



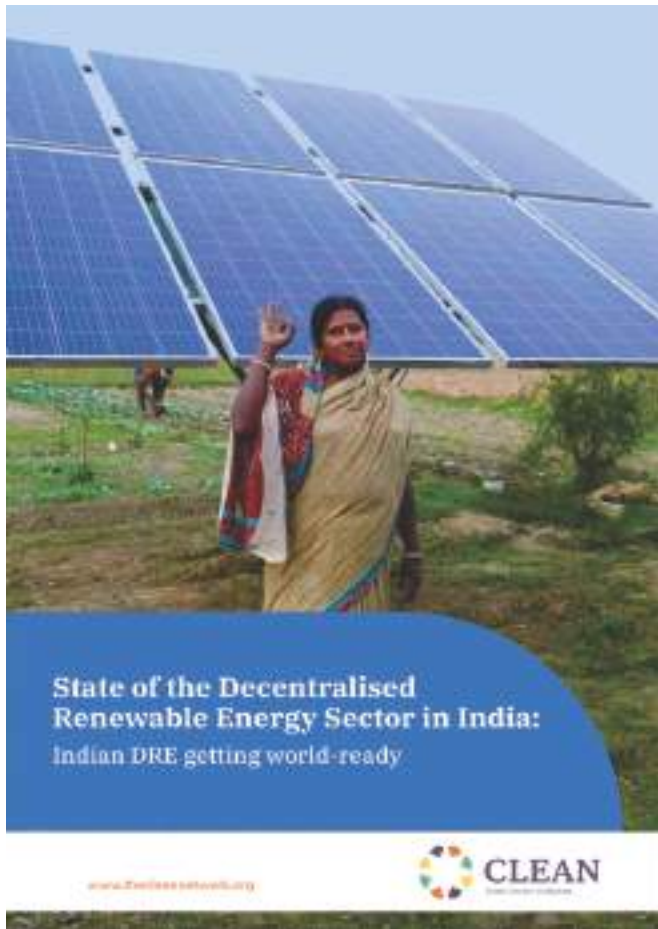
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DRE for Livelihoods in Meghalaya: *Policy Brief with focus on Horticulture*

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DRE for Livelihoods in Meghalaya:

Policy Brief with focus on Horticulture

Meghalaya: driven by rural livelihoods

Meghalaya, with a Gross State Domestic Product of over Rs 46,600 Crore, has agriculture and allied sectors as its single largest contributor at 17%. 80% of the state's population is engaged in agriculture / horticulture¹. Other major livelihoods sectors include tourism, handicrafts and sericulture – apart from mining, It is recognised that the state has tremendous potential for growth², particularly given its rich natural resource base, eco-tourism, and untapped renewable energy potential. The land-locked state has historical trade ties with neighbours – Bangladesh, Myanmar and Bhutan and is seen as a gateway to Southeast Asia.

Owing to its terrain and climatic conditions, the state is ideally suited for various types of horticulture crops including fruits, vegetables, spices, etc. Horticulture accounts for over half of the cropped area in Meghalaya. The state is particularly well-known for pineapple and turmeric.

Most of the fruit production is consumed within the state in fresh form. Only 10% or less of fruits are processed. It is estimated that 30% of fruits and vegetables are lost due to limited infrastructure for storage, processing, and access to markets.

A Roadmap for strengthening horticulture in Meghalaya through DRE integration (CLEAN, WEFT 2024) points to the huge need and opportunity for horticulture processing in Meghalaya. According to estimates, the value of pineapple can go up nearly 18 times – from INR 10 per kg (raw pineapple) to INR 1,800 per kg (spicy dried pineapple) – by processing and value

addition activities. The estimated wasted pineapple (30%) could be worth Rs 840 crores if stored and processed in a planned manner.

There are various factors that constrain and inhibit horticulture processing in the state. These are:

1. Limited access to modern post-harvest technologies and techniques; also resulting in low awareness about possibilities
2. Weak market linkages for selling of processed products
3. Rural/tribal people not skilled or trained to adopt modern technologies
4. Lack of access to and awareness about financing to invest in modern machineries
5. Poor grid supply in rural areas hindering the operation of electric equipment (though connection is over 90%, outages are frequent and long)

While there are several policies/ schemes at central and state levels addressing the challenges related to awareness, markets etc., DRE intervention would specifically address the challenge related to mechanisation and modernisation being constrained by lack of access to reliable energy.

DRE to catalyze growth in horticulture sector

DRE systems are typically small-scale energy units that use renewable sources of energy like small hydro, agriculture & forest biomass waste, wind, solar, etc. to generate and distribute energy close to the point of use, ensuring limited or no transmission and distribution loss. DRE contributes to climate change mitigation³.

1. <https://investmeghalaya.gov.in/resources/homePage/17/megeodb/megataglance.html>

2. Agricultural mechanisation in Meghalaya is just 0.89 kW/ hectare (as compared to 4.4 kW/ha in Punjab) and only 25% of the cropped area is under irrigation.

3. It is estimated in the agriculture and allied sectors for Africa, for instance that, by powering irrigation, cold storage and lighting with DRE, emissions can be reduced by 20%. Cold storage can additionally avoid emissions from food wastage (Powering Agriculture with Renewable Energy- A Just Transition for Food Systems), <https://www.powerforall.org/>

It is less vulnerable to the volatility of the fossil fuel markets and brings added benefits of stimulating local employment, technological development, and economic growth.

DRE offers an opportunity for Meghalaya's economic growth to be decoupled from emissions. This means that the state can move to a low or zero carbon growth pathway by adopting DRE. Being small and decentralized systems, DRE offers opportunities to create models of energy self-reliance. Livelihoods and community services (like schools, hospitals) constrained by unreliable energy can benefit from DRE integration.

DRE based processing technology would make processing possible without dealing with unreliable electricity or diesel gensets and would support in unlocking the horticulture potential in the state. Access to DRE based processing technology would enable value addition, reduce post-harvest loss, and enhance rural incomes.

DRE integration possibilities are broadly categorised as:

- wide range of RE-based electric applications,
- energy-efficient RE-powered thermal / boilers and
- decentralised clean energy generation.

DRE appliances can support numerous processes to prevent post-harvest loss and enable preparation of value-added products from fruits, vegetables and spices. The following figure illustrates the different processes in spices and fruits processing that can be supported through DRE appliances. Besides appliances, large scale multi-processing facilities can be powered by solar rooftop, small wind, small hydro and hybrid plant or RE-powered mini-grids. In fact, given the techno-economics for horticulture products (especially pineapple), practitioners suggest DRE-powered multi-processing units with capacity of over one ton per day as optimal for Meghalaya.

The "Roadmap for greening and strengthening horticulture in Meghalaya through DRE integration" (CLEAN, WEFT 2024) has presented the profitability of using DRE in several processes/ products such as for preparing ready to serve pineapple juice, spicy dried pineapple, pineapple candy, turmeric powder, polished turmeric sticks and banana chips. DRE technologies considered and analysed are- rooftop solar PV and solar powered appliances (slicers, grinders, polisher, sifter, sieve), biomass and solar dryers, and fuel-efficient biomass stoves.

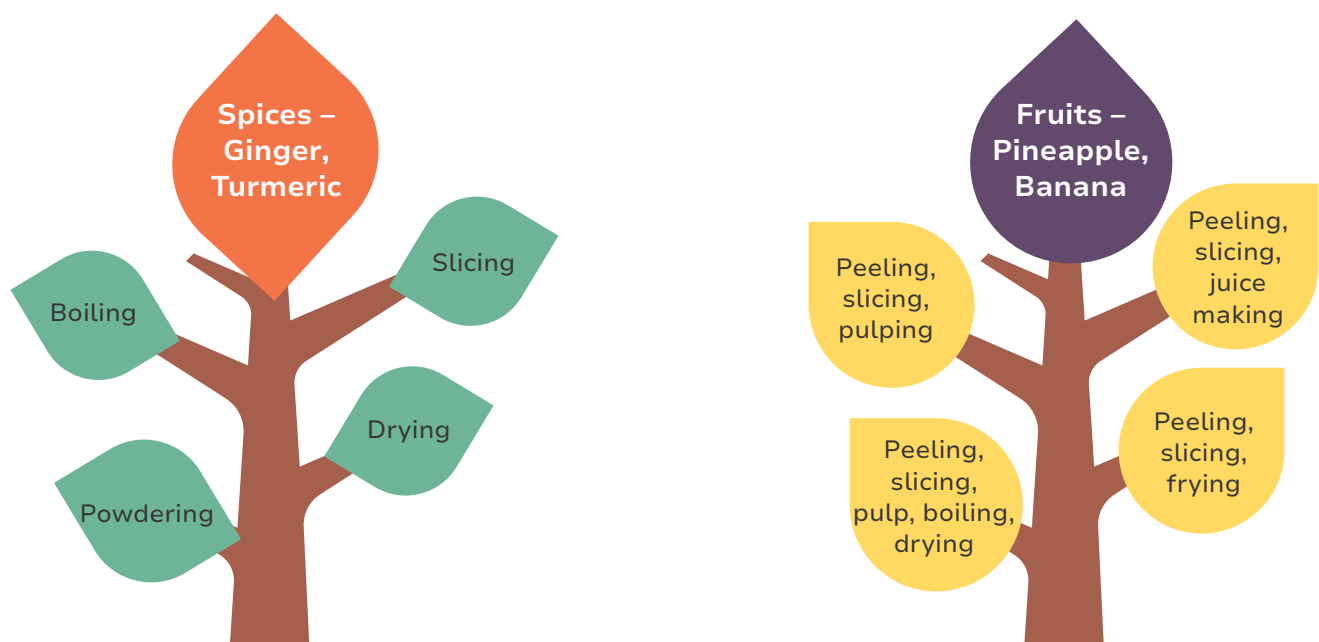


Figure 1: Different processes that can be supported through DRE in spices and fruits

DRE for livelihoods sectors beyond horticulture

Apart from horticulture, Meghalaya has tremendous potential to be a front-runner in many livelihoods sectors including agriculture, tourism, textiles, handicrafts, fisheries etc. While growth has been remarkable in some of these sectors in the state, it is seen that adoption of new and innovative technologies is limited. Adoption of clean and reliable technology can speed up growth.

DRE-powered technology adoption possibilities in various sectors are varied, broadly categorised as:

- wide range of RE-based electric applications,
- energy-efficient RE-powered thermal / boilers and
- decentralised clean energy generation.

Examples of sector-wise DRE applications are listed below. Most of these are market-ready and are in operation in many parts of India including in the Northeastern states:

Agriculture



- Irrigation – solar water pump
- On-farm applications – e.g. solar sprayer, solar chaff cutter, battery-operated tea leaves plucker, solar fencing
- Post-harvest management⁴ – solar-powered milling, hulling, rolling, powdering, juice and pulp-making; cold storage and dryers powered by RE (solar, biomass etc), improved biomass stoves / boilers (e.g. for rice par-boiling)

Livestock



- Solar-powered cold storage portable and large - for semen, vaccines, milk, meat
- Improved biomass stoves for boiling animal feed, milk-boiling
- Solar powdered fodder cutters
- Sheds with lighting and ventilation powered by solar
- Solar water heaters
- Energy generation

- Biogas from cow dung
- Electricity from poultry litter

Fishery



- Solar-powered fishing boats
- Solar pond aerators
- Solar or biomass-based dryers
- RE powered cold storage and ice boxes

Tourism



- Solar lights and lanterns
- Solar charging stations for battery-operated buggies and solar boats
- Solar fencing
- Solar water heaters
- Improved biomass and biogas stoves

Bamboo



- Solar to power bamboo slicing or polishing
- Energy generation - from bamboo as pellets or ethanol

Handicrafts (example of brass and bell metal):



- Improved biomass kilns for metal smelting and casting processes, biomass briquettes, or clay-based furnace (bhatti) and sand or clay-based casting
- Solar powered cutting, buffing, powdering

Handloom and sericulture



- Solar lighting for individual weavers and community work sheds
- Solar powered silk reeling and twisting, winding, jacquard lifting, warping machine
- Improved biomass boilers for water heating for dyeing, cocoon boiling etc.

4. Details In DRE for Horticulture Roadmap document (CLEAN, WEFT 2024)

DRE implementation mechanism in Meghalaya

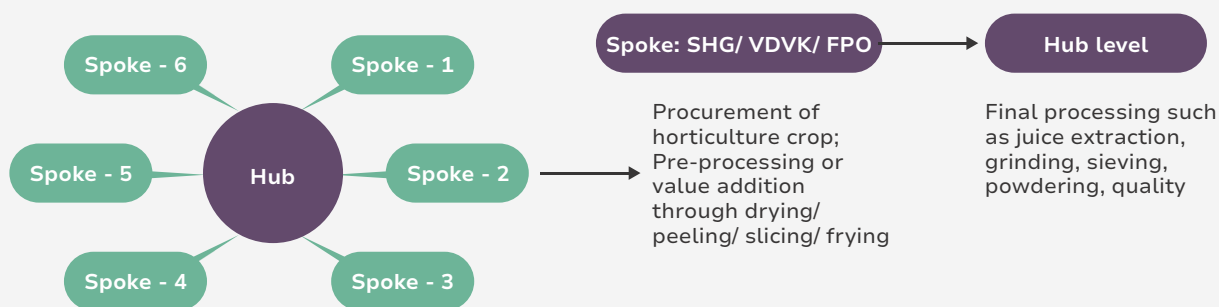
Value-addition in horticulture with integration of DRE can be organized in various ways. Individual farmers or groups of farmers may take up processing. Alternatively, farmers may choose to hand over their produce to a processing facility. In all cases, it is expected that farmers will see some increase in their income as there will be value addition and avoidance of wastage.

Marketing of processed food products is complex as it involves Food Safety and Standards Authority of India (FSSAI) certification and other quality controls, and so it may be difficult at this stage for individual farmers in the state, to take up processing and marketing of products on their own. The hub-and-spoke type of models, where farmers undertake minimal or some processing at their end and the rest of the processing is typically handled by

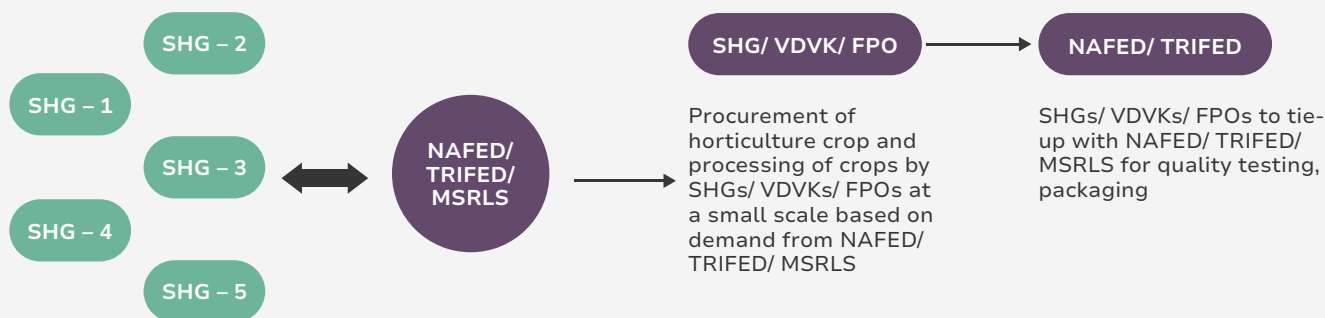
organized groups or collectives of farmers or multi-processing facility, are more feasible at this stage.

Existing institutions like Self-Help Groups, Village Organization, Van Dhan Vikas Kendras are well-suited for taking up these activities. Meghalaya State Rural Livelihoods Society (MSRLS) which operates at three levels of aggregation through SHGs, VOs and CLFs is very suitable for hub-and-spoke model of DRE-powered horticulture processing. Similarly, a Van Dhan Vikas Kendra (VDVK) cluster constituting 15 tribal SHGs, each comprising 20 tribal farmers is well-suited for a hub-and-spoke model. VDVks have been set up under the Tribal Co-Operative Marketing Development Federation of India Limited (TRIFED). Farmer Producer organisations (FPOs) can also take the role of hubs working with their member-farmers as spokes. Figure 2 below presents a few of these models.

Implementation model 1



Implementation model 2



Implementation model 3

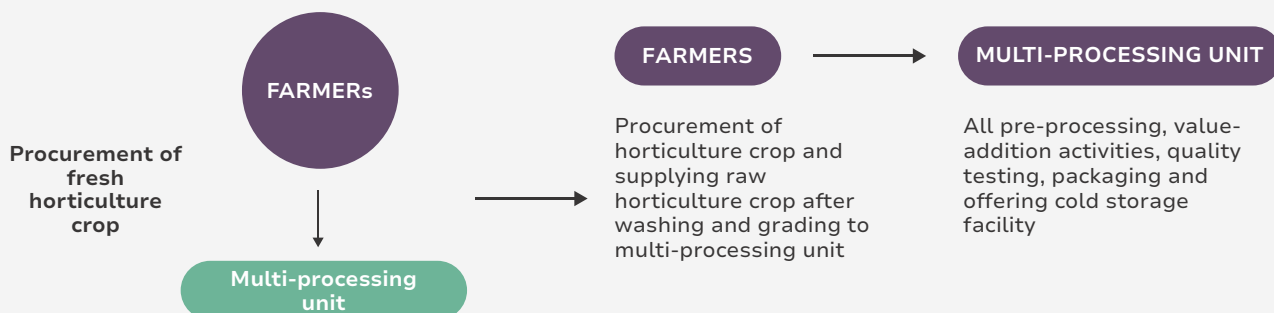


Figure 2: Proposed approaches for implementation of DRE for horticulture

Policy Framework for DRE for Horticulture in Meghalaya

The analysis in the Roadmap (CLEAN, WEFT 2024) clearly shows that horticulture processing can play a major role in strengthening Meghalaya's economy and enhancing farmers' income. DRE integration can facilitate and strengthen this process. However, to ensure that DRE-powered horticulture processing is adopted on a wide scale in the state, there is a need to systematically catalyse and support it through:

1. Technology customisation and after sales services to ensure sustainability and reliability
2. Skill development and capacity building for understanding, managing and operating the systems effectively
3. Collaborative working among departments/ institutions in the state to draw synergies among various schemes and maximise their impact
4. Policy measures to incentivise and organise DRE integration
5. Access to end-user financing to increase adoption of DRE technologies/ products/ appliances/ systems

Key steps/ activities for each of the above is provided below.

Technology customization and after sales services

- i. Assessment of the potential of deployment of DRE appliances across horticulture industry and across different regions to map the needs of beneficiaries with appropriate fit to DRE applications should be done
- ii. Customization of technology (capacities, design, processes) to suit the local processing requirements would be required
- iii. An assessment of comparative benefits of DRE options (DRE appliance vs solar PV plant vs biogas plant vs micro, pico hydro) considering availability of different renewable resources at the location should be undertaken
- iv. To ensure reliability of electricity supply in the long run, maintenance and repair of DRE appliances must be provided by the vendors for the first 5 years. Vendors should also provide guarantees on DRE appliances and train local youth for simple problem-solving
- v. DRE appliances should be utilized for other purposes or for processing alternative fruit/ vegetables to increase their capacity utilization since it affects viability of the technology

Skill development and capacity building

- i. DRE technology is a new concept for rural people in Meghalaya and there is very little know-how. State government departments under their existing programmes may take up awareness campaigns on importance of processing and how DRE can help
- ii. Trained workforce within the state will be required for installation and maintenance. Partnership with technical institutes to develop and impart technical training to rural/ tribal people on DRE technology and its usage would be useful
- iii. Technology providers should build the capacity of potential users and buyers on basic troubleshooting of the equipment to boost adoption of DRE technologies

Collaborative working among departments/ institutions

Various departments/ institutions are implementing schemes/ programs that support horticulture processing directly or indirectly. Co-ordination and collaboration among these departments/ institutions to include DRE applications in their programmes and to extend support to DRE based horticulture processing in the state will be essential. Policy support, financing and institutional arrangements must connect across at least three areas: farmer, processing, and renewable energy. A mapping of departments and institutions in terms of their significance and role has been done in Table 1.



Table 1: Roles of various departments and organisations in strengthening horticulture

Name of the institution	Role and significance in strengthening horticulture
Directorate of horticulture	It is the nodal department of the state government to implement farmer-oriented schemes of the State and Centre and implementing the Fruit processing centre scheme for promoting processing of fruits and vegetables in the state
MBMA	MBMA is the implementing agency for Van Dhan Vikas Yojana(VDVY) in Meghalaya. The fund for equipment purchase under VDVY scheme is allocated and released by MBMA
MSLRS	It is the nodal agency for implementing NRLM in Meghalaya. MSRLS is also the mentoring agency for PMFME and VDVK scheme
TRIFED	A National Cooperative Body under the Ministry of Tribal Affairs, Gol. It is implementing Van Dhan Vikas Yojana through state nodal department and developing markets for tribal products
NECTAR	It is an autonomous society, under Department of Science & Technology, Gol. It is implementing Technology Outreach and Services Scheme which supports implementation of technologies including clean energy technologies having potential for social and economic growth
NAFED	It is a registered body having agricultural farmers as its main members. Its objective is to promote co-operative marketing of agricultural produce to benefit the farmers
MNREDA	It is the nodal agency of MNRE for implementing renewable energy policies and programs in Meghalaya
CLEAN	CLEAN is an industry body for DRE sector in India and has a network of 200+ members comprising developers, financiers, consultants. It develops and influences policies for DRE sector, bridges access to finance and assist members in accessing markets and build capacity
NABARD	It is supporting establishment of farmer producer organizations through loan linked grant support
SFAC	It is providing venture capital to agribusiness projects by way of soft loan and promoting and supporting viable FPOs
PRIME Meghalaya	State government program for incubation and promotion of enterprises in the state. It has supported various food processing enterprises like Rynsan (Savourit), Dalade Foods, among others

Policy measures for incentivizing and organizing DRE integration

DRE policy is most effective when it originates in the policy documents of the departments that are for instance, food processing, fisheries, agriculture, MSME etc. The role of the energy department is important in terms of facilitating the adoption by way of technology provisioning, quality control, financial incentives, awareness and knowledge creation etc. However, policy commitments to DRE must be also be visible in the schemes of the user-departments as part of their efforts to energise efforts like mechanisation, productivity improvement etc.

A review of sectoral / departmental policies points to the following categories of policy changes that may be considered:

- Where mechanisation can help increase productivity and there is no provision in policy to support the same, this may be included with specific mention of relevant DRE-powered equipment
- Wherever incentives are there for mechanisation or energisation or electrification, these incentives can be reviewed and revised to clearly include DRE integration in the form of DRE-powered appliances / equipment and / or powering a unit / centre with RE
- Policies that provide subsidy on grid electricity connections or grid electricity usage may be modified to include electricity from DRE; in fact, a higher subsidy may be extended to such clean and decentralised electricity
- Inter-departmental connects already exist, for instance, between food processing and horticulture – these linkages are important more generally for value chain strengthening but also for DRE integration. While DRE in a horticulture value chain may fit in well with the Department of Horticulture, higher scales of processing and DRE integration may be better suited under the Department of Food Processing.
- District DRE for Livelihoods Hubs may be set up using the formal and informal state-wide networks of the SRLMs and SNAs. These hubs can play an important role in planning, demand assessment and demand creation, DRE project design, maintenance / servicing.

- It is also important to avoid policy disconnects and dis-synergies. As an example, Meghalaya Industrial & Investment Promotion Scheme (MIIPS) 2016⁵ provides subsidy @30% on power tariff to all categories of enterprises for a period of five years. MIIPS also offer subsidy @50 % on the cost of renewable energy systems for all categories of enterprises set up in rural/urban areas. In addition, Meghalaya startup policy 2018⁶ offers power subsidy @ 50% for a period of five years. Such measures can be counter-productive in the sense that deliberately lowering grid electricity tariff while also offering subsidy for renewables, will dis-incentivise the adoption of DRE, whose strength lies in providing reliable and low / no-cost energy. Such policy disconnects need to be investigated as part of inter-Departmental co-ordination.

Relevant policies and schemes at the state and the central level have been identified that can be used for incentivizing and supporting DRE integration in horticulture processing in the state. Table 2 discusses the various state level and central level policies separately and provides recommendations under each.



5. https://megindustry.gov.in/policy/MIIPS_2016.pdf

6. https://megindustry.gov.in/policy/Meghalaya_Startup_Policy_2018.pdf

Table 2: Policies and schemes (central and state) relevant for DRE integration in horticulture

Policy/ scheme	Features	Recommendations
Fruit processing centre scheme (Directorate of Horticulture, Meghalaya)	<ul style="list-style-type: none"> • Supports manufacturing of quality processed fruit products such as squashes, jams, jellies, canned fruits and juices under the trade name “Meg” fruit products • Disseminate technical knowhow to youth entrepreneurs, farmers and housewives through practical demonstration on the importance of fruit preservation. 	Supports manufacturing of quality processed fruit products such as squashes, jams, jellies, canned fruits and juices under the trade name “Meg” fruit products
CM Solar Mission, Government of Meghalaya	<ul style="list-style-type: none"> • Government of Meghalaya has recently approved CM Solar Mission With a commitment to fostering green and clean energy transformation • Subsidy in the range of 50-70% to be available along with back-end bank financing • Beneficiaries: individual households, public institutions, and commercial entities • A large sum of fund has been earmarked for supporting livelihood activities through solar 	The guidelines of CM Solar Mission should clearly specify support to horticulture processing under types of livelihood activities that will be supported and should have provision recommending inclusion of O&M up to 5 years by the developers within government tenders for solar installations
PM Formalisation of Micro Food Processing Enterprises (PM-FME)	<ul style="list-style-type: none"> • Financial, technical and business support for upgradation of existing food processing units; 2 lakh micro FPIs to be supported with an outlay of INR 10,000 cr. over a period of 5 years from 2020-21 • Credit linked grant at 35% of the project cost with maximum up to INR 10 lakh • Additional grant support to SHGs at INR 40,000 per SHG member towards working capital and purchase of small tools 	Seed capital @INR 40,000 per member of SHG may be extended to purchase of small DRE based appliances. Existing training and handholding support may also be provided on DRE technologies
Horticulture Mission for North-Eastern Region and Himalayan States (HMNEH) - Mission for Integrated Development of Horticulture (MIDH) scheme	<ul style="list-style-type: none"> • Assistance up to 50% of the eligible project cost with a ceiling of • Target beneficiaries: Farmers, SHGs, FPOs, Machine manufacturers • Cold storages upto 5000 MT capacity and minimal processing units are supported 	Scheme should extend to DRE powered cold storages and should include small DRE appliances under primary/ minimal processing units
Van Dhan Vikas Yojana	<ul style="list-style-type: none"> • Involves setting-up tribal community owned VDVks in forested tribal districts • 100% Central Government Funded with INR 15 lakhs for each 300 member VDVk Cluster • 39 VDVk cluster has been set up in Meghalaya so far in 7 districts 	DRE appliances for horticulture processing should be eligible and listed under the list of equipment supported by the scheme of INR 15 Lakh per VDVk Centre

Pradhan Mantri Kisan Sampada Yojana	<p>Creation/ Expansion of Food Processing/ Preservation Capacities (Unit scheme)</p> <ul style="list-style-type: none"> • Creation of processing and preservation capacities, modernization/ expansion of existing FPIs • Grants-in-aid at 35% of the eligible project cost in general areas and at 50% of the eligible project cost in the North-Eastern and Himalayan States 	The sub scheme on 'Infrastructure for agro-processing' that supports infrastructure including electricity supply/ power back-up in cluster approach should include DRE technologies for supporting VDVK centres which essentially works as a cluster scheme
	<p>Infrastructure for Agro-processing Clusters</p> <ul style="list-style-type: none"> • Grants-in-aid @ 35% of eligible project cost in general areas and @50% of eligible project cost in the North East States/ Himalayan States to a maximum of INR 10 Crore - for development of modern infrastructure including electricity supply, power back-up, for cluster based FPIs 	
	<p>Creation of Backward and Forward Linkages</p> <ul style="list-style-type: none"> • To provide effective backward and forward integration for the processed food industry • Grants-in-aid @ 35% of eligible project cost in general areas and @50% for North-East States, Himalayan States to a maximum of INR 5 crore per project 	

Access to financing

Though the upfront cost of DRE equipment are often very high, the techno-economics of DRE use in some cases show that the payback is quick, even within a season. However, farmers are not economically affluent to bear the upfront costs and thus easy end-user financing plays a major role in adoption of DRE appliances and scale of the sector. In some cases, subsidy support may be needed and can be integrated in existing state policies supporting livelihood.

Ministry of Development of North-Eastern Region (DoNER) coordinates with the Central Ministries in the socio-economic development of North-East states including creating an environment for private investment, removal of infrastructural bottlenecks, among others. MSRLS can also leverage their existing institutional setup to provide financial support for the women self-help group members

For DRE-powered technology integration to be planned at scale, several financing options can be considered:

- Producers' Organisation Development Fund (PODF) of NABARD where POs can directly avail credit from the lending institutions with grant capped at 20% of loan amount and an initial corpus of INR 50 crore - for credit support, capacity-building, and market linkage support

- Venture Capital Assistance from Small Farmers Agribusiness Consortium (SFAC) – providing 40% of promoter's equity in Meghalaya (North Eastern states) for setting up agribusiness, to strengthen backward linkages and for training and exposure visits
- North-Eastern Development Finance Corporation Limited (NEDFi) - provides financial assistance to micro, small, medium, and large enterprises for setting up industrial, infrastructure and agri-allied projects in the North-East region of India and microfinance through MFI/NGOs
- At the state level, there are several financing options that can be considered for financing DRE projects. Examples include: Rural Infrastructure Development Fund (RIDF) of NABARD; NABARD Infrastructure Development Assistance (NIDA) and NABARD's Rural Innovation Fund for more experimental work around DRE.

Two ongoing state schemes can extend credit guarantees to ensure that eligible lending institutions extend collateral free credit to FPOs and MSMEs coming forward to adopt new technologies like DRE. Specific directives/ amendments may be required to ensure DRE are not left-out from getting benefits of these initiatives. The two schemes are as follows:

- Credit Guarantee Scheme for agriculture has been operated by Small Farmers Agri-Business Consortium (SFAC) through lending institutions for the last ten years⁷.
- To support the extension of financial assistance to MSEs in the state, there is a 95% credit guarantee under the Meghalaya Credit Guarantee Scheme (MeCGS)

Additionally, MFIs can be roped in for 'third party sell' or cross-selling of DRE products (where they partner with vendors of products to bundle these products to their existing clients/customers along with micro credit⁸).

Institutions like NABARD may be approached to design a scheme around DRE-powered livelihoods clusters in the state as was suggested during the Stakeholder Consultation organised on August 1, 2023 in Shillong, as part of the WEFT-CLEAN initiative. It was pointed out that NABARD has promoted 22 FPOs in the state and has also funded 15 large projects. A state-specific fund for horticulture infrastructure can be proposed with a pilot of about Rs 200 crore for a specific value chain such as pineapple.



7. https://www.cgtmse.in/Default/ViewFile/?id=1681258073736_Circular%20No.%2020224.pdf&path=Circular

8. CLEAN (2023)- How the Green Tech Sector Can Work with MFIs: Observations and Experiences from the DRE Sector