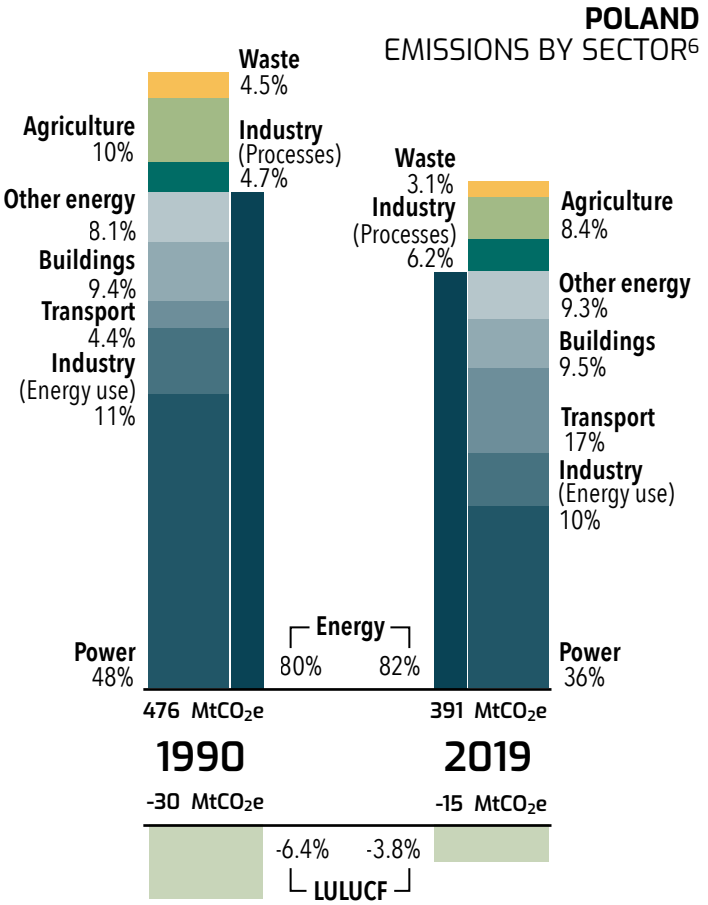
- Pathways were downscaled using the SIAMESE model developed by Climate Analytics. See 1.5°C Pathways for Europe Report[3] for details
- Land use, land use change and forestry (LULUCF), and international aviation and shipping emissions are not covered by this assessment
- Detailed macro-economic modelling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

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

## Emissions profile

Due to an economic transformation since the end of the 1980s, GHG emissions fell steeply in the early 1990's from 580 MtCO2e in 1988 to reach 396 MtCO2e in 2000.[4] Emissions have remained relatively stable since then, and are projected to still be above 2000 levels in 2030 under current policies.[1]

Power and heat generation made up 38% of Poland's total GHG emissions in 2019, due to a high level of coal generation still remaining in the system (70%).[5] Transport emissions made up 17% of 2019 emissions, however they have tripled since 1990, and continue to head in the wrong direction. While buildings emissions made up just 10% of total emissions, a high proportion of this was from the burning of coal for heat, a highly polluting method of heating.




## Energy overview and main policy gaps

Poland, with a large coal mining industry, remains highly dependent on coal for its energy supply, though the share of coal in total energy supply has fallen from 76% in 1990 to 43% in 2019.[5] This has partly been replaced by renewables, that now contribute 9%, while oil consumption has risen from a 13% share in 1990 to reach 29% in 2019. A coal phase out date that was recently set at 2049 is far behind all others already set by EU countries, and leaves coal in the system well beyond what is compatible with the 1.5°C temperature goal. In 2040, 11% of power generation is targeted to still come from coal. Policies addressing rapidly rising transport emissions are lacking in Poland. While a successful support scheme for residential solar thermal systems was scrapped in 2014, in 2017 a scheme supporting the adoption of solar PV systems was initiated which has proven to be rather successful.

# 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**

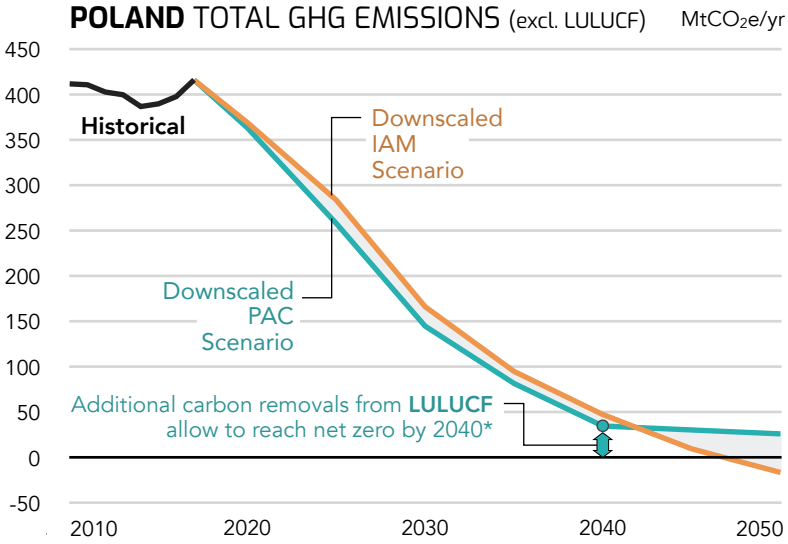
#### Carbon Capture and Storage (CCS):

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 Poland requires a 65-69% 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 downscaled, a LULUCF sink of up to 27 $MtCO_2e$ would achieve net zero by 2050, while with a LULUCF sink of 36 $MtCO_2e$ would achieve net zero emissions in 2040. This is only slightly higher than Poland's current LULUCF sink.[6]

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## 1.5°C Compatible 2030 primary energy mix*

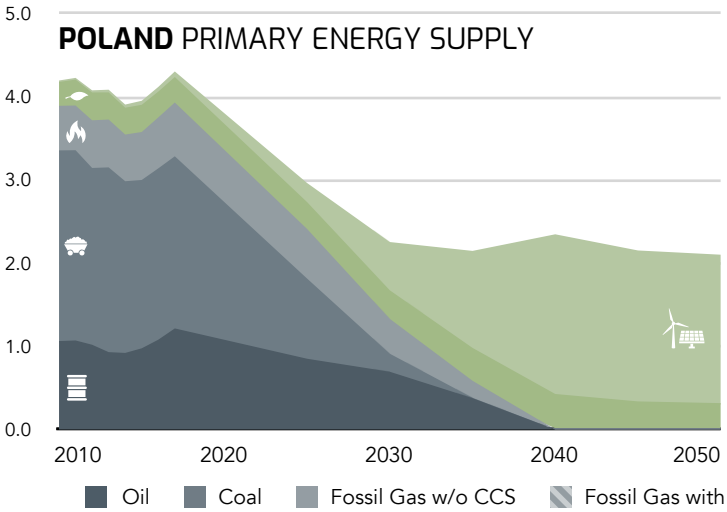
| | 2017[5] | 2030 |
|---|---|---|
| **Renewables** incl. biomass | 9% | 41–43% PAC IAM |
| **Fossil Fuels** | 91% | 57–59% IAM PAC |
| Nuclear | 0% | 0% |

In the downscaled PAC and IAM pathways the share of unabated fossil fuels in primary energy demand is reduced to between 57-59% by 2030, whereas the share of renewables including biomass reaches between 41-43% by the same date.

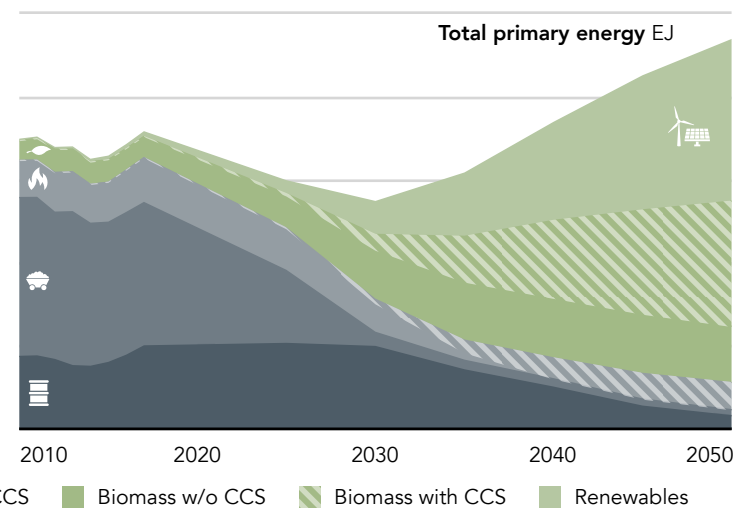
Roughly two thirds of emissions from fuel combustion in homes and roughly half in the industry sector in Poland comes from burning coal.[6] Measures to eliminate these emissions are urgently needed.

*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

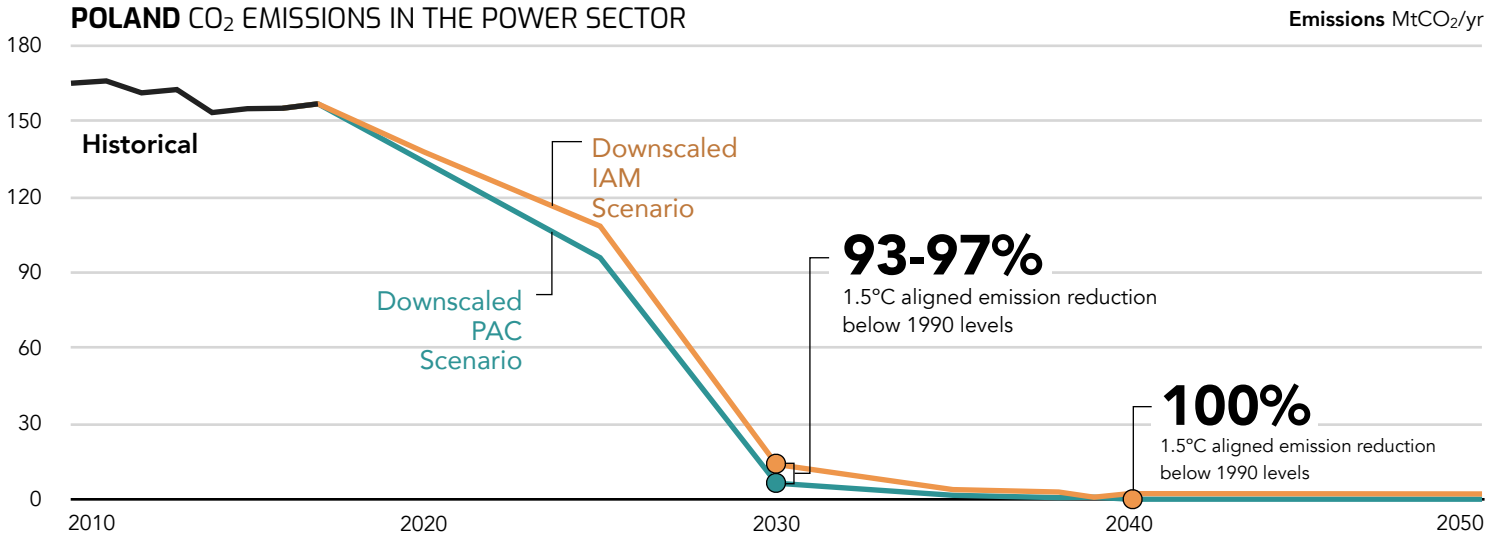



Oil | Coal | Fossil Gas w/o CCS | Fossil Gas with CCS | Biomass w/o CCS | Biomass with CCS | Renewables

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.

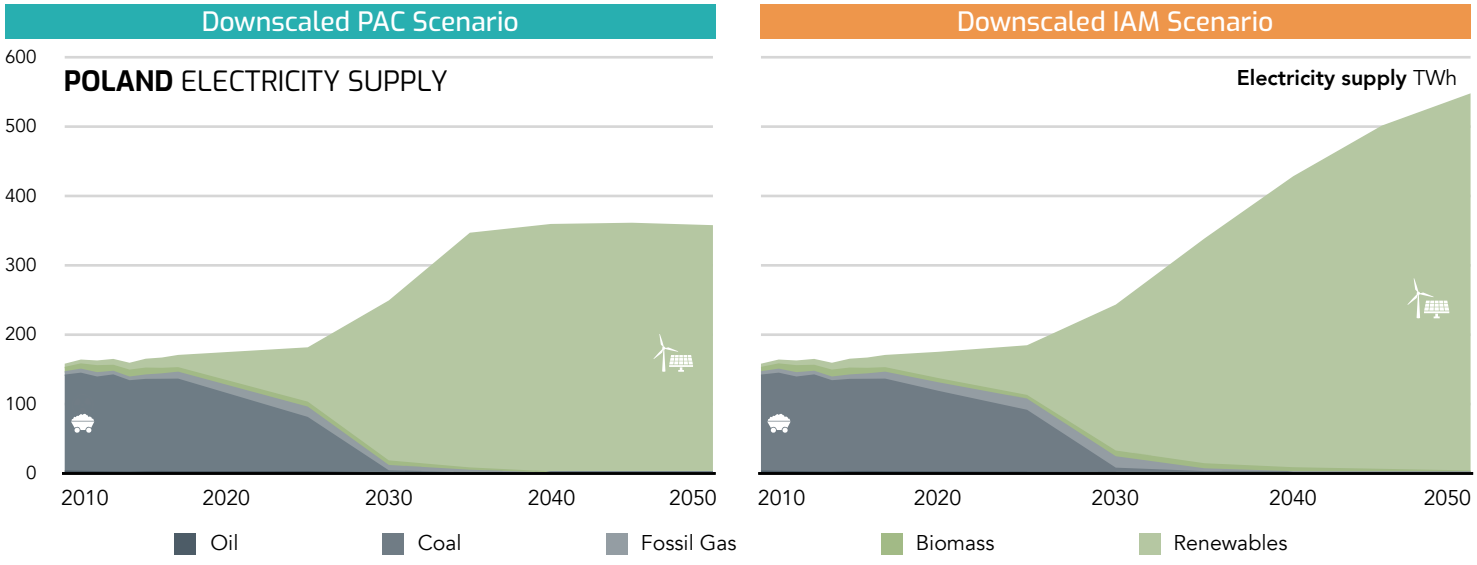
# Sectoral decarbonisation: Power




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

| | Renewables incl. biomass | Coal | Fossil gas | Nuclear |
|---|---|---|---|---|
| 2017 [5] | 24% | 79% | 6% | 0% |
| 2030 | 90–96% IAM PAC | 1–3% PAC IAM | 3–7% PAC IAM | 0% |

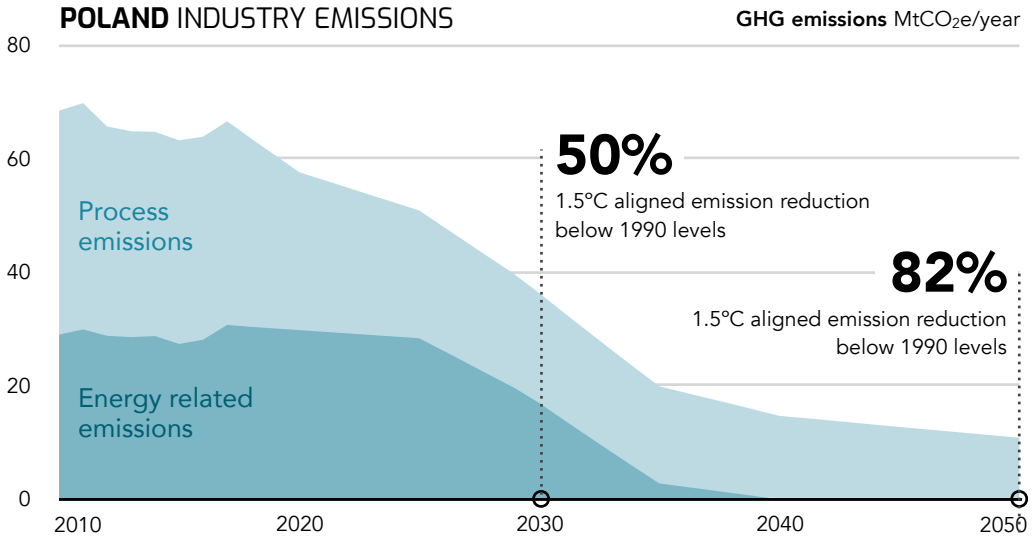
*No detailed wholesale electricity market modelling was undertaken for this assessment




## Towards a fully decarbonised power sector

To align with the downscaled 1.5°C compatible power sector pathways Poland's very high proportion of coal-fired power needs to be scaled down rapidly and replaced with renewables, particularly after 2025. Coal and gas generation fall close to zero by 2030 in both downscaled scenarios, with both phased out by 2035. This stands in contrast to the recently released Energy Policy to 2040 that targets fossil gas as a bridging fuel and leaves coal in the system well into the 2040s.[12] The expected increase in total electricity demand due to widespread electrification across the economy is met exclusively with renewable sources, with at least a doubling in total electricity demand by 2035 in both scenarios. Biomass demand does not rise above the current low levels in either scenario.

# Sectoral decarbonisation: Industry



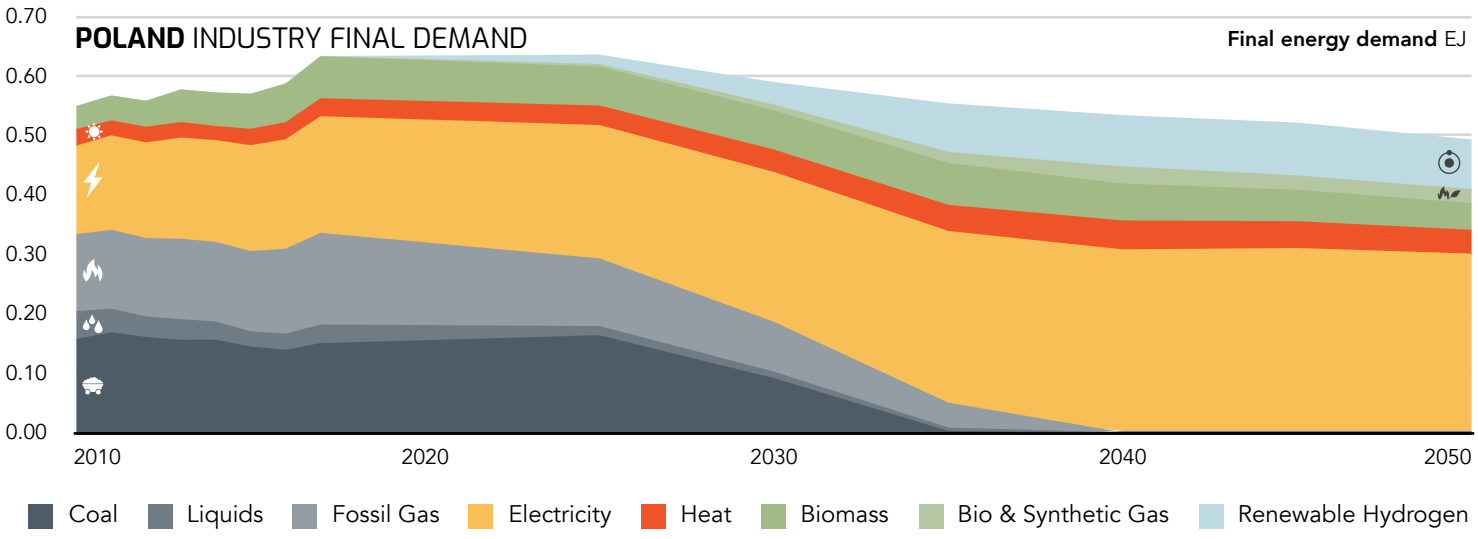

Emissions from industry decline significantly until 2040 in the pathway downscaled from the PAC scenario, whereby energy-related emissions reach zero and further reductions occur more gradually. This is due to the nature of these residual (process) emissions that are harder to mitigate than those from 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] | 31% | 24% | 24% | 0% |
| **2030** | **43%** | **15%** | **16%** | **6%** |

Downscaled PAC Scenario




## Towards a fully decarbonised industry sector

Poland's industry sector declined markedly due to the economic transformation that began at the end of the 1980s, causing emissions in this sector to drop 75% between 1990 and 2000.[6] Emissions have since stabilised, and under current policies, are not projected to decline significantly below current levels by 2030.[1] Roughly half of Poland's industrial energy-related emissions come from coal consumption, reflecting the need to prioritise electrification of this sector. Coal and oil consumption in Poland's industry sector are eliminated by 2035 in the pathway downscaled from the PAC scenario, with fossil gas following by 2040.

# Closing the Ambition Gap

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

| | Historical | 1.5°C compatible benchmarks | | Country targets | |
|---|---|---|---|---|---|
| | 2017 | 2030 | 2050 | 2030* | 2050 |
| **Total GHG** excl. LULUCF | 417 $MtCO_2e/yr$ | 146–168 $MtCO_2e/yr$ | -15–27 $MtCO_2e/yr$ | 336 $MtCO_2e/yr$ | |
| | 12 % below 1990 | 65–69 % below 1990 | 94–100 % below 1990 | 29 % below 1990 | |
| **Emissions intensity of power generation**** | 925 $gCO_2/kWh$ | 26–57 $gCO_2/kWh$ | 0-4 $gCO_2/kWh$ | 533 $gCO_2/kWh$ | |
| **Share of renewable power** | 14 % | 90–96 % | 100 % | 32 % | |
| **Share of unabated fossil fuel in power** | 86 % | 4–9 % | 0 % | 68 % | |
| **Share of nuclear power** | 0 % | 0 % | 0 % | 0 % | |
| **Industry electrification rate** | 31 % | 43 % | 61 % | | |

* 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

Poland's current 2030 target is less than half of the 1.5°C compatible range of 65-69% below 1990 levels (excl. LULUCF) suggested by this project, demonstrating the urgent need to ratchet up its ambition. Coal is currently projected to remain in the Polish energy system until well into the 2040s despite the need for developed countries to phase out coal power by 2030 to remain 1.5°C compatible.[12,13] The Polish government's recently confirmed commitment to use fossil gas as a bridging fuel is also misaligned with downscaled 1.5°C aligned pathways, which suggest it needs to be phased out of the power sector completely by 2035. Reaching net zero emissions in 2050 will require a rapid decarbonisation across all sectors including transport and buildings, which are not covered by this analysis.

## Other modelling results

**WWF: Poland and climate neutrality**[14]

- Climate neutrality by 2050
- Coal phase out by 2030

**Forum Energii: Four Scenarios (renewable scenario)**[15]

- 39% renewable power generation by 2030, 73% by 2050
- Coal phase out between 2040-2050

**Greenpeace: Poland coal phase out**[16]

- Poland could phase out coal by 2035 under business as usual, so should therefore aim to achieve this much faster

**Centre for Climate and Energy Analyses: Poland Net-Zero 2050**[17]

- 53% reduction by 2030 and 90% reduction by 2050 in total GHG emissions below 1990 levels (excl. LULUCF)
- Roughly 250 $gCO_2/kWh$ emissions intensity of power sector by 2030

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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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