2020 Environmental Reporting

extract from 2020 Universal registration document

ENGIE

#Act With ENGIE

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 ENGIE website) 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 Director of Environment. It has environmental coordinators in each BU 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 BUs' 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 price 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 2020, the entities that had implemented an Environmental Management System (EMS) accounted for 75.7% of relevant revenue [(1)]. The need to obtain external EMS certification is assessed locally with regard to local economic conditions and benefits.

(1) Relevant revenue excludes revenue generated by activities not considered pertinent in terms of environmental impact (services, trading, sales, activities, etc.)

Percentage of relevant revenue covered

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
By an EMAS certification	3.72%	3.09%	2.42%
By an ISO 14001 (non-EMAS) certification	57.25%	59.09%	65.99%
By another external EMS certification	2.80%	2.90%	2.15%
TOTAL EXTERNAL CERTIFICATIONS	**63.77%**	**65.08%**	**70.57%**
By an internal certification (but not by a certified EMS)	11.92%	7.36%	9.73%
TOTAL INTERNAL AND EXTERNAL EMS	**75.68%**	**72.43%**	**80.30%**

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 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.

A system of letters for environmental compliance ensures operational management involvement.

Methodological elements

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 of the BUs 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 solely engaged in energy trading, financial activities or engineering are excluded. The selected entities 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. Legal entities consolidated at equity are excluded.

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

The environmental data reporting procedures encompass general procedures defined as standard guidelines to be implemented at the appropriate levels of the reporting process. 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 BU 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 BU.

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).

Previously, ENGIE used to provide a "coverage rate" for each indicator published, corresponding to the response rate obtained from all the entities surveyed. Thanks to the implementation of the new EARTH reporting tool, the coverage rate is now 100% for all indicators.

The following points should be noted with regard to the data published in this report:

- 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 the BU's environmental managers in order to check which industrial entities contributing to EARTH report to which financial entities;
- for facilities burning natural gas that do not have automated measurement systems, default emission factors for SOx and fine particle emissions have been set up (factors recommended by the EMEP, the European Monitoring and Evaluation Programme);
- 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 in 2011 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 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;
- 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 is also the case for alternative fuels for which it is not possible to use standard emission factors;
- 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 (5^{th} Assessment Report – 2014), considered on a 100-year scale;
- specific GHG emissions from energy generation in kg CO_2 eq./MWh are calculated for the BUs 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;
- for the sake of consistency, the factor for converting thermal energy produced (GWhth) into electric power (GWhe) is set at 0.44 for all Group power generation businesses and at 0.25 for incinerators;
- 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;
- the energy efficiency indicator covers fossil fuel and biofuel power plants. It also includes heat supplied by third parties;
- 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;
- NOx, SOx and fine particulate matters emissions are calculated locally on the basis of measurements. As of this year, if discontinuous measurements are carried out on a site, an average of the measurements over the last five years is taken where possible. This methodological change, which avoids inconsistencies due to one-off measurements, has notably led to a 3% increase in NOx emissions in 2019. When it is not possible to measure these emissions, a calculation method is provided for NOx emissions and standard emission factors based on fuel consumption are used for SOx and fine particles. These emission factors are taken from the US Environmental Protection Agency (US EPA) standards;
- 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 the 2019 French law 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 generation facilities are not recognized." As a result, ENGIE now excludes these GHG emissions from its Scope 1 (-6.7 Mt in 2020) and has restated data for 2018 and 2019 for consistency purposes (-8.53 Mt in 2018 and -8.9 Mt in 2019). 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;

- In 2018, Glow's power plants in Thailand were sold to Global Power Synergy Public Company Ltd. (GPSC). These power plants were initially set to exit the scope by the end of 2018, but remained within ENGIE's scope until March 18, 2019 for administrative reasons. For the sake of consistency, 2019 values were corrected to take this activity into account. This mainly included fuel consumption, 1.8 Mt of direct GHG emissions and energy production. Other indicators (management, waste, air, water) were estimated based on 2019 production and data collected in 2018. Two other smaller entities, Viking Energy of Lincoln and Viking Energy of McBain, were reintegrated for the same reason in the same manner;
- the methodology for calculating the "Purchases of goods and services" item in "Other indirect GHG emissions" was reviewed in 2020. On the one hand, purchasing sub-categories have been created to calculate more precisely the GHG emissions associated with purchases. On the other hand, the volume of expenditures not yet categorized has been taken into account by extrapolating the nature of these expenditures on the basis of the volume already categorized. This extrapolation made it possible to estimate the GHG emissions associated with this volume of expenses not yet categorized. The 2018 and 2019 data have been restated for consistency.

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. ENGIE is further increasing its decarbonization efforts: the emission rate at the end of 2020 was 212.5g CO_2eq./kWh, down 3.4% compared to 2019, and down 52% compared to 2012, i.e. well in excess of its 2020 target of 20%. The Group's absolute direct CO_2 eq. emissions fell by more than 12.2 million tons in one year, from 46.2 tons to 38.6 million tons, a 16.5% reduction.

This excellent result reflects 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 prepares a plan to implement these recommendations. The Group publishes its Scope 1, 2 and 3 (main items) emissions and answers the CDP (formerly Carbon Disclosure Project) questionnaire each year.

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
Total direct GHG emissions – Scope 1 □□	38,589,016 t CO_2 eq.	46,188,978 t CO_2 eq.	57,205,670 t CO_2 eq.
of which emissions from energy production	36,396,271 t CO_2 eq.	43,724,817 t CO_2 eq.	54,696,246 t CO_2 eq.
of which CH_4 emissions	1,516,355 t CO_2 eq.	1,726,874 t CO_2 eq.	1,830,192 t CO_2 eq.
GHG emissions per business unit – energy generation	212.5 kg CO_2 eq./MWheq.	220.0 kg CO_2 eq./MWheq.	284.1 kg CO_2 eq./MWheq.
GHG emissions per business unit – gas storage	0.8 kg CO_2 eq./MWheq.	0.9 kg CO_2 eq./MWheq.	0.9 kg CO_2 eq./MWheq.
GHG emissions per business unit – gas transportation (excluding via LNG tanker)	0.8 kg CO_2 eq./MWheq.	1.0 kg CO_2 eq./MWheq.	1.1 kg CO_2 eq./MWheq.
GHG emissions per business unit – LNG terminals	0.9 kg CO_2 eq./MWheq.	0.8 kg CO_2 eq./MWheq.	1.8 kg CO_2 eq./MWheq.
GHG emissions per business unit – gas distribution	3.2 kg CO_2 eq./MWheq.	3.4 kg CO_2 eq./MWheq.	3.2 kg CO_2 eq./MWheq.

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2020*

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.

(1) The share of energy production from non-fossil sources has increased by 60.8% in six years, from 31.6% to 50.8% in 2020

ENGIE is implementing practical measures to guard against this set of risks, including 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, the digging of ditches and a reservoir to deal with the risk of flooding at the Capel Grange solar park in England, etc.

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, 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. For the purposes of consistency with the other environmental information published, the "Scope 2" and "Scope 3" emissions listed below do not include those of the water and waste management businesses of SUEZ.

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	ENGIE 2020	ENGIE 2019	ENGIE 2018
Indirect emissions related to energy ("Scope 2")	**2,330,625 t CO_2 eq.**	**2,534,464 t CO_2 eq.**	**2,912,586 t CO_2 eq.**
Indirect emissions related to power consumption*	1,215,892 t CO_2 eq.	1,454,795 t CO_2 eq.	1,853,696 t CO_2 eq.
Indirect emissions related to the consumption of steam, heating or cooling*	1,114,733 t CO_2 eq.	1,079,669 t CO_2 eq.	1,058,890 t CO_2 eq.
Other indirect GHG emissions ("Scope 3")	**134,001,032 t CO_2 eq.**	**133,601,446 t CO_2 eq.**	**139,222,319 t CO_2 eq.**
Upstream fuel chain (energy-related emissions not included in the "direct GHG emissions" and "indirect energy-related GHG emissions" categories)	19,684,560 t CO_2 eq.	20,467,749 t CO_2 eq.	21,889,235 t CO_2 eq.
Investments (GHG emissions from power plants consolidated under the equity method)	31,105,244 t CO_2 eq.	31,127,157 t CO_2 eq.	30,869,952 t CO_2 eq.
Use of products sold (fuel sales to third parties)	61,496,829 t CO_2 eq.	60,882,185 t CO_2 eq.	61,968,404 t CO_2 eq.
Purchased products and services	18,572,190 t CO_2 eq.	17,762,429 t CO_2 eq.	21,670,364 t CO_2 eq.
Capital equipment	3,142,210 t CO_2 eq.	3,361,926 t CO_2 eq.	2,824,365 t CO_2 eq.

* *The electricity and thermal energy consumption used to calculate this data is subject to verification by the Statutory Auditors with "reasonable" assurance for the financial year 2020 (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 generation and, in the case of biogas, for transportation. In 2020, renewable energy accounted for close to 17.3 GW of installed electric equivalent, representing 28.4% of the total capacity directly operated by the Group.

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
Renewable – Net installed power (electric and thermal) □□	17,289 MWeeq.	16,315 MWeeq.	14,799 MWeeq.
Share of renewable resources in installed capacity*	28.4%	24.6%	23.9%
Renewable – Electricity and heat produced □□	55,442 GWheeq.	61,556 GWheeq.	57,069 GWheeq.
Energy produced – share of large hydropower	64.0%	71.8%	77.4%
Energy produced – share of small hydropower	1.7%	1.4%	1.7%
Energy produced – share of wind	18.1%	12.3%	6.2%
Energy produced – share of geothermal	0.26%	0.23%	0.23%
Energy produced – share of solar	5.1%	3.2%	2.5%
Energy produced – share of biomass and biogas	10.9%	11.1%	11.9%

* *These capacities correspond to the scope of the environmental reporting specified in Section 3.5.3 (excluding equity-accounted and non-controlled facilities)*

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2020*

3.5.4.3 Energy efficiency

For electricity-generating 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	ENGIE 2020	ENGIE 2019	ENGIE 2018
Primary energy consumption – total (excluding own consumption) □□	284,571 GWh	342,564 GWh	330,440 GWh
Share of coal/lignite	10.13%	12.05%	20.90%
Share of natural gas	46.19%	42.31%	44.59%
Share of fuel oil (heavy and light)	0.71%	0.70%	0.74%
Share of uranium	33.59%	35.85%	24.50%
Share of biomass and biogas	5.68%	5.57%	5.71%
Share of other fuels	3.37%	3.23%	3.28%
Share of fuel in transport	0.32%	0.30%	0.29%
Electricity and thermal energy consumption (excluding own consumption) □□	8,697 GWheeq.	9,244 GWheeq.	10,362 GWheeq.
Energy efficiency of fossil fuel plants (including biomass/biogas) □□	45.1%	45.0%	44.2%

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2020 (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).

Concerning waste from nuclear power plants, particularly radioactive waste, is monitored by Electrabel, but also by ONDRAF (the national body for radioactive waste and enriched fissile materials) and its subsidiary Belgoprocess, which is responsible for the management of radioactive waste from nuclear power plants. Each plant also publishes an annual environmental on the Electrabel website.

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 19 to Section 6.2.2 "Notes to the consolidated financial statements".

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
Radioactive gas emissions			
Rare gases	47.3 TBq	35.1 TBq	54.4 TBq
Iodines	0.04 GBq	0.02 GBq	0.03 GBq
Aerosols	0.25 GBq	0.26 GBq	0.26 GBq
Radioactive nuclear waste (low and medium level)	225 m^3	149 m^3	204 m^3
Radioactive liquid wastes			
Beta and Gamma emitters	16.50 GBq	17.21 GBq	22.77 GBq
Tritium	86.50 GBq	65.07 GBq	84.82 GBq

The risk factors relating to nuclear power are presented in Section 2.2.5 "Industrial Risks".

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 two water-related objectives for 2020: one involves the implementation of concerted local action plans for sites in areas with extremely high water stress, and the other involves reducing freshwater withdrawals across the Group. In 2020, ENGIE was awarded an A- rating by the CDP Water Disclosure program, representing a marked improvement compared with 2019.

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). In 2020, 40 sites were located in areas with extremely high water stress (5.9% 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 40 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. As of 2013, the Group has calculated the water footprint in the life cycle analysis of 1 kWh of electricity, and of 1 kWh of gas in 2016. All of the Group's initiatives have resulted in a 71.5% reduction in freshwater withdrawals from its power generation business since 2012.

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
Fresh water			
Total withdrawal	2,088 Mm^3	2,814 Mm^3	2,717 Mm^3
Total discharge	2,036 Mm^3	2,743 Mm^3	2,642 Mm^3
Non-fresh water			
Total withdrawal	5,195 Mm^3	6,003 Mm^3	7,603 Mm^3
Total discharge	5,169 Mm^3	5,979 Mm^3	7,594 Mm^3
Total consumption	76.8 Mm^3	94.5 Mm^3	85.1 Mm^3

3.5.4.6 Waste

In January 2014, 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.

These efforts have led to a recovery rate of 76.1% for non-hazardous waste and 30.2% for hazardous waste in 2020. 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	ENGIE 2020	ENGIE 2019	ENGIE 2018
Total quantity of non-hazardous waste and by-products discharged (including sludge)	3,333,317 t	3,440,451 t	2,535,782 t
Fly ash, refioms (residues from the purification of incineration fumes from household waste)	1,583,111 t	1,719,517 t	1,509,757 t
Ash, bottom ash	1,280,439 t	1,047,170 t	638,364 t
Desulfurization by-products	66,332 t	120,365 t	180,478 t
Sludge	21,860 t	19,316 t	19,500 t
Driftwood	12,970 t	5,305 t	8,888 t
Total quantity of non-hazardous waste and by-products recovered (including sludge)	2,537,618 t	2,352,561 t	2,159,142 t
Total quantity of hazardous waste and by products discharged (including sludge and excluding radioactive waste) □□	38,139 t	52,524 t	40,371 t
Total quantity of hazardous waste and by products recovered (including sludge and excluding radioactive waste) □□	11,511 t	16,291 t	11,919 t

□□ *Verified by the Statutory Auditors with "reasonable" assurance for 2020*

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 fine particle emissions; installation of low-NOx 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. A strong improvement was observed in 2019 thanks to the reorientation of ENGIE's production assets portfolio.

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
NOx emissions	47,538 t	52,799 t	60,355 t
SO_2 emissions	119,584 t	124,276 t	118,291 t
Fine particle emissions	4,406 t	4,662 t	4,791 t

3.5.4.8 Management of biodiversity

Biodiversity (fauna, flora) is a natural heritage essential to human health and well-being. ENGIE depends on it also depends on it through its use of biomass resources and water and climate regulation provided by biodiversity.

Biodiversity is threatened by climate change, pollution, habitat modification, invasion of exotic species and overexploitation of resources. 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.

In order to contribute to biodiversity protection and to mitigate its impact under the "prevent, reduce, offset" process, the Group has been committed since 2010 to integrating biodiversity into its strategy and activities.

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.

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.

As part of a voluntary initiative, which was recognized at the end of 2012 by the French government as part of the National biodiversity strategy, the Group has defined a targeted action plane [(1)] for each of its priority sites in Europe designed to address the biodiversity protection issues identified at the site and/or by local stakeholders, based on the site's activity.

Since 2016, biodiversity action plans have been incorporated into a more comprehensive approach to integrated and concerted environmental management at site level for all the Group entities, but the method of identifying sites for biodiversity remains unchanged.

In 2018, the Group also strengthened its international commitments by joining the "*act4nature*" initiative. The individual commitments made in this area were largely achieved. Among the measures completed it is worth noting: the constant increase in the number of participants in the network of experts, the introduction of an integrated biodiversity assessment tool (IBAT), and the publication of an internal brochure covering biodiversity. Further information is available on the website.

In 2020, the Group renewed its two commitments in terms of biodiversity via the "act4nature international initiative" and "Entreprises engagées pour la nature-act4nature France".

3.5.4.9 Active prevention of environmental risks

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

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
% of relevant revenue covered by an environmental risk prevention plan	82.7%	81.2%	87.6%
% of relevant revenue covered by an environmental crisis management plan	88.4%	86.1%	88.4%

The six complaints registered in 2020 did not give rise to an obligation to pay compensation. They all originate from surrounding neighborhoods and are exclusively related to the stromboscopic effect of wind turbines. The Group actively monitors these data and implements actions to further reduce this nuisance.

In September 2019, a leakage of 5.4 kg of SF_6, a greenhouse gas, was recorded at the Bergum power plant in the Netherlands. Following the disclosure of this leak to the authorities by ENGIE, a police investigation is underway to determine its source.

In France, at the site of the Plateau de la Motte solar farm, deforestation operations encroached on protected woodland reserves and resulted in a criminal transaction of €14,000 with the DRAAF (the French Regional Directorate of Agriculture and Forestry).

In 2020, environmental expenses (investments and current operating expenses related to environmental preservation) amounted to more than €553 million.

Indicator title	ENGIE 2020	ENGIE 2019	ENGIE 2018
Environment-related complaints	6	10	24
Environment-related convictions	2	1	0
Amount of compensation *(in € thousands)*	14	13	0
Environmental expenditure *(in € thousands)*	553,019	466,365	406,428

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.

(1) A targeted action plan must combine and detail all the measures taken to preserve or restore biodiversity locally. See the note on methodology in Section 3.5.3 for more details

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 €1.125 billion in 2020 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 dialogue 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 dialogue is defined at Group level and then rolled out to each BU according to specific local requirements in terms of issues, activities and regulations. As part of these new CSR objectives, ENGIE aims to cover 100% of its industrial activities with an appropriate dialogue and consultation mechanism by 2020.

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.

In France, for example, in August 2020, in the Kastellin (Finistère) biogas production plant of ENGIE Bioz Services – a 100% subsidiary of ENGIE, an operating incident caused an overflow of a tank of digestates, which are the residues resulting from the methanization of organic matter. These digestates have polluted in a nearby river with ammonia and caused drinking water restrictions in Châteaulin (France) and its surroundings for a few days. After analysis of the accidental causes, ENGIE has taken the appropriate measures to prevent this incident from happening again. These measures concern the follow-up by thermal camera of the incoming organic materials to avoid any accidental heating, the sealing of the rainwater basin, the removal of the automatic pumping device for discharge into the outside environment and the installation of a safety system at the level of the liquid digestate recovery tank. These measures have made it possible to envisage a restart of the installation.