Environmental reporting 2022

Extract from 2022 Universal Registration Document

3.5 ENVIRONMENTAL INFORMATION

ENGIE faces the main environmental challenges: climate change, the quality and availability of natural resources (air, water, soil and energy) and the protection of biodiversity and ecosystems. Although its activities sometimes have an impact on ecosystems and natural resources, the Group seeks to measure and reduce this via the environmental management of its activities.

ENGIE's challenges and ambitions in this area are reflected in the Group's environmental policy (available on the following webpage: https://www.engie.com/en/group/social-responsibility/policies) and in the performance indicators deployed across all its activities. The challenges also include the risks identified in the environmental vigilance plan. A team in charge of analysis and coordination is specifically dedicated to environmental responsibility and reports to the Group CSR Department. It has environmental coordinators in each region or country who lead their own networks of coordinators, organize actions, supplement corporate expertise with their knowledge of operations, and implement environmental reporting.

The Corporate Social Responsibility Department produces an annual report which is sent to the Executive Committee and then presented to the Board of Directors' Ethics, Environment and Sustainable Development Committee. This report is supplemented by Regional hubs' own reports and letters of environmental compliance, as well as the results of environmental audits ordered by the Executive Committee.

3.5.1 LEGAL AND REGULATORY FRAMEWORK

The Group actively monitors regulatory developments (set out in Chapter 2 "Risk factors and controls"), stating its positions while they are being prepared and applying the new rules as soon as they are published. In particular, the Group has been calling for the harmonization of international regulations and greater integration between the various environmental and energy policies. In the run-up to COP21, the Group strongly pledged to support an ambitious international climate agreement to limit the global temperature rise to 2°C. It also pledged to support the more widespread application of regulations on carbon pricing, which would be a strong signal for investment in low-carbon technologies and an incentive to reduce greenhouse gas emissions. To this end, the Group plays an active role in the CPLC (Carbon Pricing Leadership Coalition).

3.5.2 ENVIRONMENTAL MANAGEMENT

At the end of 2022, the entities that had implemented an Environmental Management System (EMS) accounted for 75.6% of relevant revenues[1]. The need to obtain external EMS certification is assessed locally with regard to local economic conditions and benefits.

Percentage of relevant revenues covered

Indicator title	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
By an EMAS certification	8.86%	7.30%	3.72%
By an ISO 14001 (non-EMAS) certification	59.12%	55.76%	56.41%
By another external EMS certification	0.03%	0.78%	2.81%
TOTAL EXTERNAL CERTIFICATIONS	**68.01%**	**63.85%**	**62.93%**
By an internal certification (but not by a certified EMS)	7.59%	9.38%	11.92%
TOTAL INTERNAL AND EXTERNAL EMS	**75.6%**	**73.2%**	**74.9%**

(1) Revenues generated after excluding activities not considered pertinent in terms of environmental impact: services, trading, sales, activities, etc.

When the implementation of a certified or registered management system is not economically justified, entities are encouraged to define an internal management system ensuring concern for the environment in carrying out their activities. As a result, some Group entities have defined their own management system standard. When an internal or external EMS is implemented, employees take part in awareness and training sessions relating to the environmental issues they encounter at their sites so that they adopt the EMS methodology and make it their own.

3.5.3 PERFORMANCE CONTROL AND MEASUREMENT SYSTEMS, A PREREQUISITE FOR ENVIRONMENTAL RESPONSIBILITY

To monitor the implementation of its environmental policy, control environmental risks and encourage the communication of its environmental performance to stakeholders, ENGIE implements a specific reporting system that goes beyond the requirements of French law and which takes into account the Global Reporting Initiative (GRI) recommendations.

Environmental reporting is closely tied to operational performance reporting, thus becoming a management tool. The Group's Executive Committee transmits this goal of making environmental concerns an integral part of management responsibilities.

Methodological elements

Organization and scope

ENGIE conducts its environmental reporting using a dedicated tool that allows data to be reported following a defined methodology. This tool, called EARTH, is an environmental reporting IT solution used to manage the network of environmental correspondents and coordinators; to handle the management and documentation of the scope of environmental reporting; to manage data entry, monitoring and consolidation of indicators; to draft reports; and to provide the documentation necessary for producing and collecting data (reporting procedures and instructions).

EARTH is deployed in each regional Hub and thus covers the entire ENGIE organization.

The legal entities included in the reporting scope are those whose operations are relevant in terms of environmental impact and that are consolidated fully or proportionately under the rules of financial consolidation (IFRS). Legal entities whose sole business is energy trading, financial activity or engineering are therefore excluded from the scope, as are legal entities consolidated using the equity method. The entities included in the reporting report on the performance and impacts of the industrial facilities over which they have technical operational control, including facilities operated on behalf of third parties. In 2022, ENGIE nevertheless started to roll out its comprehensive survey of the entities consolidated by the equity method GBU Energy Solutions and the GBU Networks to acquire environmental-based information from a wider scope.

Thus, in accordance with the rules of financial consolidation, 100% of the impact data collected is consolidated when the entities are fully consolidated. For entities proportionately consolidated, the environmental impact data are consolidated in proportion to the Group's consolidation rate provided that it has 100% technical operational control or that, as a minimum, this is shared with other shareholders.

For disposals occurring during the year, the entities concerned complete the environmental questionnaire with the data available as of the last day of the month preceding the disposal. If it is not possible to collect all the environmental indicators, they are extrapolated on the basis of the main activity (for example, energy production for a power plant) and historical data. For acquisitions made during the year, it may happen that their environmental management system is not sufficiently mature to meet all the environmental indicators. In this case, the missing indicators are extrapolated on the basis of the main activity and indicators available in entities with a similar technical profile. A correction of these extrapolated values can be made a posteriori the following year, at the end of the first full fiscal year.

To calculate environmental management indicators such as the "share of relevant revenues covered by an environmental certification, an environmental crisis management plan, etc.," the relevant revenues is estimated for each legal entity. To obtain the relevant revenues, operations regarded as "not relevant in terms of environmental impact" (e.g. trading, finance and engineering) are stripped out of the consolidated revenues figure for each legal entity.

Procedures and guidelines are rolled out Group-wide via a network of duly mandated environmental contacts and coordinators. These procedures and guidelines at Group and regional or country level describe in detail the environmental data collection, control, consolidation, validation and transmission phases at the different levels of the organization, as well as the rules for defining the scope of consolidation. They include technical documents that provide methodological guidelines for the calculation of some specific indicators. Depending on its activities, each entity is assigned a profile that determines the indicators to answer. The list of the entities included in the scope of environmental reporting is approved by each region or country.

The definitions of the indicators used to measure the environmental performance of Group businesses have been revised based on comments made by the Statutory Auditors. They also take into account the comments by line managers represented in dedicated work groups. All the documentation is available from the Group upon request (CSR Department).

Until 2016, ENGIE would provide a "coverage rate" for each indicator published, corresponding to the response rate obtained from all the entities surveyed. Since 2017, thanks to the implementation of the new EARTH reporting tool, the coverage rate has been 100% for all indicators.

A certain number of methodological choices have been made to carry out the environmental reporting. These are described in the following five paragraphs.

General information

- The reliability of the scope of environmental reporting is a priority for ENGIE, which is evolving in an international context of business disposals and acquisitions. Before every reporting campaign, the financial scope for consolidation is compared against the information fed back by each regional Hub's environmental managers in order to check which industrial entities contributing to EARTH report to which financial entities. Moreover, reconciliations are carried out on several occasions using PERFORM, ENGIE's database which is dedicated to the operating performance of energy production facilities, to carry out an additional verification of the comprehensive nature of the scope.

- Significant environmental impacts resulting from subcontractors during services performed at one of the Group's facilities must be included in the Group's impacts except when a specific contractual clause provides that a subcontractor is liable for impacts generated at the site while providing the service. Data provided by subcontractors is not subject to systematic internal verification before being included in Group data and is the responsibility of the subcontractors alone. Regulations and legal obligations related to the environment may differ from one country to another, and certain data may thus be sometimes more difficult to gather.
- Since 2007, ENGIE has been a signatory to the CEO Water Mandate, thus demonstrating its commitment to the preservation of water resources. The water indicators are consistent with the GRI indicators and fall into four categories: withdrawal, discharge, consumption, reuse/recycling. Since 2015, the materiality of the water indicators published has been reviewed and the Statutory Auditors verify the inputs, outputs and consumption of fresh and non-fresh water as well as total consumption.

Non-GHG indicators

- NO_x, SO_x and fine particulate matters emissions are calculated locally on the basis of measurements. If discontinuous measurements are taken on a site, an average of the measurements over the last five years is taken where possible to avoid inconsistencies related to one-off measurements. For facilities burning natural gas that do not have automated measurement systems, a calculation method is provided for NO_x emissions and a default emission factor for SO_x (0.281 g/GJ LHV) and an other for fine particle emissions (0.9 g/GJ LHV) have been set up (factors recommended by the European Monitoring and Evaluation Programme - EMEP).
- As it is concerned about what becomes of the waste generated by its activities, the Group has indicators on the production and recovery of the waste generated by its activities. These are based on definitions of waste and recovery established by local regulations. To avoid erroneous data about stock, only the tonnages taken away and weighed on site are reported as disposed of. The tonnages that must be reported are wet or dry, depending on the way they are disposed of: if the waste disposed of was wet, the reported tonnages are wet and the converse for dry waste. As an exception, if the waste is permanently stored on site, the associated dry tonnages must also be reported as disposed of. In the latter case, the waste is never recovered. Waste generated by the construction or dismantling of plant and equipment, by the repowering or upgrading of facilities, and by soil rehabilitation, are not covered by the indicators for waste generated by activities.
- ENGIE operates hydraulic installations, some of which have water tanks. Given the difficulties in modeling the evaporation of each site, the evaporated water is not yet included in environmental reporting.
- Pumping storage stations are now recognized in the same way as batteries, as recommended by the European taxonomy. In this regard, electricity consumption corresponds to the difference between electricity supplied by the network and that returned to the network. The latter, as a result, is no longer accounted for under ENGIE's electricity production. This modification was applied with retroactive effect as from 2015 for the sake of consistency.
- For the sake of consistency, the factor for converting thermal power produced (GWhth) into electric power (GWhe) is set at 0.25 for incinerators and at 0.61 for all of the Group's procurement and energy production activities. This last factor was updated with retroactive effect as of 2015 for consistency purposes on the basis of EU Commission Delegated Regulation 2015/2402.
- The energy efficiency indicator covers fossil fuel and biofuel power plants. It also includes heat supplied by third parties as well as steel gases (see the note on heat and that on steel gases below).

GHG indicators: direct emissions (Scope 1)

- CO_2 emissions from the combustion of fossil fuels were calculated based on the most recent emission factors published by the IPCC (IPCC Guidelines for National GHG Inventories, Vol. 2 Energy – 2006). However, the emission factors for coal can vary greatly depending on the provenance. For this reason, each reporting entity consuming coal provides a locally calculated emissions factor. This also holds for alternative fuels for which it is not possible to use standard emission factors.
- The biomass and biogas consumed by ENGIE in its facilities generates energy that is counted as ENGIE production and, in accordance with conventions in this area, ENGIE counts CH_4 and N_2O emissions associated with their combustion when these fuels are used to produce energy but does not count CO_2 emissions.
- The Global Warming Potential (GWP) compares the warming capacity of the various greenhouse gases to CO_2. The GWP used to convert the Group's greenhouse gas (GHG) emissions to CO_2 equivalent are the latest GWP published by the IPCC (6^{th} IPCC Assessment Report – 2022), considered on a 100-year scale. Therefore, the GWP of methane was decreased in 2022 from 36 to 29.8.
- Specific GHG emissions from energy generation in kg CO_2 eq./MWh are calculated for the regional hubs and GBU where this is a main activity: Generation Europe, North America, Latin America, Brazil, Asia Pacific, Middle East, South and Central Asia, and Turkey, Benelux, North, South and Eastern Europe, UK, France BtoB, France Networks, and France Renewable Energy.
- ENGIE carries out residual gas recovery services for its steel producing customer ArcelorMittal. This service allows ArcelorMittal to meet the majority of its electricity needs and thus reduce its GHG emissions by avoiding a high level of energy use by the network. When analyzing the GHG emissions relating to these services, ENGIE has noted that 100% of the emissions relate to the steel manufacturing process. At the end of this process, regulations require that steel producers burn residual gases, generally through flaring. ENGIE only intervenes in this process to extract energy that would otherwise have been lost to flaring, by taking over for ArcelorMittal in the burning of the residual gases, but without generating additional GHG emissions. This is why ArcelorMittal's reporting methodology includes direct emissions from the external plants to which the residual gases are delivered for recovery. This state of affairs is confirmed by Law No.2019-1147 of November 8, 2019 on climate and energy and the related decrees which set the greenhouse gas emissions ceiling for fossil-fueled power plants. Decree No. 2019-1467 of December 26, 2019 states that "Emissions from waste gases used in electricity production facilities are not recognized." Consequently, ENGIE now excludes these GHG emissions from its Scope 1

and the DK6 power plants in France and the Knippegroen and Rodenhuize power plants in Belgium no longer report emissions associated with steel gases. As these are residual gases and not fuel with a supply chain, ENGIE does not include emissions from an upstream fuel chain in its Scope 3. With the exception of GHG emissions related to the combustion of steel gases, all environmental indicators for these entities are included in the consolidated data, as well as their energy production.

GHG indicators: indirect emissions (Scopes 2 and 3)

- The nature of heating purchases accounted for under scope 2 changed in 2022. Heating from Energy Recovery Units (ERU) or non-ERU are therefore no longer included in the calculation of Scope 2 emissions. ENGIE is therefore in line with French practices in this area, as set out in the methodology of the Syndicat National du Chauffage Urbain (the French national district heating syndicate - SNCU) in response to the annual survey on Heating and Cooling Networks. This survey serves as national statistics for the Ministry of Energy Transition and the basis of calculation for CO_2 content and the EnRR rate of each network published in the energy performance diagnosis decree. Heating purchases taken into account only relate to heating produced excluding ERU. Based on MWh purchased, an average loss rate of 16.5% supplied by the SNCU is used to recognize MWh of heat lost during transmission and calculate scope 2. In 2022, heating purchased generated excluding ERU represented 8.11% of all heating acquired. In the absence of historical data to distinguish between ERU heating and non-ERU heating, the same percentage has been applied retrospectively since 2015 for the sake of consistency.
- Two methodological changes that occurred in 2022 had a significant impact on Scope 2 in particular, with retroactive effect from 2015. It concerned the exclusion of the heat recovered from ERUs and the change in the status of pumped storage stations from electricity production facilities to batteries. As a result of the restatement that followed, Scope 2 in 2021 dropped from 1,903,934 tCO_2eq to 552,962 tCO_2eq (-71%) while scope in 2020 dropped from 2,330,625 tCO_2eq to 613,714 tCO_2eq (- 73.7%). To measure the impact of these measures, the decrease compared with 2021 was the result of the change in pumped storage of roughly -37% and by the change in heat from the ERUs of 34%.
- In the "Use of sold products (fuels sold to end-consumers, off market)" indirect emissions category, the term "end-consumer" refers to customers who use the natural gas purchased themselves. Volumes sold to trading platforms, resellers, Local Distribution Companies or other intermediaries not owned by ENGIE are, therefore, excluded.
- In 2022, three sources of emissions were added to Scope 3 to make it even more exhaustive:
  - emissions from the upstream chain of electricity purchased for resale were calculated and represent 62.5% of the energy-related emissions category not included in the "direct GHG emissions" and "indirect energy-related GHG emissions" categories and 18.3% of the total Scope 3 in 2022. Emissions of the TWh sold are determined by first calculating the emissions from ENGIE's production. The emission factors used for this include the complete LCA, including the construction of the installations, except for combustion installations for which the factors are applied to their actual fuel consumption. This method is more precise than the calculation based on the LCA for this type of installation. These production emissions are then deducted from ENGIE's total sales in the countries concerned, calculated on the basis of European average factors including the complete LCA, including construction;
  - following the extension of the environmental data collection to the entities consolidated by the equity method of the GBU Energy Solutions and the GBU Networks, the "investments" category now includes direct emissions from all energy production but also from other activities such as gas networks;
  - sales of biomass and biomethane to end-users are now collected to complete the "use of sold products" category by calculating biogenic emissions. This last addition also completes the first category mentioned in this paragraph with emissions from the upstream chain of these two fuels.

3.5.4 GROUP ACTIONS

3.5.4.1 Climate change

Direct emissions

Information presented in this Section and in Section 2.2.2 "Climate change" reflects the financial risks associated with the effects of climate change and the measures taken by the company to mitigate them by implementing a low carbon strategy in all areas of its business as required by Article L.225-37 of the French Commercial Code.

By developing a low carbon[(1)] energy mix and through its energy efficiency activities, the Group has put energy transition and the fight against climate change at the heart of its strategic focus. Thus the carbon intensity of energy production in 2022 was 151.8 $gCO_2eq./kWh$, down 14.8% from 2022 and 65% from 2012. The Group's absolute direct CO_2 eq. emissions, known as "Scope 1 emissions," fell by more than 6.03 million tons in one year, from 35.86 tons to 29.83 million tons, a 16.8% reduction.

These results reflect the Group's desire to follow an emissions trajectory compatible with the Paris Agreement's objective of not exceeding +2°C by 2050, which corresponds to an 85% reduction in its direct emissions by 2050 compared to 2012, total disengagement from coal, and growth in green energy (renewable electricity and biogas).

In addition, the Group supports TCFD's (Task Force on Climate-related Financial Disclosures) recommendations for greater transparency on the risks and opportunities related to the impacts of climate change, monitors issuer-investor work and, for the first year, will produce a TCFD report when it publishes its Climate Notebook. In the following year, this TCFD report will be amended to incorporate the results of the ongoing financial assessment work, as required by the TCFD. The Group publishes its Scope 1, 2 and 3 (main items) emissions and answers the CDP's Climate Change questionnaire each year.

(1) The share of energy production from non-fossil sources has increased by 106.5% in eight years, from 28.6% in 2015 to 59% in 2022.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Total direct GHG emissions – Scope 1 □□	t CO_2 eq.	29,832,102	35,860,798	38,606,036
of which emissions from energy production	t CO_2 eq.	27,917,242	33,697,812	36,394,644
of which CH_4 emissions	t CO_2 eq.	1,263,608	1,624,082	1,516,355
- share of Gas Distribution	t CO_2 eq.	947,586	1,197,204	1,123,286
- share of Gas Transmission	t CO_2 eq.	192,740	247,550	237,814
- share of Gas Storage	t CO_2 eq.	78,928	92,691	78,678
- share of LNG Terminals	t CO_2 eq.	44,354	86,637	76,577
Incl. other emissions (vehicles, fluorinated gases, etc.)	t CO_2 eq.	651,252	538,905	695,037
Carbon intensity from energy production □□	kg CO_2 eq./MWheq.	151.8	178.2	208.1

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2022 (see Section 3.11).*

Adaptation through anticipation of the negative impacts of climate change is key to making ENGIE's infrastructure and activities more resistant to natural hazards (more extreme events such as floods and droughts, etc. and other more progressive phenomena such as rising sea levels, rising temperatures, etc.). The risks generated by climate change are varied and include physical risks, risks of disruption to value chains, reputational risks and regulatory risks.

ENGIE is implementing practical measures to guard against this set of risks, including, for example, the construction of a perimeter wall to tackle the risk of exceptionally heavy flooding at the Tihange site in Belgium, a vegetation project to prevent soil erosion in the event of storms in Mexico (Mina Solar solar park), the digging of ditches and a reservoir to deal with the risk of flooding at the Capel Grange solar park (United Kingdom).

The Group has also established methods to help its various sites to draw up adaptation action plans. The use of tools, such as Aqueduct software for managing and analyzing water risks and areas of water stress, helps the Group to identify local-scale risks and enables it to identify adaptation strategies tailored to the problems and features of each site.

Adapting to climate brings multiple beneficial effects for ENGIE: anticipating risks enables it to manage its assets better, cut costs and expand its market to new products and services.

Indirect emissions

The Group's approach to GHG emissions accounting and reporting is based on the GHG Protocol Corporate Standards (for companies) and the ISO 14064 standard (supplemented by ISO 14069). These standards constitute an internationally recognized reference framework.

ENGIE has analyzed the various categories of emissions in order to identify and quantify the most pertinent categories. The following categories have been identified and quantified to date.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Indirect emissions related to energy("Scope 2") □□	t CO_2 eq.	751,862	538.222	613.714
of which indirect emissions related to power consumption	t CO_2 eq.	743,376	529.273	598.797
of which indirect emissions related to the consumption of steam, heating or cooling	t CO_2 eq.	8.486	8.948	14.917
Other indirect GHG emissions ("Scope 3")	t CO_2 eq.	143,705,796	122,487,530	124,240,115
Upstream fuel chain (Energy-related emissions not included in the "direct GHG emissions" and "indirect energy-related GHG emissions" categories)	t CO_2 eq.	41,978,623	17,765,961	19,343,594
of which emissions for electricity purchased for resale (added in 2022)	t CO_2 eq.	26,250,871	-	-
Investments (GHG emissions from power plants consolidated under the equity method)	t CO_2 eq.	32,136,497	31,465,816	31,150,692
of which emissions from energy production	t CO_2 eq.	31,626,021	31,465,816	31,150,692
of which emissions from other activities (added in 2022)	t CO_2 eq.	510,476	-	-
Use of sold products (fuels sold to end-consumers, off market)	t CO_2 eq.	61,304,676	65,561,753	61,496,829
of which sales of natural gas and LNG	t CO_2 eq.	61,279,484	65,561,753	61,496,829
of which sales of biomass and biomethane (added in 2022)	t CO_2 eq.	25,192	-	-
Purchased products and services	t CO_2 eq.	5,466,061	5,486,727	8,976,422
Capital equipment	t CO_2 eq.	2,820,358	2,206,878	3,273,440

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2022 (see Section 3.11).*

3.5.4.2 Renewable energy

The strengthening of the Group's capacity in renewable energy has continued, for both electricity and heat production and, in the case of biogas, for transportation. In 2022, the renewable energy capacities of facilities controlled by ENGIE, excluding equity-accounted companies and unconsolidated operations, represented 22.07 GW equivalent of installed energy (GWeeq).

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Renewable – Net installed power (electric and thermal) ◻◻	MWeeq.	22,077	20,374	17,676
Renewable – Electricity and Heat produced ◻◻	GWheeq.	70,267	63,470	56,610
Energy produced – share of large hydropower	Percentage	59.7%	60.6%	62.7%
Energy produced – share of small hydropower	Percentage	1.2%	1.3%	1.7%
Energy produced – share of wind	Percentage	23.1%	22.7%	17.7%
Energy produced – share of geothermal	Percentage	0.4%	0.4%	0.3%
Energy produced – share of solar	Percentage	7.0%	4.8%	5.0%
Energy produced – share of biomass and biogas	Percentage	8.6%	10.2%	12.6%
Renewable and Non-Renewable – Electricity and Heat produced	GWheeq.	183,871	189,066	174,912
Renewable share of total electricity and heat produced	Percentage	38.2%	33.6%	32.4%

◻◻ *Verified by the Statutory Auditors with "reasonable" assurance for 2022 (see Section 3.11).*

3.5.4.3 Energy efficiency

For electricity production facilities, energy performance is directly connected to the site's efficiency which influences its profitability. Measures taken to improve the generation fleet, and which are compliant with environmental regulations and the constraints of the electricity market, have helped optimize its energy efficiency and, hence, consumption of raw materials. For example, the replacement of older turbines or boilers with recent models has an immediate positive impact on a facility's energy efficiency.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Energy production of controlled facilities (Scope 1)	GWheeq.	183,871	189,066	174,912
Energy production of equity-accounted facilities (Scope 3)	GWheeq.	92,222	88.544	93,230
Primary energy consumption – total (excluding own consumption) ◻◻	GWh LHV	278,433	313,840	284,606
Share of coal/lignite	Percentage	4.79%	10.18%	10.12%
Share of natural gas	Percentage	41.35%	36.32%	46.19%
Share of fuel oil (heavy and light)	Percentage	0.83%	0.73%	0.71%
Share of uranium	Percentage	44.68%	45.36%	33.59%
Share of biomass and biogas	Percentage	4.77%	4.23%	5.68%
Share of other fuels	Percentage	3.43%	3.05%	3.37%
Share of fuel in transport	Percentage	0.14%	0.13%	0.33%
Electricity and thermal power consumption (excluding own consumption) ◻◻	GWheeq.	6,715	7,430	7,437
Energy efficiency of fossil fuel plants (including biomass/biogas) ◻◻	Percentage	49.6%	47.7%	48.0%

◻◻ *Verified by the Statutory Auditors with "reasonable" assurance for 2022 (see Section 3.11).*

3.5.4.4 Nuclear energy

Maintaining a very high level of safety at the seven nuclear reactors operated by ENGIE is a key priority for the Group. ENGIE also attaches great importance to limiting the environmental impact of these facilities (e.g. waste, emissions). Each plant publishes an annual environmental on the Electrabel website.

Waste from nuclear power plants, particularly radioactive waste, is monitored by Electrabel, but also by the national body for radioactive waste and enriched fissile materials (ONDRAF) and its subsidiary Belgoprocess, which is responsible for the management of radioactive waste from nuclear power plants. The detailed information to be published about volumes of fuel or of high-level radioactive waste is specified by the Belgian Royal Decree of October 17, 2011 titled "Royal Decree regarding the physical protection of nuclear materials and nuclear installations."

Provisions for the downstream portion of the nuclear fuel cycle (operations relating to fuel after its use in a nuclear reactor) and for the costs of decommissioning nuclear power plants after they are shut down, are shown in Section 1.6.5.2.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Radioactive gas emissions				
Rare gases	TBq	32.19	36.12	47.35
Iodines	GBq	0.03	0.03	0.04
Aerosols	GBq	0.28	0.27	0.25
Radioactive nuclear waste (low and medium level)	m^3	182	186	225
Radioactive liquid wastes				
Beta and Gamma emitters	GBq	14.95	11.46	16.50
Tritium	GBq	101.80	83.49	86.50

The risk factors relating to nuclear power are presented in Section 2.2.7 “Risks related to nuclear activities”.

3.5.4.5 Water

As a committed player in water management, ENGIE is taking part in the current debate over corporate risk disclosure and water stewardship, alongside organizations such as the CEO Water Mandate of the UN Global Compact and the OECD. These initiatives have led to a homogenization of the definition and implementation of water stewardship. The Group has set itself the target of reducing water consumption for energy produced by 2030 and is continuing to implement action plans for sites facing high or extreme water stress. In 2022, ENGIE was awarded a B rating by the CDP Water Disclosure program.

Each year, as part of the optimization of its energy production, ENGIE assesses the risk of water stress for the Group’s industrial sites using the Baseline Water Stress Index and the Aqueduct tool (World Resource Institute) which maps different water-related risks. In 2022, 33 sites were located in areas with extremely high water stress, i.e. 4% of sites (excluding solar and wind), for which action plans have been finalized and are being implemented. The impact of water stress is relative, however, as it depends on the site’s activity and fresh water needs. Only six out of the 33 sites have substantial freshwater requirements (more than 100,000 m^3/year). For the others, the challenge is rather how to indirectly help to preserve water resources, for example by proposing the reuse of the water by other entities in the drainage basin. All of the Group’s initiatives have resulted in a 77.3% reduction in freshwater withdrawals from all its activities since 2012.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Fresh water				
Total withdrawal	Mm^3	1,658	2,402	2,088
Total discharge	Mm^3	1,603	2,336	2,039
Non-fresh water				
Total withdrawal	Mm^3	5,215	5,249	5,195
Total discharge	Mm^3	5,191	5,218	5,167
Total consumption (Withdrawals - Discharges)	Mm^3	80	96	77

3.5.4.6 Waste

ENGIE took the recommendations of an internal audit on waste management and incorporated them into its environmental policy released in 2017. Its chief aim was to reduce the quantities of waste it produces and to increase its rate of waste recovery. The Group has set operational production reduction objectives for hazardous waste (-95% vs 2017) and non-hazardous waste (-80% vs 2017).

These reduction efforts are supplemented by the monitoring of recovery rates of more than 79.8% for non-hazardous waste and of 21% for hazardous waste in 2022. The Group's industrial sites actively seek local waste recovery solutions, even though some of these channels remain dependent on market opportunities governed by the laws of supply and demand.

Food waste and associated waste only relate to group catering for employees. In this area, ENGIE selects subcontractors that include missing space measures against food waste in their specifications.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Total quantity of non-hazardous waste and by-products discharged (including sludge)	t	1,459,706	2,843,003	2,857,579
• Fly ash, refioms (residues from the purification of incineration fumes from household waste)	t	660,169	1,668,246	1,583,111
• Ash, bottom ash	t	513,615	702,305	804,701
• Desulfurization by-products	t	53,170	69,841	66,332
• Sludge	t	13,484	16,237	25,221
• Driftwood	t	10,783	11,508	12,970
Total quantity of non-hazardous waste and by-products recovered (including sludge)	t	1,164,816	2,405,454	2,464,614
Total quantity of hazardous waste and by products discharged (including sludge and excluding radioactive waste) □□	t	23,506	30,240	38,139
Total quantity of hazardous waste and by products recovered (including sludge and excluding radioactive waste) □□	t	4,926	4,933	11,511

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2022 (see Section 3.11).*

3.5.4.7 Atmospheric pollutants

ENGIE uses a wide range of techniques to further reduce its emissions: reduction at the source using a tailored energy mix; optimization of combustion and treatment of fumes; filters or water injection to reduce all particles (of all sizes); installation of low-NO_x burners or use of urea injection (secondary treatment) to control nitrogen oxides; and choosing fuels with very low sulfur content to reduce sulfur dioxide emissions.

The Group has set operational objectives to reduce NOx (-75% vs 2017), SO_2 (-98% vs 2017) and total particle emissions (-60% vs 2017) by 2030.

Indicator title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
NO_x emissions	t	33,517	48,831	49,022
Incl. energy production	t	33,216	48,586	48,752
SO_2 emissions	t	7,418	105,984	119,584
Incl. energy production	t	7,400	105,962	119,568
Fine particle emissions	t	3,398	5,693	6,312
Incl. energy production	t	3,391	5,688	6,305
Mercury emissions	kg	49.47	194.21	304.73
Incl. energy production	kg	49.33	194.09	285.25

3.5.4.8 Management of biodiversity

Biodiversity is a natural heritage that is essential to human health and well-being, but also to economic activities. ENGIE, through its industrial activities, has a direct potential impact on biodiversity (ecological continuity, avifauna, ischiofauna, etc.), and an indirect impact via the supply chain. The Group is also dependent on biodiversity, notably through its use of biomass resources and water and climate regulation provided by biodiversity.

According to international experts at IPBES[1], biodiversity is threatened, in order of severity, by: changes in land use, the overexploitation of resources, climate change, pollution and invasive exotic species. Fragmentation and disturbance of habitats caused by the territorial of our sites and soil sealing are the main impact of the main impact of ENGIE's activities on biodiversity.

Since 2010, the Group has integrated biodiversity into its strategy and activities. It now has a dedicated policy and key commitments through the "act4nature international" initiative and "Entreprises Engagées pour la Nature." Full details of these commitments and their progress are available on ENGIE's website at the following address: www.engie.com/en/group/social-responsibility/csr-goals/biodiversity.

Examples of objectives and actions carried out by the Group include the restoration of natural habitat (hedges, grassy strips, wetlands), the reduction of the impact of wind turbines on wildlife, the installation of fish ladders at dams, ensuring that gas-grid easements contribute to ecological continuity, and applying differentiated landscaping to green spaces.

The Group develops its projects in line with the "Avoid, reduce and offset" approach.

All of the Group's sites are analyzed each year with regard their proximity to various protected areas (IUCN, Ramsar, UNESCO natural and mixed, KBA, MAB). Each site located less than 15 km from a protected areas works on implementing action plans developed in consultation with the relevant stakeholders.

The Group has also made a strong commitment to manages the sites in a manner that respects nature, by discontinuing the use of. phytosanitary products and contributing to the restoration of ecological continuity.

Objective title	Unit	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans	2030 target
Development of action plans for industrial sites located in or near a biodiversity hotspot	%	60	41	21	100
Introduction of ecological management of the Group's industrial sites, including nature-friendly maintenance of green spaces and zero phytosanitary products	%	34	28	ND	100

In pursuit of its commitment to biodiversity, the Group relies on the skills and expertise of its two partners: the French committee of the IUCN (International Union for Conservation of Nature) and France Nature Environnement Since 2009, the French IUCN committee has been providing ENGIE with its expertise to further integrate biodiversity into its strategy, and since 2008, FNE has been helping to establish contacts with local experts and to raise awareness of issues such as the application of the "avoid, reduce and offset" approach in France. These partnerships are developed on a three-year basis.

3.5.4.9 Managing risk and environmental complaints

The management of environmental risks has two components: risk prevention and crisis management.

Indicator title	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
% of relevant revenues covered by an environmental risk prevention plan	96.0%	93.8%	81.9%
% of relevant revenues covered by an environmental crisis management plan	95.3%	93.2%	87.5%

The Group handles any environmental complaints. A summary is given below:

Indicator title	ENGIE 2022 excl. Equans	ENGIE 2021 excl. Equans	ENGIE 2020 including Equans
Environment-related complaints	8	11	6
Environment-related convictions	1	2	2
Amount of compensation (*in € thousands*)	9	697	14
Environmental expenditure (*in € thousands*)	902,683	528,705	553,019

Complaints received by ENGIE subsidiaries were as follows:

- in Belgium, wind farm managers received two complaints for noise pollution, one relating to disturbances associated with the strobe effect of the turbines and one for falls of ice concretions. Another complaint was received for noise pollution concerning the Zedelgem turbojet plant;
- in Romania, there was a complaint relating to disturbances associated with the strobe effect;
- in the United States, the Whitehorn Solar LLC solar park received a complaint from residents because the grass around the site was not cut. The problem was resolved;

(1) Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

- in Brazil, after residents near four gas pipelines complained about the height of vegetation on the easements, the grass was cut.

Assessments have been, or are being, carried out for all these complaints and talks with stakeholders are underway.

A fine was also paid by the Energia Mayakan site in Brazil following a check on the diameter of a water evacuation pipe which did not correspond to the one authorized by the operating permit. Work was carried out to bring the water discharge into compliance.

In 2022, environmental expenses (investments and current operating expenses related to environmental preservation) amounted to around €903 million.

3.5.4.10 Noise pollution

Any industrial activity is a source of noise pollution. In order to reduce these impacts, Group entities conduct regular soundproofing work (acoustic cladding, noise barriers, containment, etc.). For more recent projects, reducing this potential form of noise pollution is directly integrated into the design.

For its renewable energy projects, particularly onshore wind and solar power, ENGIE conducts impact studies and offers support measures to prevent, reduce or offset any noise or visual impact. Examples of such actions include defining and implementing turbine restrictions (stoppage or reduced power at key times and / or under certain wind conditions), conducting specific actions with builders to reduce the sound power of machines, seeking better harmonization with the landscape during the design and, after construction, initiating planting and vegetation schemes on sites or for neighbors if there is an obvious visual impact. By way of illustration, in France, ENGIE has partnered with the "Respect" project launched as part of the offshore wind project in the city of Tréport and on the islands of Yeu and Noirmoutier. The aim is to improve understanding of the biological impact related to the noise footprint of projects and reduce this by developing appropriate technology. The results were integrated into the impact studies and made it possible to obtain prefectural authorization in October 2018.

3.5.4.11 Land use

Protection of soil and groundwater is an integral part of the Group's environmental policy. The environmental consequences of soil pollution can be significant, as can the costs of subsequent remedial measures. It is therefore important to prevent this risk and to hedge it with financial provisions. These amounted to €1.332 billion in 2022 and concerned site rehabilitation, decommissioning of non-nuclear facilities and scheduled product elimination. In this area, ENGIE complies with the regulations in each of the countries in which the Group operates.

For example, a soil pollution survey was carried out at several power plant sites in Belgium. Risks were assessed in conjunction with the appropriate environmental authorities and a remediation program was implemented.

ENGIE owns a number of former gasworks. These sites may be affected by oil, heavy metals and other volatile substances that can adversely affect health. As a result, they must be repaired before reuse. In 1996, a ten-year plan was agreed via a memorandum between Gaz de France and the French government to rehabilitate these sites, which have been compatible with their use from a health perspective since 2007. When these former sites are sold, ENGIE is committed to ensuring that the buyer's project is compatible with the environmental and industrial liabilities of the site and that the risk to the environment and residents is effectively managed. At all its sites, the Group monitors the soil and groundwater, in accordance with its operating permits, in order to prevent pollution.

Moreover, in order to more firmly anchor its presence in the regions, ENGIE has established a structured system of dialog with its stakeholders, pursuant to the main international standards (AA1000, ISO 26000, the Global Compact principles, and OECD guidelines). This system is based on regular meetings with NGOs and non-profit associations, and on the development of long-term partnerships in connection with ENGIE's activities. The dialog is defined at Group level and then rolled out to each regional hub according to specific local requirements in terms of issues, activities and regulations. As part of these new 2030 CSR objectives, ENGIE aims to cover 100% of its industrial activities in 2020 with a structured stakeholder dialog and consultation mechanism.

Gas pipelines account for the largest amount of land use by ENGIE. As the gas lines are buried, they do not break up natural habitats, but may nevertheless generate land-use conflicts. GRTgaz has therefore established amicable easement agreements in France with all the owners of the land crossed, following consultation periods (the signing rate for amicable agreements is regularly >90% for projects). These agreements define land usage restrictions for the owners (prohibition on building in pipeline locations and planting vegetation higher than 2.70 m) in exchange for compensation. More specific work is carried out with the agricultural industry to preserve land use for farmers as part of their professional activity.

For the development of new wind and photovoltaic renewable energy production sites, the choice of the site is paramount. The arable nature of the land is an essential element taken into account very early in the project to avoid any subsequent conflict. In France, calls for tenders for photovoltaic power plants are made under the aegis of the French Energy Regulatory Commission. Proposing a site on arable land causes valuable points to be lost in tenders and this is another reason for selecting other types of land. For wind farms, development on arable land is possible provided that an assessment is carried out before and after the project by an independent agricultural expert. This allows for fair compensation to be paid to owners or farmers for the use of these lands.