FMO
Entrepreneurial
Development
Bank

FMO impact model

Methodology

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1. Introduction

FMO's ambition is to become the leading impact investor by doubling impact and halving footprint by 2020. FMO's strategy is aligned with the Sustainable Development Goals. We focus on three SDGs across our focus sectors: Decent Work and Economic Growth (SDG 8), Reduced Inequalities (SDG 10), and Climate Action (SDG 13). In 2013, FMO set the ambition to double our impact and halve our footprint by 2020. When considering doubling our impact, we refer to doubling the amount of (in)direct jobs we generate with our new commitments (own and catalyzed). We aim to halve our footprint by doubling the amount of avoided greenhouse gas (GHG) emissions associated with our investments. Jobs supported and avoided GHG emissions are our current measurements of our contribution to SDG 8 and SDG 13.

The FMO impact model helps FMO to track its ambition towards 2020. It shows how our investments support jobs in the local economy.

2. Operationalization and alignment with Planning & Control (P&C) cycle FMO

It is a challenge to operationalize both terms 'development impact' & 'sustainability footprint', given the variety of projects in terms of country, industry, individual clients, and types of financial services provided. Furthermore, FMO prefers to have an integrated approach with regards to impact & footprint effects, and to align calculation, reporting and steering with our existing financial reporting. The most crucial decision within FMO's credit process is the contracting of new projects, making new commitments the relevant variable for impact. We focus on the estimated impact and footprint effects of the new contracts signed in a specific year for FMO's doubling and halving ambition. The baseline consists of the contracts closed in the period 2010-2012. Given the volatility of annual results FMO has set its ambition on a 3 year moving average, and aims for doubling and halving in the period 2018-2020 (against the baseline). The baseline results are published in FMO's Annual Report 2014.

3. Impact & Footprint: jobs & GHG avoidance

'Development impact' is realized in different dimensions ('access to electricity, finance, telecom etc.). The challenge is to aggregate projects in a meaningful way. FMO has chosen for employment ('jobs supported', see 5.3 Definitions of impact) as the common denominator, because (private sector) employment is considered a driving factor in reducing poverty in emerging countries and wages from jobs represent the largest part of value added of our clients. Additionally, number of jobs supported can be aggregated over different industries and countries. Also other development banks (IFC, CDC) regard employment as the most relevant impact indicator, as is for example illustrated by the Jobs Study of IFC, and the World Development Report 2013.

FMO's halving footprint ambition is translated in 'doubling its GHG avoidance'. GHG avoidance is only calculated for projects labelled as 'green projects', according to available international definitions, and a formal 4-eye principle based internal process.

A market survey (executed at the moment of implementation of this model) indicated that Greenhouse Gas (GHG, measured in CO2 equivalent) is the most frequently used environmental sustainability indicator, which has a global reporting standard (GHG protocol). GHG is a broadly accepted relevant factor and can be aggregated over the portfolio given its global nature. For GHG one can look at GHG emissions and GHG avoidance. GHG avoidance is only calculated for 'green projects': projects that 'prevent' GHG emissions from being released by producing in a more sustainable way than the most likely alternative (i.e. industry average). For every renewable energy project a comparative calculation is made between the annual GHG emission of the project (i.e. 0 for most renewables during the operation phase) and the industry average in that country (i.e. the average GHG emission per Kilowatt Hour energy production). For renewable energy and energy efficiency projects the GHG avoidance calculation is derived from underlying project documentation. For specific 'green' private equity funds and financial institutions investing in renewable energy the GHG avoidance is estimated by FMO with an internationally accepted tool[1].

4. A robust model

The FMO Impact Model is developed by Steward Redqueen, a consultancy firm with a strong track record in quantifying the impact of (development) financial institutions on local economies. FMO's Impact Model is based on Steward Redqueen's proprietary methodology which has been validated by independent third parties in 2014. Ecofys, an external GHG specialist confirmed that "the model suits the purpose for which it is intended by FMO and the GHG data used are among the best available". Furthermore, FMO's external auditors perform an annual assurance engagement with a limited level of assurance on the sustainability information in specific chapters of FMO's integrated annual report. As part of their work on the information regarding the impact model in FMO's annual report, the auditors review the continued suitability of the developed reporting methodology and underlying assumptions as well as the consistent application of these. For a detailed explanation, refer to the assurance reports in FMO's annual reports since 2014.

5. Methodology

5.1 Scope

The model covers FMO's new commitments, including all types of transactions (loans, equity, and guarantees), clients (projects, companies and financial intermediaries) and regions (Africa, Asia, Europe & Central Asia, and Latin America & Caribbean).

5.2 Focus

The impact of FMO's investments is estimated taking the effects of the end-beneficiary as starting point. An important point to note is that not all clients are the actual beneficiaries of FMO's capital. A large part of FMO's financing goes to Financial Institutions and Private Equity funds, which will on-lend the financing provided by FMO to their local clients. These types of financing via intermediaries are called 'indirect investments'. FMO's direct investments directly support a company which makes this client the beneficiary of

[1] IFC Abacus tool

FMO's capital. However, FMO's indirect financing aims to support a group of companies which it can only reach by means of intermediate financing through financial institutions (FIs). These intermediaries can be banks, private equity funds or micro finance institutions (MFIs). In this case, the FI is technically FMO's client, but the ultimate beneficiary of financing is the FI's local client (i.e. corporates, SMEs, retail).
In order to correctly distinguish FMO's clients and end-beneficiaries, the model estimates the impact that is related to FMO financing at the level of the end-beneficiary. This is the FMO client in the case of direct investments and the FI's client in the case of indirect financing.

5.3 Definitions of impact

The model estimates impact based on two economic indicators and two environmental indicators:

- Jobs supported: sum of all jobs related to FMO financing;
- Value added: sum of all wages, taxes and profits related to FMO financing;
- GHG emissions: sum of CO_2 and non-CO_2 emissions related to FMO financing;
- GHG avoidance: sum of CO_2 and non-CO_2 emissions avoided related to FMO financing.

FMO reports on jobs supported and GHG avoidance, the metrics value added and GHG emissions are used for internal purposes.

The above-mentioned indicators are measured at the direct and indirect level:

- Direct effects: sum of impacts at FMO's end-beneficiary that are related to FMO financing;

Indirect effects are the sum of:

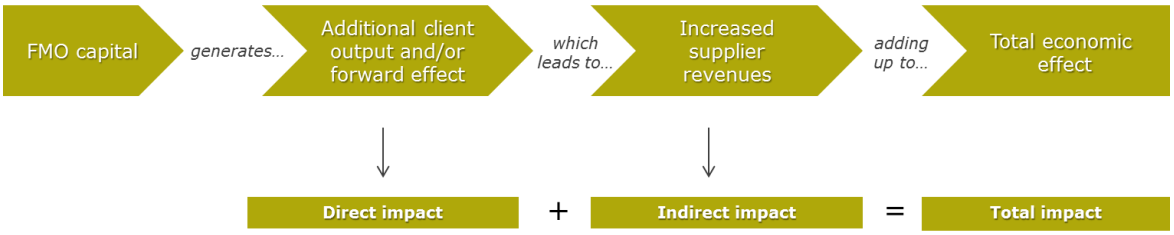
- Backward effects: sum of impacts at the end-beneficiary's direct and indirect suppliers that are related to FMO's financing;
- Induced effects: sum of impacts of the re-spending of salaries earned by employees of the end-beneficiary and its (in)direct suppliers that are related to FMO's financing;
- Forward effects: sum of impacts at the direct consumers of energy and infrastructure projects that can be related to FMO financing[2].

See for all definitions used by FMO's Impact Model annex 1 Definitions used by the model

5.4 Methodology

The model is based on a statistical methodology to measure the marginal effect of FMO's capital. With this additional capital, a company can produce more economic output which generates additional jobs, but also environmental footprint. Subsequently, because of this additional output, the company also increases its consumption of inputs thereby stimulating economic and environmental effects at the company's suppliers and suppliers' suppliers.

[2] It is assumed that project finance primarily has an enabling effect on its beneficiaries which leads to increased economic output of consumers of a project's production (e.g. electricity). For direct and indirect investments in project finance, the model traces forward effects (also referred to as enabling effects). Forward linkage jobs represent between 5% and 10% of total jobs supported by FMO.



Direct effects are measured with data collected from FMO's clients. To quantify the indirect effects in the economy, as well as the direct effects at the beneficiaries of indirect investments, the model uses an input-output model.

5.5 Input-output model

Input-output modelling is an economic method to depict inter-linkages between sectors, which enables the model to trace product and money flows through an economy. It is a rigorous academic method that is widely agreed upon and for which Wassily Leontief received the Nobel prize in 1973. To trace all indirect effects of an investment, the model is based on a statistical representation that shows how sectors in an economy depend on one another, as a consumer of output and as a supplier of input. These representations are called blue prints and are compiled in input-output tables (I/O tables).

The data sets of the Global Trade Analysis Project (GTAP) provide the model with the macroeconomic data to compile the blue prints of national and regional economies (see annex 2 Sources for more information on GTAP). Containing 23 regional I/O tables differentiating 16 sectors, the model estimates the broader effects of FMO's capital in various countries and regions (see annex 3 I/O tables used by the model for all I/O).

5.6 Functioning of the model

Directly from FMO sources, the model obtains information on the direct GHG emissions avoided and direct jobs of direct investments. Regarding indirect job and emission effects, the model starts by calculating the additional economic output (revenues) of an end-beneficiary generated by FMO's capital which can thus be attributed to FMO. This calculation is based on the capital intensity of the end-beneficiary. For direct investments, capital intensities are calculated based on direct client data (revenues, non-current and total assets) from FMO's database. For indirect investments, calculations are based on macroeconomic statistics on the capital intensities of the industries and end-beneficiary types (corporates or SMEs, formal or informal) spread over the countries/regions in FMO's portfolio. For sources of macroeconomic statistics please refer to the annex 4 Macroeconomic data from external sources used by the model).

Once the additional economic output of the end-beneficiary is estimated, it is inserted into the I/O tables to calculate the additional output that it supports at (in)direct suppliers. This yields the total economic output related to FMO's capital, consisting of (i) value added, (ii) spending on intermediate inputs from other local sectors and (iii) imports. This information is again directly obtained from GTAP. Subsequently, the total economic output is multiplied by the applicable employment intensity and GHG emission intensity per unit of output from the I/O tables. These intensities are obtained from various sources (see annex 1 Sources)

5.7 Limitations of the model

The major advantage of the methodology is that it allows quantifying the wider impact of investing in various economic sectors, both directly and through FIs. Input-output modelling is a rigorous academic method, which is widely agreed upon. However, it is also important to point out the limitations of this methodology:

1. The model produces ex-ante estimates of impact. Therefore, realized impact (ex-post) on the ground can differ from ex-ante expectations;
2. Given that the analysis is conducted for a specific moment in time, it does not take into account any structural changes of the economy (e.g. increased productivity);
3. Estimates are based on historical relations, while the methodology is based on the most recent (macro) economic data available;
4. FMO's investments are treated as investments from any other lender and it has been assumed that FMO's financial support does not affect the relations of sectors within an economy;
5. Estimates of indirect impact are based on industry averages (via I/O tables). In reality indirect effects will be different on individual company level due to differences in individual company characteristics. As a result, model outcomes become less accurate for smaller number of investments.

Taking the limitations of the model into account, we use the results only on the portfolio and sub portfolio level, and not on individual deal level. In addition, we perform activities to provide insight in ex-post development effects, such as monitoring of direct effects, sector evaluations, effectiveness studies and impact evaluations. FMO has updated the macro-economic data[3] between 2016 and 2017 to reflect structural economic changes. Annex 4 Macroeconomic data from external sources used by the model shows data both pre-update (2010-2016) and post-update (2017-2020). To ensure comparability between baseline and end line, the update of the data is also projected onto the baseline commitments. The update of macro-economic data affects number of jobs supported and GHG emissions. Going forward, from 2018 onwards, FMO has also adopted a new methodology for the calculation of the GHG avoidance of production projects which is more aligned with IFI practices.

6. FMO Attribution rules

Due to the fact that FMO wants to steer on impact & footprint, to be able to report credibly over the achievements of its own financing, and to prevent adverse incentives, FMO applies attribution rules[4] for its reported impact. Via these attribution rules, expected impact on client level is linked to FMO-financing. The FMO Impact Model which is used for the calculation of the effects, takes into account the amount of euro's FMO has invested, and the third party amounts actively catalyzed by FMO ('catalyzed funds'). Underlying idea here is that without FMO the third party would not have invested in the project. Furthermore, to take into account the higher impact of equity products (due to its higher leverage effects on client level), the model uses a multiplier of 2 for equity products. For further rules and exceptions, please refer to annex 5 Rules and exceptions.

[3] This is done once, since more recent economic data (GTAP) is not available annually and more frequent updates will hamper comparability of FMO's impact over different points in time.

[4] Pro-rata with its financing part, including catalyzed funds, and applying a multiplier of 2 for equity products in order to take into account the leverage effects of equity products.

7. Ensuring data quality

FMO's impact model uses both FMO client data, and macroeconomic statistics. Basis of the model are international statistical sources and client data provided from FMO systems. The quality of this limited set of client indicators is important for the data quality of the model's output. Therefore, a robust process with well-defined lines of defense is in place. An internal target on data quality is part of the agreed goals of Front-Office management to ensure adequate data quality. In order to ensure a proper four eye principle, the responsibility for checking quality and completeness of delivered data lies within the Finance department.

8. Embedding & reporting

FMO's Impact Model is used to calculate the expected impact of new commitments from FMO on a bi-annual basis. Model output is externally reported in FMO's Annual Report on a portfolio level. Internally, model outcomes are analyzed and reported on a more detailed level, which contributes to the 'learning curve' of FMO. The main advantage of the model, is that it provides FMO with more information about the expected direct and indirect effects of its portfolio. The model is not used for steering on individual deal level, given the limitations of the model as discussed in 5.7 'Limitations of the model'. In order to report impact on an ex-post basis, FMO uses a mixed methods approach: by combining several approaches (case studies, monitoring direct effects, impact studies) FMO remains transparent and reports its findings externally. However, given the characteristics of the model (in particular the non-directly observable indirect effects), a rigorous ex-post validation on portfolio level is not feasible.

Annex 1 Definitions used by the model

Indicator	Definition
Total jobs	Sum of all jobs related to FMO-related-output (see attribution) at a particular moment in time per annum. Expressed in full-time equivalent (FTE).
Direct jobs	Total FTEs at the client/end beneficiary that are related to FMO's financing.
Indirect jobs (backward)	Total FTEs at the client/end beneficiary's direct and indirect suppliers that are related to FMO's financing.
Induced jobs	Total FTEs related to the re-spending of salaries earned by employees of the FMO client/end beneficiary and its (in)direct suppliers that are related to FMO's financing.
Forward linkage jobs	Jobs that are supported at direct consumers of electricity/ infrastructure that can be related to FMO's project finance investments. Estimation of enabling effects is based on the assumption drawn from literature review that 1% increase of electricity to the grid results in 0.1% increase in GDP. This assumption is based on electricity projects, and is also applied to other infrastructure (non-energy) projects.
Full-time equivalent (FTE)	A full-time equivalent (FTE) job is the equivalent of one person working full time as defined by local laws.
Total value added	Sum of net salaries, taxes and profits of an organization related to FMO-related-output (see attribution) at a particular moment in time per annum in millions of Euros.
Direct value added	Total value added of an FMO client/end beneficiary that can be related to FMO's financing.
Indirect value added (backward)	Total value added of the FMO client/end beneficiary's direct and indirect suppliers that are related to FMO's financing.
Forward linkage value added	Value added supported at direct consumers of electricity/ infrastructure that can be related to FMO's project finance investments.
Profit	Net annual profit after tax.
Salaries	Net annual payment to personnel, including net wages and benefits incurred by the organisation.
Taxes	All local taxes paid including net VAT, sales tax, payroll tax and corporate income taxes and all other local royalties/fees net of direct subsidies.
Total GHG emissions	Sum of CO2 and non-CO2 gases related to FMO-related output (see attribution) at a particular moment in time per annum. Expressed in metric tons of CO2 equivalents, at least including scope 1 (direct emissions) and scope 2 (emissions from the production of purchased electricity, heat and steam).
Direct GHG emissions	Total emissions of scope 1 GHGs per annum through the FMO client/end beneficiary's operations that can be related to FMO's financing. These are CO2 emissions related to onsite combustion of fossil fuels (at beneficiary level) and non-CO2 emissions related to capital use, inputs to and outputs from the FMO client/ end beneficiary's direct operations. PLUS direct GHG emissions from energy generation of FMO's non-green energy project finance that can be related to FMO.
Indirect GHG emissions (backward)	Total emissions of scope 2 GHGs per annum through the FMO client/end beneficiary's operations that are related to FMO's financing as well as the total emissions of scope 1 and 2 GHGs per annum through the operations of the direct and indirect suppliers of the FMO client/end beneficiary that are related to FMO's financing.
Induced GHG emissions	Total emissions of scope 1 and 2 GHGs per annum related to re-spending of salaries earned by employees of the FMO client/end beneficiary and its (in) direct suppliers and clients that are related to FMO's financing.
Forward linkage GHG emissions	GHG emissions that are supported at direct consumers of electricity/ infrastructure that can be related to FMO's project finance investments.
CO2 Greenhouse Gases	Carbon dioxide (CO2).
Non-CO2 Greenhouse Gases	Methane (CH4), Nitrous oxide (N2O), Fluorinated gases.
GHG avoidance	Estimation of scope 1 and 2 GHGs avoided per annum in a client's operations (green energy generation) that are related to FMO's financing against the counterfactual that traditionally generated electricity would have been used.

Annex 2 Sources

Investment-related data are retrieved directly from FMO databases which in turn are collected either by the client or FMO itself, but macroeconomic data are retrieved from various public sources. See Annex 3 for background information on the data used by the model per indicator.

GTAP Data Base	The Global Trade Analysis Project (GTAP) is a global database describing bilateral trade patterns, production, consumption and intermediate use of commodities and services consisting of over 100 tables for individual countries or a group of countries and 57 sectors. The database uses input from a global network of institutes, researchers and policy makers conducting quantitative analysis of international policy issues. It is coordinated by the Center for Global Trade Analysis in Purdue University's Department of Agricultural Economics.
World Bank Development Indicators Databank	These are the primary World Bank collection of development indicators which are compiled from officially-recognized international sources. It presents the most current and accurate global development data available, and includes national, regional and global estimates.
National Statistics	Country-based statistical information are compiled and produced by National Statistical Offices and Central Banks.
IEA Energy Statistics	The International Energy Agency (IEA) coordinates a database with statistical information on energy production, consumption and prices across various regions and countries.
OANDA currency exchange rates	OANDA operates a worldwide historical, high frequency, filtered currency database.

Annex 3 I/O tables used by the model

I/O TABLES FOR CAPITAL INTENSITIES AND SPENDING PATTERNS/SECTOR	
I/O table	**Countries included**
Kenya	Kenya
Nigeria	Nigeria
South Africa	South Africa
Low Income Sub-Saharan Africa	Benin, Burkina Faso, Ethiopia, Madagascar, Malawi, Mozambique, Rwanda, Tanzania, Togo, Uganda, Zimbabwe
Lower middle income Sub-Saharan Africa	Cameroon, Ghana, Ivory Coast, Senegal, Zambia
Northern Africa	Egypt, Morocco, Tunisia
Total Africa	All African countries (weighted average of above)
India	India
South Asia	Bangladesh, Nepal, Sri Lanka
China and Mongolia	China, Mongolia
South-East Asia	Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam
Total Asia	All low, lower middle and upper middle income Asian countries and Middle Eastern countries (weighted average of above)
Mercosur	Argentina, Uruguay, Paraguay
Andean countries	Colombia, Ecuador, Peru, Bolivia
Central America & Caribbean	Panama, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Total Latin America	All low, lower middle and upper middle income Latin American countries and Uruguay except Brazil, Chile, Mexico (weighted average of above)
Turkey	Turkey
Eastern Europe	Ukraine, Belarus, Moldova
Balkans	Serbia, Bosnia & Herzegovina, Macedonia, Albania, Andorra, Faroe Islands, Gibraltar, Guernsey, Vatican City, Isle of Man, Jersey, Monaco, Montenegro, San Marino

Caucasus	Georgia, Armenia, Azerbaijan
Central Asia	Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan and Pakistan
Total Europe and Central Asia	All European and Central Asian countries (weighted average of above)
Global	All countries in FMO investment universe (weighted average of above)

I/O TABLES FOR EMPLOYMENT INTENSITIES

I/O table	Countries to which they are applied	Basis for calculation
Kenya	Kenya	Kenya
Nigeria	Nigeria	Nigeria
South Africa	South Africa	South Africa
Low Income Sub-Saharan Africa	Benin, Burkina Faso, Ethiopia, Liberia, Madagascar, Malawi, Mali, Mozambique, Rwanda, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zimbabwe	Tanzania
Lower middle income Sub-Saharan Africa	Cameroon, Djibouti, Ghana, Ivory Coast, Senegal, Zambia	Zambia
Northern Africa	Algeria, Egypt, Morocco, Tunisia	Egypt
Total Africa	All African countries	Avg. of African intensities
India	India	India
South Asia	Bangladesh, Nepal, Sri Lanka, Maldives	Bangladesh
China and Mongolia	China, Mongolia	China
South-East Asia	Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam, Myanmar	Indonesia
Total Asia	All low, lower middle and upper middle income Asian countries and Middle Eastern countries	Avg. of Asian intensities
Mercosur	Argentina, Uruguay, Paraguay	Argentina
Andean countries	Colombia, Ecuador, Peru, Bolivia	Peru
Central America & Caribbean	Panama, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua	El Salvador
Total Latin America	All low, lower middle and upper middle income Latin American countries and Uruguay except Brazil, Chile, Mexico	Avg. of Latin American intensities
Turkey	Turkey	Turkey
Eastern Europe	Ukraine, Belarus, Moldova	Ukraine
Balkans	Serbia, Bosnia & Herzegovina, Kosovo, Macedonia, Albania	Macedonia
Caucasus	Georgia, Armenia, Azerbaijan	Azerbaijan
Central Asia	Kyrgyzstan, Tajikistan, Uzbekistan, Afghanistan and Pakistan	Pakistan
Total Europe and Central Asia	All European and Central Asian countries	Avg. of European and Central Asian intensities
Global	All countries in FMO investment universe	Avg. of all intensities

I/O TABLES FOR CO_2 INTENSITIES

I/O table	Countries to which they are applied	Basis for calculation
Kenya	Kenya	Kenya
Nigeria	Nigeria	Nigeria
South Africa	South Africa	South Africa
Low Income Sub-Saharan Africa	Benin, Burkina Faso, Ethiopia, Liberia, Madagascar, Malawi, Mali, Mozambique, Rwanda, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zimbabwe	Benin, Burkina Faso, Ethiopia, Madagascar, Malawi, Mozambique, Rwanda, Tanzania, Togo, Uganda, Zimbabwe

Lower middle income Sub-Saharan Africa	Cameroon, Djibouti, Ghana, Ivory Coast, Senegal, Zambia	Cameroon, Ghana, Ivory Coast, Senegal, Zambia
Northern Africa	Algeria, Egypt, Morocco, Tunisia	Egypt, Morocco, Tunisia
Total Africa	All African countries	All African countries
India	India	India
South Asia	Bangladesh, Nepal, Sri Lanka, Maldives	Bangladesh, Nepal, Sri Lanka
China and Mongolia	China, Mongolia	China, Mongolia
South-East Asia	Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam, Myanmar	Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam
Total Asia	All low, lower middle and upper middle income Asian countries and Middle Eastern countries	India, Bangladesh, Nepal, Sri Lanka, China, Mongolia, Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam,
Mercosur	Argentina, Uruguay, Paraguay	Argentina, Uruguay, Paraguay
Andean countries	Colombia, Ecuador, Peru, Bolivia	Colombia, Ecuador, Peru, Bolivia
Central America & Caribbean	Panama, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua	Panama, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
Total Latin America	All low, lower middle and upper middle income Latin American countries and Uruguay except Brazil, Chile, Mexico	Argentina, Uruguay, Paraguay, Colombia, Ecuador, Peru, Bolivia, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Belize, Venezuela
Turkey	Turkey	Turkey
Eastern Europe	Ukraine, Belarus and Moldova	Ukraine, Belarus and Moldova
Balkans	Serbia, Bosnia & Herzegovina, Kosovo, Macedonia, Albania	Albania, Andorra, Bosnia & Herzegovina, Faroe Islands, Gibraltar, Guernsey, Holy See (Vatican City State), Isle of Man, Jersey, Macedonia, Former Republic of Yugoslav, Monaco, Montenegro, San Marino, Serbia
Caucasus	Georgia, Armenia, Azerbaijan	Georgia, Armenia, Azerbaijan
Central Asia	Kyrgyzstan, Tajikistan, Uzbekistan, Afghanistan and Pakistan	Kyrgyzstan, Tajikistan, Uzbekistan, Pakistan, Turkmenistan
Total Europe and Central Asia	All low, lower middle and upper middle income European and Central Asian countries except Russian Federation, Kazakhstan, Lithuania, Latvia, Bulgaria, Romania	All European and Central Asian countries
Global	All countries in FMO investment universe	All above

I/O TABLES FOR NON-CO_2 INTENSITIES

I/O table	**Countries to which they are applied**	**Basis for calculation**
Kenya	Kenya	All African countries except South Africa, Algeria, Egypt, Morocco, Tunisia, Libya
Nigeria	Nigeria	All African countries

		except South Africa, Algeria, Egypt, Morocco, Tunisia, Libya
South Africa	South Africa	South Africa
Low Income Sub-Saharan Africa	Benin, Burkina Faso, Ethiopia, Liberia, Madagascar, Malawi, Mali, Mozambique, Rwanda, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zimbabwe	All African countries except South Africa, Algeria, Egypt, Morocco, Tunisia, Libya
Lower middle income Sub-Saharan Africa	Cameroon, Djibouti, Ghana, Ivory Coast, Senegal, Zambia	All African countries except South Africa, Algeria, Egypt, Morocco, Tunisia, Libya
Northern Africa	Algeria, Egypt, Morocco, Tunisia	Algeria, Egypt, Morocco, Tunisia, Libya
Total Africa	All African countries	All African countries
India	India	India
South Asia	Bangladesh, Nepal, Sri Lanka, Maldives	Sri Lanka, Bangladesh
China and Mongolia	China, Mongolia	China
South-East Asia	Cambodia, Indonesia, Laos, Malaysia, Philippines, Thailand, Vietnam, Myanmar	Indonesia, Malaysia, Philippines, Thailand, Vietnam
Total Asia	All low, lower middle and upper middle income Asian countries and Middle Eastern countries	India, Sri Lanka, Bangladesh, China, Indonesia, Malaysia, Philippines, Thailand, Vietnam
Mercosur	Argentina, Uruguay, Paraguay	Argentina, Uruguay
Andean countries	Colombia, Ecuador, Peru, Bolivia	Colombia, Ecuador, Peru, Bolivia
Central America & Caribbean	Panama, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua	Panama, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Belize
Total Latin America	All low, lower middle and upper middle income Latin American countries and Uruguay except Brazil, Chile, Mexico	Argentina, Uruguay, Colombia, Ecuador, Peru, Bolivia, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Belize, Venezuela
Turkey	Turkey	Turkey
Eastern Europe	Ukraine, Belarus and Moldova	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Balkans	Serbia, Bosnia & Herzegovina, Kosovo, Macedonia, Albania	Albania, Andorra, Bosnia and Herzegovina, Faroe Islands, Gibraltar, Macedonia the former Yugoslav Republic of, Monaco, Montenegro, San Marino, Serbia
Caucasus	Georgia, Armenia, Azerbaijan	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Central Asia	Kyrgyzstan, Tajikistan, Uzbekistan, Afghanistan and Pakistan	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

Total Europe and Central Asia	All low, lower middle and upper middle income European and Central Asian countries except Russian Federation, Kazakhstan, Lithuania, Latvia, Bulgaria, Romania	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
Global	All countries in FMO investment universe	All above

Annex 4 Macroeconomic data from external sources used by the model

Years 2010-2016

GTAP		
Data	**Base year**	**Input to**
Firms' domestic purchases for 57 sectors and 144 regions (in mln USD)	2007	I/O tables
Household & government domestic purchases, exports for 57 sectors and 144 regions (in mln USD)	2007	I/O tables
Firms' expenses on endowments for 57 sectors and 144 regions (in mln USD)	2007	I/O tables, capital intensities
Corporate income tax, payroll tax, import duties, commodity tax, consumption tax, other taxes for 57 sectors and 144 regions (in mln USD)	2007	I/O tables
Firms' imports (in mln USD)	2007	I/O tables
Total capital stock for 144 regions (in mln USD)	2007	Capital intensities
CO2 emissions from onsite combustion of fossil fuels for 57 sectors and 144 regions (in CO2 eq)	2007	GHG intensities
Non-CO2 emissions for 57 sectors and 87 regions (in CO2 eq)	2007	GHG intensities

WORLD BANK DEVELOPMENT INDICATORS DATABANK		
Data	**Base year**	**Input to**
Gross fixed capital formation, private sector, per country (% of GDP)	1997-2007	Capital intensities
Gross fixed capital formation, per country (% of GDP)	1997-2007	Capital intensities
GDP/capita, per country (in current USD)	2013	Employment proxy
Electric power consumption, per country (in kWh)	2010-2011	Forward effects
Total GDP , per country (in current USD)	2010-2011	Forward effects

IEA ENERGY STATISTICS		
Data	**Base year**	**Input to**
Total electricity net consumption, per country (in bln kWh)	2010-2011	Forward linkage effects if WBDI data are not available

NATIONAL STATISTICS		
Data	**Base year**	**Input to**
Total employment per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan	2012-2013	Employment intensities

Total GDP per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan	2012-2013	Employment intensities
Credit to private sector, per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan (in %)	2012-2014	Breakdown of FMO investment into economic sectors for sector 'other' and financial services into real economy sectors

Years 2017-2020

GTAP

Data	Base year	Input to
Firms' domestic purchases for 57 sectors and 144 regions (in mln USD)	2011	I/O tables
Household & government domestic purchases, exports for 57 sectors and 144 regions (in mln USD)	2011	I/O tables
Firms' expenses on endowments for 57 sectors and 144 regions (in mln USD)	2011	I/O tables, capital intensities
Corporate income tax, payroll tax, import duties, commodity tax, consumption tax, other taxes for 57 sectors and 144 regions (in mln USD)	2011	I/O tables
Firms' imports (in mln USD)	2011	I/O tables
Total capital stock for 144 regions (in mln USD)	2011	Capital intensities
CO2 emissions from onsite combustion of fossil fuels for 57 sectors and 144 regions (in CO2 eq)	2011	GHG intensities
Non-CO2 emissions for 57 sectors and 87 regions (in CO2 eq)	2011	GHG intensities

WORLD BANK DEVELOPMENT INDICATORS DATABANK

Data	Base year	Input to
Gross fixed capital formation, private sector, per country (% of GDP)	2011	Capital intensities
Gross fixed capital formation, per country (% of GDP)	2011	Capital intensities
GDP/capita, per country (in current USD)	2013	Employment proxy
Electric power consumption, per country (in kWh)	2013	Forward effects
Total GDP , per country (in current USD)	2013	Forward effects

IEA ENERGY STATISTICS

Data	Base year	Input to
Total electricity net consumption, per country (in bln kWh)	2010-2011	Forward linkage effects if WBDI data are not available

NATIONAL STATISTICS

Data	Base year	Input to
Total employment per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan	2014-2015	Employment intensities

Total GDP per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan	2014-2015	Employment intensities
Credit to private sector, per sector for Kenya, Zambia, Nigeria, South Africa, Egypt, India, China, Bangladesh, Indonesia, Argentina, Peru, El Salvador, Turkey, Ukraine, Macedonia, Azerbaijan, Pakistan (in %)	2014-2015	Breakdown of FMO investment into economic sectors for sector 'other' and financial services into real economy sectors

All years

OANDA CURRENCY EXCHANGE RATES		
Data	**Base year**	**Input to**
Exchange rate USD to EUR	According to data's base year	Currency conversion

SECONDARY LITERATURE		
Data	**Source**	**Input to**
Overall leverage ratio debt/ total assets for SMEs and corporates, total developing world	Bas, Muradoglu, Phylaktis, 'Determinants of capital structure in developing countries', 2009	Capital intensities for corporates and SMEs
Labor productivity of formal SMEs and corporates, total developing world	IFC, 'Scaling-Up SME Access to Financial Services in the Developing World', 2010, p. 6	Employment intensities for corporates and SMEs
Labor productivity of informal sector, for North Africa, Sub-Saharan Africa, Latin America, Asia	ILO, 'Women and men in the informal economy', 2002	Employment intensities for formal sector
Relationship between electricity consumption and GDP growth	Hossain, S., "Energy consumption nexus economic growth: a dynamic co-integration and causality analysis, 2013 M. Masuduzzaman, "Electricity consumption and economic growth in Bangladesh: co-integration and causality analysis", 2012	Forward effects

Annex 5 Rules and exceptions

In order to have a consistent model, it uses a number of boundaries, rules and assumptions. However, to make it fit the full range of FMO's portfolio there also some exceptions required.

Boundaries	
	The model uses a company's static situation implying that FMO's capital does not change productivity. The model follows FMO's capital for as long as there is local spending left in the economy Supplier of supplier effects decrease due to procurement from abroad; Taxes, wages and net profit are not followed any further. Import effects are not translated into impact and footprint effects. All calculations are made based on client data of commitment's vintage year -1. All calculations are made on an annual basis, however employment effects of project finance are in men years

Calculations	
Direct economic output	Multiplication of FMO related capital by capital intensity of end-beneficiary.
Direct invest.	$[\text{FMO commitment} + \text{catalysed amount}] \text{ x } \left[\frac{\text{Revenues}}{(\text{non} - \text{current})\ \text{Assets}}\right]$
Indirect invest.[5]	$[\text{FMO commitment} + \text{catalysed amount}] \text{ x } \left[\frac{\text{Output}}{\text{Private capital stock}}\right]$
Indirect economic output	Matrix-multiplication of additional output of end-beneficiary by procurement of all input suppliers and their suppliers.
All invest.	$\left[\begin{matrix}\text{Related}\\ \text{direct output}\end{matrix}\right] \text{ x } \left[\begin{matrix}\text{Procurement}\\ \text{direct sector}\end{matrix}\right] \text{ x } \left[\begin{matrix}\text{Procurement}\\ \text{all suppliers}\end{matrix}\right]$
Direct valued added	Sum of multiplication of FMO's share of end-beneficiary's assets by profits reported by client and multiplication of related direct output with share of salaries and taxes in direct spending pattern
Direct invest.	$\left[\frac{\begin{matrix}\text{FMO commitment}\\ +\text{catalysed amount}\end{matrix}}{(\text{non} - \text{current})\ \text{Assets}}\right] \text{ x } \left[\begin{matrix}\text{Total profits}\\ \text{reported by client}\end{matrix}\right] + \left[\begin{matrix}\text{Related}\\ \text{direct output}\end{matrix}\right] \text{ x } \left[\begin{matrix}\text{Share of salaries taxes}\\ \text{in spending pattern}\\ \text{direct sector}\end{matrix}\right]$
Indirect invest.	Multiplication of additional output of end-beneficiary by share of taxes, net salaries and profits of end-beneficiary's total spending pattern. $\left[\begin{matrix}\text{Related}\\ \text{direct output}\end{matrix}\right] \text{ x } \left[\begin{matrix}\text{Share of value added}\\ \text{in spending pattern}\\ \text{direct sector}\end{matrix}\right]$
Indirect valued added	Matrix- multiplication of additional output of suppliers and supplier's suppliers by share of taxes, net salaries and profits of spending patterns of suppliers and supplier's suppliers.
All invest.	$\left[\begin{matrix}\text{Related}\\ \text{indirect output}\end{matrix}\right] \text{ x } \left[\begin{matrix}\text{Spending patterns}\\ \text{indirect sectors}\end{matrix}\right]$
Direct employment	Multiplication of FMO's share of end-beneficiary's assets by employment reported by client.
Direct invest.	$\left[\frac{\text{FMO commitment} + \text{catalysed amount}}{(\text{non} - \text{current})\ \text{Assets}}\right] \text{ x } \left[\begin{matrix}\text{Total employment}\\ \text{reported by client}\end{matrix}\right]$
Indirect invest.	Multiplication of end-beneficiary's output by general employment intensity adapted for end-beneficiary type (formal/informal and SME/corporate). $\left[\begin{matrix}\text{Related}\\ \text{direct output}\end{matrix}\right] \text{ x } \left[\frac{\text{Output}}{\text{Employment}}\right] \text{ x } \left[\frac{\text{Formal GDP}}{\text{Formal employment}}\right] \text{ x } [\text{SME/Corp factor}]$
Indirect employment	Matrix- multiplication of additional output of suppliers and supplier's suppliers by employment intensity.
All invest.	$\left[\begin{matrix}\text{Related}\\ \text{indirect output}\end{matrix}\right] \text{ x } \left[\frac{\text{Output}}{\text{Employment}}\right]$
Direct GHG emissions	Multiplication of additional output of end-beneficiary by GHG emissions intensities of end-beneficiary.
All invest.	$\left[\begin{matrix}\text{Related}\\ \text{direct output}\end{matrix}\right] \text{ x } \left[\frac{\text{CO2 and non} - \text{CO2 emissions}}{\text{Output}}\right]$
Indirect GHG emissions	Matrix- multiplication of additional output of suppliers and supplier's suppliers by emission intensities
All invest.	$\left[\begin{matrix}\text{Related}\\ \text{indirect output}\end{matrix}\right] \text{ x } \left[\frac{\text{CO2 and non} - \text{CO2 emissions}}{\text{Output}}\right]$
Direct GHG avoidance	FMO related direct GHG avoidance is based on FMOs share in the total project. Client level GHG avoidance data is taken from independently verified documents (e.g. Clean Development Mechanism documentation). If not available, FMO calculates expected GHG avoidance using the IFC CEET tool.
Forward enabled economic output	FMO related power production based on FMO's share in total project and expected production relative to current national power consumption to estimate marginal effects. Marginal effect has similar enabling effects depending on factor 0.1 to national GDP.

[5] Private capital stock excludes the public capital stock as end-beneficiaries of FMO capital are ultimately private, real sector companies

Direct invest.[6]	$\left[\frac{\text{FMO commitment}}{\text{Total project size}}\right] \text{ x } \left[\text{expected kWh production}\right] = \left[\text{FMO related kWh}\right] \rightarrow \left[\frac{\text{FMO related kWh}}{\text{Country kWh consumption}}\right] \text{ x } [0.1] \text{ x } \left[\text{country GDP}\right]$

Specifics

Capital intensities[7]	1. SMEs are considered 20% less capital intensive than average. 2. Corporates are considered 27% more capital intensive than average.
Spending patterns	3. SMEs and corporates in the same sector/country have the same spending patterns.
Forward effects	4. To calculate the enabling effect of energy projects, the model assumes a 1:0.1 relationship between electricity consumption and GDP growth[8] in emerging markets. 5. It is assumed that all electricity related to FMO's investment is consumed domestically. 6. Related enabled GDP is divided over sectors and households based on their electricity use in %. The effects of the electricity used by households are not followed. 7. Related employment and GHG effects are estimated based on GDP per sector converted to output using value added/output ratios per sector and region. 8. In case of green-power investments, forward linkage emissions are only based on on-site combustion of power consumers and not on their electricity use. 9. It is assumed that non-energy projects equally stimulate economic growth as energy projects; therefore energy multipliers per unit of FMO capital are used as a proxy. This proxy is updated annually, based on the (unweighted) averages of the energy multipliers of the baseline and available previous years.
Attribution	10. The model does not distinguish between the effects of equity and debt, however FMO applies a factor 2 to the impacts of private equity capital in accordance with its attribution policy. 11. In case of investments in agribusiness traders FMOs share in the company is calculated by using total assets instead of non-current assets due to the relatively low capital intensity in these type of companies.
Employment	12. Related employment per unit of output is based on national employment statistics per sector and GDP per sector converted to output using value added/ output ratios per sector and region. 13. Employment intensities are based on regional proxy applied to specific sector/region. 14. Employment intensities differ per formal/informal end-beneficiary type as the formal sector is considered to be 70% more productive than country average of the formal and the informal sector[9]. ▪ Rule is applied to Manufacturing, Construction, Trade, Communication, Transport and Other services ▪ Mining, utilities and financial and business services are considered to employ only formal jobs ▪ Agriculture is considered to employ both formal and informal jobs 15. Formal SMEs are considered to generate 33% and formal corporates 67% of formal GDP. Distinction between SMEs and corporates based on output per employee. 16. Formal SMEs are considered to employ 45% and formal corporates 55% of formal employment. 17. FMO end-beneficiaries are considered to operate in the formal sector meaning the following intensities per round of impact: ▪ Direct based on formal intensities per end-beneficiary type (exc. MFI) ▪ Indirect based on country average ▪ Induced based on country average
GHG emissions	18. SMEs and corporates per sector/region have the same non-CO2 & CO2 emission intensities.

[6] Forward enabling effects are only calculated for project finance

[7] Determinants of Capital Structure in Developing Countries, Research Gate London

[8] This is a conservative estimate based on a comparison of relevant academic studies

[9] Source: IFC SME Access to Finance in Developing World

	19. For GHG avoidance of green and non-green power projects the model uses GHG avoidance based on FMO's share of project size. 20. Model estimates are made for all investments. FMO obtains client data on GHG emissions for direct investments in clients emitting > 25k tons CO2eq annually.. *21.* In case of green-power investments, forward linkage emissions are only based on on-site combustion of power consumers not on their electricity use.
Financial Institutions	22. For FI investments, direct employment and value added effects at the FI are also included in direct impact results. ▪ FMO related direct employment based on FMO investment as % of FI's total assets ▪ FMO related direct value added based on value added per job in financial sector per region 23. Effects at end-beneficiary level are based on FI's portfolio breakdown (sector, country, end-beneficiary) and FMO's commitment is allocated accordingly. 24. FMO's commitment is translated into related economic output based on specific capital intensity per sector, region and end-beneficiary type. ▪ MFI investments are treated as investments in the trade sector ▪ Labour productivity at MFI's end-beneficiaries is comparable to the informal trade sector in the country ▪ Mortgage finance is allocated for 50% to the business services sector and for 50% to construction ▪ Retail finance is equally allocated to trade, construction and business services ▪ Forward effects for FI's investments into infrastructure projects are estimated based on multipliers for green project finance. That is as often it is unknown whether the FI invests into power or other infrastructure projects. ▪ Share of FI lending to financial sector and all sector 'other' investments are divided over real economy sectors in FI's portfolio
Private equity funds	25. FMO's commitment is allocated over various economic sectors according to investment breakdown of the intermediate private equity fund. ▪ Share of investments into financial sector is divided over real economy sectors in PE fund's portfolio 26. FMO's commitment is translated into related economic output based on specific capital intensity per sector, region and end-beneficiary type. 27. Green line investments have no direct emissions at end-beneficiary level. ▪ In case less than 100% of an investment is labelled as green line, this counts holds only for the green line part 28. Forward effects for PE's investments into power projects are estimated based on multipliers for green project finance. That is as often it is unknown whether the FI invests into power or other infrastructure projects.
Project finance	29. Attribution of GHG emissions based on FMO investment as % of total project size. 30. A 1-1 relationship is considered between FMO's direct and indirect project finance and the related economic output meaning that 100% of FMO's investment is spent. 31. Backward effects are estimated as for the construction sector (including direct effects at contractor itself).
FMO data	32. In case FMO does not have direct client data, the model uses statistical averages. 33. For the direct value added of direct investments the model uses profit data as reported to FMO. This also implies that for some direct investments negative profits are considered by the model. For direct clients with negative profits a tax reduction is applied as these clients are assumed not to pay corporate income taxes.

Annex 6 Data sensitivities in the FMO Impact Model

Data sensitivity			
Applicability	Issue	Consequences for FMO impact	Mitigation
Revision of GDP	Increase or decrease of total GDP	An upward revision of a country's GDP is an indication of higher productivity. This could mean that by using the 'old' data, FMO's employment impact is overestimated (and vice versa).	Use of most recent GDP data available to calculate labour productivity, base year of latest GDP data is 2014/2015.
	Increase or decrease in GDP/ output ratio	A current underestimation of GDP related to output would mean an overestimation of FMO's employment and GHG impact, and an underestimation of value-added effects (and vice versa).	Update the model once every couple of years when more recent GTAP data is available
Agriculture consumption	Agriculture consumption is minimal	Tracing own consumption of agriculture would mean an overestimation of all FMO's impacts on agriculture and an overestimation of induced effects.	Adapt input-output tables in a way that private consumption of agricultural products and agricultural sourcing from agriculture is zero.
Allocation of countries to regional input-output tables	Country is poorer or richer than average of regional table	As productivity in poorer countries is lower and energy use is less efficient, FMO's employment and GHG impact is underestimated, and value-added impact overestimated (and vice versa).	Careful selection of regions based on country income classification.
	Country's electricity generation is cleaner or dirtier than the average of regional table	This means that FMO's GHG impact is overestimated (and vice versa).	As this applies in two directions, the over and underestimations of impact of investments in various regions levels out.
	Country is allocated to region where capital productivity is higher or lower	This would mean an overestimation of directly related economic output to FMO and thus an overestimation of all impacts related to FMO (and vice versa).	Countries are allocated to regions based on their income classification which is often more or less in line with their capital productivity.
	Country is allocated to region where labour productivity is higher or lower	This would mean an underestimation of FMO's employment impact (and vice versa).	Countries are allocated to regions based on their income classification which is often more or less in line with their labour productivity.
Capital data	Incomplete capital data	Incomplete capital data can implicate an over or underestimation of capital. This would mean an over or underestimation of directly related economic output when output/ capital ratios are used. Hence, impact results would be over or under estimated.	We use the best available data, supplementing GTAP information by private sector gross fixed capital formation of the World Bank Development Indicators.
Revenues	FX-rate on effective date	Used to calculate p/k ratio (revenues/non-current assets). FX rate should be consistent with non-current assets.	We apply consistent FX rates for revenues and non-current assets.

Employment data	Limited availability	Insufficient data could lead to an over or underestimation estimation of FMO's employment impact.	We use the best available national data. We apply the employment intensities of countries of which more detailed data is available to the aggregate regions for which insufficient data is available. Employment proxies have been selected based on data availability and proximity of country GDP per capita to regional GDP per capita.
Data per end-beneficiary type	Limited data available on labour productivity per end-beneficiary	Applying the general employment intensities (average of formal and informal sector) to FMO's end-beneficiaries, could lead to an over or underestimation of FMO's employment effects.	We calculated formal employment intensities and applied these to all FMO's direct end-beneficiaries to avoid an overestimation of FMO's impact. To do this we used best available national data on productivity of the formal sector versus the informal sector from the International Labour Organization (ILO). We assume Small and Medium Enterprises (SMEs) are responsible for about 45% of formal employment, while contributing about 33% to formal GDP[10]. We apply this to all regions and sectors. This results in the following calculation of ratios for corporates, SMEs and micro enterprises: Employment intensity ratio for corporates: formal employment intensity ratio per sector divided by (67/55); Employment intensity ratio for SMEs: formal employment intensity ratio per sector divided by (33/45); Employment intensity ratios for Micros: formal employment intensity ratio per sector divided by (33/45).
Sector electricity intensity	Expenses on electricity per sector are used as indicator for the amount of kWhs consumed per sector	Electricity use of sectors that have gained a discount on electricity costs is underestimated. This could change the forward linkage impact per sector of FMO.	Accept

Data sensitivity - Converting FMO investments into directly related economic output			
Applicability	Issue	Consequences for FMO impact	Mitigation
Equity/ debt	Investments in equity facilitate attraction of additional capital	Not distinguishing equity and debt might underestimate FMO's impact as impact linked to the attraction of additional capital is not considered.	Apply a multiplier of 2 on equity investments to account for leverage effect.

[10] International Finance Corporation. (2010). Scaling-Up SME Access to Financial services in the Developing World. http://documents.worldbank.org/curated/en/669161468140035907/pdf/948300WP0Box385443B00PUBLIC00ScalingUp.pdf

1-1 relationship project finance - output	Not all project finance might be spent in the local economy	This might lead to an overestimation of FMO's impact.	Accept
Capital productivity per end-beneficiary type	No data available on capital productivity per end-beneficiary type	Applying the general output/ capital ratios (these are formal & informal averages) to end-beneficiaries of FMO's indirect investments, could lead to an overestimation of directly related economic output. This would imply an overestimation of FMO's impact.	To avoid an overestimation of FMO's impact we used the capital productivity ratios per end-beneficiary type based on an external study to capital structures in developing markets. Micro, Small and Medium Enterprises (MSMEs) are considered 20% less capital intensive than average, corporates are considered 27% more capital intensive than the average.[11]

Data sensitivity - Calculating related money flows of directly related economic output (backward linkages)			
Applicability	Issue	Consequences for FMO impact	Mitigation
Imports excluded	-	By not tracing money flows to imports any further, FMO's impact on a global level is underestimated.	The impact related to FMO should be communicated as local impact.

Data sensitivity - Calculating directly enabled economic output by FMO energy investments (forward linkages)			
Applicability	Issue	Consequences for FMO impact	Mitigation
Power production related to FMO	Not all power produced might be domestically consumed	By tracing all power production related to FMO, FMO's forward linkage impact might be overestimated, as some power might be lost or exported.	-
Causality electricity consumption-GDP growth	Limited data availability	The relationship between energy and GDP has been a topic of research, with mixed results: many studies confirm a cointegration of economic growth and energy or electricity consumption, but the direction and causality differ. Despite this, it is generally accepted that adequate supply of reliable energy is essential for economic growth and past values of electricity consumption do have a predictive ability for economic growth. The relation between electricity consumption	To account for enabling effects of electricity and infrastructure investments, we use a 1-0.1 relationship between electricity consumption and GDP growth, which is well within the range of literature.[12] [13] [14] [15] [16]

[11] Bas, Tugba & Muradoglu, Gulnur & Phylaktis, Kate. (2010). Determinants of Capital Structure in Developing Countries. https://www.researchgate.net/publication/228465937_Determinants_of_Capital_Structure_in_Developing_Countries

[12] Hossain, S. (2013, November). *Energy Consumption Nexus Economic Growht: A Dynamic Co integration and Causality Analysis.* Dhaka: Scholars World.

[13] Lu, W. (2016, December 30). Electricity Consumption and Economic Growth: Evidence from 17 Taiwanese Industries. Taoyuan, Taiwan. doi:10.3390/su9010050

[14] Masuduzzaman, M. (2012). Electricity Consumption and Economic Growth in Bangladesh: Co-Integration and Causality Analysis. Global Journal of Management and Business Research, 47-56.

[15] Proparco. (2016). *The Link between Renewable Energy and Jobs.* Paris: Proparco.

[16] CDC. (2016). *What are the links between power, economic growth and job creation?* London: CDC.

		and GDP growth is crucial for calculations of FMO's forward linkage impact related to energy. Over and underestimations are possible.	

Data sensitivity – Data collection/mapping			
Applicability	Issue	Consequences for FMO impact	Mitigation
Attribution of client data to FMO	Attribution	Attributing all impact related to an FMO client to FMO would mean an overestimation of FMO's impact.	We divide FMO's capital provided to a client by total capital of the client to calculate the share of output that can be attributed to FMO.
Project finance mapped to the construction sector	Backward linkages	Infrastructure projects generate most effects by enabling economic activities. However, during the construction phase, backward linkage economic activities are also supported. Allocating infrastructure project finance to e.g. energy would not be representative for the backward linkages.	We allocate project finance to the construction sector to calculate the backward linkages. Please note that this is a temporary impact.
FMO sector allocation	Non-compatible FMO labelling	In case an FMO investment label doesn't adequately fit its corresponding label in the model, this can to incorrect calculations of FMO's impact.	FMO is currently revising its sector definitions, also taking into account sector labels of this model.

Data sensitivity - Calculating employment related to FMO investments			
Applicability	Issue	Consequences for FMO impact	Mitigation
Non-energy project finance	No/ limited data available on causality between non-energy infrastructure and GDP growth	Not taking into account forward linkage impact of non-energy project finance would lead to an underestimation of FMO's impact.	To include forward linkage impact of non-energy project finance, we used average impact multipliers (impact per Euro invested) of energy project finance over the baseline (2010-2012) and 2015 until the most recent year.