# THE BAIF JOURNAL

Vol. 51 (1) April-June 2026



## Clean Energy for a Sustainable Future

**The BAIF Journal**

A quarterly Journal of
BAIF DEVELOPMENT RESEARCH FOUNDATION

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## CONTENTS

Clean Energy for a Sustainable Future 1
*Dr. Bharat Kakade*

Energy Farming: Driving India's Energy Transition through Rural Prosperity 2
*Bharat Kakade, Waman Kulkarni and Mahesh Lade*

Renewable Energy Solutions for Rural Prosperity 6
*Mahesh Lade*

Integrated Agrivoltaics Systems: Driving Green Jobs and Rural Transformation 9
*Waman Kulkarni*

Guhir Climate-Smart Village shows the Way 12
*Richa Gautam and Jogi Bhargava*

Wind Energy - A Driver of Clean Energy 15
*Naveen Balachandran*

Green Hydrogen Cooking: Path to Self-Reliance 18
*Prakash Chandra Ghosh*

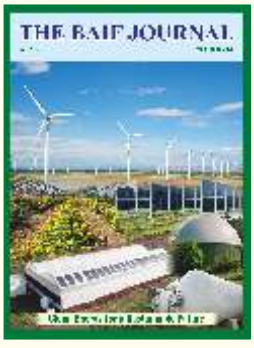
Biomass Pricing in India 21
*Chaitanya Korgaonkar*

Amid LPG Shortage, Haridwar Village shows how biogas can power rural kitchens 24

Voice of Development Participant 26

Capacity Building in Agri Photovoltaics Technology 27

BAIF's Participation in Policy Dialogues on Green Energy 28




Cover Page Design:

India's transition towards a sustainable and secure energy future calls for distributed, decentralised and innovative renewable energy solutions tailored to diverse geographical and community needs. Harnessing the potential of wind, green hydrogen, solar, biomass and biogas, can expand equitable energy access, strengthen energy security, support rural livelihoods and accelerate the progress towards a resilient, inclusive and low-carbon future.

**Edited and Published by:**
BAIF Development Research Foundation
Dr. Manibhai Desai Nagar, Warje, Pune 411058
E-mail: baif@baif.org.in Website: www.baif.org.in

Designed and Printed by Pratima Mudran, Pune.

*The views expressed in all the articles are those of the authors.*




# Clean Energy for a Sustainable Future

India stands at a defining moment in its development journey. As the nation advances towards *Viksit Bharat @2047*, the challenge before us is not merely to meet the growing demand for energy, but to do so in a manner that is sustainable, inclusive, resilient and equitable. The transition towards clean energy is no longer an environmental imperative alone; it is a strategic necessity for ensuring energy security, strengthening rural livelihoods and accelerating economic growth.

This issue of *The BAIF Journal* highlights an emerging paradigm that places rural communities at the centre of India's energy transformation. Rural India possesses immense untapped potential in the form of solar energy, biomass, livestock resources, crop residues, degraded lands and human capital. By harnessing these resources through innovative approaches such as Energy Farming, Agrivoltaics, Bioenergy, Green Hydrogen and Climate-Smart Village models, villages can evolve from being consumers of energy to producers of clean energy and drivers of the green economy.

At BAIF, we view green energy not as a standalone sector but as an integrated rural development strategy that connects livelihoods, livestock, natural resource management and climate action. Our initiatives in solar-powered agriculture, bioenergy systems, carbon farming, climate-smart villages and community-owned energy enterprises, demonstrate how renewable energy can create employment, enhance farm incomes, reduce dependence on fossil fuels and strengthen local resilience.

The model of the Climate-Smart Village at Guhir in Palghar district, Maharashtra, illustrates the transformative power of this approach. Through solar-powered irrigation, agro-processing, reliable electricity and community ownership, the village is demonstrating how clean energy can simultaneously address livelihood security, women's empowerment, climate resilience and rural prosperity. Similar innovations in agrivoltaics and green hydrogen are opening new pathways for sustainable agriculture and energy self-reliance.

India's Green Revolution ensured food security, the White Revolution strengthened nutritional security, and the Watershed Movement conserved natural resources. The coming decades call for an **Energy Farming Revolution** that integrates food, fodder, fibre, fuel, fertiliser, carbon sequestration and renewable electricity generation into a holistic rural development framework. Such a transformation can significantly reduce fossil fuel imports, generate green jobs and contribute meaningfully to India's Net Zero aspirations.

The articles in this issue bring together the perspectives of researchers, practitioners, industry leaders and development professionals who are shaping this transition. I hope they inspire policymakers, development agencies, entrepreneurs, researchers and rural communities to work together to build a cleaner, more prosperous and climate-resilient future.

As we move forward, BAIF remains committed to promoting innovations that place rural communities at the heart of India's clean energy transition. Together, let us transform the challenge of energy security into an opportunity for sustainable rural prosperity.

**Dr. Bharat Kakade**
*President and Managing Trustee, BAIF*

# Energy Farming: Driving India's Energy Transition through Rural Prosperity

**Bharat Kakade, Waman Kulkarni and Mahesh Lade**

India stands at an unprecedented inflection point. The national imperative to decarbonise, guarantee energy sovereignty, and deliver equitable rural growth, demands a fundamental paradigm shift from traditional energy sources to Energy Farming to empower small farmers to become a major stakeholder in the rural prosperity of *Viksit Bharat @2047*.

The last three decades were dominated by climate change and the global race for clean energy. Hence, it will be a major challenge for India to achieve energy security, economic prosperity, and environmental sustainability during the next two decades. The strategy should be to promote green energy as an integral part of inclusive rural development.

India imports ~87.8% of its crude oil, 55% of its natural gas, and 19% of its coking coal, worth USD 150 billion annually (Ministry of Power, 2023-24). The energy demand is projected to double by 2045. Concurrently, over 55% of India's farmland owned by 120 million smallholder families remains underutilised due to erratic monsoons and soil organic carbon depletion. To address this challenge and to ensure energy security, India has targeted the following, under its COP26 *Panchamrit* commitments:

- 500 GW non-fossil energy capacity by 2030.
- 50% electric power capacity from non-fossil resources by 2030
- 1 billion tonnes of carbon emission reduction by 2030.
- Net Zero GHG emissions by 2070.

As of January 2026, India had 141 GW of installed solar capacity, accounting for 27% of its total power capacity, second only to coal and lignite. Non-fossil fuel sources together make up more than half of India's installed capacity.

## Sectoral Energy Consumption

India is among the world's top three countries in solar power. Its solar capacity grew from 1 GW in 2012 to 141 GW by January 2026, but storage and transmission limits solar generation to about one-third of its installed capacity.

In India, electricity accounts for only 21% of energy consumption, while the remaining 79% is consumed as thermal heat, liquid transportation fuels, and gaseous fuels. Heavy transport, high-temperature industrial furnaces, and agricultural machinery require high-energy-density carbon-neutral fuels. Bioenergy, such as CBG, liquid biofuels, biochar, and compressed pellets, provides a direct substitute for fossil hydrocarbons without requiring complete replacement of existing mechanical machinery.

## India's Transition Framework

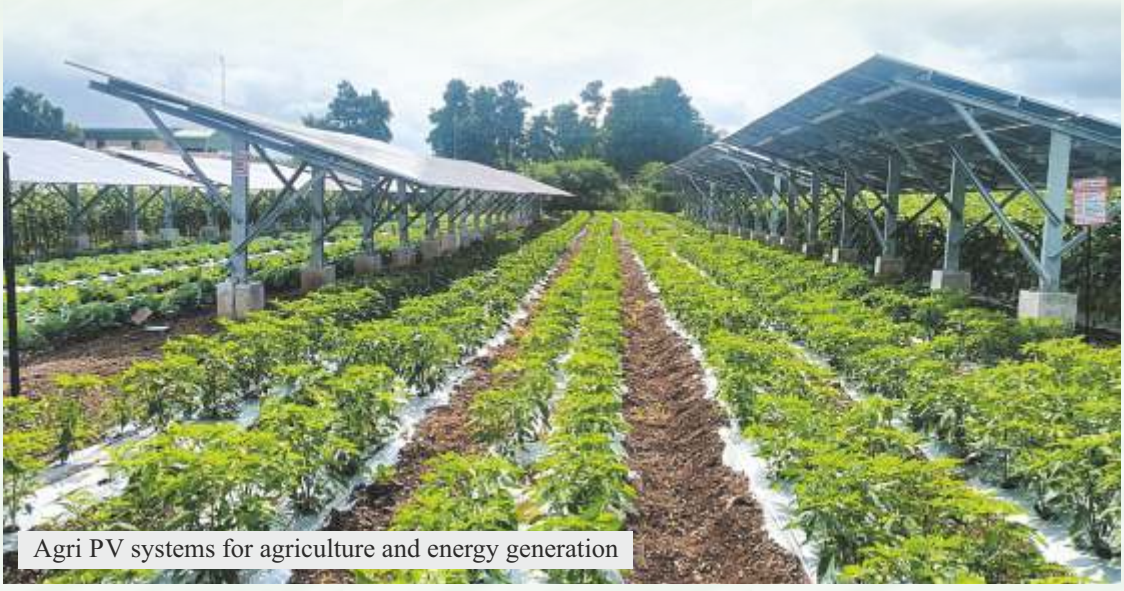
Synthesis of official reports suggest the following Six Pillars of India's Integrated Energy Transition:

1. **Renewable Electricity Expansion:** Utility solar/wind, rooftop solar, and agrivoltaics.
2. **Deep Electrification:** Transitioning diesel irrigation to solar and expanding electric mobility.
3. **Green Hydrogen:** Establishing domestic production for hard-to-abate industries.
4. **Circular Bioeconomy:** Converting organic waste to fuel via Compressed Biogas.
5. **Demand-Side Energy Efficiency:** Driving industrial and commercial energy conservation.
6. **Individual and Community Action:** Driving sustainable resource consumption and market-based mechanisms.

## Agriculture: India's Untapped Energy Resource

Historically, Indian agricultural policy focussed on Food, Fodder, and Fibre to ensure self-sufficiency in food through the Green Revolution, which can be remoulded into an 8-Pillar Energy Farming engine that yields eight interconnected outputs:

1. **Food:** High-yield climate-resilient grains, millets, pulses, and horticulture.
2. **Feed:** Protein-rich forage, Hybrid Napier grass, and Spineless cactus on degraded soils.
3. **Fibre:** Natural fibres (cotton, jute, bamboo, cactus) for industrial use.
4. **Fuel:** Crop residues, bio-energy feedstock, and biogas for bio-CNG, ethanol, pellets and Green Hydrogen.
5. **Bio-Fertiliser:** Liquid Organic Fertiliser and bio-slurry to restore soil health.
6. **Carbon:** Soil organic carbon and biochar application for long-term carbon locking.



Agri PV systems for agriculture and energy generation

7. **Electricity:** Agrivoltaic arrays over cropland and decentralised biomass power generation, wind power.
8. **Ecosystem Services:** Groundwater recharge, soil and biodiversity conservation.

To generate green energy, Rural India is blessed with the following resources (IIM–Bangalore):

- **Crop Residues:** 500 Million Tons annually, of which 140 MT is surplus and can produce ~7 MT/year of CBG.
- **Livestock dung:** 1.2 billion tonnes of wet dung annually, which can produce 50 million $m^3$ methane/day.
- **Agrivoltaics:** Installing elevated panels on 1% of net sown area in the country can host ~700 GW of solar power, without affecting agriculture income.
- **Degraded Lands:** 55 million ha can be used for growing energy crops, which can produce 10–15 tons biomass/ha/year for bio-refineries.
- **Biochar Potential:** 50% of surplus crop straws can produce 100 million tons CO2 equivalent of biochar annually.

## Green Economy Opportunities

Transitioning to Energy Farming transforms rural areas from energy consumers into decentralised clean energy producers, creating new rural enterprises and skilled jobs such as solar power sales, biomass feedstock sales, biogas kit production and distribution units, biochar enterprises, organic bio-slurry sales, land leases for agrivoltaics and carbon credit transactions, thereby increasing the income of rural families. The following Table shows these opportunities in different sectors.

**Table 1. Rural Energy Interface and Opportunity in different Sectors**

| Sectors | Energy Share | Rural Energy Interface & Opportunity |
|---|---|---|
| **Electricity Generation** | ~21% | Agrivoltaics, feeder solarisation, biomass mini-grids |
| **Transportation & Logistics** | ~18% | Ethanol feedstock, crop residue for CBG, rural EV charging |
| **Industrial Processing** | ~42% | Crop-residue briquettes/pellets for thermal co-firing; Biochar. |
| **Agriculture & Irrigation** | ~8% | On-farm solar power export, replacement of 5.5M diesel pumps. |
| **Domestic Cooking** | ~11% | Community digesters, GOBAR dhan, organic slurry manure |

*Press Information Bureau, 2026*

## BAIF's Green Energy Mission – Systems Innovation in Practice

BAIF views green energy as a systems innovation framework connecting livelihoods, livestock husbandry, land stewardship, and clean energy access in 100,000 villages by 2030. The Seven Operational Domains of BAIF are:

### Seven Operational Domains of BAIF:

1. **Solar Energy and Micro-Grids:** Solar micro-grids, solar-powered enterprises, and solar-powered farming.
2. **Livestock and Bioenergy Systems:** Anaerobic digesters converting cattle dung into clean fuel and Liquid Organic Fertiliser (LOF).
3. **Biomass Feedstocks and Biochar Protocols:** Pyrolysis kilns converting agro-waste to soil carbon, alongside dedicated bioenergy feedstocks like Spineless Cactus and Hybrid Napier cultivation.
4. **Carbon Farming and Circular Ecosystems:** Agri-horti-forestry (*wadi*), landscape management, soil carbon sequestration, and closed-loop agricultural recycling systems.
5. **Climate-Smart Village Solutions:** Climate Information Services (CIS), water-smart technologies, carbon and nutrient management, soil health optimisation, and crop-smart innovations.
6. **Community and Rural Energy Enterprises:** FPO and SHG-owned bio, hydrogen, and solar enterprises.
7. **Blended Finance and Digital MRV:** De-risking capital by combining subsidies and credit, supported by digital MRV protocols for small holders' carbon credit aggregation.

### Green Energy Innovation and Promotion Agenda of BAIF :

- **Applied Research:** Testing bio-energy crops, high-efficiency digesters, agrivoltaic designs and green hydrogen for cooking and power generation.
- **Field Demonstration:** Establishing 100 Model Green Energy Villages.
- **Smallholder MRV Protocols:** Designing satellite-enabled MRV systems for smallholders.
- **Skill and Capacity Building:** Training 10,000 rural youth as "Urja Mitras".
- **Enterprise Incubation:** Supporting 100 FPOs to establish bioenergy business verticals.
- **Policy Advocacy:** Sharing field insights with MNRE, MoA & FW, NITI Aayog, and state regulators.

### Way Ahead

The Green Revolution eliminated mass hunger; the White Revolution achieved nutritional security to a great extent; the Watershed Movement protected soil and water resources. As India targets energy independence by 2047 and Net Zero by 2070, the nation requires an **Energy Farming Revolution**. This can reduce the import of fuel while reducing greenhouse gas emissions.

### This can be achieved through the following strategies:

1. **Policy Integration:** There is a need for a unified policy for prioritising **Energy Farming**.
2. **Infrastructure Capital:** Provision for low-interest credit.
3. **Carbon Market Access:** Simplify CCTS guidelines to allow smallholders to access the market.
4. **Institutional Partnership:** Easy partnership among stakeholders.
5. **Research and Capacity Building:** Establishment of research facilities and training institutions. ■



SPOTLIGHT

# Renewable Energy Solutions for Rural Prosperity

Mahesh Lade

## Background

India's dependence on coal remains high, with coal power generation projected to reach around 283 GW (Ministry of Power, July 2024, PIB) by 2032. Rural India, home to nearly 60% of the population, faces unreliable electricity supply.

## Opportunities:

India is the world's fourth largest solar power producer and aims to achieve 500 GW of non-fossil fuel capacity by 2030. Solar energy is particularly suitable for rural and tribal areas because it is a decentralised source of energy which is affordable, scalable, and can be deployed locally.

## BAIF's Clean Energy Initiatives

Solar Distributed Renewable Energy (Solar DRE) generates electricity at the point of use through standalone systems or mini-grids, making it ideal for remote communities. BAIF has promoted low-cost, need-based solar micro-enterprises (below 1 kW) in rural areas. These enterprises can be supported through subsidies, enabling wider community acceptance.

**Fractional HP Solar Pump:** In the BAIF Agri-Horti-Forestry (*wadi*) model, fruit crops are cultivated with vegetable crops as inter-crops and forestry plants on the border



Low cost fractional HP Solar Pump with gravity drip unit.



Nature-based solutions: Solar Insect Trap

of the plantation. To reduce the physical hardships encountered in transportation of water and the high cost of pumps, BAIF promoted fractional HP solar pumps ranging from 0.25 to 0.5 HP and specific to the needs of small farmers. This unit costs approximately Rs. 30,000, with a maximum discharge head of 90 metres. So far, 7,604 installed pumps of 1 HP to 20 HP capacity, have enabled farmers to increase the area under cultivation and to take up cultivation in summer, without any recurring fuel cost. A 30–40% increase in farmers' income along with reduced diesel consumption has been observed. Replacing diesel pumps with solar pumps can reduce emissions by about 1 $tCO_2$-eq per acre per year.

**Solar Insect Trap and battery-powered Spray Pump:** The Solar Insect Trap controls insect populations before they damage crops. It consists of a UV LED light that attracts insects during the night. The insects fall into a water container placed below the light, thereby reducing the insect population and minimising crop damage. Lower insect populations result in reduced pesticide requirements, lower input costs, and improved crop production. Since spraying is a seasonal activity, BAIF has introduced a battery-powered spray pump with LED light mobile charging, using solar energy.

**Solar-powered Charging Station for Spray Pumps:** The solar-powered DC charging station operated by a Self-Help Group or farmer's group and generally installed near agricultural fields. enables farmers to use battery-powered spray pumps resulting in uninterrupted spraying operations. One charging station can charge up to five battery-operated spray pumps using a 200 W solar panel. The use of battery-powered spray pumps replaces diesel-operated pumps and reduces emissions.

**Solar-powered Sewing Machine with battery back-up:** Solar-powered sewing machines are provided to participants



Use of solar energy with 3-in-1 Spray Pump

already using sewing machines as a livelihood enterprise. The manually operated or electrically-driven sewing machine is converted to operate with a solar-powered DC motor. The DC motor is connected to a battery backup, providing a reliable and stable power supply which improves the quality of stitching and enables entrepreneurs to meet delivery schedule. The system also includes LED lighting, which provides better visibility during evening hours.



Green Enterprise - Solar-powered machineries

**Solar-powered Common Service Centre and printer-cum-copier machine:** Common Service Centres provide essential e-services to the local community in remote areas and enable local entrepreneurs to earn sustainable income.

**Solar-powered DC Refrigerator:** Solar-powered DC refrigerators have been installed in grocery stores operated by SHGs, to maintain the cold temperature of bottled water and beverages.

## Benefits:

The benefits from the use of solar-powered devices are immense. These energy systems promote rural entrepreneurship and local employment, reduce dependency on electricity and diesel, lower production expenses and improve productivity and income. Greenhouse gas emissions are reduced by replacing fossil fuels with clean solar energy while supporting climate-resilient and sustainable agricultural practices. These solar-powered devices provide rural households access to reliable energy while reducing drudgery and improving health and overall quality of life.

## Community Development

Village-level meetings are organised to create awareness among the local community about the benefits of solar power as a suitable alternative to grid power. Initially, a few demonstration units are installed. Participants from nearby villages are taken to these sites to gain first-hand exposure of the technology. As a part of backward linkages, members of the local community are trained in installation, repair, maintenance and operation of the solar systems. The availability of trained local technicians ensures prompt economic services for the farmers while reducing their dependency on external vendors.

*Mahesh Lade is Thematic Programme Executive – Renewable Energy at BAIF.*



SPOTLIGHT

# Integrated Agrivoltaics Systems: Driving Green Jobs and Rural Transformation

**Waman Kulkarni**

## Background:

India's food security is under tremendous pressure due to climate change and rising population. At the same time, the country is striving to achieve net-zero emissions by 2070. In recent years, integration of photovoltaic (PV) systems with agriculture has led to the emergence of Agrivoltaics (AV). This novel approach enables the use of land for agricultural production and photovoltaic (PV) energy generation. By integrating renewable energy with farming systems, AV enhances resource-use efficiency, reduces carbon emission and ensures ecosystem restoration.

## BAIF's Renewable Energy Solution:

Leveraging over six decades of experience in rural livelihoods, agroforestry and natural resource management, BAIF has developed the integrated agrivoltaics approach with crops, livestock, water resources (farm ponds), and solar energy on the same land. A unique large-scale demonstration comprising of 17 agrivoltaics models has been established at the BAIF Rural Innovation Centre, Central Research Station, Uruli Kanchan, Maharashtra, Karimnagar, Telangana and S. Lakkihalli, Tumkur, Karnataka, generating 1233 kW and serving as pioneering Centres of Excellence in the country.

The agrivoltaics model established by BAIF across diverse agro-climatic regions is the first agrivoltaics model in the country and comprises of 17 models with 13 distinct structural designs and 5 energy uptake options such as climate-smart village model



Elevated 4m height Agrivoltaics model for banana cultivation

which fulfils the entire energy need of the village through solar energy, scientific development of crop cultivation practices and cost economics for each model. This initiative aims at improving livelihood of farmers by enhancing land-use efficiency and promoting sustainable, climate-resilient farming systems.

## Technological Advancement:

Early evidence reveals improved water use efficiency, stable / enhanced crop yields under partial shading, and additional income stream such as solar grazing. Initial findings across two cropping seasons indicate enhanced land-use efficiency, reduced evapo transpiration, improved microclimate conditions, and increased crop yield and quality under regulated shading. Diversified income streams through cultivation of agriculture crop, water harvesting, hydroponics, aquaculture, and energy generation, demonstrate significant potential to improve farm profitability and climate resilience.

Several agrivoltaic models have been established, and various crops and vegetables are being cultivated beneath and between the solar panels. The main objective of these installations is to evaluate the performance of different agrivoltaic models and crop combinations and identify the most suitable model for wider adoption by the farming community.

Key innovations include rainwater harvesting through panel structures, reuse of stored water for irrigation and panel cleaning, integration of livestock for organic nutrient cycling, and protected cultivation for residue-free, high-value crops, ensuring circularity within the food–water–energy nexus. The model also promotes skill development and green jobs by training rural youth in system installation and maintenance.

## Crop Performance under Agri-PV

A common metric used to evaluate the efficiency of Agri-PV systems is the Land Equivalent Ratio (LER). LER measures efficient utilisation of land with agricultural production and photovoltaic electricity generation, as against separate land areas for each activity. Twenty eight diverse crops were tested to evaluate their performance under various agrivoltaic models and structural designs. Crop growth and yield were assessed under different light intensities created by panel shading. During the Kharif season, 15 crops - crysanthemum, chilly, cowpea, radish, brinjal, marigold, beans, banana, papaya, Guinea Grass, cauliflower, cabbage, spinach, drumstick and fenugreek and during Rabi season, 13 crops - garlic, onion, broccoli, pea, zucchini, tomato, cabbage, carrot, okra, coriander, cauliflower, lucerne and berseem were studied for their growth and the yield performance was tested under different shading conditions.

In addition, summer crops such as turmeric, ginger, sunflower, Sweet corn, cucumber, cowpea, crysanthemum, beetroot, palmarosa, *Aloe vera*, and Bottle gourd were included to assess crop suitability across seasons under varying AV conditions. The results showed that variations in light intensity significantly influenced crop performance. Crop yield reduction under different agrivoltaics structures ranged from 11% to 18%, depending on crop type, shading level, and system design. However, additional income from solar energy and diversified farm

outputs can improve farmers' livelihoods. For example, in a fixed-tilted agrivoltaic (APV) system, full shading panels below produced at par, chrysanthemum yield of 7.36 MT/ha. In comparison, yields were 4.73 MT/ha under partial shade, 5.74 MT/ha between panels, and 8.04 MT/ha in the control, demonstrating improved crop performance.

## Agri PV and Mechanisation:

The transition towards green energy-based farm mechanisation is critical for sustainable agriculture. Agrivoltaics (Agri-PV) decarbonises farm operations while optimising land-use efficiency and resource productivity. By integrating clean energy into the agricultural value chain, Agri-PV significantly lowers operational overheads, enhances energy security, and fosters diverse income for smallholder farmers.

A fully solar-powered farming ecosystem includes the following stages:

- Pre-Sowing and Cultivation: Land preparation via electric tractors and energy-efficient polytunnel structures.
- Precision Management: Automatic drip and fertigation systems, high-pressure crop sprayers, and real-time data collection through solar-powered automatic weather stations.
- Post-Harvest and Value Addition: Solar dryers, decentralised processing units, and cold storage solutions to reduce spoilage.
- System Maintenance: Semi-automated panel cleaning mechanisms to ensure peak energy generation efficiency.



Floating Solar Panel on farm ponds for energy generation

## Constraints and Solutions:

Large-scale adoption of agrivoltaics in India faces challenges in the form of limited awareness and technical knowledge, shortage of skilled professionals, high upfront capital costs, limited access to finance, policy and regulatory uncertainties, low investor confidence and hesitation of farmers due to investment risks.

However, AV has potential to enhance resilience to climate change and ensure a brighter future for farming in India. Based on the field experiences of BAIF and other Civil Society Organisations, it is possible to bridge the gap between technological innovation, community institutions, and policy frameworks.

*Waman Kulkarni is Chief Thematic Programme Executive – NRM and Climate Action at BAIF.*

# POWERING CHANGE: Guhir Climate-Smart Village Shows the Way

Richa Gautam and Jogi Bhargava

## Background:

Guhir is a small agrarian village in Maharashtra's Palghar district, situated approximately 114 km from Mumbai. Home to 113 farming families, the village is predominantly composed of smallholder farmers, each cultivating an average landholding of around two acres. Despite their strong dependence on agriculture, household incomes remain modest, averaging about ₹55,000 per year.



Solar energy for irrigation and agri processing

The village has an organised social structure consisting of farmer groups and Self-Help Groups (SHGs), which play a critical role in collective action, financial inclusion, and community support.

## Cropping Pattern:

Agricultural activities follow a seasonal cycle:

- **Monsoon season (June–September):** Rice is the principal crop.
- **Winter season (November–February):** Moisture-based crops such as beans are cultivated; families with irrigation access grow vegetables on small plots.
- **Summer season (March–June):** Few families are engaged in Mango *wadi* plantations as a horticulture-based livelihood activity.

Although the village has a total **irrigation potential of nearly 100 acres**, only **15–20 acres** are irrigated, highlighting significant scope for irrigation development and increased agricultural productivity.

## Why Guhir?

Guhir is part of an aspirational district-Palghar and its location made it the perfect choice for the climate-smart initiative. Hence the issue was never availability of water but the inability to lift and distribute it reliably. Thus, it was felt that this constraint could be resolved by solar-powered irrigation. Just as importantly, BAIF was already active in Guhir since 2015, working on natural resource management, renewable energy, climate-resilient agriculture, biodiversity conservation, and community capacity building. This gave the project an established relationship of trust with the community and a foundation of local knowledge to build on, making Guhir a strong location to pilot an integrated, replicable Climate Smart Village model.

## Interventions

To address Guhir's challenges, the **Spreading Happiness InDiya Foundation (SHIF)** is a collaboration between the Sachin Tendulkar Foundation (STF), and **Schneider Electric India**, drawing on **BAIF's** presence in the village. Together, they designed a holistic, integrated village development model centred on a Climate-Smart Village approach that pairs decarbonisation with livelihood generation.

Key elements of the intervention include:

- **Doubling the irrigated area** through solar-powered lift irrigation pumps, freeing farming from total dependence on rainfall
- **Solar-powered agro-processing units** to help farmers add value to their produce rather than selling it raw to middlemen
- **24x7 electricity** for households and street lighting, replacing diesel and manual alternatives
- **Community capacity building** so that villagers themselves can maintain and operate the solar infrastructure
- A **women-led, community-managed model** designed for long-term local ownership rather than dependence on outside maintenance



Solar-powered irrigation for crop production

## Installation and Maintenance

At the core of the Guhir Climate-Smart Village is a **40 kW solar array** integrated with an **IoT-enabled smart power management system**.

The system currently powers:

- **Two solar lift irrigation pumps** (7.5 hp each)
- **Spice processing machine** (3hp)
- **Rice/wheat huller** (3hp)
- **One paddy thresher** (2hp)
- **113 households** and roughly **25 streetlights**
- A **photocopy/printing machine** requiring continuous power, supported by an inverter with battery backup
- An **electrified Anganwadi (early childhood centre)**, benefiting more than 30 children

The system is designed to deliver:

- **~30% lower capital expenditure** than conventional microgrids
- **Over 95% efficiency**, with high operational reliability
- **~80% lower operation and maintenance costs**
- **100% capacity utilisation**
- A **simple operating design** that can be operated by semi-skilled local resources.

## Community Ownership

**Kohaj Krushi Samruddhi Farmers Producer Co. Ltd, Taluka Wada** in Guhir has mobilised 308 farmers from 6 villages.

## Impact

The Climate-Smart Village model has begun reshaping life in Guhir across several dimensions:

- **Higher household income**, driven by assured irrigation across multiple crop cycles, local value addition, and better price realisation through improved market linkages
- **Reduced input costs** for farmers, who no longer rely on expensive diesel-powered alternatives
- **New local job opportunities** created by processing and irrigation infrastructure
- **Improved food and nutrition security**, supported by more reliable, multi-crop cultivation
- **Reduced seasonal migration**, as villagers find sufficient income and opportunity closer to home
- **Women's empowerment**, through leadership roles in the community-managed operating model
- **24/7 reliable electricity** for homes, schools, and community facilities
- **Environmental impact**, with the system estimated to cut carbon emissions by roughly **60,000 kg per year**

*Ms. Richa Gautam, Director – CSR & Sustainability, Schneider Electric with key operational insights from Mr. Jogi Bhargava, Manager – CSR.*

## Legendary Cricketer Mr. Sachin Tendulkar visits Guhir Village

Guhir Climate-Smart Village was inaugurated by **Sachin Tendulkar** on April 28, 2026. He was accompanied by Sara and Saaniya Tendulkar.

Deepak Sharma, Zone President Greater India and MD & CEO of Schneider Electric India, described clean energy and sustainable livelihoods as the foundation on which resilient communities are built. Dr. Bharat Kakade, President and Managing Trustee of BAIF, placed the project within the organisation's broader, pan-India work on rural livelihoods and climate action. Sachin Tendulkar expressed hope that the model with children, women, and youth taking the lead, will be adopted by many more villages.





SPOTLIGHT

# Wind Energy - A Driver of Clean Energy

Naveen Balachandran

## Global Renewable Landscape

The 2025 renewables report by the International Energy Agency shows that global renewable power capacity is projected to double from 2025 to 2030 with an increase of 4,600 GW. The growth is vastly accounted for by solar PV by almost 80%, with the rest covered by wind, hydropower, bioenergy, and geothermal. While solar PV is gaining far more popularity, global wind capacity is still projected to nearly double to over 2,000 GW by 2030. This is largely supported by major economies such as China, India and the European Union addressing the main challenges such as grid constraints, overcapacity, supply chain security, and permit bottlenecks.

## Current trends in Global Market

The year 2025 marked a benchmark for the wind industry as 165 GW of new capacity was installed worldwide, seeing a 40% improvement from the previous year. The new installations brought cumulative global capacity over 1,299 GW, grounding wind as a cornerstone energy source in major world economies. The market has become more widespread in recent years as wind energy is now used in 138 countries. Of these, 57 had total installations of nearly 28,400 turbines in 2025.

Wind generated power has been noted to outperform fossil fuels in terms of affordability, accessibility, reliance, as well as near-term growth potential.

## Onshore Wind Progress

155 GW of new onshore wind capacity was grid connected worldwide, excelling the 1,200 GW milestone. The additions marked a YoY growth of 42% from 2024-2025.

## Offshore Wind Progress

The offshore wind sector has been growing rapidly in regions with deep waters and has established itself across the world as a key source of energy. The establishment of this market has created global value chains which contribute to job creation, increased port activity, and demand for steel manufacturing and digital services. Major infrastructure developments including upgrades made to ports to host high-voltage transmission are also direct results of offshore market growth. Floating offshore further opens opportunity in deep-water markets driving innovation and exploration forward. Offshore wind capacity worldwide grew by 9.2 GW bringing cumulative capacity to 92.3 GW. These additions showed a 19% improvement from the previous year.

Europe makes up for one fifth of offshore wind capacity connections worldwide after commissioning almost 2 GW across 3 markets in the last year.

## Indian Wind Market Outlook

Demand for electricity within India is predicted to grow at a Compound Annual Growth Rate (CAGR) of around 7% until 2032. This is driven by factors including rapid urbanisation, economic growth, as well as goals set by the Government of India on climate change mitigation and clean energy transition. These goals were set during the COP26 summit in November 2021 - *Panchamrit*.

- 500GW of non-fossil energy capacity installed by 2030 comprising of 140 GW wind power
- 50% of energy requirements to be drawn from renewable sources by 2030
- 1 billion tonnes of reduced total projected carbon emissions from 2022-2030
- Carbon intensity of the economy reduced by 45% by 2030
- Net zero target by 2070.

These objectives are further supported by the Electricity Amendment Bill 2025, a draft which strengthens power supply by distinguishing the distribution network from supply. Renewable Purchase Obligation (RPO) compliance also receives support in order to improve the financial governance of DISCOMs.

Emphasis on the domestic supply chain shows concessional customs duty extensions on key wind components. On top of a predicted 40 GW of added wind capacity over the next five years, restoring older wind farms across states like Tamil



Offshore wind energy production

Nadu, Maharashtra, and Gujarat will further increase power generation from wind. By January 2026, India had installed 54.5 GW of onshore wind capacity, a substantial increase since 2024. This makes it the second-largest hub for onshore wind assembly and production in the Asia-Pacific region. To aid the growth of the wind industry in India, the Government made changes to the auction mechanism to avoid unviable projects from being accepted due to aggressive price-based bidding.

Maharashtra specifically is a geographically advantageous region to pursue wind power development. The coastal belt which stretches along the Konkan region shows proximity to various urban cities like Mumbai, Navi Mumbai, Pune, and Thane that have high demand for energy. The location also improves chances of grid stability, minimises potential risk of transmission losses, and opens access to pre-existing maritime infrastructure. Offshore wind energy developments have very high potential in this region also because of deep water level availability and consistent wind speeds between 6.5-8m/s.



Wind energy around the world has carved out a dependable backbone for a clean energy transition alongside solar, and other renewable sources. It meets rising energy demand in an era of digitisation while simultaneously improving energy security. This progress displays a broader shift in global goals and a future of long-term sustainability and resilience.

India in particular is seeing immense growth and future potential driven by strong policies, favourable natural resources, and rising demand. The next phase of growth displays the country's strength in terms of efficiency within grid allocation, market design, and maximising offshore potential. Making the most out of pre-existing local resources by repowering older assets and strengthening domestic manufacturing, can further accelerate the growth.

## Conclusion

Ultimately, wind energy is no longer just a complement to the energy mix - it is becoming central to it. As both global and Indian markets continue to evolve, the focus will shift from ambition to delivery. And in that journey, the steady expansion of wind power will play a crucial role in shaping a cleaner, more reliable, and more secure energy future.

*Naveen Balachandran is Vice President, Business Development & Public Affairs at HBA Future Energy in Singapore. The organisation is focussed on delivering end-to-end integrated energy solutions and facilitating the transition towards sustainable energy.*




SPOTLIGHT

# Green Hydrogen Cooking: Pathway to Self-Reliance

**Prakash Chandra Ghosh**

## Introduction

The continued dependence on conventional cooking and heating fuels such as LPG, kerosene, and traditional biomass contributes significantly to greenhouse gas emissions, indoor air pollution, and environmental degradation, including deforestation. Although considerable progress has been made in expanding access to clean cooking fuels, substantial disparities remain in their availability and accessibility in various regions of India. Globally, nearly 2.4 billion people, including approximately 350 million in India, continue to rely on polluting fuels for cooking and heating. According to the World Health Organization (WHO), exposure to household air pollution from these fuels results in approximately 3.2 million premature deaths annually, including more than 237,000 deaths among children under five years of age (2020 estimates).




In addition to domestic applications, commercial kitchens, community kitchens, educational institutions, healthcare facilities, and defence establishments require clean, reliable, and scalable thermal energy solutions capable of meeting high heat demands while minimising environmental and health impacts.

The United Nations has established a target of achieving net-zero-emission cooking by 2050 as part of global climate mitigation efforts. While decarbonisation through cleaner fuels addresses greenhouse gas emissions, it does not inherently eliminate localised indoor air pollution and associated health risks. Therefore, there is a pressing need for holistic clean cooking and heating technologies that simultaneously achieve zero-carbon emissions, eliminate harmful indoor pollutants, ensure energy security, and remain deployable across diverse geographical and climatic conditions, particularly in remote and energy-constrained regions.

## Proposed Solution

A **solar-powered green hydrogen production unit** integrated with a **hydrogen burner/heating system** for clean thermal applications provides a solution. It delivers a **comprehensive turnkey system** integrating **clean and green cooking and heating**, while also addressing **electrical energy needs** and supplying **oxygen** as required.

## Operational Experience:

A system developed by Zest Clean Power Pvt. Ltd. and manufactured by Pratishna Greentech Pvt. Ltd. with electrolyser size of

25 kW solar-powered green hydrogen cooking system has been successfully installed and demonstrated at IIT Bombay. The system effectively met the cooking energy requirements of an institute canteen, particularly during a period of LPG supply disruption, thereby demonstrating the reliability and resilience of decentralised hydrogen-based cooking solutions.



Green $H_2$ for Social Welfare: Enabling Self-Reliant and Inclusive Development at the Last Mile

The proposed system is capable of producing approximately **2.5–3.0 kg of green hydrogen per day** through on-site water electrolysis when coupled with a **35 kWp solar photovoltaic (PV) system**. The generated hydrogen is utilised directly for cooking applications and can cater to the preparation of approximately **200–250 meals per day**, depending on the cooking load and menu. The successful long-term operation of the system validates the technical feasibility of green hydrogen-based cooking.

The proposed system **eliminates the need for firewood collection**, allowing women in remote areas to dedicate more time to productive activities. **Community-based cooking systems** foster socialisation and strengthen **community ties**.

**Environmental Benefits:** Globally, baseline cooking-sector emissions have been estimated at approximately 1.69 $GtCO_2e$, representing a significant opportunity for emission reduction through transition to clean cooking solutions.

**Health Benefits:** By reducing exposure to pollutants from fossil fuel burning, the system improves **family health**. It also **reduces heat stress** for women responsible for cooking, with cooking temperatures lowered by roughly **8°C compared to LPG stoves**.

**Gender Justice:** The proposed cooking method alleviates burdens, enhances **quality of life and well-being**, advances **gender equality**, and promotes **sustainable development**. By reducing rural hardships, it also helps **bridge the urban-rural divide** and curb migration from rural areas.

**Strategic Benefits:** The **hydrogen-based clean cooking system** can significantly **reduce import dependency** and **mitigate risks** arising from regional or global conflicts that disrupt the cooking fuel supply chain. This advancement strengthens **national self-reliance** which is vital for **energy security, survival, and long-term sustainability**.

**Scalability and Policy Impact**: Developing a **replicable framework** for




Green hydrogen-based cooking model at IIT Bombay

deploying green hydrogen cooking systems in developing nations provides a critical **climate resilience strategy**. This approach supports the UN's **Clean Cooking Goal**, aiming to eliminate cooking poverty and deliver **cleaner cooking solutions for all by 2030 and Net-zero emission cooking by 2050**.

## Alignment with UN SDGs

The proposed system **directly supports multiple United Nations Sustainable Development Goals (SDGs)** by promoting clean energy access, improving public health, and fostering sustainable innovation:



Electroliser



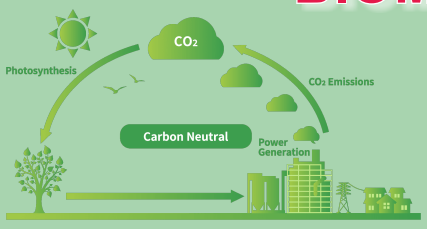
Control Panel




*Dr. Ing. Prakash Chandra Ghosh is Professor, Department of Energy Science and Engineering at IIT Bombay. Apart from his research interests including low temperature fuel cells, he has also developed sustained interest in solar hydrogen research and energy storage.*

# BIOMASS PRICING IN INDIA

SPOTLIGHT




## Building a Market Beyond Benchmarks

Chaitanya Korgaonkar

### Policy-led Growth to Market Maturity

India's energy transition is actively being built on the ground, with biomass at the heart of this transformation. The Government of India has taken decisive steps through biomass co-firing initiatives in thermal power plants, the SATAT and GOBARdhan programmes for CBG development, and benchmark pricing frameworks for biomass pellets. These initiatives have created demand at scale, encouraged investment in biomass processing, supported aggregation networks, and laid the foundation for more structured price discovery in the sector.

Global disruptions in gas markets have reinforced that energy security matters as much as sustainability. Biomass - locally available and renewable, has emerged as a strategic option for Indian industry. The sector now stands at an inflection point. Policy has successfully enabled growth, demand is expanding, and the ecosystem is getting more organised. The next phase will naturally shift from policy-led expansion to market-led maturity, and this is where pricing becomes central.

The government's benchmark pricing for biomass pellets in the power sector has been a strong starting point, standardising expectations and providing a reference framework for quality-linked pricing. However, as the market deepens and diversifies, pricing will increasingly need to reflect real-time supply-demand dynamics across regions, seasons, and fuel types.

### Understanding Biomass Pricing

Biomass behaves very differently from conventional fuels. It is decentralised, with supply aggregated from multiple local sources; seasonal, driven by agricultural cycles; quality-linked, with parameters like GCV, moisture, and ash affecting value; and multi-sectoral, with demand from power plants, CBG players, and industries. As a result, pricing is not just a number - it is a function of location, timing, and quality.

| Characteristic | Coal/Gas | Biomass |
|---|---|---|
| **Supply Structure** | Centralised mining/extraction | Decentralised agricultural sources |
| **Availability** | Year-round consistent | Seasonal (harvest-dependent) |
| **Quality Standardization** | Highly standardized | Variable, Heterogeneous (GCV, moisture, ash) |
| **Price Discovery** | Exchange-based benchmarks | Transaction-based, auction- based evolving |
| **Storage Stability** | Long-term stable | Quality degradation over time |

This inherent variability reflects the strength of biomass as a distributed and resilient energy source. It also means that pricing mechanisms need to evolve accordingly.

Historically, biomass procurement relied heavily on fixed or long-term contracts. These provided some visibility but often did not align perfectly with underlying market realities. As supply chains grow more complex and demand becomes multi-dimensional, there is a natural shift towards more flexible, market-linked approaches.

## Structural Drivers of Price Volatility

Several fundamental factors contribute to biomass pricing volatility. The decentralised supply base means biomass originates from dispersed agricultural residues, with supply chains built around farmers, traders, and small processors, creating inherently fragmented ecosystems with uneven availability and pricing.

Seasonality and storage constraints create availability peaks during harvest seasons followed by lean periods. Storage over monsoons results in quality degradation, affecting calorific value and pricing.

Competing demand from multiple sectors is intensifying. Government programmes such as Compressed Biogas Plant (CBG) and co-firing strengthen the sector but also increase competition for the same feedstock, pushing prices upward during tight supply cycles.

Quality variability remains a persistent challenge. Parameters such as GCV, moisture, and ash content vary significantly across regions and seasons, making price standardisation complex and often leading to commercial disputes.

In essence, biomass is a dynamic, location-specific and quality-sensitive energy input, making traditional pricing mechanisms difficult to apply.

## Shift to Market-based Price Discovery

As the sector matures, there is a visible shift from rigid contracting to market-aligned pricing mechanisms.

Emerging procurement approaches are increasingly focussed on periodic price discovery rather than long-term fixed rates, multi-supplier participation to improve competition, and transparent linkage between price and quality parameters.

Digital platforms and structured procurement models are enabling competitive bidding processes, improved visibility into prevailing market prices, and better alignment between supply commitments and market realities.

In this evolving landscape, integrated models that combine price discovery with execution accountability are gaining relevance. These approaches ensure that discovered prices are honoured through structured sourcing and monitoring mechanisms.



Compressed biogas - Substitute for industrial energy

## Building Trust with Transparent Pricing

Biomass in India is moving through a natural and healthy evolution. From being an unorganised, localised fuel, it is now becoming a policy-backed, demand-driven energy market. Strong government support, growing industry participation, and new procurement models have created the foundation for this transition.

The next stage will be defined by transparent, dynamic, and credible pricing systems that reflect real market conditions while giving confidence to both suppliers and industrial users. Biomass is no longer just an alternative fuel; it is becoming central to India's energy transition, rural economy, and decarbonisation strategy.

Pricing volatility will remain part of this market, but it should be seen as a signal of a sector that is expanding, diversifying, and becoming more sophisticated. The focus now must be on converting that volatility into better price discovery, better quality alignment, and stronger trust across the value chain.

There is a need to build a biomass market which will not only be widely used, but also efficiently priced, reliably delivered, and trusted for long term. With the right mix of policy support, market participation, transparent platforms, and execution discipline, biomass can evolve from a fragmented fuel source into a benchmarked and investable energy market–supporting both sustainability goals and India's long-term energy resilience.

*Chaitanya Korgaonkar is Co-Founder & Director of Biofuels Junction, Mumbai (https://biofuelsjunction.com).*



Biomass briquette manufacturing machine

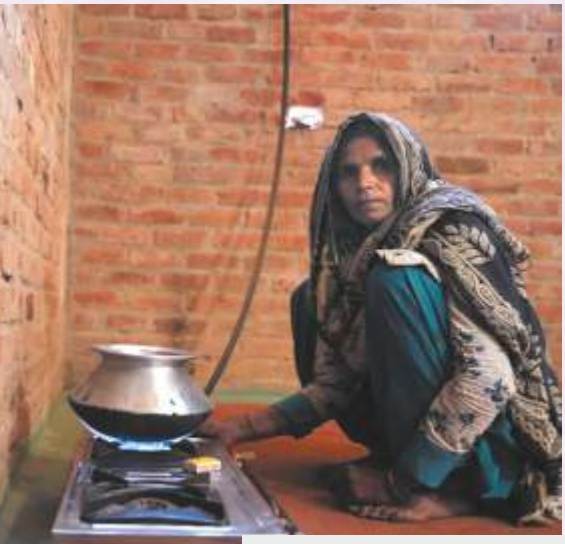
# Amid LPG Shortage, Haridwar Village shows how biogas can power rural kitchens

Dehradun: Haljora village in Haridwar district has presented an interesting model of rural energy self-sufficiency with community and household biogas plants helping residents tackle the ongoing LPG shortage that has exposed the fragility of cooking fuel supply chains.

In Haljora, one of five villages under Ibrahimpur Masahi gram panchayat, a community biogas plant was set up in dung from around 40 cows, the plant 2023-24 at a cost of Rs 20 lakh. Powered by currently serves 20 households but has the capacity to support up to 40. "It guarded the villagers against the ongoing LPG crisis. Each beneficiary has to pay Rs 300 per month," said pradhan Swami Ghanshyam.

Alongside the community plant, 18 household biogas units of two cubic metres each were installed in Haljora over the past two years with the help of non-governmental organisation BAIF Development Research Foundation (BAIF). Across five villages under the gram panchayat, 99 such units were set up. Haljora has around 150 households and a population of over 700. The project, funded by Panasonic Life Solutions India Pvt Ltd, under its CSR initiative, cost Rs 60 lakh, with each unit costing around Rs 55,000 and farmers contributing Rs 3,000 per unit.

Families with at least two cattle are eligible for setting up the plant. "Families of four to five people can sustain easily after putting around 7-8 kg of cow dung every day, mixed





Biogas unit at household level: Addressing LPG and promoting green energy



ONGC-backed bio-CNG plant at Krishnayan Gaushala, Haridwar

with water in a 1:1 ratio and without lumps, in the unit. Gas starts forming within two weeks," said project leader Ram Raksha Joshi. Beneficiaries said the system has reduced fuel costs and firewood use. Ishwar Singh, a villager who owns six cattle, said, "The unit produces more than enough gas for our family. We put in dung once every 2-3 days and also use the fertiliser on our fields." Nirmala Devi, another villager, said, "We hardly need firewood now and buy LPG cylinders only twice a year. We need cylinders as a backup in extreme winters." Low temperatures decrease microbial activity, increase slurry viscosity and reduce gas output.

Minor technical issues are handled locally, as per the villagers. "Most problems are with valves or pipes and they can be fixed easily," said Sandesh Kumar, who is trained in the plant's operations. Encouraged by the results, more residents are planning to adopt the system. The same model but at a larger, commercial scale, operates at Shree Krishnayan Gaushala in Gaindi Khata, Haridwar. Here, an ONGC-backed bio-CNG plant processes 20 to 25 tonnes of dung daily. "This plant has over 1,500 cows. Fuel is produced here for sale," said Uttarakhand Renewable Energy Development Agency (UREDA) officer Yudhvir Bisht.

In similar efforts being made across the state, Dehradun's Dharkot saw 12 families adopting biogas in 2024-25 and saving around Rs 800 a month. Meanwhile, Doiwala's Markham Grant cluster has 17 plants since 2024-25 with plans for expansion in 2025-26.

In Rudrapur, a different model is at work. A plant here converts segregated organic waste into compressed biogas. Set up by the nagar nigam, it processes wet waste from homes, hotels and markets and produces high-purity methane for industrial use and transport fuel under the Centre's Sustainable Alternative Towards Affordable Transportation (SATAT) scheme. The plant also generates around 600 kW of electricity daily and produces organic manure sold under the name "Kalyani".

*Source: Prashasti Singh, Times of India, Dehradun, May 1, 2026*

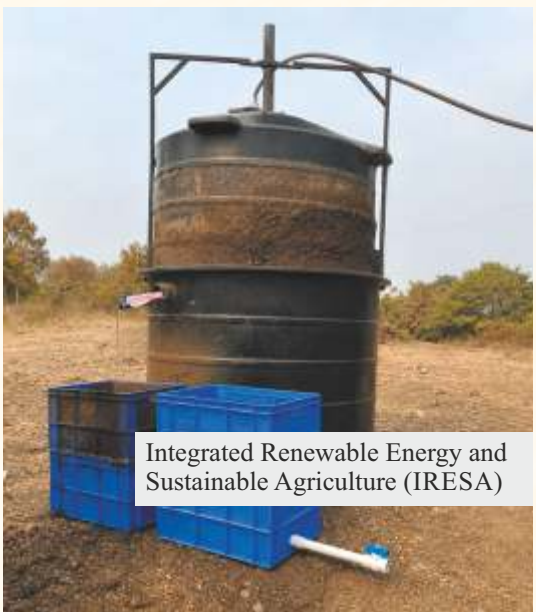


# IRESA Technology: Road to a Better Tomorrow



Life has not been a bed of roses for Akkabai Mahadev Bhange from Shirewadi, Igatpuri, Nashik district and her family. They endured low returns from farming on their plot of land measuring 5 acres which did not match the physical effort. To top it all, the family relied on commercial cooking gas and traditional woodstove to fulfil their cooking needs. Hence, the household had to constantly battle soaring domestic fuel expenses with increasing dependence on external agricultural inputs. Prolonged exposure to smoke resulted in persistent irritation in the eyes and respiratory ailments. They were indeed paying a heavy price for their style of cooking.

There was no end to their woes. Farming operations required regular purchase of compost and fertilisers and caused a huge burden on their already limited financial resources. The fact that the family owned livestock and also boasted of abundant agricultural crop residues did not offer any consolation as in the absence of technical know-how and guidance, these resources remained grossly underutilised.



Integrated Renewable Energy and Sustainable Agriculture (IRESA)

Then came the big day. When the HSBC Resilient and Regenerative (R&R) Project entered their village in the year 2022, time stood still for this family. Under this project, an Integrated Renewable Energy and Sustainable Agriculture (IRESA) unit was installed on their farm in 2023. Overnight the family started realising the benefits of IRESA technology. Vermicompost produced from digested organic slurry resulted in the availability of microbially-enriched liquid slurry and improved use of farm waste through circular resource management. The family were also empowered with training in the operation, maintenance, and use of slurry. The biogas generated from the unit served as a reliable source of clean cooking energy and significantly reduced their dependence on commercial LPG cylinders from 5 cylinders to 2 cylinders annually along with a savings of approximately ₹ 3,000 per year on cooking fuel expenses not to speak of escape from health hazards. and a growing sense of self-sufficiency in energy generation and ownership over household energy resources. Reduction in the purchase of costly fertilisers and compost has enabled the family to boast of an annual savings of nearly ₹ 8,000 which was unbelievable in the past.

> **"We now manufacture our own fuel and this feels very empowering"**

The IRESA model has addressed energy security, waste management, soil health, and input cost reduction. Its low-maintenance design and compatibility with existing farming systems make it a scalable, resilient and environmentally sustainable intervention for strengthening rural livelihoods.

*Agasti Chaskar, BAIF Igatpuri*

FARMER SPOTLIGHT

# Capacity Building *in* Agri Photovoltaics Technology

An Awareness and Training Workshop on 'Agri Photovoltaic' was organised at BAIF, Uruli Kanchan, on May 21, 2026 in collaboration with Agriculture Skill Council of India (ASCI). The workshop aimed at promoting sustainable and climate-resilient agricultural practices with integration of solar photovoltaic systems with farming activities among 47 farmers including 19 women participants.

Dr. Vitthal Kauthale, Chief Thematic Programme Executive, BAIF explained the concept, importance, and future potential of Agri Photovoltaics. Dr. Jayant Khadse, Vice President, Livestock Development and Scientific Research, provided an overview of BAIF's Programmes. Mr. Richard and Mr. Ashutosh, ASCI, presented on Agrivoltaics, business models, and the economic aspects associated with this innovative technology. Mr. Mahesh Lade, Thematic Programme Executive - Renewable Energy, BAIF highlighted solar system configurations, challenges, opportunities and policy perspectives on Agrivoltaics. Dr. Sanjay Khalikar, former Joint Director, Krishi Bhavan, Agriculture Department, New Delhi, shared valuable insights. A field visit was organised to the BAIF Rural Innovation Centre. Mr. Abhijit Gholap and Mr. Kailas Gavhane demonstrated 13 APV models and their applications in agriculture. The participant farmers expressed keen interest in adopting Agrivoltaics technology in their farming systems.







Classroom sessions and exposure visits for capacity enhancement

# BAIF's Participation in Policy Dialogues on Green Energy




Mr. Waman Kulkarni, Chief Thematic Programme Executive – NRM & Climate Action, at the 4th National Agro-RE Summit: Building India's Future Agri-Energy Ecosystem, organised by the India Agrivoltaics Alliance and anchored by the National Solar Energy Federation of India in New Delhi in March 2026.




Mr. Mahesh Lade, Thematic Programme Executive - Renewable Energy at the Scaling Distributed Renewables: A Policy and Finance Forum and session on Community-centric DRE transitions" organised by Climate Policy Initiative (CPI) and National Solar Energy Federation in New Delhi in April 2026.

Mr Vitthal Kauthale, Chief Thematic Programme Executive – NRM & Climate Action, at the Policy Dialogue on PM-KUSUM and AgriPV: Opportunities and Challenges and the Road Ahead", organised by the National Solar Energy Federation of India with the International Solar Alliance and the India Agrivoltaics Alliance in New Delhi in June 2026.



# CSIR-NIIST and BAIF forge Strategic Partnership to Advance Sustainable Technologies and Climate-Resilient Rural Development



The Council of Scientific and Industrial Research – National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Thiruvananthapuram, Kerala, and BAIF Development Research Foundation, Pune, formalised a strategic partnership through the exchange of a Memorandum of Understanding (MoU) at BAIF's Central Research Station, Uruli Kanchan, Pune, on June 15, 2026. The MoU was exchanged between Dr. Bharat Kakade, President and Managing Trustee, BAIF, and Dr. C. Anandharamakrishnan, Director, CSIR-NIIST.

A key focus of the partnership will be the advancement of agrivoltaics, an emerging field that integrates solar energy generation with agricultural production. Together, the two organisations will collaborate on field validation, demonstration, and deployment of agrivoltaic technologies across diverse agro-climatic regions of the country.

The strategic partnership is expected to accelerate the development and deployment of scalable solutions in agrivoltaics, circular bioeconomy, sustainable agriculture, renewable energy, water management, and rural development, contributing significantly to India's sustainability, climate action, and rural prosperity goals.

*Adapted from Press Information Bureau, Thiruvananthapuram*

Registration with R.N.I., Registration No.: 39839/82

# BAIF BHAVAN COMPLETES THREE DECADES



## Promoting Cutting Edge Technologies and Nurturing Young Professionals

BAIF Bhavan, Pune, an integral part of the legacy of BAIF, completed three decades on June 19, 2026. The BAIF Bhavan and the Management Training Centre - the dream of the Founder of BAIF - Late Dr. Manibhai Desai, were inaugurated by then Canadian High Commissioner, Mr. Stanley Gooch. The premises spread over 2 ha, houses the Head Office, Training Classrooms, Hostel and Canteen, amidst a green canopy with diverse flora and fauna, forming a shelterbelt for improved micro-climate and biodiversity conservation.

Over the years these premises have welcomed and nurtured young professionals with a desire to contribute to sustainable development of Rural India. It has also had the honour of receiving national and international dignitaries and well-wishers who have expressed their support for fulfilling the mission of BAIF. With its presence in 7 states three decades ago, BAIF has now expanded to 19 states, reaching out to more than 5 million families in more than 115,000 villages and moving steadily towards Viksit Bharat@2047.



