Les Amis de la Terre France

Study on French public finance for energy projects and its job impacts

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clarity from complexity

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Contents

Tables

Figures

Key Findings

- The study uses publicly available data from the OCI Public Finance for Energy database to provide a profile of public financing support for energy projects between 2016 and 2020. This shows that **French public finance institutions provided financial support for energy-related projects with private-sector companies as beneficiaries at a total value of 7.5 billion EUR (on average 1.49 billion EUR worth of support annually), for 112 project-type of activities in total**:
  - 10 projects were financed in relation to Fossil Fuels (i.e., projects related to coal, oil and gas), representing 26% of the total financing value.
  - 84 projects financed related to Clean energy forms (i.e., projects related to solar, wind, tidal, geothermal, small-scale hydropower and energy efficiency), representing 40% of total financing.
  - 18 projects financed related to Other energy forms (biomass, hydro and other renewables, such as marine energy), representing 26% of total financing.
  - Fossil Fuel-related projects, on average, received higher amounts of financial support per project than other type of projects, i.e., on average three times the value of the financial support offered to Clean projects.
  - However, in the last two years of available data (2019 and 2020), Clean projects received the greatest share of the annual financial support provided.
- **It is calculated that between 2016 and 2020, French public finance institutions supported approximately up to 62.000 jobs by providing financial support to energy-related projects located inside and outside France.** While Clean energy projects account for 52% of jobs and 40% of the total financing issued, Fossil Fuel projects account for 18% of jobs and 26% of the financial support. For the assessment of job impacts, employment multipliers are used together with the amount of financial support provided to estimate an approximate number of jobs supported through the activities of French public finance institutions. The difference in the number of jobs is thus explained by a combination of higher levels of financial support as well as a higher employment intensity of clean energy types (on average).
- **The future employment impact potential of French public finance for energy-related projects was assessed for three scenarios**:
  - 'Baseline / business-as-usual': French public financing and its allocation profile across Fossil Fuel, Clean and Other projects is held constant over the forward-looking period.
  - '100% Clean scenario with constant shares': French public financing shifts entirely to Clean projects, and the allocation of financing across various Clean types is in line with the historical distribution (2016-2020).
  - '100% Clean scenario with shifting shares': French public financing shifts entirely to Clean projects, and the distribution of support across various Clean types changes gradually over time in line with global energy supply growth projections from the IEA.
- **In the '100% Clean' scenarios, more jobs are supported overall than in the Baseline**. It is estimated that – with 1.5 billion EUR - from 2023 up to 2027, up to ~62,000 jobs can potentially be supported in the Baseline, ~81,000 jobs in a '100% Clean – constant shares' scenario, and ~82,000 jobs in a '100% Clean – shifting shares' scenario. Most energy sector jobs are thus provided in the latter scenario, in which the shift to financing for Solar energy projects is most marked.

1 Introduction

Public finance plays an important role in the energy transition. As reported by the International Energy Agency (IEA) in the 2021 World Energy Outlook, halting new investments in coal, gas and oil supply are paramount to curb global warming to 1.5 degrees and avoid the worst expected impacts of climate change.[1] Public finance for energy is central to the shaping of energy systems; by lowering risk for investors, public finance can be paramount to the realisation of high-risk projects. The financing decisions of public finance institutions can therefore play an important role in the future energy landscape, and are an expression of government priorities in this respect.

The first objective of the present analysis is to provide a detailed overview of French public financing provided to energy-related projects. The study relies on publicly available information published by Oil Change International (OCI). In its recently published Public Finance for Energy database, detailed data is presented on support of G20 export credit agencies and development finance institutions as well as the major multilateral development banks. The database illustrates that France ranks 13th in a global comparison of public finance support offered to companies for the realisation of energy projects, between 2016 and 2020, for a total amount of EUR 7.46 billion. This is equivalent to half of what is reported for Germany and less than a quarter of the support offered by the European Investment Bank. A more detailed breakdown of the data for France is provided in Chapter 2 of the report.

The second objective is to provide a quantitative assessment of the likely number of jobs supported through French public finance support to energy-related projects in the private sector. The study relies on available data regarding employment intensities by energy sector/technology published by the IEA. These are matched to project finance provided by French public finance institutions to private sector companies for energy-related projects to estimate the number of jobs supported in France and abroad. The results of the analysis are described in Chapter 3.

The third objective is to explore future scenarios of the impact of support provided by French public finance institutions. As an increasing number of countries move towards decarbonisation, the report presents indicative figures of the potential role of French public finance institutions in supporting jobs all the while supporting alignment with the Paris goals. This is done using the same employment intensities provided by the IEA to compare the job potential of public finance support in a business-as-usual versus the potential for supporting jobs exclusively through projects associated with Clean energy. This shows that, ceteris paribus, investing in clean energy-related projects can support a greater number of jobs than investing in the fossil fuel sector or in other (mixed) energy-related projects. Results are provided in Chapter 4.

The results need to be understood having some key limitations in mind. First of all, it is the number of jobs supported which are estimated, rather than the number of additional jobs being created. The additionality of public finance contracts, i.e. the extent to which the financial support leverages additional economic activity rather than supports activities which would have existed either way, is not being assessed. Such additionality remains very challenging to assess and it exceeds the scope of this report. Second, the use of

[1] See. World Energy Outlook 2021 (windows.net)

employment multipliers makes abstraction of local macroeconomic and labour market conditions that can influence the exact number of jobs supported, and changes over time. Advanced bespoke modelling of the French and global economy would be required to capture such conditions. Third, due to the lack of information relating to the value chain of each project, the data is insufficient to work out in which location the different activities within the supply chain are carried out, and thus whether the supported jobs are based in France or abroad. Fourth, there are considerable limitations in the publicly available data regarding financial support provided by public finance institutions. Notable deficiencies in this respect are that institutions do not report all projects (some projects remain confidential) and that there is no information available on project duration.

Despite these limitations, the results presented in this report can provide valuable insights to inform debates around the future of public finance in France and how it can be shaped to help drive the energy transition forward. While the findings of this report relate to financial support provided by French public institutions, key conclusions are of relevance to other countries with active public finance entities that focus on energy project support.

2 Support to energy-related projects (2016-2020)

2.1 Data included in the analysis

The OCI Public Finance for Energy database[2] presents data on support of G20 export credit agencies and development finance institutions as well as the major multilateral development banks. Table 1 presents information relating to the key indicators for this study that are provided by the OCI Public Finance for Energy database, and the filters that have been set to generate the data subset on which the analysis for this report is based.

Table 1 Key indicators in the OCI database

Indicator	Definition	Categories/filters considered for the analysis
Date	The date when the finance was approved.	2016-2020
Amount in USD	The amount of financing in US dollars – exchange rate is used to report figures in EUR.	Greater than zero
Institution	The institution that awarded the financing. Almost all institutions and governments lack complete reporting	BPI France, Caisse des Depots et Consignations, Proparco, Compagnie Francaise d'Assurance pour le Commerce Exterieur, Agence Francaise de Development, and the Compagnie France
Institution Group	The group or country the institution belongs to. The major multilateral development banks (MDBs), do not have institution groups, so in these cases this is the same as the institution.[3]	
Project	The name of the project.	All
Country	The country where the project is located.	All
Region	The region of the world where the project is located. This roughly follows the World Bank's region classification.	All
Energy category	The category of the energy sector of the project: Clean, Fossil Fuel, Other.	Clean, Fossil Fuel, Other
Sector	The energy sector financed: Batteries, Biofuels, Biomass, Climate, Coal, Efficiency - Clean,	Batteries, Biofuels, Biomass, Climate, Coal, Efficiency - Clean, Efficiency - Fossil, Efficiency - Other,

[2] See. Oil Change International launches first of its kind Public Finance for Energy Database - Oil Change International (priceofoil.org)

[3] Note: Almost all institutions and governments lack in complete reporting

	Efficiency - Fossil, Efficiency - Other, Hydrogen - Other, Hydrogen - Clean, Hydrogen - Fossil, Geothermal, Green Hydrogen, Hydro - Large, Hydro - Small, Incineration, Mixed – incl. Coal, Mixed or unclear - Clean, Mixed or unclear - Fossil, Mixed or unclear - Other, Natural Gas, Nuclear, Oil, Oil and Gas, Renewables - Clean, Renewables and Efficiency - Other, Solar, Wind and Solar, Wave, and Wind.	Hydrogen - Other, Hydrogen - Clean, Hydrogen - Fossil, Geothermal, Green Hydrogen, Hydro - Large, Hydro - Small, Incineration, Mixed – incl. Coal, Mixed or unclear - Clean, Mixed or unclear - Fossil, Mixed or unclear - Other, Natural Gas, Nuclear, Oil, Oil and Gas, Renewables - Clean, Renewables and Efficiency - Other, Solar, Wind and Solar, Wave, and Wind.
Kind	The kind of activity financed: Project, Financial Intermediary, Policy, Technical Assistance, Pilot/Research.	Project
Entity kind	The kind of entity receiving the financing: Company, Government, Group, Non-Governmental Organization.	Company
Mechanism	The type of financing awarded.	All

The resulting subset focusses on support provided by French institutions for the realisation of energy-related projects, between 2016 and 2020, i.e. since the Paris Climate Agreement (UNFCCC)[4] and either inside or outside France.

All energy categories – Fossil fuel, Clean, Other – as reported in the OCI dataset are considered:

- **Fossil fuel** includes oil, gas and coal sectors. This can include access, exploration and appraisal, development, extraction, preparation, transport, plant construction and operation, distribution, and decommissioning. The Fossil fuel category also includes energy efficiency projects that primarily involve fossil fuels as an energy source.
- **Clean** includes sectors that are **low-carbon and have negligible impacts on the environment and human populations**, when implemented with appropriate safeguards. Solar, wind, tidal, geothermal, and small-scale hydro projects are included in the Clean energy category, as well as energy efficiency projects when the energy source(s) involved are not primarily fossil fuels.
- **'Other'** includes projects of unclear or unidentified energy source, and **non-fossil energy sources that typically have significant impacts on the environment and human populations**. Typically, transmission and distribution, large hydropower, biofuels, biomass, nuclear power, and incineration projects are included in this category. The great majority of finance in this category is for transmission and distribution projects, and other projects where the associated energy sources are unclear.

[4] The analysis maintains a narrow focus with respect to the time period of study, to ensure a valid comparison between energy support so far and future scenarios.

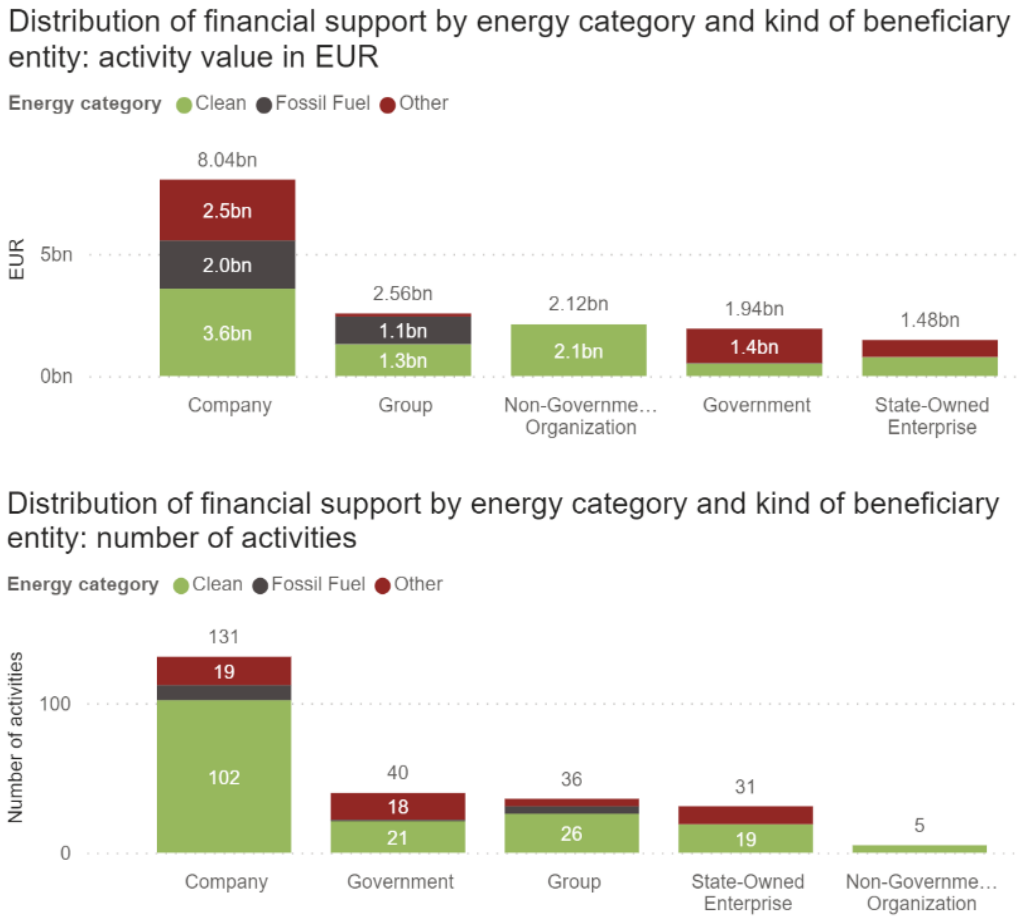
The project value observed (Amount in USD) refers to the monetary value of the financial support offered for the production of the good or service described in publicly available financial support contracts. This is in contrast to the value of the entire project to which realisation the financial support contract contributes. The latter is not observed in the data, thereby the monetary figures reported by this analysis are exclusively linked to the stated monetary value of the financial support contract.

2.2 Financial support provided

2.2.1 Finance by beneficiary type

The chart below illustrates how financial support provided was distributed across different types of beneficiaries. This shows that between 2016 and 2020, the “Company” beneficiary type accounts for 49.8% of the total support in value terms and 54.4% of the total support in project numbers.

Figure 2-1. Distribution of public financial support by energy type and by beneficiary (2016 to 2020)

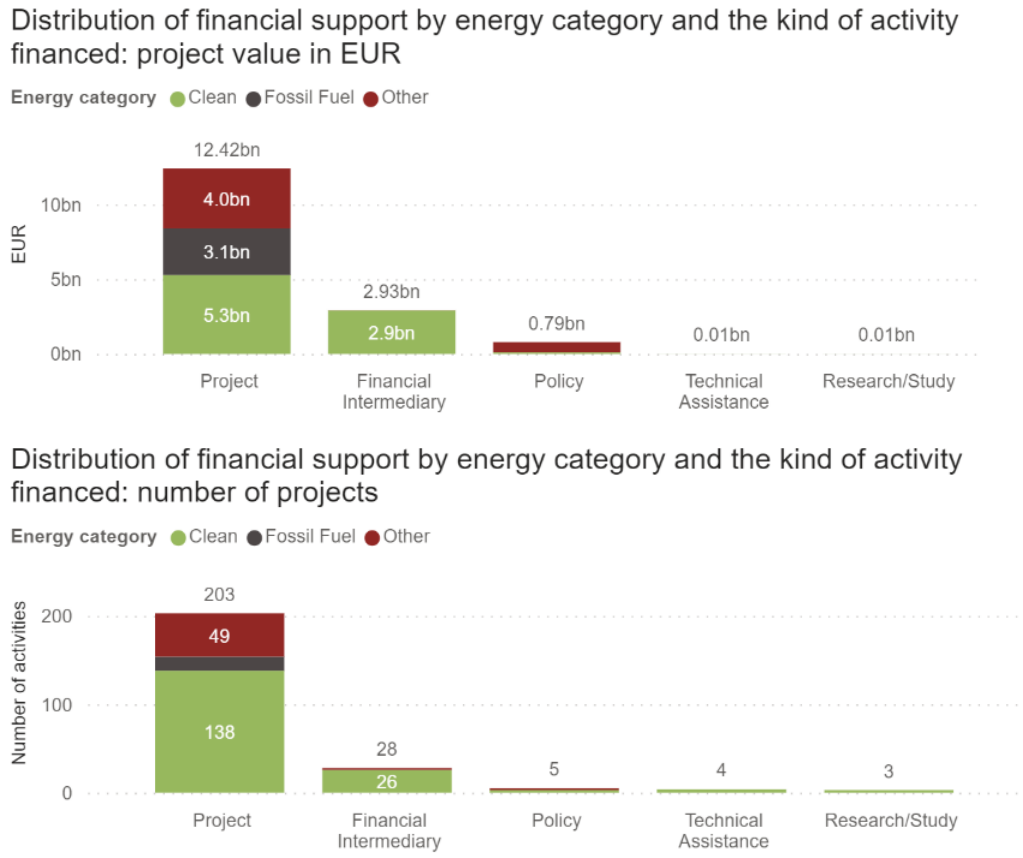


Source: OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

2.2.2 Finance by type of activity

The chart below illustrates how financial support provided has been distributed across the different types of activity. In the years 2016 to 2020, the “Project” type is the most common type of activity receiving financial support from French public finance institutions – “Project” accounts for 76.9% of the total support in terms of value and 84% in terms of number of activities supported.

Figure 2-2. Distribution of public financial support by energy type and by activity financed (2016 to 2020)

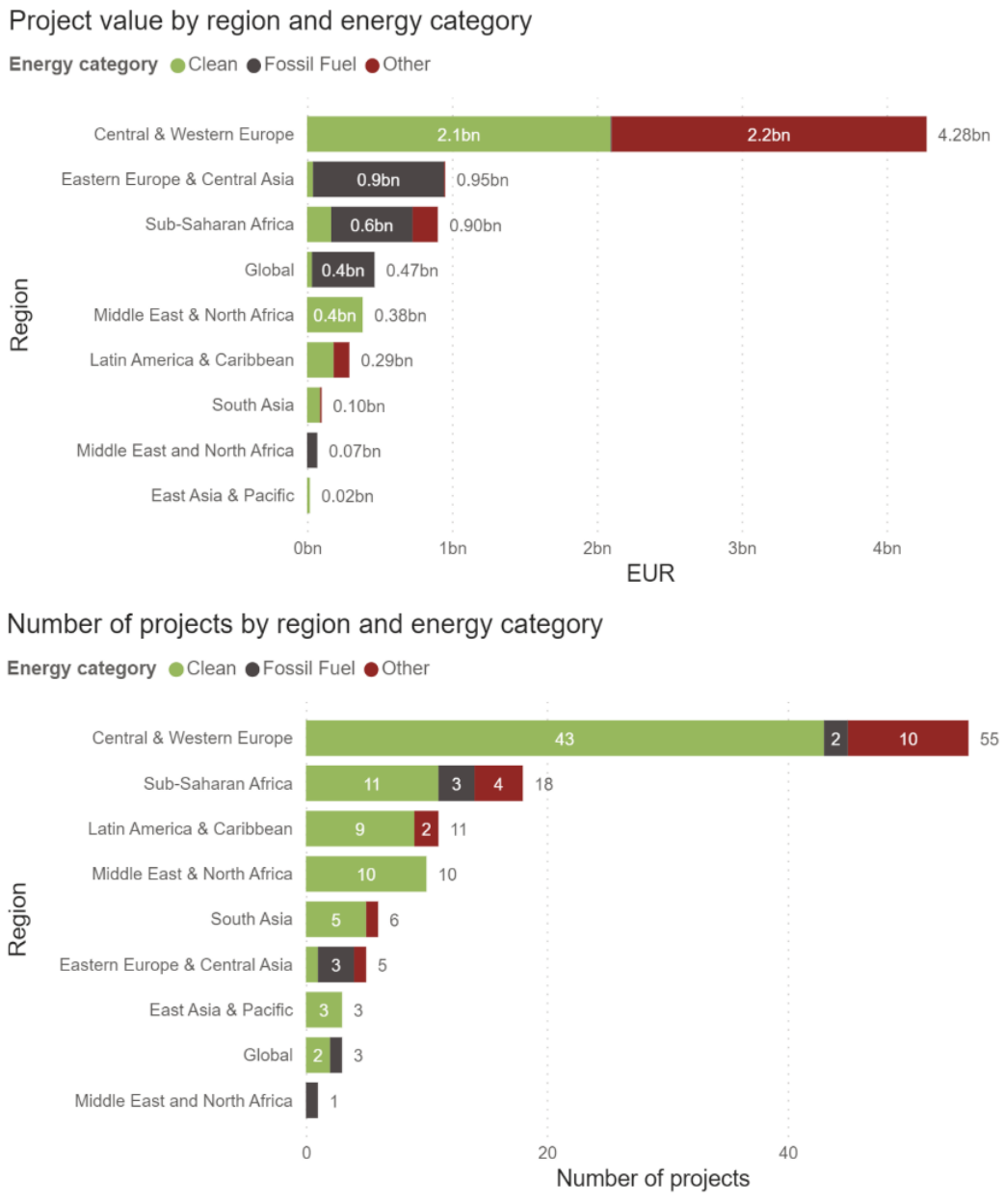


Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

2.2.3 Finance by location

The chart below illustrates how financial support in its different forms has been allocated geographically. Between 2016 and 2020, close to half of the total value of support offered by French public finance institutions is located outside France (note that all project value within 'Central & Western Europe is in fact located in France). Within France, Other energy projects account for 50.8% of total project value supported, followed by Clean energy project (49%) and Fossil Fuel projects (0.1%). Outside France, public finance support is tilted towards Fossil fuel projects, which account for 61.8% of the supported value. Clean energy projects account for 28.7%, while Other energy projects for 9.4%. Eastern Europe and Central Asia together with Sub-Saharan Africa are the regions accounting for the majority of energy projects receiving support outside of France, mostly for Fossil fuel projects.

Figure 2-3. French public finance energy project support by region (2016 to 2020)



Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

Figure 2-4 French public finance support across countries (2016-2020)

Distribution of projects by energy category and project location: project value

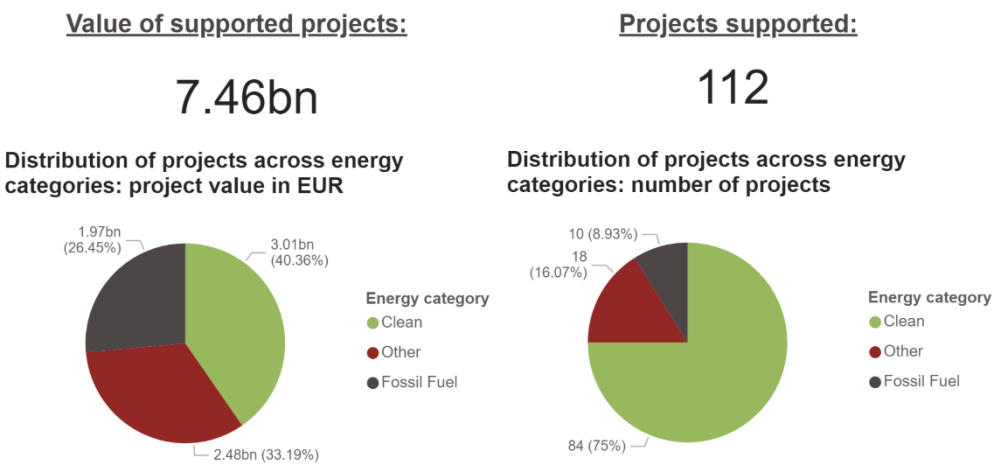
Distribution of projects by energy category and project location: number of projects

Note: These maps present an approximation of the countries receiving French public finance support based on the project location reported through the OCI dataset. The figure does not take under consideration the complex value chains involved in projects and cannot represent visually multiple county projects. Figure 5-1 of the appendix presents a full list of the geographic dimension of French public finance support, based on the reported project location.

2.2.4 Projects by energy category

The chart below illustrates differences in project finance activity between the three principal energy sector categories – Fossil Fuel, Clean and Other. Between 2016 and 2020, French public finance institutions supported approximately 112 energy-related project by issuing loans, guarantees, or equities worth EUR 7.46 billion. Around 40% of this budget supported Clean energy projects, and 26% Fossil Fuel projects. This resulted in support for 84 Clean energy projects and 10 Fossil Fuel – an outcome that reflects the greater capital intensity of Fossil Fuel projects. On average, a Fossil Fuel project appears to cost three times the value of the support offered to the average Clean energy project.

Figure 2-5. Value and number of projects supported (2016 to 2020)

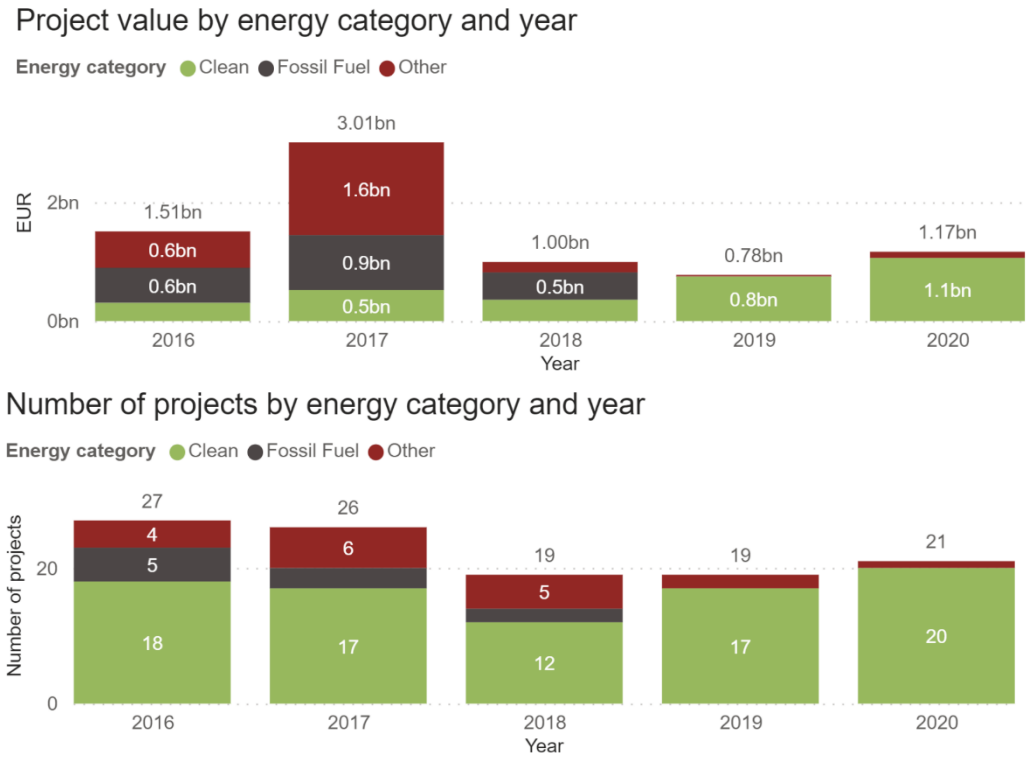


Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

2.2.5 Projects by year

The chart below illustrates how financing for private sector energy projects have varied from year to year over the period considered (2016-2020). French public finance institutions issued on average EUR 1.49 billion worth of support annually. Only in the last two years, Clean Energy projects received the greatest share of the annual budget. However, in terms of the number of projects supported Clean energy projects consistently account for more than half of the total.

Figure 2-6. Distribution of project support by year (2016 to 2020)

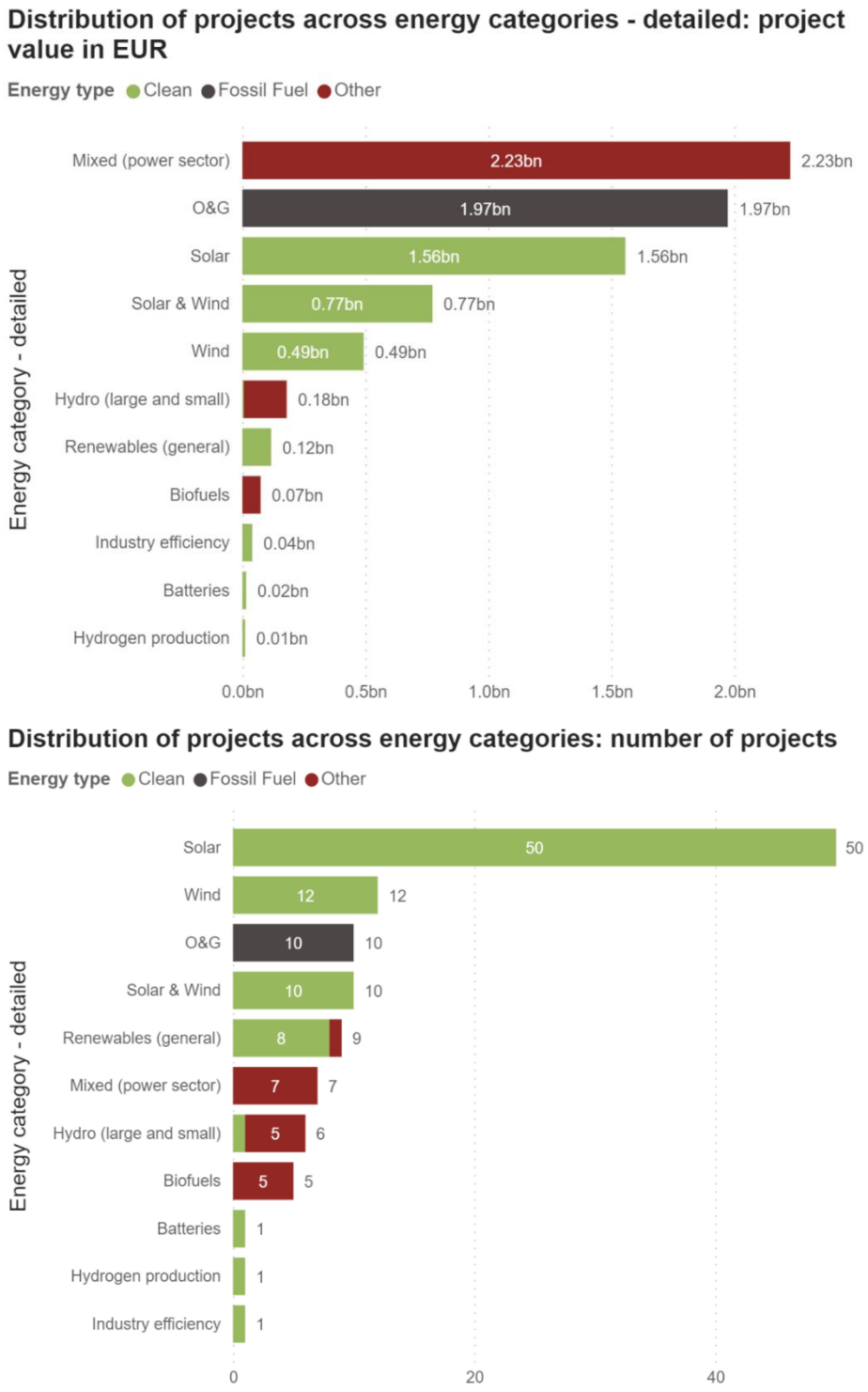


Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

2.2.6 Projects by sector

The chart below illustrates differences in project finance activity between key energy-technologies. Between 2016 and 2020 EUR 2.82 billion in public finance supported Solar and Wind projects. This was followed by projects in the mixed power sector category (EUR 2.23 billion) and Oil and Gas projects (EUR 1.97 billion). The figure below presents the allocation of public finance provided for various energy types, where the initial categories used by the OCI dataset have been matched to CE (Cambridge Econometrics) energy type categories for the sake of the analysis. The mapping used to match the OCI energy types and sectors to CE energy type categories can be found in the Annex.

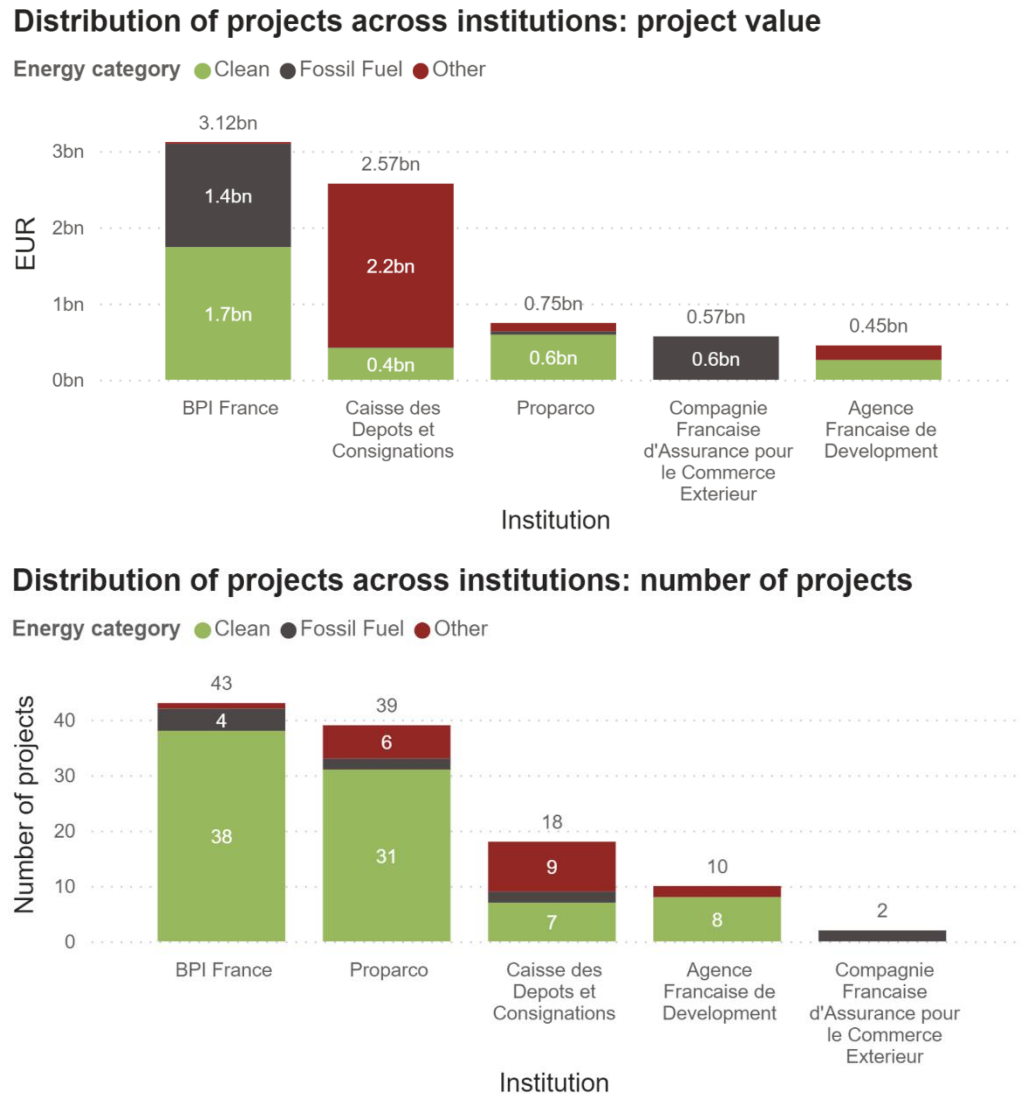
Figure 2-7. Project supported by detailed energy category (2016 to 2020)



2.2.7 Projects by institution

The chart below illustrates how financing decisions have varied between the key French public finance institutions over the period considered. Between 2016 and 2020, there are five French public finance institutions granting support to energy projects – Banque Publique d'Investissement (BPI France), Caisse des Dépôts et Consignations, Proparco, Compagnie Francaise d'Assurance pour le Commerce Exterieur (COFACE)[5] and Agence Francaise de Development (AFD). BPI France accounts for more than 41% of the financial support issued and 43% of projects supported during the period – more than half of the project value is associated to projects located in France. Caisse des Depots et Consignations (CDC) is the second most active entity in terms of financial support issued, accounting for 34.5% of the total value. However, Proparco records the second highest number of projects supported following BPI France. More than 97% of the support in terms of project value issued by Proparco, COFACE and AFD is linked to projects located outside France.

Figure 2-8. Projects supported by public finance institution (2016 to 2020)



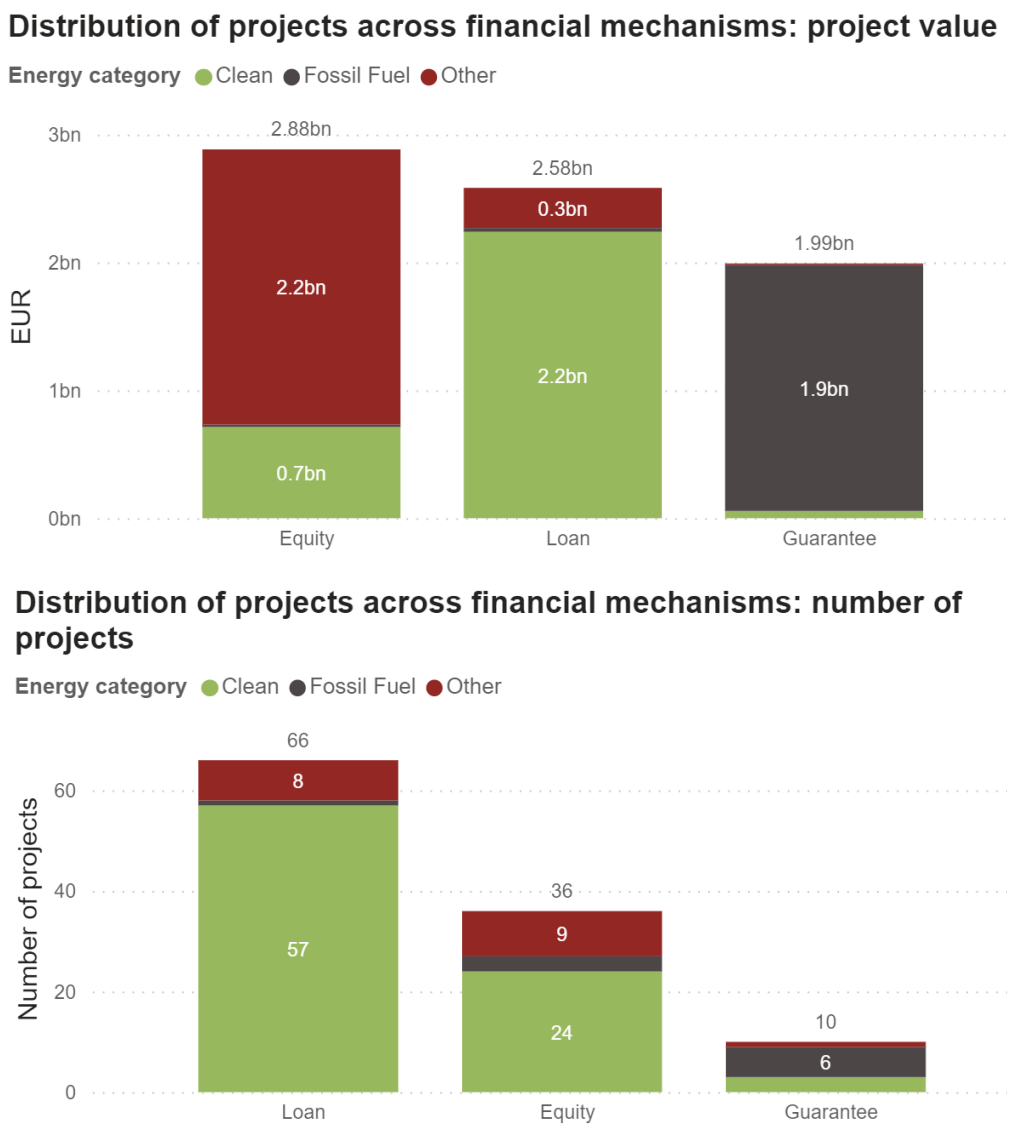
Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

[5] BPI took over COFACE in 2016-2017.

2.2.8 Projects by financial mechanism

French public finance support to energy projects is evenly split between three types of financial mechanisms, in terms of project value: equity (38.6%), loan (34.6%) and guarantees (26.7%). In terms of the number of projects, however, most projects that benefit from French public finance support, receive support through the use of loans; only 10 of projects receive guarantees. Each financial support mechanism is used to target a certain energy type. Equity-based finance, in terms of project value, supports mostly Other type energy projects (74.6%). Similarly, loan-based finance supports mostly Clean energy projects, while guarantees are mostly extended to Fossil fuel projects (96.6%). Figure 2.9 presents these figures in EUR terms, for the period 2016-2020.[6]

Figure 2-9. Project supported by financial mechanism (2016 to 2020)



Source(s): OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.

[6] BPI France uses both loan-based and guarantee-based finance. CDC offers exclusively equity-type support; COFACE offers exclusively support in the form of guarantees; AFD offers support exclusively in the form of loans; Proparco offers support mostly in the form of guarantees (81.4%).

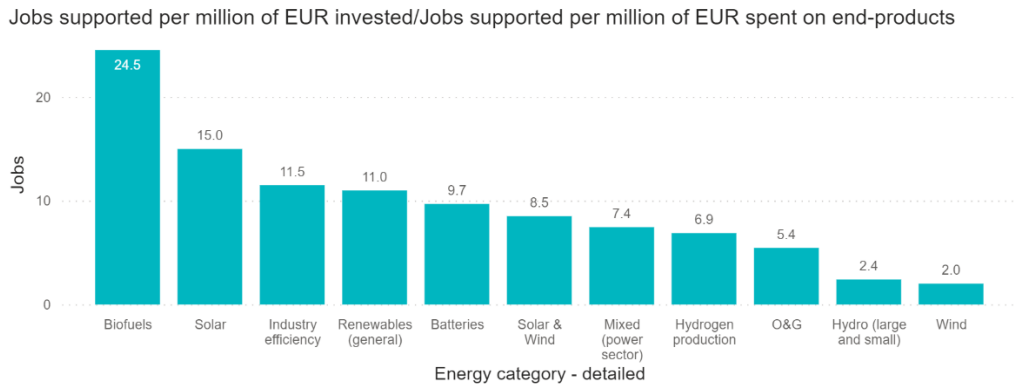
3 Jobs supported (2016-2020)

3.1 The theoretical framework of jobs supported by different types of energy projects

Employment multipliers provide an estimate of the number of jobs created or maintained per million of EUR investment in specific energy technologies.[7] For our analysis, the IEA employment multipliers are used together with the amount of financial support provided between 2016 and 2020 to estimate an approximate number of jobs supported through the activities of French public finance institutions.

For the purpose of this project, eight IEA distinct multipliers are used: Batteries, Industry Efficiency, New hydro, Hydrogen production, Solar PV, Wind power, Biofuels and Unabated gas-fired projects. IEA distinct categories were complemented by two derived categories based on simple averages to better accommodate the link with the OCI database: average of New hydro, Biofuels, Wind power and Solar PV (Renewables – general), and the average of Wind power and Solar PV (Solar & Wind). More information on how the two databases were matched, and what underlying IEA multiplier values are used for the analysis is presented in the Annex of this report.

Figure 3-1. Employment multipliers



Source(s): Cambridge Econometrics, based on IEA data.

The figure above illustrates that - based on the available literature, industry engagement, surveys of government statistical accounts and macroeconomic modelling - the IEA suggests that investment in Biofuels requires the highest number of jobs per million EUR invested. For every million EUR invested, approximately 24.5 jobs are supported. This is followed by investment in energy categories mostly included in the Clean energy category, such as Solar (15 jobs per million EUR) and Renewable energy (11 jobs per million EUR). Hydro and Wind[8] have the lowest job intensity, 2.4 and 2 jobs per million EUR respectively.

While the IEA does not offer different estimates for Onshore and Offshore Wind energy (hence one single multiplier is used for the analysis), available evidence suggests that Offshore Wind energy is more employment intensive than Onshore Wind energy. In France therefore, Offshore wind is expected to be a considerable lever for job creation: in recent

[7] See. Sustainable Recovery – Analysis - IEA

[8] The IEA does not provide different multiplier for onshore and offshore wind, instead, 'wind' multipliers is calculated as the weighted average of onshore and offshore wind, based on recent historic deployment rates.

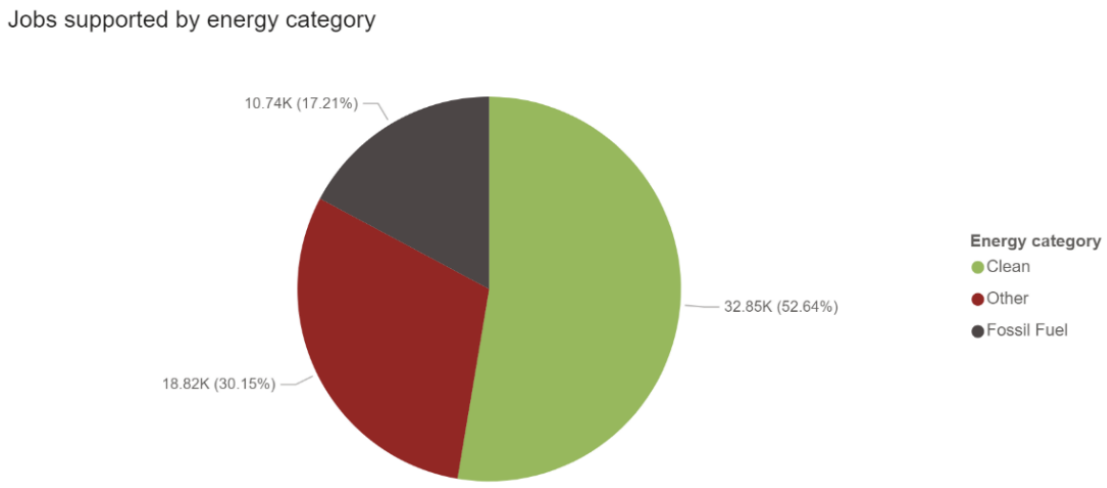
years France has expressed its ambition to establish a strong national Offshore Wind industry which is expected to have high economic benefits (in terms of GDP and employment), primarily in the O&M phases of projects[9]; and the wider supply chain impacts are also considerable as the construction of dedicated port and ship infrastructure for offshore wind deployment can also be a key driver of new jobs related to the technology[10].

The jobs estimates provided in this report assume 100% additionality, yet it is unlikely that all jobs are indeed supported solely through the activities of the public finance institutions. The reported estimates are therefore best used as an indication of jobs supported, rather than the jobs created. Project duration, additionality, financial mechanism used, financing provisions, degree of risk mitigation, resource mobilisation, location, and other macroeconomic and labour market conditions can all lead to variation in the number of jobs supported by a given project.[11]

3.2 The jobs supported by French public finance for energy projects between 2016 and 2020

It is calculated that between 2016 and 2020, French public finance institutions supported up to 62.000 jobs by providing financial support to projects located inside and outside France. More than half of the jobs supported during this period is linked to financial support offered to Clean energy projects (52.64%), followed by Other type energy projects (30.15%) and Fossil Fuel projects (17.21%). The difference in the number of jobs between Clean energy and Fossil fuel is explained by a combination of higher levels of financial support as well as the higher employment intensity of clean energy categories. While Clean energy projects account for 52.64% of jobs and 40.36% of the total finance support issued, Fossil Fuel projects account for 17.21% of jobs and 26.45% of finance support.

Figure 3-2. Job supporting capacity (2016 to 2020)



[9] Kahouli, S. - Martin, J.C. (2018) Can Offshore Wind Energy Be a Lever for Job Creation in France? Some Insights from a Local Case Study. Environ Model Assess 23, 203–227. https://link.springer.com/article/10.1007/s10666-017-9580-4#citeas

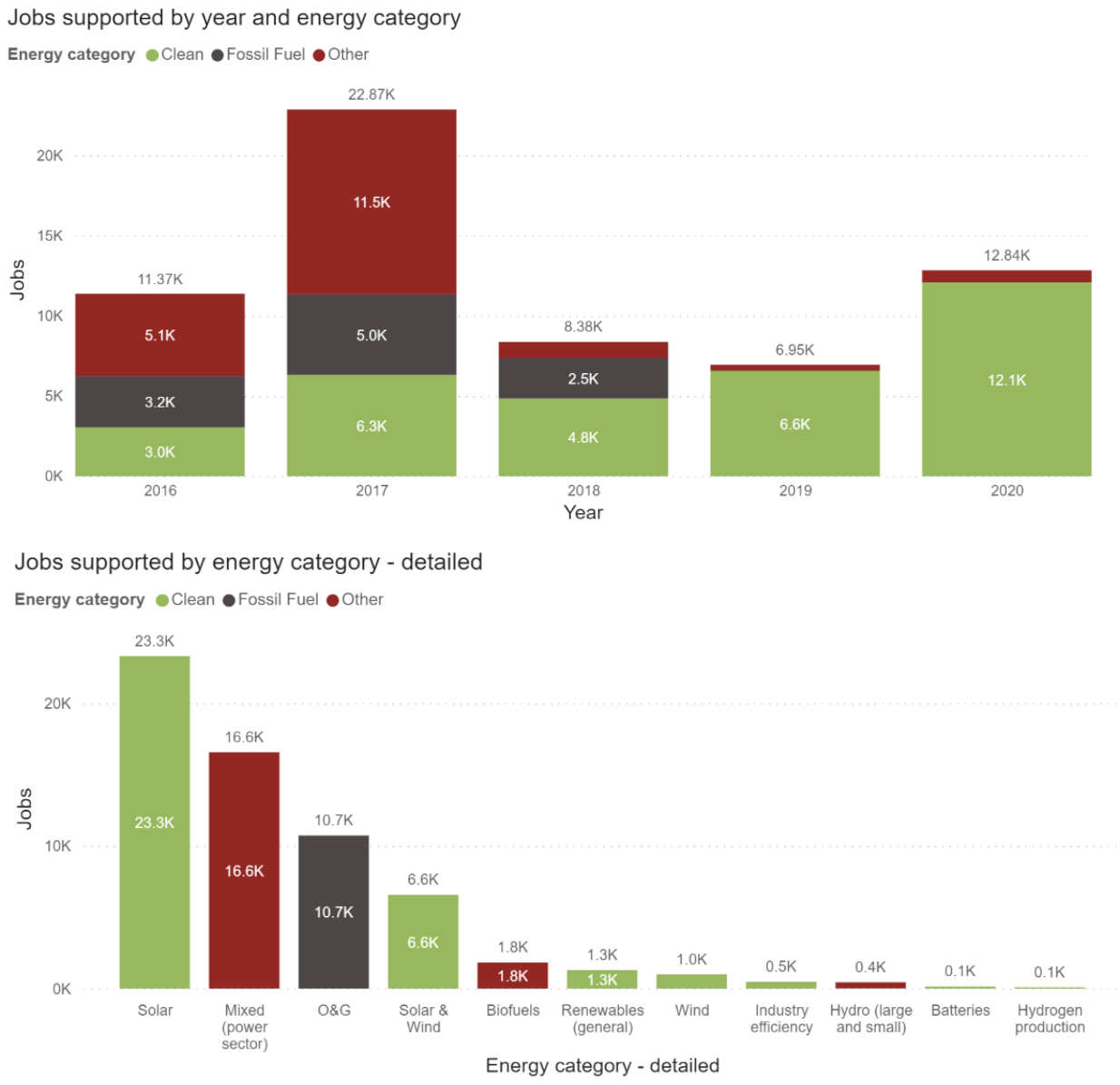
[10] See. IEA (2022) World Energy Employment Report. https://iea.blob.core.windows.net/assets/a0432c97-14af-4fc7-b3bf-c409fb7e4ab8/WorldEnergyEmployment.pdf

[11] USAID, (2021) Using Blended Finance to Generate Additionality and Human Impact: Guidance Note (usaid.gov). Winckler Andersen, O., H. Hansen and J. Rand (2021), "Evaluating financial and development additionality in blended finance operations", OECD Development Co-operation Working Papers, No. 91, OECD Publishing, Paris, https://doi.org/10.1787/a13bf17d-en.

Source(s): Cambridge Econometrics calculations based on OCI Public Finance for Energy database and IEA employment multipliers.

The greatest number of jobs supported was the result of project finance issued in 2017 (22,900 jobs), followed by 2020 when Clean energy projects supported account for more than 90% of jobs supported. Solar energy projects are the greatest contributor to jobs supported during the study period (23,300 jobs) – compared to ranking third in terms of total value supported. Financial support for Solar and Wind projects supported more jobs than the sum of Fossil Fuel and Other energy type projects.

Figure 3-3. Job supporting capacity of project finance by year and detailed energy category (2016 to 2020)



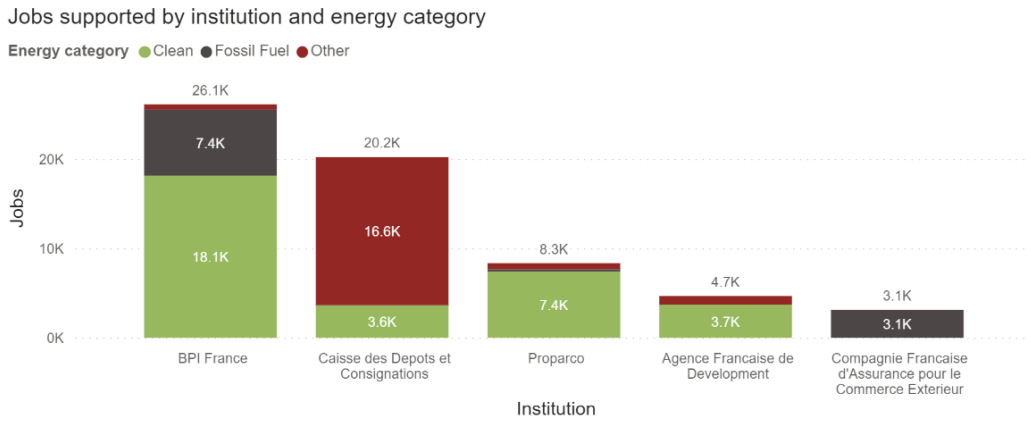
Source(s): Cambridge Econometrics calculations based on OCI Public Finance for Energy database and IEA employment multipliers.

Between 2016 and 2020, financial support issued by BPI France supported the greatest number of jobs (26,100 jobs), followed by CDC. BPI France is the greatest supporter of jobs both through Clean energy and Fossil Fuel projects. CDC contribution to jobs supported is

primarily through Other type energy projects, Proparco and AFD though Clean energy projects, and COFACE through Fossil Fuel projects.

Overall, the distribution of jobs supported across institutions is similar to the distribution of the value of the finance support. The only change in rank is observed between AFD and COFACE. While the two public finance institutions have a similar value of finance support issued, AFD outperforms COFACE due to a greater share of Clean energy type projects in its portfolio.

Figure 3-4. Job supporting capacity of project finance issued by institution (2016 to 2020)



Source(s): Cambridge Econometrics calculations based on OCI Public Finance for Energy database and IEA employment multipliers.

The value of public support finance corresponding to projects located inside France is associated with 61% of total jobs supported between 2016 and 2020 yet only accounts for 57% of the total value issued in support. Chapter 2 reported that between 2016 and 2020 projects located inside France account for EUR 4.28 billion (55 projects), while projects located outside France for EUR 3.18 billion (57 projects).

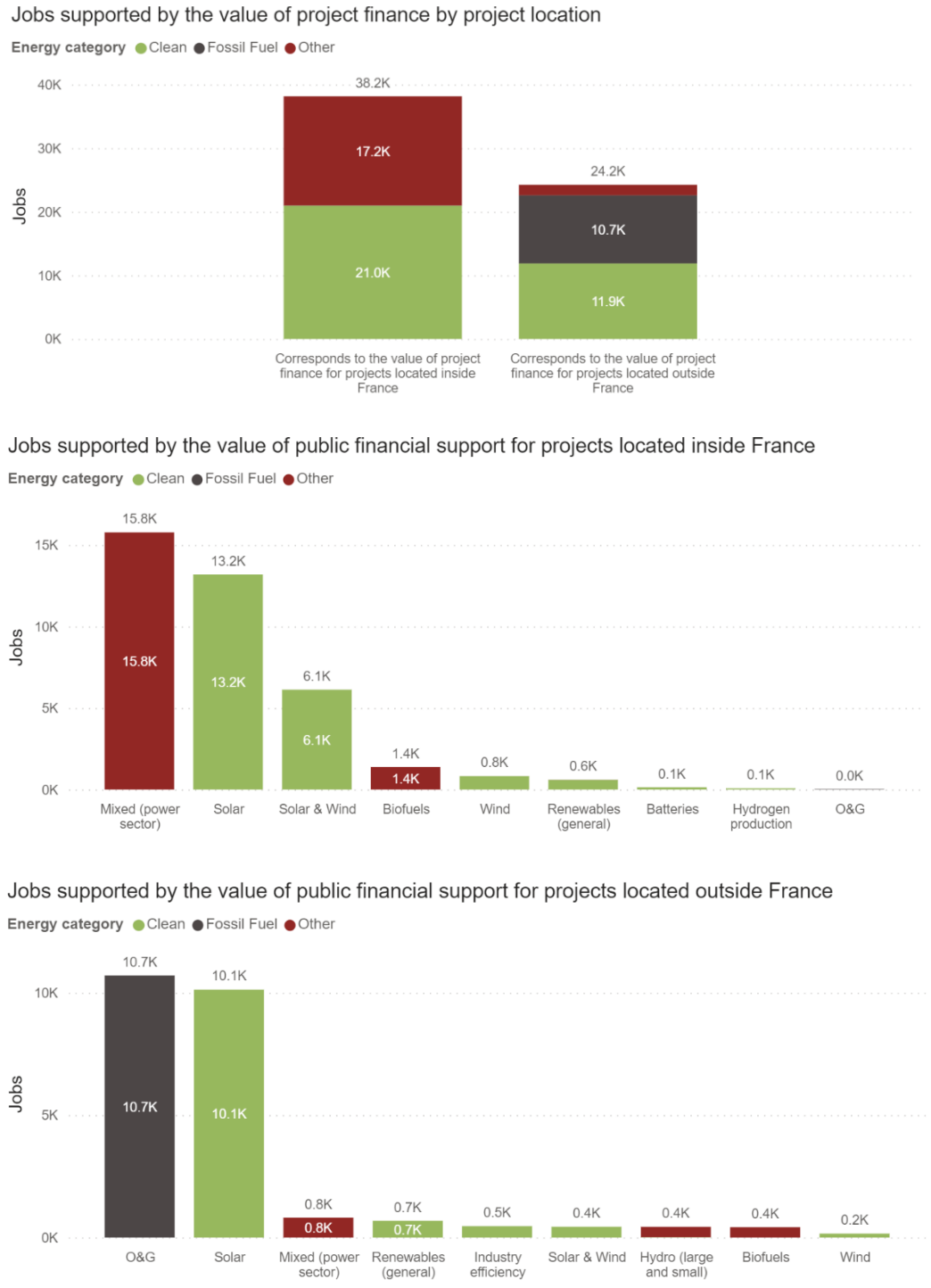
Both inside and outside France most jobs supported are due to Clean energy projects. For projects located inside France, the second largest contributor to jobs supported is Other energy type projects, while for projects located outside France it is Fossil Fuel projects.

Channelling more support to Clean energy projects, compared to Fossil Fuel projects is likely to result in a greater number of jobs supported. The value of project finance corresponding to projects with location inside France is associated with a greater number of jobs supported due to the project composition of the support portfolio in terms of energy type – lower share of Fossil fuel projects, coupled with a higher share of Clean energy projects. During the period considered, only two Fossil Fuel projects are reported in France, with cumulative supported value of EUR 0.005 billion.

Mixed (power sector) and Solar energy projects are the principal contributor to jobs supported through by the value of public finance support to energy projects inside France. Proportionally, financial support for Solar energy results in a greater number of jobs supported. Almost half of the value of public finance support to energy projects located inside France is channelled to Mixed (power sector) projects, while only 20.6% is dedicated exclusively to Solar projects.

Outside France, Oil and Gas projects and solar energy projects are the principal contributor to the number of jobs supported through French public finance. Fossil Fuel and Solar projects result in a similar level of jobs supported, despite Oil and gas projects accounting for 61.8% of the total support value and Solar projects for 21.2%.

Figure 3-5. Job supporting capacity of project finance issued by project location (2016-2020)



Source: Cambridge Econometrics calculations based on OCI Public Finance for Energy database and IEA employment multipliers.

4 Jobs supported (outlook)

4.1 Market outlook and assumptions

Technological change and climate policy are poised to accelerate the energy transition globally, leading to growth in demand for renewable energy and associated products and services**.** In the IEA's Net Zero Emissions Scenario, it is projected that final consumption of electricity will jump by 25% between 2020 and 2030. Direct use of renewables in buildings and industry together with low-emission fuels account for most of energy consumed. The demand for fossil fuels on the other hand is projected to decline sharply. The IEA[12] suggested that 2021 needed to mark the end to investments in new fossil fuel supply to maintain a 50% chance to keep global warming limited to 1.5 degrees. The UNEP Production Gap Report[13] stated that coal, oil and gas production need to decline by, respectively, 11%, 4% and 3%, every year between 2020 and 2030. This presents both challenges and opportunities for French industry, and thus for public finance institutions' support.

In this chapter, we assess the potential of French public financing to support jobs under three scenarios, assuming that the annual level of financing provided equals the average of the past 5 years (2016-2020) for Clean projects, Fossil Fuel projects and Other projects. The first scenario assumes that the current (2016-2020 average) share of support provided for 'Fossil Fuel'-related, 'Clean energy'-related and Other projects remains unchanged over the forthcoming years (26%, 40% and 33%, respectively). The second scenario (100% Clean) assumes that 'Fossil Fuel'-related and 'Other project'-related support stops completely from 2023 onwards (in line with the Glasgow Statement[14], committing countries to shift their support towards clean energy theoretically starts in the beginning of 2023), and all the financial support previously allocated to 'Fossil Fuel'-related and 'Other project'-related is shifted to support 'Clean energy'-related projects. There are two different types to this 100% Clean scenario: in one of them the distribution across various Clean energy types within total Clean are kept constant (in line with the 2016-2020 average, while in the other the distribution changes in line with IEA growth projections for the respective Clean categories (which means a gradual shift of financing towards Solar energy from other Clean sources).

Table 2 Scenarios used for the market outlook and future job estimates

Scenario	Description
Business-as-Usual (Baseline)	Current (2016-2020 average) French public financing support value and its composition for FF, Clean and Other % is held constant over the forward-looking period. In other words, no change in the financing decisions of public finance institutions is assumed.
100% Clean scenario – constant shares	Financial support in any form for Fossil fuel projects is banned and Current (2016-2020 average) French public financing support for FF, Clean and Other shifts entirely to support Clean projects

[12] See. https://iea.blob.core.windows.net/assets/888004cf-1a38-4716-9e0c-3b0e3fdbf609/WorldEnergyOutlook2021.pdf
[13] See. https://www.unep.org/resources/adaptation-gap-report-2021?gclid=Cj0KCQiAys2MBhDOARIsAFf1D1f-vbvaFc67JAUBn3-asT--xhpGP_SCviWxnvhf8uwPuk04M5hj4OkaAjA2EALw_wcB
[14] See. https://ukcop26.org/statement-on-international-public-support-for-the-clean-energy-transition/

	only. The distribution of support across various Clean energy types from 2023 onwards is in line with the distribution over the period 2016-2020, on average: • Solar: 52.4% • Solar & Wind: 25.7% • Wind: 16.2% • Renewables (general): 3.7% • Industry efficiency: 1.3% • Batteries: 0.5% • Hydrogen production: 0.3%
100% Clean scenario – shifting shares	Financial support in any form for Fossil fuel projects is banned and Current (2016-2020 average) French public financing support for FF, Clean and Other shifts entirely to support Clean projects only. Shares within total Clean change in line with the IEA's projected growth of energy supply by clean technology for the years 2023 onwards (i.e., the same growth rate is applied, thus changing the shares in favour of the most demanded energy type category). The shares for the years 2023 and 2030 are provided as an illustration (arrows denote change from 2023 to 2030): • Solar: 52.4% → 54.5% • Solar & Wind: 25.7% → 25.6% • Wind: 16.2% → 15.5% • Renewables (general): 3.7% → 2.9% • Industry efficiency: 1.3% → 1.0% • Batteries: 0.5% → 0.4% • Hydrogen production: 0.3% → 0.3%

The objective is to estimate and compare, using a consistent method, the number of jobs that can potentially be supported by French public finance institutions for exports under different assumptions regarding the future composition of the project portfolio. The three scenarios assume the same level of support is provided in each year (average support provided yearly over the period 2016-2020), i.e. EUR 1.5 billion total yearly transaction value.

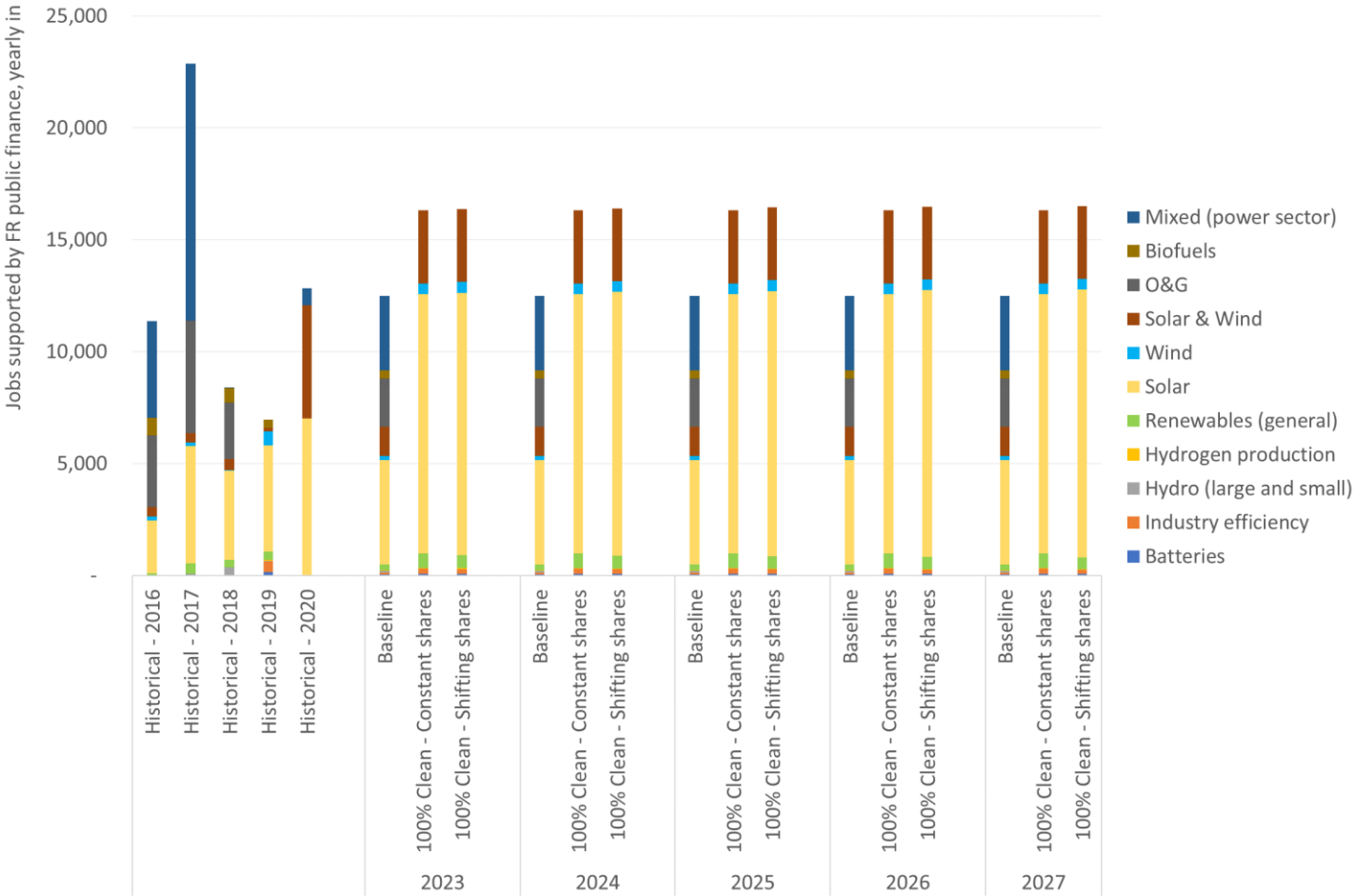
4.2 Jobs impact resulting from a public finance redirection 100% towards renewable energies vs historical composition of support

In both variants of the 100% Clean scenario, more jobs are supported overall than in the Baseline. With the same level of financing assumed, 16,300 and 16,400 Clean jobs are expected to be supported in the 100% Clean scenarios with constant shares and shifting shares, respectively, as of 2023; while only 12,500 jobs are expected to be supported overall in the Baseline in the year 2023 (consisting of 6,600 Clean jobs, 2,100 Fossil Fuel jobs and 3,800 Other type of jobs). This results primarily from the higher job support potential of investment made in Clean projects than in 'Fossil Fuel'-related activities and in Other energy types, as described by the IEA employment multipliers. It is key to note here, however, that there is uncertainty on the evolution of the location of the energy sector value chains over the coming years and therefore the global multipliers indicate only the total jobs supported, but do not give indication on where these jobs will be created (regionally, and in which parts of the value chain exactly).

With financial support of the Fossil Fuel and Other category being shifted to Clean projects, the overall job impact under the 100% Clean scenarios is higher than in the baseline with current support structure (in total, 31-32% higher than in the baseline as of 2023). The highest job impact is yielded under the 100% Clean scenario with shifting shares, where more jobs are assumed to be supported in Solar energy-related projects (and therefore, overall) than in the 100% Clean scenario with shares kept constant in line with the historical distribution.

The amount of jobs supported in the Clean scenario is largely driven by the underlying support provided: most jobs are expected to be supported in relation to solar energy (~11,600), solar & wind mix projects (~3,200), other renewables (~1,000) and wind energy-related projects (~500). This is increasingly true in the alternative 100% Clean scenario, where current support for FF, Clean and Other all shift to 100% Clean, and the distribution across various Clean energy types change within total Clean change in line with IEA growth projections for the respective Clean categories. In this set-up, support and consequently, jobs impact gradually shifts towards Solar energy, and by 2027 this would result in almost 12,000 jobs in Solar and consequently slightly less jobs for all the other Clean categories compared to the 100% Clean scenario with constant shares.

Figure 4-1. Future jobs potentially supported by French public finance institution support, in the Baseline and in the 100% Clean scenarios, yearly between 2023-2027, by energy type

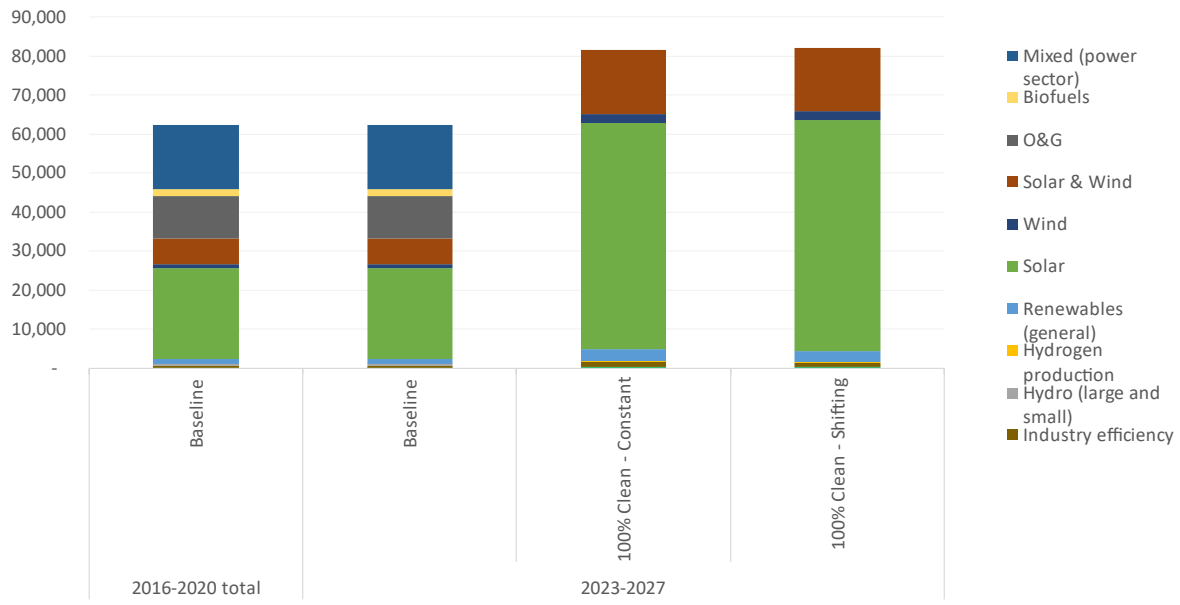


Source(s): Cambridge Econometrics calculations based on OCI Public Finance for Energy database, IEA employment multipliers and energy supply projections based on the IEA's Net Zero Emissions Scenario

The three scenarios assume that the same level of support is provided in each year for the forward-looking part (average support provided yearly over the period 2016-2020, i.e. EUR 1.5 billion total yearly transaction value). Therefore, the yearly jobs supported do not vary substantially between the 100% Clean variants, as seen in the figure above, only its distribution changes slightly in the 100% Clean – shifting shares scenario.

When looking at cumulative job impacts over time, this shift in the 100% Clean scenario becomes more visible: the below figure illustrates the total number of jobs supported historically over the period 2016 to 2020, and over the period 2023 to 2027 for the scenarios. It is estimated that - with 1.5 billion EUR -, from 2023 up to 2027, ~62,000 jobs can potentially be supported, in the Baseline scenario (no change compared to historical structure of support), ~81,000 jobs can potentially be supported in the 100% Clean – constant shares scenario, and ~82,000 jobs can potentially be supported in the 100% Clean – shifting shares scenario. Therefore, the most cost-efficient way to support jobs is provided by the scenario in which public finance support is shifted to 100% Clean, and the allocation of financing is shifting towards Solar energy (in line with energy supply growth projections).

Figure 4-2 Future jobs potentially supported by French public finance institution support, in the Baseline and in the 100% Clean scenarios, cumulative, historically and estimates for the specified future periods, by energy type



Source(s): Cambridge Econometrics calculations based on OCI Public Finance for Energy database, IEA employment multipliers and energy supply projections based on the IEA's Net Zero Emissions Scenario

The key driver behind these results is that investment in value chains related to renewables generally requires more labour input per EUR invested than in fossil fuel industries due to higher labour requirements[15]. Renewable energy infrastructure has higher labour intensity during the construction and manufacturing phase[16]. A significant part of the investment in renewables is channelled to processes such as the development, manufacturing, installation and the management of associated activities. In contrast, fossil fuel sectors channel more

[15] See. Czako, V. (2020) Employment in the Energy Sector. JRC, Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC120302

[16] As also evidenced by the IEA multipliers, see: https://www.iea.org/reports/sustainable-recovery/evaluation-of-possible-recovery-measures

expenditure towards operation and maintenance as a result of the existence of variable costs in fuel[17]. This requires comparatively less labour.

Short term transition costs – regarding labour market mismatches and distributional impacts in particular – are key in ensuring a smooth and just transition away from fossil fuels. The analysis presented here quantifies the number of jobs potentially supported by French public financing institutions, using multiplier analysis. In this approach, short term transition costs are not accounted for in the quantifications (e.g. the cost of reskilling and additional training, or the cost arising from a shortage of skilled workers which would undermine the creation of new jobs in the renewable value chains). In this respect, there is an important role for government in facilitating the just transition through labour market and social policies, such as well-planned and adequately financed long-term retraining and re-skilling programmes. As noted in the IEA's recent World Energy Employment Report, the new jobs will not always be in the places where jobs are lost, but they are likely to suit the workers and skill sets from industries that are downsizing, as workers in coal and other fossil fuels have many of the skills needed today to fill positions in growing clean energy sectors[18]. As French public finance support mostly concerns projects outside of France, it is expected that the transition costs resulting from a shift away from fossil fuels would also to a large extent materialise outside of France, which would limit the impact of these costs within France.

At the same time, continued support to the fossil fuel-related industry and continued investment in fossil fuels can have adverse effects for the French economy, subject to expectations for subdued demand for fossil fuels in the future. This is not accounted for by the quantitative analysis either, yet other research suggests that continued investment in fossil fuels is likely to lead to the creation of substantial stranded assets (assets become obsolete before the end of the lifetime due to industrial transition)[19]. The valuation of such stranded assets suggests that the long-term costs could outweigh the short-term benefits of fossil fuel investments. Similarly, fossil fuel projects made possible with French public finance support could also pose economic risks for importing countries where these contribute to a fossil fuel lock-in, particularly when this concerns developing countries that lack the investments necessary to diversify their energy mix.

This highlights the potential risks of investing in fossil fuel-based assets as the rest of the world decarbonises. In the short term, these investments are seen as 'protecting' existing fossil fuel industry jobs; however, as global demand shifts, it presents opportunities for other firms outside of France to develop expertise in the emerging industries and technologies (e.g. the shipping and installation of offshore wind turbines), meaning that French firms are then at a competitive disadvantage when later trying to shift to focus on meeting the increasing demand for these services. The trade-off could therefore be trading security for jobs in fossil fuel-supporting industries in the short term for the long-term employment prospects in industries supporting renewables and other nascent industries.

[17] https://iea.blob.core.windows.net/assets/a0432c97-14af-4fc7-b3bf-c409fb7e4ab8/WorldEnergyEmployment.pdf
[18] See. IEA (2022) World Energy Employment Report. https://iea.blob.core.windows.net/assets/a0432c97-14af-4fc7-b3bf-c409fb7e4ab8/WorldEnergyEmployment.pdf
[19] See. Macroeconomic impact of stranded fossil fuel assets (nature climate change)
Europe Gas Tracker Report 2021

5 Annex – Methodological notes

The OCI dataset used

The jobs analysis builds on the dataset developed and maintained by Oil Change International (OCI)[20], presenting data on the support provided by French public financing institutions for the realisation of energy-related activities.

To ensure that the section of the OCI database is up to date with respect to France in time for the publication of this report, publicly available OCI database was expanded by two projects in close collaboration with the Amis de la Terre France, following the validation of the OCI. The OCI database was extended with information on two large Fossil Fuel projects, information on which was published through the BPI France website[21]. Finance support for both projects was issued in 2016 by the COFACE and are Oil and Gas projects. The first, located in Iraq received support of value EUR 0.07 billion. The second, located in the Russian Federation received support of value EUR 0.499 billion.

Employment multipliers used for the job estimates

Employment multipliers estimate how many jobs are created or maintained per million of EUR investment in certain specific energy technologies. For this analysis, we took existing employment multipliers from the publicly available sources (i.e. the 2020 Sustainable Recovery report of the International Energy Agency, IEA)[22], which include direct and indirect job creation (induced jobs are not included). More detailed information on the construction of specific employment multipliers can be found in the technical annex[23] of the report. The IEA database was compiled based on existing literature, industry engagement, surveys of government statistical accounts and macroeconomic modelling. The use of employment multipliers makes it possible to isolate employment created by an investment from other macroeconomic factors that could otherwise impact the levels of job creation. For the analysis, USD-based multipliers have been converted to EUR.

The table below shows the employment multipliers used for the assessment of job impacts. The table also shows how the energy types and sectors classified by the OCI were matched to CE (Cambridge Econometrics) energy types for the analysis (with the goal to link it to the multipliers available in the IEA dataset).

Table 3 Employment multipliers used for the job impact calculations (jobs per million EUR invested)

OCI Energy type	OCI Sector	CE Energy type	IEA Multiplier description	Multiplier (jobs per mn EUR)
Clean	Batteries	Batteries	Batteries	9.7
	Efficiency - Clean	Industry efficiency	Industry efficiency	11.5
	Hydro - Small	Hydro (large and	New hydro	2.4

[20] See. Oil Change International launches first of its kind Public Finance for Energy Database - Oil Change International (priceofoil.org)
[21] See. https://www.bpifrance.fr/Bpifrance/Qui-sommes-nous/Nos-metiers/International/Assurance-Export/Evaluation-Environnementale-et-Sociale. For direct download, see here. "Liste des projets pris en garantie - 2016" https://www.bpifrance.fr/download/media-file/75895 "Liste des projets pris en garantie - 2016" https://www.bpifrance.fr/download/media-file/75895
[22] See. https://www.iea.org/reports/sustainable-recovery
[23] https://iea.blob.core.windows.net/assets/c3de5e13-26e8-4e52-8a67-b97aba17f0a2/Sustainable_Recovery.pdf

		small)		
	Hydrogen - Clean	Hydrogen production	Hydrogen production	6.9
	Mixed or unclear - Clean	Renewables (general)	average of New hydro, Biofuels, Wind power and Solar PV	11.0
	Renewables	Renewables (general)	average of New hydro, Biofuels, Wind power and Solar PV	11.0
	Renewables - Clean	Renewables (general)	average of New hydro, Biofuels, Wind power and Solar PV	11.0
	Solar	Solar	Solar PV	15.0
	Wind	Wind	Wind power	2.0
	Wind and Solar	Solar & Wind	average of Wind power and Solar PV	8.5
Other	Biomass	Biofuels	Biofuels	24.5
	Hydro - Large	Hydro (large and small)	New hydro	2.4
	Renewables - Other	Renewables (general)	average of New hydro, Biofuels, Wind power and Solar PV	11.0
	Mixed or unclear - Other	Mixed (power sector)	average of New grids and Existing grids	7.4
Fossil Fuel	Natural Gas	O&G	Unabated gas-fired power	5.4
	Efficiency - Fossil	O&G	Unabated gas-fired power	5.4
	Oil and Gas	O&G	Unabated gas-fired power	5.4

Source: International Energy Agency (2020) Sustainable Recovery - World Energy Outlook Special Report.
Note: Unabated gas-fired power used for all Oil & Gas type of transactions and for the Fossil Fuel jobs in the market outlook.

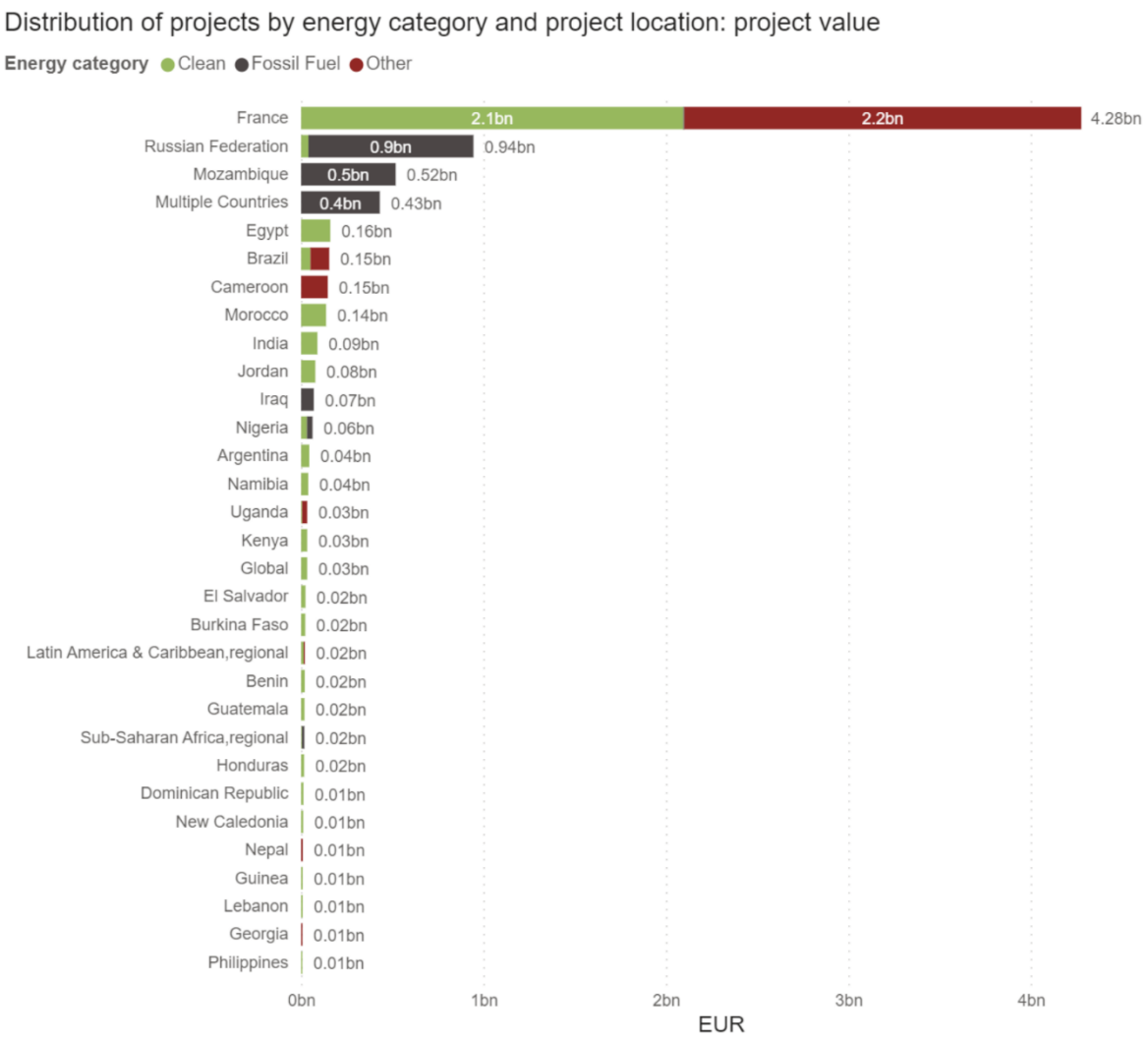
No robust data is publicly available on the French-foreign content split of project support; therefore the split of jobs supported domestically in France and abroad is not considered, only total jobs impact are captured.

The project location identification

The identification of the distribution of financial support across countries is a challenging task, even in the availability of value chain data at project level. This report has taken a step towards providing an indicative distribution of public finance support for energy projects across countries by using the information on project location reported by the OCI database.

To allow an accessible communication of results, the report has been using an approximation to project location. The first approximation has been to identify projects based on whether they are located in France. The second approximation has been to produce two world maps that describe project location. Both of these approximation omit to take into account multiple country projects. In the first case, multiple country projects are attributed to the outside France category – without a verification as to the share of which that might be realised inside France. In the second case, multiple country projects are not reported through the world maps produced. To this end, Figure 5-1 presents a detailed review of the reported projects between 2016 and 2020 based on the OCI country identification.

Figure 5-1 Distribution of projects by energy category and location (2016 to 2020)



Source: OCI Public Finance for Energy database. Calculations by Cambridge Econometrics.