Enel's performance in fighting against climate change

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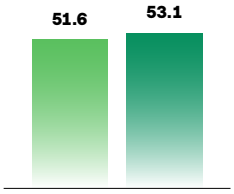
Our carbon footprint

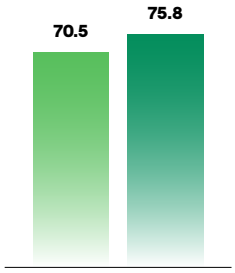
2021 2022

Total **direct GHG** emissions Scope 1 ($MtCO_{2eq}$)



Total **indirect GHG** emissions Scope 2 ($MtCO_{2eq}$)

Total **indirect GHG** emissions Scope 3 ($MtCO_{2eq}$)



Total **GHG** emissions ($MtCO_{2eq}$)

Value chain	Generation	Trading	Networks	End customers	Other
Global Business Lines					**Real Estate and others**
GHG Scope 1 direct emissions ($MtCO_{2eq}$)	**1** Generation from thermal sources 50.71 52.11 **2** Other 0.45 0.54		**3** SF_6 losses in the networks 0.11 0.11 **4** Auxiliary motors in networks 0.21 0.22		**5** Offices 0.01 0.01 **6** Company fleet 0.07 0.08
GHG Scope 2 indirect emissions ($MtCO_{2eq}$) (location based)	**7** Electricity purchased from the grid 0.63 0.57		**7** Electricity purchased from the grid 0.14 0.16 **8** Technical losses from the grid 2.97 3.26		**7** Electricity purchased from the grid (offices) 0.03 0.03
GHG Scope 3 indirect emissions ($MtCO_{2eq}$)		**9** Upstream Fuels 11.25 10.31 **10** Electricity purchased for sale 23.96 28.40		**11** Sales of gas 22.25 22.90	**12** Supply chain 12.99 14.18 **13** Transport of other raw materials and waste 0.00 0.01

Source		Description	2021 $MtCO_{2eq}$	2022 $MtCO_{2eq}$
1	Generation from thermoelectric sources	Combustion of fossil fuels in generation activities (CCGT, Oil&Gas and coal thermal plants and Biomass).(1) This includes:		
		• CO_2 emissions	50.56	51.93
		• CH_4 (GWP=28) and N_2O emissions (GWP=265)	0.16	0.18
2	Other	CO_2, CH_4, N_2O emissions from fossil fuel use in auxiliary engines in nuclear and renewable plants	0.03	0.02
		NF_3 losses (GWP=16,100) in solar panel generation activity(2)	0.00	0.00
		SF_6 losses (GWP=23,500) in insulation systems of power plants	0.03	0.04
		Use of refrigerant gases Fgas and ODS in thermal and hydroelectric plants	0.01	0.01
		CH_4 leakages in gas-fired thermal power plants(3)	0.00	0.01
		CH_4 biogenic emissions from hydroelectric basins	0.32	0.32
		CO_2, CH_4, N_2O emissions from transport of fuels (LNG and coal) on vessels under own operational control	0.06	0.15
3	SF_6 losses in the networks	SF_6 losses (GWP=23,500) in insulating systems for power distribution activities	0.11	0.11
4	Auxiliary motors in networks	CO_2, CH_4, N_2O emissions of fossil fuel use in auxiliary engines in network assets	0.21	0.22
5	Offices	CO_2, CH_4, N_2O emissions from diesel and natural gas combustion for heating systems and canteens in offices, including all properties in all Business Lines and Group offices	0.01	0.01
6	Company fleet	CO_2, CH_4, N_2O emissions from diesel and gasoline combustion in company fleet vehicles	0.07	0.08
7	Electricity purchased from the grid for consumption(4)	GHG emissions from consumption of electricity purchased from the grid (location based):		
		• In energy power plants (including 3SUN Factory, mines and port terminals)	0.63	0.57
		• In power distribution substations	0.14	0.16
		• Civil uses in the premises (computers, lighting, heating) and in the commercial offices (Market and Enel X)	0.03	0.03
8	Technical losses from the grid	GHG emissions from energy dissipation by distribution network losses under Enel's operational control (location based)	2.97	3.26
9	Upstream Fuels (Category 3)(5)	Emissions of CO_2, CH_4 and N_2O from the extraction and transport of fuels used in thermal power plants:		
		• Coal	1.24	1.88
		• Gas	10.01	8.42
		• Diesel & fuel oil	0.01	0.01
10	Electricity purchased for sale (Category 3)(5)	Emissions for the generation of electricity purchased and sold to end customers (retail market, $MtCO_{2eq}$ in 2022 and 2021, respectively)	23.96	28.40
11	Gas sales (Category 11)(4)	Emissions from the use of gas sold to end customers (retail market)	22.25	22.90
12	Supply chain(5) (6) (7)	GHG emissions from the supply chain, related to the production of goods and services purchased from suppliers	12.99	14.18
13	Transport of other raw materials and waste (Category 4)(5) (8)	GHG emissions from road transport of other fuels, raw materials and waste	0.00	0.01

GHG Scope 1 | GHG Scope 2 | GHG Scope 3

- GHG source considered in SBTi target on Scope 1 GHG emission intensity relating to power generation.
- GHG source considered in the SBTi target on the intensity of GHG Scope 1 and 3 emissions relating to Integrated Power.
- GHG source considered in the SBTi target on absolute Scope 3 GHG emissions relating to Retail Gas.
- GHG source considered in SBTi target on absolute additional GHG emissions Scope 1, 2 and 3.
- GHG source excluded from SBTi targets boundary.

(1) Following the guidance of the GHG Protocol, CO_2 emissions from biomass, which amounted to 114,838 tCO_2 in 2022 (125,878 tCO_2 in 2021), were not included as they cannot be considered within Scope 1, while CH_4 and N_2O emissions were considered.
(2) NF_3 losses were 14 tCO_{2eq} in 2021 and 4 tCO_{2eq} in 2022.
(3) CH_4 leakage in gas-fired thermal power plants was 3,255 tCO_{2eq} in 2021 and 6,754 tCO_{2eq} in 2022.
(4) 2021 figure restated following the introduction of a new method for calculating GHG emissions from pumping systems.
(5) Scope 3 categories according to the GHG Protocol.
(6) 2021 figure restated following the implementation of a new, more precise methodology for calculating indirect emissions related to work performed in the power distribution business.
(7) 29% of 2022 emissions contribute to the target on absolute additional GHG Scope 1, 2 and 3 emissions in 2030 and 43% in 2040 (these percentages cannot be added together).
(8) GHG emissions from transport of other fuels, raw materials and waste on wheels are 4,032 tCO_{2eq} in 2021 and 9,842 tCO_{2eq} in 2022.

The calculation of Scope 1, 2 and 3 emissions covers all greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NF_3), depending on the type of emission source.

In 2022, Enel's carbon footprint was 132.9 $MtCO_{2eq}$ (up from 2021 by 6%), broken down as follows:

- **Scope 1**: 53.1 $MtCO_{2eq}$, representing 40% of total GHG emissions (98.2% of these emissions of CO_2, CH_4 and N_2O result from the combustion of fossil fuels in thermal power plants for electricity generation). Despite the positive impact of the sales of gas-fired plants in Russia and the closure of coal-fired plants in Chile, there was a 3% increase in direct emissions compared to 2021, due to an increase in coal-fired electricity generation in Europe of about 7 TWh (61.5% increase compared to 2021) as a result of the current geopolitical environment and various weather factors, including a reduction in gas availability and an increase in drought, which limited hydroelectric generation in Europe (7 TWh less compared to 2021, a 31% reduction). The percentage of emissions related to EU-ETS is 66.8% of the total Scope 1 (compared to 61.5% in 2021) and the percentage of emissions related to the green tax system in Chile (Sistema de Impuestos Verdes) accounted for 9.0%.

- **Scope 2**: 4.0 $MtCO_{2eq}$ accounting for 3% of the total GHG emissions. Despite the 6% reduction in scope 2 emissions from energy consumption in 2022 compared to 2021 due to a reduction of 9% of the energy consumption in 2022 (from 3.6 TWh to 3.2 TWh), there has been a 7% increase in overall Scope 2 emissions compared to 2021, due to the worsening of the emission factors of the electricity systems in some countries where Enel distributes energy, including Italy, Romania, Chile and Brazil, with a negative impact on indirect emissions related to technical grid losses, which have a weight of 81% in Scope 2.

- **Scope 3**: 75.8 Mt CO_{2eq} accounting for 57% of total GHG emissions. There has been an 8% increase over 2021 as a result of:
  - a 9% increase in indirect emissions from suppliers (from 13.0 $MtCO_{2eq}$ to 14.2 $MtCO_{2eq}$), due to a 19% increase in the volumes (measured in euro) of products, services and works ordered, although the ratio of greenhouse gas emissions to volumes ordered improved by 8% due to the circularity approach in procurement (from 968 tCO_{2eq}/€ to 889 tCO_{2eq}/€);
  - a 19% increase in indirect emissions from the purchase of energy for sale to end customers (from 24.0 $MtCO_{2eq}$ to 28.4 $MtCO_{2eq}$), mainly due to the worsening of the emission factors of the electricity systems in which Enel purchases electricity in the wholesale market;
  - a 52% increase in indirect emissions from the coal mining and transport process for thermal power plants (from 1.2 $MtCO_{2eq}$ to 1.9 $MtCO_{2eq}$), due to the geopolitical context and the drought period in Europe. In spite of this, indirect emissions related to the process of extracting and transporting gas for thermal power plants and end customers decreased by 16% in 2022 compared to the previous year (from 10.0 $MtCO_{2eq}$ to 8.4 $MtCO_{2eq}$).

CO_2 emissions from biomass combustion, not included in Scope 1, were 114,838 tCO_2 in 2022, down 9% from 2021.

In 2022, the trend in intensity metrics compared to 2021 was as follows:

Intensity metric	2021 (gCO_{2eq}/kWh)	2022 (gCO_{2eq}/kWh)	Var. %	
CO_2 emissions intensity relating to power generation	222	225	1.4%	Metric considered for the 2020-2022 long-term incentive program. Takes into account CO_2 emissions relating to power generation, excluding other greenhouse gases. The target set in 2022 of 220 gCO_2/kWh was not reached due to the following exogenous factors related to the geopolitical context: • non-authorization of the closure of the As Pontes coal-fired plant (Spain), requested in 2019 for 2021; • three-month delay in authorizing the closure of the Bocamina coal-fired plant (Chile). The sterilization of these exogenous effects leads to a result of 220 gCO_2/kWh.
Scope 1 GHG emissions Intensity relating to Power Generation	225	229	1.8%	Metric considered in the Sustainability-Linked Financing Framework. It considers Scope 1 emissions relating to power generation (including heat), including CO_2, CH_4 and N_2O, and excluding pumped storage power generation. The increase compared to 2021 is mainly due to higher coal production in Europe following the drought period (particularly in Italy) and the geopolitical context.
Scope 1 and 3 GHG emissions Intensity relating to Integrated Power	203	218	7.4%	Metric considered in the Sustainability-Linked Financing Framework. It is calculated as the combination of the Group's direct GHG emissions (Scope 1, including CO_2, CH_4 and N_2O) from power generation and the Group's indirect GHG emissions (Scope 3) from generation of electricity purchased and sold to end customers, divided by power generation (including heat and excluding pumped storage generation) and purchase of electricity. In addition to the exogenous factors already indicated in the previous metrics on direct emissions, the increase compared to 2021 is also due to an increase in indirect emissions relating to the purchase of energy caused by a worsening of the emission factors of the electricity systems in which Enel sells electricity to the end customer.
Scope 1 GHG emissions intensity	229	233	1.7%	The metric considers 100% of direct emissions (Scope 1), including those from power generation (and other emissions in plants), energy distribution, the vehicle fleet and buildings, compared to all power generation (except pumped storage generation). The increase is due to the exogenous factors described above.

The GHG inventory statements were audited by DNV GL, one of the main certification bodies world-wide, with a reasonable level of certainty for Scope 1, Scope 2 and Scope 3 emissions, as limited to the sale of natural gas, and with a limited level of certainty for the other Scope 3 emissions included within the scope of application of the inventory. The audit was conducted according to Standard ISO 4064-3 for the compliance of greenhouse gas (GHG) inventories with the WBCSD/WRI Corporate Accounting and Reporting Standard (GHG Protocol). Furthermore, the calculation of Scope 1, 2 and 3 emissions has been subject to reasonable assurance by the independent auditing company, KPMG SpA.

For more details concerning Enel's carbon footprint, please refer to the 2022 GHG inventory (accessible via the following link: https://www.enel.com/content/dam/enel-com/documenti/investitori/sostenibilita/ghg-inventory-2022.pdf).

Financial, operational and environmental metrics

The main metrics and financial goals regarding the risks and opportunities connected to climate change, as well as the operational metrics along the entire value chain and the environmental ones, are reported below.

Financial metrics

	UM	2022	2021	2022-2021	%
Ordinary EBITDA for low-carbon products, services and technologies[1]	billions of euros	13.9	17.3	3.4	-19.6
	% of tot EBITDA	70.6	90.1	-19	-
Capex for low-carbon products, services and technologies[2]	billions of euros	13.3	12.3	1.05	8.5
	% of total Capex	92.1	93.9	-1.8	-
Revenues from coal plants[3]	billions of euros	6.5	1.9	4.6	-
	% of total Revenues	4.6	2.2	2.4	-
Revenues from thermal generation[3]	billions of euros	24.1	12.9	11.2	86.8
	% of total Revenues	17.2	15.1	2.1	-
Revenues from nuclear plants[3]	billions of euros	1.6	1.4	0.2	14.3
	% of total Revenues	1.1	1.6	-0.5	-
Debt ratio with sustainability criteria	%	63	55	8	-
CO_2 reference price	€/ton	78.2	53.2	24.9	46.8

(1) 2021 figure has been restated to integrate the changes of gas margin due to a change of the control model.
(2) 2021 figure has been restated to consider the inclusion of Latin American retail business in Enel Grids.
(3) 2021 figure has been restated to consider the classification in the count "net results of discontinued operations" concerning the results from the business activities performed in in Russia (disposed in the fourth quarter of 2022), Romania and Greece as they meet the requirements established in the international accounting principle IFRS 5 for the classification of "discontinued operations".

In 2022, Enel's ordinary EBITDA associated with low-carbon emissions services and solutions was 13.9 billion euros, down 19.6% from 2021. The Capex dedicated to low-carbon emission technologies, services and solutions has increased as compared to 2021, reaching 13.3 billion euros, equal to 92.1% of total Capex.

The percentage share of revenues from coal-fired plants increased, mainly due to the need to compensate for low hydraulicity in Italy and Spain due to adverse weather conditions that severely penalized hydroelectric generation in 2022. Specifically, in 2022, revenues related to coal-fired plants correspond to 4.6% of the Group's total revenues.

Enel's strategy of promoting a sustainable financial model has contributed to reaching 63% of debt related to the sustainability objectives.

With regard to the effects of climate change issues, the Group considers them an implicit element in the application of the methodologies and models used to make estimates in the valuation and/or measurement of certain accounting items. Furthermore, the Group has also taken into account the impacts of climate change in the significant judgments made by management. In this regard, the main items included in the Consolidated Financial Statements for the year ended December 31, 2022 affected by the use of management's estimates and judgments concern the impairment of non-financial assets, bonds related to the energy transition, including those for decommissioning and site restoration of certain power generation plants. For further details please refer to Section 5. Climate Change Disclosures in the 2022 Integrated Annual Report.

Operational metrics

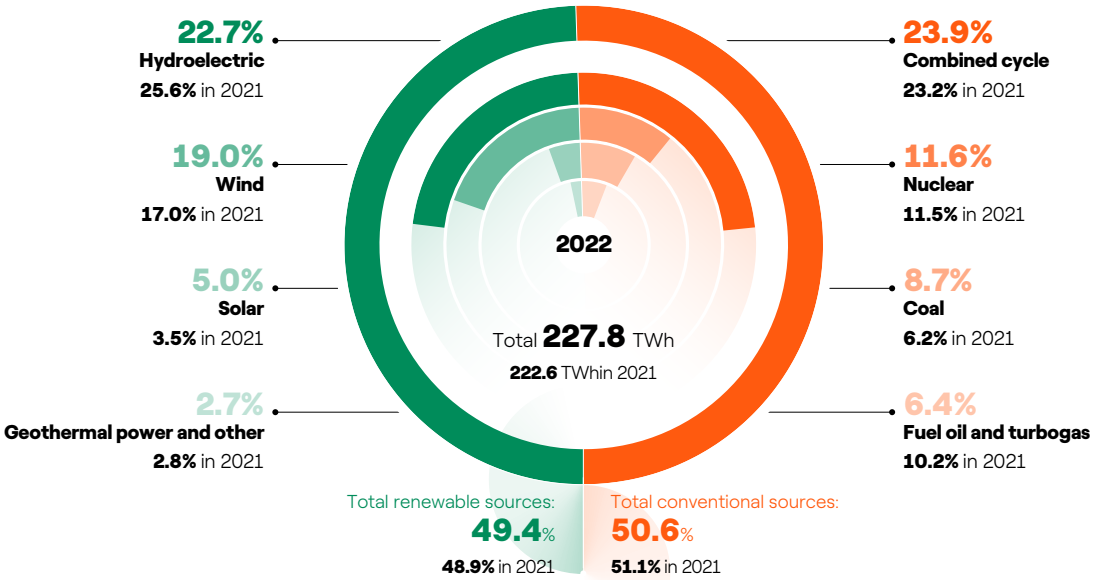
302-1 | EU1 | EU2 | EU3 | EU11 | EU30

Segment of the electricity value chain		UM	2022	2021	2022-2021	%
GENERATION	**Net installed maximum capacity[1]**	**GW**	**84.6**	**87.1**		
	- of which renewables	%	63.3	57.5		-
	- of which thermoelectric	%	32.8	38.7		-
	- of which nuclear	%	3.9	3.8		-
	Net generation[2]	**TWh**	**227.8**	**207.1**		
	- of which renewables	%	49.4	48.9		-
	- of which thermoelectric	%	39.0	39.6		-
	- of which nuclear	%	11.6	11.5		-
	Additional indicators					
	Average thermoelectric park efficiency (%)[3]	%	42.8	42.9	-0.1	
	Total direct fuel consumption	Mtep	26.5	26.3	0.2	0.8
NETWORKS	**Digitalization**					
	End users with active smart meters[4]	no.	45,824,963	44,968,974	855,989	1.9
	Smart meters (coverage)	%	63	60	3.0	-
RETAIL	**Electrification, energy efficiency and digitalization**					
	Publicly owned charging points for electric mobility[5]	.000	22.6	18.1	4.5	24.9
	Electric buses	.000	5.3	3.0	2.3	76.7
	Smart public lighting	mil	3.0	2.8	0.2	7.1
	New services					
	Demand response capacity	MW	9,004	7,713	1,291	16.7
	Storage capacity	MW	760	375	385	-

(1) Does not include managed capacity of 4.9 GW in 2022 and 3.3 GW in 2021.
(2) Does not include generation from managed capacity of 11.3 TWh in 2022 and 9.6 TWh in 2021.
(3) The value is calculated on the park's plants and is weighted on the production values.
(4) The figures for 2021 have been restated. Of which second-generation smart meters 25.2 million in 2022 and 23.5 million in 2021.
(5) KPIs changed from previous year, with focus on publicly owned infrastructure.

The net electricity generated by Enel in 2022 increased by 5.2 TWh (+2.3%) compared to the value recorded in 2021, mainly due to higher generation from wind sources (+5.5 TWh) mainly in Brazil and North America, a higher contribution from coal-fired plants (+5.9 TWh) in Italy, and higher generation from combined-cycle plants (+2.7 TWh) mainly in Spain and Chile. It should also be noted that the complete deconsolidation of the companies present in Russia took place in 2022, which led to a decrease in net power generated of 11.2 TWh for oil & gas and combined cycle sources only.

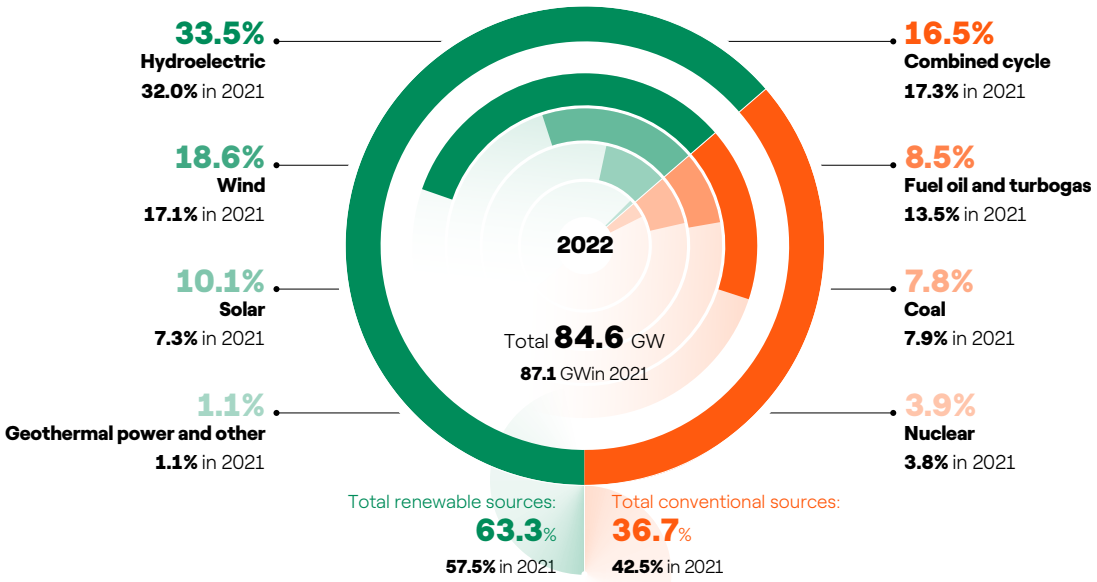
Net electricity generation by source (2022)



At the end of December 2022, Group's total net installed maximum capacity was 84.6 GW, down by 2.5 GW compared to 2021. In addition, Group's net renewable installed capacity reached 53.6 GW, up by 3.5 GW from 2021, and accounting for 63.3% of total net installed efficient power. During the year , 1.8 GW of new wind capacity was installed, mainly in North America, Brazil and Spain, and 2.6 GW of new solar capacity, mainly in Chile, the United States, Spain and India.

In addition, as already mentioned for net power generated, all companies in Russia totaling 5.3 GW were deconsolidated.

Net installed maximum capacity (2022)



In 2022, Enel maintained a key role in developing new solutions to accelerate the energy transition process through the development of 760 MW of storage capacity, increasing the current GW of demand response by 51% compared to 2021.
The digitalization of the electricity grid, which has been identified as a key enabler able to positively influence climate change through levers such as the integration of more renewable energy or an increase in energy efficiency, continued being a priority for Enel also in 2022. In particular, in 2022 the total number of end users with active smart meters grew 1.9% as compared to the previous year, reaching 45,824,963 in 2022.

Environmental metrics

302-3

The following table presents the environmental metrics related to climate change, in addition to the greenhouse gas emissions previously described. Refer to the chapter on "Conservation of natural capital" of 2022 Sustainability Report.

	UM	2022	2021	2022-2021	%
Specific withdrawal of freshwater[1]	l/kWh_{eq}	0.23	0.25	-0.02	-8.0
Withdrawal of water in water stressed areas[1] [2]	%	19.2	23.0	-3.7	-16.3
Generation with water withdrawal in water stressed areas[2]	%	13.3	14.0	-0.70	-5.0

(1) The new target of reducing specific freshwater withdrawals, turning its attention to the most valuable and vulnerable water resource, testifies to Enel's even more explicit commitment to the protection of natural habitats and the needs of the community. In particular, the objective is in keeping with the reporting and commitment requirements introduced by the new proposed EU EFRAG ESRS-E3 Water and Marine Resources standard, and with the environmental impact (or pressure) priorities indicated for corporate analysis of nature-related risks and opportunities by the international TNFD and SBTN frameworks.
(2) The total value of process and closed-loop cooling water withdrawals for the year 2021 was recalculated following the refinement conducted in 2022 of the way in which water withdrawn for cooling purposes at certain nuclear power plants in Spain was calculated.


Zero emissions ambition

Financial and operational targets

The table below shows the main operational objectives included in the 2023-2025 Strategic Plan, which reflect Enel's role in combating climate change along the entire electricity value chain, in addition to the GHG emission reduction targets described in the previous section.

Segment of the electricity value chain	Description of the goal	UM	2025
GENERATION	**Net installed maximum capacity[1]**	**GW**	**79.9**
	- of which renewables	%	76
	- of which thermoelectric	%	20
	- of which nuclear	%	4
	Net generation[2]	**TWh**	**204**
	- of which renewables	%	70
	- of which thermoelectric	%	17
	- of which nuclear	%	13
NETWORKS	**Digitalization**		
	Smart meter	mil	48.3
	Smart meters (coverage)	%	~80
MARKET	**Electrification, energy efficiency and digitalization**		
	Publicly owned charging points for electric mobility [3]	.000	31.4
	Electric buses	.000	12.965
	Smart public lighting	mil	3.3
	New services		
	Demand response capacity	GW	12.4
	Storage behind the meter	MW	352

(1) Does not include managed capacity and BESS, which are around 10 GW and about 5 GW by 2025, respectively.
(2) Does not include generation from managed capacity of approximately 25 TWh in 2025.
(3) KPI changed from previous year, with focus on publicly owned infrastructure.

In addition, the following targets have been set to 2030:

- renewable capacity out of the total: ~85% (~+20% from 2022);
- gas sold: ~3 bcm (-70% from 2022);
- demand response capacity: >20 GW (>2x compared to 2022);
- digitalized network customers: 100% (+37% compared to 2022).