Case study Summary sheet

Context

CASE STUDY

Footprint use category: Project / site and Corporate & portfolio
Assessment time: 2019

Perimeter

		LUEFN Pressure	CC Pressure	Aquatic Pressures
Scope 1		✓	✓	✓
Scope 2		✓	✓	✓
Scope 3	Tier 1	✓	✓	✓
	Rest of value chain	✓	✓	✓
	Downstream	☐	☐	☐

COMPANY'S IDENTITY

Industry
Utilities

Sub-industry
Production of electricity by gas

2019 turnover
71.3 billion EUR

Listed
Euronext, CAC 40

Why?

ASSESS THE BIODIVERSITY IMPACTS OF ENERGY PRODUCTION ACTIVITIES FOR THREE GAS POWER STATIONS, EXPLORE BIODIVERSITY FOOTPRINT ASSESMENTS (BFA) WITH THE GBS.

When?

COMPUTATION IN DECEMBER 2020 BASED ON 2019 FIGURES

How often?

ONE OFF

What?

TERRESTRIAL AND FRESHWATER BIODIVERSITY FOOTPRINTS LINKED TO THREE GAS POWER STATIONS' DIRECT OPERATIONS (AKIN TO A SITE-LEVEL ASSESSMENT) AND PURCHASES (THE THREE POWER STATIONS BEING SIMILAR TO A SMALL BUSINESS UNIT)

For who?

INTERNAL USE, STRATEGY, SOURCING

How detailed?

RESULTS ARE AVAILABLE FOR EACH GAS POWER STATION AND BROKEN DOWN BY SCOPE AND PRESSURE

DATA COLLECTED

Item	Description	Source
Land use	Areas occupied by the three power stations and associated land use type	
GHG emissions	Scope 1 and 2 GHG emissions of the three powers stations	
Water withdrawals and discharge volumes	Water withdrawals and discharged volumes of the three power stations	EDF
Natural gas consumed	Natural gas consumed for the functionning of the plants	
Financial data	Turnover and purchases of the three plants	

Footprint analysis

RESULTS

Vertically integrated* **terrestrial dynamic** impact
18 MSA.km²

Vertically integrated* **terrestrial static** impact
32 MSA.km²

Vertically integrated* **aquatic static** impact
1.2 MSA.km²

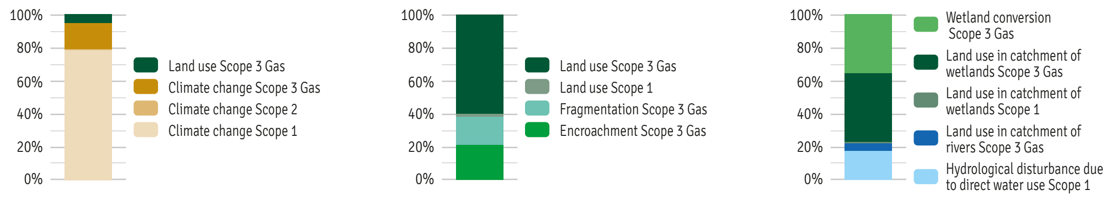

Figure 11: *Impacts split by accounting category, realm, pressure and Scope for the three production units*
(Source: GBS 1.0.1, December 2020, Antoine Vallier)

*vertically integrated: sum of Scope 1, 2, 3 Upstream

KEY MESSAGES

- GHG emissions and water use are the main drivers of impacts in the direct operations, while the impacts from land use at the production site are relatively small.
- The extraction of natural gas plays a predominant role in the upstream impacts of the power stations.
- Compared to a conservative counter-factual scenario, EDF management practices on the production sites contribute to avoiding impacts on biodiversity.

IMPROVEMENTS

- Ecological surveys and waste management data related to circular economy could not be used with the version of the tool used in the study (1.0.1)
- Due to sourcing data limitation, the world average impact factor was used to assess the upstream Scope 3 impacts related to natural gas extraction
- The approach used to estimate avoided impacts is preliminary

3.1 EDF

3.1.1 Context and objectives

EDF is interested in better understanding how a biodiversity footprint methodology can be applied to its activity of electricity generation. This case study is part of a broader analysis where different tools are tested and compared. EDF has been very active in managing biodiversity on its production sites[(1)], using the GBS is an opportunity to broaden its biodiversity analysis to the supply chain.

For CDC Biodiversité, this case study is an opportunity to test and reinforce the GBS for the electricity sector. It is expected that carbon-intensive energy production types are significant contributors to the climate change pressure. Using the GBS allows the assessment of other pressures and the identification of impact hotspots in the supply chain.

The assessment focuses on three natural gas power plants owned and managed directly by EDF in mainland France. Relying exclusively on natural gas combustion, they produce electricity fed into the French continental network. In 2019, they represented 2.2 % of installed capacities of EDF in France. In 2019 electricity produced with gas represented 2% of total EDF SA production[(2)] in mainland France. Detailed production characteristics per site are presented by Table 16.

The temporal perimeter is the year 2019. The assessment covers direct operations (Scope 1), non-fuel energy purchases (Scope 2) and upstream impacts (Upstream Scope 3). Downstream impacts were not evaluated.

The case study has two main objectives. The first one is the identification of impact hotspots considering Scope 1, Scope 2 and upstream Scope 3. The second one is the exploration of the concept of "avoided impacts".

The first objective involves the core use of the GBS methodology. The interest is to see how it applies to one type of power generation technique. It fits within a broader work of CDC Biodiversité aiming at building an electricity production module that will provide biodiversity impact factors for different energy production techniques. The second objective is more innovative. It is to compare the lower impacts associated to the active biodiversity management implemented by EDF to a counterfactual to assess "avoided impacts".

3.1.2 Methodology

The methodology for this case study follows the typical framework of a BFA. Table 17 provides an overview of the data collected and where they fit within the assessment.

For Scope 1, land use and fragmentation are assessed using surface areas per land use type. The data provided by EDF for land use types corresponds to the EUNIS framework[(3)]. CDC Biodiversité and EDF built a correspondence to translate the EUNIS habitats inventoried into GLOBIO land use types. As a first approximation, hydrological disturbance due to water use was assessed using water (net) consumption data only (see **Results and discussion** below for a discussion on water withdrawals). The associated GBS's basin-level impact factors were applied (Escaut, Durance and Moselle). Seawater withdrawals were ignored since the impacts on marine biodiversity were excluded from the perimeter (the GBS 1.0.1 being unable to cover them). The onsite GHG emissions during natural gas combustion were used to assess the impacts due to climate change. The other pressures are not assessed.

For Scope 2, climate change related pressures are assessed using GHG emissions. Other pressures are evaluated based on electricity purchases amounts (in practice, the land occupation, water use, etc. related to average French electricity generation were not available in the GBS 1.0.1 and will be available after the release of the GBS's electricity module).

For upstream Scope 3, impacts associated to the natural gas supply are evaluated based on the annual amount of natural gas consumed (in Nm³). The (default) global GBS' impact factor is applied given that the sourcing location is unknown. For other materials, monetary purchases of various goods and services as provided by EDF are used. CDC Biodiversité associated each purchase to an EXIOBASE industry.

EDF has implemented specific land management practices on its (Scope 1) production sites with the aim of preserving biodiversity. For example, when possible, forest areas are conserved. For open areas, late mowing is preferred. These practices were put in place before the assessment, and it is considered that gains already occurred in the past. However, **avoided impacts** *i.e.* the negative impacts prevented compared to a counterfactual scenario can be assessed. The counterfactual scenario here is defined as the implementation of usual management methods without any effort in relation to biodiversity.

The assessment of avoided impacts is limited to the land use and fragmentation pressures due to the lack of time and, partly, of data. In principle, other pressures could also be covered by also considering water use, pesticides use or even greenhouse gas emissions linked to land management. For land use, the counterfactual is Urban area with an associated MSA of 5%.

(1) See https://www.edf.fr/en/the-edf-group/taking-action-as-a-responsible-company/corporate-social-responsibility/biodiversity#act4nature

(2) See https://www.edf.fr/en/the-edf-group/dedicated-sections/investors-shareholders/financial-and-extra-financial-performance/edf-group-s-facts-and-figures

(3) European Nature Information System, https://eunis.eea.europa.eu/

3.1.3 Results and discussion

A MAIN RESULTS

The overall results are presented by Table 18.

The vertically integrated, *i.e.* combined Scope 1, 2 and upstream Scope 3, terrestrial dynamic impacts - periodic gain/loss or flow of impacts - of the three production units are 18 MSA.km². The terrestrial static impacts - accumulated negative impact or stock of impacts[1] - are 32 MSA.km². The total aquatic static impacts are 1.2 MSA.km². Aquatic dynamic impacts are not included as the methodology is being improved for these impacts.

Figure 11 identifies the main impact hotspots for each pressure and Scope. Regarding the terrestrial dynamic impacts, Scope 1 impacts due to climate change, from the gas combustion, are largely preponderant, followed by the climate change impacts due to the upstream Scope 3 extraction of natural gas. The impacts related to Land use conversion due to natural gas extraction is notable. Regarding the terrestrial static impacts, spatial pressures associated to the extraction of natural gas are largely predominant. The impacts from land use at the production site level (Scope 1) are comparatively low. Finally, on the aquatic static compartment, the picture is more contrasted. There is also a preponderance of impacts related to the upstream Scope 3 extraction of natural gas, and the Scope 1 impacts related to hydrological disturbance due to direct water use are noticeable (around 17% of vertically integrated impacts).

Results regarding avoided impacts are presented by Table 19. EDF management prevents on average about 15% of its impacts related to Scope 1 spatial pressures compared to the counterfactual scenario for all three sites. These encouraging figures highlight the positive potential of dedicated measures in favour of biodiversity. Encouraging EDF's suppliers (upstream Scope 3 in Figure 11) to replicate these measures and implement impact reduction actions would further contribute to limiting its biodiversity impact.

B LIMITATIONS AND IMPROVEMENTS

The assessment has several limitations and room for improvement.

Not all available data could be used. For instance, ecological survey of wall lizard populations at the Bouchain site could not be used since a single-species ecological survey without knowledge of optimal population size cannot be translated into MSA. Data on positive waste management or circular economy were not considered either due to GBS limitations. Some pressures were not evaluated for Scope 1 (see Table 17). Finally, it should be noted that the oil and gas module of the GBS has not yet been evaluated by third party experts. The main concepts and assumptions related to the oil and gas module are presented in section 2.2 of this report.

Hydrological disturbance due to direct water use was estimated only based on consumption data computed as discharges subtracted to withdrawals. The impacts of withdrawals could be assessed with further developments of the GBS.

The world average impact factor was used to assess the upstream Scope 3 impacts related to natural gas extraction. Improving the underlying methodology for assessing these impacts appears to be a priority. For purchases, a good tracing with the identification of specific countries of origin or given extraction site would allow to enhance the impact calculation.

Regarding avoided impacts, the evaluation of the fragmentation is simplified by not considering roads crossing the natural patches. On Martigues site, only a fraction of the entire site (almost 50 ha) is necessary to produce electricity but in the counterfactual scenario, the entirety of the site (and not only the area used for electricity production) was considered as urban area (MSA: 5%) which overestimates avoided impacts.

3.1.4 Lessons learnt

The assessment identifies major impact hotspots related to EDF three production sites' vertically integrated footprint. While, as expected, the impacts related to climate change due to Scope 1 GHGs emissions are significant (Figure 11), the study highlights the importance of the impacts related to the extraction of natural gas.

The actions implemented by EDF to avoid impacts on biodiversity could also be quantified. In this respect, this case study is an opportunity for CDC Biodiversité to move forward on the concept of avoided impacts. The definition of a counterfactual scenario and the calculation of the related impact variation on a concrete case illustrates the capacity of the GBS to perform this type of analysis but also highlights the difficulty of its generalisation. A collective approach would make it easier to provide the necessary work force and the consensus for the systematisation of this type of sectoral analysis.

For this study, data availability was satisfactory overall. Indeed, most of the data used were already collected by the company for other reporting purposes (*e.g.* climate reporting).

(1) As usual in GBS 1.1 assessments, climate change static impacts have not been assessed due to GBS methodological limitations. This explains a relatively low static impact compared to the dynamic impact.

Table 16: *Key information on the three sites assessed*

SITE*	INSTALLED CAPACITY (MW)	YEAR	HOURS OF OPERATION (HM)	NET POWER SUPPLY (MWh)
Blenod	450	2019	6200	2 100 000
Bouchain	605	2019	6000	2 800 000
Martigues	Martigues 5: 465 Martigues 6: 465	2019	Martigues 5: 5400 Martigues 6: 5700	3 900 000

* Natural gas power plants from EDF electricity generation mix.

Table 17: *Overview of how the collected data were integrated into the GBS for each pressure and Scope*

<table>
<tr><th>REALM</th><th>PRESSURES</th><th>SCOPE 1</th><th>SCOPE 2</th><th>UPSTREAM SCOPE 3</th></tr>
<tr><td rowspan="6">Terrestrial</td><td>Land use</td><td rowspan="2">Habitats from fauna and flora studies (ha)</td><td rowspan="5">Electricty consumption :
2019 energy bills (€)</td><td rowspan="12">2019 Natural gas volume for combustion (Nm³)
2019 Purchase amounts (€)</td></tr>
<tr><td>Fragmentation</td></tr>
<tr><td>Encroachment</td><td>Not assessed</td></tr>
<tr><td>Atmospheric nitrogen deposition</td><td>No emission reported</td></tr>
<tr><td>Terrestrial ecotoxicty</td><td>No emission reported</td></tr>
<tr><td>Climate change</td><td rowspan="2">2019 GHG emissions (t)</td><td rowspan="2">2019 GHG emissions (t)</td></tr>
<tr><td rowspan="6">Aquatic</td><td>Hydrological disturbance due to climate change</td></tr>
<tr><td>Wetland conversion</td><td>Not assessed</td><td rowspan="5">Electricty consumption :
2019 energy bills (€)</td></tr>
<tr><td>Land ues in catchment of rivers and wetlands</td><td>Not assessed</td></tr>
<tr><td>Freshwater eutrophication</td><td>No impact: no emission</td></tr>
<tr><td>Hydrological disturbance due to water use</td><td>2019 water consumption (m³)</td></tr>
<tr><td>Freshwater ecotoxicity</td><td>No emission reported</td></tr>
</table>

Table 18: *Summary of total impacts for the three production units* (Source: GBS 1.0.1, December 2020, Antoine Vallier)

BIODIVERSITY REALM	ACCOUNTING CATEGORY	VERTICALLY INTEGRATED FOOTPRINT (MSA.KM²)	AVOIDED IMPACTS (MSA.KM²)
Terrestrial	Dynamic	18	/
Terrestrial	Static	32	-0.1
Aquatic	Static	1.2	-0.03

Table 19: *Total Scope 1 land use and fragmentation avoided terrestrial static impacts for the three sites* (Source: GBS 1.0.1, December 2020, Antoine Vallier)

TERRESTRIAL SPATIAL PRESSURES SCOPE 1 MSA.m²	MANAGEMENT GAINS MSA.m²	MANAGEMENT GAINS %
610 000	-105 000	17%