

NABARD Framework for Financing Mitigation Actions in the Agriculture Sector in India

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1. Introduction

Agriculture sector is one of the most important sectors of Indian economy and it plays a significant role in the overall socio-economic development of India. The agriculture sector accounts for 20-22% of total electricity consumption and managing agricultural load is increasingly becoming a challenge for electricity utilities in India. Subsidized tariff generates a perception of zero marginal cost of electricity use and consequently, efficiency in consumption is disregarded¹.

Under the provisions of the National Action Plan on Climate Change (NAPCC), India has launched a dedicated National Mission on Sustainable Agriculture (NMSA) to define its strategies for

mitigation and adaptation to climate change within the agriculture sector. NMSA has been successful in identifying the larger challenges faced by Indian agriculture and how they will be exacerbated in a changing climate context.

2. Prioritizing Agriculture for Domestic Climate Change Mitigation

The agriculture sector in India contributes to one-sixth of the GDP, employs more than half of the labour force, and is a source of livelihood for two thirds of the population. The sector is not only the most vulnerable to climate change impacts, but also has the maximum potential for mitigation. Yet, in global climate negotiations, India maintained a long-standing position that any discussion on agriculture must be held in the realm of adaptation, not mitigation. This partly explains India’s domestic action for low-carbon development within the sector. India may resist inclusion of agriculture in the climate change mitigation debate at the global level, but it cannot afford to avoid these mitigation needs at the domestic level, particularly since adaptation and resilience are closely linked with and dependent on mitigation efforts².

3. Mitigation Opportunities in Indian Agriculture Sector

The Indian agriculture sector is vulnerable to impacts of climate change and contributes

1. Fact Sheet on Agriculture Demand Side Management (AgDSM), Ministry of Power, Government of India.
 2. Low-carbon development in Indian agriculture: A missed opportunity? 12 Apr 2013
http://www.ideasforindia.in/article.aspx?article_id=124

approximately 18% of the total greenhouse gases (GHG) emissions in India as of 2010³. While the agricultural sector directly emits 334.41 million tons of CO₂ equivalent (and around 180 million tons indirectly through electricity consumption), croplands absorb only 207.5 million tons of CO₂⁴. Yet, there is high potential for climate mitigation within this sector. A sizeable reduction in emissions within the agricultural sector would have significant implications for India's commitment to climate mitigation.

Agricultural processes release three major greenhouse gases: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)⁵. The greenhouse gases released by agriculture have three major sources: first, methane emissions from irrigated rice production; second, nitrous oxide emissions from the use of nitrogenous fertilizers; and finally, the release of carbon dioxide from energy sources used to pump groundwater for irrigation. The third component is often excluded while calculating agricultural GHG emissions, since it is already counted as

part of energy-related emissions.

4. NABARD Framework for Financing Mitigation Actions in Indian Agriculture Sector

The National Bank for Agriculture and Rural Development (NABARD) is the apex organization with respect to all matters relating to policy, planning and operational aspects in the field of credit for the promotion of agriculture and allied activities in rural areas in India. The bank provides refinance to various banks for their term lending operations for the purposes of agriculture and rural development. NABARD has emerged as an apex refinancing institution for agricultural and rural credit in the country since July, 1982.

There are multiple schemes by Government of India, state governments and NABARD on financing mitigation related projects in agriculture sector, some of the popular schemes are enlisted in the Table 1.

Table 1: List of National government and NABARD schemes on mitigation for agriculture sector

Name of the scheme/fund	Description
Schemes for promoting solar photovoltaic water pumping systems for irrigation purpose and solar lighting	To promote solar photovoltaic pumping system - independent of grid supplied power - for irrigation purposes, the Ministry of New and Renewable Energy (MNRE), Government of India had launched a credit-linked and back-ended capital subsidy scheme in November 2014. An amount of `US \$2.16 million was released as subsidy during 2015-16 for 781 units. A cumulative subsidy of US \$3.02 million was released under the scheme for 784 units as on 31 March 2016. The scheme envisages subsidising 30,000 units across the country. NABARD is also implementing the Gol scheme of LED-based lighting systems.
National Energy Efficient Agriculture Pumps Programme	Under the National Energy Efficient Agriculture Pumps Programme, farmers can replace their inefficient pumps free of cost with the new Bureau of Energy Efficiency (BEE) star rated energy efficient agricultural pump-sets. These pumps are enabled with smart control panel and a SIM card, giving farmers the flexibility to remotely control these pumps from their mobile phones. As of 7th April, 2016, the Ministry of Power, Government of India indicated that the Energy Efficiency Services Limited (EESL) will distribute 200,000 BEE star rated pump sets to the farmers under this programme, which will lead to 30% of energy savings by 2019. This translates into annual savings of approximately US \$2,955.74 million on agricultural subsidies or a saving of 50 billion units of energy every year ⁶ .

3. First Biennial Update Report. Ministry of Environment, Forest and Climate Change. Government of India. December 2015. INDIA <http://www.moef.gov.in/sites/default/files/indbur1.pdf>

4. Indian Network for Climate Change Assessment. Ministry of Environment & Forests. Government of India (INCCA), 2010

5. However, standard international practice is to present greenhouse gases in CO₂ equivalents (CO₂e). Accordingly, one unit of CO₂ is equivalent to 25 units of CH₄ and 298 units of N₂O

6. <http://pib.nic.in/newsite/PrintRelease.aspx?relid=138678>

Name of the scheme/fund	Description
Agriculture Demand Side Management (AgDSM)	Launched in 2009, the objective of the AgDSM programme is to reduce peak demand, shift the time during which electricity is consumed to off-peak hours and to reduce the total quantum of consumption. The AgDSM proposition is very simple i.e. replacement of inefficient agricultural pump sets with BEE star rated and high efficiency pump sets to reduce the amount of electricity needed to pump water in agriculture sector.
Rural Innovation fund (RIF)	NABARD, in association with Swiss Agency for Development and Cooperation (SDC), has constituted the “NABARD-SDC Rural Innovation Fund (RIF)”. Through RIF, NABARD has supported 46 innovative projects, as on February 2014. These projects were sponsored so as to create more jobs in the rural areas of Tamil Nadu. According to NABARD, RIF supports innovative, risk-friendly projects in the farm, non-farm and micro finance sectors that have the potential to promote sustainable livelihood opportunities in rural areas. Of the 46 projects, some have been scaled up after completion of pilot projects. Besides creating jobs in the rural sector, these projects also address issues related to environmental pollution, reducing drudgery in farm and non-farm operations, increasing productivity, and access to improved conditions of living.
Rural Infrastructure Development Fund (RIDF)	The RIDF was set up by the Government in 1995-96 for financing ongoing rural infrastructure projects. The Fund is maintained by the NABARD. Domestic commercial banks contribute to the Fund to the extent of their shortfall in stipulated priority sector lending to agriculture. The main objective of the Fund is to provide loans to state governments and state-owned corporations to enable them to complete ongoing rural infrastructure projects. The total corpus of RIDF (RIDF I to RIDF X) amounts to US \$6,203.89 million ⁷ . The scope of RIDF has been widened to include activities such as rural drinking water schemes, soil conservation, rural market yards, rural health centres and primary schools, mini hydel plants, shishu shiksha kendras, anganwadis, and system improvement in the power sector. From RIDF V onwards, the ambit was extended to projects undertaken by Panchayati Raj Institutions and projects in the social sector covering primary education, health and drinking water. The activities to be financed under RIDF X include minor irrigation projects/ micro irrigation, flood protection, watershed development/ reclamation of waterlogged areas, drainage, forest development, market yard/godown, apna mandi, rural haats and other marketing infrastructure, cold storage, seed/agriculture/ horticulture farms, plantation and horticulture, grading and certifying mechanisms such as testing and certifying laboratories etc., community irrigation wells for irrigation purposes for the village as a whole, fishing harbour/jetties, riverine fisheries, animal husbandry and modern abattoir.

7. <http://indiabudget.nic.in/es2004-05/chapt2005/chap38.pdf>

Name of the scheme/fund	Description
Under Umbrella Programme on Natural Resource Management (UPNRM)	<p>German Development Corporation (GDC) has sanctioned assistance to NABARD in two phases. UPNRM Phase-I and UPNRM Phase-II⁸. The programme has both loan and grant components. Under the loan component, NABARD will provide loans to technically and financially viable community-based natural resource management projects. The programme is expected to lead to a tangible increase in income for the targeted rural poor. The grant component will be used for financing capacity building and related measures. Since 2007, UPNRM's innovative and inclusive approach has benefited more than 3,32,051 people promoting livelihood activities that use, replenish and conserve local natural resources in an efficient and sustainable manner⁹. UPNRM is:</p> <ol style="list-style-type: none"> (1) Far reaching: 280 projects have been sanctioned under UPNRM with financial assistance of US \$86.24 million covering 20 states and one union territory of India, (2) Pro-poor: There has been a near threefold (175%) increase in mean income in all interventions which have been implemented under UPNRM, (3) Environmentally sustainable: Projects generated about 34,750 quintals of vermi compost replacing 1.73 lakh kilograms of chemical fertilizers. More than 90% of the projects deal directly with conservation and maintenance of natural resources. (4) Gender-friendly and inclusive: 44% of all project participants are women, around 78% are from scheduled castes and tribes and other backward castes. (5) Climate friendly: An agro-forestry project has been registered as a Clean Development Mechanism (CDM) project and it is expected to mitigate 33,400 tons of CO₂ annually, agro-forestry plantations covering 4.2 million trees in 2300 ha of private wasteland has contributed to an annual carbon sequestration of roughly 2,01,618 tons of CO₂. (6) Multi-sectoral: UPNRM supports projects in the fields of agriculture, organic farming, animal husbandry and integrated dairy, agro-processing, efficient irrigation, fisheries, ecotourism, medicinal plants, marketing of agri-products, non-timber forest produce, renewable energy, seed production, effective utilization of residue products, agro-forestry, drinking water and many more.
Green Climate Fund	<p>The Green Climate Fund has been designated as an operating entity of the financial mechanism of the UNFCCC. The decision to set up the Green Climate fund (GCF) was taken at COP 16 in Cancun on December 2010 and the GCF was operationalized in COP 17 in Durban in 2011. The GCF is head quartered in Songdo, Incheon City, Republic of Korea. The Fund aims to promote a paradigm shift towards low emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions and to adapt to the impacts of climate change, taking into account the needs of those developing countries particularly vulnerable to the adverse effects of climate change. The finance is expected to be for agreed full and incremental costs for activities to enable and support enhanced action on adaptation, mitigation (including REDD-plus), technology development and transfer (including carbon capture and storage), capacity-building and the preparation of national reports by developing countries.</p>

8. <http://ecurrentaffairs.in/wp-content/uploads/2013/04/UMBRELLA-PROGRAMME-ON-NATURAL-RESOURCES-MANAGEMENT.pdf>

9. https://www.nabard.org/pdf/12%20_UPNRM.pdf

Name of the scheme/fund	Description
	NABARD is accredited as National Implementing Entity in 10th Board meeting of GCF held on 9th July 2015 on fast track. NABARD is eligible to submit large size projects having outlay of more than US \$ 250 million. Eligible project proponents are invited to submit project concepts or proposals to NABARD in the prescribed formats ¹⁰ .

NABARD's core function is to provide refinance in respect of term loan for both farm sector and non - farm sector activities for a period up to 3-15 years and is released to only eligible institutions viz. State Co-operative Agriculture and Rural Development Banks (SCARDBs), State Co-operative Banks (SCBs), Regional Rural Banks or Scheduled commercial banks or any other financial institution, approved by the Reserve Bank of India (RBI). NABARD also has direct financing window besides RIDF, Ware House Infrastructure Fund, LT Project Loans, National Infrastructure Development Assistance (NIDA), Producers Organization Development Fund (PODF), Credit facility for Federations (CFF), Food Processing Fund etc.

NABARD refinance covers a wide range of activities like Minor Irrigation, Land Development, Dry Land Farming, Watershed Development, Farm Mechanization, Plantation & Horticulture, Poultry / Dairy / Other Animal Husbandry Activities, Fisheries, Bio-gas, Forestry, Storage/ Market Yard, Non - Farm Sector (Small & Micro Enterprises), Self Help Groups, Self Employed / Professionals, Small Road and Water Transport Operators, Agri-clinics & Agri Business Centres, Financing in Agri Export Zones / Contract Farming/ Organic Farming, Agro Processing, Non-Conventional Energy, Rural Housing, Govt. Sponsored Programmes etc.

Investment Credit Department has also opened a window for direct lending by way of co-financing for projects involving sunrise technology / national priorities / thrust-areas like agro processing / large outlays / long gestation period / long repayment period. NABARD is

already supporting projects, many of which can be classified under climate finance. Over 28% of NABARD's cumulative disbursements have links with climate change adaptation and mitigation. Specifically, NABARD's thematic areas of forestry, agriculture, animal husbandry, land development, minor irrigation etc. have projects / components with emission reduction potential.

The Bank has earlier been accredited by the Adaptation Fund Board (AFB) of UNFCCC as the only National Implementing Entity (NIE) for India. In all, six projects amounting to US \$9.85 million has been submitted to AFB, of which three (with an outlay of US \$5 million) have been approved by AFB.

NABARD is accredited as National Implementing Entity in 10th Board meeting of GCF held on 9th July 2015 on fast track (owing to our existing accreditation with Adaptation Fund). This would give thematic leadership to NABARD in India in the area of climate change adaptation and mitigation particularly in agriculture and rural sectors. Accreditation provides NABARD access to financial assistance from GCF, for both adaptation and mitigation projects/programmes. The fund could be used to finance climate change adaptation and mitigation projects identified in the NAPCC of Govt. of India and State Action Plan for Climate Change (SAPCC) of the State Governments besides feasible projects from private sectors including NGO sector. As such, accreditation to GCF is the first step towards enabling NABARD to play a larger role in financing climate change adaptation and mitigation projects in India.

10. <https://www.nabard.org/English/GreenClimateFund.aspx>

5. Cases from Agriculture Sector Mitigation Project Implementation Experience in India

(a) Cycle-mounted solar pump in Odisha: NABARD collaboration with Tata Trusts

NABARD and Tata Trusts entered into an MoU in January 2015. Convergence of development and credit interventions, tribal development, village development, and development of sustainable livelihood opportunities by providing easy financial access are some of the key areas of the collaboration. The Bank had supported Harsha Trust in implementing an innovative project to irrigate vegetable fields by using cycle-mounted portable solar pump on cost sharing basis with Tata Trusts. Under this programme, Harsha Trust successfully implanted the concept with 20 ultra-poor beneficiaries of drought affected Golamunda, Thuamul Rampur and Lanjigarh blocks in Kalahandi district of Odisha. The total cost of the project was 21320 USD, out of which NABARD contributed `13220 USD under the Rural Innovation Fund (RIF), Tata Trusts contributed `4402 USD and Harsha Trust has contributed 3698 USD. Under this project, the beneficiaries who did not have enough water to irrigate their crops were provided with a cycle mounted portable solar pump of just 96-watt capacity along with a drip or sprinkler set. The farmers who had either a dug well or a ring well were

able to irrigate up to 0.25 acres of land to grow vegetables. The pump can deliver up to 700 litres of water per hour and can effectively run for six to eight hours a day. The entire unit comprising pump and panels is easily transported from one water source to another on a bicycle, upon which the solar panels are adjusted and can be folded while being transported. The important benefits observed from this project are the significantly reduction of operational cost for irrigation due to zero energy consumption and Production is maximised due to efficient water use.

(b) Agriculture Demand Side Management (AgDSM) in Maharashtra

The Bureau of Energy Efficiency has facilitated and initiated the implementation of first Ag DSM pilot project in Solapur circle of Maharashtra where 2,209 old inefficient pumps were replaced with star rated Energy Efficient Pump sets (EEPS) and provided free operation and maintenance for installed pump sets. The intervention would lead to lower energy supply on the feeder, and hence, could result in lower subsidy to be paid by the state government. In order to accelerate and implementation of BEE AgDSM scheme, EESL had taken a step forward for implementation of AgDSM project all over India. EESL has conducted a survey and study for the implementation of AgDSM. The details of implementation status of projects are given in Table 2.

Table 2: Status of the Implementation of AgDSM Project

Project Name	Number of Pump Sets Replaced	Date of Completion	Energy Saved per Annum	Energy Saved in Percentage (%)	Investment (USD)
HUBLI Electricity Supply Company Limited, Byadgi And Nippani Circle	590	30 Decem-ber,2013	30 lakh units (kWh)	37%	384,157.4
Chamundeshwari Electricity Supply Corporation Limited, Mandya District	1337	18 March, 2015	56.68 lakh units (kWh)	37%	743,153.7
Bangalore Electricity Supply Company Limited (BESCOM)	280	N/AV	12.50 Lakh units (kWh)	33%	N/AV
Eastern Power Distribu-tion Company Of Andhra Pradesh Limited, Rajanaga-ram Mandal	2496	Under pro-gress	N/AV	~30%	2,904,652.4

(c) Improving pumping efficiency in Andhra Pradesh

Andhra Pradesh is one of the most groundwater-dependent states in India, with 146.8% of its ultimate groundwater potential (in terms of electrical pumps) developed, and an agricultural sector accounting for 31.19% of total electricity consumption¹¹. Government of Andhra Pradesh, under its free power policy, made mandatory provisions for four DSM measures to be implemented in a time-bound manner: 1) installation of shunt capacitors; 2) replacement of crude metal foot valves with frictionless foot valves; 3) replacement of suction and delivery pipes from Galvanized steel GI to Poly Vinyl Chloride (PVC); and 4) installation of ISI marked

pumps. As can be seen, these measures were drawn from past experiments with technology upgrades for energy efficiency, which claimed to have produced positive results in pilot projects. The farmers were required to undertake the first two measures by March 2006 and the last two measures by March 2008. While these were mandatory for farmers accessing the free power supply, others were offered an incentivized tariff of US \$0.0029 USD per kWh (instead of US \$0.0073) upon implementing all four measures. It was claimed that the first three measures are easy and cheap to undertake and can lead to 30% to 40% energy savings. However, these policy measures were hardly ever implemented in the field.

There are multiple reasons why the measures were not implemented, even when they were mandatory under the agricultural electricity policy and had demonstrated (through earlier pilot projects) positive results for energy efficiency. Some of the crucial reason includes following;

- (1) Since a freepower policy had already been in place, there was little incentive for farmers to undertake these measures. Moreover, the farmers always fear new technology, which they suspect may lead to tracking of their consumption and thus higher tariffs in the future. Neither the government nor the utilities put enough effort into educating the farmers about these measures, and how they could improve the quality of the electricity supply.
- (2) Utilities were supposed to monitor implementation of these measures. But, as the state government paid for agricultural electricity, they had little motivation and no incentive to bear the cost of monitoring the implementation.
- (3) The government emphasized penalties for defaulters, but there were no regulatory mandates for penalizing neither the farmers nor the utilities for non-implementation of these measures.
- (4) Lack of local technical expertise was yet another barrier to implementation.
- (5) Replacement of pumps is always expensive, and unaffordable, for many farmers. Neither the state nor the utilities offered to share the cost of pump replacement. So the measures had little momentum.
- (6) Finally, due to a lack of monitoring, many of the high income farmers, who were denied free power under the new policy, are still getting free power. These farmers, often with higher political clout, have defended the status quo of free-power policy¹².

6. Conclusion

It is evident that the access to finance is critical for any developing country's agriculture sector, including its farmers and small and medium enterprises. It is crucial for a country

like India to periodically monitor and assess greenhouse gas (GHG) emissions and to identify mitigation opportunities and the potential from its agriculture sector. It is also important to develop the capacity of stakeholders to employ the climate-smart agriculture practices and

11. www.cea.nic.in

12. Agence Française de Développement Working Paper "In Pursuit of Energy Efficiency in India's Agriculture: Fighting 'Free Power' or Working with it?" August 2012. Page 47-49

to carry out life cycle assessments that guide decision making.

Agriculture sector can also benefit from synergies between climate change adaptation and mitigation within the right enabling conditions.

Comprehensive data management and strong institutional arrangements can facilitate the identification of feasible and effective climate change mitigation options in the agriculture and land use sectors. The Government of India has been playing a proactive role by promoting laws and regulations with new financial instruments or also raising awareness of existing ones to bring them to the attention of the financial and agricultural sectors which require more

intensification. Building capacities of the governments in agricultural finance mechanisms to effectively use/progress in agricultural related climate change interventions will be an important driver to its development.

Specialization in agricultural finance in the government and in the financial sectors is an important driver to its development.

Disclaimer: This document has been produced solely for the purpose of the exercise. All references to the data and information should be considered as mere examples and reflections based on the Asia LEDS Partnership Secretariat's conversation with NABARD officials, and secondary literature review. Readers are, therefore, advised to exercise due diligence before quoting this document.

Contributors:



National Bank for Agriculture and Rural Development (NABARD) is an apex development bank in India, headquartered at Mumbai with branches all over India. The Bank has been entrusted with “matters concerning policy, planning and operations in the field of credit for agriculture and other economic activities in rural areas in India”. NABARD is active in developing financial inclusion policy and is a member of the Alliance for Financial Inclusion. NABARD has been instrumental in grounding rural, social innovations and social enterprises in the rural hinterlands. It has in the process partnered with about 4000 partner organisations in grounding many of the interventions be it, SHG-Bank Linkage programme, tree-based tribal communities’ livelihoods initiative, watershed approach in soil and water conservation, increasing crop productivity initiatives through lead crop initiative or dissemination of information flow to agrarian communities through Farmer clubs. For more information, visit: www.nabard.org



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