

Environmental reporting

2019



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 2019, the entities that had implemented an Environmental Management System (EMS) accounted for 72.6% of relevant revenue ⁽¹⁾.

The need to obtain external EMS certification is assessed locally with regard to local economic conditions and benefits.

PERCENTAGE OF RELEVANT REVENUE COVERED

Indicator title	ENGIE 2019	ENGIE 2018	ENGIE 2017
By an EMAS certification	3.08%	2.42%	4.75%
By an ISO 14001 (non-EMAS) certification	58.23%	66%	61.84%
By another external EMS certification	2.88%	2.15%	3.16%
TOTAL EXTERNAL CERTIFICATIONS	64.19%	70.57%	69.75%
By an internal certification (but not by a certified EMS)	8.37%	9.73%	11.92%
TOTAL INTERNAL AND EXTERNAL EMS	72.56%	80.30%	81.67%

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.

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

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 2019 was 248.7g CO₂eq./kWh, down 19.6% compared to 2018, and down 43.8% compared to 2012 objective of, i.e. well in excess of its 2020 target of -20%. The Group’s absolute direct CO₂ eq. emissions

fell by more than 12.2 million tons in one year, from 66.2 tons to 54 million tons, a 18.4% 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 2019	ENGIE 2018	ENGIE 2017
Total direct GHG emissions - Scope 1 ■■	53,952,322 t CO eq.	66,117,396 t CO eq.	89,756,230 t CO eq.
of which CH ₄ emissions	1,726,874 t CO eq.	1,830,192 t CO eq.	2,252,850 t CO eq.
GHG emissions per business unit – energy generation	248.7 kg CO eq./MWheq.	315.3 kg CO eq./MWheq.	363.7 kg CO eq./MWheq.
GHG emissions per business unit – gas storage	0.9 kg CO eq./MWheq.	0.9 kg CO eq./MWheq.	0.8 kg CO eq./MWheq.
GHG emissions per business unit – gas transportation (excluding via LNG tanker)	1.0 kg CO eq./MWheq.	1.1 kg CO eq./MWheq.	1.7 kg CO eq./MWheq.
GHG emissions per business unit – LNG terminals	0.8 kg CO eq./MWheq.	1.8 kg CO eq./MWheq.	2.3 kg CO eq./MWheq.
GHG emissions per business unit – gas distribution	3.4 kg CO eq./MWheq.	3.2 kg CO eq./MWheq.	2.8 kg CO eq./MWheq.

■■ Verified by the Statutory Auditors with “reasonable” assurance for 2019

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 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.

(1) The share of energy production from renewable and nuclear sources has increased by 67.3% in 5 years, from 32.7% to 54.8% in 2019.

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 2019	ENGIE 2018	ENGIE 2017
Indirect emissions related to energy ("Scope 2")	2,518,487 t CO eq.	2,912,586 t CO eq.	3,576,861 t CO eq.
Indirect emissions related to power consumption ⁽¹⁾	1,438,826 t CO eq.	1,853,696 t CO eq.	2,602,395 t CO eq.
Indirect emissions related to the consumption of steam, heating or cooling ⁽¹⁾	1,079,661 t CO eq.	1,058,890 t CO eq.	974,466 t CO eq.
Other indirect GHG emissions ("Scope 3")	126,317,314 t CO eq.	133,060,132 t CO eq.	145,527,966 t CO eq.
Upstream fuel chain (energy-related emissions not included in the "direct GHG emissions" and "indirect energy-related GHG emissions" categories)	20,179,995 t CO eq.	23,368,440 t CO eq.	25,616,434 t CO eq.
Investments (GHG emissions from power plants consolidated under the equity method)	28,862,010 t CO eq.	30,732,680 t CO eq.	9,847,667 t CO eq.
Use of products sold (fuel sales to third parties, market sales excluded)	60,599,653 t CO eq.	68,796,400 t CO eq.	3,301,942 t CO eq.
Purchased products and services	13,685,097 t CO eq.	6,812,253 t CO eq.	27,896,370 t CO eq.
Capital equipment	2,990,558 t CO eq.	3,350,358 t CO eq.	78,865,553 t CO eq.

(1) 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 2019 (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 2019, renewable energy accounted for

close to 19.5 GW of installed electric equivalent, representing 29.5% of the total capacity directly operated by the Group.

Indicator title	ENGIE 2019	ENGIE 2018	ENGIE 2017
Renewable - Net installed power (electric and thermal) ■■	19,512 MW _{eeq.}	18,094 MW _{eeq.}	16,812 MW _{eeq.}
Share of renewable resources in installed capacity	29.5%	27.8%	24.5%
Renewable - Electricity and heat produced ■■	71,496 GW _{heeq.}	66,325 GW _{heeq.}	58,985 GW _{heeq.}
Energy produced – share of large hydropower	71.5%	76.2%	75.4%
Energy produced – share of small hydropower	1.2%	1.5%	1.4%
Energy produced – share of wind	14.5%	9.2%	9.9%
Energy produced – share of geothermal	0.19%	0.19%	0.14%
Energy produced – share of solar	3.1%	2.6%	1.2%
Energy produced – share of biomass and biogas	9.6%	10.3%	12.0%

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 2019.

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 2019	ENGIE 2018	ENGIE 2017
Primary energy consumption - total (excluding own consumption) ■■	337,596 GWh	330,656 GWh	445,327 GWh
Share of coal/lignite	11.54%	20.89%	24.55%
Share of natural gas	41.72%	44.56%	40.11%
Share of fuel oil (heavy and light)	0.71%	0.74%	0.99%
Share of uranium	36.37%	24.48%	26.90%
Share of biomass and biogas	5.73%	5.77%	4.57%
Share of other fuels	3.25%	3.28%	2.63%
Share of fuel in transport	0.68%	0.29%	0.25%
Electricity and thermal energy consumption (excluding own consumption) ■■	8,075 GWheeq.	9,124 GWheeq.	9,503 GWheeq.
Energy efficiency of fossil fuel plants (including biomass/biogas) ■■	44.9%	44.2%	43.4%

■■ Verified by the Statutory Auditors with "reasonable" assurance for 2019 (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).

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 2019	ENGIE 2018	ENGIE 2017
Radioactive gas emissions			
Rare gases	35.1 TBq	54.4 TBq	34.0 TBq
Iodines	0.02 GBq	0.03 GBq	0.01 GBq
Aerosols	0.26 GBq	0.26 GBq	0.34 GBq
Radioactive nuclear waste (low and medium level)	149 m ³	204 m ³	178 m ³
Radioactive liquid wastes			
Beta and Gamma emitters	17.21 GBq	22.77 GBq	20.56 GBq
Tritium	65.1 TBq	84.8 TBq	55.7 TBq

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 2019, ENGIE was awarded a B rating by the CDP Water Disclosure program, in real progress from 2018.

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 2019, 33 sites were located in areas with extremely high water stress (4.5% of sites excluding solar and wind), for which action plans are being implemented. The impact of water stress is relative, however, as it depends on the site's activity and fresh water needs. Only 6 out of the 33 sites have substantial freshwater requirements (more than 100,000 m³/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 61.4% reduction in freshwater withdrawals from its power generation business since 2012.

Indicator title	ENGIE 2019	ENGIE 2018	ENGIE 2017
Fresh water			
Total withdrawal	2823 Mm ³	2717 Mm ³	2793 Mm ³
Total discharge	2755 Mm ³	2642 Mm ³	2680 Mm ³
Non-fresh water			
Total withdrawal	5636 Mm ³	7603 Mm ³	8685 Mm ³
Total discharge	5611 Mm ³	7594 Mm ³	8672 Mm ³
Total consumption	93.3 Mm ³	85.3 Mm ³	124.9 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% for non-hazardous waste and 31% for hazardous waste in 2019. 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 2019	ENGIE 2018	ENGIE 2017
Total quantity of non-hazardous waste and by-products discharged (including sludge)	3,192,173 t	2,723,905 t	2,773,419 t
Fly ash, reflows (residues from the purification of incineration fumes from household waste)	1,642,912 t	1,509,757 t	1,709,087 t
Ash, bottom ash	677,893 t	645,597 t	503,592 t
Desulfurization by-products	120,757 t	180,478 t	191,522 t
Sludge	18,828 t	19,500 t	20,576 t
Driftwood	5,305 t	8,888 t	7,331 t
Total quantity of non-hazardous waste and by-products recovered (including sludge)	2,432,929 t	2,315,236 t	2,255,802 t
Total quantity of hazardous waste and by products discharged (including sludge and excluding radioactive waste) ■■	52,893 t	43,174 t	386,783 t
Total quantity of hazardous waste and by products recovered (including sludge and excluding radioactive waste) ■■	16,377 t	11,953 t	52,203 t

■■ Verified by the Statutory Auditors with "reasonable" assurance for 2019.

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 2018 thanks to the reorientation of ENGIE’s production assets portfolio.

Indicator title	ENGIE 2019	ENGIE 2018	ENGIE 2017
NOx emissions	50,408 t	60,412 t	92,209 t
SO ₂ emissions	129,026 t	118,291 t	159,623 t
Fine particle emissions	4,544 t	4,873 t	7,353 t

3.5.4.8 Management of 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. Restoring natural habitats (e.g. contribution of Glow in Thailand to the restoration of the Houay Mahad Hill Forest), reducing the impact of wind turbines on wildlife (e.g. Cheppes-la-Prairie windfarm in France), installing fish ladders at dams (e.g. the Sauveterre-sur-le-Rhône fishway), ensuring that gas-grid easements contribute to ecological continuity, and applying differentiated landscaping to green spaces are examples of actions taken by the Group. 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 the target sites, but the method of identifying sites for biodiversity remains unchanged.

Building on the results of 2015, and to support the Group’s change and transformation, ENGIE extended its contribution to the National Biodiversity Strategy for the period 2016-2018 by defining a new objective: local and sustainable integration. The aim of this objective is to position biodiversity as an asset in order to integrate its activities within the regions in conjunction with its stakeholders, and to highlight the good practices carried out by the Group’s business units, such as ecological site management. The Group also strengthened its international commitments by joining the “act4nature” initiative in July 2018.



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 2019	ENGIE 2018	ENGIE 2017
% of relevant revenue covered by an environmental risk prevention plan	80.2%	87.6%	83.2%
% of relevant revenue covered by an environmental crisis management plan	85.1%	88.4%	87.7%

The 10 complaints registered in 2019 did not give rise to an obligation to pay compensation. One complaint concerns a problem of odor nuisance for the neighborhood, 2 are related to a construction site but no damage was finally confirmed, 7 were addressed to ENGIE by private individuals for nuisances related to the operation of wind turbines (noise, stroboscopic effect, falling of ice chunks). The Group actively monitors these data and implements actions to further reduce them.

In 2017, local residents brought a lawsuit before the Environmental Court of Valdivia, for alleged environmental damage caused by the growth of an algae, during the summer, in the tank of the hydropower plant of Laja (Chile). ENGIE has not yet received a notification. The Group has implemented measures to contain the growth of such algae.

In 2019, environmental expenses (investments and current operating expenses related to environmental preservation) amounted to more than €466 million.

(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.

Indicator title	ENGIE 2019	ENGIE 2018	ENGIE 2017
Environment-related complaints	10	24	13
Environment-related convictions	1	0	1
Amount of compensation (in € thousands)	13 k€	0 k€	0 k€
Environmental expenditure (in € thousands)	466,365 k€	406,428 k€	396,731 k€

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, 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 authorizations 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 billion in 2019 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.