ASSESSMENT OF GREENHOUSE GAS EMISSIONS

EDF group 2018

INTRODUCTION

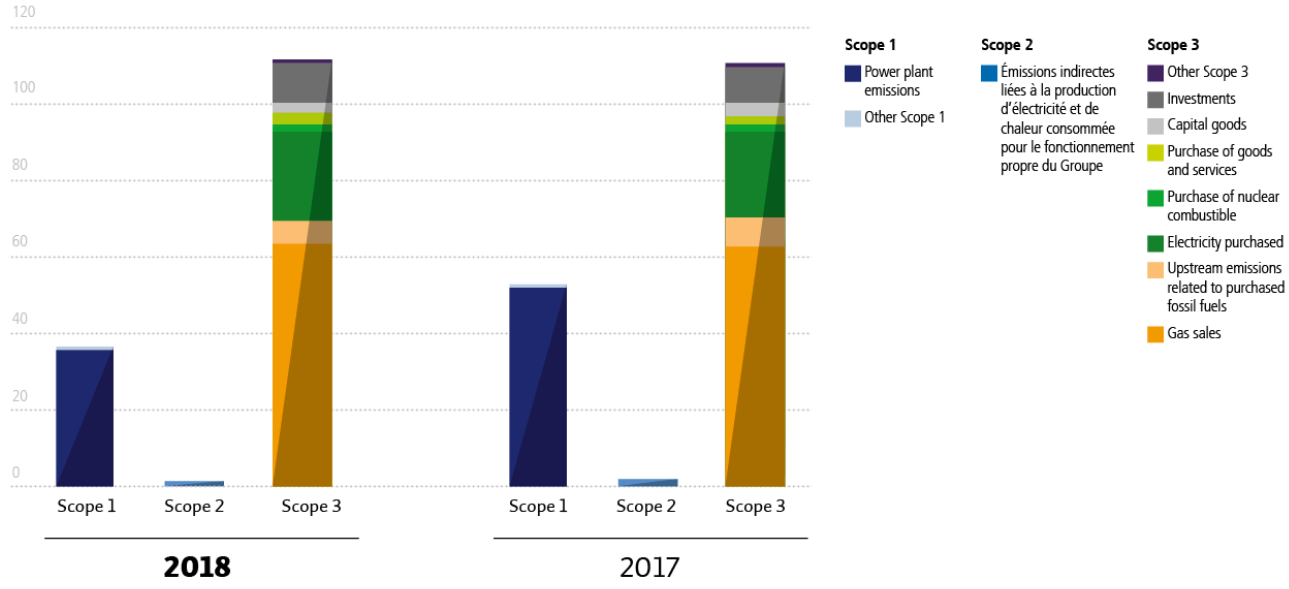
EDF[1] publishes an Assessment of greenhouse gas emissions covering the entire EDF group[2] and all the main emissions sources in the GHG Protocol[3]. It makes progress in analysing its emissions to produce information that is as accurate and exhaustive as possible. EDF goes beyond the legal requirements in France by having more than 71% of its emissions – of which 99% Scope 1, 85% Scope 2 and 62% Scope 3 – verified by a third party.

The analysis focuses on Scopes 1, 2 and 3 of the GHG Protocol, covering the six greenhouse gases listed in the Kyoto Protocol (CO_2, CH_4, N_2O, HFC, PFC, SF_6, NF_3), and ranging from fuel manufacturing to employees' office activities. The data is presented in CO_2 equivalent, with other gases converted based on their global warming potential (GWP).

2018 GREENHOUSE GAS EMISSIONS

The Group's direct and indirect emissions for 2018 total about 147 million tonnes of CO_2 equivalent. Two sources of emissions account for more than 65% of the Group's total environmental footprint: direct CO_2 emissions due to electricity and heat generation (most of Scope 1) and indirect GHG emissions associated with the combustion of gas sold to end customers.

EDF group's direct and indirect CO_2 emissions in 2017[4] and 2018



[1] The term "EDF" refers to EDF SA, the parent company. The terms "Group" or "EDF group" refer to EDF and its subsidiaries and shareholdings.
2 See section on Group Scope.
3 The Greenhouse Gas Protocol Initiative, more commonly known as the GHG Protocol, is the most internationally recognised GHG accounting method. Introduced in 1998 by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), it was developed in partnership with companies, NGOs and governments. It provides a set of resources, tools and data for carbon footprint calculation (http://www.ghgprotocol.org/).
[4] Scope 3 for 2017 was recalculated to include gas sales to a category of customer that was not taken into account at the time of the previous publication. These sales represent around 12 million tonnes of CO_2 equivalent. 2017 and 2018 are therefore presented here like for like.

Scope 1

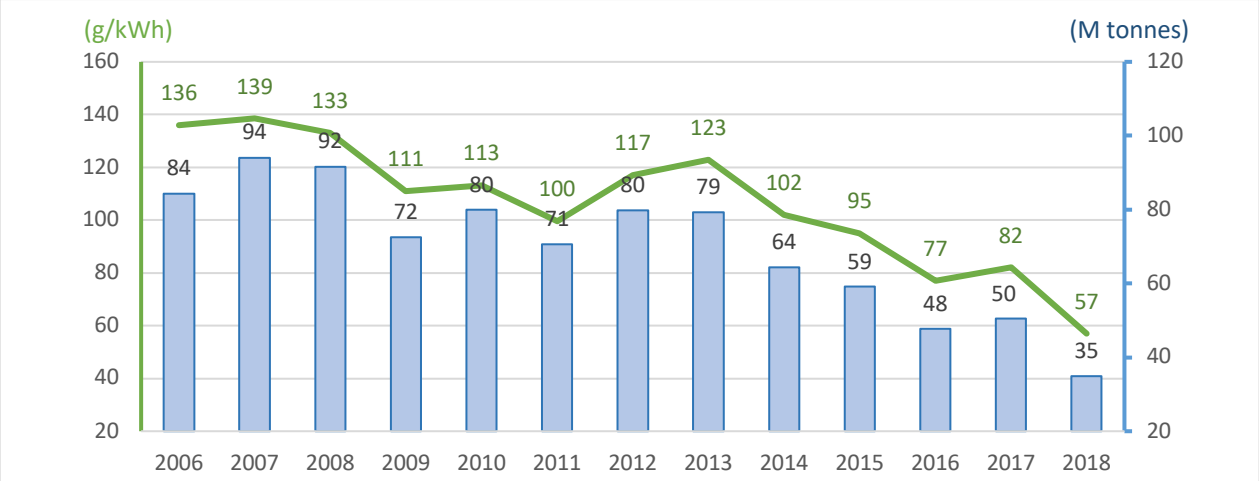
For several years, EDF group has published data on direct CO_2 emissions from heat and power generation plants, which represent over 98% of all Scope 1 emissions. These emissions, along with all Scope 1 emissions, fell at almost all Group entities between 2017 and 2018.

EDF group – Scope 1 – Direct CO_2 emissions due to electricity and heat generation	2017	2018
Direct CO_2 emissions from power plants (million tonnes of CO_2 equivalent)	50.5	34.9✓
Scope 1 total emissions (million tonnes of CO_2 equivalent)	51.3	35.7✓

✓Data audited for limited assurance by the Statutory Auditors, KPMG SA, appointed as an independent third party.

This reduction was particularly high in France (30%) due to lower use of fossil-fired plants, higher rainfall and increased availability of nuclear power plants. The disposal of Polish power plants also helped lower the Group's emissions. These results tie in with EDF's commitment to bringing its Scope 1 level below 30 million tonnes in 2030.

It is necessary to underline the high level of variability in annual emissions for EDF group, due to the very low proportion of fossil-fired electricity generation in EDF's total output. Annual variations in temperatures and rainfall, as well as the availability of the nuclear facilities, can have a significant impact on how much use is made of EDF's fossil-fired plants and lead to considerable differences in annual emissions. However, the trend towards lower emissions has been entrenched since 2007, as shown in the following graph of direct CO_2 emissions (output from heat and power generation plants).



Change in EDF group's direct CO_2 emissions in absolute and specific values from 2006 to 2018

Scope 2

Scope 2 emissions, which include electricity, heating and cooling purchased for EDF group's own use, are very limited compared with the rest of the assessment. Due to the Group's business activities as an electricity generator, most emissions connected to the Group's own use are reported under Scope 1. Furthermore, following the GHG Protocol's Scope 2 Guidance, the Group's Scope 2 emissions are calculated based both on the average content of the network and on supplier content. Taking a conservative reporting approach, EDF decided to report Scope 2 emissions based on the average content of the network.

Between 2017 and 2018, the Group's Scope 2 emissions were fairly stable (down 3%). This slight reduction stems from the fall in the electricity emission factor in France.

EDF group – Scope 2 – Indirect CO_2 emissions	2017	2018
Indirect CO_2 emissions (million tonnes of CO_2 equivalent)	0.50	0.47✓

✓ Data audited for limited assurance by the Statutory Auditors, KPMG SA, appointed as an independent third party.

Scope 3

Emissions associated with the combustion of gas sold to end customers account for the largest share of indirect emissions: 54.1 million tonnes of CO_2 equivalent[5], representing 49% of the Group's Scope 3 indirect emissions in 2018.

On top of these emissions are emissions from upstream operations of gas sold, estimated at 10.6 million tonnes of CO_2 equivalent. Together, these two sources of emissions total 64.7 million tonnes of CO_2 equivalent, or 58% of indirect emissions.

Indirect emissions associated with the generation of electricity purchased for resale to end customers, account for 21.4 million tonnes of CO_2 equivalent, or 19% of the Group's indirect emissions.

Scope 1 and Scope 2 emissions from power plants of companies accounted for under the equity method[6] are reported based on the Group's financial control approach pro rata to our share of ownership. These emissions are estimated at 9.9 million tonnes of CO_2 equivalent, i.e. about 9% of the Group's indirect emissions (emissions from organisations reported as Investments).

Upstream emissions from fossil and nuclear fuels consumed at the Group's power plants fell considerably (down 21%), accounting for 7.3 million tonnes of CO_2 equivalent, or 7% of the Group's indirect emissions.

Other sources of emissions account for about 7% of the Group's indirect emissions.

EDF group – Scope 3 – Indirect CO_2 emissions	2017[7]	2018
Indirect CO_2 emissions (million tonnes of CO_2 equivalent)	109.6	110.8✓

✓ Data audited for limited assurance by the Statutory Auditors, KPMG SA, appointed as an independent third party.

Between 2017 and 2018, the most significant emissions associated with the combustion of gas sold to end customers were stable (up 0.6 million tonnes of CO_2 equivalent, a 0.6% increase). This was due to two factors that offset each other: sales increased by 8.3%, while the emission factor of gas combustion fell by 9.1%. The increase in sales came mainly from the United States.

Indirect emissions associated with electricity purchased for resale to end customers increased by 2.6 million tonnes of CO_2 equivalent, i.e. 14%.

Lastly, emissions from companies accounted for under the equity method increased slightly, by 5%.

EDF has therefore been able to present an exhaustive Scope 3 analysis, and is pursuing its efforts to provide an ever more accurate and exhaustive analysis of its indirect emissions.

GROUP PERIMETER

The Group perimeter is determined by the consolidation method applied to companies, in line with financial standards (IAS-IFRS[8]). EDF group uses the basis of full consolidation for the financial and non-financial data of its companies. The information presented here is from the 2018 Reference Document.

Full consolidation covers all companies that the Group controls. Companies that EDF group does not control are accounted for under the equity method.

However, criteria linked to relevance of the subsidiaries' activities in terms of environmental impact are also taken into account. As such, the assessment may not cover some subsidiaries included in the financial reporting scope if their business activity or size is deemed insignificant with regard to environmental issues. Conversely, some companies deemed to have a significant impact may be included in the environmental scope but do not appear in the financial reporting scope.

The scope defined for the assessment of GHG emissions covers the following companies: EDF SA, EDF PEI, Dalkia, Edison, Enedis, Électricité de Strasbourg, EDF Energy Services, EDF Energy, Framatome, EDF Renouvelables, Norte Fluminense, MECO, EDF Luminus, EDF Belgium and their subsidiaries. The subsidiaries included under the financial consolidation approach but excluded from this assessment represent less than 5% of the Group's total environmental footprint.

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[6] See section on Group Scope.

[7] Scope 3 for 2017 was recalculated to include gas sales to a category of customer that was not taken into account at the time of the previous publication. These sales represent around 12 million tonnes of CO_2 equivalent (combustion and upstream operations of gas sold). 2017 and 2018 are therefore presented here like for like.

[8] Accounting standards applied by the Group, see section 6 of the 2017 Reference Document.

The companies accounted for under the equity method and factored into the assessment (Scope 3, under Investments) are: Shandong Zhonghua, Datang San Men Xia, Fuzhou, Sloe, Alpiq, Nam Theun, Enercal, Électricité de Mayotte and Chacao. Scope 1 and Scope 2 emissions from these companies are calculated based on the Group's financial control approach pro rata our share of ownership. Other companies accounted for under the equity method that are excluded from the assessment represent less than 5% of these emissions. Three companies – Chacao, Enercal and Électricité de Mayotte – are not included in the financial scope but, for the sake of completeness, are included in this assessment and accounted for under the equity method.

BREAKDOWN OF GHG PROTOCOL EMISSIONS FOR EDF GROUP

Scope 1	**Direct** emissions: • produced by stationary combustion sources: - CO_2, CH_4 and N_2O emissions from fossil-fired power plants - consumption of fossil fuels for heating in office buildings • produced by mobile combustion sources: - fuel consumption by fleet vehicles and worksite equipment • fugitive emissions: - fugitive emissions from hydro reservoirs - fugitive emissions of SF_6 and coolant leaks
Scope 2	**Indirect** emissions associated with the generation of electricity, heating or cooling consumed for own use: • electricity consumption for own use (office buildings and data centres) • consumption of heating and cooling systems for own use
Scope 3	**Indirect** emissions from operations not included in Scopes 1 and 2: • purchases of goods and services • upstream operations of fuels used in power plants (nuclear and fossil-fired), for heating in office buildings and for fleet vehicles and equipment: extraction, refining, enrichment, transport • upstream operations and losses of electricity, heating and cooling systems consumed for own use • amortisation of emissions from the production of fixed assets (power plants, electricity networks, buildings, vehicles and equipment) • generation of electricity purchased for resale to end customers • power transmission and distribution (upstream operations and losses) • upstream activities and combustion of gas purchased for resale to end customers • other: waste management, employee work-related travel, leased assets, downstream transportation of by-products, production of consumables

DETAILS ON METHODOLOGY

The reporting period for the data included runs from 1 January of year Y to 31 December of year Y.
Unless otherwise indicated, the emission factors used are from the Base Carbone®, a database of emission factors administered by France's environment and energy management agency (Ademe), dating from January 2019. The GWP[9] data used is that set out in the fifth report of the IPCC[10].

Details on Scope 1

Direct emissions from fossil-fired power plants (CO_2, CH_4 and N_2O) are measured or calculated based on fuel measurements or standard emission factors, and cover all electricity generation phases, including unit commissioning and shutdown phases.
CO_2 emissions also include emissions from processes, such as flue gas desulphurisation.
CH_4 and N_2O emissions are then converted into tonnes of CO_2 equivalent.

Emissions due to fuel consumption by back-up power systems at nuclear power plants are calculated based on amounts of fuels purchased over the year from the Group's main supplier, as they are representative of real consumption.

Emissions associated with filling hydro reservoirs with water: these CO_2 and CH_4 emissions are calculated using an IPCC method for reservoirs of more than 1 hectare. N_2O emissions cannot be assessed using this method.

[9] GWP: Global Warming Potential.
[10] IPCC: Intergovernmental Panel on Climate Change.

Details on Scope 2

In compliance with GHG Protocol Guidance, Scope 2 emissions are calculated based both on the average content of the network and on supplier content. Taking a conservative reporting approach, EDF decided to report Scope 2 emissions based on the average content of the network.
Electricity consumption is converted into emissions (excluding upstream operations and network losses), all uses combined, by applying the emission factor of the average mix recommended by Ademe for the first case, and the content of the company's generation mix for the second calculation method.
These emissions also include generation of electricity consumed in office buildings (heat, cooling, processes, lighting, IT systems, various equipment, etc.) and in the two main data centres.
Emissions from electricity use in office buildings are calculated by taking the average electricity use per unit of surface area from a representative sample of occupied buildings. This average use is then applied to the total surface area of office buildings.

Details on Scope 3

Emissions from upstream activities in the nuclear fuel cycle include purchases of nuclear fuel (extraction, enrichment and MOX, transportation), calculated based on the amount of nuclear fuel load over the year. An emission factor from the Ecoinvent 2.2. database is applied for MOX fuel and extraction and enrichment activities.

Auditors' report on certain items in the 2018 Assessment of Greenhouse Gas Emissions from EDF group's business operations (Scopes 1, 2 and 3)

Year ended 31 December 2018
To the attention of the General Management,

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EDF

Rapport d'assurance modérée de l'un des commissaires aux comptes sur les totaux scope 1, scope 2 et scope 3 du Bilan de gaz à effet de serre des activités du Groupe EDF

Exercice clos le 31 décembre 2018
EDF
22-30 avenue Wagram
75008 Paris
Ce rapport contient 4 pages

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Exercice clos le 31 décembre 2018

A l'attention de la Direction Générale,

A la suite de la demande qui nous a été faite et en notre qualité de commissaire aux comptes d'Electricité de France (ci-après « **Groupe EDF** »), nous vous présentons notre rapport d'assurance modérée sur les émissions totales de gaz à effet de serre respectivement du « scope 1 », du « scope 2 » et du « scope 3 ».

Ces émissions sélectionnées par le Groupe EDF et identifiées par le signe ✓ (ci-après « **les Données** ») sont présentées dans le Bilan de gaz à effet de serre 2018 du Groupe EDF aux pages 3 et 4 en Annexes.

La conclusion formulée ci-après porte sur ces seules Données et non sur l'ensemble des informations présentées.

Responsabilité de la société EDF

Les émissions de gaz à effet de serre respectivement du « scope 1 », du « scope 2 » et du « scope 3, y inclus les Données, ont été préparés sous la responsabilité de la Direction du Développement Durable du Groupe EDF conformément aux procédures de collecte et de calcul (ci-après le « Référentiel ») dont les éléments significatifs sont présentés dans le Bilan des émissions de gaz à effet de serre 2018 du Groupe EDF et disponibles sur demande auprès de cette Direction.

Indépendance et contrôle qualité

Notre indépendance est définie par les dispositions prévues à l'article L. 822-11-3 du code de commerce et le code de déontologie de la profession. Par ailleurs, nous avons mis en place un système de contrôle qualité qui comprend des politiques et des procédures documentées visant à assurer le respect des règles déontologiques, de la doctrine professionnelle et des textes légaux et réglementaires applicables.

Responsabilité de l'organisme tiers indépendant

Il nous appartient, sur la base de nos travaux, d'exprimer une conclusion d'assurance modérée sur le fait que les Données sont présentées, dans tous leurs aspects significatifs, conformément au Référentiel.

Nature et étendue des travaux

Nos travaux ont été effectués selon la doctrine professionnelle de la Compagnie nationale des commissaires aux comptes ainsi qu'à la norme internationale ISAE 3410[1].

Nous avons mené les travaux suivants :

- Nous avons pris connaissance de l'ensemble des entreprises incluses dans le périmètre de consolidation ;
- Nous avons apprécié le caractère approprié du Référentiel au regard de sa pertinence, son exhaustivité, sa fiabilité, sa neutralité et son caractère compréhensible, en prenant en considération, le cas échéant, les bonnes pratiques du secteur ;
- Nous avons mis en œuvre sur les Données :
  - des procédures analytiques consistant à vérifier la correcte consolidation des données collectées ainsi que la cohérence de leurs évolutions ;
  - des tests de détail sur la base de sondages, consistant à vérifier la correcte application des définitions et procédures et à rapprocher les données des pièces justificatives. Ces travaux ont été menés auprès d'une sélection d'entités contributrices[2] et couvrent entre 62% et 99% des Données.

Nous estimons que les travaux que nous avons menés en exerçant notre jugement professionnel nous permettent de formuler une conclusion d'assurance modérée ; une assurance de niveau supérieur aurait nécessité des travaux de vérification plus étendus.

Moyens et ressources

Nos travaux ont mobilisé les compétences de six personnes.

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[1] ISAE 3410 - *Assurance Engagements on Greenhouse Gas Statements* – norme qui explicite les modalités d'application de la norme ISAE 3000 - *Assurance engagements other than audits or reviews of historical financial information* – aux missions d'assurance visant la délivrance d'un rapport sur le bilan de gaz à effet de serre d'une entité.

[2] Direction du Développement Durable, Direction SoDATA - Expertise & Prévision, Direction Production Nucléaire, Direction des Achats, Direction Immobilier Groupe, Division Production & Ingénierie Thermique.

Nous avons fait appel, pour nous assister dans la réalisation de nos travaux, à nos spécialistes en matière de développement durable et de responsabilité sociétale.

Conclusion

Sur la base de nos travaux, nous n'avons pas relevé d'anomalie significative de nature à remettre en cause le fait que les Données, sont présentées, dans tous leurs aspects significatifs, conformément au Référentiel.

Paris-La Défense, le 17 avril 2019

KPMG S.A.

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THE EDF GROUP IS ISO 14001 CERTIFIED. **MAY 2019**