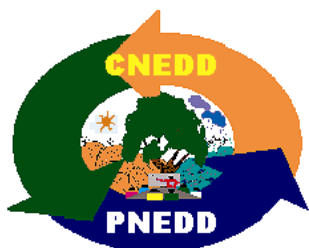


Republic of Niger
Conseil Suprême pour la Restauration de
la Démocratie (CSRD)
Cabinet du Premier Ministre



National Committee for Environment &
Sustainable Development
Executive Secretariat

United Nations Development Programme
(UNDP)



UNDP Global Project:
Capacity Development for Policy Makers
to address Climate Change

Final Report

Assessment of Investment & Financial Flows
to Mitigate Climate Change in the Forestry Sector

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Abbreviations

MEA:	Multilateral Environmental Agreements
UNFCCC	United Nations Framework Convention on Climate Change
ESC / DRS:	Soil water conservation / Defense and Soil Remediation
CNEDD:	National Council of Environment for Sustainable Development
CNES:	Centre National Solar Energy
DE/ME /LCD:	Environment Directorate / Ministry of the Environment and the Fight against Desertification
Dered:	Department of Renewable Energy and Energy Domestic
FAO:	Food and Agriculture Organization
GEF:	Global Environment
FH-OPT:	Hertzian beam - Office of Post and Telecommunications
GHG:	Greenhouse Gases
IPCC/OECD/IEA:	Intergovernmental Panel on Climate Change / Organisation for economic Cooperation and Development / International Energy Agency
I&FF:	Investment and Financial Flows
MME:	Ministry of Mining and Energy
O & M:	Operations and Maintenance
NGO:	Non Governmental Organization
ORTN:	Office of Radio and Television of Niger
NFAP:	Draft Management of Natural Forests
TFAP:	Tropical Forest Action Plan
ALMPs:	Programme of Action Medium Term
NFP:	National Forestry Programme
GDP:	Gross Domestic Product
NEPSD:	National Plan for the Environment for Sustainable Development
UNDP:	United Nations Development
PV:	Photovoltaic
RIN:	National Inventory Report
SNA:	Second National Communication
RDS:	Rural Development Strategy
SNER:	National Strategy on Renewable Energy
PRRS:	Strategy for Accelerated Development and Poverty Reduction
NAPS / HVAC:	National Strategy and Action Plan on Change and Variability Climate
LULUCF:	Land Use, Land Use Change and Forestry

Summary

The project "Capacity building of policy makers" aims to strengthen the national capacity of developing countries to develop policy options to address climate change in different sectors and economic activities, which could serve as the entry points for negotiating positions of the Convention.

This project funded by UNDP is part of the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) which Niger has ratified in 1995 and fits with national priorities contained in the Strategy for Accelerated Development and Poverty Reduction (PRRS).

For Niger, two sectors namely Agriculture and Forestry have been identified as priorities for adaptation and mitigation respectively; these have been evaluated and Investment & Financial Flows (I&FF) have been carried out to study the effects of climate change.

To this end in the forestry sector, two mitigation measures are identified: (i) sequestration of carbon by the action of restoring degraded soils, afforestation and reforestation and (ii) substitution across measures to prevent or limit emissions of carbon consumption of wood energy.

The main measures adopted are based on the mitigation studies within the framework of the preparation of the Second National Communication (SNA) and the National Strategy and Action Plan on Climate Change and Variability (SNPA / CAC).

The I&FF evaluation team was composed of five (5) national experts who worked according to the guidelines contained in the UNDP User Guide and Guidebook for Assessing Methodology I&FF to Address Climate Change. The team agreed the main entities involved in the field are households, firms (NGOs and private) and government entities. Data and information were collected mostly in documents of national communications, the National Action Plan for Adaptation (NAPA) to climate change, the National Strategy on Climate Change and Variability and structures such as the Directorate of Environment Directorate of Domestic Renewable Energy and Energy, the National Institute of Statistics and NGOs.

The main results obtained at the level of sequestration is that natural regeneration and forest management conducted by households only have a flux difference between the baseline and the mitigation of respectively 3.5 million and 20.14 million to achieve the mitigation target for 2030.

Reforestation, reclamation of land and plantations, sand dune fixation are performed by all entities. Thus, to achieve the goals of reducing the level:

- Household should have 0.26 million dollars for reforestation, 5.87 million for plantations and 2.5 million for dune fixation
- Business (NGOs) should have 48.3 million for reforestation, plantations for 31.5 million and 44.5 million for dune fixation. These flows come mainly from foreign sources.
- Governmental entities should have \$ 27.9 million for reforestation, planting 33.4 million to 48.4 million and for dune fixation. These flows are from national sources.

Alleviating the pressure on forests in 2030 through the substitution requires an additional cost compared to the current situation. Thus at level:

- Household mitigation activities should have 976.8 million for solar photovoltaic (PV), 173.1 million for solar thermal and 238.3 million for energy conservation. This makes a total of 1.388 billion, mainly from national funds (equity or debt),
- NGOs and businesses should have 299.3 million from domestic sources and 84.4 million of

public aid for development of PV installations only. This shows that over 90% of investments will come from national funds,

- State should have 126.9 million from internal funds and 5.9 million from foreign sources (borrowing 4,200,000; 990,000 from ODA bilateral & 730,000 from multilateral ODA).

The funding of community projects implemented by NGOs for the benefit of communities seeking to enhance carbon sinks (REDD and CDM and others) are needed to bridge the gap and achieve the goal set by the Action Plan for Medium Term (ALMPs). For this, the government of Niger has particular interest in international funds to mobilize while positioning themselves for funds relating to REDD.

It is important that increased awareness, information and education for behavioral change on the protection of the environment is taken as policy measures that could be used to encourage entities in connection with the sequestration.

1. Introduction

Niger signed in June 1992 and ratified in July 1995 the United Nations Framework Convention on Climate Change (UNFCCC). As part of the implementation of this Convention and in addition to the projects and programs executed, Niger has prepared its Second National Communication (SNA) on Climate Change.

Inventories of greenhouse gas emissions are one of the key parts of preparing these national communications. To this end, five (5) sectors of greenhouse gas emissions inventories have been the focus for the second national communication: (i) Land Use, Land Use Change and Forestry (LULUCF), (ii) Agriculture/Livestock (iii) Energy, (iv) Industrial processes and (v) Waste management.

This inventory covered the year 2000 and was conducted according to the revised 1996 version of the methodology IPCC / OECD / IEA.

Although the results of this inventory has brought to light that Niger is still a well sequestration of greenhouse gases (CO₂-eq Gg -417.94.), the first three sectors with the largest sources of emissions (Agriculture, LULUCF, Energy) have been subject of mitigation studies on climate change.

The mitigation measures identified reflect the priorities of economic and social development as defined by the strategic framework and are: the National Strategy and Action Plan on Climate Change and Variability (SNPA / CAC), the Rural Development Strategy (CSD) and the Strategy for Accelerated Development and Poverty Reduction (PRRS).

The capacity building project supported by UNDP within which the evaluation of I&FF is part of the implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and is in line with national priorities. It is an opportunity for Niger to assess and develop policy options to address the effects of climate change in the forestry sector, which could constitute a contribution to defining the negotiating positions of the Convention.

To this end, the mitigation options are selected from the mitigation studies within the framework of the preparation of the Second National Communication (SNA) and the National Strategy and Action Plan on Climate Change and Variability (SNPA / CAC).

Analysis of Investment and Financial Flows (I&FF) for GHG mitigation is an important activity for the establishment of effective national response measures and appropriate climate change.

Thus, for Niger, the proposed mitigation measures in the forestry sector aim, in addition to the avoidance of emissions by the introduction of new technology, to also facilitate the inclusion/consideration of climate change.

This study highlights the investment and financial flows in the framework of realization of actions contributing to the mitigation of GHG emissions in the forestry sector in Niger.

1.1 Objectives of the evaluation I & FF

The overall objective of the evaluation of I&FF is to determine the extent and sources of funds to address climate change concerns at national level. Specifically, the following outcomes are expected:

- consolidated information on investment and financial flows current in key areas;
- a projection of future I&FF in the absence of efforts to address climate change;

- identification of measures to address climate change and projections of future I&FF associated with their implementation.

1.2 Background

1.2.1. Previous analysis used

This assessment is based on I&FF strategies, plans and programs adopted by the Government of Niger including:

National Plan for the Environment for Sustainable Development (PNEDD)

This document adopted by Niger in 2000 is the framework on environment and sustainable development. It is thus a response to various international commitments made by Niger, in particular those relating to the conventions on the fight against desertification, biodiversity and climate change.

Strategy for Accelerated Development and Poverty Reduction (PRRS)

The PRRS is the unified document reference to Niger in the fight against poverty. The socioeconomic data were drawn from this document.

The Rural Development Strategy (RDS)

In this paper four (4) of the fourteen (14) programs related to the sustainable management of natural resources and preserving the environment. They are:

- Program 2 on the local governance of natural resources
- Program 10 on the preservation of the environment
- Program 13 on land restoration and reforestation
- Sub-program 4.4 on rural electrification whose objective is to reduce the cost associated with wood energy by promoting renewable energy in rural areas.

Programme of Action Medium Term (ALMPs)

This was taken from the document of policy objectives and national development strategies namely the quantification of regression of forested areas, increasing reforestation efforts, data from annually assisted natural regeneration and the increase of areas being developed yearly. All data and information have resulted in the baseline scenarios and mitigation.

The Second National Communication on Climate Change

The mitigation measures identified in this study were funded by the study on mitigation of forestry of the second communication.

Report on National Inventory of greenhouse gas emissions

Data on inventories of greenhouse gas emissions within the SCN have justified the choice of the forestry sector given its importance in terms of CO₂ emissions associated with the consumption of wood energy.

National Strategy on Renewable Energies

This paper has raised the key data and information on the substitution of fuel wood.

1.2.2 Institutional Arrangement and collaborations

At the national level, the supervision of the project is ensured by the National Council of Environment for Sustainable Development (CNEDD), an institution affiliated to the Prime Minister through the Executive Secretariat (SE / CNEDD) with the support of the Commission on the National Technical Change and Climate Variability (CTNCVC). This committee consists of state institutions, civil society and private sectors whereby the issues of climate change in general and data access activities can be treated at the national level.

A Project Coordination Unit has been placed in the SE / CNEDD and coordinates the activities of the entire project. This unit is composed of Mr. Gousmane MOUSSA, Climate Change Adviser and Mr Hassane HAROUNA, Assistant Financial Officer, SE / CNEDD.

The NGO, OSEILED, has been contracted by the Project Coordination Unit for the implementation of this evaluation by preparing two studies (adaptation and mitigation). Taking into account the guidelines, the NGO has set up two teams of multidisciplinary experts; five (5) experts have been contracted individually to the forestry team namely:

- Mr Abdoulaye ISSA, energy specialists, expert team leader
- Mr Dan Chaïbou Bakoye, Finance Expert
- Mr Moussa Koch, Statistics Expert
- Mr Omar Ahmed, Forestry Expert
- Ms. Safiatou Alzouma, Energy Expert.

These teams have been formed by the PASS Centre through a training workshop held in Niamey to guide in the use of UNDP User Guide and Guidebook for Assessing methodology I&FF to address climate change.

1.2.3 Basic Methodology and Key Terms

The methodological approach of the national assessment of I&FF mitigation followed the eight steps outlined in the methodological guide are:

- **Establish the key parameters of the assessment;** they are:
 - Determine in detail the scope of the sector;
 - Identify the preliminary measures of mitigation;
 - Specify the period of evaluation and the reference year
 - Select an analytical approach
- **Compile historical data of I&FF and other data that can contribute to the scenarios:**
 - The exercise is to compile data of I&FF and O&M annually, disaggregated by investment entity & source and investment flows with respect to financial flows.
- **Define the baseline scenario;** at this stage, we must highlight the scenario:
 - Socio-economic trends
 - Changes and technological advances;
 - Sectoral and national plans and
 - Expected investments given current sectoral and national plans
- **Estimate the I&FF for the baseline scenario:**

- Estimates of I&FF annually disaggregated by investment entity and funding source
 - Estimates the O&M annually disaggregated by investment entity and funding source
 - Estimate annual subsidy costs for each relevant investment type and for IF, FF, and O&M costs, if subsidies are included explicitly in the assessment.
- **Define mitigation scenarios:**
 - I&FF estimates annual disaggregated by investment entity and funding source
 - Estimates of the O&M annual breakdown by entity and by investment

Taking into account the situation of climate change
- **Derive / estimate / project the I&FF for the mitigation scenario;**
 - Derive annual estimates of FI & FF, broken down by entity and source of investment.
- Estimate annual changes I&FF and EM required to implement mitigation scenarios; **Estimate annual IF, FF, and O&M costs, and subsidy costs if included explicitly, for mitigation scenario**
 - Estimate annual IF and FF for each investment type, disaggregated by investment entity and funding source
 - Estimate annual O&M costs for each IF, disaggregated by investment entity and funding source
 - Estimate annual subsidy costs for each relevant investment type and for IF, FF, and O&M costs, if subsidies are included explicitly in the assessment
- **Calculate the changes in IF, FF, and O&M costs**, and in subsidy costs if included explicitly, needed to implement mitigation Calculate changes in cumulative IF, FF, and O&M costs, by funding source, for individual investment types and for all investment types
 - Calculate changes in annual IF, FF, and O&M costs for individual investment types, for individual sources of funds, and for all investment types and funding sources
 - If subsidies are included explicitly, consider calculating changes in cumulative and/or in annual subsidies for IF, FF, and O&M for each investment type and all investment types
- **Assess the implications in terms of public policy;** these highlight the need to:
 - Integrate climate change in regional projects, regional and national strategy,
 - Strengthen the capacities of all stakeholders,
 - Integrating these options in national reference
 - Involve local entities proactively; give responsibility/empowerment to the people
 - Develop activities that support the generation of income/revenue.

It is expected that this national assessment of I&FF will increase greater awareness and understanding of future investments that address climate change as well as development priorities.

In particular, this assessment of I&FF should provide the following results:

- a synthesis of current information on investment and financial flows in forestry;
- a projection of future I&FF in the absence of baseline scenario to address climate change;
- identification of measures to address climate change and projections of future I&FF associated with their implementation;
- an assessment of potential sources of financing entities and national and international role in addressing climate change.

The methodology was to take stock of data and information including those contained in national communications, the National Action Plan for Adaptation (NAPA) to climate change, the National

Strategy on Climate Change and Variability. Other data sources such as the ministries including the MHE / LCD-GRN, MME, the National Institute of Statistics, NGOs and private individuals have been identified.

The Centre has also helped the teams and the focal point in the revised work plan and guidance in the selection of specific methodologies.

The main entities involved in the area are the households, NGOs, private and government. The group has set a regular meeting every two weeks. To search for data and information, the team split into three groups (i) the expert team leader and expert in forestry on forestry data, (ii) the expert in statistics and finance for government entities and NGOs and (iii) energy expert for all data related to its sector. Proactive information and data searching was advocated.

Monthly meetings were adopted for both teams. Both team leaders had agreed to meet whenever necessary to have a common understanding of certain issues/points and to address the great difficulties encountered in the work.

Thus it was agreed to retain the name three entities for the study in the case for Niger: households (families, individual farmers), government entity (state) enterprises (NGOs and private).

Also, given the difficulty in finding reliable data related to the ten year period originally planned; a period of 6 (six) years [2000-2005] coinciding with the country's political stability was used as the basis for historical data research.

Definitions of key terms

Mitigation: It is the modification and substitution techniques used in order to reduce the resources used and emissions per unit of production. Mitigation means implementing policies to reduce emissions of Greenhouse Gases (GHG) emissions from the consumption of wood energy (conversion of forest and meadow) and to enhance carbon sinks through operations reforestation (changes in forest).

Investment Flows: The "Investment flows" (IF) is the capital cost of new physical assets with a lifespan of more than one year, such as the capital cost of solar PV kits, equipment for the work of Conservation Soil water / defense and Soil Remediation (CES / DRS).

Financial Flows: The "cash flow" (FF) is the ongoing expenditure on programmatic measures, the FF covers expenditures other than those for the expansion or installation of new physical assets.

Investment Entity: An investment entity" is an entity responsible for an investment. These are the entities that decide to invest in, for example: a photovoltaic park, a program of reforestation, national parks, a program for stabilizing sand dunes. This methodology uses three types of investment entities: families, companies and government.

Sources of I&FF funds: The "sources of I & FF funds" are the origins of the funds invested by investment entities, e.g. domestic equity, foreign debt, domestic subsidies, foreign aid.

Households: Households are individuals or groups of people (eg families) acting as one unit financially. Households invest in assets such as houses, farms, crop fields. It is assumed that all their investment funds, including capital (savings), debt (borrowing from friends, family, financial institutions) and government support in form of grants (that is to say-refundable deductions tax, tax credits on purchases) are national funds, to simplify the estimation of I&FF.

Corporations: The companies include both financial firms as non-financial businesses, and organizations may be profit or non-profit. Financial firms are entities such as banks, credit unions and insurance companies that provide financial services to non-financial business, households and governments. The non-financial firms produce goods (such as fossil fuels, electricity, food or wood).

The non-governmental organizations are a kind of company non-profit. Firms invest in physical assets and programs. Their sources of investment funds are from domestic sources and external sources and can be in the form of shares (shares in domestic capital markets and FDI), debt (loans from commercial banks and bonds sold in capital market), national government support (subsidies) or public foreign aid (in the form of grants and loans conditional preference, known as ODA or ODA).

Governments: Governments are the national, provincial, county and local governments of a country. Financial and non-financial corporations owned wholly or in part by governments, such as public universities, research institutions and publicly held oil companies, utilities and management of waters and forestry authorities belong to this category. Government entities invest in physical assets and long-term programs and services that provide public benefits.

Scenario: A scenario is an internally consistent and plausible characterization of future conditions over a specified period. For each sectoral assessment of I & FF for mitigation, it must develop a baseline scenario and a mitigation scenario for this sector. In both cases, the baseline scenario describes the conditions of the status quo, that is to say, this is a description of what will probably happen if no new policy measure to address climate change is put in place.

Mitigation Scenario: The mitigation scenario includes measures to mitigate GHG emissions, that is to say, the mitigation scenario should describe the expected socio-economic developments, technological change (if appropriate), new measures to mitigate GHG emissions and the expected investment in the sector given the implementation of mitigation measures.

Evaluation period: The evaluation period is the time horizon for assessment i.e. the number of years.

Base Year: The base year is the first year of the assessment period, that is to say the first year of baseline, mitigation and adaptation. The base year should be a recent year for which information on the I&FF and O&M is available so that the IF, FF and O&M costs for the first year of these scenarios are all historical data. In fact, the reference year as the starting waves of cost data for each scenario is based. The reference year 2005 is recommended.

For externalities it should be noted that mitigation of the forestry sector contributes more to environmental protection through various afforestation and reforestation and recovery of degraded lands. Also, these measures will probably avoid some through and through reducing emissions of other greenhouse gas emissions. These mitigation measures are implemented at community level to benefit vulnerable populations facing the effects of climate change contributing to the fight against poverty in these populations.

2. Scope, input data and scenarios

2.1. Sectoral Scope

The results of last inventory of GHG (CNEDD, RIN-2007) showed that the sector Land Use, Land Use Change and Forestry is the biggest emitter of GHGs 17,135.16 Gg CO₂-eq is 55.52 % in Niger.

Also, major change in Land Use, Change of Assignment of Lands and Forestry and their management classes consist of the following sources: (i) changes in forest and other stocks woody biomass, (ii) the conversion of forests and grasslands, (iii) abandonment of managed lands and (iv) land affected by agriculture.

Forests are a source of greenhouse gas emissions. They absorb carbon through photosynthesis and emit through decomposition or burning of trees by human actions or natural reasons. Managing forests to retain and increase the carbon they contain will help to reduce the rate of emission of CO₂ and N₂O in the atmosphere.

For this sector, GHG emissions for 2000 are derived primarily from the conversion of forests for a total issue of 925.24 Gg CO₂ eq 4. The sources of forest conversion are among other land clearing for agricultural purposes constitutes an important source of deforestation.

The work of FAO (1993) estimated that each year, approximately 190,400 hectares of forest land are cleared for the installation of such fields. In addition to clearing, other factors also contribute to the decline of forest cover, including brush fires, the use of wood for domestic energy, overgrazing etc.

Forestry is the only potential for carbon sequestration (-33 206.46 Gg CO₂-eq in 2000). In addition to natural formations, trees outside forests, the sequestration potential is formed by the effort of producing and planting seedlings at the national level. Thus one can note that during the period 2000-2006, it produced 64,796,973 seedlings for all species (Report DE / MHE - 2006).

The emission of the main gases (CO₂, CH₄, N₂O) for LULUCF sector is estimated at 17,135.16 Gg CO₂ Eq (CNEDD-RIN-2007) 166.07 17, taking into account the sequestration capacity, resulting in a difference in favor of sequestration (-16 071.30 Gg CO₂).

This result indicates that the LULUCF sector is a net sink for CO₂ sequestration.

Moreover, the socio-economic contribution of forestry to Gross Domestic Product (GDP) is estimated at 17% according to the Tropical Forestry Action Plan (TFAP, 1992). Forest resources that are not sufficiently mastered are of strategic importance for the people who depend on them for meeting their basic needs. Indeed, forests are the main source of cooking fuel for urban and rural populations. The economic importance of wood energy, for example, translates into an increase in turnover of operators over the years.

The contribution of forest resources to improve the living conditions of the poorest people and reducing rural poverty has increased in recent years with the promotion of decentralized forest management where turnover related to the timber trade has grown to about 11.333 billion CFA (NFAP 2003).

Unfortunately, their surfaces are initiated each year especially for agriculture. Despite these pressures multifaceted, forest resources play an important role in the field of climate change

because they are the only source of sequestering CO₂ from the atmosphere. These are the reasons for choosing this sector whose scope covers the entire national territory.

The major mitigation activities identified for the forestry sector are grouped into two (2) measures:

- Sequestration
 - Afforestation / reforestation
 - Assisted natural regeneration
 - Forest management
 - Restoration of degraded lands
 - Dune fixation.
- Substitution
 - Operation of solar photovoltaic
 - Using solar thermal energy
 - Energy savings in the use of wood for cooking.

The main entities involved in the area are the households, NGOs, private and government. In the case of Niger, households include families and communities, NGOs and businesses include private and government entities state.

2.2. Input data and scenarios

2.2.1. Period of assessment and costing parameters

Following the recommendations of the Guide, the first year considered as the base year chosen for this evaluation is 2005. And the year 2030 was chosen as the closing year, so the evaluation covers the period 2005-2030.

The accounting units are U.S. dollars in 2005 constant values. For the update, the interest rate on the money market in 2005 is 4.95% used. In the baseline scenario, the references for the calculations are shown in Table 1 below:

Table 1: Results of calculation (baseline)

Reference of calculation	Areas affected by year (in ha)
Regression of Forest	190400*
Plantation efforts	20000
Management efforts	50000
Natural regeneration	150 000

Source: FAO-1992*, SDR -2003

Emissions remain constant over the years that the annual loss of forest area are assumed constant (190,400 ha). As for the sequestration capacity, there is a decrease due to the reduction of forest potential.

Table 2: Cost per hectare (ha) of shares in the baseline scenario

Actions	Costs per unit in CFA
Natural regeneration (ha)	1306
Reforestation* (ha)	81801
Forest management (ha)	5000

* Includes land reclamation

Sources of data: PAFN-2004

For the scenario of climate change, the calculation of mitigation costs is made on the following basis:

- Period of the mitigation: 2005-2030 or 25 years;
- Cost per hectare of afforestation with land reclamation: 81801FCFA;
- Cost of a hectare of forest converted: 5000 FCFA;
- Cost of a hectare of regenerating natural: CFA 1306.

Source: NFAP 2004; frame of reference standards for technical and financial implementation of the activities of NFAP.

For the Operation and Maintenance (O&M), a rate of 10% of the amount of activity was applied and this is justified by the average adopted in the implementation of various projects in the field. This O&M concerns include wages, fuel etc.

2.2.2. Analytical Approach

The selected analytical approach is the Excel spreadsheet because of lack of data to feed models. These Excel spreadsheets that are established in the framework of this project listed in the "Methodological Guide" and "Guidelines on reporting of UNDP.

For the baseline scenario, statistical techniques such as growth rate, using the average of its variation, was used to develop the baseline. The mitigation scenario was based on the objectives that were set in national papers as well as the cost of shares.

2.2.3 Historical Data on FI, FF, O&M costs

At present, the level of disaggregation of data collected from various entities, did not allow to reveal distinct financial flows and investment flows in our analysis. In each entity, the financial scenarios of the projects or any other operations are given by major components or parts.

However, in the context of the implementation of the Paris Declaration in July 2005 on the effectiveness of Official Development Assistance (ODA), Niger has joined the Platform Management Help. The new database on projects and development programs that are being installed, will allow us in future to meet any request for information on financial flows and investment flows at least in terms of the main entity, the State.

Also, increasingly, there are partners who are willing to help improve the structure of the private sector, NGOs / AD and the accompanying decentralized local authorities and community organizations to bring them sound and detailed accounts. Along with actions to strengthen capacity, all this will enable Niger to conduct a better I&FF analysis exercise. This ensures the data are treated comprehensively.

Historical data has been collected for the period 2000-2005, the period in which account data was maintained regularly during stable political developments. These data refer only to the physical assets, so the values for financial flows were calculated from this.

For **measures of sequestration**, enhancing carbon sinks through the achievement of the following activities:

- **Afforestation / reforestation**

The study on mitigation forestry sector within the framework of the SNA (CNEDD -2007) gives the

achievements made by entities in Table 3 below.

Table 3: Status of the physical and financial cost between 2000 and 2005 for reforestation.

Years	Funding Sources	Types of physical plantations			Financial flows (million 2005 US\$)		
		Block plantations (ha)	Reforestation and restoration of land (ha)	Fixation of dunes (ha)	Block plantations (ha)	Reforestation and restoration of land (ha)	Fixation of dunes (ha)
2000	Government	12	10	0	0,002	0,818	0
	Households	160,8	7,6	30,5	0,028	0,622	0,011
	Corporations	6 718,40	5 531,80	905,3	1,159	452,507	0,326
	Total	6 891,20	5 549,40	935,8	1,189	453,947	0,337
2001	Government	3 910,00	2 256,40	214,2	0,675	184,576	0,077
	Households	103,5	5,7	0	0,018	0,466	0
	Corporations	1 966,80	5 425,00	182,3	0,339	443,77	0,066
	Total	5 980,40	7 687,10	396,4	1,032	628,812	0,143
2002	Government	5 747,20	2 804,40	881,6	0,992	229,403	0,318
	Households	444,7	86,9	125,4	0,077	7,109	0,045
	Corporations	3 196,00	10 541,70	601,5	0,551	862,322	0,217
	Total	9 387,90	13 433,00	1 608,50	1,62	1098,834	0,58
2003	Government	7 714,50	3 990,70	1 098,50	1,331	326,443	0,396
	Households	1 164,50	101,8	17	0,201	8,327	0,006
	Corporations	8 119,70	5 930,00	160	1,401	485,08	0,058
	Total	16 998,70	10 022,50	1 275,50	2,933	819,85	0,46
2004	Government	3 886,70	1 758,80	213	0,671	143,872	0,077
	Households	364,8	53,9	0	0,063	4,409	0
	Corporations	6 266,00	6 976,60	1 117,00	1,081	570,693	0,402
	Total	10 517,50	8 789,20	1 330,00	1,815	718,974	0,479
2005	Government	3 982,50	16 508,50	1 101,00	0,687	1350,412	0,397
	Households	8 092,30	0	0	1,396	0	0
	Corporations	3 967,60	4 076,90	181,9	0,684	333,494	0,066
	Total	16 042,40	20 585,40	1 282,90	2,767	1683,906	0,463
Total	Government	25 252,90	27 328,80	3 508,30	4,358	2235,524	1,265
	Households	10 330,60	255,90	172,90	1,783	20,933	0,062
	Corporations	30 234,50	38 482,00	3 148,00	5,215	3147,866	1,135
Total		65 818,00	66 066,70	6 829,20	11,36	5 404,32	2,46

Sources: DE/ME/LCD-2006

For the Care and Maintenance (O&M), a rate of 10% of the amount of activity was applied and this is justified by the average adopted in the implementation of various projects in the field. This O & M concerns include wages, fuel. For plantations, in Niger, reforestation has long been a strong action in forestry.

During the period 2000-2006, 64,796,973 seedlings of all species was produced. Also, in this context, emphasis has been placed on local species with high economic and nutritional value, among which *Acacia senegal* (gum).

- **Assisted Natural Regeneration (NAS)**

The actions to contain this level include:

- Planting in the fields;
- Identification and protection of natural regeneration or assisted natural regeneration.

The efforts of various stakeholders permitted the sharing of knowledge of this technology by farmers who protect and manage the volunteer in their fields, especially those species fertilizers and economic and nutritional value. Thus, the study report on the Niger Sahel impact of investment in the management of natural resources from 1984 to 2004 on food security, rural poverty and the environment sets the size of the species by RNA almost three million hectares (an average of 150,000 ha per year), with densities often exceeding 100 feet per ha (DE-ME/LCD-2006).

- **Forest management**

Niger has managed to develop experiences that are now used as sources of inspiration for other countries. Since the 1990s, the national option in forest remains participatory management thereof. This option has been reaffirmed by the new forestry law. Thus, to date, more than 800,000 ha of natural forests are put under management through a network of about 290 rural wood markets that manage them. This arrangement aims to limit the agricultural front and consequently deforestation. Plantations are also made in replenishable forests.

- **Restoration of degraded lands forestry purposes**

The experience of implementing erosion control structures (benches, half-moons, stone bunds, zai, etc.) to regenerate the soil is very conclusive. All these works are accompanied by planting trees in their realization.

For alternative measures, it should be noted that in Niger, wood energy accounts for more than 90% of energy consumption. It is mainly used for cooking but also for heating during a certain period of the year. It is taken for a large share (over 95%) on forest formations (Source: National Strategy on Renewable Energy-2009).

This measure aims to promote access to cleaner energy sources in rural and urban areas and allows it to reduce pressure on wood resources and thus avoiding emissions of greenhouse gases. The proposed activities that fall within the target set by the Niger to increase to 10% by 2015 (SNER/2009) the introduction of clean energy sources are:

Table 4: Achievement of financial alternatives (in million U.S. \$ 2005)

Year	Solar Photovoltaic (PV)						Solar thermic energy						Energy saving					
	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005
Investment entity Source of funds	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF	I&FF
Households																		
Internal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Assets and liabilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total funds of households	0,000	0,000	0,002	0,000	0,004	0,000	0,0061	0,0059	0,0093	0,0116	0,0106	0,0104	0,0005	-	-	0,0005	-	-
NGO																		
Internal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Domestic assets	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Domestic borrowing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total internal sources	0,410	0,456	0,011	0,000	4,925	5,594	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Foreign	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FDI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign bonds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ODA	0,070	0,021	29,549	38,912	32,626	32,372	-	-	-	-	-	-	-	-	-	-	-	-
Total foreign sources	0,070	0,021	29,549	38,912	32,626	32,372	-	-	-	-	-	-	-	-	-	-	-	-
Total sources of enterprises	0,480	0,477	29,561	38,912	37,551	37,966	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Government entities																		
Internal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inland Fonds	0,032	0,011	0,013	0,194	0,041	0,008	-	-	-	-	-	-	-	-	-	-	-	-
Foreign	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Foreign bonds	0,010	0,009	0,022	0,037	0,268	0,014	-	-	-	-	-	-	-	-	-	-	-	-
Bilateral ODA	0,010	0,501	0,094	0,031	0,966	0,150	-	-	-	-	-	-	-	-	-	-	-	-
Multilateral ODA	0,158	0,055	0,065	0,972	0,203	0,038	-	-	-	-	-	-	-	-	-	-	-	-
Total foreign sources	0,179	0,564	0,181	1,040	1,437	0,202	-	-	-	-	-	-	-	-	-	-	-	-
Total of Government entities	0,210	0,575	0,194	1,234	1,477	0,210	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Annual total	0,690	1,052	29,757	40,147	39,033	38,176	0,006	0,006	0,009	0,012	0,011	0,010	0,0005	0,0000	0,0000	0,0005	0,0000	0,0000

Sources: DERED- 2009

- **Solar Photovoltaic (PV)**

To achieve the target set by the SNER, Niger awaits the promotion of solar panels at the household level. In rural areas, night lighting is mainly based in the use of wood for energy and non-formal education (Koran school).

The use of solar photovoltaics to reduce pressure on forest resources is in the following applications:

- Integrated Health Centres (CSI);
- Especially in rural households in rural communities;
- Formal and non formal education.

- **Solar Thermal**

The use of solar thermal for heating water and cooking will reduce a pressure on scarce forest resources of the country.

The most common use of solar thermal:

- The solar water heater is promoted by the National Solar Energy Centre (CNES). This solar water heater has a capacity ranging from 200 to 1000 liters of hot water per day. The most common uses of the water heater in the generation of hot water
- Distillers capacity 10-20 liters allows the production of distilled water for laboratory use and maintenance of battery acid solution (CNES)
- Allows the dryer to dry the food to protect from flies and dust, both of which are severely limiting the quality of food hygiene in Niger (CNES, NGOs, private).

- • **Energy saving in the use of firewood**

Saving energy in this case relates to (i) access of rural households to alternative energy for cooking and lighting from biogas, (ii) the promotion of biofuel plantations in the recovery and (iii) recovery of municipal waste for energy.

2.2.4. Base Scenario

2.2.4.1. Sequestration

Based on historical data, the baseline shows the trend expected in the area during the evaluation period (2005-2030) in the absence of new policies to address climate change (status quo scenario).

Historical data from the I&FF and other data that can contribute to the scenarios being compiled earlier, the Court finds that from 1993 to 2005 it increased from 190,400 ha of forest loss 12,000 hectares with a current trend to a renewal of forest capital, the rate of population growth is 3.3% and the GDP which is 7, 4 in 2005 rose to 9.5 in 2008.

Historical data IF, FF and O&M costs were collected for the period 2000-2005 from the physical implementation of the various entities and whose status has been given by the Environment Directorate in the development of Second National Communication on Climate Change.

Table 5 below provides an estimate of I&FF disaggregated investment entity and source for all the activities of the sequestration option.

Table 5: I&FF and O&M annual investment by type (in million U.S. \$ 2005)

Year	Natural regeneration		Forest management		Reforestation and restoration of land		Plantations		Fixation of dunes	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	0,37	0,04	0,47	0,05	3,19	0,32	2,77	0,28	0,46	0,05
2006	0,35	0,04	0,45	0,05	1,12	0,11	2,48	0,25	0,45	0,05
2007	0,34	0,03	0,43	0,04	0,70	0,07	2,24	0,22	0,43	0,04
2008	0,32	0,03	0,41	0,04	0,80	0,08	2,02	0,20	0,41	0,04
2009	0,31	0,03	0,39	0,04	0,55	0,06	1,83	0,18	0,39	0,04
2010	0,29	0,03	0,37	0,04	0,61	0,06	1,66	0,17	0,37	0,04
2011	0,28	0,03	0,35	0,04	0,47	0,05	1,52	0,15	0,35	0,04
2012	0,26	0,03	0,34	0,03	0,50	0,05	1,39	0,14	0,34	0,03
2013	0,25	0,03	0,32	0,03	0,41	0,04	1,27	0,13	0,32	0,03
2014	0,24	0,02	0,31	0,03	0,44	0,04	1,17	0,12	0,31	0,03
2015	0,23	0,02	0,29	0,03	0,39	0,04	1,09	0,11	0,29	0,03
2016	0,22	0,02	0,28	0,03	0,40	0,04	1,01	0,10	0,28	0,03
2017	0,21	0,02	0,27	0,03	0,37	0,04	0,94	0,09	0,27	0,03
2018	0,20	0,02	0,25	0,03	0,38	0,04	0,88	0,09	0,25	0,03
2019	0,19	0,02	0,24	0,02	0,36	0,04	0,82	0,08	0,24	0,02
2020	0,18	0,02	0,23	0,02	0,37	0,04	0,77	0,08	0,23	0,02
2021	0,17	0,02	0,22	0,02	0,36	0,04	0,73	0,07	0,22	0,02
2022	0,16	0,02	0,21	0,02	0,36	0,04	0,69	0,07	0,21	0,02
2023	0,16	0,02	0,20	0,02	0,36	0,04	0,65	0,07	0,20	0,02
2024	0,15	0,01	0,19	0,02	0,36	0,04	0,62	0,06	0,19	0,02
2025	0,14	0,01	0,18	0,02	0,36	0,04	0,59	0,06	0,18	0,02
2026	0,13	0,01	0,17	0,02	0,36	0,04	0,57	0,06	0,17	0,02
2027	0,13	0,01	0,16	0,02	0,36	0,04	0,54	0,05	0,16	0,02
2028	0,12	0,01	0,16	0,02	0,36	0,04	0,52	0,05	0,16	0,02
2029	0,12	0,01	0,15	0,01	0,36	0,04	0,50	0,05	0,15	0,01
2030	0,11	0,01	0,14	0,01	0,36	0,04	0,48	0,05	0,14	0,01
Total	5,63	0,56	7,19	0,72	14,66	1,47	29,76	2,98	7,18	0,72

Sources: Our calculations in Excel

Table 5 above shows the flow of investments and financial statements in U.S. million dollars (2005 value) for all types of investments linked to the sequestration option for the baseline scenario. It appears that the flow of investment and financial are more important in plantations (29.76 million U.S.) followed by reforestation and land reclamation power 14, 66 million U.S.

Table 6: I&FF and O&M accumulated by investment type and entity according to sources (in million U.S. \$ 2005)

Investment entity	Natural regeneration		Forest management		Reforestation and restoration of land		Plantations		Fixation of dunes	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
Households	5,63	0,56	7,19	0,72	0,08	0,01	10,86	1,09	0,09	0,01
Corporations	0	0	0	0	3,51	0,35	14,06	1,41	2,62	0,26
Government	0	0	0	0	11,06	1,11	4,84	0,48	4,47	0,45
Total	5,63	0,56	7,19	0,72	14,66	1,47	29,76	2,98	7,18	0,72

Sources: Our calculations in Excel

Table 6 above shows the flow of investments and financial statements in U.S. million dollars (2005 value) for all types of investments linked to the sequestration option for the baseline scenario. It appears that natural regeneration and forest management are exclusively made by households in 2005 respectively for a total of 5.63 million and U.S. \$ 7.19 million USD. The business entity (NGO) invests the matter in terms of planting (14.06 million USD) while the state invests more in

reforestation and land reclamation and sand dune fixation and 11.06 respectively for 4 47 million USD.

Table 7: Annual IF FF & for all types of investment entities and investment / funding source

Year	I&FF and O&M Baseline Scenario (million US\$ in 2005)					
	Households		Corporations		Government	
	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	2,24	0,22	1,38	0,14	3,64	0,36
2006	2,04	0,20	1,69	0,17	1,14	0,11
2007	1,85	0,19	1,17	0,12	1,12	0,11
2008	1,68	0,17	1,28	0,13	1,00	0,10
2009	1,53	0,15	1,00	0,10	0,95	0,09
2010	1,39	0,14	1,04	0,10	0,88	0,09
2011	1,27	0,13	0,87	0,09	0,83	0,08
2012	1,16	0,12	0,89	0,09	0,78	0,08
2013	1,06	0,11	0,78	0,08	0,74	0,07
2014	0,98	0,10	0,79	0,08	0,70	0,07
2015	0,90	0,09	0,72	0,07	0,67	0,07
2016	0,83	0,08	0,71	0,07	0,64	0,06
2017	0,76	0,08	0,67	0,07	0,61	0,06
2018	0,71	0,07	0,66	0,07	0,59	0,06
2019	0,65	0,07	0,63	0,06	0,57	0,06
2020	0,61	0,06	0,62	0,06	0,56	0,06
2021	0,56	0,06	0,59	0,06	0,54	0,05
2022	0,52	0,05	0,58	0,06	0,53	0,05
2023	0,49	0,05	0,56	0,06	0,52	0,05
2024	0,45	0,05	0,55	0,05	0,51	0,05
2025	0,42	0,04	0,53	0,05	0,50	0,05
2026	0,40	0,04	0,52	0,05	0,49	0,05
2027	0,37	0,04	0,51	0,05	0,48	0,05
2028	0,35	0,03	0,50	0,05	0,47	0,05
2029	0,33	0,03	0,48	0,05	0,47	0,05
2030	0,31	0,03	0,47	0,05	0,46	0,05
Total	23,85	2,39	20,19	2,02	20,37	2,04

Source: Our calculations in Excel

The flows are higher in households (23.85 million U.S. \$) than the other two entities. This is attributable to the activities of natural regeneration and forest management mainly conducted by households.

Regarding maintenance and servicing, it should be noted that their costs are estimated at 10% of the total investment and it is based on the finding in several development projects.

2.2.4.2. Substitution

Studies conducted in the framework of the inventory of solar installations and wind Ministry of Mines and Energy and the National Center for Solar Energy (CNES-2006 and 2007) and updating the strategy for renewable energy Directorate of Renewable Energy and Energy Domestic (Dered), Ministry of Mines and Energy have helped provide historical data of FI and FF per year per entity and source.

Table 8: I&FF and O&M annual investment by type (in million U.S. \$ 2005)

Year	Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	38,18	3,82	0,01	0,00	0,0000	0,0000

2006	27,16	2,72	0,02	0,00	0,0005	0,0000
2007	26,95	2,69	0,02	0,00	0,0004	0,0000
2008	25,63	2,56	0,03	0,00	0,0004	0,0000
2009	24,94	2,49	0,03	0,00	0,0004	0,0000
2010	23,89	2,39	0,03	0,00	0,0004	0,0000
2011	23,10	2,31	0,05	0,00	0,0004	0,0000
2012	22,28	2,23	0,03	0,00	0,0003	0,0000
2013	21,53	2,15	0,04	0,00	0,0003	0,0000
2014	20,71	2,07	0,05	0,01	0,0003	0,0000
2015	19,93	1,99	0,04	0,00	0,0003	0,0000
2016	19,19	1,92	0,03	0,00	0,0003	0,0000
2017	18,48	1,85	0,04	0,00	0,0003	0,0000
2018	17,80	1,78	0,05	0,00	0,0003	0,0000
2019	17,14	1,71	0,04	0,00	0,0002	0,0000
2020	16,51	1,65	0,03	0,00	0,0002	0,0000
2021	15,91	1,59	0,02	0,00	0,0002	0,0000
2022	15,33	1,53	0,05	0,00	0,0002	0,0000
2023	14,77	1,48	0,05	0,01	0,0002	0,0000
2024	14,23	1,42	0,04	0,00	0,0002	0,0000
2025	13,72	1,37	0,04	0,00	0,0002	0,0000
2026	13,22	1,32	0,03	0,00	0,0002	0,0000
2027	12,74	1,27	0,04	0,00	0,0002	0,0000
2028	12,28	1,23	0,04	0,00	0,0002	0,0000
2029	11,84	1,18	0,03	0,00	0,0001	0,0000
2030	11,41	1,14	0,04	0,00	0,0001	0,0000
Total	498,87	49,89	0,93	0,09	0,0067	0,0007

Source: Our calculation in Excel

Table 8 above shows the flow of investment and annual financial different types of investments. It appears these flows are higher for solar photovoltaics. A total of 498.9 million dollar investment over the period 2005-2030 is about 19.19 million per year.

Investments in solar thermal energy and energy conservation are very low compared to those of solar photovoltaic less than a million each over the period.

Table 9: I&FF and O&M accumulated by investment type and entity (in million U.S. \$ 2005)

Investment entity	Source of funds		Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
			I&FF	O&M	I&FF	O&M	I&FF	O&M
Households	Total I&FF of households (all national)		0,0190	0,0019	0,93	0,093	0,0067	0,001
Corporations	National	Total internal sources	67,00	6,700	0,00	0,000	0,00	0,000
	Foreign	ODA	423,83	42,383	0,00	0,000	0,00	0,000
	Total IF&FF of corporations		490,83	49,08	0,00	0,000	0,00	0,000
Government	National	Internal funding (budget)	0,2745	0,027	0,00	0,000	0,00	0,000
	Foreign	Foreign borrowing abroad	1,1580	0,116	0,00	0,000	0,00	0,000
		Bilateral ODA	5,2202	0,522	0,00	0,000	0,00	0,000
		Multilateral ODA	1,3725	0,137	0,00	0,000	0,00	0,000
		Total foreign sources		7,7506	0,7751	0,00	0,000	0,00
Total IF&FF of government		8,03	0,803	0,00	0,000	0,00	0,000	
Total		498,87	49,887	0,93	0,093	0,0067	0,001	

Sources: Our calculation in Excel

The flow of investment and annual cash flow by entity and by source and by type of investment are given in Table 9 below. The cumulative investment are higher for solar PV. They are more than 90% achieved by companies through public development aid. The investments for solar thermal energy and energy conservation are made only by households with accumulated is less than one million each.

Table 10: I&FF and O&M annual all types of investments and investment entity / source of funding

I&FF and O&M in the Baseline scenario (million US\$ in 2005)														
Year	Households		Corporations				Government							
	National sources		Internal sources		National sources		Internal sources		National sources					
	Fund and debt		National funds		ODA		National funds		Foreign loans		Bilateral ODA		Multilateral ODA	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	0,01	0,001	5,59	0,56	32,37	3,24	0,01	0,001	0,01	0,001	0,15	0,01	0,08	0,01
2006	0,02	0,002	3,57	0,36	23,10	2,31	0,02	0,002	0,02	0,002	0,33	0,03	0,14	0,01
2007	0,02	0,002	4,24	0,42	22,30	2,23	0,01	0,001	0,03	0,003	0,29	0,03	0,07	0,01
2008	0,03	0,003	3,64	0,36	21,54	2,15	0,02	0,002	0,04	0,004	0,31	0,03	0,09	0,01
2009	0,03	0,003	3,66	0,37	20,79	2,08	0,01	0,001	0,05	0,005	0,35	0,04	0,07	0,01
2010	0,04	0,004	3,40	0,34	20,08	2,01	0,01	0,001	0,07	0,007	0,25	0,03	0,08	0,01
2011	0,05	0,005	3,28	0,33	19,39	1,94	0,01	0,001	0,09	0,009	0,27	0,03	0,08	0,01
2012	0,03	0,003	3,10	0,31	18,72	1,87	0,01	0,001	0,12	0,012	0,25	0,03	0,08	0,01
2013	0,04	0,004	2,97	0,30	18,07	1,81	0,01	0,001	0,17	0,017	0,25	0,02	0,07	0,01
2014	0,05	0,005	2,82	0,28	17,45	1,75	0,01	0,001	0,13	0,013	0,24	0,02	0,07	0,01
2015	0,04	0,004	2,69	0,27	16,85	1,69	0,01	0,001	0,10	0,010	0,22	0,02	0,07	0,01
2016	0,03	0,003	2,56	0,26	16,27	1,63	0,01	0,001	0,08	0,008	0,21	0,02	0,06	0,01
2017	0,04	0,004	2,44	0,24	15,71	1,57	0,01	0,001	0,06	0,006	0,20	0,02	0,06	0,01
2018	0,05	0,005	2,33	0,23	15,17	1,52	0,01	0,001	0,05	0,005	0,19	0,02	0,06	0,01
2019	0,05	0,005	2,22	0,22	14,65	1,46	0,01	0,001	0,04	0,004	0,18	0,02	0,05	0,01
2020	0,03	0,003	2,11	0,21	14,14	1,41	0,01	0,001	0,03	0,003	0,17	0,02	0,05	0,01
2021	0,02	0,002	2,01	0,20	13,66	1,37	0,01	0,001	0,02	0,002	0,17	0,02	0,05	0,00
2022	0,05	0,005	1,92	0,19	13,19	1,32	0,01	0,001	0,02	0,002	0,16	0,02	0,05	0,00
2023	0,05	0,005	1,83	0,18	12,73	1,27	0,01	0,001	0,01	0,001	0,15	0,02	0,04	0,00
2024	0,04	0,004	1,74	0,17	12,29	1,23	0,01	0,001	0,01	0,001	0,14	0,01	0,04	0,00
2025	0,04	0,004	1,66	0,17	11,87	1,19	0,01	0,001	0,01	0,001	0,14	0,01	0,04	0,00
2026	0,04	0,004	1,58	0,16	11,46	1,15	0,01	0,001	0,01	0,001	0,13	0,01	0,04	0,00
2027	0,04	0,004	1,51	0,15	11,07	1,11	0,01	0,001	0,00	0,000	0,12	0,01	0,04	0,00
2028	0,04	0,004	1,44	0,14	10,69	1,07	0,01	0,001	0,00	0,000	0,12	0,01	0,03	0,00
2029	0,03	0,003	1,37	0,14	10,32	1,03	0,01	0,001	0,00	0,000	0,11	0,01	0,03	0,00
2030	0,04	0,004	1,30	0,13	9,96	1,00	0,01	0,001	0,00	0,000	0,11	0,01	0,03	0,00
Total	0,95	0,10	67,00	6,70	423,83	42,38	0,27	0,03	1,16	0,12	5,22	0,52	1,58	0,16

Sources: Our calculations in Excel

General speaking, it appears to the baseline scenario alternative investment flows are higher-level businesses and other entities. More than ¾ of these investments comes from ODA.

The state investment on national fund is relatively low (0.27 million).

2.2.5 Mitigation Scenarios

2.2.5.1 Sequestration

The mitigation scenario pointed out by the provision in the area during the evaluation period (2005-2030) in the presence of new policies to address climate change: the National Action Plan for Adaptation (NAPA) to climate change, the measures contained in national communications, the Rural Development Strategy (RDS) program and the Regional Energy Access Service (PRASE). Goals from these various documents mentioned above have been set for the mitigation scenario in Table 12 below. They will make the projection of the situation, taking account of climate change.

Table 11: Results of calculation for mitigation

Reference of calculation	Areas affected by year (en ha)
Assisted natural regeneration	250 000*
Forest management	200 000
Reforestation and restoration of degraded land	40 000
Block plantations	40 000
Fixation of dunes	20 000*

Source: SDR, rapport DE-ME/LCD, jugement d'experts*

The unit costs of activities are the same as those of the status quo scenario.
The data and information gathered was used to establish the various tables below:

Table 12: I&FF and O&M annual type of activity (in million U.S. \$ 2005)

Year	Natural regeneration		Forest management		Reforestation and restoration of land		Plantations		Fixation of dunes	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	0,37	0,04	0,47	0,05	3,19	0,32	2,77	0,28	0,46	0,05
2006	0,39	0,04	1,21	0,12	5,91	0,59	6,58	0,66	4,59	0,46
2007	0,38	0,04	1,15	0,12	5,63	0,56	6,27	0,63	6,54	0,65
2008	0,36	0,04	1,10	0,11	5,37	0,54	5,97	0,60	6,23	0,62
2009	0,34	0,03	1,05	0,10	5,11	0,51	5,69	0,57	5,94	0,59
2010	0,33	0,03	1,00	0,10	4,87	0,49	5,42	0,54	5,66	0,57
2011	0,31	0,03	0,95	0,09	4,64	0,46	5,16	0,52	5,39	0,54
2012	0,30	0,03	0,90	0,09	4,42	0,44	4,92	0,49	5,14	0,51
2013	0,28	0,03	0,86	0,09	4,21	0,42	4,69	0,47	4,89	0,49
2014	0,27	0,03	0,82	0,08	4,02	0,40	4,47	0,45	4,66	0,47
2015	0,26	0,03	0,78	0,08	3,83	0,38	4,26	0,43	4,44	0,44
2016	0,24	0,02	0,75	0,07	3,65	0,36	4,06	0,41	4,23	0,42
2017	0,23	0,02	0,71	0,07	3,47	0,35	3,86	0,39	4,03	0,40
2018	0,22	0,02	0,68	0,07	3,31	0,33	3,68	0,37	3,84	0,38
2019	0,21	0,02	0,64	0,06	3,15	0,32	3,51	0,35	3,66	0,37
2020	0,20	0,02	0,61	0,06	3,01	0,30	3,34	0,33	3,49	0,35
2021	0,19	0,02	0,59	0,06	2,86	0,29	3,19	0,32	3,33	0,33
2022	0,18	0,02	0,56	0,06	2,73	0,27	3,04	0,30	3,17	0,32
2023	0,17	0,02	0,53	0,05	2,60	0,26	2,89	0,29	3,02	0,30
2024	0,17	0,02	0,51	0,05	2,48	0,25	2,76	0,28	2,88	0,29
2025	0,16	0,02	0,48	0,05	2,36	0,24	2,63	0,26	2,74	0,27
2026	0,15	0,02	0,46	0,05	2,25	0,22	2,50	0,25	2,61	0,26
2027	0,14	0,01	0,44	0,04	2,14	0,21	2,38	0,24	2,49	0,25
2028	0,14	0,01	0,42	0,04	2,04	0,20	2,27	0,23	2,37	0,24
2029	0,13	0,01	0,40	0,04	1,95	0,19	2,16	0,22	2,26	0,23
2030	0,12	0,01	0,38	0,04	1,85	0,19	2,06	0,21	2,15	0,22
Total	6,24	0,62	18,44	1,84	91,06	9,11	100,52	10,05	100,24	10,02

Sources: Our calculations in Excel

Table 12 above shows the flow of investments and financial statements in U.S. million dollars (2005 value) for all types of investments linked to the sequestration option for the mitigation scenario. It appears that the flow of investment and financial will be more important in plantations (100, 52 million U.S.), followed by dune stabilization (100.52) and restoration of lands 91 power, 06 million U.S.

Table 13: I&FF and O&M earned by investment type and entity (in million U.S. \$ 2005)

Investment category	Natural regeneration		Forest management		Reforestation and restoration of land		Plantations		Fixation of dunes	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
Households	9,14	0,91	27,33	2,73	0,34	0,03	16,74	1,67	2,58	0,26
Corporations	0	0	0	0	51,81	5,18	45,59	4,56	47,11	4,71
Government	0	0	0	0	38,91	3,89	38,19	3,82	52,82	5,28
Total	9,14	0,91	27,33	2,73	91,06	9,11	100,52	10,05	102,51	10,25

Sources: Our calculations in Excel

Table 13 above shows the flow of investment and financial cumulative million U.S. dollars (2005 value) for all types of investments linked to the sequestration option for the mitigation scenario. It appears that natural regeneration and forest management are pursued exclusively by households for a total of respectively U.S. \$ 9.14 million and 27.33 million USD. The business entity (NGOs) could invest in the term reforestation and land rehabilitation (U.S. \$ 51.81 million) and plantation (U.S. \$ 45.59 million) while the state invests more to fix dunes for U.S. \$ 52.82 million.

Table 14: Annual Estimates of I&FF, broken down by investment entity

Year	I&FF Mitigation scenario (million US\$ in 2005)					
	Households		Corporations		Government	
	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	2,24	0,22	1,38	0,14	3,64	0,36
2006	3,62	0,36	9,63	0,96	8,49	0,85
2007	3,45	0,35	9,17	0,92	8,09	0,81
2008	3,29	0,33	8,74	0,87	7,71	0,77
2009	3,14	0,31	8,33	0,83	7,35	0,73
2010	2,99	0,30	7,94	0,79	7,00	0,70
2011	2,85	0,28	7,56	0,76	6,67	0,67
2012	2,71	0,27	7,20	0,72	6,36	0,64
2013	2,58	0,26	6,86	0,69	6,06	0,61
2014	2,46	0,25	6,54	0,65	5,77	0,58
2015	2,35	0,23	6,23	0,62	5,50	0,55
2016	2,24	0,22	5,94	0,59	5,24	0,52
2017	2,13	0,21	5,66	0,57	4,99	0,50
2018	2,03	0,20	5,39	0,54	4,76	0,48
2019	1,93	0,19	5,14	0,51	4,53	0,45
2020	1,84	0,18	4,90	0,49	4,32	0,43
2021	1,76	0,18	4,66	0,47	4,12	0,41
2022	1,67	0,17	4,44	0,44	3,92	0,39
2023	1,59	0,16	4,23	0,42	3,74	0,37
2024	1,52	0,15	4,03	0,40	3,56	0,36
2025	1,45	0,14	3,84	0,38	3,39	0,34
2026	1,38	0,14	3,66	0,37	3,23	0,32
2027	1,31	0,13	3,49	0,35	3,08	0,31
2028	1,25	0,13	3,33	0,33	2,93	0,29

2029	1,19	0,12	3,17	0,32	2,80	0,28
2030	1,14	0,11	3,02	0,30	2,66	0,27
Total	56,13	5,61	144,51	14,45	129,92	12,99

Sources: Our calculations in Excel

Table 14 shows that IF and FF are higher at company level (NGOs) for other entities. Thus, to achieve the mitigation target for 2030 it is necessary that NGOs (companies) mobilize U.S. \$ 144.51 million during the period. These flows are derived largely from foreign sources. Similarly for the government, the amount of 192,920,000 should be mobilized to achieve the objective of reducing the source of flow that is also mainly foreign. However, households with 56.13 million dollars contribute to the objective of reducing the national fund.

2.2.5.2 Substitution

The goal of mitigation is taken from the Action Plan of the National Strategy for Renewable Energy (SNER). These objectives are:

- Sustainable biomass represents 5% of the energy balance of 2020,
- The contribution of solar energy balance at 0.7%,

Table 15 below shows the annual estimates of investment flows and financial support to achieve the objective of mitigation.

Table 15: I&FF and O&M annual investment by type (in million U.S. \$ 2005)

Year	Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	38,18	3,82	0,01	0,00	0,00	0,00
2006	39,70	3,97	0,14	0,01	2,93	0,29
2007	36,98	3,70	0,25	0,03	2,80	0,28
2008	36,26	3,63	0,36	0,04	3,66	0,37
2009	35,56	3,56	0,45	0,05	4,13	0,41
2010	34,59	3,46	0,47	0,05	5,12	0,51
2011	34,08	3,41	0,85	0,08	6,89	0,69
2012	74,77	7,48	1,17	0,12	21,06	2,11
2013	35,28	3,53	2,29	0,23	12,98	1,30
2014	72,20	7,22	4,10	0,41	21,58	2,16
2015	41,34	4,13	4,66	0,47	12,74	1,27
2016	42,94	4,29	5,93	0,59	12,14	1,21
2017	42,39	4,24	7,03	0,70	13,69	1,37
2018	44,01	4,40	8,03	0,80	13,05	1,30
2019	47,12	4,71	8,88	0,89	11,64	1,16
2020	50,03	5,00	12,06	1,21	7,42	0,74
2021	55,22	5,52	12,06	1,21	7,07	0,71
2022	87,39	8,74	12,05	1,21	15,00	1,50
2023	70,63	7,06	12,01	1,20	8,33	0,83
2024	104,82	10,48	11,94	1,19	13,93	1,39
2025	95,92	9,59	11,87	1,19	9,30	0,93
2026	114,02	11,40	11,76	1,18	8,86	0,89
2027	137,07	13,71	11,64	1,16	7,91	0,79
2028	166,45	16,64	11,50	1,15	5,04	0,50
2029	203,86	20,39	11,34	1,13	4,80	0,48
2030	251,51	25,15	11,18	1,12	6,17	0,62
Total	1992,30	199,23	174,04	17,40	238,27	23,83

Sources: Our calculations in Excel

The evolution of annual investments according to their types given in Table 15 below shows that investments in the solar PV are higher and increase from one year to another. This is explained by the acquisition for each household of a PV for achieving the goal of mitigation. Thus, it is 1,992,300,000 total over 2005-2030 is 76.6 million per year for all entities combined.

Table 16: I&FF accumulated by investment type and entity (in million U.S. \$ 2005)

Investment entity	Source of funds		Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
			I&FF	O&M	I&FF	O&M	I&FF	O&M
Households	Total I&FF of households (all national)		976,80	97,680	174,04	17,4	238,27	23,83
Corporations	National	Total national sources	366,34	36,634	0,00	0,000	0,00	0,000
	Foreign	ODA	508,27	50,827	0,00	0,000	0,00	0,000
	Total I&FF of corporations		874,61	87,461	0,00	0,000	0,00	0,000
Government	National	Internal funds (budget)	127,20	12,720	0,00	0,000	0,00	0,000
	Foreign	Foreign borrowing abroad	5,3778	0,538	0,00	0,000	0,00	0,000
		Bilateral ODA	6,2098	0,621	0,00	0,000	0,00	0,000
		Multilaterale ODA	2,0988	0,210	0,00	0,000	0,00	0,000
		Total foreign sources	13,6864	1,369	0,00	0,000	0,00	0,000
	Total government funds		140,88	14,088	0,00	0,000	0,00	0,000
Total			1992,30	199,230	174,04	17,4	238,27	23,827

Sources: Our calculations in Excel

Table 16 above shows the flow of investment and accumulated by financial entities. It follows:

- For PV, the most important investments are made at the household level, almost half of total flows of funds must come from households (equity or debt). The companies have 44% of the flows that originate more than half of public development aid. As for the state, it has 7% with 90% of flows from internal funds;
- For solar thermal energy and energy conservation, investments are made only at households with a total over the period 2005-2030 respectively 174.0 and 238.3 million.

Table 17: Annual Estimates of I&FF, broken down by entity and source of investment

I&FF Mitigation scenario (million US\$ in 2005)														
Year	Households		Corporations				Government entities							
	National sources		National sources		Foreign sources		National sources		Foreign sources					
	Fund and debt		National funds		ODA		National funds		Foreign loans		Bilateral ODA		Multilateral ODA	
	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M	I&FF	O&M
2005	0,01	0,00	5,59	0,56	32,37	3,24	0,01	0,00	0,01	0,00	0,15	0,01	0,08	0,01
2006	3,07	0,31	5,97	0,60	33,00	3,30	0,00	0,00	0,02	0,00	0,53	0,05	0,20	0,02
2007	3,05	0,30	6,37	0,64	30,15	3,02	0,00	0,00	0,03	0,00	0,32	0,03	0,12	0,01
2008	4,02	0,40	6,79	0,68	28,90	2,89	0,00	0,00	0,04	0,00	0,39	0,04	0,15	0,01
2009	4,58	0,46	7,25	0,72	27,82	2,78	0,00	0,00	0,05	0,00	0,33	0,03	0,13	0,01
2010	5,65	0,56	7,73	0,77	26,28	2,63	0,00	0,00	0,07	0,01	0,34	0,03	0,64	0,06
2011	7,96	0,80	8,25	0,82	25,10	2,51	0,00	0,00	0,09	0,01	0,31	0,03	0,61	0,06

2012	22,50	2,25	8,80	0,88	23,95	2,39	41,23	4,12	0,12	0,01	0,30	0,03	1,07	0,11
2013	17,84	1,78	9,39	0,94	22,78	2,28	0,00	0,00	0,17	0,02	0,29	0,03	1,93	0,19
2014	28,12	2,81	10,01	1,00	21,72	2,17	37,43	3,74	0,22	0,02	0,27	0,03	0,97	0,10
2015	26,72	2,67	10,68	1,07	20,70	2,07	0,00	0,00	0,30	0,03	0,26	0,03	1,75	0,18
2016	29,16	2,92	11,40	1,14	19,71	1,97	0,00	0,00	0,41	0,04	0,25	0,02	1,67	0,17
2017	31,29	3,13	12,16	1,22	18,79	1,88	0,00	0,00	0,56	0,06	0,24	0,02	2,35	0,23
2018	33,16	3,32	12,97	1,30	17,90	1,79	0,00	0,00	0,76	0,08	0,23	0,02	2,24	0,22
2019	35,87	3,59	13,84	1,38	17,06	1,71	0,00	0,00	0,59	0,06	0,21	0,02	1,79	0,18
2020	37,76	3,78	14,76	1,48	16,25	1,63	0,00	0,00	0,46	0,05	0,20	0,02	1,70	0,17
2021	42,50	4,25	15,75	1,58	15,49	1,55	0,00	0,00	0,36	0,04	0,19	0,02	1,94	0,19
2022	56,92	5,69	16,80	1,68	14,76	1,48	25,43	2,54	0,28	0,03	0,19	0,02	2,14	0,21
2023	58,53	5,85	17,93	1,79	14,06	1,41	0,00	0,00	0,22	0,02	0,18	0,02	2,04	0,20
2024	74,68	7,47	19,12	1,91	13,40	1,34	23,09	2,31	0,17	0,02	0,17	0,02	2,21	0,22
2025	83,58	8,36	20,40	2,04	12,76	1,28	0,00	0,00	0,13	0,01	0,16	0,02	2,11	0,21
2026	100,40	10,04	21,76	2,18	12,16	1,22	0,00	0,00	0,10	0,01	0,15	0,02	2,25	0,23
2027	121,55	12,15	23,22	2,32	11,59	1,16	0,00	0,00	0,08	0,01	0,15	0,01	2,15	0,21
2028	146,93	14,69	24,77	2,48	11,04	1,10	0,00	0,00	0,06	0,01	0,14	0,01	2,27	0,23
2029	182,83	18,28	26,43	2,64	10,52	1,05	0,00	0,00	0,05	0,00	0,13	0,01	2,16	0,22
2030	230,44	23,04	28,19	2,82	10,03	1,00	0,00	0,00	0,04	0,00	0,13	0,01	2,06	0,21
Total	1389,11	138,91	366,34	36,63	508,27	50,83	127,20	12,72	5,38	0,54	6,21	0,62	38,73	3,87

Sources: Our calculations in Excel

Table 17 shows that to achieve the goal of mitigation, investment flows are higher for households than for all other entities. On average, these flows are \$ 53.4 million per year for households from the equity and debt; 14.1 million from national funds and 19.5 million of ODA per year for businesses.

3. Results

3.1 Changes of I&FF and O&M

3.1.1 Sequestration

The chart below shows the evolution of investment flows and financial baselines and mitigation for sequestration. It appears that the two curves decrease, that of the mitigation scenario decreased more rapidly than the baseline and still evolving below. This denotes the importance of flow to be mobilized to achieve mitigation objectives in 2030.

Figure 1: Comparison of I&FF annual Scenario

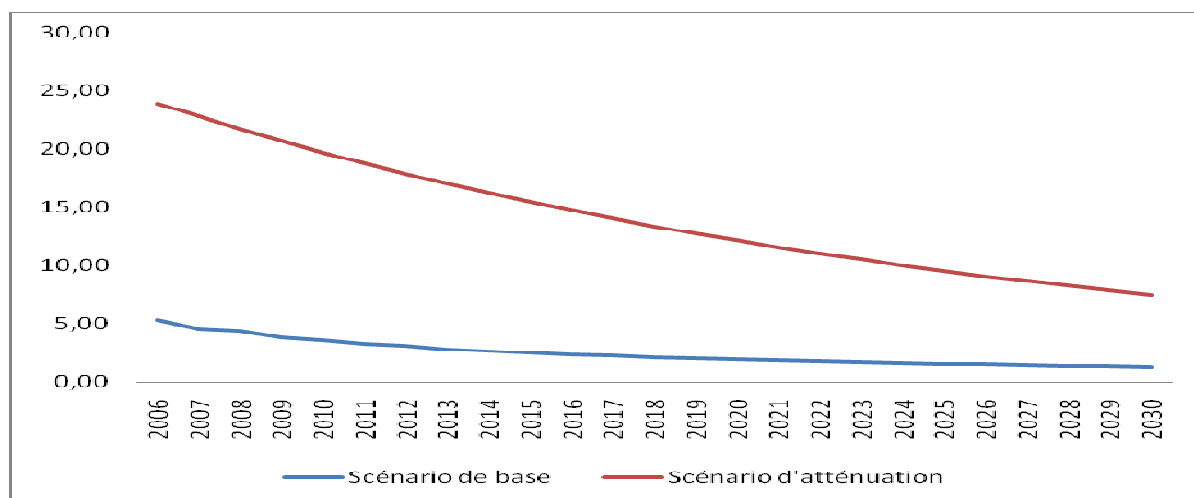


Table 18: Change of FI and FF & MS Annual Investment by Type (in million U.S. \$ 2005)

Year	Natural regeneration		Forest management		Reforestation and restoration of lands		Plantations		Fixation of dunes	
	ΔI&FF	ΔO&M	ΔI&FF	ΔO&M	ΔI&FF	ΔO&M	ΔI&FF	ΔO&M	ΔI&FF	ΔO&M
2005	0,00	0,000	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2006	0,04	0,004	0,76	0,08	4,79	0,48	4,09	0,41	4,14	0,41
2007	0,04	0,004	0,72	0,07	4,93	0,49	4,03	0,40	6,11	0,61
2008	0,04	0,004	0,69	0,07	4,56	0,46	3,95	0,39	5,82	0,58
2009	0,04	0,004	0,65	0,07	4,56	0,46	3,86	0,39	5,55	0,55
2010	0,03	0,003	0,62	0,06	4,26	0,43	3,76	0,38	5,29	0,53
2011	0,03	0,003	0,59	0,06	4,18	0,42	3,65	0,36	5,04	0,50
2012	0,03	0,003	0,57	0,06	3,92	0,39	3,53	0,35	4,80	0,48
2013	0,03	0,003	0,54	0,05	3,80	0,38	3,41	0,34	4,57	0,46
2014	0,03	0,003	0,51	0,05	3,58	0,36	3,29	0,33	4,36	0,44
2015	0,03	0,003	0,49	0,05	3,44	0,34	3,17	0,32	4,15	0,42
2016	0,03	0,003	0,47	0,05	3,25	0,32	3,05	0,30	3,96	0,40
2017	0,02	0,002	0,44	0,04	3,10	0,31	2,93	0,29	3,77	0,38
2018	0,02	0,002	0,42	0,04	2,93	0,29	2,81	0,28	3,59	0,36
2019	0,02	0,002	0,40	0,04	2,79	0,28	2,69	0,27	3,42	0,34
2020	0,02	0,002	0,38	0,04	2,64	0,26	2,57	0,26	3,26	0,33
2021	0,02	0,002	0,37	0,04	2,51	0,25	2,46	0,25	3,11	0,31
2022	0,02	0,002	0,35	0,03	2,37	0,24	2,35	0,23	2,96	0,30

2023	0,02	0,002	0,33	0,03	2,24	0,22	2,24	0,22	2,82	0,28
2024	0,02	0,002	0,32	0,03	2,12	0,21	2,13	0,21	2,69	0,27
2025	0,02	0,002	0,30	0,03	2,00	0,20	2,03	0,20	2,56	0,26
2026	0,02	0,002	0,29	0,03	1,89	0,19	1,93	0,19	2,44	0,24
2027	0,01	0,001	0,27	0,03	1,78	0,18	1,84	0,18	2,32	0,23
2028	0,01	0,001	0,26	0,03	1,68	0,17	1,75	0,17	2,22	0,22
2029	0,01	0,001	0,25	0,02	1,58	0,16	1,66	0,17	2,11	0,21
2030	0,01	0,001	0,24	0,02	1,49	0,15	1,58	0,16	2,01	0,20
Total	0,60	0,060	11,25	1,12	76,40	7,64	70,76	7,08	93,06	9,31

Sources: Our calculations in Excel

Table 19: Change of FI and FF & EM accumulated by investment type and entity (Million U.S. \$ 2005)

Investment category	Natural regeneration		Forest management		Reforestation and restoration of land		Plantations		Fixation of dunes	
	Δ I&FF	Δ O&M	Δ I&FF	Δ O&M	Δ I&FF	Δ O&M	Δ I&FF	Δ O&M	Δ I&FF	Δ O&M
Households	3,51	0,35	20,14	2,01	0,26	0,03	5,87	0,59	2,50	0,25
Corporations	0,00	0	0,00	0	48,30	4,83	31,53	3,15	44,48	4,45
Government	0,00	0	0,00	0	27,85	2,78	33,35	3,34	48,35	4,84
Total	3,51	0,35	20,14	2,01	76,40	7,64	70,76	7,08	95,33	9,53

Sources: Our calculations in Excel

Natural regeneration and forest management conducted by households only have a flux difference between the baseline and the mitigation of respectively 3.5 million and 20.14 million for the goal of the mitigation 2030.

For other activities, reforestation, planting and sand dune fixation are performed by all entities. Thus, to achieve mitigation objectives at:

- Household must be 0.26 million dollars for reforestation, 5.87 million for plantations and 2.5 for sand dune fixation.
- Companies (NGOs) should be \$ 48.3 million for reforestation, planting 31.5 million to 44.5 million for dune fixation. These flows come mainly from foreign sources.
- Government should be \$ 27.9 million for reforestation, planting 33.4 million to 48.4 million and for dune fixation. These flows are from national sources.

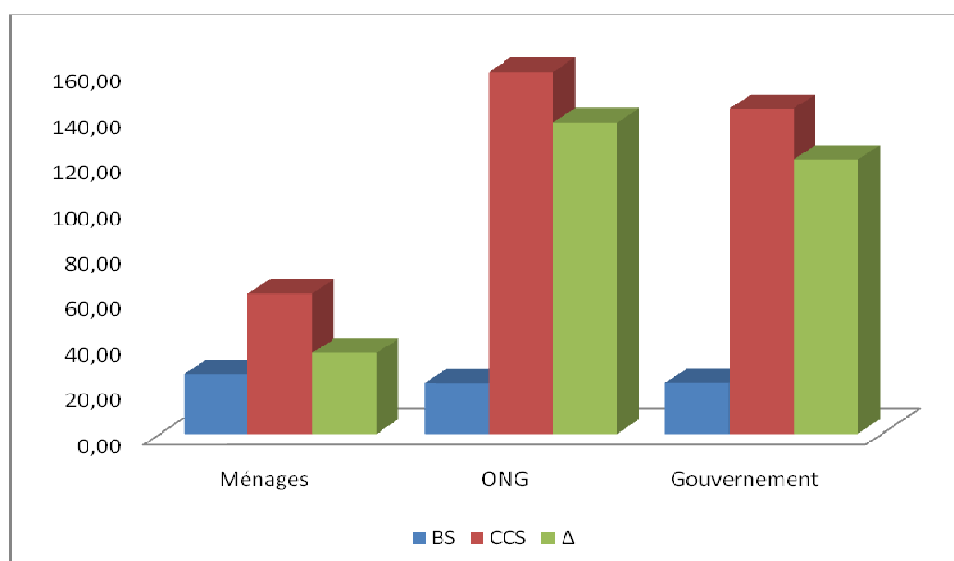
Table 20: Difference of I&FF annual per entity and source (U.S. \$ million, 2005)

Year	Households		Corporations		Government	
	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M
2005	0,00	0,00	0,00	0,00	0,00	0,00
2006	1,58	0,16	7,94	0,79	7,36	0,74
2007	1,60	0,16	8,00	0,80	6,98	0,70
2008	1,61	0,16	7,46	0,75	6,71	0,67
2009	1,61	0,16	7,33	0,73	6,40	0,64
2010	1,60	0,16	6,89	0,69	6,13	0,61
2011	1,58	0,16	6,69	0,67	5,85	0,58
2012	1,55	0,16	6,31	0,63	5,58	0,56
2013	1,52	0,15	6,08	0,61	5,32	0,53
2014	1,49	0,15	5,75	0,58	5,07	0,51
2015	1,45	0,14	5,51	0,55	4,83	0,48
2016	1,41	0,14	5,22	0,52	4,60	0,46
2017	1,37	0,14	4,99	0,50	4,38	0,44
2018	1,32	0,13	4,73	0,47	4,16	0,42
2019	1,28	0,13	4,51	0,45	3,96	0,40
2020	1,24	0,12	4,28	0,43	3,76	0,38
2021	1,19	0,12	4,07	0,41	3,57	0,36
2022	1,15	0,12	3,86	0,39	3,39	0,34
2023	1,11	0,11	3,67	0,37	3,22	0,32
2024	1,07	0,11	3,49	0,35	3,05	0,31
2025	1,02	0,10	3,31	0,33	2,90	0,29
2026	0,98	0,10	3,14	0,31	2,74	0,27
2027	0,94	0,09	2,98	0,30	2,60	0,26
2028	0,91	0,09	2,83	0,28	2,46	0,25
2029	0,87	0,09	2,69	0,27	2,33	0,23
2030	0,83	0,08	2,55	0,25	2,20	0,22
Total	32,28	3,23	124,32	12,43	109,55	10,96

Sources: Our calculations in Excel

From Table 20 above that flows I&FF cumulative mobilized to achieve the objective of reducing by entities are as follows: \$ 32.3 million for households, 124.3 million and 109.6 for businesses million for the government.

Figure 2: I & FF earned by entities in the scenarios



3.1.2 Substitution

The chart below shows the trend of investment flows and financial baselines and mitigation for substitution. It shows that the curve of the mitigation scenario rises while the baseline decreases very slowly. The amount of additional investment needed to achieve the goal of mitigation leads that the curve of the mitigation scenario is still below that of the baseline. This denotes the importance of flow to be mobilized for the attainment of these goals in 2030 for the substitution.

Figure 3: Comparison of I&FF annual Scenario

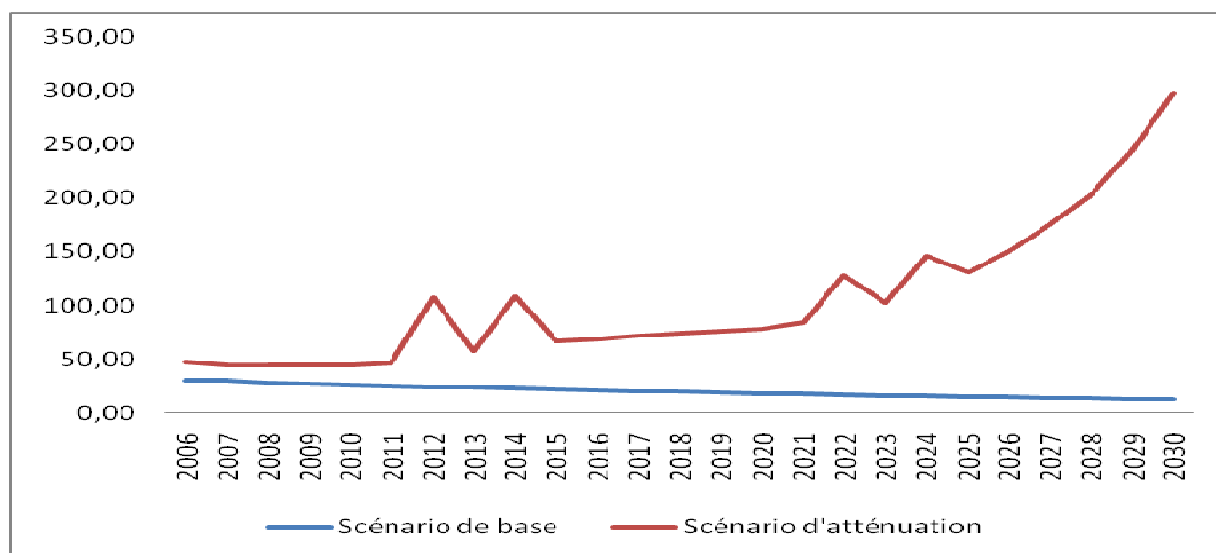


Table 21: Change of I&FF & MS Annual Investment by Type (in million U.S. \$ 2005)

Year	Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M
2005	0,00	0,00	0,00	0,00	0,00	0,00
2006	12,54	1,25	0,12	0,01	2,93	0,29
2007	10,03	1,00	0,23	0,02	2,79	0,28
2008	10,62	1,06	0,33	0,03	3,66	0,37
2009	10,62	1,06	0,42	0,04	4,13	0,41
2010	10,70	1,07	0,43	0,04	5,12	0,51
2011	10,98	1,10	0,80	0,08	6,89	0,69
2012	52,49	5,25	1,15	0,11	21,06	2,11
2013	13,75	1,37	2,25	0,23	12,98	1,30
2014	51,49	5,15	4,04	0,40	21,58	2,16
2015	21,41	2,14	4,62	0,46	12,74	1,27
2016	23,75	2,38	5,90	0,59	12,14	1,21
2017	23,91	2,39	6,98	0,70	13,69	1,37
2018	26,22	2,62	7,98	0,80	13,05	1,30
2019	29,98	3,00	8,83	0,88	11,64	1,16
2020	33,51	3,35	12,03	1,20	7,42	0,74
2021	39,31	3,93	12,04	1,20	7,07	0,71
2022	72,06	7,21	12,01	1,20	15,00	1,50
2023	55,85	5,59	11,96	1,20	8,33	0,83
2024	90,59	9,06	11,90	1,19	13,93	1,39
2025	82,20	8,22	11,83	1,18	9,30	0,93
2026	100,80	10,08	11,72	1,17	8,86	0,89
2027	124,33	12,43	11,61	1,16	7,91	0,79
2028	154,17	15,42	11,46	1,15	5,04	0,50
2029	192,02	19,20	11,31	1,13	4,80	0,48

2030	240,10	24,01	11,15	1,11	6,17	0,62
Total	1493,42	149,34	173,11	17,31	238,26	23,83

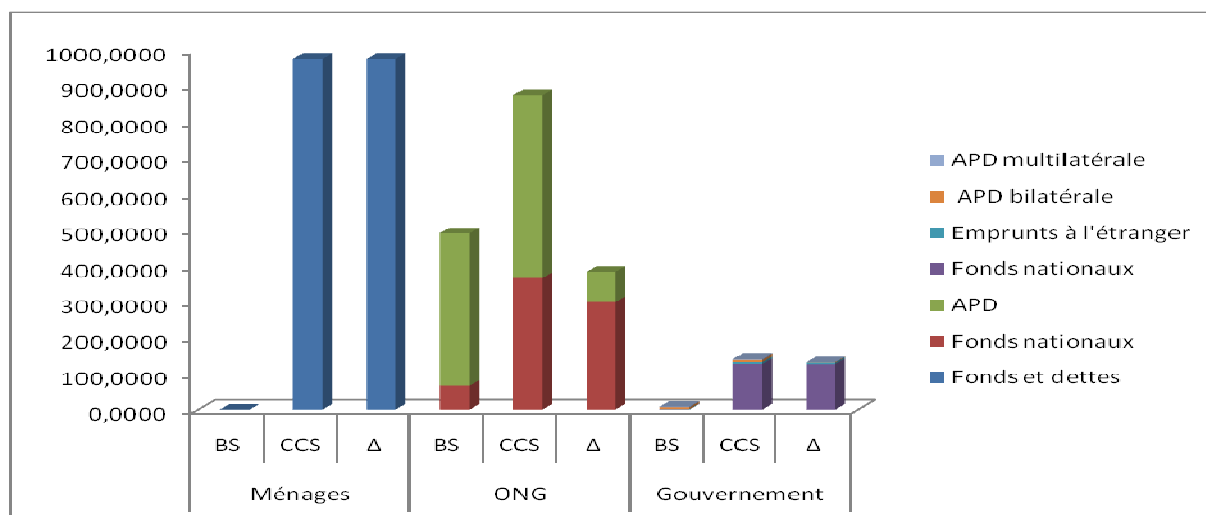
Sources: Our calculations in Excel

Table 22: Change of I&FF & O&M accumulated by investment type and entity (in -million U.S. \$ 2005)

Investment category	Source of funds		Solar Photovoltaic (PV)		Solar thermic energy		Energy saving	
			ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M
Households	Total I&FF of households (all national)		976,78	97,68	173,11	17,31	238,26	23,83
Corporations	National	Total internal sources	299,34	29,93	0,00	0,00	0,00	0,00
	Foreign	ODA	84,44	8,44	0,00	0,00	0,00	0,00
	Total I&FF of corporations		383,78	38,38	0,00	0,00	0,00	0,00
Government	National	Internal funds (budget)	126,92	12,69	0,00	0,00	0,00	0,00
	Foreign	Foreign borrowing abroad	4,22	0,42	0,00	0,00	0,00	0,00
		Bilateral ODA	0,99	0,10	0,00	0,00	0,00	0,00
		Multilateral ODA	0,73	0,07	0,00	0,00	0,00	0,00
		Total foreign sources	5,94	0,59	0,00	0,00	0,00	0,00
Total I&FF of government		132,86	13,29	0,00	0,00	0,00	0,00	
Total			1493,42	149,34	173,11	17,31	238,26	23,83

Sources: Our calculations in Excel

Figure 4: I & FF earned by entities and sources according to the scenarios



Alleviating the pressure on forests in 2030 through the substitution requires an additional cost compared to the current situation and level:

- Households for mitigation activities should be 976.8 million for PV, 173.1 million for solar thermal and 238.3 million for energy conservation. This makes a total of 1.388 billion, mainly from national funds (equity or debt),
- NGOs, and companies require 299.3 million from domestic sources and 84.4 million of public aid to development only for PV systems. This shows that over 90% of investments will come from national funds,
- From State, you have 126.9 million from internal funds and 5.9 million from foreign sources

(borrowing 4,200,000; 990,000 from ODA bilateral & 730,000 from multilateral ODA).

The graph below illustrates the investment and financial flows for each scenario and the difference in flux through entity according to different sources. One can see how the I&FF of the households rise most to implement the mitigation measures. These investments come mainly from national sources.

Figure 4: I&FF earned by entities and sources across scenarios.

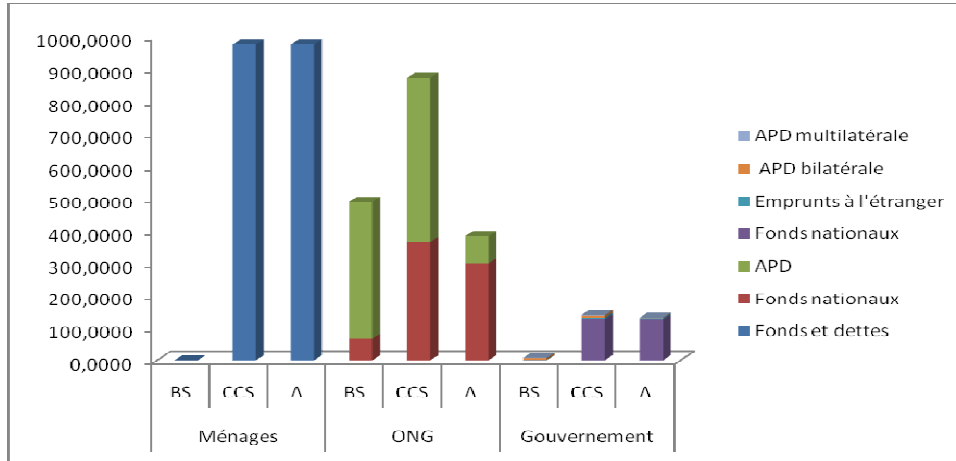


Table 23: Difference of I&FF annual per entity and source

Incremental costs (million US\$ in 2005)														
Year	Households		Corporation				Government							
	National sources		National sources		Foreign sources		National sources		Foreign sources					
	Fund and debt		National funds		ODA		National funds		Foreign loans		Bilateral ODA		Multilateral ODA	
	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M	ΔI&FF	Δ O&M
2005	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
2006	3,05	0,31	2,40	0,24	9,90	0,99	0,00	0,00	0,00	0,00	0,20	0,02	0,06	0,01
2007	3,02	0,30	2,13	0,21	7,85	0,78	0,00	0,00	0,00	0,00	0,03	0,00	0,05	0,01
2008	3,99	0,40	3,15	0,32	7,36	0,74	0,00	0,00	0,00	0,00	0,08	0,01	0,06	0,01
2009	4,55	0,45	3,59	0,36	7,03	0,70	0,00	0,00	0,00	0,00	-0,02	0,00	0,05	0,01
2010	5,61	0,56	4,33	0,43	6,20	0,62	0,00	0,00	0,00	0,00	0,09	0,01	0,56	0,06
2011	7,92	0,79	4,97	0,50	5,71	0,57	0,00	0,00	0,00	0,00	0,05	0,00	0,53	0,05
2012	22,48	2,25	5,69	0,57	5,23	0,52	41,22	4,12	0,00	0,00	0,05	0,00	0,99	0,10
2013	17,80	1,78	6,42	0,64	4,70	0,47	0,00	0,00	0,00	0,00	0,04	0,00	1,86	0,19
2014	28,06	2,81	7,19	0,72	4,27	0,43	37,42	3,74	0,10	0,01	0,04	0,00	0,90	0,09
2015	26,67	2,67	7,99	0,80	3,85	0,38	0,00	0,00	0,20	0,02	0,04	0,00	1,69	0,17
2016	29,12	2,91	8,83	0,88	3,44	0,34	0,00	0,00	0,33	0,03	0,04	0,00	1,61	0,16
2017	31,24	3,12	9,72	0,97	3,08	0,31	0,00	0,00	0,50	0,05	0,03	0,00	2,29	0,23
2018	33,11	3,31	10,64	1,06	2,73	0,27	0,00	0,00	0,71	0,07	0,03	0,00	2,18	0,22
2019	35,82	3,58	11,62	1,16	2,41	0,24	0,00	0,00	0,55	0,06	0,03	0,00	1,73	0,17
2020	37,72	3,77	12,65	1,26	2,11	0,21	0,00	0,00	0,43	0,04	0,03	0,00	1,65	0,17
2021	42,48	4,25	13,74	1,37	1,83	0,18	0,00	0,00	0,34	0,03	0,03	0,00	1,89	0,19
2022	56,88	5,69	14,88	1,49	1,57	0,16	25,43	2,54	0,26	0,03	0,03	0,00	2,09	0,21
2023	58,48	5,85	16,10	1,61	1,33	0,13	0,00	0,00	0,20	0,02	0,03	0,00	2,00	0,20
2024	74,64	7,46	17,38	1,74	1,10	0,11	23,08	2,31	0,16	0,02	0,02	0,00	2,17	0,22
2025	83,54	8,35	18,74	1,87	0,89	0,09	0,00	0,00	0,12	0,01	0,02	0,00	2,07	0,21
2026	100,37	10,04	20,18	2,02	0,70	0,07	0,00	0,00	0,10	0,01	0,02	0,00	2,22	0,22
2027	121,51	12,15	21,71	2,17	0,52	0,05	0,00	0,00	0,07	0,01	0,02	0,00	2,11	0,21
2028	146,89	14,69	23,34	2,33	0,36	0,04	0,00	0,00	0,06	0,01	0,02	0,00	2,23	0,22
2029	182,80	18,28	25,06	2,51	0,20	0,02	0,00	0,00	0,05	0,00	0,02	0,00	2,13	0,21
2030	230,40	23,04	26,89	2,69	0,06	0,01	0,00	0,00	0,04	0,00	0,02	0,00	2,03	0,20
Total	1388,15	138,82	299,34	29,93	84,44	8,44	127,15	12,71	4,22	0,42	0,99	0,10	37,15	3,72

Sources: Our calculations in Excel

3.2 Assessment of implications for public policy

For sequestration, companies are entities whose investments are the most important followed by the State for the purpose of mitigation. In general, funding for these entities comes largely from outside through the financing of land reclamation projects monitoring of plantations, biological fixation of the dunes and reforestation through which communities vulnerable to climate change are paid by the work of "Cash for Work" meaning financial compensation after labor. The funding of community projects implemented by NGOs for the benefit of communities seeking to enhance carbon sinks (REDD and CDM and others) are needed to bridge the gap and achieve the goal set by the ALMPs. For this, the government of Niger has particular interest in international funds to mobilize while positioning themselves for funds relating to REDD.

For households, information/awareness measures that support the project or activities of natural regeneration are taking place mainly in the crop fields should be intensified at this level. Natural regeneration is a process that has increasingly proven successful with very modest means required by

households. This contributes to the increase in forest and therefore a means of subsistence and a true carbon sink.

For government entities, it is important to maintain and increase funding for the environmental component of the "Special Program of the President of the Republic". This is an initiative resulting from the use of funds from HIPC (Heavily Indebted Poor Countries) which has benefited Niger. Also, the achievement of objectives could only be reached through more substantial funding from bilateral and multilateral development projects including the restoration of degraded lands and reforestation.

It is important that increased awareness, information and education for behavioral change on the protection of the environment is taken as policy measures that could be used to encourage entities in connection with the sequestration.

For substitution, it is especially households that are the first players to alleviate pressure on forests. To achieve the objective of replacing mitigation measures such as use of solar photovoltaics are expected in the SNER. It was an operation planned a household solar kit to bring the share of solar PV to 10% in the projection period. Policy measures that could be used to encourage households to acquire solar photovoltaic subsidies, the effective implementation of the national strategy on new and renewable energy, greater focus on advocacy, benefit investment in all the research / development, taxation of costs of photovoltaic materials to make them accessible to the population, increasing household incomes through programs against poverty. The Niger has a program PRASE Programme (regional access to basic energy services) that contributes to the achievement of objectives.

3.3 Uncertainty and key limitations of the methodology.

At present, the level of disaggregation of data collected from different entities, does not reveal distinct financial flows and investment flows in our analysis as hoped for/expected as per tables 8 and 9.

At each entity, the financial statements or other projects operations are given by major components or parts.

However, in the context of the implementation of the Paris Declaration in July 2005 on the effectiveness of Official Development Assistance (ODA), Niger has joined the Platform Management Help. The new database on projects and development programs that are being installed, will allow the future to deal with any request for information on financial flows and investment flows, at least at the primary entity that is the State.

Also, increasingly, there are partners who are willing to help improve the structure of the private sector, NGOs / AD and the accompanying Local Authorities decentralized and community organizations to bring them to keep accounts and more detailed sound. All this will contribute to the future, with some actions to strengthen capacity to conduct better analysis exercise I & FF in Niger.

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