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ARGENTINA

**Promoting risk mitigation instruments and finance for renewable energy and energy efficiency investments**

**(AR-L1280)**

**Economic Analysis**

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1. Introduction
   1. The “Promoting risk mitigation instruments and finance for renewable energy and energy efficiency investments” project intends to address the absence of adequate financing for small and medium enterprises (SME) in Argentina, where a significant potential for Renewable Energy (RE) and Energy Efficiency (EE) investments has been identified (for a detailed project context description and a diagnosis of the problems identified, please refer to Section I of the Proposal for Operation Development (POD).
   2. There is an intrinsic link between the level of investments in RE and EE and the availability of financing. SMEs in less developed economies are largely dependent on external financing to realize new projects; in turn, external financing in these countries relies on the banking sector, as stock markets and venture capitalism are not well enough established to provide funding. However, the underdevelopment of the banking sector, in addition to problems specific to RE and EE, such as high up-front costs and long lead times, hamper the emergence of RE and EE innovations. These arguments have been supported by empirical data; for example, a study conducted on finance for RE[[1]](#footnote-1) is conclusive in that financial intermediation has a significant positive effect on the amount of RE produced, and the impact is especially large when considering non-hydropower RE such as wind, solar, geothermal and biomass. The same could be expected from EE, as these technologies share with RE the same characteristics in terms of financial needs, especially in emerging economies.
   3. The general objective of the project is to promote the efficiency in the production and use of energy in Argentina. The specific objectives are: (i) increase SME investments in RE and EE, by providing access to medium and long-term finance; and (ii) contribute to the reduction of Greenhouse Gas (GHG) emissions.
   4. The proposed project consists of a single component in the form of a global credit operation to be executed by *Banco de Inversion y Comercio Exterior* (BICE), Argentina’s national development bank. Green Climate Fund (GCF)[[2]](#footnote-2) concessional resources will be channeled by IDB through BICE, and blended with BICE’s own resources to provide long-term financing for RE and EE projects by SMEs.[[3]](#footnote-3) Financing may be delivered through first-tier financial institutions (FI) regulated by the Central Bank or directly to projects by BICE.[[4]](#footnote-4)
   5. The eligibility criteria for beneficiary projects will be described in detail in the Operational Regulations (OR),[[5]](#footnote-5) including the legal, financial, environmental, social and technical requirements for each individual project to be eligible, following local legislation and IDB standards.[[6]](#footnote-6) All guidelines included in this OR shall be consistent with BICE’s and IDB’s operational policies and procedures.
   6. The inclusion of local financial actors into the design of this project aims to capitalize from their knowledge of the local business, promote their participation and familiarize them with investments of this kind. Over time, the project is expected to have an important transformational impact as it is expected that FIs will be encouraged to further support RE and EE investments, once demonstration of its viability and profitability (track record) has occurred.
   7. A complementary technical cooperation (TC) project (AR-T1213, to be approved separately) includes activities to address other issues related to the lack of knowledge and market structure aspects obstructing the development of RE and EE, including (i) insufficient information, risk assessment skills, and track record for these projects within the investor community; (ii) inexistence of network effects (investors, investment opportunities, established range of energy service and technology providers, ESTPs) found in established markets; and (iii) lack of familiarity with and skills related to project-finance structures. Activities under this TC will support the structuring of various mechanisms that will complement the provision of loans and improve capacities of participating actors.[[7]](#footnote-7) The implementation of these activities is considered essential to reduce adversity to RE and EE and have positive spillover effects to other clean energy projects and other local FIs.
   8. The end borrowers and intended beneficiaries of the project will be SMEs investing on RE (primarily biogas and biomass) and EE projects.[[8]](#footnote-8) Improved efficiency in the use and production of energy will also enable energy consumers to benefit from greater and better availability of cleaner energy at competitive prices, and may allow the government to downscale existing subsidies for fossil-fuel based generation. Finally, communities as a whole should benefit from positive externalities associated to environmental and economic impacts of the project.
   9. In order to present evidence of the economic viability of the project, the proposal is supported by a Cost Benefit Analysis (CBA) which quantifies ex ante the value for the net economic benefits of the project. The following sections present the methodology, assumptions, results and conclusions of this analysis. Benefits are measured on a simulated portfolio of projects incorporated to the system via support from BICE.[[9]](#footnote-9) Environmental externalities are also accounted for based on a valuation of GHG emission reductions.
2. Methodology and Assumptions
3. A. Proposed methodology
   1. Following standard practice, the economic evaluation of the project is based on a set of assumptions that allow for the characterization of a simulated portfolio of projects financed by the project. This simulation is necessary, as the actual list of projects to be financed is not known ex ante but will depend on the demand and will be subject to the analysis and approval by the corresponding lending institution.[[10]](#footnote-10) In this sense, this model serves as a practical tool to quantify ex ante the economic value of the aggregated incremental benefits of the project.[[11]](#footnote-11)
   2. **Assumed portfolio:** An indicative portfolio of projects to be deployed with support from the project is developed based on information provided by BICE (tentative pipeline), the current status of RenovAr awarded projects (for RE projects) and the market study[[12]](#footnote-12) carried out to support the design of the project (see ¶1.8).
   3. It should be emphasized that the use of an assumed portfolio is needed for the purpose of quantification of resources needed, benefits and costs of the project, and estimations on project results. Nonetheless, although the list of projects is based on expectations of future demand, this portfolio should be taken merely as indicative. There is no formal pre-determined allocation of funds to be disbursed by sub sector or technology, and projects will be financed upon demand, on a first-come-first-served basis. Possible combinations of actual technologies and sub sectors participating in the project could be infinite, and aggregated values may be more or less impacted by differences between the assumed and real portfolio.[[13]](#footnote-13) The sensitivity analysis in Section V intends to address this issue, by including a scenario in which the assumed mix of projects changes. This is done in order to strengthen the conclusions of the assessment of the project’s economic value.
   4. **Definition of scenarios**: The economic evaluation of the project compares aggregated costs and benefits of the assumed portfolio of projects financed for scenarios “with” and “without” project:
      1. In the scenario “with” project, resources from the project (GCF funding and co-financing from BICE) enable access to finance by SMEs to invest in a number of RE and EE projects. This in turn will result in the successful implementation of RE and EE technologies. Investment costs occur during the investment phase, while operation and maintenance (O&M) costs occur throughout the life of the projects. Additional costs corresponding to the complementary TC activities, although not part of this proposal, are included, as they are considered essential (along with the financing) for the investments to be deployed effectively. In this scenario, RE-sourced electricity is provided to the system by RE projects financed, energy consumption is reduced by EE projects financed and overall GHG emissions are reduced.
      2. In the alternative scenario “without” project, none of the projects in scenario “a” is implemented –without financing from the project, SMEs do not have the capacity to finance 100% of these investments by themselves and other sources of financing are not currently available at terms adequate to match their projects’ profiles. In this scenario, the amount of energy added to the system in scenario “a” must come from other sources, no energy savings from EE projects are produced, and there are no CO2 emission reductions.
   5. **Project cash flows:** The cash flows are built from the following main elements: (i) investments costs of new equipment (incorporating all sources of financing, including third-party leveraged equity); (ii) O&M costs, based on the average production/use of new equipment; (iii) installed capacity and energy production factors of RE technologies; and (iv) average energy consumption of old equipment and expected savings produced by EE technologies. Based on the expected lifetime of sub projects to be financed (20 years), and the projected schedule of disbursements throughout the execution, the horizon for the analysis is 25 years.
   6. **Project benefits:** Main benefits for the project derive from: (i) the difference between the expected energy supply costs of the scenario with project (biogas and biomass plants installed), and the expected energy supply costs of the scenario without project (additional energy comes from other sources); (ii) the difference in the energy costs of SMEs once EE measures are implemented, compared to the scenario without project (the foregone energy costs produced by installing and operating new and more efficient equipment); and (iii) a monetized value of CO2 emissions avoided by all projects financed, as a representation of the externalities associated with the reduction of GHG emissions.
   7. **Results:** The project net present value (NPV) is calculated by projecting the net economic flows over the estimated useful life of equipment installed by projects financed (considering the year in which they start operating), discounting them at a rate of 12%.[[14]](#footnote-14) The internal rate of return (IRR) is also obtained as key indicator to determine the economic viability of the project.
   8. **Sensitivity analysis:** The main calculation parameters used in the core analysis are altered in order to test the sensitivity of the NPV and IRR obtained to variations in the assumptions. Sensitivity scenarios are determined based on relevant risks and changing conditions.
4. B. Main assumptions
   1. **Sub project mix and schedule**: Following discussions with BICE on their tentative pipeline for RE projects, existing information on the status of the *RenovAr* tendering process and awarded projects under each technology, and the results of the market study, the assumed portfolio is composed by:
   * Small RE projects of up to 5 MW capacity. Due to the limited size of projects, it is expected that projects under this category will be mainly biogas and biomass. Biogas projects consist of the use of bio digesters. Gases captured from the organic waste deposited in the bio digester can be used as energy. Biomass projects refer to plants that convert biomass (dry waste from forestry activity and other related industries such as wood and furniture, paper, logging) into energy via thermochemical processes. For this category of projects, relatively large SME producers and cooperatives are in better position to guarantee an adequate supply of the resource.
   * EE in industry and service (electric/thermal), mainly energy intensive subsectors such as chemical, food processing, dairy, plastic. Technologies in this category include cooling systems, pumps, cogeneration, solar heating, boilers and heat recovery. EE projects consist of the replacement of obsolete and inefficient equipment for new ones that consume less energy to provide the same number of products or services.[[15]](#footnote-15)
   1. It is important to note that this categorization is only indicative and used for the purpose of making assumptions, but financing from the project will be open to other technologies and will be demand-driven.
   2. Although the project does not pre-establish specific amounts to be allocated by subsector or technology, based on the discussion of tentative pipeline with BICE, it is assumed that the majority of the resources (75%) will be used in RE projects (biogas and biomass) while the remaining funds (25%) will go to EE projects.[[16]](#footnote-16) Such investments will be developed gradually throughout the 5-year execution period of the project, based on an assumed schedule of project readiness and closing of deals by BICE and participating FIs (see Table 2.1). From a demand perspective, appetite for investing in EE projects is determined not only by the cost of energy, but also potential productivity gains that SMEs expect to obtain from these technological changes. In the case of RE projects, demand is guaranteed by secured contracts for those awarded by the *RenovAr* tenders (PPAs).

**Table 2.1.- Disbursement schedule**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Y1 | Y2 | Y3 | Y4 | Y5 | Total |
| Financing from project (USD) | 15.5 | 31.0 | 43.3 | 54.1 | 16.1 | 160 |
| Beneficiary sub projects (number) | 4 | 10 | 27 | 39 | 51 | 131 |

* 1. Annual projections for each category have been estimated based on a distribution of financial closing/implementation of the total number of projects throughout the 5-year execution period, following discussions and agreements with BICE[[17]](#footnote-17) and IDB experience with similar projects on programming and pace of disbursements. The sum of the annual percentages is equal to 100% of the target for each category of projects, namely RE or EE. For example, for RE projects, distribution considers the timeframe to complete implementation of the projects from the moment of financial close (an average of 18 months); hence, while financing occurs on the first year, accounting of projects that begin operation starts in year 2. In both RE and EE cases, the annual growth takes into account an initial learning stage and a progressive increase of the number of projects, especially in the case of EE. The reason for this is that it is expected that the project will engage more suppliers and customers interested in technology solutions and the BICE project.

**Table 2.2.- Distribution of projects per year**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Y1 | Y2 | Y3 | Y4 | Y5 |
| RE Biogas/Biomass | 0 | 2 | 4 | 5 | 6 |
| Energy efficiency | 4 | 8 | 23 | 34 | 45 |

* 1. Based on information collected from BICE, the Ministry of Energy and Mines, technology service providers, local and international experts on the field and relevant studies available, parameters have been established for a typical project (in average terms) for each of these technologies and subsectors. The data is presented in Table 2.3 and 2.4.

**Table 2.3.- Parameters for a typical project by technology/subsector**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | RE (biogas/biomass) | | EE | |
| Production factor[[18]](#footnote-18) |  | 0.8 |  |  |  |
| Average plant capacity |  | 2 | MW |  |  |
| Average loan |  | 7 | MUSD | 0.35 | MUSD |
| Average total investment |  | 10 | MUSD | 0.50 | MUSD |

MUSD = millions of USD

**Table 2.4.- Assumed mix of EE technologies and saving parameters[[19]](#footnote-19)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Technology | # of projects | Energy consumption (baseline) | Energy savings per project | | |
|  |  | **kWh/yr** | **%** | **KWh/yr** | **Gal/yr** |
| Solar Water heaters | 46 | 32,385 | 60% |  | 19,431 |
| Efficient boilers | 17 | 760,010 | 6% |  | 45,601 |
| Electric motors | 17 | 3,163,392 | 5% | 158,170 |  |
| Refrigeration systems | 11 | 4,274,880 | 27% | 1,154,218 |  |
| Air conditioning | 17 | 2,275,165 | 20% | 455,033 |  |
| Cogeneration | 6 | 525,600 | 35% | 183,960 |  |
| Total | 114 |  |  |  |  |
| Average energy savings per project | | |  | 474,992 | 44,531 |

* 1. **Investment and O&M costs:** Investment costs are assumed to be fully covered by financing from the project (including BICE counterpart) plus the private funding complementing this financing (equity and/or additional financing from sources other than BICE and the IDB). Investment costs are accounted for entirely at the time of start of implementation of each project; the assumption is that these will cover the initial costs of starting up and deployment of RE and EE technologies. Projects are expected to start operations and produce benefits (associated to the production and/or savings of energy) after the end of the installation of the system is completed, which in some cases (particularly in RE projects) will happen on a year following that in which the investment is accounted for.[[20]](#footnote-20) Likewise, O&M costs will be included yearly starting from the year in which each project begins operations. From then on, lifetime of projects is assumed to be equal to 20 years, regardless of the type of technology and usage.

**Table 2.5.- Standard costs of a typical project by technology[[21]](#footnote-21)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RE (biogas/biomass) | | EE | |
| Investment costs | 5,000 | mUS$/MW | 500 | mUS$/project |
| O&M costs | 0.015 | US$/MWh | 0.02 | % of CAPEX |

mUS$ = thousands of US$.

* 1. **Other relevant parameters**: In order to produce calculations of benefits, including difference in energy supply costs from RE production, savings from EE and reduced emissions, the analysis uses other relevant parameters for which values and their corresponding sources are listed in Table 2.6.

**Table 2.6.- Assumed values for other relevant parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Value | Unit | Source |
| Marginal cost of energy | 175.4 | US$/MWh | See Annex I |
| Carbon reduction price[[22]](#footnote-22) | 9 | US$/tCO2 | <http://www.finanzen.net/rohstoffe/co2-emissionsrechte> (January 2017) |
| Energy consumption costs (industrial): | | | |
| Gas \* | 1.89 | US$/m3 | *Análisis comparativo de las tarifas eléctricas*  *en la Argentina y en América del Sur*, March 2016, *Centro de Estudio de la Regulación*  *Económica de los Servicios Públicos*  *Universidad de Belgrano,* Chapter 4; *Subsidios a la energía, devaluación y precios*; Navajas, Fernando, 2015. |
| Electricity \* | 0.20 | US$/KWh | Same as above. |
| Conversion factor Gal to m3 | 264.15 | Gal/m3 | n.a. |
| CO2 emission factors: | | | |
| Electricity | 0.535 | tCO2/MWh | <https://www.minem.gob.ar/www/830/25597/calculo-del-factor-de-emision-de-co2-de-la-red-argentina-de-energia-electrica> |
| Fossil fuel | 0.015 | tCO2/Gal | Ministry of Energy and Mines of Argentina |

1. \* The price of electricity that the clients pay correspond to the real tariff applied of 0.03 US$/kWh. However, for the purpose of the economic analysis, this price considers the real cost of the service (eliminating the impact of the subsidy, which would distort the evaluation) to determine its economic value. It is estimated that the price paid by consumers corresponds to some 13.3% to 16% of the real cost of the service. The same applies to the price of gas, for which the tariff of 0.66 US$/m3 corresponds to 35% of the real cost of the service.[[23]](#footnote-23)
2. C. Identification and quantification of economic costs and benefits
   1. **Costs** of the project are composed by the initial investment costs plus O&M costs of the projects. Investment costs are accounted for entirely at the first year of projections for each project, following the distribution in Table 2.3; the assumption is that these will cover the initial costs of starting up and deployment of the RE and EE technologies.[[24]](#footnote-24) O&M costs will be included yearly starting from the year in which each project begins operations (for RE projects, considered to be one year after the investment is made).
   2. The abovementioned investment costs are assumed to be fully covered by financing from the project (including BICE counterpart) plus the private funding complementing this financing (equity and/or additional financing from sources other than BICE and the IDB).
   3. Additional costs associated to the complementary TC to be approved separately are also included, as activities under this TC are considered essential to the successful deployment of projects financed (see ¶1.7).
   4. **Benefits** include three main elements: i) the difference in energy supply costs for the new installed capacity added, as a result of electricity produced by the RE projects financed; (ii) the foregone energy costs (energy savings) produced by installing and operating more modern and efficient equipment with the EE projects financed; and (iii) abated costs derived from the avoided future GHG emissions from both RE and EE projects financed (see ¶2.6).

Economic benefits (US$) = Difference in energy supply costs from RE + Foregone costs from EE + Abated costs of emissions

* 1. The first set of benefits is determined by the difference in energy supply costs when comparing energy generated and provided to the system by the RE projects financed (in this case, biomass and biogas) and that same amount of energy generated and provided to the system by other sources in the absence of the project. In the without project scenario, the equivalent amount of energy that would have been produced by the beneficiary projects must be provided to the system by a mix of traditional sources (largely generated from fossil fuels, mainly natural gas) and the cost of providing this energy is assumed to be the average marginal cost of the system.[[25]](#footnote-25) A detailed analysis for this assumption in included in Annex I.

Difference in energy supply = Costs of adding RE capacity to supply clean energy (US$) – Costs of supplying equivalent amount of energy from other sources (US$)

* 1. Benefits from energy savings are obtained by calculating the difference between energy costs associated to equipment currently in operation, and the energy costs generated by the new/efficient equipment (i.e. the costs that will be avoided by covering the same energy needs with the new efficient systems). The calculation is made using projected prices of energy and average consumption of each technology and subsector under analysis. It should be noted that the energy costs used for this calculation have been adjusted to eliminate the subsidy element (see Table 2.6) and determine the real cost. With this, the analysis intends to eliminate distortions in the overall assessment as well as include a quantification of long-term, cumulative savings for the government that avoids the subsidy imbedded in the energy consumption price.

Foregone costs from EE = Cost of energy consumed with old equipment (US$) – Cost of energy consumed with new/efficient equipment (US$)

* 1. A third portion of benefits (abated costs of emissions) uses a monetary value of GHG emissions reduced by the projects financed, determined by the unit price of a metric ton of C02 in the international market (see table 2.6). Emission reductions are calculated by multiplying the energy savings produced by the sub projects financed, by its corresponding conversion factor, also included in table 2.6.

Abated costs of emissions = TM CO2 displaced x Price per TM CO2 (US$)

CO2 displaced = Conversion factor x Energy saved

1. Other Considerations
   1. It is assumed that after the very recession context, the positive growth trends achieved by the country in the past year will remain stable and conditions conducive to sustaining investment will continue to be supported in the medium to long term.
   2. The project is not expected to generate a crowding out effect, since it is assumed that the current demand for financing exceeds supply and the intervention of BICE responds to the need to fill this financing gap. Likewise, specifically related to the RE projects to be financed and due to their relatively small size, it is considered that these will not have a considerable effect on the marginal generation cost of electricity, spot market prices, and on the grid emission’s factor.
   3. The financing of RE projects is typically based on the existence of long term contracts with Argentina’s *Compañía Administradora del Mercado Mayorista Eléctrico* (CAMMESA), awarded via a formal bidding process based on price (see Table 3.1), which allows for a stable framework within which private developers can analyze the financial viability of specific projects. Hence, voluntary participation of the private sector under market conditions and at a bidding price is indicative that the expected value of these projects will result in net financial profits (i.e. financial costs are lower than financial benefits from a private perspective). In this sense, the financial viability of RE projects under the project is guaranteed. With regards to EE projects, the market study identified a market size of over 70,000 SME and analyzed energy-intensive sub sectors with a potential for developing eligible projects for at least US$60 million investment. The introduction of the various mechanisms complementing the financing, via the activities supported by the TC AR-T1213, are assumed to stimulate this demand and to fully cover the risks associated to the achievement of energy savings needed to generate returns as planned.

**Table 3.1.- Current status of *Renovar* tenders and projects awarded \***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of projects | |  |  |  |  |  |
|  | Wind | Solar | Hydro | **Biomass** | **Biogas** | Total |
| Renov 1.0 | 12 | 4 | 5 | **2** | **6** | 29 |
| Renov 1.5 | 10 | 20 |  |  |  | 30 |
| Renov 2.0 | 8 | 12 | 9 | **14** | **23** | 66 |
| Renov 2.5 | 4 | 5 |  | **2** | **11** | 22 |
| Total | 34 | 41 | 14 | **18** | **40** | 147 |
|  |  |  |  |  |  |  |
| Capacity contracted (MW) | | |  |  |  |  |
|  | Wind | Solar | Hydro | **Biomass** | **Biogas** | Total |
| Renov 1.0 | 708 | 400 | 11 | **15** | **9** | 1,143 |
| Renov 1.5 | 765 | 516 |  |  |  | 1,282 |
| Renov 2.0 | 666 | 557 | 21 | **117** | **48** | 1,409 |
| Renov 2.5 | 328 | 260 |  | **26** | **21** | 634 |
| Total | 2,467 | 1,733 | 32 | **158** | **78** | 4,467 |

\* Information is current as of December 2017

* 1. Related to the above, an assumption is made that all complementary TC activities included in the project AR-T1213 (see ¶1.7) will be successfully deployed and effective in raising awareness among all relevant actors in the sector on the convenience, opportunity and need to introduce RE and EE improvements.
  2. The analysis is considered conservative, as it does not incorporate some additional co-benefits, which are not possible to quantify accurately within the scope of the project. There are far-reaching social and economic benefits for society that result from reducing carbon emissions and ensuring universal access to modern energy services. In general, access to affordable and non-polluting energy services is a prerequisite for achieving economic empowerment and poverty reduction. Specifically, some of the co-benefits expected as a result of project implementation include:
  + Positive effects on long-term net reductions on electricity consumer prices (relative to non-subsidized prices) and avoided costs due to a reduced dependency on fuel imports and fuel price volatility (particularly in Argentina, which has been a net importer of energy since 2011), savings in reduced infrastructure investments for energy supply (generation, transmission and distribution), improved system reliability, the possibility to delay or defer investments in generation capacity and system upgrades, significant savings in electricity subsidies.
  + Especially in the case of SMEs that will be investing in EE as a result of the project, their operation will become more cost-efficient, which has a direct impact in their competitiveness, profitability, production and product quality, and improving the working environment while also reducing costs for O&M and for environmental compliance.[[26]](#footnote-26) Where projects include trade-intensive industries, productivity gains could translate in increased inflows of foreign exchange.
  + A range of local and regional air quality benefits, as air pollution from energy generation includes SO2, NOx, and Mercury (Hg), in addition to GHG emissions.
  + Development of the local industry and new sources of employment (at the preparation, development and operation stages of projects). The total direct and indirect jobs created will depend on the number and size of projects financed.[[27]](#footnote-27)
  + Energy projects that support the use of locally available sources for productive uses can provide opportunities for women’s entrepreneurship, for example, in local enterprises that can deliver reliable energy services based on RE and EE technologies. The complementary TC AR-T1213 includes resources to finance activities aimed to encourage women’s interest in these sectors, facilitating access to information and training to women, and promoting greater gender parity in the sector’s workforce.[[28]](#footnote-28)
  + Macroeconomic and public budget impact, whether by reducing government expenditures on energy or by generating increased tax revenues.

1. Results of the Analysis
   1. Based on the considerations described in the sections above, the net present value of the project is estimated in US$87.24 million and its internal rate of return is 20.1%. A table with detailed calculations for the period of analysis is shown in Annex II.

**Table 4.1.- Summary of results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | Value |
| Net Present Value (millions of US$) |  |  |  | **87.24** |
| Internal Rate of Return (%) |  |  |  | **20.1** |

1. Sensitivity Analysis
   1. For the sensitivity analysis is included in this section, assumptions are modified in order to test the tolerance of the project to variations on the conditions that may have an impact on the results established above. For this purpose, the values of some key variables used for the base analysis are changed in order to determine their impact with regards to the potential net value of the project. These changes seek to build alternative scenarios that in most cases are not likely to occur, but serve to add robustness to the base analysis.
   2. While all variables used in this analysis (and assumptions related to them) may be affected by factors out of the control of the project execution, the selection of parameters included in this section was determined on account of their criticalness in the quantification of results, both overall and at the project level. Following is a brief explanation on the parameters used and the corresponding test values:
      1. The sensitivity of the project to the marginal cost of generation was verified by using an alternative scenario in which the gas oil price variation is considered to obtain the lowest probable marginal cost. As cost of generation is defined by the most expensive unit, which works with gas oil, its variable costs will be associated with this fuel. Using available data on gas oil historic price (period 2005-2017) the variation in fuel prices is calculated (+/- 27.7%) and used to determine a lowest price within this range of time for the marginal cost of generation. This cost is equal to 126.81 US$/MWh (see Annex I for more detail).
      2. With regards to energy consumption costs (related to EE projects), values are reduced for the two energy sources considered (electricity and fuel) in order to test a decrease in the energy savings benefit (as the foregone costs of consuming this energy will be lower. A 10% cut is considered sufficient for this test, as reductions in tariffs are not likely to occur in the short to medium term (especially due to the important subsidy element that is still involved in these tariffs).
      3. For the monetary value per ton of CO2 emission, the lowest bound of US$5 per tCO2, along the lines of existing or potential instruments in other emerging economies (including Korea, China, Mexico and Chile), is used. A fall in the value of CO2 reduced will have an impact on the abated costs of emissions.
      4. Projects that may not evolve successfully and do not achieve production or savings of energy as expected are considered for the next scenario. This implies an assumption that after the investment is made and the financing is approved, some of these projects do not become operative or fail. This scenario assumes that 5% of projects in all categories are not fully implemented even though the full amount of the investment was disbursed. The level of bank non-performing loans (NPL) can be taken as a reference for projects that are not able to pay back the loans. In this sense, a 5% of failed projects is considered appropriate: since 2011, Argentina has achieved and maintained NPL levels below 2%[[29]](#footnote-29) and more than doubling that rate is most likely to cover for any impacts from the incremental risks associated to these particular types of projects.
      5. Given that the combination of technologies and sub sectors within the portfolio can have an impact in the results, and the projects to be financed are not known ex ante, the allocation of funds assumed for the base analysis (75% RE, 25% EE) is varied to test the impact of having: (i) 100% RE projects and no EE projects in the mix; and (ii) less RE projects in the mix (60% RE, 40% EE).[[30]](#footnote-30) This is simplification of the initial consideration that any mix of projects that is assumed will produce a different NPV and IRR for the overall project, as differences may exist also within the group of technologies classified as RE or EE. Nonetheless, based on a revision of BICE’s ongoing efforts to build a portfolio of projects for this project, and the market study, it is not likely that the share of projects used in the base analysis will change considerably. Also, the complementary TC includes activities related to support the assessment of risks in each project applying for financing and optimize the use of project funds.
   3. The sensitivity analysis is summarized in table 5.1, which includes the test value of a particular parameter (alternative scenario), the adjusted ratios (NPV and IRR) under the modified scenario, and the break-even value (the value of the parameter under which the NPV of the project becomes zero).

**Table 5.1.- Summary of sensitivity analysis**

| Parameter | Initial value | Test value | Adjusted NPV (MUSD) | Adjusted IRR (%) | Break-even value |
| --- | --- | --- | --- | --- | --- |
| a. Reduction in marginal cost of energy | 175.37 US$/MWh | 126.81 US$/MWh | **30.71** | **14.8** | 100.42 |
| b. Reduction in energy consumption cost | 0.007 US$/Gal; 0.20 US$/KWh | 0.0063 US$/Gal; 0.18 US$/KWh | **84.85** | **19.9** | -0.54 US$/kWh; -0.02 US$/Gal |
| c. Reduction in CO2 price | 9 US$/tCO2 | 5 US$/tCO2 | **83.71** | **19.8** | -89.98 US$/tCO2 |
| d. Projects successfully implemented after closing of financing | 100% | 95% | **76.48** | **19.2** | 63% |
| e. Allocation of funds for project mix in portfolio | 75% RE; 25% EE | 100% RE; 0% EE | **123.54** | **22.5** | n.a. |
| 75% RE; 25% EE | 60% RE; 40% EE | **70.15** | **18.6** | n.a. |

* 1. The results of the sensitivity analysis show that the net economic benefit of the project, calculated following the methodology proposed, is not particularly elastic to the majority of the parameters under study, individually, and only changes to a relevant extent if we consider a change in the marginal cost of energy. Furthermore, when analyzing the combined effect of: (i) scenarios a, b, c and d, the economic value of the project remains positive, at US$16.3 million, while the IRR falls to 13.5%; and (ii) scenarios a, b, c, d, and e (60% RE and 40% EE),[[31]](#footnote-31) the resulting economic value is US$6.6 million, with a 12.6% IRR.
  2. Some important considerations to take from this exercise include:
     + All else equal, the contribution of RE projects to the NPV is higher than that of EE projects. From the beneficiary SMEs’ perspective, a financial analysis would incorporate the positive impact of the financing in the cash flows of these projects and, at any rate, it is considered unlikely that a particular project will in practice produce negative returns if adequate financing from the project is available.
     + The economic viability of the overall project is dependent to an important extent on the energy supply cost in the alternative scenario, that considers that there are no investments in RE projects, and that a mix of traditional generation sources will provide the electricity to the system. This means that the economic value of the project depends largely on which technologies would be implemented in the absence of the project (to cover the same amount of energy), and their generation costs. The break˗even marginal generation cost of the counterfactual scenario for the project to be viable, under the methodology of analysis proposed, is 100.42 US$/MWh.
     + As an important amount of value is associated to energy consumption costs and to the level and price of CO2 emissions, it is important to highlight the robustness of the project when these variables are tested. The break-even value of both the energy consumption costs and the price of CO2 turn out negative, which is not a reasonable scenario.
     + A slightly higher effect is shown when assuming that a portion of the projects do not materialize, even after investments for these unsuccessful projects have been accounted for in their entirety. Still, the economic value of the project remains positive under this scenario. The break-even value for this test is 63% which means a highly unlikely 37% or more of the projects would have to fail to make the project economically unviable.

1. Conclusions
   1. The presented CBA seeks to bring greater objectivity into the decision making of IDB approval of the “Promoting risk mitigation instruments and finance for renewable energy and energy efficiency investments” project in Argentina. Throughout the sections of the document, the analysis identifies all relevant benefits and costs of the project’s particular scheme, and quantifies them in monetary terms. Results shows how the discounted benefits are greater than the discounted costs over the time of analysis, producing a positive NPV of US$87.24 million and a 20.1% IRR. This assessment is conservative, as all the possible economic benefits of the project were not monetized.
   2. The sensitivity analysis presented in section V intends to improve the reliability of the results obtained from the initial assumptions, allowing for less uncertainty in the presentation of conclusions. No significant risks are observed regarding the sustainability of the project in case reasonable changes occur that may affect the main variables on which the benefits are based.
   3. In general, the CBA provides a rational technique for the evaluation of the project where some information is either non-existent or deficient. While in some cases it cannot provide precise values, its aim is to support decision-making purposes, and be useful towards the project execution. In this sense, the project team considers that plausible and contrasted assumptions have been used, with an approach that is rather prudent and conservative, and thus recommends the IDB approves the financing of the proposed project.

**Annex I.- Marginal cost of generation analysis**

1. **Thermal power generation and fuel consumption for the power sector**.

Two thirds of electricity in Argentina is generated from fossil fuels, mainly natural gas. However, given that the availability of natural gas is not sufficient to meet the requirements of thermal generation plants, part of the power is generated from liquid fuels derived from petroleum, Fuel Oil and Gas Oil (diesel), which are more expensive than natural gas. The following graphs show, on the left, the matrix of total generation in GWh for 2016 and on the right, the share of each fuel in thermal generation. Fuel Oil and Gas Oil accounts 11% each of the thermal generation, which is equivalent to 7.6% of the total electricity demand.

1. **Generation cost**

According to the operation rules of the energy dispatch process to supply the demand for electricity, the plants are dispatched in ascending order according to their variable generation costs, associated mainly with the fuel cost in hourly basis, (short-term). In this way the hydraulic power plants are dispatched first, given their marginal cost close to zero, then the plants based on natural gas and finally those with liquid fuels, fuel oil and gas oil. In the case of Argentina, several power plants are able to generate with either natural gas or liquid fuel, which depends on the availability of the former. The marginal cost corresponds to the cost of the last unit dispatched to meet the demand. In the case of Argentina, during the summer in some hours the last unit required to generate operates with Gas Oil, but in the winter gas oil is required during the whole day, given the decrease in the availability of natural gas for the power sector, which is used mainly for heating[[32]](#footnote-32). Then, Gas Oil is the most expensive fuel to be replace by cheaper technologies along the whole year for power generation. Based on the Gas Oil cost, the equivalent marginal cost for electricity is calculated for the period of time of analysis, through a linear regression. The resulting average marginal cost is 175 US$/MWh. The second graph shows the historic Gas Oil price and the estimated electricity cost.

1. **Fuel price variability**

The costs of liquid fuels vary according to the price of a barrel of oil in the international market. Given that the most expensive generation units in Argentine system operates with Gas Oil, which supplies close to 7.6% of the total demand, the gas oil price variation is considered for an alternative scenario of marginal cost (to test the sensitivity of the analysis to this parameter). The following table shows main statistics for the gas oil historic price, analyzed in a period of thirteen years between 2005 and 2017, with an average value of 2.23 US$/gallon and a standard deviation of 0.62 US$/gallon, corresponding to a 27.7% variation[[33]](#footnote-33).



1. **Reference price for the economic analysis and sensitivity analysis.**

It is considered that the cost of generation is defined by the most expensive unit according to Section 3, which works with Gas Oil, so its variable costs will be associated with this fuel. The period from 2005 to 2017 is taken as reference range, where the variation in fuel prices is 27.7%, with an average of US$2.3 per gallon. This value will be used as a reference for the economic analysis period applying a sensitivity analysis in a range of +/- 27.7%.

Annex II. Detailed calculations (project cash flows)



Notes: Total investment includes financing from the project (US$160 million) plus equity provided by beneficiary firms (up to US$67 million), based on an assumed loan-to-equity value of 70/30. The total amount of TC funding from AR-T1213 is included as a cost (distributed from Y0 through Y3), as activities included in this TC are considered essential to the successful implementation of the projects financed. Technologies included under each category of project, as well as number of projects and schedule of disbursements are based on relevant information collected from BICE, the local market and studies related to the potential for EE in Argentina. These were established for the purpose of this analysis and should only be taken as indicative (the number and type of projects included do not constitute a committed portfolio for the project).

**Main values and formulas used in the analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameters** | **RE (biogas/biomass)** | | **EE** | |
| Production factor | 0.8 |  |  |  |
| Average plant capacity | 2 | MW |  |  |
| Average loan | 7 | MUSD | 0.35 | MUSD |
| Average total investment | 10 | MUSD | 0.50 | MUSD |
| Investment costs | 5,000 | mUSD/MW | 500 | mUSD/project |
| O&M costs | 0.015 | mUSD/MWh | 0.02 | % of CAPEX |

|  |  |  |  |
| --- | --- | --- | --- |
| **Mix of EE Technologies** | **# of projects** | **Energy consumption (kWh/yr or Gal/yr) (baseline)** | **Energy Savings (%)** |
| Solar Water heaters | 46 | 32,385 | 60% |
| Efficient boilers | 17 | 760,010 | 6% |
| Electric motors | 17 | 3,163,392 | 5% |
| Refrigeration systems | 11 | 4,274,880 | 27% |
| Air conditioning | 17 | 2,275,165 | 20% |
| Cogeneration | 6 | 525,600 | 35% |
| **Total** | **114** |  |  |

|  |  |  |
| --- | --- | --- |
|  | **Electricity-sourced** | **Fuel-sourced** |
| Average energy savings per EE project | 474,992 KWh/yr | 44,531 Gal/yr |

|  |  |  |
| --- | --- | --- |
| **Other variables:** |  |  |
| Price of CO2 emissions | 9 | USD/tCO2 |
| Electricity cost abated (consumption price) | 0.203 | USD/kWh |
| Fuel cost abated (consumption price) | 0.007 | USD/Gal |
| Energy substitution price (new capacity) | 75.37 | USD/MWh |
| Electricity displaced emission factor | 0.535 | tCO2/MWh |
| Fuel displaced emission factor | 0.015 | tCO2/Gal |
| Conversion rate Gal to MWh | 27.32 | Gal/MWh |

|  |  |
| --- | --- |
| **Main formulas for benefits** |  |
| 1. Difference in energy production cost | (Investment + O&M costs of RE projects) – (Substitution price of new capacity x total added capacity with project) |
| 2. Abated energy costs from EE | (Energy savings of electricity-sourced EE projects x Electricity cost abated) + (Energy savings of fuel-sourced EE projects x Fuel cost abated) |
| 3. Abated costs from CO2 emissions | (Total Co2 displaced x Price of CO2 emissions) |

1. Brunnschweiler, Christa N. Finance for RE: an empirical analysis of developing and transition economies. Environment and Development Economics 15.03 (2010): 241-274, 2010. [↑](#footnote-ref-1)
2. The [GCF](http://www.greenclimate.fund/home) provides funding to promote mitigation and adaptation to climate change. The IDB is accredited by the GCF to manage these resources, under the terms established in the AMA approved by the IDB Board (GN‑2895) (see footnote 1). The project has Argentina’s National Designated Authority’s non-objection. [↑](#footnote-ref-2)
3. In the context of this project, SME is defined as per Argentine’s government classification of PYME (*Resolución General* 103-E/2017 of the Ministry of Production). In this resolution, firms are classified based on their level of sales, with distinctions by economic activity. SMEs constitute firms with sales of up to $760 million Pesos and $250 million Pesos for the industrial and services sectors, respectively. [↑](#footnote-ref-3)
4. It is expected that direct lending will only be available for loans larger than US$5 million, and that only RE eligible projects (particularly, biomass) have the potential to be this large. [↑](#footnote-ref-4)
5. The OR is an agreement by which the executing agency formally adapts their internal processes to requirements by the IDB, in the context of the execution of a specific project. The OR will be prepared and owned by BICE, with supervision from the IDB, and must be finalized and approved by BICE’s appropriate instances prior to the first disbursement of funds. [↑](#footnote-ref-5)
6. The same criteria and conditions will apply to direct and indirect operations. [↑](#footnote-ref-6)
7. These include support for project implementation, training and capacity building, advisory services for the design of risk mitigation mechanisms, workshops, activities and marketing campaigns to raise public awareness, etc. [↑](#footnote-ref-7)
8. A [Market Study](https://idbg.sharepoint.com/teams/EZ-AR-LON/AR-L1280/_layouts/15/DocIdRedir.aspx?ID=EZSHARE-972212929-2) undertaken for BICE and IDB (Magallon, 2017) identified a significant potential for RE and EE investments in Argentina’s SME (equivalent to more than US$2 billion), linked to modernization of equipment and substitution of energy sources, using biomass and biogas. In addition, there is significant potential in the development of awarded projects under the government’s *RenovAr* tendering project, which is the main source for constructing a pipeline to be financed by BICE. A total of 18 biomass projects and 40 biogas projects have been awarded so far (for a total of 236 MW of new capacity), most of which are in need of financing [↑](#footnote-ref-8)
9. For practical purposes, the analysis uses aggregated data for the accounting of benefits over time, based on the construction of a portfolio of projects and the characteristics of a representative beneficiary firm for each type of project. [↑](#footnote-ref-9)
10. Before implementation of the project, any existing portfolio is indicative. There is no information on specific projects available until it is presented by participants when applying to credits by BICE or FIs, and in all cases this information should be treated with confidentiality. [↑](#footnote-ref-10)
11. For practical purposes, the analysis uses aggregated data, based on the characteristics of a representative beneficiary firm for each category of project and the number of projects under each category considered. [↑](#footnote-ref-11)
12. Magallon, 2017,[Feasibility Analysis](https://idbg.sharepoint.com/teams/EZ-AR-LON/AR-L1280/_layouts/15/DocIdRedir.aspx?ID=EZSHARE-972212929-20). This study evaluates different business opportunities associated to sustainable energy investments in Argentina and performs an analysis of these opportunities based on their potential. Based on this, the study describes and recommends technologies and sub sectors with the highest potential, where viable projects are more likely to occur and activities to structure demand should be prioritized. [↑](#footnote-ref-12)
13. An ex-post evaluation will be performed when project execution is completed, in which real values from projects implemented will replace the assumed values in this analysis (see [Monitoring and Evaluation Plan](https://idbg.sharepoint.com/teams/EZ-AR-LON/AR-L1280/_layouts/15/DocIdRedir.aspx?ID=EZSHARE-972212929-4)). [↑](#footnote-ref-13)
14. Following IDB guidelines for economic analysis of projects financed by the IDB, it is recommended to use a discount rate of 12% for all IDB operations. [↑](#footnote-ref-14)
15. The typical sub project likely to receive financing corresponds to a small to medium-sized retrofit or replacement of equipment (boilers, ovens, dryers). However, potential has been identified also for mid-sized cogeneration projects (in particular, in the sugar production industry). Typical loan size for these projects is US$15 million and finances around 70% of total investment. [↑](#footnote-ref-15)
16. The main source for building an assumed portfolio is the information provided by BICE on the current status of their pipeline for this project. Based on the number of projects awarded by the RenovAr tendering process (see ¶3.3 and Table 3.1), which is likely to guarantee demand for RE projects up to US$120 million, BICE suggested this distribution of resources during interviews carried out on-site over an analysis mission on January 2018. During meetings with staff from the Ministry of Energy’s *Dirección de Energías Renovables* and *Dirección de Desarrollo de Políticas y Programas de Ahorro y Eficiencia Energética*, we also corroborated the information regarding volume of funding for each category, based on the analysis of the expected profile of potential projects eligible for the project. [↑](#footnote-ref-16)
17. During an analysis mission carried out in January 2018, the IDB team met with BICE representatives from the *Gerencia de Financiamiento Estructurado y Entidades Financieras* (leading the RE project financing) and from the *Gerencia de Banca Empresas* (in charge of the development of the project financing products for EE projects). Discussions on their current experience with this kind of projects, their current capacity and expected capacity, led to agreeing on the most likely projection for the 5-year period in terms of execution. [↑](#footnote-ref-17)
18. This information was also provided by technology providers during interviews carried out as part of the Feasibility Analysis, including production factors of 0.8 for pig farms and agribusiness biogas plants, 0.85 production factor for feedlot biogas plants and 0.8 production factor for small to medium-sized biomass plants. Data was verified with the US Department of State’s National Renewable Energy Laboratory (NREL), [Utility-scale energy technology capacity factors](https://www.nrel.gov/analysis/tech-cap-factor.html). See also [Agri-For-Energy 2, Work Package 4: Biogas & Biomethane](https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/agriforenergy_2_international_biogas_and_methane_report_en.pdf), Vagonyte, E., European Biomass Association, 2015; and [E*valuación Técnica y Económica de una Planta de Biogás para Autoabastecimiento Energético: Una estrategia para diferentes contextos*](http://repositorio.uchile.cl/bitstream/handle/2250/133520/Evaluacion-tecnica-y-economica-de-una-planta-de-biogas.pdf?sequence=1), Carrasco, J., Universidad de Chile, 2015. [↑](#footnote-ref-18)
19. All data in this table was obtained from the results of the Feasibility Analysis, using information collected in the field, plus previous experience with similar projects in El Salvador, Mexico and Colombia, with regards to technology mix, enterprise sectors, average size of projects and investments, and savings ratios. [↑](#footnote-ref-19)
20. It is important to differentiate a period when a project is financed from that when a project begins operating. In the detailed cash flows (see Annex II) disbursements of loans and co-financing (including equity) will precede the accounting of benefits. [↑](#footnote-ref-20)
21. See also National Renewable Energy Laboratory (NREL), [Utility-scale energy technology capacity factors](https://www.nrel.gov/analysis/tech-cap-factor.html); [Agri-For-Energy 2, Work Package 4: Biogas & Biomethane](https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/agriforenergy_2_international_biogas_and_methane_report_en.pdf), Vagonyte, E., European Biomass Association, 2015; and [*Evaluación Técnica y Económica de una Planta de Biogás para Autoabastecimiento Energético: Una estrategia para diferentes contextos*](http://repositorio.uchile.cl/bitstream/handle/2250/133520/Evaluacion-tecnica-y-economica-de-una-planta-de-biogas.pdf?sequence=1), Carrasco, J., Universidad de Chile, 2015. [↑](#footnote-ref-21)
22. Information about carbon pricing around the world (emissions trading systems, ETS, and carbon taxes) has been substantially increasing since 2012. The existing carbon prices vary significantly—from less than US$1 per tCO2e to US$130 per tCO2e, with the majority of emissions (85%) priced at less than US$10 per tCO2e. The use of the US$9 reference price is an interpretation of the evaluation exercise of the various economic, local and global, current and future costs of negative externalities associated to emissions. International carbon pricing provides us with a publicly available resource for monetization of this aspect of the analysis. In the European Union Emissions Trading System (EU ETS), which remains the single largest international carbon pricing instrument, the average price in 2014 was €6/tCO2 (US$7/tCO2). As of August, 2015, this price stood at some US$9/tCO2. For governments, carbon pricing is an instrument to achieve emissions mitigation but also a source of revenue. (see [State and Trends of Carbon Pricing](http://www.worldbank.org/content/dam/Worldbank/document/Climate/State-and-Trend-Report-2015.pdf), World Bank and Ecofys, 2015. [↑](#footnote-ref-22)
23. Navajas, F., *Subsidios a la Energía, Devaluación y Precios, Fundación de Investigaciones Económicas Latinoamericanas*, 2015. [↑](#footnote-ref-23)
24. In practice, disbursements of funds are made gradually. In the case of RE projects, cash flows consider that 30% of the investment is made the year prior to the first year of projections (Year Zero in Annex II), as these technologies normally take over a year (18 months in average) to complete implementation. [↑](#footnote-ref-24)
25. By definition, the marginal cost of the system represents the variation of the operating cost required to meet one additional MWh of demand, using existing resources. The analysis considers that without the project, the energy not supplied by the otherwise beneficiary RE projects would need to be supplied by other energy sources (at a marginal cost for the system). It is worth emphasizing that the analysis is made from the point of view of the electricity system, which in the absence of these RE developments, would need to provide the same amount of energy with a marginal cost. [↑](#footnote-ref-25)
26. See Capturing the Multiple Benefits of Energy Efficiency, International Energy Agency (IEA), 2014. According to this report, the value of the productivity and operational benefits derived can be up to 2.5 times (250%) the value of energy savings (depending on the value and context of the investment). [↑](#footnote-ref-26)
27. For example, in the EE sector, the potential for job creation ranges from 8 to 27 job years per EUR 1 million invested (IEA, 2014). See also [IRENA](http://www.irena.org/rejobs.pdf), EESI 2015 Fact Sheet: [Jobs in Renewable Energy and Energy Efficiency (2015)](http://www.eesi.org/papers/view/fact-sheet-jobs-in-renewable-energy-and-energy-efficiency-2015). [↑](#footnote-ref-27)
28. For a detailed Gender Action Plan for the project, please see [Optional ELink #9](https://idbg.sharepoint.com/teams/EZ-AR-LON/AR-L1280/_layouts/15/DocIdRedir.aspx?ID=EZSHARE-972212929-12) of the POD. [↑](#footnote-ref-28)
29. World Bank Indicators, [Bank nonperforming loans to total gross loans (%)](https://data.worldbank.org/indicator/FB.AST.NPER.ZS?locations=AR&view=chart). [↑](#footnote-ref-29)
30. No scenario for 100% EE projects in the mix is considered. According to BICE, it is more likely that a larger portion of the funding will be used in RE projects, as concrete projects have already expressed their need for financing. In the case of EE, while there is a strategy associated to the project (mainly within the framework of the TC AR-T1213) to develop these markets, train BICE and encourage investment by SMEs, demand for these projects is less guaranteed. [↑](#footnote-ref-30)
31. The scenario “e” in which 100% of the funding goes to RE is not included, as the individual sensitivity test for this case shows an increased NPV for the project. Hence, to test the lowest possible value, we take the lowest value of the two alternative project portfolio mixes (60% RE and 40% EE). [↑](#footnote-ref-31)
32. Annual report 2016 [www.cammesa.com](http://www.cammesa.com). [↑](#footnote-ref-32)
33. <https://www.eia.gov/dnav/pet/pet_pri_spt_s1_m.htm>. [↑](#footnote-ref-33)