Paris Agreement Compatible Scenarios for Energy Infrastructure

A net-zero EU is possible

Findings from NGOs' Paris Agreement Compatible energy scenario

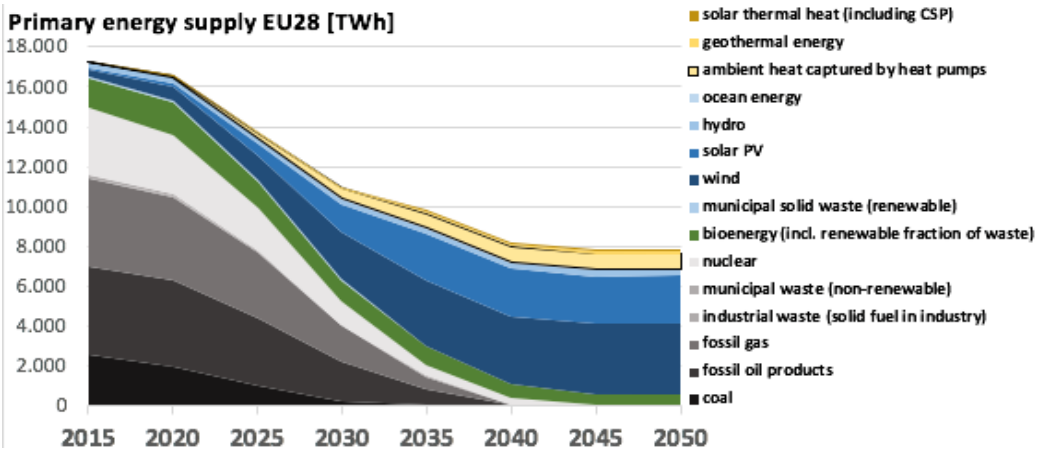
Investing in our future

The current health crisis has taught us an important lesson: building resilience is the most efficient solution to protect us from global threats – even when they might appear distant. What is evident for health crisis is also valid for climate and energy. The sooner we prepare, the smaller the damage. The recent initiatives led by the European Commission around the European Green Deal and the proposed Climate Law sent a positive signal towards a transition to a net-zero energy system. But the EU needs to step up the pace: the current deployment of renewables and energy savings fall behind what is needed, despite strong scientific evidence and a large civil society demand to act faster.

The negotiation of the Recovery Package is an opportunity for the EU to make a change: by investing in local solutions rather than in gas pipelines, by supporting energy savings and renewables rather than subsidizing fuels from the past. The next few years will be our unique window of opportunity to give a much-need boost to climate and energy policies to meet our commitments under the Paris Agreement, support our resilience and safeguard our future.

Building a safe and resilient energy system

The EEB and CAN Europe have worked together with civil society, industry, academics and energy experts with one core objective: develop a robust pathway for the EU towards net-zero emissions by 2040 in line with the Paris Agreement's objective of limiting temperature rise to 1.5°C. CAN Europe and the EEB assessed the EU's masterplan for energy infrastructure: the *Ten Year Network Development Plan* (TYNDP)[1] as proposed by grid operators. We explored their strengths and limitations and built an own civil society alternative: the Paris Agreement Compatible (PAC) scenario. The lesson from this work is clear: we do not need to wait for a technological miracle: we have the solutions on the market. We only need to act.



The PAC scenario shows cutting energy demand in half and building a 100% renewable energy system by 2040 is possible

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EU energy masterplans should integrate the PAC scenario: a quick comparison

	TYNDP SCENARIO(S)[2]	PAC SCENARIO	WHY CURRENT SCENARIOS COULD BE IMPROVED?
ENERGY MIX			
RENEWABLE ENERGY	**<60% renewables in primary energy supply[3]** And less than 80% in electricity generation[4]	**Nearly 100% renewables** And nearly 100% in electricity generation	The TYNDP scenarios systematically underestimate the potential of renewable electricity to cut emissions by replacing fossil fuels in all sectors. Renewable energies are the most competitive electricity generation technology with much higher sustainable potential than combustible fuels.
RENEWABLE HEAT	**Moderate to high heat pump uptake** Units increase by 2 to 5 between 2018 and 2040[5]	**High heat pump uptake** Heat pumps provide 50% of heating and cooling demand (increase by 6 by 2040)	Heat pumps need to play a large role in phasing out fossil fuel boilers, fossils in district heating and low-mid grade industrial heat, without using expensive renewable hydrogen solutions.
GAS	**High reliance on gas** ~4000 TWh of gas[6], out of which ~50% is still fossil	**Gas phase-out** ~1200 TWh of gas, covered by non-fossil gases, limited to industry and transport	With expected high costs and sustainability issues, hydrogen and biomethane are not scalable solutions to replace fossil gas.
BIOENERGY	**Increase of biomass for energy** ~30% of primary energy supply[7]	**Decrease of biomass for energy** < 10% of primary energy supply[8]	Solid biomass should be left to the chemical industry, and biomass used according to the cascading principle.
BIOGAS (INCLUDING BIOMETHANE)	**High increase of biogas** Supply multiplied by ~4 between 2015 and 2040[9]	**Decrease and focus on sustainable biogas only** Supply reduced by a third between 2015 and 2040	Given the concerns on land-use and environmental impacts, biomass and waste cannot be considered a safe and sustainable energy source.
ENERGY CROPS	**High increase of energy crops** ~2/3 of biomethane (37 Mtoe) from energy crops[10]	**Limited use of energy crops** Max. 7,4 Mtoe biomass from energy crops	Potential conflict of use with food, agriculture and material leaves a limited sustainable potential for energy crops.
FOSSIL FUELS	**No phase-out of fossil fuels** still ~1/3 of primary mix in 2040	**Gradual phase-out of fossil fuels** Coal: 2030, gas: 2035, oil: 2040	A delayed phase-out of fossil fuels is not compatible with reaching carbon neutrality by 2040 as developed in the IPCC report[11]
NUCLEAR	**Still part of the electricity mix** >400 TWh in all scenarios	**Nuclear phase-out** 109 TWh in 2040, 0 TWh in 2045	Nuclear is no sustainable solution to climate crisis. Postponing nuclear phase-out puts pressure on costs, decommissioning and risks on future generations.
ENERGY DEMAND			
ENERGY EFFICIENCY	**Limited demand reduction** ~1/3 reduction of final demand between 2015 and 2040[12]	**Energy efficiency first** 47% reduction of final demand between 2015 and 2040[13]	More efficient technologies, electrification and behavioural changes can substantially lower our energy demand.
GREENHOUSE GASES			
EMISSIONS REDUCTION	**Late reduction of emissions** ~56 Gt net cumulative CO_{2eq} emissions in 2040 incl. ~8 Gt CO_{2eq} credits from CCS and LULUCF	**Net-zero emissions by 2040**	Delaying GHG reductions is a risky gamble that shifts the burden of climate impacts to the next generation. Betting on a swift and broad roll-out of CCS is questionable. Costs and environmental risks make nature-based solutions more efficient.

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Policy asks for a Paris compatible EU energy system

The PAC scenario is an energy system-wide exercise by NGOs to offer a credible alternative to current energy planning, as captured in the TYNDP process. But reaching net-zero emissions requires more than isolated steps: it requires **systemic change**, supported by a more resilient energy infrastructure ready for a **fossil-free future**.

The current TYNDP scenarios assume very modest renewable energy potentials, do not tap the potential of energy savings, and bear the risk of a fossil gas lock-in. We need to prepare our infrastructure beyond pylons and pipelines. Flexible consumers, producers, together with storage technologies can ease the grids. An independent assessment must be carried to identify the most cost-efficient solutions towards 100% renewables. In this view, we ask to integrate the PAC scenario into future infrastructure planning.

Mainstreaming the PAC scenario findings in policymaking

Revision of 2030 Climate and Energy Targets[14] *(Adoptions: 2021)*

- The PAC scenario shows that high climate & energy targets are achievable with current technologies[15]. The EU Commission should set clear pathway to these targets.
- Our ask: enshrine at least 65% greenhouse gas emission reduction, 50% renewable energy share and 45% energy savings by 2030 in legislation towards 100% renewables by 2040

Hydrogen Strategy (*released in July 2020, follow-up actions to come in 2021*)

- The PAC scenario shows that non-fossil gases and fuels (such as hydrogen from renewables) are only needed in aviation, heavy transport, and a few energy intensive industry sectors[16].
- Our ask: leave no room for fossil-based hydrogen and prevent blending of renewable-based hydrogen with fossil gas. Support only renewable-based hydrogen in the few sectors that are most difficult to decarbonise.

Trans-European Energy infrastructure (TEN-E) Regulation (*Winter 2020*)

- The PAC scenario shows that energy infrastructure planning needs to foster electrification and flexibility options such as prosumers and storage technologies[17].
- Our ask: build an energy infrastructure in line with the European Green Deal and 65% GHG reduction by 2030. Stop funding fossil gas infrastructure with public money to avoid stranded assets. Remove the modelling and planning responsibilities from the ENTSOs and ensure that they are taken over by an independent science-based expert body.

The Recovery and Resilience Facility (RRF) (*Winter 2020 - Spring 2021*)

- The PAC scenario shows that fossil fuels need to be quickly phased out[18] by 2040 at the latest. Any further investment in fossil fuel and fossil infrastructure is delaying the transition.
- Our ask: exclude fossil fuel and fossil fuel infrastructure funding under the Recovery Plan and integrate 40% climate action in each plan. Submit any funding allocation to climate proofing, a compatibility test with net zero emission by 2040, the wider EGD zero pollution objective and the “do not significant harm” principle in the Taxonomy Regulation.

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About us

www.caneurope.org
Climate Action Network (CAN) Europe is Europe's leading NGO coalition fighting dangerous climate change. With over 170 member organisations active in 38 European countries, representing over 1,500 NGOs and more than 47 million citizens, CAN Europe promotes sustainable climate, energy and development policies throughout Europe.

www.eeb.org
The European Environmental Bureau (EEB) is the largest network of environmental citizens' organisations in Europe. It currently consists of above 160 member organisations in more than 30 countries, including a growing number of European networks, and representing some 30 million individual members and supporters.

Links

- Main findings: https://www.pac-scenarios.eu/scenario-development.html
- Data: https://www.pac-scenarios.eu/fileadmin/user_upload/201014_PAC_scenario_data_web.xlsx

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This document is to be considered EEB and CAN Europe joint Policy Brief, as part of the official deliverables of the PAC project lead by the Renewables Grids Initiative.

[1] https://www.entsos-tyndp2020-scenarios.eu/
[2] Unless otherwise specified, all data extracted from the TYNDP 2020 Final Scenario Report published in June 2020
[3] Distributed Energy scenario - Primary energy supply
[4] Distributed Energy scenario
[5] Distributed Energy scenario: 50 million heat pumps by 204-0. Source of historic data : EHPA
[6] Average of Global Ambition and Distributed Energy scenarios
[7] Distributed Energy scenario - Primary energy supply
[8] Primary energy supply
[9] Distributed Energy Scenario, assuming 700 TWh biomethane by 2040
[10] TYNDP 2020 Scenario Building Guidelines Final Report, June 2020 - assuming biomethane supply based on Navigant's "*Gas for Climate*" study
[11] as developed in the IPCC 1.5°C report.
[12] Distributed Energy and Global Ambition scenarios - Final Energy Demand
[13] Final Energy Demand
[14] followed by revision of Renewable Energy, Energy Performance of Buildings and Energy Efficiency Directives
[15] see PAC scenario ch.3.1
[16] see PAC scenario, ch.2.12
[17] see PAC scenario p. 38
[18] see PAC scenario ch.2

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