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IMPLEMENTATION COMPLETION AND RESULTS REPORT

GEF-TF-14400

ON A

GRANT

IN THE AMOUNT OF US$12.69 MILLION

TO THE

Republic of Uzbekistan

FOR THE

SUSTAINABLE AGRICULTURE AND CLIMATE CHANGE MITIGATION PROJECT (GEF)

September 12, 2018

Agriculture Global Practice

Europe And Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective August 22, 2018)

Currency Unit =	Uzbek Som (UZS)
UZS 7,800 =	US$1
US$1.40 =	SDR 1

FISCAL YEAR
July 1 - June 30

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ABBREVIATIONS AND ACRONYMS

AF	Additional Finance
ADB	Asian Development Bank
CO2	Carbon Dioxide
CPS	Country Partnership Strategy
EF	Energy Efficiency
EMF	Environmental Management Framework
FFS	Farmer Field Schools
FBM	Feedback Mechanism
FM	Financial Management
GIZ	German Corporation for International Cooperation GmbH
GEF	Global Environment Facility
GEOs	Global Environmental Objectives
GoU	Government of Uzbekistan
GHG	Greenhouse Gas
IA	Impact Assessment
ISRs	Implementation Status and Results Reports
IFC	International Finance Corporation
ILO	International Labor Organization
IRENA	International Renewable Energy Agency
I&D	Irrigation and Drainage
MIS	Management Information System
MGP	Matching Grant Program
MAWR	Ministry of Agriculture and Water Resources
MoE	Ministry of Economy
MoF	Ministry of Finance
M&E	Monitoring and Evaluation
PFI	Participating Financial Institutions
PAD	Project Appraisal Document
PDOs	Project Development Objectives
RE	Renewable Energy
RF	Results Framework
REIR	Rural Enterprise Investment Guidelines
RRA	Rural Restructuring Agency
RESP II	Second Rural Enterprise Support Project
SME	Small and Medium -sized Enterprises
SEE	State Ecological Expertise
SACCMP	Sustainable Agriculture and Climate Change Mitigation Project
TPM	Third-Party Monitoring
UNDP	United Nations Development Program
WCA	Water Consumer Associations
WUA	Water User Associations
WB	World Bank

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P127486	SUSTAINABLE AGRICULTURE AND CLIMATE CHANGE MITIGATION PROJECT (GEF)
Country	**Financing Instrument**
Uzbekistan	Investment Project Financing
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
Republic of Uzbekistan	Rural Restructuring Agency under Ministry of Agriculture and Water Resources, Ministry of Agriculture and Water Resources

Project Development Objective (PDO)

Original PDO

The Global Environmental Objectives of the proposed Project are to (i) promote the introduction of renewable energy and energyefficiency technologies of relevance to agri-businesses and farms; and (ii) strengthen capacity for improving degraded irrigatedland and water conservation in the project area.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
TF-14400	12,699,000	12,699,000	12,576,327
Total	**12,699,000**	**12,699,000**	**12,576,327**
Non-World Bank Financing			
Borrower	0	0	0
Total	**0**	**0**	**0**
Total Project Cost	**12,699,000**	**12,699,000**	**12,576,327**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
29-Jan-2013	07-May-2014	04-Dec-2015	31-Dec-2016	31-Mar-2018

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
02-Aug-2016	3.19	Change in Loan Closing Date(s) Change in Implementation Schedule Other Change(s)
28-Sep-2017	10.25	Change in Results Framework Change in Components and Cost Reallocation between Disbursement Categories Change in Procurement

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Moderately Satisfactory	Moderately Satisfactory	Modest

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
09	28-Jun-2013		Moderately Satisfactory	0
10	04-Jan-2014		Moderately Unsatisfactory	0
11	09-Jul-2014		Moderately Satisfactory	2.00
12	18-Dec-2014	Satisfactory	Moderately Satisfactory	2.00
13	08-Jun-2015	Satisfactory	Moderately Satisfactory	2.17
14	20-Aug-2015	Moderately Satisfactory	Moderately Unsatisfactory	2.17
15	14-Mar-2016	Moderately Unsatisfactory	Moderately Unsatisfactory	2.44
16	29-Jul-2016	Moderately Satisfactory	Moderately Unsatisfactory	3.19
17	06-Feb-2017	Moderately Satisfactory	Moderately Unsatisfactory	4.62
18	09-Jun-2017	Moderately Satisfactory	Moderately Satisfactory	6.86
19	29-Dec-2017	Moderately Satisfactory	Moderately Satisfactory	11.77

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Agriculture, Fishing and Forestry	**57**
Agricultural Extension, Research, and Other Support Activities	24
Crops	4
Irrigation and Drainage	29

Energy and Extractives	**43**
Renewable Energy Biomass	7
Renewable Energy Geothermal	7
Public Administration - Energy and Extractives	15
Renewable Energy Solar	7
Renewable Energy Wind	7

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Urban and Rural Development	**29**
Rural Development	29
Rural Infrastructure and service delivery	7
Land Administration and Management	22
Environment and Natural Resource Management	**70**
Climate change	38
Mitigation	38
Renewable Natural Resources Asset Management	26
Biodiversity	13
Landscape Management	13
Water Resource Management	6
Water Institutions, Policies and Reform	6

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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. **In 2008, Uzbekistan was the 35th largest carbon dioxide (CO_2) emitter and the most carbon-intensive economy in the world: CO_2 emissions amounted to 124.9 million tons, and CO_2 emissions per unit of GDP were more than twice the level of Russia and three times the ECA average.** The largest source of total greenhouse gas (GHG) emissions was the energy sector, which accounted for approximately 84 to 87 percent of total emissions in various years. The majority of GHG emissions in the energy sector were related to fuel combustion and methane leakage. Regarding CO_2 emissions from fuel combustion, electricity and heat production were the main emitters, followed by the residential sector and manufacturing industries. The second largest source of GHG was agriculture, which accounted for 8.2 percent of GHG in 2005. The majority of GHG emissions from agriculture (not related to fuel combustion) was due to fermentation and agricultural soils. The agricultural sector was also a major consumer of electricity, using 24 percent of final electricity consumption. This was as much as the residential sector consumed; 70 percent of the electricity consumption by the agricultural sector was used for irrigation pumping.

2. **The Government of Uzbekistan (GoU) was committed to reduce GHG emissions.** The country joined the United Nations Framework Convention on Climate Change in 1993 and ratified the Kyoto Protocol in 1999. Given the importance of the energy sector in total GHG emissions, the mitigation strategy focused on energy policy measures. Due to the high energy intensity of the economy, the GoU assigned strategic priority to improving efficiency in power generation, delivery and end-use. To this end, the GoU amended the Law on Rational Energy Utilization in 1997, adopted an Energy Saving Program as well as several decrees to improve energy efficiency in different sectors. Other laws concerning environmental protection included the Law on Protection of Nature, Air Protection and Ecological Expertise. Along with the GoU's efforts to reduce energy intensity, different donors and multilateral institutions, such as United Nations Development Program (UNDP), Asian Development Bank (ADB), and German Corporation for International Cooperation GmbH (GIZ) were active in promoting the use of renewable energy technologies in Uzbekistan. The World Bank (WB) also supported the promotion of energy efficiency in industries and reduction of gas flaring, which also contributed to mitigating GHG emissions.

3. **The vast potential for reducing greenhouse gases by promoting energy efficiency and renewable energy technologies was in sharp contrast with the low volume of actual investments in energy efficiency and renewable energy.** The reasons for this disparity were informational, technical, financial, institutional, and policy-related barriers constraining the promotion and market penetration of low-carbon technologies. Relatively low energy prices hampered the financial viability of investments in energy efficiency and renewable energy technologies. Although energy prices had increased since 2002 and cross-subsidies were gradually removed, average end-user tariffs remained relatively low at around US$0.05/kWh. The legal and regulatory framework remained fragmented and underdeveloped. The lack of provisions allowing and incentivizing the feed-in of electricity from renewable energy sources into the grid constituted a major barrier to the promotion of renewable energy. Other barriers preventing the scaling-up of renewable energy and energy efficiency included the lack of access to finance as well as insufficient information and technical capacities.

4. **Scarcity of water resources and land degradation were main challenges in the agricultural sector.** The main reasons for the degradation of pastures were anthropogenic desertification, aridization of the climate, as well as an increase in the number of cattle livestock over the last 15 years. Additionally, natural features such as the absence of natural drainage flow, low atmospheric precipitation, and high vaporability resulted in increased salinization of soils, wind and water erosion throughout the country. The growing rate of salinization was considered one of the main causes for land degradation. Other factors that degraded land and negatively affected agricultural production included irrational water use, physical aging of irrigation and drainage systems, ineffective methods of irrigation, absence of crop rotation, and low humus content.

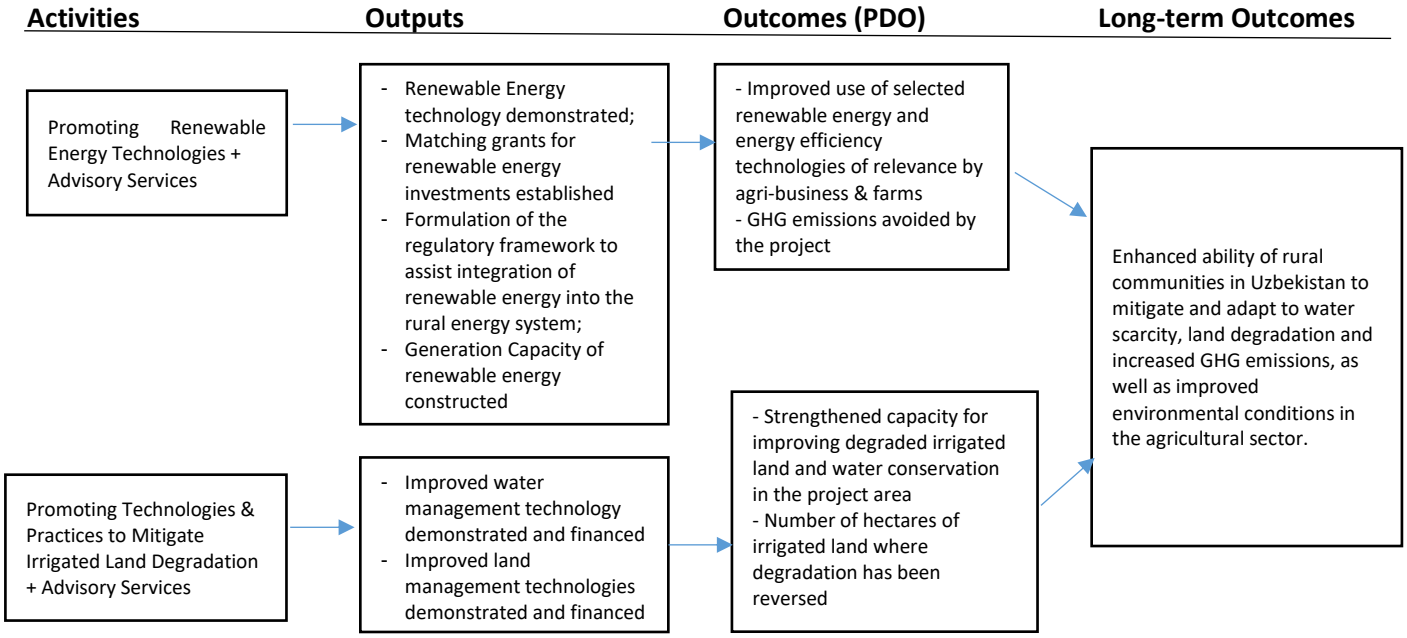
5. **The GoU was keen to develop the agricultural sector and address its major challenges, including those related to climate change.** The Global Environment Facility (GEF)-funded Sustainable Agriculture and Climate Change Mitigation Project (SACCMP) was conceived to promote the use of renewable energy for provision of rural energy services, and support new low-GHG emitting energy technologies. It also aimed at maintaining and improving flows of agro-ecosystem services to sustain livelihoods of local communities. The project was aligned with the 2012-15 World Bank Country Partnership Strategy (CPS) objectives of (i) increasing the efficiency of infrastructure; (ii) enhancing the economy's competitiveness; and (iii) diversifying the economy.

6. **The GEF project provided incremental financing to a larger program that included financing from IDA and the Swiss Development Cooperation.** The GEF project was closely intertwined with a larger program focused on rural enterprise development through the IDA financed Second Rural Enterprise Support Project (RESP II) and improving water management on irrigated agricultural lands through the Swiss Development Cooperation (SDC) financing. All three projects provided complementary financing and were planned in an integrated manner. The GEF project activities were sequenced to complement these other two projects and targeted the same beneficiary groups and geographic areas to generate additional global public goods and meet environmental goals.

Theory of Change (Results Chain)

7. The theory of change, or logic, behind the design of the project – as described in the Project Appraisal Document (PAD) – is illustrated in Figure 1. The links between the activities supported under the main components of the project and the related key outputs, desired outcomes, and long-term outcomes are presented.

Figure 1: Overview of the Project's Theory of Change



Project Development Objectives (PDOs)

8. The Global Environmental Objectives (GEOs) of SACCMP were to: (i) promote the introduction of selected renewable energy and energy efficient technologies of relevance to agri-business and farms; and (ii) strengthen capacity for improving degraded irrigated land and water conservation in the project area.

Key Expected Outcomes and Outcome Indicators

9. Key expected outcomes included: (i) improved use of selected renewable energy and energy efficiency technologies of relevance by agri-businesses and firms, and (ii) improved degraded irrigated land in the project area and improved use of water conservation technologies by project beneficiaries.

10. Key outcome Indicators included:

- GHG emissions avoided by the project;
- Number of hectares of irrigated land where degradation has been reversed;
- The formulation of the regulatory framework to assist integration of renewable energy into the rural energy system;
- Generation capacity of renewable energy constructed - Biogas

Components

11. The Project included three components designed to complement the four RESP II components (Rural Financing-IDA US$72.13 mln, Irrigation and Drainage-IDA US$26.38, Rural Training and Advisory Services-US$1.6 mln, and Project Management-US$4.45 mln) and Swiss Development Cooperation (parallel grant financing US$7.7 mln). The resources from RESP II and SDC parallel grant financing pooled to support improvement of agricultural

systems and water resources through the introduction of renewable energy and energy efficiency technologies and good practices for irrigated land. The project components consist of following:

12. ***Component 1: Promoting Renewable Energy Technologies (GEF US$9.0 million)*** – This component included the following activities: (i) support the dissemination of knowledge and information on renewable energy technologies (including, inter alia, bio-gas digesters, solar water heaters, solar photovoltaics and energy efficient irrigation pumps) by provision of goods, works and training for demonstration purposes in selected districts; and (ii) provision of support to beneficiaries for carrying out renewable energy subprojects through a matching grant mechanism that accompanied a line of credit.

13. ***Component 2: Promoting Technologies and Practices to Mitigate Irrigated Land Degradation (GEF US$1.1 million)*** – This component included the following activities: (i) support the dissemination of knowledge and information on technologies and management practices for controlling and reversing the degradation of irrigated lands (including, inter alia, improved land-levelling techniques, micro-irrigation methods, salinity coping measures, deep ripping and cropping diversification) by provision of goods, works and training for demonstration purposes in selected districts; (ii) provision of training to eligible farmers and Water Consumer Associations (WCAs) in selected districts on, inter alia, methods for efficiently using and scaling up the technologies and/or management practices under point (i) above.

14. ***Component 3: Advisory Services and Project Management (GEF US$2.6 million)*** – This component included the following activities: (1) provision of advisory services to, inter alia, (i) analyze and develop a regulatory framework aimed at supporting the adoption of renewable energy technologies; (ii) develop an improved system for monitoring carbon emissions produced by renewable energy subprojects; (iii) update the wind and solar maps of the Recipient's territory; and (iv) carry out financial feasibility studies on the adoption of renewable energy technologies; (2) provision of training and workshops to eligible farmers and students in selected districts on, inter alia: (i) the technical issues and financial and management aspects related to the adoption of renewable energy technologies; and (ii) the legislation and regulations (including regulations on health and safety issues) governing said technologies; (3) support to Rural Restructuring Agency (RRA) to design training and workshops (including developing technologies, curricula, tests, feedback forms and assessments of training and workshops) on, inter alia, the impact of climate change on agribusinesses and the Recipient's legislation and regulations governing renewable energy technologies; and (4) provision of support for the technical and administrative management of the project.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

15. No changes were made to the PDO, however some adjustments made to PDO indicator targets as described below.

Revised PDO Indicators

16. In September 2017, the project was restructured to adjust target values of one PDO indicator and one intermediate indicator. Specifically, the PDO indicator (i) Number of hectares of irrigated land where the degradation

was revised upwards, from 900 to 26,351; and the intermediate outcome indicator (ii) Investment in renewable energy in the agri-business sector measured as a number of sub-projects was revised downwards from 2,370 to 37, reflecting the actual sub-grant applications approved by the Participating Financial Institutions (PFIs). The actual value of each sub-project applications received by the PFIs was much higher than what was projected at appraisal, limiting the number of sub-projects supported under the project. The value of individual sub-projects increased significantly due to: (i) the demand by beneficiaries for greater biogas and energy efficient pumps capacity, which turned out to be more cost efficient than the smaller systems; and (ii) the higher prices of the equipment packages than was assumed at appraisal.

Revised Components

17. No changes.

Other Changes

18. In June 2016, the project was restructured to (i) extend the project closing date by 15 months from December 31, 2016 to March 31, 2018, to make up for the delays in effectiveness, and (ii) under Component 1, increase of the grant financing proportion of the Renewable Energy Sub-projects from 40 percent to 70 percent, with the remaining 30 percent to be co-financed by the beneficiary or credit line of the PFIs. The financing proportion was revised due to the lack of RESP II IDA funds on the fourth year of project implementation, which were fully disbursed, and the consequent closure of the RESP II Project on December 30, 2018.

19. In September 2017, the project was restructured to reallocate funds between the disbursement categories. Specifically, the GoU requested the reallocation of US$1.1 million from Unallocated (Category 4) to Goods, works, consultants, services (Category 1) to allow additional demonstration of renewable energy and energy efficient technologies (Component 1) in line with the project objectives. These unallocated funds remained unutilized under Component 2 Technologies and Practices to Mitigate Irrigated Land Degradation (US$0.3 million) and Component 3 Advisory Services and Project Management (US$0.8 million).

Rationale for Changes and Their Implication on the Original Theory of Change

20. The rationale for the extension of the project implementation period for 15 months in 2016 was to allow for the project to proceed with its implementation that was delayed due to the late effectiveness and the low disbursement during the first two years of the project implementation. The upward adjustment of the PDO indicator “Number of hectares of irrigated land where the degradation has been reversed” from 900 to 26,351 ha was a result of taking into consideration outputs and outcomes from the activities implemented in parallel by the Swiss Development Corporation (SDC) under the parent RESP II, which were difficult to decouple from the activities supported by this GEF project. These two projects worked together, contributing to the achievement of the same development outcome and helping significantly scale up the initially-projected impact. The downward revision of the intermediate outcome indicator “Investment in renewable energy in the agri-business sector measured as a number of sub-projects” was a result of the demand of the beneficiaries for larger sub-projects, which were also more efficient to adopt. Overall, the changes did not have a significant impact on the original theory of change.

II. OUTCOME

A. RELEVANCE OF PDO

21. The PDO *"to (i) promote the introduction of selected renewable energy and energy efficient technologies of relevance to agri-business and farms; and (ii) strengthen capacity for improving degraded irrigated land and water conservation in the project area"* remained and still remains highly relevant to Uzbekistan's priorities in agricultural and irrigation development, and supported the GoU's efforts to mitigate and adapt the sector to water scarcity, land degradation and increased GHG emissions.

22. The project also responded to the strategic goals of the GEF-5 Strategy to the Climate Change Mitigation focal area, namely, promoting the use of renewable energy for the provision of rural energy services, and supporting new long-GHG emitting energy technologies. Specifically, the project responded to the GEF's Objective 1 in the Land Degradation focal area to "maintain or improve flows of agro-ecosystem services to sustain livelihoods of local communities." The project supported rural communities in Uzbekistan to adopt, transfer and replicate sustainable agriculture and land management practices aimed at restoring and improving irrigated land while increasing economic opportunities for the rural population and improving environmental conditions.

23. The PDO was consistent with the World Bank's CPS at the time of approval and remained consistent with the current CPS for FY 16-20 and its aim to support development of the country's agricultural sector as "it remains the largest source of employment, especially of the poor and women, it offers large opportunities for productivity improvements, and it embodies many of Uzbekistan's most pressing environmental sustainability issues." In particular, the project was aligned with the CPS's Focal Areas 1 and 2, Private Sector Growth and Job Creation and Agricultural Competitiveness.

Assessment of Relevance of PDOs and Rating

24. With the alignment of the PDO to the GEF objectives and World Bank CPS, as well as its relevance to Uzbekistan's national agricultural policies, the relevance of the PDO is rated "High."

B. ACHIEVEMENT OF PDO (EFFICACY)

25. The PDO consists of two parts: (i) promote the introduction of selected renewable energy and energy efficient technologies of relevance to agri-business and farms, and (ii) strengthen capacity for improving degraded irrigated land and water conservation in the project area. Overall, the project is considered to have fully achieved the first outcome area and partially achieved the second one.

Assessment of Achievement of Each Objective/Outcome

26. ***PDO#1: Promote the introduction of selected renewable energy and energy efficiency technologies of relevance to agri-businesses and firms***. This target was fully achieved. Component 1 and Component 3 significantly contributed to the achievement of the first part of the PDO, with two sub-components comprising (i) technology demonstrations and (ii) renewable energy technology investments. The project supported the establishment of 98 demonstration sites (against the targeted 55 sites) under Component 1 and trained 23,990 farmers, rural

entrepreneurs and students on promotion of Renewable Energy (RE) and Energy Efficiency (EF) technologies provided under Component 3. This significantly increased awareness of the RE options and the availability of equipment in each of the eight project regions.

27. The demonstration sites covered a range of technologies, including the following:

- 52 sites with demonstration of technology of water lifting systems with use of solar photovoltaic station;
- 17 sites with demonstration of technology of energy efficient irrigation pumps;
- 5 sites with demonstration of technology of solar water-heating systems (collectors);
- 23 sites with demonstration of biogas installations with volumes of bioreactors of 6 m^3 – 20 pieces, 60m^3 – 1 piece, 100 m^3 – 1 piece and 600 m^3 - 1 piece;
- 1 site with demonstration of technology of sprinkling irrigation system.

28. The key achievement under sub-component 1.2 was the successful implementation of a US$8.2 million Matching Grant Program (MGP) that was designed to scale-up and expand the introduction of renewable energy technologies in small- and medium sized (SME) agribusinesses and small-, medium- and large farms. The matching grants were distributed to 39 sub-projects supporting RE (38 projects with 97.3 percent of the total amount financed) and EF (1 project with 2.7 percent of the total amount financed) investments among six commercial banks, which were also the PFIs for implementing the RESPII Additional Finance (AF) credit line. The PFIs were: Halq Bank, Hamkorbank, Ipak Yuli Bank, Quishloq Qurilish Bank, Turon Bank and Uzpromstrojbank. The total amount of private investments contributed by the beneficiaries was US$4,313,798. Additional details on 39 sub-projects are provided below:

(i) *Sub-project Portfolio Sectoral Breakdown*. Renewable energy and energy efficiency investments were made in a number of sub-sectors of agriculture. The sub-sectoral breakdown of the GEF-financed grants is as follows:

Sub-sector/Type of investment	Number of sub-projects supported	Share in total amount financed
Greenhouses	14	40%
Orchards and vineyards	15	22.4%
Processing and packaging	3	13.1%
Meat and milk production	3	13%
Poultry production	2	8.9%
Storage/Cold storage	2	2.6%
Total	39	100%

(ii) *Regional breakdown of sub-loans.* The regional breakdown reflects the most active regions interested in these types of investments. The project followed a demand-driven approach; participating banks approved applications that met all lending terms and conditions, without limit per region. Most of the grants were extended in Tashkent and Samarqand regions as the population in these regions were more familiar with the renewable energy technologies compared to other regions.

Region	Number of sub-projects supported	Total amount financed, US$ equivalent	Amount financed as a% of total Credit Line
Andijan	1	495,520	6%
Bukhara	1	140,000	2%
Ferghana	3	576,600	7%
Jizzakh	2	69,000	1%
Kashkadarya	2	103,350	1%
Samarqand	10	2,086,132.19	25%
Sirdarya	1	200,000	3%
Tashkent	19	4,544,591.17	55%
Total	39	8,215,193.92	100%

(iii) Share of matching grants by type of equipment:

Type of equipment	Share in %
Biogas units	58.4
Solar panels	19.9
Water lifting systems using SPP	19
Energy-efficient irrigation pumps	2.7

29. In terms of support to regulatory reform under Component 3, the project contributed to the preparation of the draft law "On renewable energy development." The project recruited an international consultant on renewable energy development to analyze the existing regulatory framework. The consultant provided comments and contributed to the draft of this law on Renewable Energy. The comments and recommendations of the consultant to the draft law were discussed with all stakeholders and submitted to the Legislative Chamber of the Parliament (Oliy Majlis) for further debates. On August 9, 2018, the Legislative Chamber of the Parliament (Oliy Majlis) held the first inter-parliamentary debate on the draft law "Renewable Energy Development." At the moment of preparation of the ICR, the Legislative Chamber of the Parliament (Oliy Majlis) planned to hold the second inter-parliamentary debate on the draft Law. After approval of Legislative Chamber of the Parliament (Oliy Majlis), the draft law will be submitted to the Senate of the Republic of Uzbekistan for consideration and approval. According to the Government, the law "On Renewable Energy Development" is expected to be adopted by end 2018.

30. Further, the Resolution of the Cabinet of Ministers #343 was issued on November 25, 2015, which started allowing connecting/selling the surplus power generated from the distributed generation sources (micro- and mini-hydro, solar PV, small wind installations, and biogas), subject to prior technical clearance for connection by grid operator.

31. In terms of GHG emissions, as a result of achievements under Components 1 and 3, the PDO indicator "Greenhouse Gas Emission Reductions" was fully achieved, exceeding the PAD target of 3.3 million tons of CO_2 equivalent (tCO_2 eq). Data on net reductions in greenhouse gas emissions were calculated at project completion stage by an independent scientific assessment commissioned by the project. The assessment utilized a baseline/without project emissions scenario, compared emissions under the "with project" scenario and also took into account variations in operating capacity for different types of production systems. The PDO indicator defined the target as GHG emissions reductions achieved over the lifetime of project investments but did not define the

specific timeframe associated with the "investment lifetime". The ICR analysis interprets this as the period in which equipment will continue to be used and could be between a ten to twenty-year time frame. Most of the demonstration and sub-project activities became operational in 2017 and early 2018, so a limited amount of emission reduction took place during the project implementation period but average annual emission reduction capacity achieved at project end – when all installed equipment was in full operation –generated an estimated reduction of 1.98 million tons of CO2 equivalent per year or 19.8 million over ten years or 39 million over 20 years. Detailed information on calculation of the GHG emission reduction is contained in Annex 4.

Technology	Total reduction achieved over project investment period (2014 – 18) in tCO2 -eq	Projected average annual reductions beyond 2018 in tCO2 -eq	Total reduction over 20 year lifetime of investments in tCO2 -eq
Biogas digestors			
Demonstration facilities	106,746	117,185	2,343,700
Sub-project loans	1,224,821	1,857,868	37,157,360
Solar Water heaters			
Demonstration sites	221	148	2,960
Sub-project loans	data unavailable	data unavailable	
Solar PVS			
Demonstration sites	92	1,839	36,780
Sup-project loans	3,623	3,623	72,460
Energy efficient pumps			
Demonstration sites	1,948	1,591	31,820
Sup-project loans	Data unavailable	100**	2,000
Total	1,337,551	1,982,354	39,647,080

32. The PDO indicator "Generation Capacity of Renewable Energy Constructed – Biogas" was considered succesfully achieved. Project investments in biogas capacity took place through 14 financed sub-project grants and 23 demonstration sites which installed over 14,500 cubic meters of methane processing capacity. Conversion of methane to KW hour equivalents requires assumptions based on type of animals and volume of manure produced. A minimum of 120 cows are considered required to generate substantial amounts of electricity and the ICR analysis therefore calculated biogas energy capacity based on three of 23 demonstration sites and 12 of 14 sub-project loans. Analysis is based on an conversion factor that assumes between 0.7-0.8 m^3 of biogas will be required to produce 1 kW hour equivalent of energy. This conversion factor already includes energy lost or utilized in the processing of manure and represents the final estimate of energy equivalence. Based on the 15 largest biogas units financed by the project, an estimated 19 MW hour of generation capacity per day was created, which is equivalent to 5,012 MW hour per year if utilized at their maximum capacity. If used at 50 percent capacity due to limited volume of manure production or weather conditions, generation capacity would be 3,421 MW hour per year. Both estimates exceed the targeted value of 1,070 MW hour per year.

33. It should also be noted that the biogas capacity generated by the project substantially increased the capacity in the country. At the time of appraisal, an estimated 17 biogas facilities existed in Uzbekistan and only 11 were functional. The project investments in 37 units more than tripled the number of functional biogas plants in the country.

Region, District	Enterprise	Capacity of Biogas equipment (m^3 of methane)	Estimated energy capacity (KW hour/day)	Max energy capacity (full year usage) (KW hour/year)	Estimated capacity (partial year usage) (KW hour/year)
Demonstrations					
Jizzak, Jizzak	Milk Foods	600 м^3/day	800	292,000	144,000
Syrdarya, Syrdarya	Inter Milk	100 м^3/day	133	48,545	23,940
Samarkand, Payarik	Obod kurig nasilli chorvasi	60м^3/day	80	29,200	14,400
Sub-project loans					
Tashkent, Kibrai	Chinobod-Miraxmedov Shuxrat	800м^3/day	1,067	389,333	192,060
Tashkent, Zangiat	Milk Agro Alliance	600м^3/day	800	292,000	144,000
Tashkent, Jangiyul	Sifatli Chorva Business	500м^3/day	667	243,333	120060
Samarkand, Samarkand	Metin Tekstil	1,000м^3/day	1,333	486,667	239,940
Tashkent, Jangiyul	Yangiyo'l Jo'jalar	1,000м^3/day	1,333	486,667	239,940
Tashkent, Akhangaran	Bobos koni dur umidi	600м^3/ day	800	292,000	144,000
Samarkand, Samarkand	Samarkand Parranda	4,000м^3/ day	5,333	194,666	959,940
Tashknet, Kibrai	Azizjon	1,000м^3/ day	1,333	486,667	239,940
Andijan, Altinkul	Baxt imkon rivoj chorvasi	2,000м^3/ day	2,666	973,333	479,880
Syrdarya, Gulistan	Jo'shqin Daryo Shamoli	400м^3/ day	533	19,467	95,940
Tashkent, Jukorichirik	TANO	1,000м^3/ day	1,333	486,667	239,940
Tashkent, Jangiyul	Asl naslchilik chorvasi	600м^3/ day	800	292,000	144,000
Total, KW hour			19,011	5,012,545	3,421,980

34. ***PDO#2: Strengthen capacity for improving degraded irrigated land and water conservation in the project area***. This part of the PDO was only partially achieved. Results are considered partial due to challenges and delays in implementation, as well as the shared contribution to results by various financiers, which means achievements cannot be fully attributed to the GEF project. Component 2 contributed to the achievement of the PDO with two sub-components comprising (i) farm-level land and water conservation demonstration; and (ii) farmer field schools. Activities under the component aimed to introduce technologies and management approaches for controlling and reversing irrigated land degradation. The activities in the framework of this component targeted seven rayons (districts) participating in the irrigation and drainage (I&D) component of the parent RESP-II and included the following activities: (i) support the dissemination of knowledge and information on technologies and management practice (including, inter alia, improved land-leveling techniques, micro-irrigation methods, salinity coping measures, and other techniques and practices to increase water use efficiency and agricultural productivity) by provision of goods, works and training for demonstration purposes; and (ii) provision of training to eligible farmers and WCAs in selected districts on methods for efficiently using and scaling up technologies and management practices.

35. The main achievements of sub-component 2.1 included:

(i) 41.4 ha of laser levelling and deep reaping of selected plots;
(ii) Demonstration of modern techniques such as drip irrigation on 32.5 ha of land, including pumping from the gravity systems, pumping from wells and using solar panels for pumping; hose reel sprinkler

on nine ha of land; other irrigation techniques applicable for gravity irrigation on about 10.45 ha of land.

(iii) Required improvements of existing irrigation canals, drainage networks and structures in demonstration plot areas, including construction of 4 cross regulators, 27 outlets, and cleaning and reshaping of about 1.3 km of on-farm systems.

36. There were, however, several shortcomings that limited the project's ability to achieve other desired outcomes under this Component. The originally discussed and agreed upon technical solutions for the three demonstration greenhouses were rejected by the RRA, leaving only drip irrigation systems without considering required improvements in the existing poor greenhouses structures. Furthermore, during the construction, 7.4 ha planned for demonstration of furrow irrigation using syphons was excluded from the design due to the contractor's non-performance.

37. Achievements under sub-component 2.2: Farmer Field Schools significantly exceeded the original PDO indicator target for the amount of irrigated land where land degradation had been reversed – the original target was 900 ha in the PAD- and was revised to 26,351 ha based on actual results achieved. The ICR analysis considers the achievement of the 26,351 ha to be a shared result given the fact that activities under this sub-component were jointly funded and implemented in parallel by SDC and SACCMP in the same seven WCAs, which had a total command area of 26,351 ha. The SDC, in particular, funded construction and rehabilitation of water control and management structures in the seven WCAs, which fully covered the 26,351 ha command area. The physical infrastructure played an important role in reducing erosion through uncontrolled water flows and improving water management.

38. SAACCMP financing was used for demonstration and capacity building within the seven WCAs and targeted the farmers operating the 26,351 ha command area. Component 2 of SACCMP built capacity of farmers through targeted training and through introduction of modern irrigation and land preparation techniques on 93 ha of demonstrations.

39. Specifically, the project training focused on the following topics:

- The use and expansion of modern methods and technologies of irrigation;
- The historical development of drip irrigation systems, features and advantages of their application in agriculture;
- Drip irrigation systems and its components;
- Operation of drip irrigation systems. Safety measures in the operation of drip irrigation systems;
- Procedure and rules for issuing grant funds

40. Additional demonstrations of simple water saving technologies as well as required trainings and farmers-to-farmers exchange visits were organized and successfully undertaken under the SDC parallel financing. The SDC Project Coordination Unit also developed a "Manual for trainers of FFS on rational water use" and copies were printed and distributed within the project area WCAs.

Justification of Overall Efficacy Rating

41. Given that the project largely achieved its intended outcomes, the overall efficacy is rated 'Substantial'. While the outcomes under land degradation are considered to be only partially achieved, they represented a smaller portion of the project's financing and the bulk of project investments were focused on achieving renewable energy and energy efficiency outcomes, which are considered substantial.

C. EFFICIENCY

Assessment of Efficiency and Rating

42. The assessment of efficiency focused on four areas: assessment of cost effectiveness of the projects investments in sustainable energy technology and land degradation; calculation of financial rates of return for individual sub-project matching grant activities; quantification net GHG emissions reductions generated by the project; and an overall consideration of administrative efficiency. Data is based on an independent impact assessment commissioned as part of the project completion process that was undertaken by a private consulting company. The company collected data from nearly all 39 sub-project loans and most of the 98 demonstrations sites as part of the impact evaluation process. A separate specialized analysis on the net greenhouse gas emission was also commissioned as part of the project completion (see Annex 4 for full assessment).

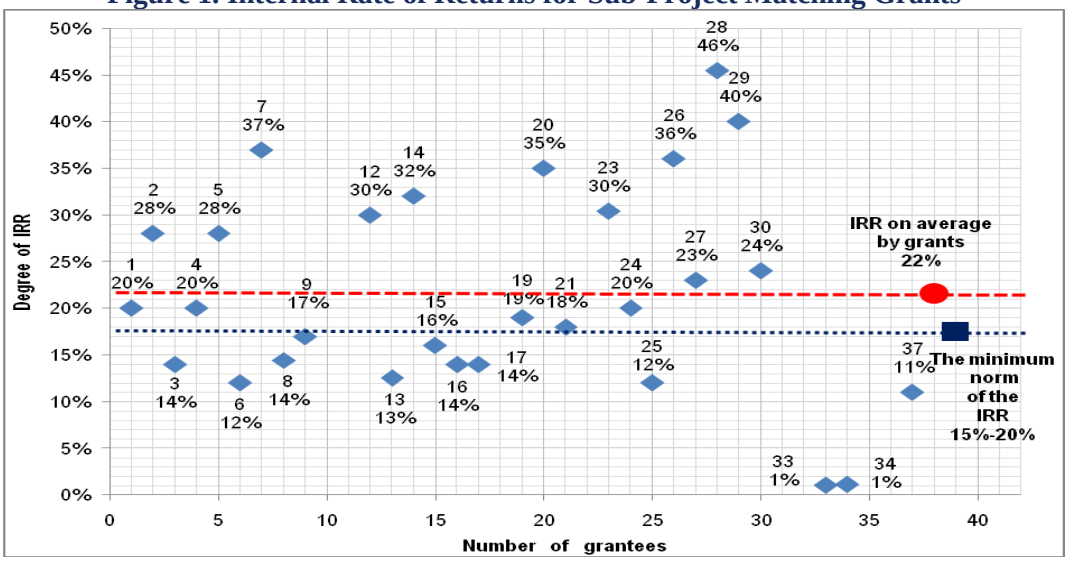
43. **Analysis of Cost Efficiency.** Unit costs for the initial capital investment and running cost for renewable energy varied significantly within the four technology types targeted by the project. The larger scale systems generally achieved greater economies of scale and lower cost per unit of installed energy.

44. In biogas, the highest per unit cost occurred in the smallest systems (US$981/$m^3$ for a 40m^3/day capacity system) compared to the larger models (US$199/$m^3$ for a 4,000 m^3/day system). At appraisal stage, the estimated cost per m^3 of biogas ranged between US$335/$m^3$ to US$917/$m^3$. The project's actual costs were still within this original estimated range. Comparisons of cost effectiveness globally also show the project was within norms for cost efficiency. Analysis of modern biogas facilities in Georgia show estimated cost of new capital investment could be between US$390 - US$600 /m^3 of installed capacity.

45. Like biogas, solar technologies for heating and water lifting also demonstrated economies of scale with larger systems showing lower unit costs**.** Comparisons to appraisal stage cost estimates and global benchmarks are complicated by the rapid change in the cost of solar technologies but indications generally show (see Annex 4) adequate cost efficiency when project capacity is converted to Kw hours per year.

46. **Financial rates of return.** Data collected by the independent impact evaluation covered most sub-project grant beneficiaries, which enabled calculation of financial rates of return for most individual grants. This analysis showed average internal rate of return (IRR) of 27 percent for biogas sub-projects, 15 percent for solar panels, and 20 percent for water-lifting systems with PVS. The average IRR across all sub-projects where data was available was 22 percent. The project targeted an internal minimum IRR benchmark between 15 percent and 20 percent, for which most sub-project exceeded. Those that did not meet this benchmark, however, were still in the 12-14 percent IRR range which is generally considered acceptable in development projects. Only two sub-projects for high cost water lifting technologies showed clearly unacceptable low IRRs.

Figure 1. Internal Rate of Returns for Sub-Project Matching Grants



Note: Horizontal axis indicates grantee identification number
Source: SACCMP Impact Evaluation Report

47. Given the highly subsidized rate of electricity in Uzbekistan, a calculation of economic rates of return would likely have generated different results if real prices were used. However, the data on real prices was not available. It is not expected, that a calculation of economic rates of return would have substantially changed the ICR conclusions. Using real prices for electricity (e.g. unsubsidized electricity rates) could have led to higher rates of economic return given the greater energy efficiency achieved, which caused a net reduction in the use of energy from the grid.

48. **Greenhouse Gas Emission Reductions.** To quantify the value of GHG reductions, total emission reductions were projected for twenty years and the discounted net present value calculated. The net present value of 20 years of emission reduction generated by the project ranges from US$177 to US$708 million depending on the price of carbon utilized (low price of US$5/ton and high price of US$20/ton).

49. **Administrative efficiency.** The project experienced substantial delays and late disbursements which led to late completion of many project investments with many sub-projects only completed in the final months of implementation. Implementation delays also reduced the overlap between the project and RESP II and SDC financing, which could have generated more synergies.

50. **Efficiency rating.** Efficiency is rated as Modest based on the positive rates of return generated by the project investments and demonstrated cost effectiveness of project investments combined with administrative efficiency, which was generally low.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

51. The overall outcome rating is Moderately Satisfactory. While a number of positive results were generated, substantial delays in project implementation that lasted one year after project effectiveness and the shared attribution of results under the land degradation outcome area warrant a MS rating. Both project implementation progress and achievement of the development objective were rated MS and MU during project life.

E. OTHER OUTCOMES AND IMPACTS

Gender

52. The renewable energy component of the project, in particular, was expected to have a positive impact on female farm family members who were to benefit from the availability of biogas for cooking and heating. All family members of project beneficiaries were also expected to benefit from greater farmer productivity achieved through availability of improved fertilizer and from expanded profitable agribusinesses (e.g., dairies, greenhouse produce) that were supported as part of renewable energy investments. However, based on the findings of the Impact Assessment (IA), most of the surveyed respondents (20 out of 24 people) stated that the equipment did not improve living standards of women, primarily because project investments did not take place at household level as was initially planned by the project.

53. The project training programs and outreach activities included women business owners and farmers. A total 1,791 women participated in the project training courses, which represents 7.5 percent of the total personnel trained by the project.

Institutional Strengthening

54. The project contributed to institutional strengthening through the following activities:

- Demonstration of renewable and energy efficiency technologies and training workshops were carried out in 98 (against 55 envisaged) demonstration sites and were attended by a total of 23,990 farmers and rural entrepreneurs. The most demanded topics for training included: (i) electricity generation from biogas; (ii) solar powered water heating and lift pumps; (iii) energy efficient irrigation pumps; and (iv) using renewable energy to heat houses.
- 13 training seminars organized for 260 loan officers in PFIs to improve their skills to appraise sub-projects, and knowledge on issues related to preparation of documents for the Environmental Impact Assessment and Environmental Action Plans, as well as other relevant monitoring documents and reports that were required during implementation of a sub-project.
- Seven Farmer Field Schools (FFS) organized specifically for training farmers/WCAs on using and scaling up water conservation practices/technologies, following which a total of 396 farmers, representatives of WCAs and local authorities were trained.
- The project supported preparation of the draft law on “Renewable Energy Development.” Prior to the closure of the project, the law was submitted to the Legislative Chamber of the Parliament (Oliy Majlis) for further discussion. The law is expected to come into force by the end of 2018.

- The project closely supported the Government on renewable energy development initiatives. Specifically, following the Government's request, the Bank in cooperation with International Finance Corporation (IFC) and International Renewable Energy Agency (IRENA) organized a workshop on renewable energy in Tashkent. This workshop brought good practices in policy and institutional measures adopted around the world to scale up renewable energy sources and inform the development of renewable energy roadmap in Uzbekistan.

Mobilizing Private Sector Financing

55. Through the Matching Grants Program, the project leveraged a total of US$4,313,798 of private investments from agribusinesses and individual farmers. Discussions with the project beneficiaries confirmed that these private investments would not have taken place without matching grants provided by the project.

Poverty Reduction and Shared Prosperity

56. While no data is available regarding poverty reduction, there is evidence that the project made an important contribution to shared prosperity**.** Based on findings of the final impact assessment, through the activities under matching grant program and FFS, the project helped create 60 permanent jobs (50 men and 10 women) and 381 temporary jobs (310 women and 71 men).

Other Unintended Outcomes and Impacts

57. The positive unexpected outcome of the project was adoption of the Program on development of biogas installation by the Government in June 2017 that envisages biogas introduction in 726 livestock and poultry farms through a new state-financed program.

58. Another unintended outcome was that the project had limited uptake of the matching grant program by small farmers. The project had originally targeted financing to 2,370 matching grant sub-projects, most of them expected to be small-scale renewable energy or energy efficiency investments. However, the project revisited this target due to limited requests for sub-projects, and requests for larger sub-project investments because of the nature of technologies that required volume and scale-up. The project achieved its planned outcomes but with lower coverage of smallholder farmers than originally expected. Possible reasons for lower uptake could include constraints in meeting PFI credit requirements by small farmers, including high collateral requirements and higher interest rates. In addition, as noted above, smaller systems were not as cost efficient for investment and larger sub-project generated higher rates of return.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

59. **The design of the GEF SACCMP was closely interlinked with the Uzbekistan RESP II and its AF.** The RESP II PDO was to increase the productivity and financial and environmental sustainability of agriculture and the profitability of agribusiness in the project area. The SACCMP was able to provide incremental support to the RESP

II, with the objective of mainstreaming environmental considerations into agricultural activities undertaken by RESP II and its AF. The GEF Project envisaged a 3-year implementation period and was scheduled to close at the same time as the RESP II, i.e. on December 31, 2016. The GEF SACCMP included three components designed to complement the four RESP II components (Rural Financing; Irrigation and Drainage (I&D); Rural Training and Advisory Services; and Project Management). The RESP II/SACCMP collaboration was set at three broad levels: (i) provision of grants to introduce renewable energy and energy efficiency for climate change mitigation; (ii) grant-funded irrigated land degradation improvement measures, linked to the I&D activities under RESP II; and (iii) grant-funded training for farmers, agribusiness owners, rural advisory service providers and RESP II credit officers, to complement ongoing training under Component 3 of RESP II. The GEF-funded Project of US$12.69 million was envisaged to receive co-financing from the RESP II Project in the amount of US$75 million and its AF in the amount of US$40 million. Parallel financing in the amount of US$7.7 million was provided by the SDC for demonstration and training under Component 2 (Irrigated Land Degradation Mitigation).

60. **The GEF Project was coordinated by RRA, i.e. same implementing agency that was in charge of RESP II, and was implemented in the same RESP II project areas.** RESP II was providing financial and capacity building support to farmers and agribusinesses in seven regions (oblasts) of the Republic of Uzbekistan (covering around 65 percent of total population of the country), and improved irrigation service delivery through rehabilitation of I&D infrastructure and strengthening of WCAs in seven districts (rayons) within seven regions including Andijan (Ulugnor district), Bukhara (Alat district), Kashkadarya (Mirishkor district), Samarkand (Pastafrom district), Syrdarya (Bayavut district), Ferghana (Yazyavan district). The same locations were selected for the GEF activities. RRA, which was the same Project Implementation Unit that was implementing the parent RESP II, provided daily management, administration and coordination of the SACCMP. The GEF MGP was administered by the RESP II PFIs (Hamkor Bank, Agro Bank, Qishlok Qurilish Bank, Mikrokredit Bank, Uzpromstroy Bank, and Turon Bank) and was supported by the newly recruited Credit Line/Grant Specialist in RRA. Finally, the RRA staff in seven regional offices responsible for RESP II, assisted with implementation of the GEF project activities.

B. KEY FACTORS DURING IMPLEMENTATION

61. **The launch of the SACCMP was delayed by one and half year.** Initially, signing of the legal agreements for the AF for RESP II in the amount of US$40 million (approved by the Board of Executive Directors on September 11, 2012) and complementary GEF grant for the SACCMP in the amount of US$12.69 million (approved on January 29, 2013) was delayed for 15 months and 11 months respectively due to the lengthy review process of the project documents by the government agencies. There was even a serious concern that the delay could possibly lead to the withdrawal of the WB's financing commitments if the situation prolonged beyond 18 months from the date of Board approval. The legal agreements were finally signed on February 8, 2014 and both projects became effective on May 7, 2014.

62. **SACCMP Implementation Progress was rated Moderately Unsatisfactory from 2015 to 2017 mainly due to initial countersigning and effectiveness delays that slowed down implementation and disbursement.** Specific issues faced by each component are described below.

63. **The MGP under Component 1 suffered from the quick disbursement of the Credit Line under the AF for RESP II, where loans were provided at the subsidized interest rate.** The GEF Project was to provide matching grants complemented with IDA funds through RESP II. While the GEF project implementation was delayed, the financing

available under RESP II sub-loans was almost fully disbursed as of June 2016. RESP II AF was allocated in sub-loans, therefore in the future the required co-financing was to be provided by PFIs from their own resources or by beneficiaries, which was more expensive with higher interest rates compared to the loans under RESP II credit line. To increase access to matching grants, the Ministry of Finance (MoF), Ministry of Economy (MoE), Ministry of Agriculture and Water Resources (MAWR) and PFIs requested to increase the share of the matching grant to from the initial 60 percent to 70 percent of the total sub-project with the remaining 30 percent to be co-financed by the beneficiary or credit line of the PFIs. Following this request, the Bank restructured the project in June 2016 to: (i) extend the project closing date by 15 months from December 31, 2016 to March 31, 2018, to make up for the delays in effectiveness; and (ii) under Component 1 (Promoting Renewable Energy Technologies) to increase the grant financing proportion of the RE Sub-Projects from 60 percent to 70 percent, with the remaining 30 percent to be co-financed by the beneficiary or credit line of the PFIs.

64. **The GEF-financed MGP was moving slowly with US$170,000 disbursed against US$8 million two years after project effectiveness.** Despite remedial actions undertaken by the WB, GoU and RRA, the pace of disbursement did not improve. Two main reasons caused this slow implementation: (i) the demonstration program, which would pilot some of these investments, was delayed, therefore there was no full information available on these investments; and (ii) the beneficiaries were concerned with the conditional nature of the matching grants co-financing their long-term investments wherein the sub-borrowers were expected to repay the sub-loan portion of the financing before gaining access to the grant. In addition, even a one-time delay of more than five days in making the required payment would have resulted in the loss of the grant and its conversion into a repayable loan. To resolve this bottleneck, the WB and RRA agreed that (i) the PFI staff would be taken to the demonstration sites to learn about such investments; and (ii) the PFIs would extend the payment due date without the sub-borrower losing the grant portion for a limited number of times. To increase attractiveness of the matching grants, two changes were introduced to the Rural Enterprise Investment Guidelines (REIR): (i) it may be permissible that the sub-borrower may take up to 30 days to make the payment due up to 3 times during the life-time of the financing (subloan+grant) extended to the sub-borrower; and (ii) municipal industrial zones were considered eligible area for support under the credit line to allow the sub-borrowers to benefit from uninterrupted electricity supply, and better access to transport routes and markets.

65. **Slow implementation progress was also observed under Component 3: Mitigate Irrigated Land Degradation.** Demonstration on improving degraded irrigated land and water conservation lagged behind. The main activities planned for demonstration plots included laser leveling of selected plots, demonstration of modern technics such as drip, sub-surface irrigation, hose reel sprinkler and three greenhouses for high value crop production. However, the component was suspended as its implementation was subject to a new Law on Renewable Energy Development to design training activities. Although the Law was not yet approved, the government issued a new resolution on November 25, 2015 which allowed connecting/selling to the grid the surplus power generated from distributed generation sources (micro and mini-hydro, solar PV, small wind installations, and biogas). The lack of renewable energy legislation also affected activities under Component 3 as no training of local trainers could be undertaken. The concept of RE was relatively unknown in the country, hence, new expertise and a learning process was required. Since the most planned activities were implemented in the framework of RESP II I&D Component, it was agreed to postpone the involvement of the international TA and training till the beginning of 2016 when the works in demonstration plots would be completed.

66. **The IP rating was upgraded within three months from Moderately Unsatisfactory (February 2017) to Moderately Satisfactory (May 2017) following a quick increase in the disbursement rate (from 25 percent to 54**

percent) and accelerated implementation of project activities. This impressive breakthrough occurred after the pending Matching Grant Financing Guideline was approved by the Central Bank, MoF and MAWR in January 2017 and Subsidiary Grant Agreements between MoF and PFIs were signed in February 2017. Along with the progress achieved under the MGP, the project completed all planned demonstration sites on renewable energy and energy efficiency technologies and training workshops were carried out on these demonstrated technologies. The project was implemented smoothly from that period on until most of project activities were completed and the GEF Grant amount was fully disbursed by the project closing date.

67. **The project was restructured for the second time in September 2017 to revise the Results Framework (RF) and to re-allocate funds from Category 4 (Unallocated) to Category 1 (Goods, works, consultants, services).** Specifically, the target value of the PDO indicator (i) number of hectares of irrigated land where the degradation was revised – from 900 ha to 26,351 ha to take into account project activities (financed in parallel by the GEF SACCMP and SDC) carried out on the demonstration plots involving modern technologies such as drip irrigation, hose reel sprinkler, and gravity irrigations; and (ii) the target value of Intermediary indicator "Investment in renewable energy in the agri-business sector" was revised from 2,370 to 37 based on the actual sub-grant applications approved by PFIs. The value of individual sub-projects increased significantly due (i) to demand-based increase of the required biogas, and (ii) EF capacity and higher prices of the equipment packages. As a result, the value of actual average sub-project applications increased, and the number of investment sub-projects reduced. Finally, funds in the amount of US$1.1 million were re-allocated from the Unallocated Category to finance additional demonstration sites in research institutes and universities to scale-up achievements of demonstrated technologies and training, as well to improve the country's research capacity.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

68. The project followed a clearly structured theory of change, as described in Section I.A. It outlined how project activities of each component would contribute to achieving the PDO. The PDO included two key outcomes and was disaggregated into five main GEO indicators that in greater part covered the contribution of project activities to the PDO. However, there were two weaknesses in the M&E design: (i) lack of definitions for indicators (e.g., decrease of GHG emissions and generation capacity of renewable energy constructed); and (ii) large deviations between some of the indicator targets at appraisal compared to at closing (e.g., number of hectares of irrigated land where degradation has been reversed). Further, in addition to measuring the number of workshops and number of training days under the project, a set of intermediate indicators in the RF could have benefited from an indicator that measured beneficiaries' satisfaction from the training or the rate of adoption of demonstrated technologies by those beneficiaries that received training. In addition, the project didn't include the baseline survey since the GEF was complementary financing to most of on-going projects RESP II and SDC activities, and results of these projects were used as baseline values for the SACCMP. The baseline survey, though, would have allowed collection of a broader number of variables to capture any changes that could be attributed to the project in the enabling environment or behavior of beneficiaries and non-beneficiaries.

69. The project had a well-established M&E system in the RRA that was earlier developed by RESP II. The M&E activities under Component 3 envisioned a project monitoring and evaluation framework to facilitate results-based management through timely monitoring, analysis and feedback of relevant indicators, involving reviews, satisfaction surveys and final project IA report. The project recruited the M&E Specialist in the RRA office in Tashkent (HQ) responsible for planning and coordinating M&E activities, involving implementing agencies, RRA regional offices, PFIs, SCD and the beneficiaries (primarily WCAs and grant recipients). The M&E system had four modules: (i) a Management Information System (MIS) to track results and financial indicators and provide feedback for decision making; (ii) investment sub-project (component 1.2) agreement compliance; (iii) site-specific monitoring and assessment of GHG reduction, with baseline for all investment sub-projects and a sampling of 20 percent of sub-projects at both mid-term and final points of the project; and (iv) standard annual auditing and WB supervision missions twice a year to review technical, fiduciary and safeguards aspects of the project. Overall, the choice of the PDO and intermediate indicators was sound and enabled an effective monitoring of progress towards to the GEOs. The RF had a separate indicator to monitor the project impact on GHG emissions.

M&E Implementation

70. The M&E activities were implemented as designed. Activities under both SACCMP and RESP II were closely monitored in parallel by RRA – both by staff at headquarters in Tashkent as well as those in the seven regional offices. A full-time M&E specialist was hired at RRA-Tashkent to oversee overall M&E responsibilities under the SACCMP. He monitored progress under each component and prepared informative project progress reports on quarterly, semi-annual and annual basis. These progress reports were timely provided by RRA, informing the WB on the project status and next steps to ensure that appropriate actions and remedies were taken immediately and jointly with the WB team to resolve any project bottlenecks. An MIS was set up to track results and financial indicators. The designated officer in each RRA regional office reviewed grant applications and regularly monitored progress during implementation of the sub-project. Further, under Component 2, the I&D consulting firm “BRL” provided monthly reports on progress on rehabilitation works to the RRA that followed up with site visits. The SDC undertook regular monitoring of activities related to WCA and farmer capacity building and training and undertook surveys in 2012 and 2015 to assess achievements, gaps and lessons learned. An IA of the project was undertaken shortly before the closing date to assess project progress and impacts related to the project activities.

M&E Utilization

71. The RRA M&E reports provided useful information on disbursement pace of the matching grants program, sub-projects trends, as well as bottlenecks in the implementation of Components 2 and 3. The M&E system thus served as an essential tool to proactively manage the project, for example, to monitor the matching grants program, revise matching grants requirements and training materials to better meet beneficiary needs, as well as track progress on activities related to mitigation of irrigated land degradation. Thanks to the M&E findings and recommendations as well as the pro-active supervision by the Bank team, the project underwent two restructurings that allowed the project to address delays and low disbursement that occurred in the first three years of project implementation. The RF was revised once to adjust target values of one PDO and one intermediate indicator. The end-of-project IA was not rigorous and less analytical, which was a missed opportunity to fully capture the positive results achieved under the project. For example, the assessment seemed to capture feedback of the grant recipients only, leaving aside feedback from other important project beneficiaries including WCAs, PFIs, farmers and agribusinesses who attended project training courses and FFS workshops, etc.

Justification of Overall Rating of Quality of M&E

72. The overall rating of quality of M&E is rated as Modest. Although, the project M&E documents were invaluable for enabling the WB and RRA to take corrective actions to issues/delays that hindered progress as well as to make strategic choices in planning, the M&E design had its weaknesses as described above, and the project missed an opportunity to (i) carry out a baseline survey, (ii) introduce meaningful indicators that would have measured quality and impact of training programs, and (iii) produce a comprehensive IA that would have surveyed a greater group of project key beneficiaries and provided analytical assessment of project results.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

73. **Environmental Safeguards:** Compliance with environmental safeguards was closely monitored throughout supervision. Based on the reviewed Environmental Assessment (EA) documents and progress reports and held discussion with the RRA representatives and subproject beneficiaries, as well as based on the field visits to the project sites, the overall project environment management performance was Satisfactory. The RRA and PFIs ensured that at the initial stage of subproject proposals review they were subject to environmental screening and assessment, filling relevant forms. For all Category B subprojects, the Environmental Management Plans were prepared. For these subprojects, the RRA requested also that all relevant environmental approvals and permits were obtained, including the decision of the State Ecological Expertise on "EIA/Declaration of potential environmental impacts" per national legislation. With regard to sub-projects, the RRA approved and implemented a total of 39 demonstration sub-projects among which 12 were of Category B and 27 of Category C. The Category C subprojects were related to the following types of investments: (a) water lifting system using solar panels technology; (b) solar water heating collectors; and (c) energy efficient irrigation pumps. The biogas sub-projects were of Category B. Based on the revised EA documents and site visits, it was confirmed that environmental categorization was done adequately and was based on the subproject business plans and on the Declaration of potential hazardous impacts approved by the State Ecological Expertise (SEE).

74. The RRA had a full time Environmental Specialist who handled environmental aspects of both parent RESP II and supplemental GEF Project. The RRA Environmental Specialist visited proposed activity sites, interviewed applicants, and was actively involved in the review and approval of credit and grant proposals. In addition, the Environmental Specialist visited selected project sites upon completion to verify the environmental compliance of undertaken activities. Potential environmental impacts of the project, associated with the implementation of sub-projects supported under credit lines and a grant program, were addressed through the same mechanism of screening and assigning EA category, and preparing sub-project specific EMP, relevant to the assigned category, as it was adopted for RESP II. The PFIs, who were trained under RESP II, advised and guided applicants/potential beneficiaries, and then submitted the complete sub-project proposal package, containing environmental management documentation as per the Project Environmental Management Framework (EMF), and the permit/approval issued by Goskompriroda in due course.

75. **Social Safeguards:** During project preparation, social safeguards were not triggered as envisaged activities did not require land acquisition or involuntary resettlement. However, the project was included in the Third-Party Monitoring (TPM) and Feedback Mechanism (FBM) implemented by the ILO in the World bank-financed projects. The key social issues arose during implementation of RESP II and they were related to the risks of child and forced

labor during the cotton harvest. While RESP II did not in any way contribute to the cotton production system directly, there were two types of indirect connections: (i) in the early phase of the project, some of the entrepreneurs receiving sub-loans for non-cotton related activities, were also involved in cotton production; and (ii) some of the farmers benefiting from the water canal repairs under component 2 of the project were also growing cotton. As per the agreement with the ILO, the project provided training on female, child and forced labor laws.

76. **Financial Management (FM):** The FM arrangements in the RRA were assessed consistently as "Satisfactory" throughout project implementation. The books of accounts were properly maintained and updated. The timeliness and quality of the financial monitoring reports/interim financial reports were satisfactory. There were no delays in the submission of audit reports, and auditors provided unqualified opinions in the audit reports. The audit reports for FY 2017 and for 1Q 2018 have been provided duly provided to the World Bank, and auditors provided unqualified opinions in the audit reports. The internal control arrangements were found adequate. The separate budget allocation, a strong financial management team at RRA, and good coordination with the WB team were key to smooth implementation of financial management arrangements under the project.

77. **Procurement:** The procurement arrangements were rated Satisfactory. The RRA's procurement capacity was mostly rated Satisfactory to the Bank during project implementation. In 2017 the Bank increased the prior review thresholds for sub-loan applications from US$500K to US$1 million. The RRA conducted a few training sessions to explain the PFIs and Beneficiaries that due diligence shall be done prior ITQs issuance and contract signing, including formulation of required technical specifications and search for market references.

C. BANK PERFORMANCE

Quality at Entry

78. The project's quality at entry was Moderately Satisfactory. The design of the project was strategically relevant, and in line with the GoU priorities in agricultural and irrigation development and supported the Government's efforts to mitigate and adapt the agricultural sector to water scarcity, land degradation and increased GHG emissions. The strong feature of the project design was synchronizing project activities with those under RESP II, which maximized the benefits and overall impact of both projects. The WB task team at preparation stage comprised capable technical, social, environmental, and fiduciary members. The M&E design was simple, well-structured and captured major project outcomes.

79. However, there were a few weaknesses in the project design and a few questions that were left unanswered at project appraisal. The first weakness was the large deviation between some targets at appraisal and closing when the targets were substantially revised during project lifetime. Project design assumed small producers would have greater interest or uptake in the matching grant program, however small farmers demonstrated limited interest in matching grants and the sub-project loans. As a result, the estimated 2,370 sub-projects were not realized and only 39 larger sub-projects for larger amounts were financed. As stated earlier, this was possibly due lack of knowledge of new technologies and scale-up requirement. There was lack of definition for the PDO indicator "Generation Capacity of Renewable Energy constructed - Biogas." The third weakness was the question of attribution of the PDO indicator "Number of ha of irrigated land where degradation was reversed." Further, the project could have benefitted from the baseline survey, which would collect additional variables to capture any changes that could be attributed to the project in the enabling environment or behavior of beneficiaries and non-beneficiaries. In addition to measuring number of workshops and client days of training provided by the project, a set of intermediate

indicators could have included an indicator that measured the outcome of these training programs (e.g. the rate of adoption of demonstrated technologies or percentage of beneficiaries satisfied with the quality of training).

80. Risk ratings were adequate, although the risk of dependency of the project's matching program on the RESP II Credit Line was not foreseen. Proper consultations with the Government, RRA, PFIs and other project stakeholders in the field seem to have taken place. The EMF ensured that strong safeguard tools were built into the project design.

Quality of Supervision

81. The quality of supervision was Satisfactory. The WB team provided implementation support to the Government, RRA and PFIs with sufficient staff and knowledge resources. Aide Memoires were regularly prepared. The task team drew attention of the Government, RRA and PFIs to the issues in project implementation and provided appropriate advice and remedy actions. The Implementation Status and Results Reports (ISRs) realistically rated the performance of the project both in terms of achievement of development objectives and project implementation. Progress towards PDO achievement and implementation progress were candidly rated Moderately Unsatisfactory several times due to delays in effectiveness, low disbursement and slow progress in implementation of key project activities. The team was pro-active about the measures to be taken to address the delays in project implementation. The Practice and Country Management provided proper guidance and support to the task team on this. The task team regularly monitored safeguards and fiduciary compliances and drew attention on the need to maintain a sound M&E system. The WB conducted a Mid-term review in February 2016, assessed progress on all project components, implementation issues, and recommended a set of actions to be taken to ensure a successful completion of the project. There was no turnover in team leadership or in members of the key team for a major part of the implementation period.

Justification of Overall Rating of Bank Performance

82. Based on the quality of performance at entry and supervision, the overall rating of World Bank performance is rated as Moderately Satisfactory.

D. RISK TO DEVELOPMENT OUTCOME

83. Although the project achieved significant outcomes in raising awareness about renewable energy and water saving technologies among the rural population through a range of demonstration sites and training activities, there is a risk that there will be a slow uptake of these technologies in rural areas due to the high cost for most of these technologies. Consequently, the individual farmers and agribusinesses will likely purchase these technologies only if the Government offers a grant or another type of subsidy to cover some portion of the cost of this equipment.

V. LESSONS AND RECOMMENDATIONS

84. **Flexible approach to redesigning the grant program to ensure its implementation.** The GoU, RRA and the project team exercised flexibility in converting the MGP complementing a bank-financed credit line, into a grant program that flexibly could support beneficiary's own funding, or a borrowing from a PFI. This helped ensure that the pilots done under Component 1 of the project could be scaled up through this matching program.

85. **Reallocation of additional funds to the PFIs for the grant program.** At least two PFIs requested additional grant funds towards the end of the project, to support new eligible beneficiaries. For instance, one of the PFIs required additional funds, beyond their original allocation, to support a pipeline of three interested beneficiaries. Therefore, a reallocation of funds from the Unallocated was implemented. The RRA was tasked with collecting requests from PFIs for additional grant funds, to allow the MoF to request reallocation of the necessary funds from Unallocated category to the grant funds.

86. **Flexibility in setting grant terms.** At the outset of the project, the share of matching grant in the sub-sector was set at 60 percent, completed by a credit in the amount of 40 percent for the first two years of implementation, to be reversed subsequently. However, upon full disbursement of the Bank-financed complementary credit line, the RRA and the Bank team realized that the beneficiaries may not be able to leverage sufficient amount of financing to implement the sub-projects, therefore, a decision was made by the teams to increase the share of the grant to 70 percent of the total sub-project.

87. **More assessment of the constraints faced by small farmers is needed when designing matching grants programs in future.** The project successfully implemented a matching grant program with PFIs but uptake of matching grants by small farmers was limited. One lesson learned is the need to better understand the constraints faced by small farmers which could include their access to credit, the minimum size of viable investments or access to knowledge about renewable energy or energy efficient technology. Although investments in biogas digestors were key to reduce carbon emissions, the project learned that these technologies require volume and scale to become efficient and cost-effective. The novelty of this type of investments and the requirement for volume and scale up were possibly another constraint for small farmers to apply for matching grants.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Promote the introduction of renewable energy and energy efficiency technologies of relevance to agri-businesses and farms

Objective/Outcome: Strengthen capacity for improving degraded irrigated land and water conservation in the project area

Unlinked Indicators

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of hectares of irrigated land where degradation has been reversed	Hectare(Ha)	0.00 04-Mar-2013	900.00 31-Dec-2016	26351.40 31-Mar-2017	26351.40 30-Mar-2018

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Renewable Energy	Number	0.00	55.00	55.00	98.00

technology demonstrated in the project areas		03-Mar-2014	31-Dec-2016	31-Mar-2017	30-Mar-2018

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Generation Capacity of Renewable Energy constructed - Biogas	Megawatt	0.00 04-Mar-2013	1070.00 31-Dec-2016	1070.00 31-Mar-2017	3421.00 30-Mar-2018

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Support formulation of the regulatory framework to assist integration of renewable energy into the rural energy system	Text	Existing draft RE policy and regulation documents 04-Mar-2013	Draft regulatory framework revised and consulted 31-Dec-2016	Draft regulatory framework revised and consulted 31-Mar-2017	The draft regulatory framework revised and consulted 30-Mar-2018

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
GHG emissions avoided by	Metric ton	0.00	3.30	3.32	19.80

the project		04-Mar-2013	31-Dec-2016	31-Mar-2017	30-Mar-2018

Comments (achievements against targets): In its project reporting RRA has reported emissions reduction values of 1.34 million tCO2 eq (below the indicator target) based on the actual operations of installed equipment during the project investment period – the period from 2014 up to the end of the first quarter of 2018. The ICR differs from the implementing agency's calculation of net reductions by using a longer time frame to more accurately capture the impact of the project beyond the project closing date when equipment will continue to be used. This is important as most of the demonstration and sub-project activities only became operational in 2017 and early 2018, limiting the achievable amount of emission reduction if analysis is restricted only to emissions reductions before the closing date. Using a longer time frame and the average annual emission reduction capacity achieved at project end – when all installed equipment was in full operation – the project generates an estimate of 1.98 million tons of CO2 equivalent per year or 19.8 million over ten years.

A.2 Intermediate Results Indicators

Component: Promoting Renewable Energy Technologies

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Investment in renewable energy in the agri-business sector	Number	0.00 08-Aug-2012	2370.00 31-Dec-2016	37.00 24-Aug-2017	39.00 30-Mar-2018

Comments (achievements against targets):

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of workshops held	Number	0.00	256.00	256.00	286.00

to inform/disseminate selected RE technologies and publicize the RESP-2 credit line		08-Aug-2012	31-Dec-2016	31-Mar-2017	30-Mar-2018

Comments (achievements against targets):

Component: Promoting Technologies and Practices to Mitigate Irrigated Land Degradation

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Client days of training provided on relevant practices for irrigation/land conservation/EE (female & male)	Text	00000 08-Aug-2012	150 31-Dec-2016	150 31-Mar-2017	267 30-Mar-2018

Comments (achievements against targets): The project did not track client days of training, but instead monitored the number of workshops provided. A total of 267 workshops were provided on relevant practices for irrigation/land conservation with 18,495 people who attended these workshops. Out of which, 17,145 (92.7%) were male and 1,350 (7.3%) were female

Component: Advisory Services and Project Management

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of workshops for equipment and service providers on legal issues,	Number	0.00 08-Aug-2012	90.00 31-Dec-2016	90.00 31-Mar-2017	91.00 30-Mar-2018

regulations, contract law, guarantees, health and safety, etc.					
Comments (achievements against targets):					

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1	
Outcome Indicators	1. Renewable Energy technologies demonstrated in the project areas: Actual end target: 98 2. Support formulation of the regulatory framework to assist integration of renewable energy into the rural energy system: Actual end target: Draft regulatory framework prepared and consulted 3. GHG emissions avoided by the project (in Tons CO2 equivalent): Actual end target: 3,39 million tons CO2eq avoided, including (1,34 million tons CO2eq – within the project) and (2,05 million tons CO2eq - including other renewable energy resource installations, not within the project, over the last 12 years)
Intermediate Results Indicators	1. Investment in renewable energy in the agri-business sector Actual end target: **39** 2. Number of workshops for equipment and service providers on legal issues, regulations, contract law, guarantees, health and safety etc Actual end target: **91** workshops 5,381 attendants including: male 4,970 (92.4%); female 411 (7.6%) 3. Number of workshops held to inform/disseminate selected RE technologies and publicize the RESP-2 credit line Actual end target: **286** workshops 18,873 attendants including: male 17,481 (92.6%); female 1,392 (7.4%)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. A total of 98 demonstration sites were created within this component. 2. According to the carried-out analysis, within this component 39 matching grants for the total amount of US$8,215,294 were financed.
Objective/Outcome 2	
Outcome Indicators	1. Number of hectares of irrigated land where degradation has been reversed: Actual end target: 26,351

Intermediate Results Indicators	1. Client days of training provided on relevant practices for irrigation/land conservation/EE (female & male) Actual end target: **267** workshops 18,495 attendants including: male 17,145 (92.7%); female 1,350 (7.3%)
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. This subcomponent financed construction and installation works at seven demonstration sites in farms of seven project regions (Ulugnor of Andijan province, Yazyavan of Fergana province, Buka of Tashkent province, Bayaut of Syrdarya province, Pastdargom of Samarkand province, Mirishkor of Kashkadarya province and Alat of Bukhara province) in order to demonstrate methods of land and water resources conservation. The component budget is 1.0 million USD. 2. Trainings (the second stage) were conducted during the period from June 14 to June 24, 2017. Totally 7 of trainings were held on next 6 topics: • "The use and expansion of modern methods and technologies of irrigation"; • "The historical development of drip irrigation systems, features and advantages of their application in agriculture"; • "Drip irrigation systems and its components"; • "Operation of drip irrigation systems. Safety measures in the operation of drip irrigation systems"; • "Procedure and rules for issuing grant funds"; • "Compliance with Gender equality, as well as international conventions of ILO and national legislation on prevention of child and forced labor"; Also, practical trainings were conducted in all demonstration sites.

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Supervision/ICR	
Dilshod Khidirov	Task Team Leader(s)
Ahmed Merzouk	Procurement Specialist(s)
Djamshid Iriskulov	Financial Management Specialist
Amy Evans	Social Safeguards Specialist
Roxanne Hakim	Social Safeguards Specialist
Sandra Broka	Team Member
Dilnara Isamiddinova	Team Member
Olivier Durand	Team Member
Arcadii Capcelea	Environmental Safeguards Specialist
Ahmed Shawky M. Abdel Ghany	Social Safeguards Specialist
Javaid Afzal	Environmental Safeguards Specialist
Oydin Dyusebaeva	Team Member
Nina Kolybashkina	Social Safeguards Specialist
Ekaterina Romanova	Social Safeguards Specialist

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY12	12.855	89,712.63
FY13	5.687	35,956.32
FY14	0	0.00
Total	**18.54**	**125,668.95**
Supervision/ICR		
FY13	2.113	25,324.16
FY14	9.210	19,371.10
FY15	6.524	18,816.02
FY16	6.363	45,817.25
FY17	14.954	58,386.91
FY18	6.802	84,097.79
Total	**45.97**	**251,813.23**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
Promoting Renewable Energy Technologies	10,470,271.26	10,105,000.00	103.61
Promoting Technologies and Practices to mitigate Irrigated Land Degradation	669,400.15	790,000.00	84.73
Advisory Services and Project Management	1,436,653.02	1,804,000.00	79.64
Total	**12,576,324.43**	**12,699,000.00**	**99.03**

ANNEX 4. EFFICIENCY ANALYSIS

1. **Scope of analysis**. The analysis focuses on three areas: assessment of cost effectiveness of the projects investments in sustainable energy technology and land degradation; calculation of financial rates of return for individual sub-project loans; and quantification net GHG emissions reductions generated by the project.

2. Financial analysis in the ICR is focused only sub-project loans rather than demonstration sites. While technologies were similar across demonstrations sites and sub-project loans, demonstrations sites were generally smaller in scale and not driven by economic considerations. As an example, 23 demonstration sites were established for biogas but installed capacity totaled only 880 m^3/day (average 38 m^3 per site) compared to the 14 sub-project loans that installed a total capacity of 13,740 m^3/day (average 981 m^3 per site). As a result, calculations on financial rates of return are restricted to sub-project loans to more accurately assess financial viability of project investments.

3. **Source of data.** RRA commissioned an independent impact assessment as part of the project completion process that was undertaken by a private consulting company and collected data from nearly all 39 sub-project loans and most of the 98 demonstrations sites as part of the impact evaluation process. [1] A separate specialized study on the net greenhouse gas emission was also commissioned as part of the project completion and focused on generating scientifically accurate estimates of emissions within dynamic production systems. [2]

Cost Efficiency Analysis

4. **Renewable energy and energy efficiency**. Unit costs for the initial capital investment and running cost varied significantly within the four technology types of renewable energy targeted by the SACCMP. Larger scale systems generally achieved greater economies of scale and lower cost per unit of installed energy.

5. In biogas, the highest per unit cost occurred in the smallest systems ($981/m3 for a 40m3/day capacity system) compared to the larger models ($199/m3 for a 4,000 m3/day system). At appraisal stage, the estimated the cost per m3 of biogas as listed in the PAD ranged between $335/m3 to $917/m3 so the project's actual costs are still within this original estimated range. Comparisons of cost effectiveness globally also show the project was within norms for cost efficiency. Analysis of modern biogas facilities in Georgia show estimated cost new capital investment could be between $390 - $600 /m3 of installed capacity while larger systems in China showed costs in excess of $1,000/ m3.[3]

6. Like biogas, solar technologies for heating and water lifting also demonstrated economies of scale with larger systems showing lower unit costs. Comparisons to appraisal stage cost estimates are complicated by the

[1] LLC Expert Info "Impact Assessment Report for the Grant Project of the Global Environment Facility "Sustainable Agriculture and Climate Change Mitigation Project" March 2018
[2] Eco-Agency Scientific-Introduction Center "Calculation of greenhouse gas emissions, reduction using renewable energy technologies, biogas plants, solar water-heating and energy efficient pumps" March 2018
[3] Biogas plants vary substantially by type of design making international comparison of costs more complicated. However some cross-country analysis has been undertaken through the Food and Agriculture Organization including examples in China: *http://www.fao.org/docrep/t0541e/T0541E0f.htm*; other examples in Central Asia include an earlier detailed analysis of biogas by the OECD in Georgia: https://www.oecd.org/countries/georgia/36203819.pdf

rapid change in the cost of solar technologies. Global benchmarks for cost are influenced by the site specific nature of installation of solar technologies but indications generally show are comparisons of cost efficiency when SACCMP capacity is converted to Kw hours per year. [4]

Table 4.1: Breakdown of sub-project by type, cost and total energy capacity- Biogas and Solar

Province	Biogas				Solar Panels			
	# of loans	Total Cost (USD)	Capacity (m3/day)	Cost/m^3 (USD)	# of loans	Total Cost (USD)	Capacity (kW/day)	Cost/Kw (USD)
Andijan	1	495,520	2,000	248				
Bukhara	1	140,000	200	700				
Jizzakh								
Kashkadarya	1	39,238	40	981				
Samarkand	2	994,982	5,000	199	1	92,000	35	2,629
Syr Darya	1	200,000	400	500				
Tashkent	8	3,016,451	6,100	495	5	1,076,137	580	1,855
Fergana								
Total	14	4,886,191	13,740	356	6	1,168,137	615	1,899

Source: SACCMP Impact Assessment, own calculations

Table 4.2: Breakdown of sub-project by type, cost and total energy capacity- Water lifting systems and energy efficient pumps

Province	Water lifting system using a solar photovoltaic station				Energy efficient irrigation pumps			
	# of loans	Cost (USD)	Capacity (kW/hour)	Cost/kW (USD)	# of loans	Cost (USD)	Capacity (kW/day)	Cost/Kw (USD)
Andijan								
Bukhara								
Jizzakh	2	69,000	384	180				
Kashkadarya	1	64,113						
Samarkand	6	785,150	320	2,454	1	214,000	149	1,436
Syr Darya								
Tashkent	6	452,003	39	11,590				
Fergana	3	576,600	31	18,481				
Total	18	1,946,866	1,068	1,823	1	214,000	149	1,436

Source: SACCMP Impact Assessment, own calculations

7. **Land degradation.** Project investments for mitigating land degradation on irrigated land took place in seven demonstration sites across a total of 100 ha. Costs varied based on the package of upgrades and rehabilitation but generally show reasonable average costs on a per hectare basis.

[4] Some discussion of cost benchmarks for solar technologies can be found in: Opportunities for Agri-Food Chains To Become Energy-Smart *http://www.fao.org/3/a-i5125e.pdf*

Table 4.3: Project Investments in Mitigating Irrigated Land Degradation

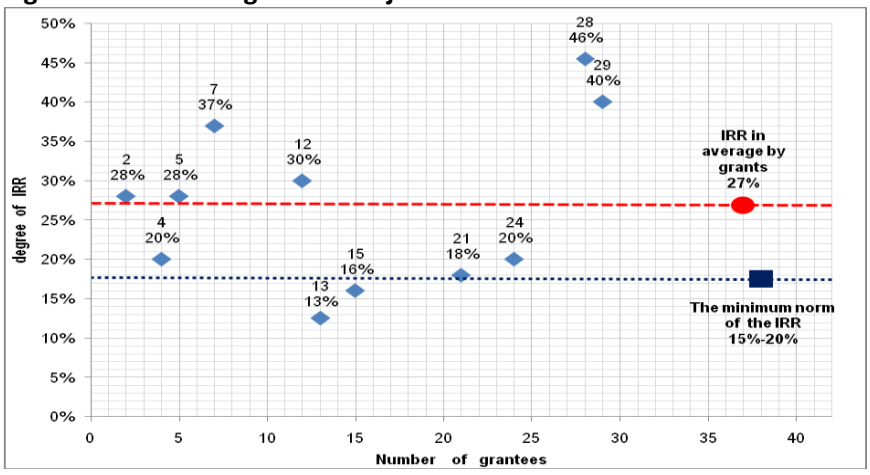
Location	Total area (ha)	Total cost (thousand of soums)	Cost per ha (thousand of soums)	Cost per ha (USD *)
Mirishkor region (Kashkadarya)	12	521,906	44,607	5,793
Ulugnar region (Andijan)	12	354,509	28,705	3,728
Yazjyavan region (Fergana)	11	517,409	45,149	5,864
Alat region (Bukhara)	18	282,805	15,685	2,037
Pastdargom (Samarkand)	28	221,522	7,889	1,025
Bayavut region (Syr Darya)	14	424,147	29,869	3,879
Buka region (Tashkent)	4	242,209	55,680	7,231
Total	100	2,564,507	25,602	3,325

Source: SACCMP Impact Assessment, own calculations

Financial Rates of Return Analysis

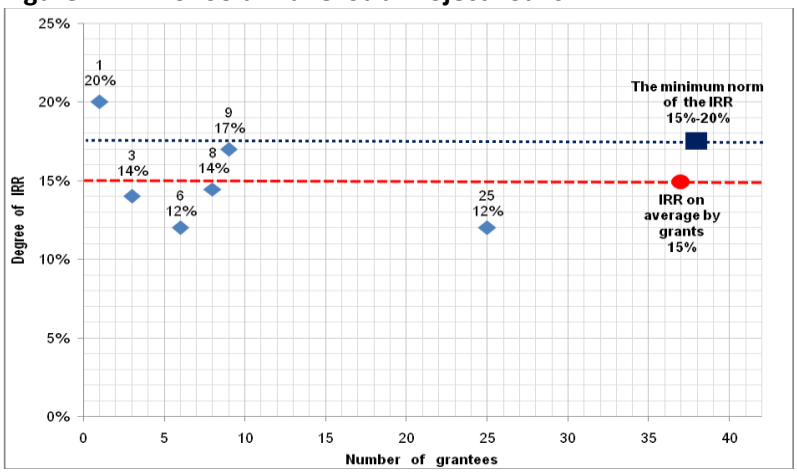
8. The independent impact evaluation collected data from sub-project loan beneficiaries excluding those sub-projects that were completed in the very end of the project life. This enabled calculation of financial rates of return for most individual grants. This analysis showed average internal rate of return (IRR) of 27% for biogas sub-projects, 15% for solar panels, and 20% for water-lifting systems with PVS. The average IRR across all sub-projects where data was available was 22%. The project targeted an internal minimum IRR benchmark between 15% and 20%, for which most sub-project exceeded. Those that did not meet this benchmark, however, were still in the 12-14% IRR range which is generally considered acceptable in development projects. Only two sub-projects showed clearly unacceptable low IRRs and were for high cost water lifting technologies.

Figure 1: IRR for Biogas Sub-Project Loans



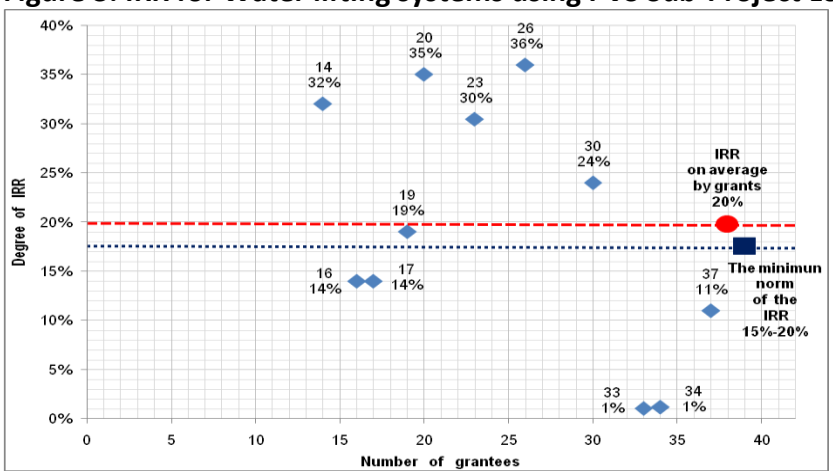
Note: Horizontal axis indicates grantee identification number
Source: SACCMP Impact Evaluation Report

Figure 2: IRR for Solar Panel Sub-Project Loans



Note: Horizontal axis indicates grantee identification number
Source: SACCMP Impact Evaluation Report

Figure 3: IRR for Water lifting systems using PVS Sub-Project Loans



Note: Horizontal axis indicates grantee identification number
Source: SACCMP Impact Evaluation Report

Greenhouse Gas Emission Reduction Analysis

9. Net reductions in greenhouse gas emissions were calculated under the project using detailed data collected from individual demonstration sites and sub-project loans to determine base (without project) emissions and estimated emissions with project investments. All emissions were converted to tons of CO2 equivalent based on the following assumptions on reductions in energy use (see detailed report for full methodology "Calculation of greenhouse gas emissions reduction using renewable energy technologies, biogas plants, solar water-heating collectors, water-lifting systems using solar photovoltaic stations and energy-efficient pumps":

- *Biogas*: reduction in methane emissions as a result of conversion of manure into biogas and reduced reliance on coal based energy sources due to availability of biogas energy sources;

- *Solar water heating*: reduction in energy and fuel consumed for pasteurization, water heating for milk processing and general dairy farm maintenance;
- *Solar PVS*: net reduction in electricity (from national grid) or fuel (from diesel powered pumping) for water pumping/lifting as a result of solar PVS systems,
- *Energy efficient pumps*: net reduction in electricity caused by replacing old technology with more energy efficient pumps in cases where existing farming activities were in place and the difference between conventional and energy efficient pumping in cases where new land was brought under cultivation.

10. Reductions in emissions were calculated based on the actual operations of installed equipment over the project life – the period from 2014 up to the end of the first quarter of 2018. Analysis also took into account variations in operating capacity and days of operation for different production systems.

11. Based on data provided, total emission reductions over the project life are estimated at 1.34 million tons of CO2 equivalent. It should be noted the emissions reduction achievable during the project were limited by the timing of project investments as most of the demonstration and sub-project activities only became operational during 2017 and early 2018. The average annual capacity for emission reductions achieved at project end – when installed equipment was in full operation – is higher and estimated at 1.98 million tons of CO2 equivalent.

12. In order to quantify the value of GHG savings, total emission reductions were projected for twenty years and net present value calculated. The net present value of 20 years of emission reduction generated by the project ranges from $177 – $708 million depending on the price of carbon.

Table 4.4: Greenhouse reductions estimates under the project

	Total reduction in $tCO2\text{-}_{eq}$ achieved over project life*	**Projected average annual reductions in $tCO2\text{-}_{eq}$**	**Projected 20 year total emissions reductions in $tCO2\text{-}_{eq}$**
Biogas			
Demonstration facilities	106,746	117,185	2,343,700
Sub-project loans	1,224,821	1,857,868	37,157,360
Solar Water heaters			
Demonstration sites	221	148	2,960
Sub-project loans	data unavailable	data unavailable	
Solar PVS			
Demonstration sites	92**	1,839	36,780
Sup-project loans	3,623	3,623	72,460
Energy efficient pumps			
Demonstration sites	1,948**	1,591	31,820
Sup-project loans	Data unavailable	100**	2,000
Total	1,337,551	1,982,354	39,647,080
Net Present Value of 20 year emissions reduction		*USD 20/ t $CO2_{eq}$*	US$ 708 million
		USD 5/ t $CO2_{eq}$	US$ 177 million

**period = 2014 to 1st quarter of 2018*

*** recalculated by from impact assessment report*

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

The State Investments Committee of the Republic of Uzbekistan has no comments or recommendations on the draft ICR except on overall project rating. Given the successful implementation and achievement of all project indicators, they are requesting that the rating be changed from Moderately Satisfactory to Satisfactory. They would also like the bank to consider allocating additional grant financing for the project on renewable energy sources in the frame of the Horticulture Development project.

O'ZBEKISTON RESPUBLIKASI INVESTITSIYALAR BO'YICHA DAVLAT QO'MITASI
STATE COMMITTEE OF THE REPUBLIC OF UZBEKISTAN FOR INVESTMENTS

№ ЧВ-03/04-2-9741
"25" 09 2018

Г-ну Хидеки Мори
Главе Представительства
Всемирного банка в Узбекистане

Уважаемый г-н Мори,

Хочу довести до Вашего сведения, что Государственным комитетом по инвестициям рассмотрен представленный отчет о завершении и результатах реализации проекта Глобального экологического фонда «Развитие устойчивого сельского хозяйства и снижение последствий изменения климата» с участием Международного банка реконструкции и развития.

В целом, замечаний и предложений к представленному документу со стороны Государственного комитета по инвестициям не имеются. При этом, учитывая успешную реализацию, а также достижение всех индикаторов проекта, просим Вас изменить общую оценку результатов проекта с «умеренно удовлетворительный» на «удовлетворительный».

Вместе с тем, были бы признательны Всемирному банку за рассмотрение вопроса предоставления дополнительных грантовых средств на проекты по возобновляемым источникам энергии в рамках проекта «Развитие сектора плодоовощеводства в Республике Узбекистан».

С уважением,

Шухрат Вафаев

Заместитель председателя
Государственного комитета по инвестициям

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ANNEX 6. SUPPORTING DOCUMENTS