Economic Analysis

# Introduction

1. The objective of this five-year Inclusive green financing for climate resilient and low emission smallholder agriculture project is to increase the resilience of smallholder farmers to adverse impacts of climate change by **removing barriers to access to green financial and non-financial services for adopting and implementing concrete innovative adaptation and mitigation measures**.
2. These measures include water capture, borehole irrigation, in-situ re-introduction of more stress resistant breeds and crop varieties, sand stabilization and other land management and agronomic techniques, Ecosystem-Based Adaptation (EbA), capacity building and awareness raising; Renewable Energy Technologies (RETs) adaptation (energy for water mobilization) and value addition along value chains (processing, packaging, maintenance).
3. This initiative will be implemented in targeted regions (Maradi, Zinder, Taouha and Diffa) that are highly vulnerable to climate change and have great potential for agricultural development, but where the existence of banking services geared towards the agricultural sector is still limited. This project will complement the new IFAD investment called Projet de renforcement de la résilience des communautés Rurales à l’insécurité alimentaire et nutritionnelle au Niger (PRECIS) under the technical supervision of the Ministry in charge of Agriculture and to be implemented according to the IFAD Country Program Approach in Niger.
4. The purpose of this project is to provide financing for the agricultural sector. Specifically, provide various financial products to farmers, agricultural enterprises, traders and processors. Two types of credit will be provided with the project.
5. Window I: credit to strengthen EbA and planning, conservation measures (land restoration, community gardening, Non-Timber Forest tree plantations, restoration of riparian areas, dunes stabilization, sensitive areas management for recreational purpose) and concrete adaptation measures along value agricultural value chains. Type of loans include:
   1. Direct investment loan on EbA with return on investment and concrete eligible adaptation measures with income generation connected to EbA and adaptation measures
   2. Working capital loans for FOs, Cooperatives, MSMEs, MFIs working on EbA and on adaptation measures
6. Window II: Strengthen, develop and scale up innovative rural electrification model through hybridized solar micro and mini-grids, off-grid solutions, standalone systems for powering agricultural value chains and multi-purpose water pumps, mills for grinding, hulling, and pressing financed by Banque Agricole du Niger (BAGRI) conventional investment and window 1. Type of loans will include:
7. Solar Loans to invest on solar panel equipment's and systems for FOs, Cooperatives, MSMEs for irrigation, processing, and household use.
8. Loans to MFIs to on-lend to solar importers, wholesalers, retailers, installers, and solar electricity service providers
9. Working capital loans for solar importers, wholesalers, retailers, installers, and solar electricity service providers
10. Each of these interventions are geared towards strengthening resilience of vulnerable households, particularly youth and women, in Maradi, Zinder, Taouha and Diffa facing increasing climate risks and impacts.
11. The economic feasibility of the project was determined using funds flow from small-scale farmers who will benefit from the project. Financial and gross margin analyses were conducted to assess the financial returns of the project’s interventions for the project’s beneficiaries.
12. Economic cost-benefit analysis was carried out to assess the impact of the project on society’s welfare. Discounted fund flows period is assumed to be 15 years and benefits such as emissions avoided are calculated based on this lifespan.

# Identifying the Costs and benefits of project intervention

1. Niger is one of the least banked countries in West Africa (World Bank (2017). Financing for working capital and investments and instruments to transfer funds are critical to the smooth operation of any industrial sector, including agriculture and livestock.
2. Two benefits with the project are estimated in this analysis. Increased productivity due to access to credit (Window 1 and 2) and mitigation benefit from solar and renewable energy use.
3. For the Innovative Financing Mechanism component, we assume that this would yield a multiple of 1.5 times the support provided (investment from component1 only) with a lag of 3 years. This is a conservative estimate compared to earlier economic analysis carried out by the World Bank in Niger that assume that as a result of increased investment in production technologies and therefore efficiency, sales, and capacity utilization, the supported farmers and firms would yield an increase in output at a multiple of 2 times the support provided with a lag of 2 years. Other studies in Burkina Faso had assumed a multiple of 10 times the grant was used.
4. For estimating the carbon benefits, EX-ACT Carbon Calculation Methodology was used showing a cumulative mitigation benefit of **1,606,242** tCO2eq. A breakdown of this by project activity is presented in the table below with details in Annex 12.

|  |  |
| --- | --- |
| **Project Activity Category** | **Total mitigation benefit (tCO2eq)** |
| Woodlot development and pastoral forest restoration | 1,178,068 |
| Annual cropland restoration | -139 506 |
| Grassland restoration | -255 688 |
| Other LUC (associated GHG mitigation) | -6,949 |
| Renewable Energy investment | -39,927 |
| **Total** | **-1,606,242** |

Breakdown of estimated mitigation of tCO2eq by individual activity

1. We converted the mitigation benefit to dollar amount in line with World Bank’s, Sept. 2017 ‘Guidance Note on Shadow Price of Carbon in Economic Analysis’. It is estimated that the low value of the shadow price is US$40 per tCO2e emission in year 2020 which will increase to US$54 per tCO2e emission in year 2034; the high values of the shadow price are estimated at US$80 per tCO2e emission in year 2020 and increase to US$109 per tCO2e emission in year 2034. We used the 2034 low values to convert the total mitigation benefit.
2. Given that this project will primarily be providing access to credit, an explicit O&M plan is not calculated. Individual investments will include a detailed O&M plan.

Other significant benefits not quantified:

1. Other benefits not quantified include benefits on strengthened capacity and business planning for FOs, women and youth organizations and or cooperatives, MSMEs including solar operators (disaggregated by gender and Youth), to design business plans and access green lines products from BAGRI and other MFIs and commercial banks and implement diversified, climate resilient livelihood options. Other benefits include improved policy dialogue, government technical and institutional capacity, advocacy, training, knowledge management, information dissemination and stakeholder management through organizing round table and events with special emphasis given to the specific issues women and youth face and capacity building of government technical and institutional capacities.
2. While the impact estimates capture total benefits of mitigation and access to loans, potential impacts like this can lead to higher benefits than the conservative estimate used in the analysis.

# Methodology and Parameter Assumptions

1. The economic analysis is based on the following additional assumptions about the project and economic conditions:
   * Benefits generally won’t accrue the three years of the project. Because of the soft nature of some of the interventions, benefits can accrue starting from the fourth year.
   * Take up rate of the loan is assumed to be 100% with the assumption that there will be enough beneficiaries to keep recruiting till the project target is met.

# Costs and Benefits

1. The total cost of the project amounts to USD 11.475 million including cofinancing from IFAD and BAGRI. This excludes the operating and maintenance costs for the interventions over the lifetime of the project.
2. The cost benefit analysis shows that with a 10 percent discount rate, the discounted net present value of the project is valued at about 54.9 million USD. The economic internal rate of return is 42%, which exceeds the discount rate of 10%.
3. Though the internal rate of return is 42% for the base case, there are other benefits not captured in this analysis highlighted previously. The implication of not capturing the increase in the differences with or without the project in the face of climate change is that benefits estimated in this analysis provides a lower bound on the value of the project.
4. Three sensitivity test cases were examined: (i) total cost increased by 20%; and (ii) total benefits decreased by 20%; and (iii) total cost increased by 20% and total benefits simultaneously decreased by 20%. In all cases, the project remains economically feasible and EIRR remains above the minimum threshold. Results are presented below.

*Table 1: Net present value (million USD) and Economic Internal Rate of Return (EIRR)*

|  |  |  |
| --- | --- | --- |
|  | NPV | EIRR |
| Base case | $54.90M | 42% |
| Cost +20% | $53.16M | 38% |
| Benefits – 20% | $42.18M | 37% |
| Cost +20% and benefit -20% | $40.45M | 34% |

# Reference:

1. World Bank (2017). Project Appraisal Document. INVESTMENT CLIMATE AND COMPETIVENESS SUPPORT PROJECT.
2. World Bank (2017) ‘Guidance Note on Shadow Price of Carbon in Economic Analysis’. World Bank. September 2017