Energy scenarios for climate neutrality (Focus electricity)

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IRENA: Second International Forum Long-Term Energy Scenarios for the Clean Energy Transition
TYNDP 2020 Scenario Storylines

**National Trends (NT)**
- **Policy** Scenario based on draft EU National Energy and Climate Plans
  - EU 2030 Energy and Climate Framework (32 % RES, 32.5 % efficiency)
  - EC 2050 Long-Term Strategy: 80 – 95 % CO₂ reduction

**Distributed Energy (DE)**
- De-centralised approach to the energy transition: active customers, small-scale solutions, circular approach.
- **COP 21**: +1.5°C target with 66.7 % probability
- Carbon neutrality by 2050

**Global Ambition (GA)**
- Future is led by economic development in centralised generation, with large-scale renewables and decarbonisation.
- **COP 21**: +1.5°C target with 66.7 % probability
- Carbon neutrality by 2050

By 2030, National Trends will reach at least 40% - 48% CO₂ reduction, where the top down scenarios see a reduction of 57% - 58% aligning with the EU green deal.

By 2050, in line with EC’s LTS 1.5 scenarios, the scenarios consider around 65 GtCO₂eq of cumulative GHG emissions.
EU28 cumulative GHG emissions - Distributed Energy

In order to meet to COP21 targets, strong development of renewables and clean gases are essentially. This must be coupled with Carbon capture technologies and LULUCFs*. Additional measures to reach net negative emissions are necessary after 2050, to bring cumulative emissions to 47.5 GT CO$_{2}$eq.

*Land use, land use change and forestry
The role of electrification

In 2030, all scenarios are in alignment with EU targets of 32% RES and 32.5% energy efficiency. Distributed Energy shows a strong need for electrification, 55% of final demand. Electricity in the charts on account for direct electricity demand, but there is a large need of P2x to support the decarbonization of the energy mix.
Electricity Generation (TWh)

Thermal generation declines as more renewables enter the market, Coal is phased out by 2040 in all scenarios. On the supply side renewable and P2x technologies are critical, we see a need of up to 2,571 TWh of clean electricity for P2x.
Increased direct electrification results in the increase of final electricity demand. The highest growth is seen in Distributed Energy. Whilst there is an increase in peak demand, it is subsided by demand side management e.g. batteries, DSR, smart grids, etc which are essential for the transition.
Energy flows around Europe and the need for grid infrastructure are important factors. The charts show the energy flows in Europe and the need for infrastructure based on the generation mix. Infrastructure development will be essential in ensuring we meet the energy transition in an efficient and economic way. This is assessed further in the TYNDP.