KfW Development Bank

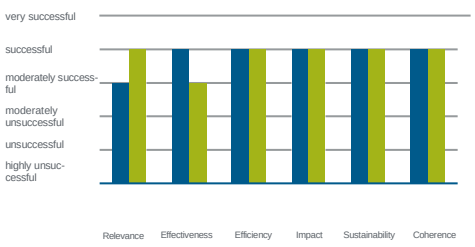
Ex-post evaluation
Renewable energy/energy efficiency, Peru

Title	Renewable energies and energy efficiency Phase I and II, COFIDE		
Sector and CRS code	Power generation, renewable sources - 23210		
Project number	2007 66 592 / 2009 67 000		
Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)		
Recipient/ Project executing agency	CORPORACION FINANCIERA DE DESARROLLO S.A. (COFIDE)		
Project volume/ Financing instrument	EUR 25,000,000 / 40,000,000 Interest subsidised loan		
Project duration	12.2013 - 9.2021		
Year of report	2024	**Year of random sample**	2024

Objectives and project outline

The objective at outcome level was to increase the use of renewable energy sources and improve energy efficiency in Peru. At the impact level, the objective was to achieve a more sustainable, secure, climate and environmentally friendly energy supply in Peru. To achieve the objectives, the programme provided low-interest loans to COFIDE to refinance loans for RE/EE investments. In the course of the programme, a pragmatic adaptation of the concept was made, by financing 8 small hydropower plants and a rural PV programme.

Overall rating:
Successful



Key findings

As part of the programme, 8 small hydropower plants with a capacity of up 20 MW each were built, feeding a total of around 805 GWh of electricity into the grid each year, and over 200,000 solar home systems were installed, providing families in remote areas with a basic electricity supply. The project is rated as "successful" for the following reasons:

– The programme was very much in line with Peru's national objectives in the energy sector and the objectives of the German Federal Government. The design was appropriate for increasing the share of renewable energies (RE) in electricity generation. However, no energy efficiency (EE) measures could be implemented.

– The programme was well integrated into the existing national structures in the sector. The contributions of various donors were coordinated by COFIDE.

– The FC funds were used to finance individual RE measures that were selected in auctions. Contrary to the original plan, EE measures were not financed. All RE projects were implemented with a high degree of professionalism. Key technical, environmental and social standards were met. The costs were within the usual international range. The electricity generation and thus the CO2 savings largely correspond to the planning. All subsidised projects are economically viable.

– Due to their profitability, professional operation and long-term contracts, all individual projects are highly likely to be utilised in the long term. The programme has also contributed to the further development of COFIDE's expertise in the financing of RE and the expansion of the environmental and social management system.

Conclusions

– The (co-)financing of a credit line for RE and EE enables the partner to use the funds flexibly and effectively in line with requirements, provided that the intended use is not too limited.

– Concession agreements of 20 years (hydropower) and 15 years (PV systems) ensure that the measures are highly sustainable.

– The PV component is characterised by ensuring a high level of sustainability in the provision of autonomous solar systems for low-income population groups. Although the Peruvian state has to subsidise the PV systems and their functionality for 15 years, this type of power supply is more cost-effective than a highly subsidised expansion of the power grid in remote, sparsely populated areas.

Ex-post evaluation - assessment according to OECD DAC criteria

Overview of the rating per criterion:

	Phase 1	Phase 2
Relevance	3	2
Coherence	2	2
Effectiveness	2	3
Efficiency	2	2
Impact	2	2
Sustainability	2	2
Overall rating:	**2**	**2**

Abbreviations:

AFD	Agence française de développement
AK	Final inspection
CONSTRUCTION	Business as usual
GDP	Gross Domestic Product
BMZ	Federal Ministry for Economic Cooperation and Development COFIDE
DAC	Development Assistance Committee
EBRD	European Bank for Reconstruction and Development
ECA	Export Credit Agency
EE	Energy efficiency
ERNC	Energía Renovable No-Convencionales / non-conventional renewable energies
EUR	Euro
DC	Development cooperation
FC	Financial co-operation
FC E	FC Evaluation
GIZ	Society for International Cooperation
HDI	Human Development Index
IDB	Inter-American Development Bank
IFI	International Financial Institutions
JICA	Japan International Cooperation Agency
SMES	Small and medium-sized enterprises
SHP	Small hydropower plants
MtCO2e	Million tonnes of CO2 equivalent
MWh	megawatt hour
NDC	Nationally Determined Contributions
PV	Photovoltaics
RE	Renewable energies
TC	Technical co-operation
USAID	United States Agency for International Development
USV	Environmental and social standards

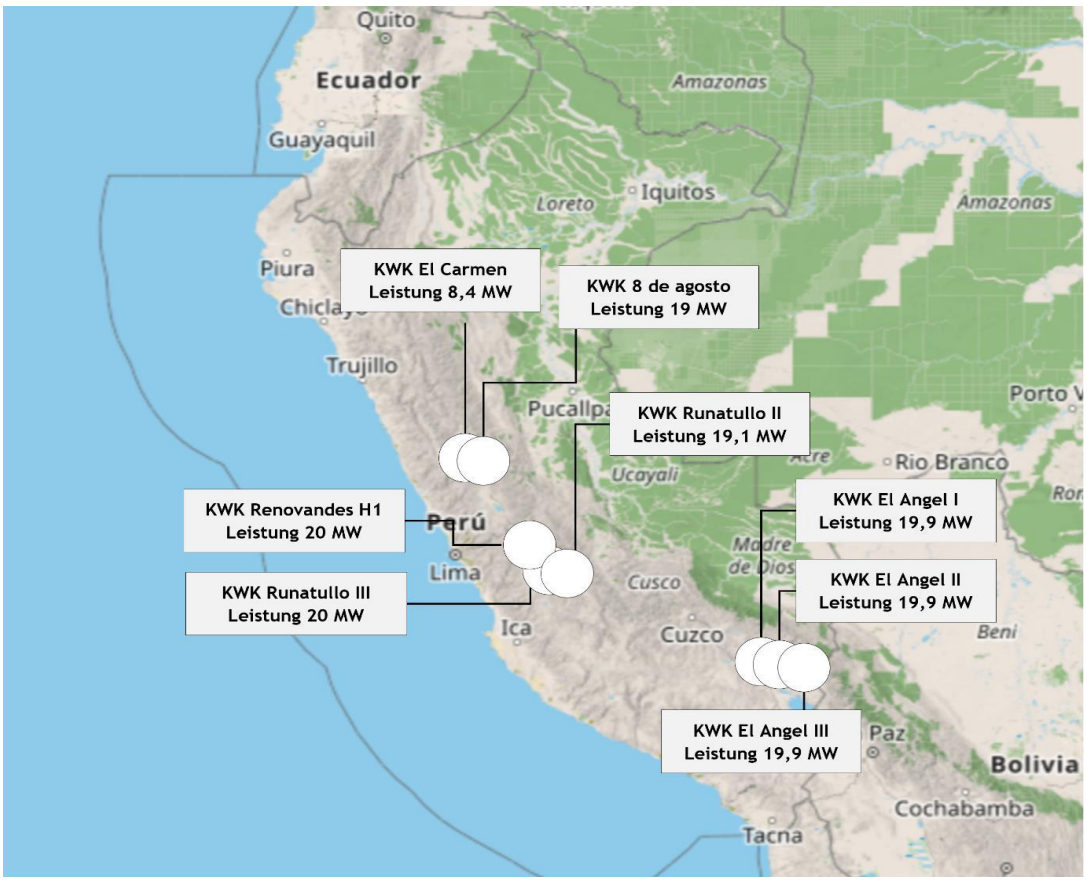
General conditions and classification of the project

The project was planned in 2010 as a stand-alone FC programme as part of the 4E/IKLU thematic programme. It was implemented in two phases from 12/2013 to 09/2021 on the basis of two subsidised loans. During the second phase, the project was integrated as an FC module into the development cooperation programme Sustainable Urban Development in Times of Climate Change in Peru and was intended to contribute to the development cooperation programme objective of "providing Peru's growing urban population with basic supplies and services in an environmentally and climate-friendly manner and ensuring their sustainability in the context of climate change". The end of the second phase coincided with the COVID crisis, and funds for a planned third phase were reallocated to a COVID-19 (Green Recovery) programme. It is not possible to strictly separate the evaluation of the first and second phases in terms of content and funding. Many measures received funding from both phase 1 and phase 2. Where possible, a separate evaluation was carried out along the criteria for the individual phases.

Brief description of the project

The development policy objective of the programme at impact level was a more sustainable, secure, climate- and environmentally friendly energy supply in Peru. This is to be achieved through greater use of renewable energies (RE) and by increasing energy efficiency (EE) (objective of the programme at outcome level). To this end, two subsidised loans were made available to the Republic of Peru to finance a credit line from the state development bank COFIDE for investments in RE/EE. COFIDE used these loans to refinance low-interest loans from financial intermediaries to private investors. The direct beneficiaries of the programme were private companies, households and private and public electricity producers.

Map of the project country incl. project locations of the financed hydropower plants[1]



Breakdown of total costs

	Phase 1				Phase 2	
	Inv. (plan)	Inv. (actual)	AM (plan)	AM (actual)	Inv. (plan)	Inv. (actual)
Total costs in EUR million	**43**	**199,2**	**1,5**	**0**	**69**	**318,8**
Own contribution	5	103,3	0	0	8	165,3
External financing	38	95,9	1,5	0	61	153,5
of which budget funds (BMZ)	*25*	*25*	*1,5*	*0*	40	40

[1] In addition to the eight small hydropower plants, around 210,000 photovoltaic (PV) systems were financed nationwide.

Rating according to OECD DAC criteria

Relevance

1. *Alignment with policies and priorities*

When the first phase of the project was planned, the Peruvian government had a keen interest in expanding electricity generation capacity. At that time, it was confronted with bottlenecks in the electricity supply on several occasions. In 2010, for example, it had to set upper limits for the electricity supply to the north and south of the country and temporarily import electricity from Ecuador to cover the increased demand. In the years 2000 to 2008, the demand for electricity in Peru rose by an average of 7.98% per year from 19.54 TWh to 32.02 TWh, while in the same period the electricity generation capacity only increased by an average of 2.29% per year from 6,102 MW to 7,218 MW, mainly in the form of thermal power plants.[2] The government expected also a high increase in demand for the following years, not least due to the growth of the mining sector. In addition to an increase in electricity consumption in the urban regions, the national plan for the electrification of rural areas 2012-2021 (Plan Nacional de Electrificación Rural 2012 - 2021) aimed to increase the access rate to electricity from 61.3% (2011) to 95% in 2021.[3] This would have meant a further increase in electricity consumption in rural areas in the future.

In the years following the turn of the millennium, Peru's electricity generation consisted almost entirely of large hydropower and thermal power plants. In 2008, for example, hydropower accounted for 58.7 % and thermal power plants for 39.9 %[4]. Smaller renewable energy plants played no role. In 2008, the Peruvian government adopted the Decree Law 1002 with the aim of generating five per cent of electricity from "non-conventional renewable energies" (Energia Renovable No-Convencionales - ERNC), including hydropower plants of up to 20 MW, by 2013. At the same time, the decree law "Decreto Supremo 064-2010-EM" prominently anchored the expansion of renewable energies and energy efficiency in the national energy policy for the period 2010 to 2040. The project's concept therefore very much in line with the political prioritisation of Peru's energy sector. The project also enabled Peru to contribute to the Framework Convention on Climate Change and to fulfil the Paris climate targets. In the updated version of the Nationally Determined Contributions (NDC), which was submitted in December 2020, Peru committed to limiting greenhouse gas emissions to a maximum of 208.8 million tonnes of CO2 equivalent (MtCO2e) by 2030. This corresponds to a reduction of 30 % compared to the business-as-usual (BAU) scenario. If international funding is available, Peru aims to reduce emissions to 179 MtCO2e, which corresponds to a reduction of 40% compared to BAU.

The programme was implemented in the second phase as part of the Special Facility for Investments in Renewable Energy and Energy Efficiency and the subsequent Initiative for Climate and Environmental Protection (4E/IKLU). It was in line with the German government's goal of promoting climate and environmentally relevant investments in developing countries. The aim of the programme was in line with the BMZ's sector concepts at the time, "Sustainable Energy for Development" (Phase 1) and "Sustainable Energy for Development" (Phase 2).[5] It also fits in with the BMZ's current core thematic strategy "Responsibility for our Planet - Climate and Energy" (fields of action 1 "Climate Protection and Adaptation to Climate Change" and 2 "Renewable Energies and Energy Efficiency").[6] The latter envisages covering the increasing energy demand with a climate-neutral energy supply and contributing to a complete net decarbonisation of the energy sector by 2050. A corresponding climate and environmental protection objective is also formulated in the BMZ's "Concept for Development Cooperation with the Countries of Latin America and the Caribbean". The project was also intended to contribute to achieving the Millennium Development Goals set at that time and to the German government's 2015 action programme.

[2] https://datosmacro.expansion.com/energia-y-medio-ambiente/electricidad-generacion/peru

[3] https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=PE

[4] https://ourworldindata.org/energy/country/peru

[5] Cf. (i) BMZ strategy paper "BMZ Concepts 145 - Sector Concept Sustainable Energy for Development" (01/2007) and (ii) BMZ information brochure: "Sustainable Energy for Development (01/2014).

[6] BMZ Core Thematic Strategy: "Responsibility for our Planet - Climate and Energy" from June 2021.

2. Alignment with the needs and capacities of the beneficiaries and stakeholders

The programme's target group consisted of companies, private households and public and private institutions. They had no or only very limited access to needs-based, low-cost loans from local banks and microfinance institutions (MFIs) for investments in renewable energies and energy efficiency. Project developers in particular faced the challenge of obtaining financing that was compatible with the project term, as local banks only offered terms of up to a maximum of 5 years, while terms of 12-15 years, e.g. for the construction of small hydropower plants or wind turbines, were only available from foreign banks to a limited extent. Investments in non-conventional renewable energy sources were correspondingly low. At the same time, Peru was characterised by low energy efficiency in the economy, private households and the public sector. In the module proposal (MV) of the first phase, it was estimated that energy savings of 15-25% could be realised on average in the Peruvian textile, plastics and agro-industry.

In order to address the problem of a lack of access to needs-based financing, the concept envisaged the establishment of a special credit line from the Peruvian development bank COFIDE for investments in non-conventional renewable energy sources (RE) and energy efficiency measures (EE). Alongside this, COFIDE was to be supported in setting up a social and environmental management system. A complementary measure was to strengthen the personnel and content-related capacities of the executing agency and the financial intermediaries as well as conduct studies and information events on RE/EE for the target group. The complementary measure should also serve to increase the demand for loans, particularly for energy efficiency measures by the target group, for example by carrying out energy audits, organising information events on savings potential and possible RE investments, as well as suitable financial products and grants for feasibility studies.

The programme was intended to indirectly benefit the entire population of Peru by improving the energy supply and contributing to local and global environmental and resource protection. In line with the programme's aim of improving investments in RE and EE, the target group was primarily defined as all consumers connected to the electricity grid. Originally, particularly disadvantaged groups were not explicitly mentioned as a target group but were specifically addressed as part of the rural photovoltaic project. As electricity generation and supply favours the respective population groups to the same extent, no gender impact potentials were identified.

3. Appropriateness of design

The design of the programme in the first and second phases was in principle suitable for helping to solve the core problem of *insufficient financing and a lack of know-how among financial intermediaries and ultimate borrowers, which are hampering the expansion of RE and EE*. It was appropriately planned in organisational and financial terms.

The concept was based on the following results chain: provision of a credit line to COFIDE + strengthening of personnel and content-related capacities + marketing measures for RE (input)-> issue of low-interest loans to financial intermediaries (input)-> promotion of RE/EE investments by borrowers (input)-> construction or installation of RE plants and EE technologies (output)-> expansion of the RE/EE credit lines of the financial sector -> expansion of further RE/EE capacities -> long-term reduction of CO2 emissions.

The main focus of the concept was to ensure sufficient financing for RE/EE measures by setting up a special credit line to finance investments in RE and EE. COFIDE should thus have the necessary funds to refinance corresponding low-interest loans from financial intermediaries with sufficiently long terms. The energy policy framework conditions were assessed as unfavourable to a limited extent. The risk of worsening was categorised as moderately high with low influenceability, meaning that no measures were planned. The lack of expertise on the part of the partner COFIDE, the intermediary financial institutions and the sub-borrowers was to be remedied by a planned complementary measure. The target system with the various indicators was comprehensible and logical, but due to the separate presentation of the indicators of the complementary measure, this important dimension is missing from the target system.

Conceptually, the project was suitable to contribute to achieving the objective of the DC programme, into which the project was later integrated. This programme aimed to improve the supply of goods and services (water, mobility, energy and sewage and waste disposal) to Peru's urban population in an environmentally and climate-friendly manner and also in the context of climate change. Specifically, the design of the project implied a contribution to two of the four target dimensions of the development cooperation programme: a) improving climate protection through CO2 reduction, b) improving adaptation to climate change through greater energy security.

4. Adaptability – response to change

In practice, however, there were some deviations from the original concept. Instead of setting up a new credit line, COFIDE used the FC funds to top up existing funds to refinance selected RE projects implemented by medium-sized and larger companies. This meant that small entrepreneurs, private/public organisations and households were no longer the target group for the loans. The projects in question were concessions that were awarded as part of inverse auctions. The bids were technically reviewed by the grid organisation Osinergmin and the Ministry of Energy, meaning that there was no need to build up the relevant technical expertise at COFIDE. As a result, the planned training activities of the accompanying measure became less important and were not implemented. In addition to the promotion of renewable energies, the original concept also included the support for investments in energy efficiency measures. However, interest in RE investments proved to be low on the partner side. EE measures were also not included in the calls for tenders, which is why this component played no role in the first and second phases of the programme. It was planned to focus on EE measures in the third phase.

At the start of implementation at the end of 2013, three years after the preparation of the MA, three auctions on RE had already taken place. It became clear that larger investment projects were more likely to attract interest than smaller ones. The programme adapted to this and adjusted the originally planned small-scale promotion of investments in RE/EE via financial intermediaries accordingly.

The COVID pandemic has had a profound impact on economic development and the development of COFIDE projects in Peru. The funds for the planned 3rd phase were reallocated to a COVID programme.

Rating summary

The project was in line with Peru's national energy and climate policy objectives and was in line with the German government's MDG and SDG targets for promoting investment in environmental and climate protection.

The programme design was appropriate in principle. In practice, however, the original concept was significantly modified allowing COFIDE to use the FC funds pragmatically to finance concession projects selected in auctions and not for a new credit line. In the course of implementation, the target group was also expanded to include off-grid electricity consumers. The assessment that there is a noticeable demand for loans for small-volume investments in energy efficiency measures and renewable energies at COFIDE proved to be incorrect. As a result, important parts of the planned accompanying measure lost significance.

Overall, the relevance of phase 1 is rated as moderately successful and phase 2 as successful. The different assessment of phase 1 and phase 2 is due to the fact that the design of the first phase did not meet the partner's actual need for financing its concession projects and was therefore not implemented in its original form. In the second phase, the concept was not formally but de facto adapted to the partner's form of implementation.

Relevance: Phase 1: 3, Phase 2: 2

Coherence

5. Internal coherence

In its first phase, the project was planned and launched as a stand-alone measure. It was later integrated into the "Sustainable urban development in times of climate change in Peru" programme. The programme aimed to achieve sustainable urban development in the areas of energy, water and transport that takes into account the requirements of climate change. The aim was to ensure that Peru's growing urban population was supplied with basic goods and services in an environmentally and climate-friendly manner. At the time the project was launched in Peru, German TC was promoting access to electricity from RE and modern cooking energy as part of a country measure of the global Energising Development Programme. There was no immediate need for coordination. Towards the end of the project term, a working group ("Cluster Energías Renovables") was established as part of the partnership between Peru and Germany, consisting of representatives of German companies (including Bosch, Siemens, Hochtief) and important German institutions (GIZ, KfW, DEG), in order to further promote the use of RE and EE technologies.

The project took into account key international norms and technical standards for the construction of RE plants (in particular small hydropower plants, SHP plants). Compliance with environmental and social standards was ensured by means of corresponding studies, implementation and monitoring plans. The documents for the various individual measures were reviewed by the responsible KfW environmental experts.

6. External coherence

Following the adoption of Decree Law 1002, the Peruvian government made various efforts of its own to increase electricity generation based on ERNCs. At the beginning of 2010, the first concessions for ERNCs with 435 MW were awarded as part of a tender, followed by a second concession award in 2011 with 228 MW.[7] In both tenders, fewer concessions were awarded than planned (44 % of the planned value in the first award, 58 % in the second round). In 2013, a third tender was organised for ERNC, in which only SHP plants were awarded. Financing was also required for these projects. COFIDE provided at least 20 % of its own funds to finance the concession projects, which was appropriate. The final borrowers had to provide a further 20 %. The originally planned participation of the financial intermediaries, also with 20 % own funds, was dropped, as the administrative effort for many banks was too high to look for another refinancing option on the market at favourable conditions in addition to COFIDE refinancing.

Peru was supported by various donors in realising its three main objectives in the energy sector: (i) ensuring security of supply through national energy sources, (ii) securing the long-term supply of energy in rural areas and (iii) diversifying the energy sources used to generate electricity. From 2009 to 2012, the Inter-American Development Bank (IDB) financed the "Programme for the development of a new energy matrix I-IV". The World Bank supported Peru with a "Programmatic Loan for Environmental Policy ". Both programmes aimed to support the government in the use and expansion of renewable resources and are therefore complementary to the FC project. In addition, the World Bank supported Peru with USD 76.7 million in a rural electrification project aimed at ensuring the energy supply of 79 % of Peru's rural areas by the end of 2011.

The Japanese Development Bank (JICA) pursued a similar approach to the FC programme. JICA also provided COFIDE with a loan totalling USD 100 million to promote renewable energies and energy efficiency in cooperation with the Peruvian commercial banking sector. The target group there comprised primarily microfinance companies and small and medium-sized enterprises (SMEs) that wanted to invest in RE and EE. JICA funds were used to convert public buses from diesel to gas fuel. Small hydropower plants and the rural PV programme were also co-financed. As part of the contractual agreements with JICA, COFIDE was responsible for deciding on the exact utilisation of the funds. In addition, JICA provided loans for large hydropower plants (including USD 70 million to finance the Moquegua hydropower plant in the south of the country). Another important financier in the sector was the regional development bank CAF. Regular coordination meetings were held with both JICA and CAF regarding upcoming (co-)financing.

IDB and AFD finance energy efficiency measures in Peru. IDB focuses primarily on the health sector and AFD on lighting and housing. The EE measures targeted by KfW were conceptually geared towards small and medium-sized enterprises (SMEs) and therefore did not overlap with the plans of IDB or AFD.

Rating summary

The programme executing agency COFIDE is a partner of many international financial institutions and is able to ensure the harmonised use of funds as required. This form of harmonisation of donor funds through a strong programme executing agency with a high level of ownership for the various projects can be considered effective and efficient in terms of donor coordination.

The programme fitted in well with the government's plans to promote ERNC and complemented the partner's own efforts. JICA and other international financial institutions (IFIs) participated in a complementary manner in financing the individual measures promoted as part of the programme. The chosen approach is therefore considered coherent and complementary to other activities in Peru.

Coherence: Phase 1: 2, Phase 2: 2

Effectiveness

7. Achievement of (intended) objectives

The goal adapted as part of the EPE was to increase the use of renewable energy sources and improve energy efficiency in Peru.

[7] The 20-year licences were awarded on the basis of auctions. The contract was awarded to the company that undercut a specified maximum tariff, which was differentiated according to technology, by the greatest margin. However, the tariffs offered still had to be able to cover investment and operating costs.

Effectiveness

8. Achievement of (intended) objectives

The goal adapted as part of the EPE was to increase the use of renewable energy sources and improve energy efficiency in Peru.

The achievement of the objective at outcome level can be summarised as follows:

Table Target achievement Outcome:

Indicator	Status at PA	Target value according to PA/EPE	Actual value at PCR (optional)	Actual value at EPE
(1) CO2 savings in tonnes per year 5 years after the start of implementation	0	**84,000 tCO_2*** ($97{,}000\ tCO_2$)** (Phase 1&2[8])	**84,752 tCO_2*** ($97{,}471\ tCO_2$)**	**77,362 tCO_2*** (88,107 tCO_2)** Value partially fulfilled (10 % below target value)
(2) The RE measures subsidised by the loans have proven to be profitable for private investors.	0	Positive IRR		Investment amortises after 10-12 years Value fulfilled

* Emission avoidance with an emission factor of 0.522 tCO_2/MWh according to current government data
** Emission avoidance with an emission factor of 0.5945 tCO2/MWh as used in the AK

9. Contribution to the achievements of objectives

The FC funds were used to support the construction of 8 SHP plants with a total capacity of 146.5 MW, which feed electricity into the Peruvian power grid. The concessions for 3 of the SHPs were awarded in the first ERNC tender, for 4 in the second and for 1 in the third. Phase 2 funds were also used to co-finance the installation of a total of 208,145 off-grid PV systems in various rural regions of Peru. According to official information from the state regulator (Osinergmin), 205,138 households, 639 health centres and 2,368 schools received PV systems.[9] The 20-year concessions for the SHP plants as well as for the 15-year operation and maintenance of the PV systems were awarded on the basis of auctions. The contract was awarded to the company that undercut a specified maximum tariff, which was differentiated according to technology, by the greatest margin. The construction of the SHP plants had no direct influence on consumers' electricity tariffs, as these are set centrally by the regulator. Households that received a PV system for use from the Peruvian state currently pay a unit tariff of 10 soles per month (approx. EUR 2.35) for each system.

Contrary to the original plan, the FC funds were not used to create a separate credit line to refinance RE and EE investments. Instead, they were used to top up existing credit lines financially and thus finance a larger number of projects. The main advantage for end borrowers was the long term of the loans on the one hand and the lower interest rates compared to commercial loans on the other. The interest rate difference was between 0.5 and 3.5 percentage points, depending on the type of contract. The management of the financing lines was improved through the further development of environmental and social standards (ESAs) for internal processes and for lending. This also implied specifications for the EIA audits and plans for each individual project.

[8] The original target value was 186,000 tCO_2(phase 1&2, PP) based on the following assumptions: a) total investment sum: EUR 112 million; b) 80% flow into RE measures with which 67.9 MW of capacity is installed, 20% into EE measures with which 23,957 MWh are saved; c) annual capacity utilisation of the RE plants: 50%. This results in: 297,600 MWh (67.9 MW x 50% x 24 h x 365 days) + 23,957 MWh = 321,557 MWh x 0.58 tCO2/MWh (grid emission factor) = 186,500 tCO2. In 2011, the target was reduced to 157,800 tCO2 and in 2018 to 114,000 tCO2 per year. The emissions saving effect of the total investment amount was no longer counted towards the indicator as before, but only the share of FC financing (assumed to be 20 %). The value was ultimately corrected to 97,000 tCO2 within the scope of the final inspection due to annual fluctuations in electricity generation by the SHP plants, higher construction costs and the lower FC share (12.8%), with the planned values of the SHP plants serving as the basis

Indicator 1

The investments in the SHP plants resulted in savings of 77,362 tCO2 per year. The savings from the PV systems can only be roughly estimated, as there is no precise information on the extent to which previous energy sources such as candles, paraffin lamps, batteries and small diesel generators were replaced by the PV systems. For this reason, the possible emission savings of the PV systems were not taken into account for indicator 1.

RE-Technology	Capacity (MW)	Annual production (GWh/year)	Emission factor ($t_{CO2/MWh}$)	Emissions avoidance (tCO2/year)	FC share Financ-ing	FC share of electricity production (MWh/year)	FC share of emissions reduction ($t_{CO2/year}$)
SHP plants < 20 MW	**146,2**	**805**	**0,522**	**478.840**	**18,4%**	**148**	**77.362**

Table 1: CO2 savings from the small hydropower plants

Indicator 2

According to the grid operator (COES), electricity production from the 8 SHP plants averaged 805,450 MWh per year between 2020 and 2023. The contractually agreed feed-in tariff fluctuates around USD 57/MWh depending on the SHP plant. Each year, the SHP plants would therefore generate inflation-adjusted revenues of around USD 45.8 million p.a., around 12 % of the total investment of USD 382.2 million. According to estimates by the operators and international experience, the annual operating and maintenance costs (including interest and amortisation payments) amount to 2.5 % to 4.2 % of the investment sum, i.e. USD 9.56 to 16 million[10]. The investment in the power plants is therefore in principle profitable and would amortise after 10-13.5 years according to this rough calculation.

Accompanying measure

However, the accompanying measure, which was intended to identify approaches for financing energy efficiency measures at industrial companies (component B) in addition to training measures for financing RE/EE projects at the participating financial intermediaries (component A), was not implemented. The reasons given were budget problems with the counterpart contribution, numerous staff changes, uncertainties regarding the development of the portfolio in the energy sector (cancellation of financing for generation capacities) and the restructuring of COFIDE. The cancellation of the accompanying measure was associated with the fact that loans for EE measures were not granted as part of the project(11).

10. Quality of implementation

COFIDE managed the granting of the loans by the IFs and paid particular attention to ensuring that the interest rate advantages were passed on and that key EIA standards were taken into account when granting the loans. Although Peruvian law does not require a full environmental study for small hydropower plants, all 8 hydropower plants were subjected to an environmental assessment, which was reviewed by KfW. In addition, environmental and social action plans (ESAPs) were drawn up, the implementation of which was monitored by external consultants in quarterly or half-yearly progress reports. However, implementation of the environmental and social measures was slow overall. As part of the monitoring of the project, five of the eight SHP plants were visited during the construction phase and after completion. Although measures to reduce environmental and social risks were suggested, overall there were no indications of gross violations of key technical or environmental and social standards

[9] Households would generally receive a 120 W PV system, health centres 600 W and schools a 1200 W system, whereby the regulator assumes smaller system sizes (100 W, 500 W and 1000 W) for the remuneration in accordance with the contractual agreements.

[10] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2012/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf

11. *Unintended effects (positive or negative)*

With COFIDE's decision to also use the FC funds to finance the PV measure,
205,000 households in remote areas got access to electricity. Assuming an average household size of 4 people, more than 800,000 people have now access to a basic electricity supply. The programme thus made a direct contribution to SDG 7 of providing all households, including disadvantaged groups, with access to modern, sustainable and affordable energy.

Rating summary

The programme has achieved or largely achieved its objectives at both output and outcome level. In the case of a loan fund, which promotes different RE technologies, it is difficult to set precise, realistic target values for electricity generation and CO2 savings/avoidance in the PV because they depend on the technology being promoted and therefore on the technology mix. The target value for the EPE was therefore adjusted and related to the planned values when the concession was awarded. The capacity utilisation and electricity generation of the SHP plants largely correspond to the planning, even if they are slightly lower on average than assumed due to seasonal factors. Accordingly, CO2 avoidance is slightly below the target value, but still at the intended target level. At the same time, all subsidised RE individual measures are profitable and amortise within an economically reasonable period of time.

The original plan was to divide the funding into smaller amounts in order to support a larger number of RE and EE projects. However, the tenders for non-conventional RE projects were dominated by medium-sized projects, particularly hydropower plants up to 20 MW. The co-financing of these projects was therefore a logical step. The financial participation in the rural PV programme, which provided over 200,000 families, several thousand schools and several hundred health posts with access to electricity for the first time, is equally positive due to the poverty reduction effect.

Contrary to the original plan, no energy efficiency measures were supported with FC funds, which is why no improvement in energy efficiency was achieved as formulated in the objective. In the second phase, conclusions should have been drawn from COFIDE's focus on RE and the EE objective should have been abandoned. However, the promotion of EE measures continued in the second phase, but without success, which had a negative impact on the effectiveness of the second phase. However, this did not affect the target values stated in the indicators.

Overall, the effectiveness of phase 1 is rated as successful, while the effectiveness of phase 2 is rated as limited.

Effectiveness: Phase 1: 2, Phase 2: 3

Efficiency

12. *Production efficiency*

As part of the programme, 8 small hydropower plants with a total capacity of 146 MW were financed. The total investment for the hydropower plants amounted to USD 381.7 million. This corresponds to USD 2,651 per kW. This is a common value for small hydropower plants in international comparison, which shows that the plants were not built at excessive costs, although the costs were 6.5% higher than originally planned due to flooding, landslides and the repair of access roads and the associated additional costs. In addition, 208,145 PV systems with a total capacity of 27.8 MW were financed. The investment costs totalled USD 219.3 million. On average, a PV system had a size 133.8 W at a cost of around USD 1,054. The investment costs for the PV systems are also within the usual international range. KfW's share of the total financing for all systems totalled EUR 65 million or around 12.8% of the total investment costs.

The loan agreement and the special agreements for the first phase were signed with a three-year delay in 2013, while the contract and the agreements for the second phase were also signed with a delay of several years in 2016. Originally, a period of four years each was planned for the implementation of the measures. However, both phases required a significantly longer period and were only formally concluded on 6 December 2021, although this had no impact on the costs.

[11] The original plan was to use 20 % of FC funds for RE measures

Efficiency

13. Production efficiency

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14. Allocation efficiency

According to the operator of the national interconnected system (Comité de Operación Económica del Sistema Interconectado Nacional - COES), the 8 SHP plants have fed an average of around 805,000 MWh into the grid over the last four years (2020 - 2023). The total amount corresponds to around 85% of the target figures announced by the operators in the various tenders, which indicates that the planned capacity utilisation of the power plants will largely be achieved, taking seasonal fluctuations into account. With an emission factor of the Peruvian electricity mix of 0.522 tonnes of CO2/MWh, the electricity generated with the help of hydropower would save 420,445 tonnes of CO2 per year. If the savings are to be secured over 20 years resulting in emission savings of 8,409,000 tonnes of CO2, inflation-adjusted operating and maintenance costs of USD 191 million (around USD 9.56 million per year) would have to be incurred in addition to the investment costs of USD 382.2 million. This results in an investment cost of around USD 68[12] per tonne of CO2 saved,, which is close to the EU emissions trading price of the last two years[13].

Irrespective of the benefits to society as a whole through the avoidance of CO2 emissions, the project is also profitable from a macroeconomic perspective and cost-effective compared to other energy sources. The dynamic production costs of the small hydropower plants are estimated at USD 0.032/kWh. The feed-in tariff has a contractually agreed amount of 0.054 - 0.0599 USD/kWh. These were the lowest feed-in tariffs that could be achieved in the auctions. In comparison, the necessary feed-in tariffs for other renewable energy sources were significantly higher, as shown by the average prices in the second tender: Hydropower: USD 53/MWh, Wind: USD 69/MWh, Biomass: USD 100/MWh, Solar: USD 120/MWh.

Rating summary

The investment costs for the SHP plants per installed MW were satisfactory by international standards. Due to the good capacity utilisation, the costs per tonne of CO2 saved/avoided are also satisfactory. The contractually agreed feed-in tariffs are low compared to other renewable energy sources and therefore favourable from a macroeconomic perspective. At the same time, they are high enough to ensure that the investments are sufficiently profitable. Overfunding of the final borrowers can be largely ruled out, as the projects with the lowest feed-in tariffs for RE were subsidised through the auctions. The programme also did not weaken the role of private financial institutions and banks, as they did not offer comparable long-term financing for investments in smaller RE projects. Larger investments in the RE sector were financed directly by large companies or investors. The allocation efficiency is therefore positive from an economic perspective, both in terms of CO2 avoidance costs and costs per KWh generated. Overall, the efficiency of both phases is rated as successful.

Efficiency: Phase 1: 2, Phase 2: 2

[12] (382,200,000+ 191,000,000)/8,409,000= 68.17

[13] EU ETS: How much will CO_2 prices rise by 2030? | EY - Germany

Impact

15. Overarching (intended) developmental changes

The goal adapted as part of the EPE was a more sustainable, secure, climate and environmentally friendly energy supply in Peru.

The achievement of the objective at impact level can be summarised as follows:

Table Target achievement Impact:

Indicator	Status PP	Target value according to PP	(optional) Actual value at AK	Actual value for EPE
(1) Increase in the share RE in electricity generation (5 years after the start of implementation)	NCRE Production: 1.83 % (2012 IRENA).	5 % (2013 target) 15% (2030 target)	9,7 %	10,1 % Fulfilled
(2) Increase in COFIDE's portfolio in the RE/EE sector (5 years after start of implementation)	0	EUR 79.25 million (phase 1+2)[14]	EUR 403.84 million	EUR 231 million Fulfilled
(3) Good portfolio quality of the RE/EE investments COFIDEs (Portfolio at Risk PaR> 30 days)	-	< 5 %	0 %	0 % Fulfilled

16. Contribution to overarching (intended) developmental changes

Indicator 1:

The Peruvian government is pursuing three main objectives in the energy sector in accordance with the Plan Energético Nacional 2014-2025: (i) ensuring security of supply from national energy sources, (ii) securing the long-term supply of energy in rural areas and (iii) diversifying the energy sources used to generate electricity. Energy production from conventional hydropower was to be doubled by 2022, the share of non-conventional renewable energies in generation was to be increased to five per cent by 2018 and a 100 per cent supply of electricity to the population was to be guaranteed in all parts of the country. The FC programme was intended to contribute to objectives i (security of supply) and iii (diversification with the help of RE). As part of the adaptation of the programme, objective ii (rural energy supply) was also addressed.

[14] The indicator describes the level COFIDE's own contribution to financing the ERNC measures supported. The target value corresponds to the committed FC funds of EUR 65 million plus COFIDE's expected counterpart contributions.

During the term of the project from 2013 to 2021, Peruvian electricity production increased by over 30 % from around 40 TWh[15] to 55 TWh.[16] During the same period, generation capacity increased by 69 % from 8.3 to around 14 GW. The country already achieved a very high level of security of supply in 2015 in the form of an oversupply of electricity, which was due to the lower growth rates in electricity demand coupled with the simultaneous high expansion of generation capacity. The electricity reserve has therefore been high in recent years (46% in 2015 and 44% in 2021) and has meant that thermal power plants have increasingly been kept in reserve(17).

Between 2013 and 2021, the share of electricity generated with hydropower in Peru rose from 51.3 % to 56.2 %, and that generated with solar energy from 0.5 % to 1.4 %. Wind energy did not play a role in 2013 (0%), in 2021 it had a share of 3.2 %. Overall, the share of RE (excluding hydropower) grew from 2.7 % to 5.6 % during this period. If hydropower plants with a capacity of up to 20 MW, which account for around 8% of installed hydropower capacity, are also taken into account, the share of ERNC is around 10.1%. The FC programme provided financial support for the installation of SHP plants with a total capacity of 146 MW. This corresponds to around 10 % of the increase in hydropower generation capacity for the period 2013 to 2021.[18] The share of ERNC capacity growth in this period was over 30 %.

Indicator 2

The indicator was intended to measure the amount of COFIDE's own contribution to financing the ERNC measures supported. The target value corresponded to the total committed FC funds of EUR 65 million plus COFIDE's expected counterpart contributions. In the programme proposal to the BMZ from June 2010, which covers both phases, this indicator was set at EUR 112 million, which corresponded to the committed FC funds of EUR 65 million plus the counterpart contributions of all parties involved in the financing (COFIDE; FI; borrower) of at least 20%. It was later agreed that the FIs' and borrowers' own contributions would not be taken into account. The main reason for this was the assessment that a financing share of 20 % could not be provided by the commercial banks and final borrowers. In addition to COFIDE refinancing, the effort involved in finding another refinancing option on the market at favourable conditions with limited chances of success would have been too high for many banks. This resulted in EUR 31.25 million for phase 1 and EUR 48 million for phase 2 = EUR 79.25 million = FC share (65 million) + COFIDE (14.25).

COFIDE actually contributed own funds totalling USD 192 million (around EUR 165 million) to finance the projects supported as part of the programme. Together with the FC contribution, this totalled around USD 269 million (approx. EUR 231 million). The target value of EUR 79.25 million was therefore exceeded by a factor of 2.9.

If we consider not only COFIDE's contribution to the jointly funded projects but also the portfolio in the RE/EE sector as a whole, it should be noted that COFIDE has also participated with its own funds in ERNC projects that were selected in the four auctions but did not receive FC funds. Accordingly, COFIDE's total investments in renewable energies in the five years since the start of the programme are well over EUR 165 million. However, the portfolio has declined in recent years due to overcapacities. The debt capital for investments in larger RE projects is now mainly provided directly by national, regional and international financial institutions.

At the same time, the high participation of other financial institutions in the funded projects shows that COFIDE and the project developers had no difficulty in mobilising further financing (in this specific case amounting to around USD 333 million = EUR 287 million). The total investment volume of the projects thus totalled around USD 602 million (approx. EUR 518 million). With the FC funds of EUR 65 million, additional funds of around EUR 453 million were therefore mobilised.

[15] TWh= 1 terawatt hour= 1,000,000,000 kilowatt hours

[16] Slightly different data is available depending on the source of information. According to https://ourworldindata.org/energy/country/peru?country=~PER, 43.51 TWh were generated in 2013 and 56.77 TWh in 2021, according to https://www.coes.org.pe/Portal/portalinformacion/generacion the values are Generación Total: 39.92 TWh and 54.53 TWh

[17] https://cdn.www.gob.pe/uploads/document/file/5277829/4742711-anuario-estadistico-2022.pdf?v=1697225335

[18] Peru's installed hydropower capacity was around 4,200 MW in 2013 and 5,500 MW in 2021. This corresponds to a difference of 1,300 MW.

Indicator 3

According to information from COFIDE, there are no outstanding or overdue arrears in the repayment of the loans (interest and amortisation) by the project developers. Accordingly, the portfolio at risk or PAR figure is 0. The long-term purchase payments for connection to the national supply grid SEIN, which were stipulated as part of the concession award, were a key factor in the success of the financing and the high repayment behaviour, enabling the SHP plants and PV systems to be operated profitably even when electricity prices are otherwise falling.

17. Contribution to overarching (unintended) developmental changes

Access to electricity through individual PV systems generally leads to an improvement in the living conditions of the population in remote areas, as scientific studies show.[19] The services provided by schools and health centres also improve thanks to electric light and the use of electrical appliances. However, there are no corresponding studies on the developmental impact of PV systems in Peru.

There are no known negative environmental or social impacts from the construction and utilisation of the SHP plants and PV systems.

Rating summary

The programme contributed to diversifying Peru's energy matrix by increasing the ERNC share and reducing the energy deficit, even though the share of financed SHP plants in the increase in total capacity was low. The promotion of RE projects also contributed to the more efficient use of resources and thus to the reduction of CO2 emissions as well as to the structural dissemination of RE investments.

The project's intended effect of sustainably securing the financing of further ERNC projects via COFIDE has become less important due to the oversupply of generation capacity. Due to the cost advantages, the further expansion of electricity generation based on RE will mainly be carried out by larger projects and companies with access to the international capital market. Overall, the programme is rated as successful in terms of its impact in both phases.

Impact: Phase 1: 2, Phase 2: 2

Sustainability

18. Capacities of the beneficiaries and stakeholders

The programme executing agency, the state development bank COFIDE, is internationally recognised as a technically and organisationally professional bank that works successfully with international financial institutions. This generally positive assessment has not been altered by the structural shortcomings and management errors that have occurred at COFIDE in the meantime. A major bad investment had led to a comprehensive change in management personnel as well as stricter lending guidelines and risk classifications. As a private-sector credit institution, COFIDE is subject to Peruvian banking legislation and supervision. It is independent in its decisions and not bound by political directives. COFIDE has been rated BBB by Fitch and S&P for years, which corresponds to the risk rating of the Republic of Peru and an investment grade rating. COFIDE is financially, organisationally and in terms of personnel in a position to set up new credit lines to promote RE/EE projects at any time if required.

The FC funds were used to provide loans to a total of five private-sector companies to finance the Runatullo II y III, El Ángel I, El Ángel II y El Ángel III, de Agosto and El Carmen, H1 hydropower plants. A company received a loan for the PV systems. The majority of all companies are owned by financially strong investors, some of them international, with many years of experience in the energy sector. The operators of all funded projects have the necessary technical, financial, organisational and human resources to operate the plants sustainably, even in the event of microeconomic problems

[19] See the recently published study by DEVAL with numerous references: Access to (green) energy in rural Africa (https://www.deval.org/fileadmin/Redaktion/PDF/05-Publikationen/Berichte/2024_Energie_Afrika/2024_DEval_GrueneEnergie_Afrika_ web_barrierefrei.pdf)

19. Contribution to supporting sustainable capacities

The programme supported COFIDE in expanding its environmental and social management system and integrating it into internal processes. The programme had no influence on the extensive structural and management changes in 2017.

There was no immediate need for support from the operators of the various plants with regard to sustainable capacities.

20. Durability of impacts over time

According to the information available, the SHP plants have a high level of availability and capacity utilisation. An evaluation of the electricity generation data for the years 2020 to 2023 only shows a downtime of 5 months in 2020 for the El Carmen SHP plant. In the remaining months and years, electricity production is on schedule and only fluctuates depending on the amount of water and flow velocity. All SHP plants were in good maintenance condition during project visits. There are no indications that they will not reach the planned service life of at least 20 years for technical reasons.

As shown in the chapter on effectiveness, all SHP plants can be operated profitably, provided no unforeseen problems occur and the capacities are utilised as planned. Although electricity purchase prices on the wholesale electricity market may turn out to be very low as a result of oversupply, as in previous years, this will not have a negative impact on the SHP plants, as the feed-in tariffs are contractually fixed in the long term and electricity from hydropower is prioritised for feeding into the grid.[20] From today's perspective, there is therefore a sufficient revenue base for the sustainable operation of the SHP plants in the coming years.

According to the regulator Osinergmin, the annual number of installed PV systems that are not operational is relatively low.[21] For example, the number of defective systems in 2022 was 8282, which corresponds to around 4% of the total number of 208,145. The main reason for the high durability of the basic power supply is the contractual obligation of the concessionaire (ERGON) to ensure the operability of the PV systems for 15 years. For this period, ERGON receives around 66 soles (EUR 15.6) per month from the Peruvian government for each functioning system. As the number of functioning or defective systems is regularly recorded on a monthly basis, the failure of a higher number of PV systems would lead to a loss of income for ERGON, which is why the company has a great interest in ensuring that the systems are in an operational condition through regular maintenance and repairs.

Rating summary:

The COFIDE credit line supported by the programme was used to co-finance long-term investments in RE technologies with an expected useful life of 20 years (hydropower plants) and 15 years (PV systems). Due to the high level of professionalism of the operating companies, the long-term contractually agreed purchase prices for the electricity generated and the prioritised feed-in of electricity from RE sources, sustainable use of the subsidised systems in accordance with the concessions granted can be expected from today's perspective. This will have a positive impact on Peru's energy mix and the associated CO2 emissions in the coming years.

[20] For example, the average electricity trading price in Peru in 2015 was only USD 15 per MW/h, while feed-in tariffs of at least USD 54 per MW/h were contractually agreed in the concession agreements for the SHP plants.

[21] Systems that have not been repaired within 7 days of receipt of the damage report are categorised as non-functional.

Overall rating: 2

At the time of planning and implementation, the project was an important and relevant element of Peruvian policy to increase security of energy supply through national energy sources, improve access to energy in rural areas and diversify power generation with the help of non-conventional renewable energies. The project was also of high interest to German development cooperation due to its impact on climate policy and its signalling effect for the RE sector. The programme design was fundamentally consistent and suitable for addressing key problems in the Peruvian energy sector in line with the stated objectives. The pragmatic adaptation of the concept during the implementation of the programme also made it possible to improve access to energy in rural areas. However, the promotion of EE measures was cancelled. With COFIDE as the executing agency and the intermediary financial institutions as lenders for the end customers, the programme was well integrated into the national structure for financing RE projects. Coordination with the relevant national actors was correspondingly good. The programme was successful in terms of the results achieved in promoting RE investments (output). Eight small hydropower plants and over 210,000 PV systems were installed, all of which produce electricity in line with their capacity and largely as planned. The programme has therefore achieved its objectives (outcome) in terms of annual CO2 emission avoidance and the basic profitability of the systems. This resulted in the expected effectiveness. The effectiveness at output and outcome level is also reflected in the high production and allocation efficiency. The developmental impact of the project is reflected in the increase in the share of renewable energy in Peru's electricity generation and in the mobilisation of additional funds for RE investments. By co-financing PV systems in rural areas, the programme also helped disadvantaged population groups to get access to a basic power supply for the first time. At the time of the evaluation, the programme is expected to be highly sustainable, as the individual projects were reviewed by COFIDE and various external experts in terms of technical, environmental and social aspects and their quality was rated as good. The operational management also demonstrated a high level of professionalism overall. Due to the oversupply of electricity, further tenders and corresponding COFIDE credit lines for smaller non-conventional RE plants are not expected in the short term, but investments will continue to be made in RE plants (primarily in solar and wind parks), with commercial banks playing a key role here. COFIDE has sufficient expertise and the organisational and technical capacity to set up and manage credit lines for RE/EE if required.

Overall, the phases of the programme are therefore rated as successful.

Contributions to the 2030 Agenda

By financing 8 small hydropower plants, the programme supported the Peruvian government's efforts to increase the share of renewable energies in Peru's electricity generation. At the same time, the installation of over 210,000 PV systems improved access to electricity for households and social institutions in remote rural areas. The programme thus contributed to the seventh Sustainable Development Goal (SDG 7) "Affordable and Clean Energy" with the two sub-goals of ensuring that all people have access to affordable, reliable and modern energy and that the share of renewable energy in the global energy mix is significantly increased. Originally, it was also planned to finance energy efficiency measures and thus also support the achievement of the third sub-goal "The global rate of increase in energy efficiency should be doubled". However, this component was not realised. Both the hydropower plants and the PV systems will avoid additional CO2 emissions from the electricity sector totalling over 480,000 tCO2/year, which means that the project will contribute to achieving the national climate targets in accordance with the Paris Climate Agreement (NDC Peru) and of SDG 13 Combating climate change and its impacts. Creating access to electricity for households and public facilities improves the living conditions of households in rural areas as well as the services provided by schools and health centres. Although these impacts have not been measured in detail, international studies show corresponding effects that relate to the sustainability goals SDG 1 "Reduce poverty", SDG 3 "Good health and well-being" and SDG 4 "Quality education".

Project specific strengths/weaknesses and general conclusions/lessons learned

The strengths and weaknesses of the project include in particular:

- The main strength of the project was that all parties involved (COFIDE, financial intermediaries, private sector concessionaires) had good technical, organisational and management skills, so that the construction of the hydropower plants and the installation of the PV systems were largely carried out without any problems and with good quality.
- Particularly noteworthy is the high mobilisation of private sector capital, which is also favoured by the good framework conditions for RE investments.
- The PV component to ensure a basic power supply for households, schools and healthcare facilities in remote areas is exemplary due to its high level of sustainability.
- The main weakness of the programme was that it was not possible to promote energy efficiency measures as part of the programme, although there is considerable potential for energy savings, particularly in the production sector. The accompanying measures planned for EE could not be realised.

Conclusions and lessons learned:

- The (co-)financing of credit lines for RE and EE enables the partner to utilise the funds flexibly and effectively in line with requirements, provided that the intended use of the funds is not too limited. In this case, the original intention of the programme to use the funds for small-scale RE and EE measures proved to be less sensible than larger projects for which concessions had already been awarded.
- Concession agreements of 20 years (hydropower) and 15 years (PV systems) favour a high sustainability of the measures.
- The PV component represents an interesting approach to ensuring a high level of sustainability in the provision of autonomous solar systems for low-income population groups. Although the Peruvian state has to subsidise the PV systems and their functionality for 15 years, this type of power supply is more cost-effective than a highly subsidised expansion of the power grid in remote, sparsely populated areas. The time since the systems were installed is still too short to derive any conclusive lessons learnt. If possible, the use and maintenance of the systems and the associated financial and social implications should be monitored further, as the experience gained can provide valuable information for the design of decentralised energy access projects.

Evaluation approach and methods

Methodology of ex-post evaluation

The ex-post evaluation follows the methodology of a rapid appraisal, i.e. a data-supported, qualitative contribution analysis and represents an expert judgement. This involves attributing impacts to the project through plausibility considerations based on the careful analysis of documents, data, facts and impressions. Where possible, this also includes the use digital data sources and modern techniques (e.g. satellite data, online surveys, geocoding). Causes of any contradictory information are investigated, attempts are made to eliminate them, and the assessment is based on statements that are - if possible - confirmed by several sources of information (triangulation).

Documents:

- Internal project documents
- Specialist literature
- Websites of various organisations with detailed information on Peru's energy sector and the individual power plants
- Strategy papers and studies

Data sources and analysis tools:

- Databases from OSINERGMIN and COES
- Data of the hydropower plant operators
- Data collection on site
- Monitoring data of the partner

Interview partner:

- Ministry of Energy
- Project organiser
- Regulator
- Network operator
- Electricity supplier
- GIZ
- Operator of the hydropower plants
- Target group

The analysis of impacts is based on assumed interdependencies, documented in the impact matrix developed during the project appraisal and, if necessary, updated during the ex-post evaluation. The evaluation report presents arguments as to why which influencing factors were identified for the identified results and why the analysed project presumably made which contribution (contribution analysis). The context of the development measure is taken into account with regard to its influence on the results. The conclusions are set in relation to the availability and quality of the data basis. An evaluation design is the reference framework for the evaluation.

For project evaluations, the method offers - on average - a balanced cost-benefit ratio, in which the gain in knowledge and the evaluation effort are in equilibrium and allows a systematic assessment of the effectiveness of FC projects across all project evaluations. The individual ex-post evaluation can therefore not fulfil the requirements of a scientific assessment in the sense of a clear causal analysis.

The following aspects limited the evaluation: none

Methodology of the performance evaluation

A six-point scale is used to assess the programme according to the OECD DAC criteria. The scale values are assigned as follows:

Level 1 Very successful: result significantly above expectations

Level 2 Successful: result fully in line with expectations, without significant deficiencies

Level 3 Moderately successful: below expectations, but positive results dominate

Level 4 Moderately unsuccessful: is significantly below expectations and negative results dominate despite recognisable positive results

Level 5 Unsuccessful: despite some positive partial results, the negative results clearly dominate

Level 6 Highly unsuccessful: the project is useless or the situation has worsened

The overall rating on the six-point scale is based on a project-specific weighting of the six individual criteria. Levels 1-3 of the overall rating indicate a "successful" project, while levels 4-6 indicate an "unsuccessful" project. It should be noted that a project can generally only be considered developmentally "successful" if the achievement of the project objective ("effectiveness") and the impact on the overall objective ("impact") as well as the sustainability are rated as at least "Moderately successful" (rating 3).

The annex to this report is available upon request (German only).

Imprint

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