



Ea Energy Analyses

Value of green transition in Europe (estimate)

Prepared for CIP

27-02-2024 (Updated 23-04-2024)

Value of green transition in Europe

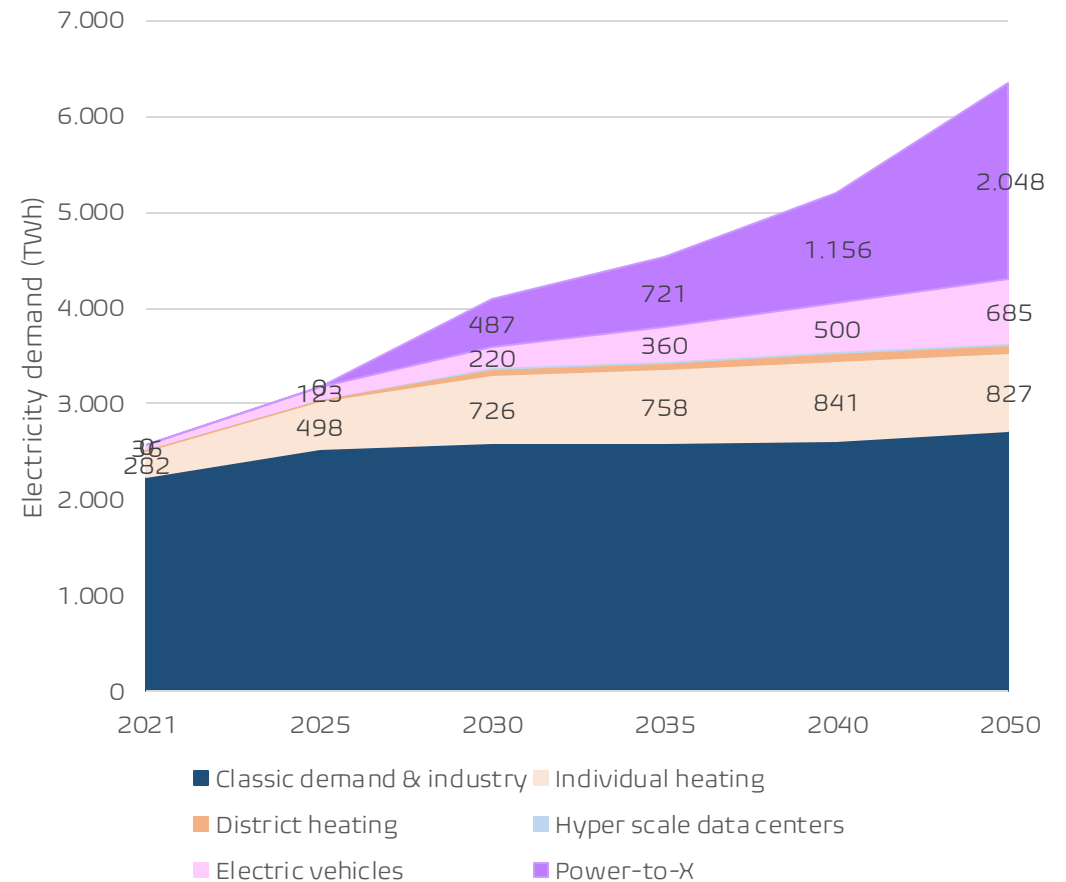
Ea Energy analyses has modelled green development of the energy sector towards 2050 in Europe. The cost - or value - of such development has been questioned.

The value is roughly estimated by applying the following method:

- All energy costs in the "Green scenario" in 2050 are compared to energy costs in a "No transition" scenario.
- Energy costs include opex, capex and net. imports
- The "No transition" scenario is assumed to have 2021 demand structure – no further electrification in transport, industry or residential sectors.

Energy demand (TWh)	Green scenario	No transition
Electricity demand (excl. PtX)	4.221	2.505
PtX demand (including imports)	1.764	
Oil demand		3.821
Gas demand		3.457
Coal demand		1.137
Total energy demand	5.985	10.920
CO ₂ emissions (bn. tons of CO ₂)		2,13

Electricity demand – green scenario



*Countries included: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Sweden, Czech Republic, Austria, Switzerland, France, Belgium, Netherlands, United Kingdom, Italy, Luxembourg, Spain, Portugal



Total energy costs two scenarios

Total energy costs 2050 bn. Euro

Total cost in two scenarios Bn. Euro in 2050	Green scenario	No transition scenario
Electricity supply (excl. PtX)	253	99(*)
PtX	140	0
Oil		194
Gas		88
Coal		9
Deployment of heat pumps (**)	65	
Additional distribution grid (elec)	16	
Deployment of EV chargers (***)	10	
Total costs (excl. CO₂)	485	390
CO ₂ costs (100 Euro/tonne)		213
Total costs	485	603

(*) The cost of electricity supply does not include fuel costs or CO₂ costs. Fuel costs in energy sector are included in the entries "Oil, gas and coal". CO₂ costs are calculated separately.

(**) Based on previous analysis the capex of small heat pumps is roughly two times the cost of electricity

(***) Assumed that the Levelised Cost of transport (excluding energy, excluding charger infrastructure) of an EV is par with an IC vehicle.

Energy costs/price per MWh

Euro22 per MWh	Green scenario	No transition
Electricity (calculated)	60	57
PtX (Calculated)	79	79
Light oil (based on IEA WEO 2023) (*)	51	51
Gas (based on IEA WEO 2023)	25	25
Coal (based on IEA WEO 2023)	8	8

Electricity cost Green: based on modelling. Includes capex and opex in a 100% fossil free system. Peakers and reserves supplied by hydrogen turbines

Electricity cost "No transition": LCOE calculation for system "as today". Not including effect of CO₂ price, not including infrastructure costs. Anticipated average Capacity Factor of production = 68%.

PtX: Includes all production costs including storage and H₂ backbone. Assumed imported H₂ is paid European cost at the borders

(*) All oil products (mainly gasoline and light oil) priced as light oil

