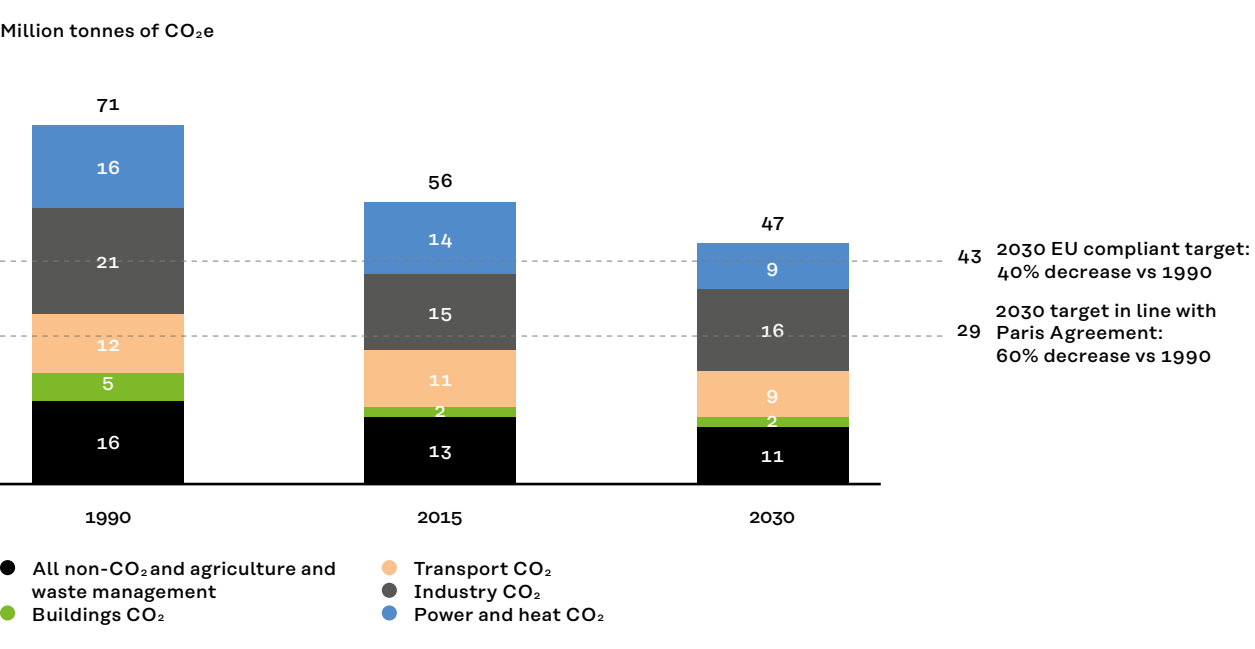
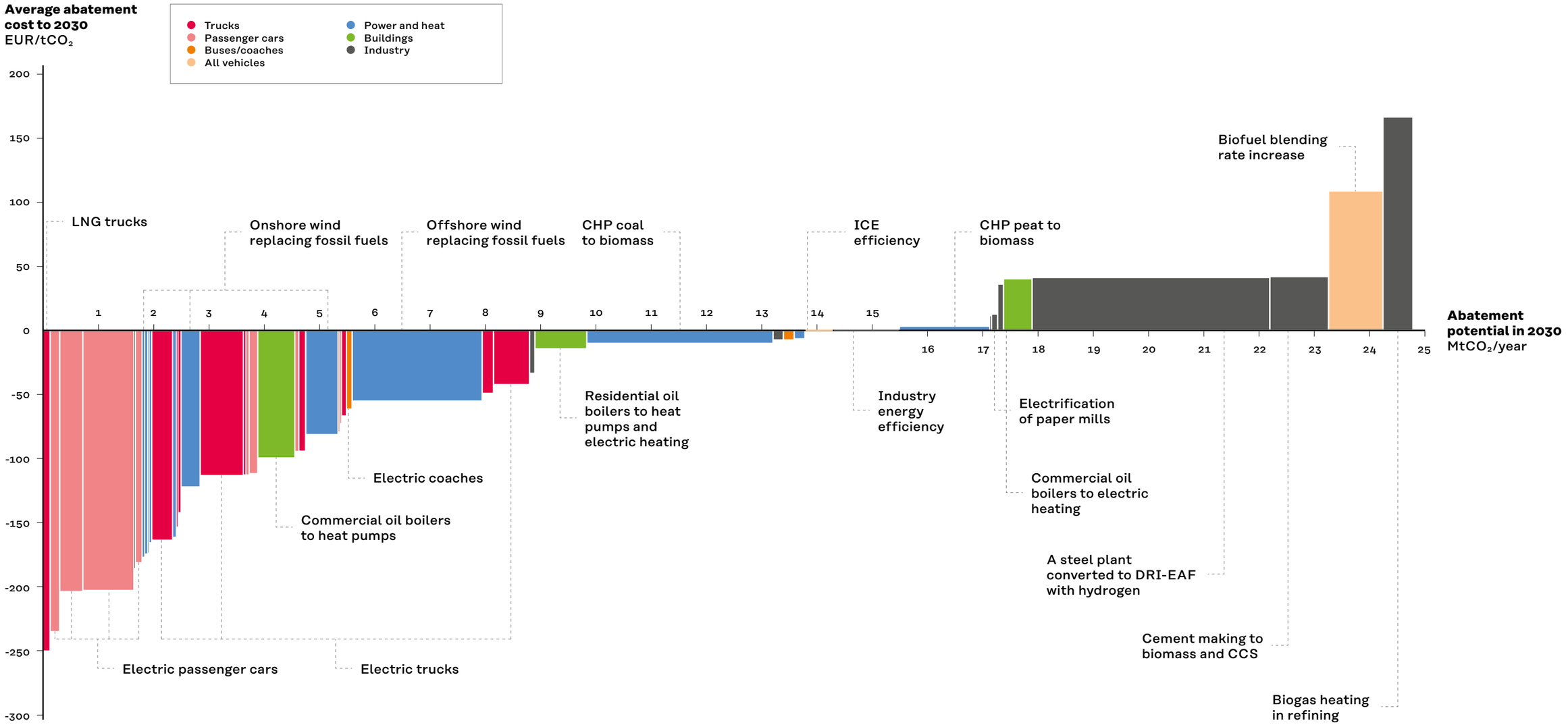
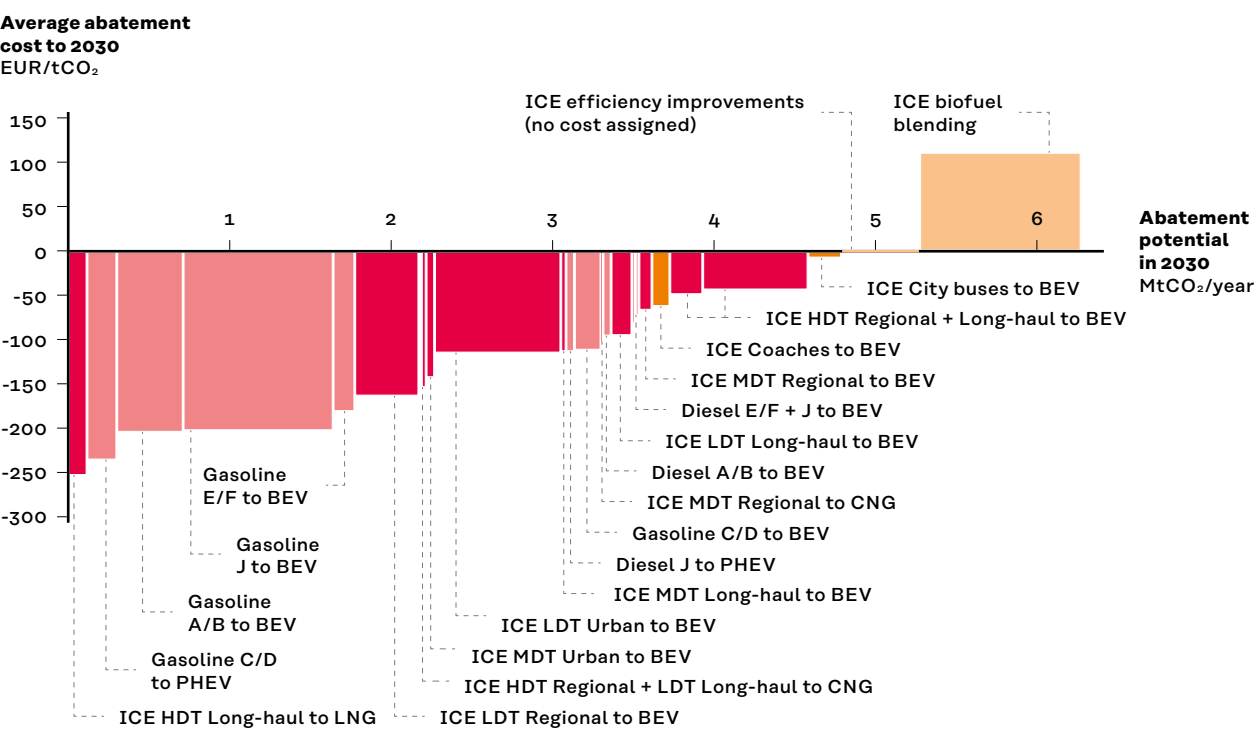

Million tonnes of CO_2e
71
16
21
12
5
16
56
14
15
11
2
13
47
9
16
9
2
11
43
2030 EU compliant target:
40% decrease vs 1990
29
2030 target in line with
Paris Agreement:
60% decrease vs 1990
1990
2015
2030
All non-CO_2 and agriculture and waste management
Buildings CO_2
Transport CO_2
Industry CO_2
Power and heat CO_2


Average abatement cost to 2030
EUR/tCO₂
Trucks
Passenger cars
Buses/coaches
All vehicles
Power and heat
Buildings
Industry
200
150
100
50
0
-50
-100
-150
-200
-250
-300
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
LNG trucks
Onshore wind replacing fossil fuels
Offshore wind replacing fossil fuels
CHP coal to biomass
ICE efficiency
CHP peat to biomass
Biofuel blending rate increase
Residential oil boilers to heat pumps and electric heating
Industry energy efficiency
Electrification of paper mills
Electric coaches
Commercial oil boilers to heat pumps
Commercial oil boilers to electric heating
A steel plant converted to DRI-EAF with hydrogen
Cement making to biomass and CCS
Biogas heating in refining
Electric passenger cars
Electric trucks
Abatement potential in 2030
MtCO₂/year



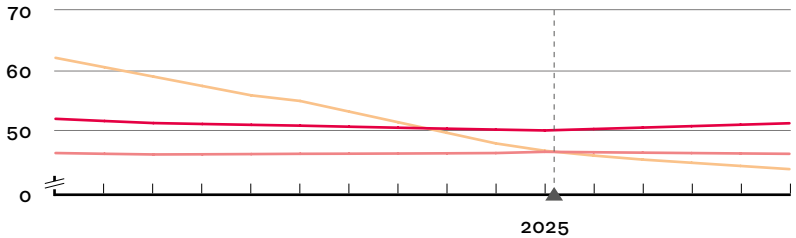
- Trucks
- Passenger cars
- Buses/coaches
- All vehicles

A/B	small cars segment	HDT	heavy-duty truck, >16t
C/D	mid-sized cars segment	BEV	battery electric vehicle
E/F	large cars segment	CNG	compressed natural gas
J	sport utility cars segment	LNG	liquified natural gas
LDT	light-duty truck, <7t	ICE	internal combustion engine
MDT	medium-duty truck, >7t, <16t	PHEV	plug-in hybrid electric vehicle

Cost projections, 1,000 EUR/vehicle

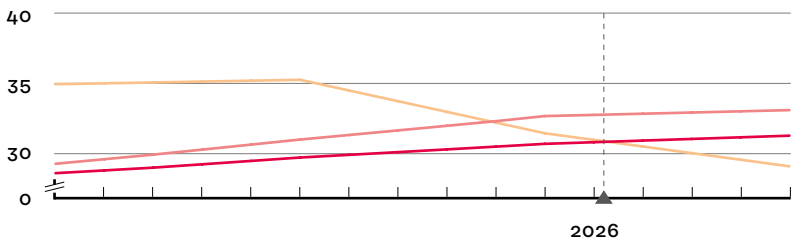
TCO:

Total cost of a vehicle over its lifetime



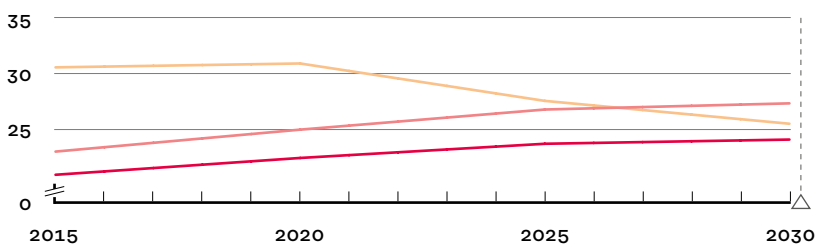
3 YEAR TCO:

Typical perceived cost of a consumer



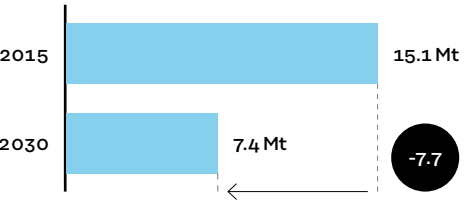
UP-FRONT COST:

Purchase price + for EV a home charger and 2 battery replacements



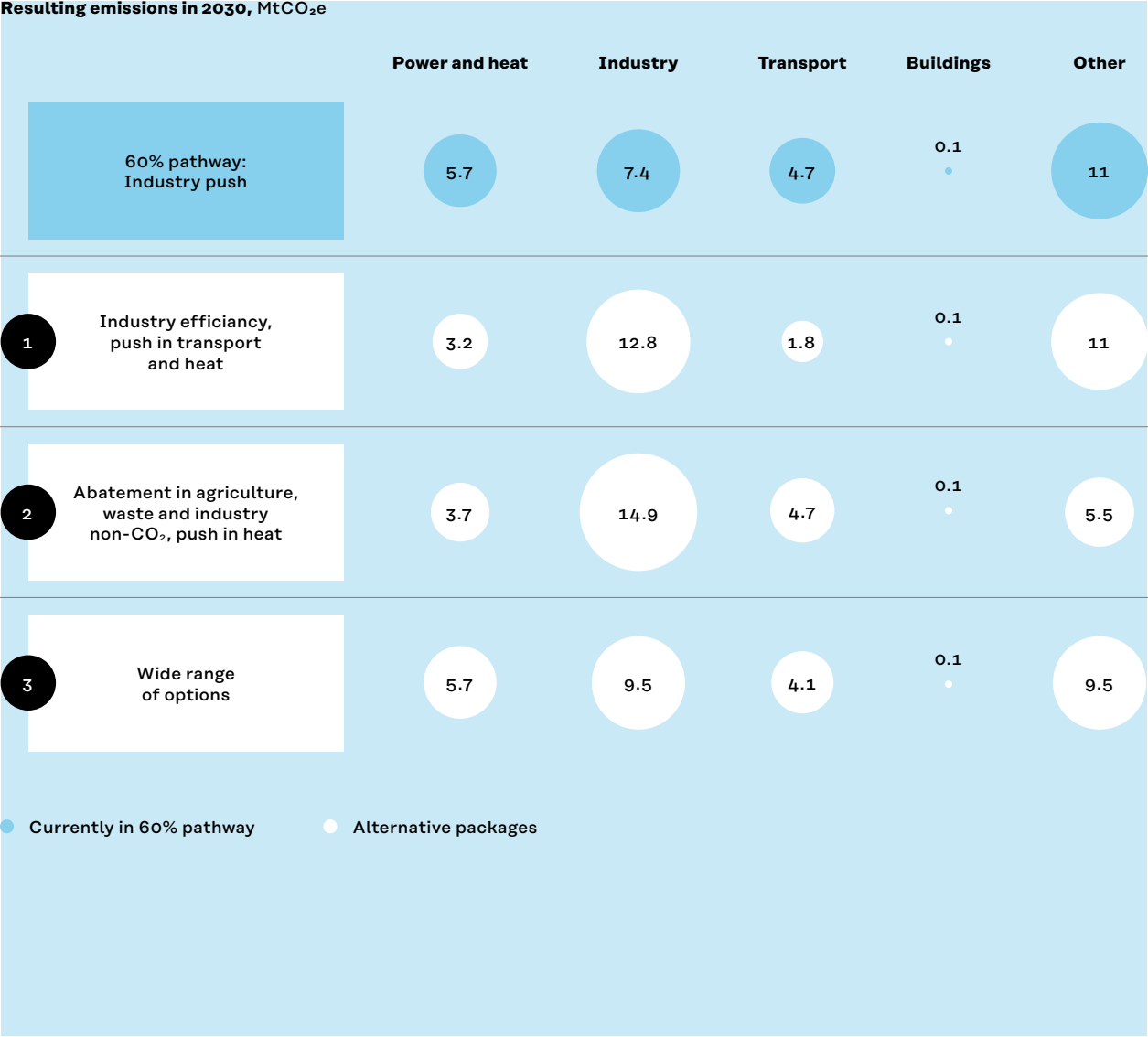
Gasoline vehicle · Diesel vehicle · Battery electric vehicle · Electric vehicle becomes the cheapest option

Sector CO_2 emissions and pathway abatement



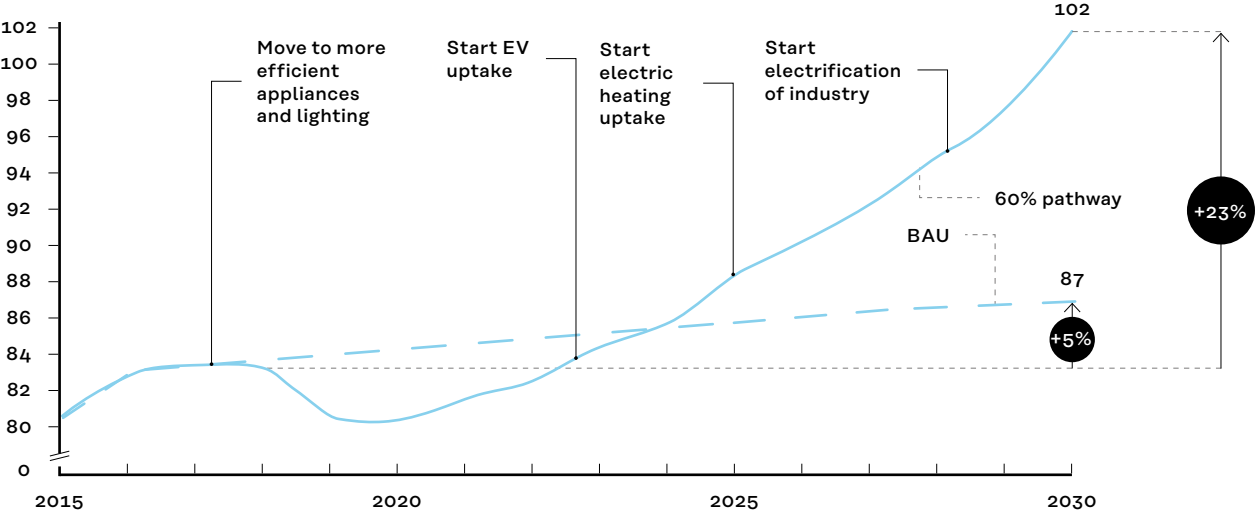
Average cost per tonne

Resulting emissions in 2030, $MtCO_2e$

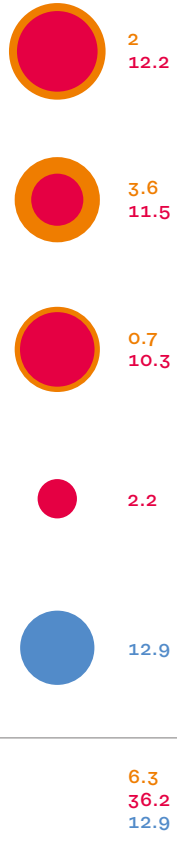


Sector	2015 Emissions, $MtCO_2e$	2030 Current policies – BAU, $MtCO_2e$	2030 40% pathway, $MtCO_2e$	2030 60% pathway, $MtCO_2e$
Industry CO_2	15	16	15	7
Power and heat CO_2	14	9	7	6
Transport CO_2	11	9	6	5
Buildings CO_2	2	2	1	0.1
Other: agriculture, waste management, non-CO_2	13	11	11	11
Total:	**56**	**47**	**40**	**29**

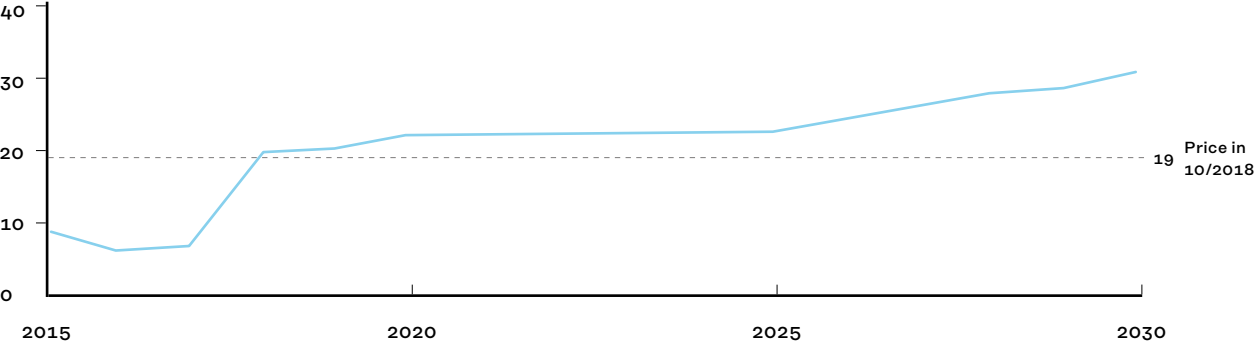
Annual power demand, TWh



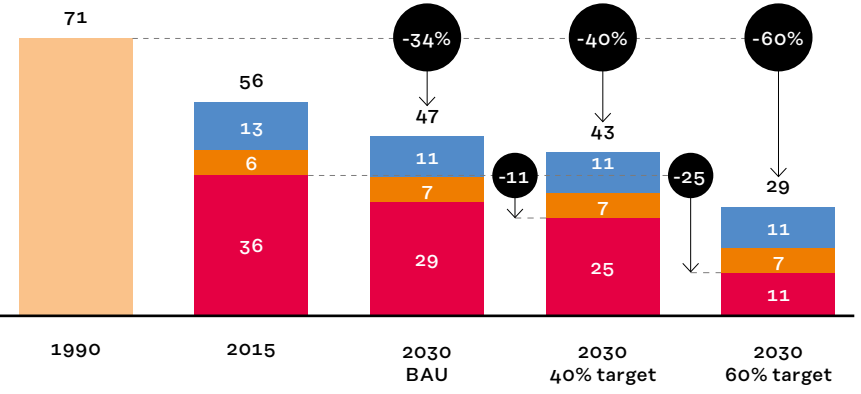
Sector	Emissions 2015, $MtCO_2e$	Modelled at technology level	Modelled to follow BAU	Projected according to WEM
Power and heat CO_2	14.3	• Electricity generation • CHPs	• Heat only plants	
Industry CO_2	15.1	• Steel, refining, cement, ethylene, pulp and paper	• Other industry (incl. agriculture and forestry working machines)	
Transport CO_2	11.0	• Road transport	• Rail and marine transport and aviation	
Buildings CO_2	2.2	• Space and water heating • Lighting, household appliances		
Other	12.9			• Non-CO_2 GHG • Waste management • Agriculture
Total	55.5	36.2	6.3	12.9

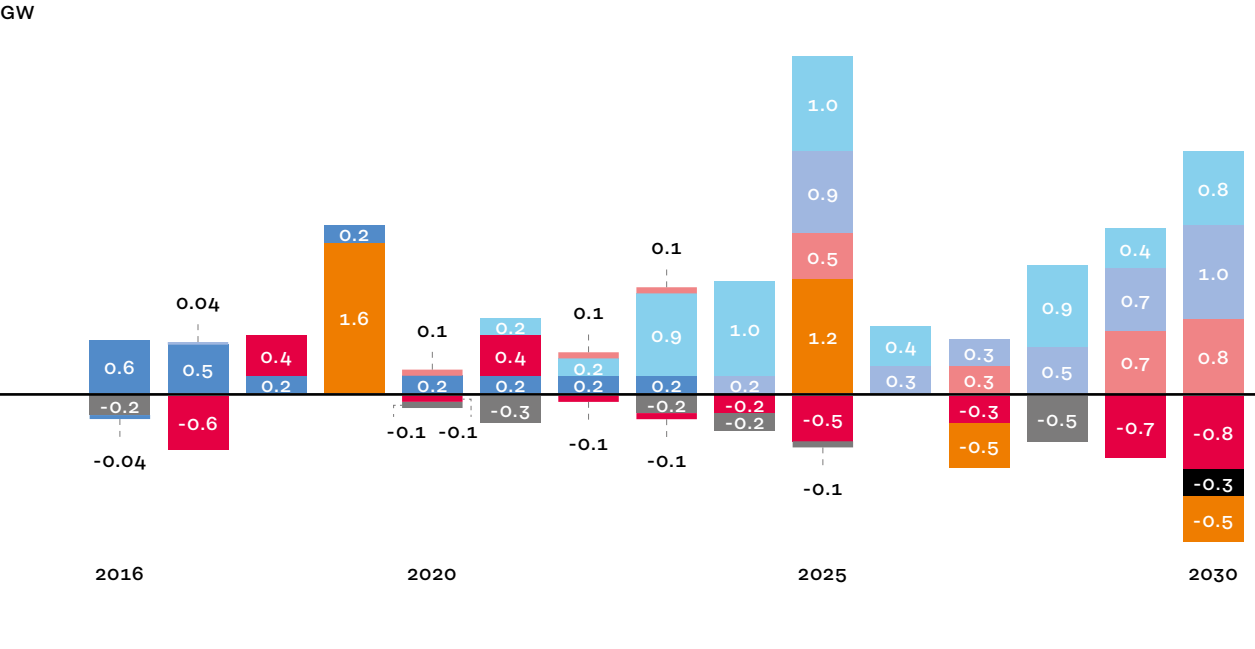


EU ETS CO_2 price,
EUR/tCO_2

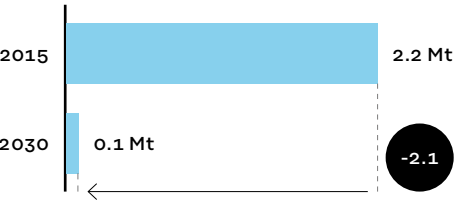


Historical and projected scenario emissions, $MtCO_2e$



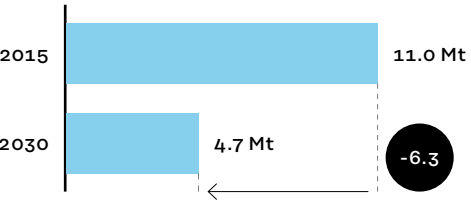

GW
0.6
-0.2
-0.04
0.5
-0.6
0.04
0.4
0.2
0.2
1.6
0.1
0.2
-0.1
-0.1
0.2
0.4
0.2
-0.3
0.1
0.2
0.2
-0.1
0.1
0.9
0.2
-0.2
-0.1
1.0
0.2
-0.2
-0.2
1.0
0.9
0.5
1.2
-0.5
-0.1
0.4
0.3
0.3
0.3
-0.3
-0.5
0.9
0.5
-0.5
0.4
0.7
0.7
-0.7
0.8
1.0
0.8
-0.8
-0.3
-0.5
2016
2020
2025
2030
Onshore wind
Offshore wind
Storage/flexibility
CHP
CHP switch to biomass
Nuclear
Coal-fired condensing power
Other condensing power
incl. oil, peat and gas

Sector CO_2 emissions and pathway abatement



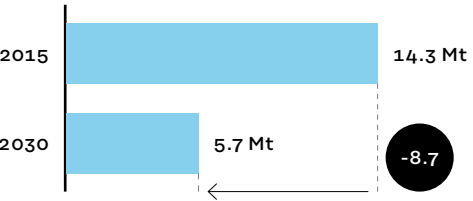
Average cost per tonne

Sector CO_2 emissions and pathway abatement

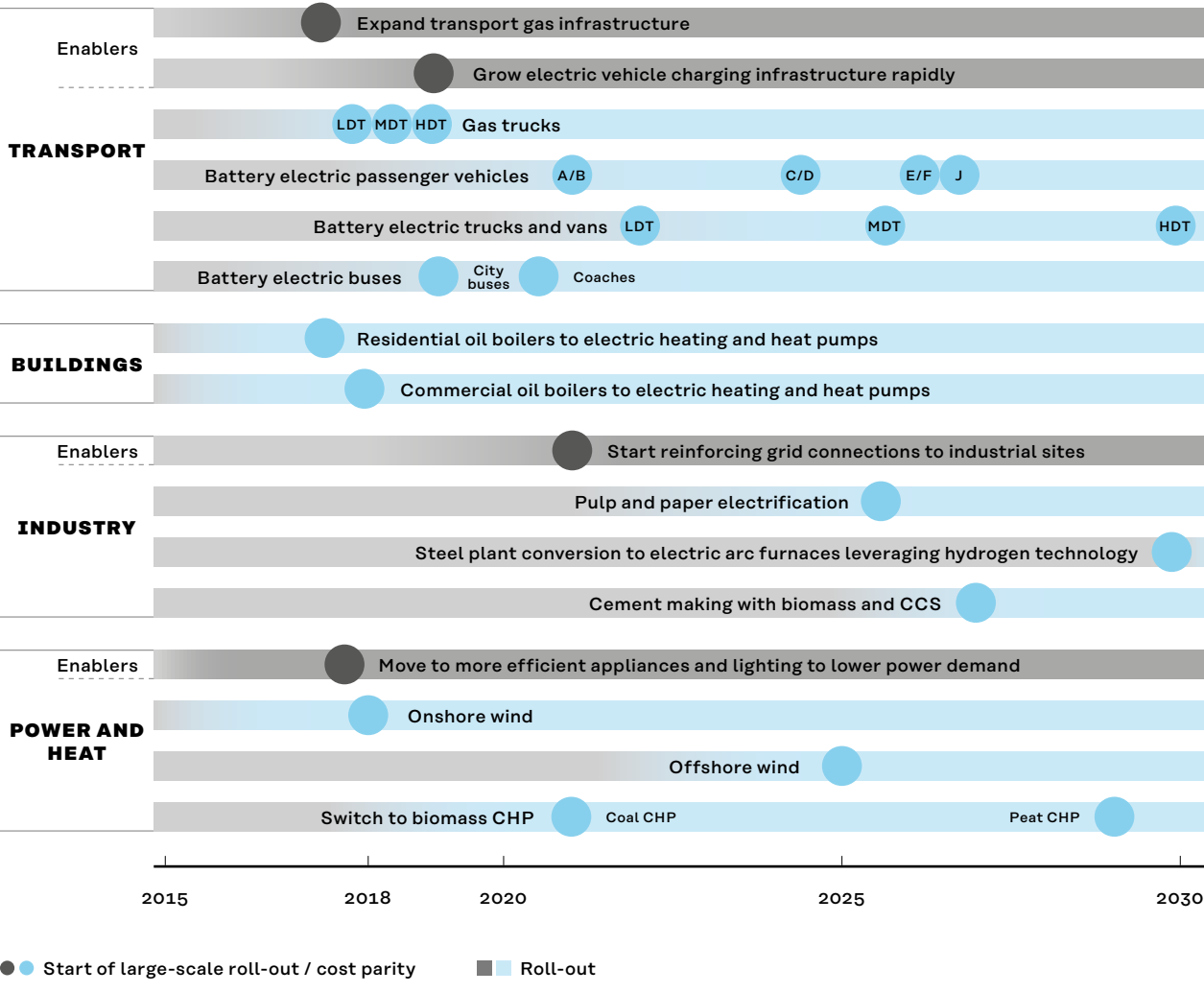


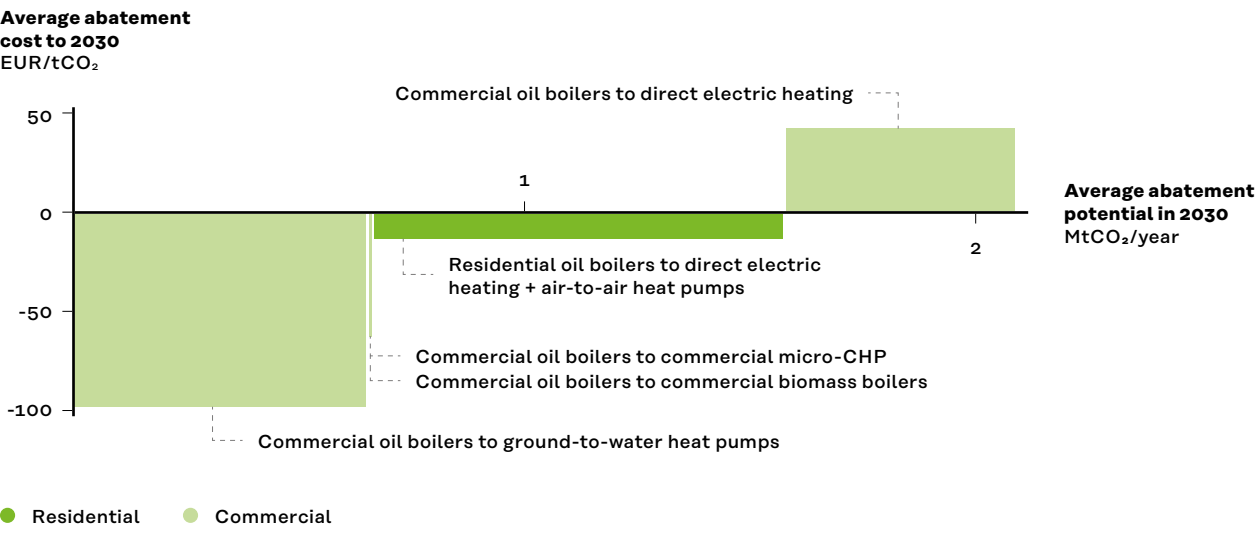
Average cost per tonne

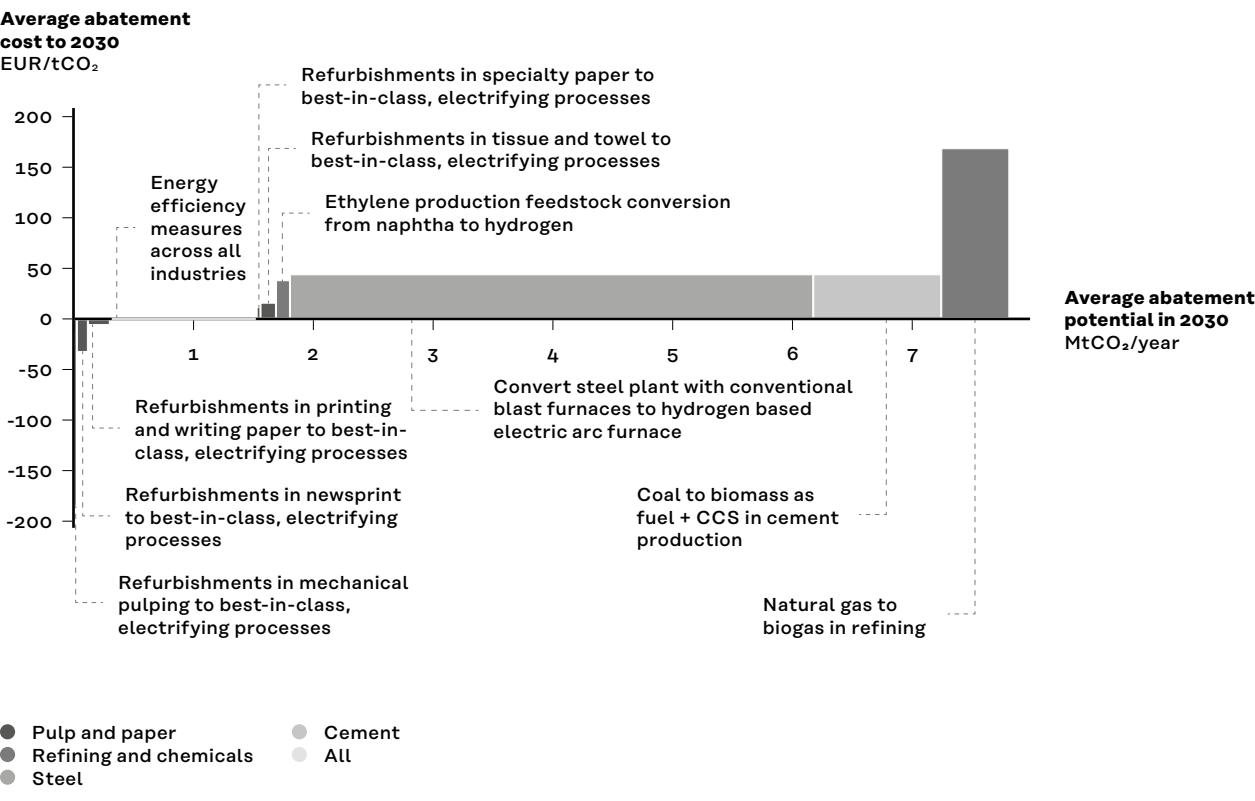
Sector CO_2 emissions and pathway abatement

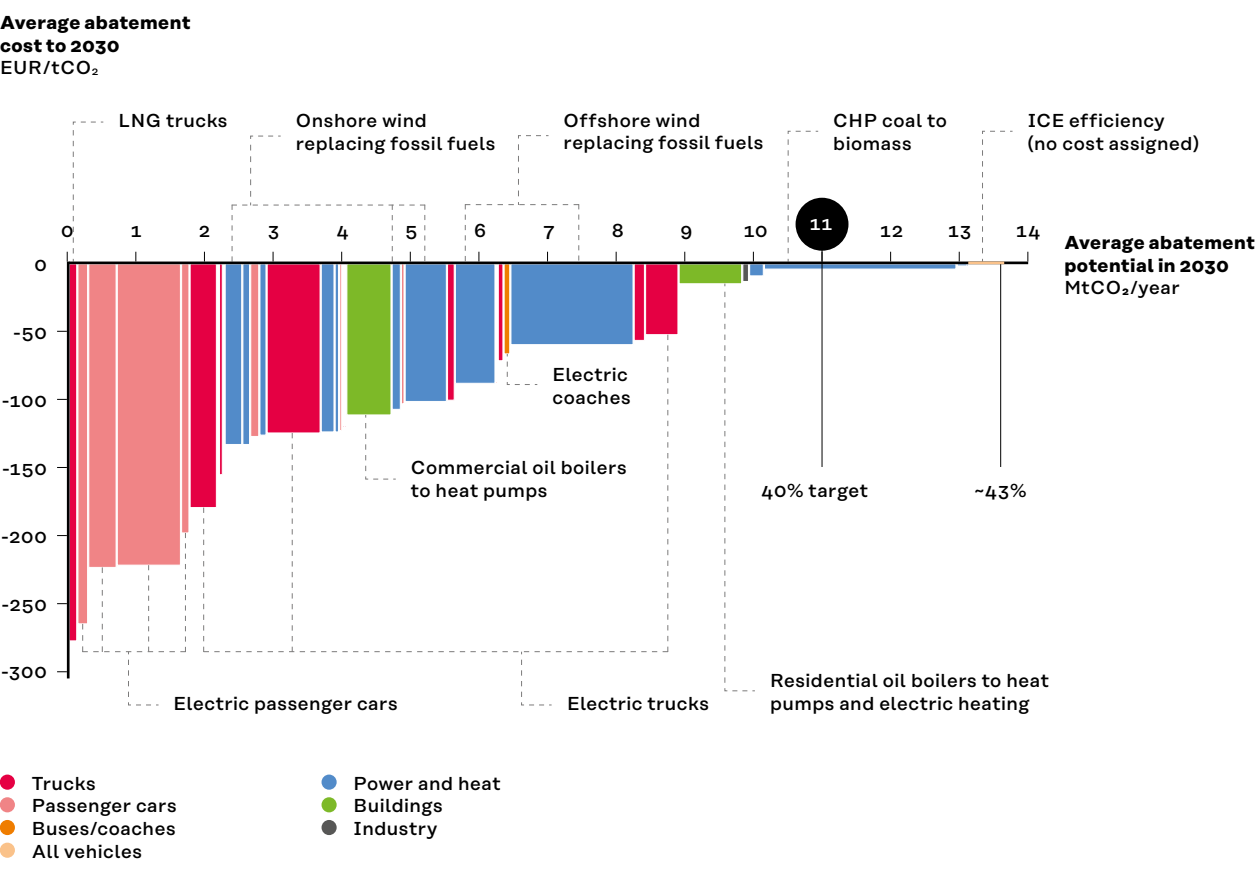


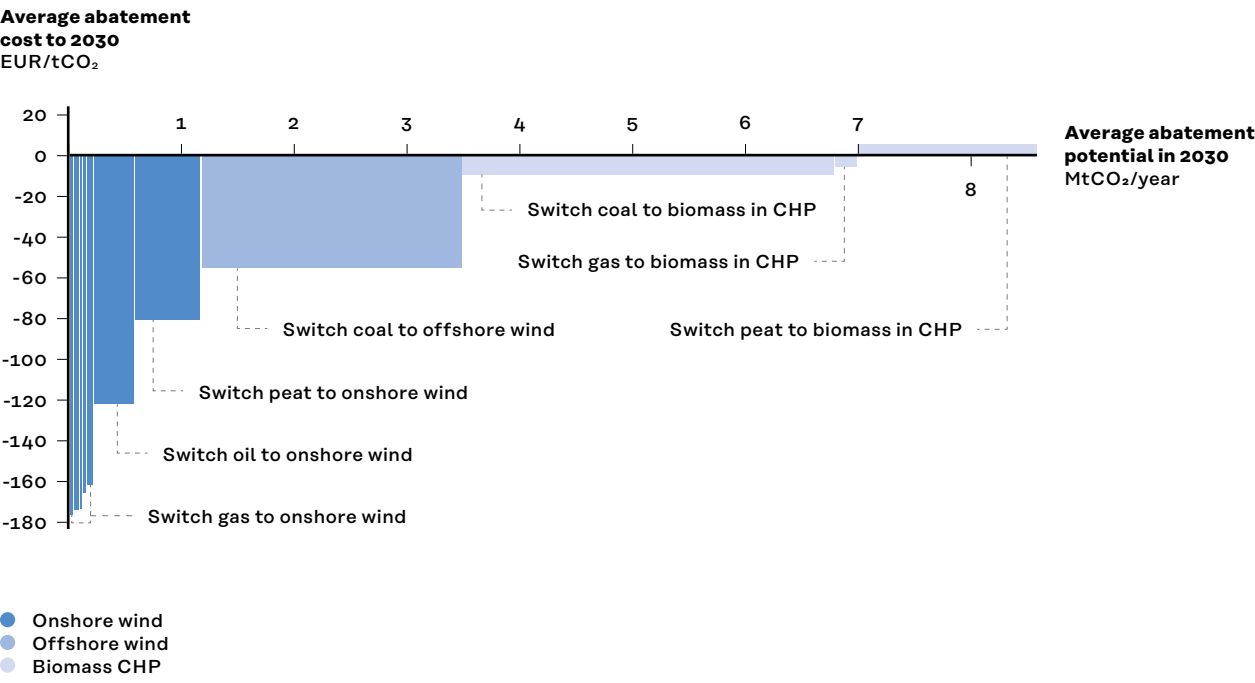
Average cost per tonne

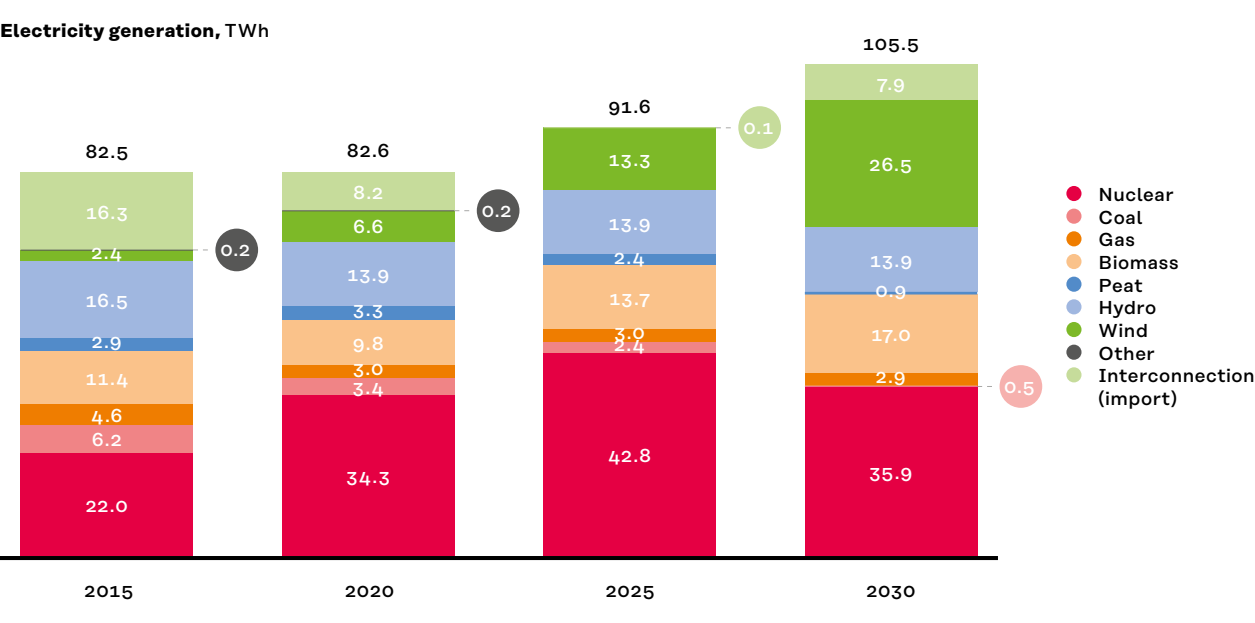

Enablers
Expand transport gas infrastructure
Grow electric vehicle charging infrastructure rapidly
TRANSPORT
LDT
MDT
HDT
Gas trucks
Battery electric passenger vehicles
A/B
C/D
E/F
J
Battery electric trucks and vans
LDT
MDT
HDT
Battery electric buses
City buses
Coaches
BUILDINGS
Residential oil boilers to electric heating and heat pumps
Commercial oil boilers to electric heating and heat pumps
Enablers
Start reinforcing grid connections to industrial sites
INDUSTRY
Pulp and paper electrification
Steel plant conversion to electric arc furnaces leveraging hydrogen technology
Cement making with biomass and CCS
Enablers
Move to more efficient appliances and lighting to lower power demand
POWER AND HEAT
Onshore wind
Offshore wind
Switch to biomass CHP
Coal CHP
Peat CHP
2015
2018
2020
2025
2030
Start of large-scale roll-out / cost parity
Roll-out


Average abatement cost to 2030
EUR/tCO2
50
0
-50
-100
Commercial oil boilers to direct electric heating
1
2
Average abatement potential in 2030
MtCO2/year
Residential oil boilers to direct electric heating + air-to-air heat pumps
Commercial oil boilers to commercial micro-CHP
Commercial oil boilers to commercial biomass boilers
Commercial oil boilers to ground-to-water heat pumps
Residential
Commercial


Average abatement cost to 2030
EUR/tCO₂
200
150
100
50
0
-50
-100
-150
-200
1
2
3
4
5
6
7
Average abatement potential in 2030
MtCO₂/year
Refurbishments in specialty paper to best-in-class, electrifying processes
Refurbishments in tissue and towel to best-in-class, electrifying processes
Energy efficiency measures across all industries
Ethylene production feedstock conversion from naphtha to hydrogen
Refurbishments in printing and writing paper to best-in-class, electrifying processes
Convert steel plant with conventional blast furnaces to hydrogen based electric arc furnace
Refurbishments in newsprint to best-in-class, electrifying processes
Coal to biomass as fuel + CCS in cement production
Refurbishments in mechanical pulping to best-in-class, electrifying processes
Natural gas to biogas in refining
Pulp and paper
Refining and chemicals
Steel
Cement
All


Average abatement cost to 2030
EUR/tCO₂
LNG trucks
Onshore wind replacing fossil fuels
Offshore wind replacing fossil fuels
CHP coal to biomass
ICE efficiency (no cost assigned)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Average abatement potential in 2030
MtCO₂/year
0
-50
-100
-150
-200
-250
-300
Electric coaches
Commercial oil boilers to heat pumps
40% target
~43%
Electric passenger cars
Electric trucks
Residential oil boilers to heat pumps and electric heating
Trucks
Passenger cars
Buses/coaches
All vehicles
Power and heat
Buildings
Industry


Average abatement cost to 2030
EUR/tCO₂
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
1
2
3
4
5
6
7
8
Average abatement potential in 2030
MtCO₂/year
Switch coal to biomass in CHP
Switch gas to biomass in CHP
Switch coal to offshore wind
Switch peat to biomass in CHP
Switch peat to onshore wind
Switch oil to onshore wind
Switch gas to onshore wind
Onshore wind
Offshore wind
Biomass CHP


Electricity generation, TWh
82.5
16.3
2.4
16.5
2.9
11.4
4.6
6.2
22.0
0.2
82.6
8.2
6.6
13.9
3.3
9.8
3.0
3.4
34.3
0.2
91.6
13.3
13.9
2.4
13.7
3.0
2.4
42.8
0.1
105.5
7.9
26.5
13.9
0.9
17.0
2.9
35.9
0.5
2015
2020
2025
2030
Nuclear
Coal
Gas
Biomass
Peat
Hydro
Wind
Other
Interconnection (import)