

# Scoping Study and Policy Imperatives on Green Jobs and Eco-Entrepreneurship Opportunities for Women in Select States in India

## EXECUTIVE SUMMARY



Green jobs and Eco-Entrepreneurship has been integral to the discourse on green growth/economy for over a decade and has assumed greater significance of late. This study - Scoping Study and Policy Imperatives on Green Jobs and Eco-entrepreneurship Opportunities for Women in Select States in India was initiated in early 2020 and draws upon the learnings from the United Nations Development Programme (UNDP)'s project "Creating Employment and Entrepreneurship Opportunities for Women in India" (Disha) project. The intent of the study is to identify areas for and promote greater women's workforce participation in renewable energy, green construction, green transport, water management and carbon sinks (forests and marine fisheries). Given the vastness of its scope and geographies, the study was confined to the UNDP's Inclusive Growth project states of Delhi, Haryana, Maharashtra, Karnataka, Telangana, Uttarakhand and Odisha.

The report, prepared by KPMG, is based on secondary sources and stakeholder interactions, as the study was initiated just prior to the COVID-19 pandemic and lockdown, that greatly limited access to primary research, physical consultations and data collections. Even though virtual stakeholder interactions, online consultations and peer review provided information across thematic areas, it is likely that there may be some gaps due to unavailability of gender disaggregated data or restricted information.

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## List of Abbreviations

B2C	Business-to-consumer
DDU- GK Y	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
DDP	Desert Development Programme
DPAP	Drought Prone Areas Programme
EV	Electric vehicle
GDP	Gross domestic product
GHG	Greenhouse gas
GW	Gigawatt
GST	Goods and Services Tax
FAME	Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles
IGBC	Indian Green Building Council
ILO	International Labour Organization
IREDA	Indian Renewable Energy Development Agency
ITI	Industrial Training Institute
IWDP	Integrated Wasteland Development Programme
IWMP	Integrated Watershed Management Programme
LEED	Leadership in Energy and Environmental Design
MFI	Microfinance institution
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forest and Climate Change
MSME	Micro, small and medium enterprises
MUDRA	Micro Units Development and Refinance Agency Bank
MW	Megawatt
NABARD	National Bank for Agriculture and Rural Development
NCEF	National Clean Energy Fund
NCR	National Capital Region

NEMMP	National Electric Mobility Mission Plan
NGO	Non-governmental organization
NISE	National Institute of Solar Energy
NIWE	National Institute of Wind Energy
NOS	National occupational standards
NSDC	National Skill Development Corporation
NSQF	National skills qualifications framework
NSTFDC	National Scheduled Tribes Finance and Development Corporation
NTFP	Non-timber based forest product
OEM	Original equipment manufacturer
PM-KUSUM	Pradhan Mantri Kisan Urja Surakhsha even evam Utthan Mahabhiyan
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PMMY	Pradhan Mantri MUDRA Yojana
PMVDY	Pradhan Mantri Van Dhan Yojana
PV	Photovoltaic
QP	Qualification pack
R&D	Research and development
RWH	Rainwater harvesting
SCGJ	Skill Council for Green Jobs
SDG	Sustainable Development Goal
SETNET	Solar Energy Training Network
SHG	Self-help group
SHP	Small hydro power
SIDBI	Small Industries Development Bank of India
STEM	Science, technology, engineering and mathematics
TRIFED	Tribal Co-operative Marketing Development Federation of India Limited
WDC-PMKSY	Watershed Development Component of Prime Minister Krishi Sinchayee Yojna



## Foreword

Climate change is perhaps the biggest challenge of our times and it is forcing all of us to define the kind of economy that works for everyone. The effects of climate change will undoubtedly alter the structure of employment; new jobs and new job families will emerge, others will evolve or become unsustainable. Economies must find ways to reorganize work and production differently.

According to ILO, at least half of the global workforce, around 1.5 billion people will be affected by the transition to a greener economy. The challenge lying ahead of us is the urgent need to equip the people with the right skills that will help them adapt to this transition. Skills gaps have already started emerging across a number of sectors, such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services and manufacturing.

Moreover, the exclusion of women and their needs in decision-making process for mitigation or adaptation measures can pose challenge to achieving gender equality at work. This will have a deep impact on the larger economies. Given that women make up a little over half of the world's population (WEF 2013), their untapped talent could significantly alter our economic development (UNDP 2013).

Nearly 60 percent of India's population is directly dependent on climate-sensitive sectors such as agriculture, fisheries and forestry for its livelihoods, and 80 percent of economically active women are in the agriculture sector. Hence the climate crisis severely affects the women who are dependent on these climate-sensitive livelihoods and who do not have any alternative livelihoods.

Keeping in mind these multiple challenges and based on our learnings from Disha Project that UNDP implemented in partnership with IKEA Foundation, to create employment and entrepreneurship opportunities for women, a study was commissioned to assess the green jobs and eco-entrepreneurship opportunities for women in India. The study focused on five major sectors identified by the Skill Council for Green Jobs: renewable energy, green transport, green construction, forestry, fisheries and water management. It covered Delhi NCR (National Capital Region), Haryana, Maharashtra, Karnataka and Telangana as well the potential states such as Uttarakhand and Odisha.

Although we faced the challenge of lack of gender-disaggregated data, and the study being conducted during the COVID-19 pandemic, the sector-specific reports present some promising prospects for a greener skilling and livelihoods ecosystem. The Government of India and some of the state governments are already moving in the right direction. For instance, the International Solar Alliance in the Renewable Energy space has already gained momentum and the cost of the solar panels in India has reduced in the recent years.

While substantial work has been done to build capacities of people and communities on water management, forest or fisheries, to promote climate-resilient practices, women are often left out and mostly under-represented in such initiatives. As we recover from the pandemic, we must ensure that women are given equal opportunities to be part of our green recovery. Only when we tap into their talents and the huge demographic dividend that is often left out, can we achieve our Sustainable Development Goals at the end of this decade.

UNDP has been working closely with the Government of India and other key partners for an inclusive and climate-sensitive response to COVID-19 that paves the path to greener pathways for recovery. India, as an emerging economy, holds immense potential, given its demographic dividend. But it can never recover fully, or reach its full potential, if half of the population – the women- are not part of its green recovery.



Shoko Noda  
Resident Representative





## Acknowledgement from Lead Facilitator

UNDP India has undertaken a study on the “Scoping Study and Policy Imperatives on Green Jobs and Eco-Entrepreneurship Opportunities for Women in Select States in India”. The report takes into cognizance the climate crises and its implications on lives and livelihoods of the people, and provide some pathways in terms of nature-based livelihoods, that can often be turned into opportunities for more decent work. Be it renewable energy, green transport, green construction water management, forest or fisheries, strides are being made by the Governments at national and state levels to build the capacity of the people and promote climate-resilient practices. And it is but appropriate to bring in the women to partake in the development and be part of the dynamic workforce in the country. And this forms the basis of the study.

This report has been made possible with contributions from many individuals and experts, who took out time and helped put this study together. This report was initiated just prior to the onset of pandemic and was drafted virtually through the lockdown period. A number of virtual consultations with thematic and regional experts were held between April and November 2020, and inputs received on each of the chapters drafted.

In this endeavour, we owe our deepest gratitude to Dr. Sunita Sanghi (Additional Secretary and Senior Advisor, Ministry of Skill Development and Entrepreneurship, Government of India), Dr. Praveen Dhamija (Advisor, Sector Skill Council on Green Jobs), Vandana Bhatnagar (Chief Programme Officer, NSDC), Sudipta Bhadra (Senior Programme Officer, ILO), and Anubha Prasad (National Coordinator, PAGE) for their guidance while discussing our findings, assessing the quality of analysis, the reliability of data, and the soundness of the recommendations emerging from the study.

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We would like to thank and acknowledge the inputs received during the peer review of the draft chapters by Dr. Srinivas Shroff Nagesha Rao (CEO, REC Foundation), Hitesh Vaidya (Director, NIUA), Suneel Padale (Director Programs, CARE India), Vishaish Uppal (Livelihoods Specialist, WWF India), Moho Chaturvedi (Independent Consultant) and Ramya Rajagopalan (Independent Researcher).

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We are eternally grateful to Ms. Shoko Noda, Resident Representative, UNDP India and Ms. Nadia Rasheed, Deputy Resident Representative, UNDP India for their inspiration, encouragement and guidance throughout the process. None of would have materialised without the faith that they reposed in our endeavours.

We thank all the members for their support and contribution.



Swayamprabha Das  
Inclusive Growth





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# Overview and Context Setting

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As governments around the world deal with the staggering impacts of COVID-19, there is an increased consensus on tailoring fiscal stimulus to combat climate change. As a signatory to the Paris Agreement, India is uniquely positioned to pursue 'green recovery' targeting the twin objectives of progress and preservation. In 2018, the Global Green Economy Index ranked India 36 out of 130 countries for its green economy performance, based on an assessment of quantitative and qualitative measures pertaining to four key dimensions: leadership and climate change; efficiency sectors; markets and investment; and the environment. The promising results are a consequence of enhanced government push and greater private sector initiative towards 'greening' the economy. While the green sector currently contributes to less than 1 percent of the Indian workforce (Assessment and Model of Green Jobs Potential in India, ILO 2018), green jobs have the potential to fuel the future economy.

Laying its foundation on the 17 Sustainable Development Goals (SDGs), the Government of India has pushed the agenda for 'green growth' at the national, state and local levels with nodal ministries at the centre playing a crucial role. Towards the objective of achieving growth coupled with increased employment, the Skill Council for Green Jobs (SCGJ) was established in 2015 under the National Skill Development Mission to bridge the demand-supply gap in skilled manpower across the country. According to the Economic Survey of India (2019-20), approximately 40 million well-paid jobs are expected to be created by 2025; the number is further predicted to double by 2030.

Though women constitute 48.1 percent of the nation's population and the number of women joining the workforce is steadily improving, lower access to training and patriarchal social and cultural norms continue to hinder their employability in well-paid jobs. In an attempt to further understand these challenges and the potential for enhancing the role of women in the green sector, UNDP, under its Inclusive Growth portfolio, is exploring avenues to create employment and entrepreneurship opportunities for underprivileged women in India.

Towards this end, UNDP commissioned a 'Scoping Study on the Green Jobs and Eco-entrepreneurship Opportunities for Women in Select States in India.' The study delves into five major sectors identified by SCGJ: renewable energy, green transport, green construction, carbon sinks (forest and fisheries) and water management. Spanning the states of Delhi NCR (National Capital Region), Haryana, Maharashtra, Karnataka and Telangana as well the potential states of Uttarakhand and Odisha, it focuses on addressing a two-

fold objective: gap assess existing and potential green jobs and map the availability of the skilled workforce for the identified job roles in each of the sectors; and develop an implementation roadmap and provide recommendations for women to leverage potential and existing opportunities in the sectors in the selected states.

The study has been conducted in five phases: finalization of methodology and assessment framework, secondary research and assessment, primary stakeholder consultation, data analysis and consolidation of findings. For the purpose of this study, 'green jobs' are those jobs that not only contribute towards preserving or restoring the environment but also lead to a better quality of life through improved working conditions, fair income, social security benefits for workers and their families, opportunities for skill development and equal opportunities, and equal treatment for all. Some key aspects of the study are detailed here.

## POLICIES AND SCHEMES

The Government of India and its relevant ministries have developed multiple policies and schemes which have the potential to provide an impetus to green growth, encourage employment and boost entrepreneurship initiatives. Some key Government of India schemes include the Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU- GKY), Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM-KUSUM), Interest Subvention Scheme for micro, small and medium enterprises (MSMEs), Pradhan Mantri Micro Units Development and Refinance Agency Bank (MUDRA) Yojana (PMMY), Pradhan Mantri Van Dhan Yojana (PMVDY), Watershed Development Component of Prime Minister Krishi Sinchayee Yojna (WDC-PMKSY), Pradhan Mantri Matsya Sampada Yojana and Indian Renewable Energy Development Agency (IREDA) National Clean Energy Fund (NCEF) Refinance Scheme. In conjunction with the policies at the centre, existing initiatives at the state level have also been examined to assess the policy and regulatory environment for employability in each of the five sectors.

## PROJECTIONS

The employability prospect in each sector is significant and growth projections look positive. It needs to be noted though that the study was conducted pre-COVID and projections are contingent upon revival of the economy. An International Labour Organization (ILO) report on Skills for Green Jobs in India projects green

jobs to increase to 64,770,600 by 2030 against the 2020 figure of 53,941,100 .

**Table 1:** Sector-wise green job projections

Sector	Job projections
Green construction	8.8 million <sup>1</sup>
Forests	1.86 million <sup>2</sup>
Water management	16 million <sup>3</sup>
Renewable energy	0.16 million <sup>4</sup>
Green transport	0.85 million <sup>5</sup>
Fisheries	11.9% <sup>6</sup>

## LIMITATIONS

The uniqueness of this assignment is an opportunity to explore and find a way forward but it also presents its own set of challenges, particularly in terms of paucity of data. The analysis conducted in the study is bounded by certain limitations:

- a) Absence of gender disaggregated data;
- b) Limited sector-specific historical data available to conduct growth projections;
- c) Negligible information available on skill training provided to women such as data related to

the enrolment, placement and type of course pursued or sector-specific women participation in the workforce; and

- d) Lack of detailed information on skill gaps in the formal and informal sectors as also on informal employment.

A significant challenge throughout the sectoral analysis was the absence of any concrete quantified information on women’s participation in the workforce. While an attempt has been made to understand gender-based workforce participation through extensive literature review, stakeholder interactions and rational assumptions have been included and reported to develop employment projections for the next decade. Further, as the report attempts to identify and enhance focus on commercializing existing jobs where women’s participation is relatively high, potential areas where women’s employment may be enhanced have been also mapped in the context of sector-specific challenges. However, it may be noted that the report does not intend to convey, by any means, implicit or explicit, that women’s participation is limited to any specific role, sector or job. The findings of the report are intended to provide a direction to enhance employment and entrepreneurial opportunities for the skilled and unskilled woman workforce in India.

<sup>1</sup> ILO report on ‘Skills for Green jobs in India’, increase in 2030 against 2020.

<sup>2</sup> ILO report on ‘Skills for Green jobs in India’, increase in 2030 against 2020.

<sup>3</sup> ILO report on ‘Skills for Green jobs in India’, increase in 2030 against 2020.

<sup>4</sup> 163,244 job opportunities projected to be generated in 2021 against 2019.

<sup>5</sup> The electric vehicle segment is projected to create 8,50,000 jobs in 2030 against 5,00,000 in 2018 (NITI Aayog).

<sup>6</sup> Growth rate of 11.9 percent in 2017-18 as against 4.9 percent in 2012-13.



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# Sectoral Analysis

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1.

# Renewable Energy

The chapter provides a brief analysis of the various sectors considered as a part of the study with a focus on women-specific challenges, existing infrastructure and growth potential.

## RENEWABLE ENERGY

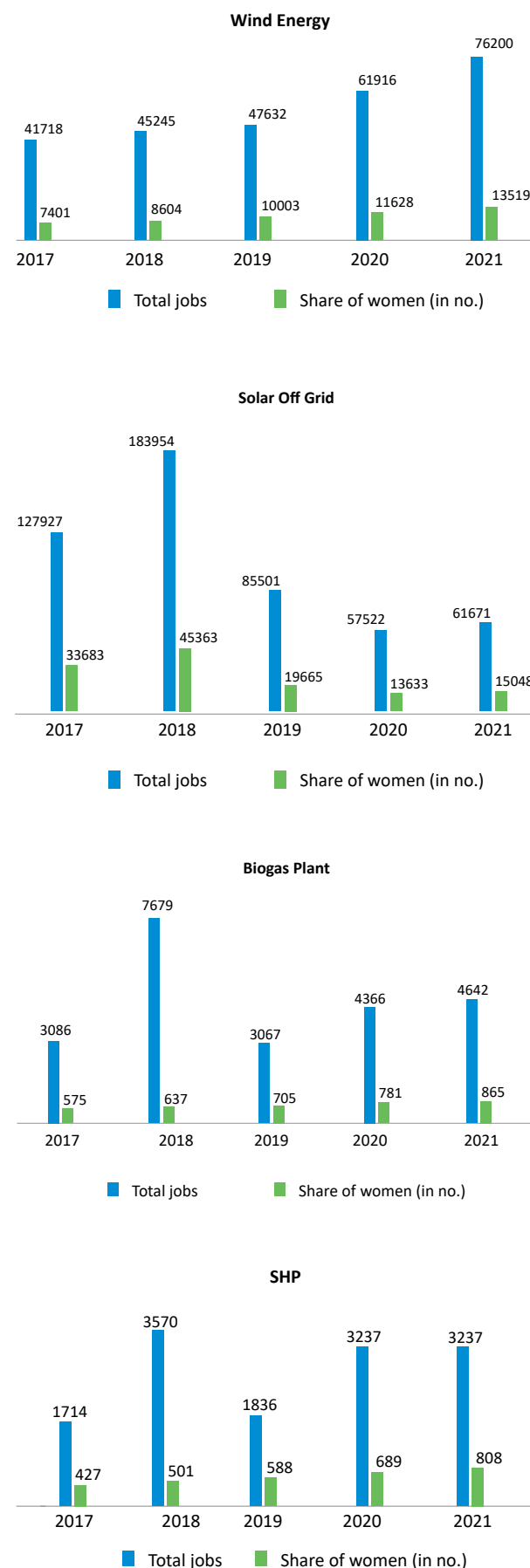
India, one of the fastest growing economies in the world, has doubled its energy demand since 2000. While demand growth has been largely served to date by the consumption of fossil fuels, India's government has shown a clear commitment to a clean energy transition for the future with a renewable electricity target of 175 gigawatts (GW) in installed capacity by 2022. India can benefit in a number of ways from this sustainable development, including through access to affordable clean energy, gender equality, decent work and economic growth, and climate change mitigation, which are four of the SDGs of the United Nations (goals 7, 5, 8 and 13, respectively). The global renewable energy sector employed 11 million people directly and indirectly in 2018 compared with 10.3 million in 2017, based on available information. Currently, women represent 32 percent of workers across all renewables workforce (28 percent science, technology, engineering and mathematics (STEM) jobs, 35 percent non-STEM technical jobs and 45 percent administrative jobs) compared with 22 percent in traditional energy industries such as oil and gas, analysis conducted by the International Renewable Energy Agency in 2019 has shown. However, its new report, Wind Energy: Gender Perspective 2020, shows that the average share of women in the wind energy sector stands at 21 percent globally. The solar photovoltaic (PV), bioenergy, hydro and wind power industries were the biggest employers.

The scope of this study included wind energy, solar off-grid systems (solar lanterns, solar home lighting systems, solar pumps, solar street lights and standalone commercial and industrial systems), small hydro power (SHP) (up to 25 megawatt (MW) under the Ministry of New and Renewable Energy (MNRE), Government of India), biogas plants (family-type biogas plants under the New National Biogas and Organic Manure Programme of MNRE).

## KEY FINDINGS

The sectoral analysis of renewable energy is based on government policies and interventions and the optimistic targets set for the future by the government. The types of job roles and total number of jobs in the sector have been identified basis government policies and schemes for the sector and, similarly, participation of women in the sector has been outlined based on stakeholder interactions and secondary research.

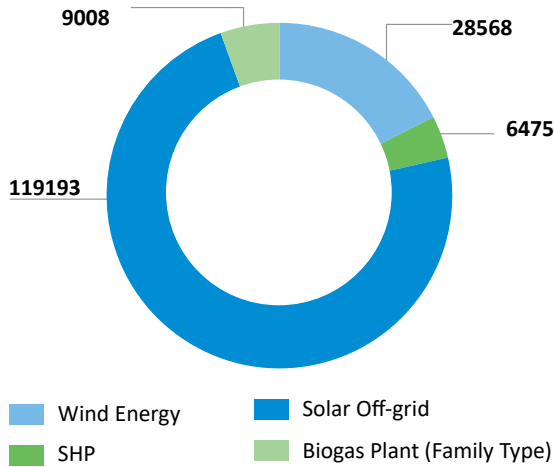
Figure 1: Total jobs and share of women in them in the sub-sectors of renewable energy



## SKILL GAP ANALYSIS

To achieve the target of 60,000 MW by 2021-22, it has been estimated that around 30,955 jobs will be available in the wind energy sector from 2019 to 2021, including 2,387 jobs in 2019, because of various

**Figure 2:** Employment growth in the renewable energy sector between 2019 and 2021



government schemes. Similarly, from 2019 to 2021, 8,311 jobs will be created in SHP including 1,836 jobs in 2019; 204,694 jobs in solar off-grid including 85,501 jobs in 2019; and around 12,075 jobs in the biogas plant sector including 3,067 jobs in 2019. Hence it is projected that around 163,244 jobs will be created in 2020-21 and 2021-22, in the renewable energy sector.

In India various skill development measures have already been undertaken but the government should now shift focus to the decentralized renewable energy sector as it has the maximum potential for generating jobs. Training and skill development should be imparted to the existing workforce as well under the recognition of prior learning approach for better employment opportunities and quality of work.

Currently there are five and two qualification packs (QPs) available for biogas plant and SHP sectors, respectively. Eight QPs are available for the wind energy sector and two for solar off-grid under the Skill India Mission. Details of QPs available against each job role are shown in Tables 2 to 5.

**Table 2:** QPs available in the wind energy sector

Manufacturing	Planning, Erection & Commissioning	Operation & Maintenance
<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>No QP Available</li> </ul>	<b>Available QPs With SSCs</b> <ul style="list-style-type: none"> <li>Assistant Planning Engineer – Wind Power Plant (NSQF-4)</li> <li>Construction Technician (mechanical) – Wind Power Plant (NSQF-4)</li> <li>Construction Technician (Civil) – Wind Power Plant (NSQF-4)</li> <li>Construction Technician (Electrical) – Wind Power Plant (NSQF-4)</li> <li>Site Surveyor-Wind Power Plant (NSQF-6)</li> <li>CMS Engineer - Wind Power Plant (NSQF-5)</li> </ul>	<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>O&amp;M Mechanical Technician – Wind Power Plant (NSQF-4)</li> <li>O&amp;M Electrical &amp; Instrumentation Technician – Wind Power Plant (NSQF-4)</li> </ul>
<b>Job roles for which QP does not exist</b> <ul style="list-style-type: none"> <li>Maintenance Technician WTG Blade (NSQF-4)</li> <li>Production Operator WTG Blade Manufacturing (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Painter (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Packer (NSQF-4)</li> <li>Maintenance Technician WTG Nacelle (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Technician Electrical Maintenance (NSQF-4)</li> <li>Maintenance Technician WTG Tower Manufacturing (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Mechanical Maintenance (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing - Production Supervisor (NSQF-5)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Mechanical Engineer (NSQF-5)</li> </ul>	<b>Job Roles for which QP does not exist</b> <ul style="list-style-type: none"> <li>Construction Technician (Electrical)- WPP (NSQF-4)</li> <li>Construction Technician (Civil)- WPP (NSQF-4)</li> <li>CMS Engineer – WPP (NSQF-5)</li> <li>Construction Technician (Mechanical)- WPP (NSQF-4)</li> <li>Crane Operator (NSQF-4)</li> <li>Procurement Executive-Wind (NSQF-5)</li> <li>Site Surveyor – WPP (NSQF-6)</li> <li>Assistant Planning Engineer (NSQF-4)</li> <li>Construction Engineer (Electrical) WPP (NSQF-5)</li> <li>Construction Engineer (Civil) WPP (NSQF-5)</li> <li>Construction Engineer (Mechanical) WPP (NSQF-5)</li> <li>Assistant Site Surveyor-WPP (NSQF-5)</li> </ul>	<b>Job roles for which QPs does not exist</b> <ul style="list-style-type: none"> <li>O&amp;M Engineer (Mechanical) – WPP (NSQF-5)</li> <li>O&amp;M Engineer (Electrical)– WPP (NSQF-5)</li> <li>O&amp;M Manager – WPP (NSQF-7)</li> </ul>

Manufacturing	Planning, Erection & Commissioning	Operation & Maintenance
<ul style="list-style-type: none"> <li>Wind Nacelle/Blade/Tower Manufacturing Electrical Engineer (NSQF-5)</li> <li>Wind Manufacturing Quality Assurance Engineering (NSQF-5)</li> <li>Production Operator: WTG Nacelle/Tower Manufacturing (NSQF-4)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Mechanical Maintenance Incharge (NSQF-6)</li> <li>Wind Manufacturing Quality Manager (NSQF-7)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Fiber Technologist (NSQF-6)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Resin Technologist (NSQF-6)</li> <li>Wind Nacelle/Blade/Tower Manufacturing Ceramic Technologist (NSQF-6)</li> <li>Wind Nacelle/Blade/Tower Manufacturing R &amp; D Manager (NSQF-7)</li> </ul>	<ul style="list-style-type: none"> <li>Wind Resource Assessment Manager (NSQF-7)</li> <li>Wind Land Acquisition Officer (NSQF-7)</li> <li>Procurement Manager – Wind (NSQF-7)</li> <li>Planning Engineer (Civil Structural)-WPP (NSQF-6)</li> <li>Planning Engineer (electrical) – WPP (NSQF-5)</li> <li>Site Manager / Subcontractor/ Entrepreneur – WPP (NSQF-6)</li> <li>HSE Engineer (NSQF-5)</li> <li>Project Head – WPP (NSQF-8)</li> <li>Project Design Manager – WPP (NSQF-7)</li> <li>Project Manager – WPP (NSQF-7)</li> <li>System Planning Engineer – WPP (NSQF-6)</li> <li>HSE Manager (NSQF-6)</li> </ul>	

\*QP available with Management & Entrepreneurship and Professional Skill Council

\*\* QP available with Capital Skill Council

Note: SSC: Sector Skill Council; NSQF: national skill qualification framework

**Table 3:** QPs available in the solar off-grid sector

Manufacturing	Engineering, Procurement & Commissioning	Operation & Maintenance
<p><b>Available QPs with SSCs</b></p> <ul style="list-style-type: none"> <li>No QP Available</li> </ul>	<p><b>Available QPs With SSCs</b></p> <ul style="list-style-type: none"> <li>Solar Grid Entrepreneur (NSQF-5)</li> <li>Solar Lighting Technician (Options: Home Lighting System/ Street Lights) (NSQF-4)</li> </ul>	<p><b>Available QPs with SSCs</b></p> <ul style="list-style-type: none"> <li>Solar PV Engineer (Option: Solar Water Pumping Engineer) (NSQF - 5)</li> <li>Solar PV Project Helper (NSQF-2)</li> <li>Solar Pump Technician (NSQF – 4)*</li> </ul>
<p><b>Job roles for which QP does not exist</b></p> <ul style="list-style-type: none"> <li>Solar Street light pole fabricator (NSQF-4)</li> <li>Head solar PV-Pump (NSQF-8)</li> <li>Head Solar Street Lighting (NSQF-8)</li> <li>Head Solar Lantern and Solar Home Lighting (NSQF-8)</li> <li>Solar off Grid Production Manager (Solar Lantern &amp; Solar Home Lighting) (NSQF-7)</li> <li>Solar off Grid Production Supervisor (Solar Lantern &amp; Solar Home Lighting) (NSQF - 5)</li> </ul>	<p><b>Job roles for which QP does not exist</b></p> <ul style="list-style-type: none"> <li>Solar Street Light Installer (NSQF-4)</li> <li>Solar PV Pump Installation &amp; Maintenance Manger/ Solar Pump Entrepreneur (NSQF-7)</li> <li>Site Supervisor (NSQF-6)</li> <li>Civil-Sub Contractor (NSQF-6)</li> <li>Solar Off-grid Street Lighting Installation &amp; Maintenance Engineer (NSQF-5)</li> <li>Mechanical/ Civil/Supervisor (NSQF-5)</li> <li>Mason (NSQF-4)</li> </ul>	<p><b>Job roles for which QP does not exist</b></p> <ul style="list-style-type: none"> <li>Customer Care Executive (NSQF-4)</li> <li>Solar Off Grid Machine/CNC Operator (NSQF-4)</li> <li>Solar Off-grid Manufacturing Technician (Solar lantern and Solar home Lighting) (NSQF-4)</li> <li>Solar Off-grid Sales Manager (NSQF-7)</li> <li>Solar Off-grid Sales Executive (NSQF-7)</li> </ul>

\*QP available with Management & Entrepreneurship and Professional Skill Council

\*\* QP available with Capital Skill Council

Note: SSC: Sector Skill Council; NSQF: national skill qualification framework

**Table 4:** QPs available in the SHP sector

Feasibility Analysis	Engineering, Procurement & Commissioning	Operation & Maintenance
<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>No QP Available</li> </ul>	<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>No QP Available</li> </ul>	<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>Security Guards-Unarmed (NSQF-4)*</li> <li>Fitter (NSQF3)**</li> </ul>
<b>Job roles with QP does not exist</b> <ul style="list-style-type: none"> <li>SHP Site Surveyor (NSQF-6)</li> <li>SHP Assistant Site Surveyor (NSQF-4)</li> <li>Hydrology &amp; Geology Expert (NQF-7)</li> <li>Small hydro Liaison Officer/ PRO/ Patwari (NSQF-5)</li> <li>SHP Designing Head (NSQF-8)</li> </ul>	<b>Job roles with QP does not exist</b> <ul style="list-style-type: none"> <li>Small Hydro Procurement Executive (NSQF-5)</li> <li>SHP Electrical Foreman- Transmission (NSQF-3)</li> <li>SHP Weir Site Foreman (NSQF-3)</li> <li>SHP Water Conductor Foreman (NSQF-3)</li> <li>SHP Electrical Supervisor – Transmission (NSQF-3)</li> <li>SHP Project Electrical Supervisor – Substation (NSQF-4)</li> <li>SHP Electrical Foreman (NSQF-3)</li> <li>SHP Mechanical Technician (NSQF-4)</li> <li>SHP OEM Foreman (NSQF-3)</li> <li>Small Hydro Crane Operator (NSQF-4)</li> <li>SHP Design Engineer (Electrical and C&amp;I) (NSQF-5)</li> <li>SHP Design Engineer (Civil &amp; Structural) (NSQF-5)</li> <li>CAD/ Draughtsman (NSQF-4)</li> <li>Small Hydro Procurement Manager (NSQF-7)</li> <li>SHP Manger/ Subcontractor/Entrepreneur (NSQF-7)</li> <li>SHP Electrical and C&amp;I Engineer (NSQF-4)</li> <li>SHP C &amp; I Technician (NSQF-4)</li> <li>SHP Mechanical Engineer (NSQF-5)</li> <li>SHP Engineer (Civil) (NSQF-5)</li> <li>SHP OEM Supervisor (NSQF-4)</li> <li>SHP Weir Site Supervisor (NSQF-4)</li> <li>Small Hydro Blasts Man (NSQF-4)</li> <li>SHP HSE Manager (NSQF-6)</li> <li>SHP HSE Engineer (NSQF-5)</li> </ul>	<b>Job roles for which QP does not exist</b> <ul style="list-style-type: none"> <li>SHP Helper – EPC and O&amp;M (NSQF-3)</li> <li>Small Hydro O&amp;M Mechanical Technician (NSQF-4)</li> <li>Turbine Generator Operator (NSQF-4)</li> <li>Fitter (NSQF-4)</li> <li>Small Hydro O&amp;M Instrumentation Technician (NSQF-4)</li> <li>Security Guard (NSQF-3)</li> <li>Small Hydro O&amp;M Engineer Mechanical / Small Hydro control system Engineer (NSQF-5)</li> <li>Small Hydro O&amp;M Civil Technician (NSQF-4)</li> <li>Small Hydro O&amp;M Electrical Engineer (NSQF-5)</li> <li>Small Hydro O&amp;M Civil Engineer (NSQF-5)</li> <li>Small Hydro O&amp;M Site in Charge (NSQF-6)</li> </ul>

\*QP available with Management & Entrepreneurship and Professional Skill Council

\*\* QP available with Capital Skill Council

Note: SSC: Sector Skill Council; NSQF: national sill qualification framework

**Table 5:** QPs available in the biogas plant sector

Construction & Fabrication	Operation & Maintenance	Finance
<b>Available QP with SSCs</b> <ul style="list-style-type: none"> <li>No QP Available</li> </ul>	<b>Available QPs with SSCs</b> <ul style="list-style-type: none"> <li>Animal Waste Manure Aggregator (option: Biogas Plant Operator/ Compost Plant Operator) (NSQF-4)</li> <li>Agri-residue Aggregator (NSQF-4)</li> </ul>	<b>Available QP with SSCs</b> <ul style="list-style-type: none"> <li>Office Assistance (NSQF-3)*</li> <li>Payment Collector (NSQF-4)**</li> <li>Account Executive (NSQF -4)***</li> </ul>
<b>Available QP with SSCs</b> <ul style="list-style-type: none"> <li>Construction Manager (NSQF-6)</li> <li>Biogas Plant Fabricator &amp; Installer (NSQF-4)</li> <li>Biogas Plant Store in Charge (NSQF-5)</li> </ul>	<b>Available QP with SSCs</b> <ul style="list-style-type: none"> <li>Maintenance manger (NSQF-6)</li> <li>Lab Technician (NSQF-4)</li> </ul>	<b>Available QP with SSCs</b> <ul style="list-style-type: none"> <li>Biogas Plant Marketing &amp; Sales Executive (NSQF-4)</li> </ul>

\*QP available with Management & Entrepreneurship and Professional Skill Council

\*\* QP available with IT-ITes Sector Skill council (extra numbers can be included as optional for a field visit)

\*\*\* QP available with BFSI Sector Skill Council of India

Note: SSC: Sector Skill Council; NSQF: national sill qualification framework



## TRAINING INFRASTRUCTURE

Several initiatives have been undertaken by the Government of India to develop the skills of the required and existing manpower in renewable energy. There are various centres which continuously work towards skill development in this area.

### a) **National Institute of Solar Energy and Solar Energy Training Network**

The National Institute of Solar Energy (NISE), an autonomous institution of MNRE, is the apex national research and development (R&D) institution in the solar energy domain. It oversees solar training initiatives in India and offers a variety of solar training courses throughout the year including the Suryamitra course. NISE certification courses are offered in each of the 35 Solar Energy Training Network (SETNET) partnering institutions. Many organizations outside of SETNET also offer training courses but may not provide training that is consistent with NISE standards.

### b) **National Institute of Wind Energy**

The National Institute of Wind Energy (NIWE) is the part of MNRE which is primarily responsible for overseeing the wind energy sector, including R&D, assessment, training, etc., in India. It has pioneered promotion of wind energy as a primary energy source in India.

NIWE has conducted 31 national training courses on self-financed and MNRE-supported mode of wind energy generation and trained over 1,300 professionals from across the country.

### c) **Skill Council for Green Jobs**

SCGJ is an autonomous body of the Ministry of Skill Development and Entrepreneurship and was founded in May 2015 in collaboration with the Confederation of Indian Industry and National Skill Development Corporation (NSDC). SCGJ acts as a bridge between the Government of India, state governments and industry in developing strategy and implementing programmes for skills development correlated to industry needs but also aligned to best international practices. SCGJ has developed various national occupational standards (NOS) and QPs for

solar, wind and bioenergy sub-sectors. From 2017 to 2025, SCGJ is aiming to train 1,320 trainers and to certify around 1,000,320 learners. At present, it has developed 23 QPs in the solar, eight QPs in wind energy and four QPs in bio-energy sub-sectors.

### d) **Industrial Training Institutes**

Industrial Training Institutes (ITIs) present a viable opportunity to increase access to training programmes on solar energy in India. MNRE has integrated renewable energy coursework into India's numerous ITIs, which could help broaden the accessibility of renewable energy education.

## POTENTIAL FOR GROWTH

As the renewable energy sector gains unrivalled traction and becomes increasingly integrated into the country's energy mix, there is a growing need for entrepreneurs who understand the renewable energy ecosystem and maintain a balance of innovation and project implementation to navigate this change. Entrepreneurship business models also help in creation of jobs across the value chain of different sub-sectors.

There are various eco-entrepreneurship model case studies available in the renewable energy sector especially for decentralized renewable energy systems in which women from marginalized communities and remote locations play important roles in livelihood generation and community development. Some successful eco-entrepreneurship models which may be promoted across the country include:

- **Distribution through proprietary agent networks:** The solar company sells its products through diffused networks of generalist or specialist solar distributors. Some companies are also vertically integrated and have developed proprietary distribution networks or are using franchise models throughout the supply chain.
- **Institutional partnerships:** The enterprises partner with rural banks, microfinance institutions (MFIs), community saving groups or non-governmental organizations (NGOs) to market their products to the partner organizations' customer base or membership network. Finance is often provided by the partner organization.



- **Energy-as-service model solutions:** Under these related approaches, solar providers focus on offering an energy service (such as a micro-utility) rather than a product, meaning households pay for electricity as they consume it. In leasing models, end-users do not own the products but are guaranteed a replacement product if it fails. Under pay-as-you-go models, end users make periodic repayments counting towards the eventual ownership of the product (and thereby matching energy consumption and payment for energy over time). These models are mainly used to finance larger lantern systems or solar home systems.

### CHALLENGES TO GROWTH IN THE SECTOR

**Lack of women-centric policies:** There are very few women-centric policies and schemes at the central and state levels. To improve women’s participation in the renewable energy sector, the government needs to make scientific interventions to promote women’s participation in the sector. It also needs to develop new and targeted policies or schemes or update existing ones to focus on participation of women in renewable energy projects.

**Limited access to finance:** Access to finance either through MFIs or banking is restricted or not available. This limits the scope of investment in the renewable energy sector, and is even more challenging for women.

**Other limitation:** Cultural and social norms are the prime barrier for women to work in the renewable energy, or any other, sector in India. Lack of training and awareness, especially gender-sensitive training and skill development, results in low participation of women in the sector. Inequity in ownership of assets is one barrier for women specifically in the rural areas. Ownership of assets is strongly associated with levels of income and women’s confidence. Lack of ownership of assets makes women more vulnerable and dependent on their partners, depriving them of confidence to go out of the house to work. Other reasons for the under-representation of women in this sector are last-mile connectivity and safety and security mainly in semi-urban and rural areas.

### KEY RECOMMENDATIONS AND SOME ACTION PLANS FOR CONSIDERATION

As observed, the current share of women in the decentralized renewable energy sector is around

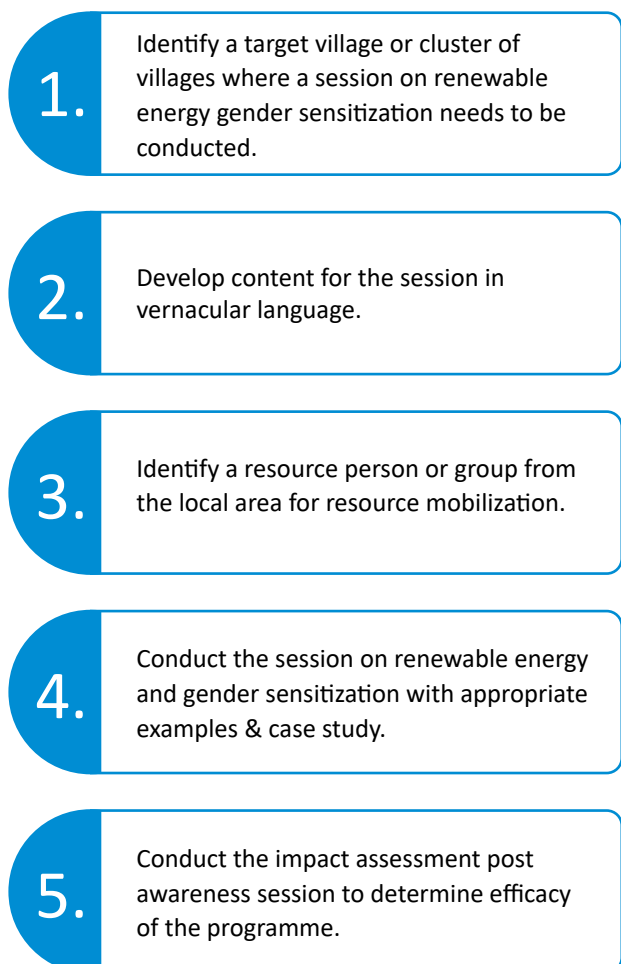
23 percent and in the wind energy sector is around 21 percent which is very low as compared to their male counterparts. The government and its nodal agencies should work to reduce this gender disparity by deploying stringent measures. As estimated, around 1,63,244 workers will be needed in the renewable energy sector by 2021-22; women can play a crucial and stable role.

### KEY RECOMMENDATIONS

The study identifies various social, cultural and economic barriers for women in the renewable energy sector in the selected states. Issues that need to be addressed include:

- **Reducing social stigma against women:** Social issues can only be tackled by spreading more awareness especially in the rural areas. Sessions should be conducted for Gram Sabha and Panchayat personnel to keep them apprised of job opportunities for women and related benefits.

**Figure 3:** Awareness training session structure



- **Gender sensitive policies and schemes:** There is a dearth of women-centric policies and schemes at the central and state levels. To improve women's participation in the renewable energy sector, the government can make scientific interventions to curb this issue. Special provisions should be made for women in existing policies; sound implementation of these policies at the national or state levels should be ensured by the government and implementing agencies.

**Figure 4:** Changes required on existing policies/schemes

1. Develop new and targeted women-centric policies or schemes on renewable energy which should include women specific targets.
2. Priority should be given to women's participants in tender processes of renewable energy projects.
3. Incorporate special provisions for women relating to financial assistance.
4. Overall project duration including commissioning & execution should higher for women entrepreneurs.
5. Provision should be made to make soft loans available for women candidates in the policies or schemes.

- **Skill development and training:** Skill development and training play a crucial role for enhancing women's share in the renewable energy sector. At present SCGJ is a nodal agency for developing NOS and QPs under the Skill Development Mission for the green business ecosystem in India. However, there is an opportunity available to develop more

QPs and NOS with national skills qualifications framework (NSQF) levels 1 to 4 which will incorporate the needs of marginalized communities including women. At present, there are five and two QPs available for the biogas plant and SHP sectors, respectively. Around eight QPs are available for the wind energy sector and five for the solar off-grid sector under the Skill India Mission. A need assessment should be carried out by the respective Sector Skill Councils (SSCs) and nodal agencies to determine the demand for existing job roles and their related QPs and NOS.

- **Last mile connectivity and security of women** are also very sensitive issues in rural areas. The government should ensure that all training centres in remote or rural areas are well connected via road at least and have adequate security measures for women in place. In case no transportation is available, the government or training centre should collaborate with the Gram Panchayat or local authority and identify and arrange a dedicated mode of transport with fixed fare, route and timing.
- **Empowering women eco-entrepreneurs:** Women from rural areas or economical backward sections need to be empowered by adopting different eco-entrepreneurship models. Concept such as Solar Mamas in which women are provided with training on assembling solar products (like lanterns, home lighting systems) and sales and maintenance of these products should be encouraged to help women create livelihood for themselves.

#### SOME ACTION PLANS FOR CONSIDERATION

Entrepreneurship models available include:

- Distribution through proprietary agent networks (see case studies on Solar Mamas, Solar Sisters in the detailed report); and
- Energy-as-service model solutions, i.e., pay-as-you-go models (see case studies on Bombay Bijlee, Lighting a Billion Lives in the detailed report).

**Table 6:** QPs and NOS to be developed based on demand assessment

Wind Energy	Solar Off-grid	Small Hydro Power	Biogas Plant
<ul style="list-style-type: none"> <li>Construction Technician-Electrical-Wind Power Plant (NSQF-4)</li> <li>Construction Technician-Mechanical-Wind Power Plant (NSQF-4)</li> <li>Assistant Planning Engineer-Wind Power Plant (NSQF-4)</li> <li>Maintenance Technician-WTG Blade/Nacelle/WTG Tower Manufacturing (NSQF-4)</li> </ul>	<ul style="list-style-type: none"> <li>Solar Street Light Pole Fabricator (NSQF-4)</li> <li>Solar Street Light Installer (NSQF-4)</li> <li>Solar Off-grid Machine/CNC Operator (NSQF-4)</li> <li>Solar Off-grid Manufacturing Technician -Solar lantern and Solar Home Lighting (NSQF-4)</li> <li>Customer Care Executive (NSQF-4)</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical Technicians (NSQF-4)</li> <li>Civil Technician (NSQF-4)</li> <li>Electrical Technicians (NSQF-4)</li> <li>Foreman (NSQF-3)</li> <li>Turbine Generator Operator (NSQF-4)</li> <li>Instrumentation Technician (NSQF-4)</li> <li>C&amp;I Technician (NSQF-4)</li> </ul>	<ul style="list-style-type: none"> <li>Biogas Plant Fabricator &amp; installer (NSQF-4)</li> <li>Material Handler (NSQF-4)</li> <li>Store in-charge (NSQF-4)</li> <li>Biogas Plant Marketing &amp; Sales Executives (NSQF-4)</li> </ul>







2.

Green Construction



The construction industry is the second largest employer in India after agriculture. It is also one of the most energy intensive industries accounting for 2.12 percent of the total industrial energy use in the country, after iron and steel and chemicals and petrochemicals (Energy Statistics, 2019).<sup>17</sup> In such a scenario, as India shifts towards a low-carbon economy, the resource- and labour-intensive construction industry is seen to have a tremendous potential to contribute to this shift by venturing into the green construction space.

According to U.S. Green Building Council data, outside the United States, India ranks third in the world in annual ranking of the top 10 countries for Leadership in Energy and Environmental Design (LEED)<sup>18</sup> certification. As of December 2019, more than 1,400 LEED-certified buildings were registered in India<sup>19</sup> and the Indian Green Building Council (IGBC) had registered more than 5,723 green building projects accounting for 7.09 billion square foot of area. IGBC is targeting to have 10 billion square foot of area under green building projects by 2022.<sup>20</sup>

Green construction includes green building and green landscape. The study mainly focuses on **commercial and residential green buildings**.

### KEY FINDINGS

According to the World Green Building Council, “a ‘green’ building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life.” Features such as efficient use of resources, use of renewable energy, pollution control measures, good indoor air quality, use of materials that are non-toxic, ethical and sustainable, consideration of environment as well as the quality of the occupant’s life in design, construction, operation and renovation are characteristic of green construction.<sup>21</sup>

Women’s representation across the green building value chain can be seen in skilled, semi-skilled and unskilled job roles, such as architect, green building consultant, health and safety steward, civil engineer, recyclable waste collector and segregator, safai karamchari, etc.

**Table 7:** Some job roles with available QPs

Job Roles	NSQF Level
Helper Mason	2
Mason General	4
Construction Painter & Decorator	4
Assistant Electrician	3
Construction Electrician- LV	4
Wastewater Treatment Plant Helper	3
Wastewater Treatment Plant Technician	4
Helper Façade Installer	2
Façade Installer	4
Recyclable Waste Collector & Segregator	4

### SKILL GAP ANALYSIS

- The construction sector comprises segments such as building, demolition and site preparation, electrical installations, plumbing, finishing, etc. These segments require significant skilled human resources, of which there is a shortage. Therefore, for the green building sector to expand, workers with proper training through skill development and skills enhancement programmes and certification are required.<sup>22</sup>
- According to an ILO study, governments in developing countries such as India are establishing policies and frameworks to offer financial incentives to facilitate growth of the green building sector. However, often these initiatives lack a training component. Thus, lack of skills is a major bottleneck that needs to be addressed for the sector to expand. This is further negatively impacted by challenges faced by women in accessing training where it is available. Women- specific challenges are discussed in detail below. One of the major reasons for the skill gap is the lack of awareness in smaller builders and contractors on codes and standards, energy efficiency guidelines, certification and rating programmes which holds back the sector’s growth, thereby limiting the job opportunities it can offer.
- NSDC has highlighted the inadequacy of skills found in the workforce engaged in the construction sector;

<sup>17</sup> Ministry of Statistics and Programme Implementation, 2019. Energy statistics.

<sup>18</sup> Manna, Dibas and Banerjee, Sulagno, 2019. A review on green building movement in India.

<sup>19</sup> <https://gbci.org/annual-top-10-states-leed-india-announced-gbci-india>.

<sup>20</sup> IGBC Annual Report, 2018.

<sup>21</sup> <https://www.worldgbc.org/what-green-building>.

<sup>22</sup> Ibid.



- Of the total workforce in the construction and real estate sector in 2022, 97 percent is likely to have had no training before starting work; and
- Nearly 80 percent of employment in real estate is attributable to minimal skills, which causes substantial wastage of time and materials.<sup>23</sup>

## TRAINING INFRASTRUCTURE

There are numerous training institutes that provide skill development training for job roles in the construction sector. However, there are very few institutes, such as SCGJ and the Building Material and Technology Promotion Council that provide training for skills pertinent to the green building segment. Some training institutes are listed Table 8.

## GROWTH POTENTIAL

- Currently, only 1.4 percent of women in India are engaged in technical roles within the construction industry particularly civil engineers, architects, structural engineers, electrical engineers, maintenance and supervisory staff.
- Of this less than 2 percent reaches leadership positions in construction companies.
- Increasing demand is projected for trained workers in construction, installation and maintenance as well as disposal and recycling operations in the green building segment.
- Between 2021 and 2030, 8,800,000 jobs will be added in the green buildings/campuses segment.

**Table 8:** List of training institutes

Name of the institute	Description
<b>National Skill Development Corporation</b>	NSDC is a first-of-its-kind public private partnership in India established in 2008 to facilitate skill development of the growing Indian workforce through skill training programmes. NSDC aims to promote skill development by facilitating for-profit vocational institutions. It also provides funding to build scalable and profitable vocational training initiatives. A significant part of the organization's efforts are directed at the building partnerships with the private sector and developing skills in the unorganized sector in India
<b>Skill Council for Green Jobs</b>	SCGJ is a not-for-profit, autonomous and industry-led society launched as an initiative by the Government of India and is aligned to the NSDC. Between 2017 and 2025, SCGJ aims to train 1,320 trainers and to certify 1,000,320 learners
<b>Centum Work Skills India (Centum WSI)</b>	Centum WSI is the result of partnership between Centum Learning and NSDC. Centum WSI aims to enhance the skills of millions of youth across the country to empower them to pursue livelihood opportunities. Construction is one of its core focus areas
<b>SEWA Delhi</b>	SEWA Delhi links construction workers with the Delhi Building and Other Construction Workers' Welfare Board to register workers, secure social security entitlements and advocacy for legal recognition. SEWA runs several programmes in Delhi to give girls appropriate skills to be gainfully employed as well as connect girls to local college student mentors and professionals
<b>Sobha Developers (Karnataka)</b>	Sobha Developers has established Sobha Vocational Training Centre through which functional vocational training and paid apprenticeships in carpentry are provided to youth from poor families

<sup>23</sup> ILO, 2018. Skills for green jobs in India.

## CHALLENGES TO GROWTH IN THE SECTOR

**Temporary employment:** Since the nature of employment is temporary in the construction sector, employers are reluctant to provide skill development training to women.

### **Policies:**

- While there are numerous skilling initiatives to address the need of skilling the workforce in India, a woman-centric approach to skill development in the sector needs to be adopted and scaled up.
- There are no corporate policies that promote recruitment of women and ensure fair wages, especially in the informal sector.
- There are various policies that facilitate or incentivize adoption of energy-efficient building and construction activities that utilize fly ash. However, the policy framework supporting other alternative construction material such as recycled plastic, recycled construction and demolition waste, etc., is non-existent.

### **Finance/Technology**

- Imparting effective training in the green building segment requires access to machinery and tools for complete hands-on training. Lack of access to upgraded machinery can often pose a challenge for training institutes, for which they must partner with companies in the sector.

### **Others**

- Lack of safe transport and accommodation facilities prevents women's participation in the workforce or even skill development training.
- Semi-skilled roles such as plumbing and masonry are not perceived as being ideal for women as these are considered to be male dominated roles. Due to this perception, women's inclination to be trained for these roles is very low. Consequently, women's participation in these roles is rare. This is part of the reason for the gap between demand and supply of skilled workers in the sector.
- Working on construction sites is often viewed negatively by women's family/community. It is acceptable for women to work as labour at construction sites only if she is accompanying her husband or another male member of the family.

- Informal employment presents significant challenges in terms of women's rights to minimum wages and facilities such as day care.

## KEY RECOMMENDATIONS AND SOME ACTION PLANS FOR CONSIDERATION

By increasing women's participation across the green building value chain will address not only industry demand for skilled workforce but also the overarching goal of sustainable and equitable development through women's empowerment be achieved. Skilling women and mainstreaming gender require comprehensive measures that include policy support and localized training, among other measures.

### **Key Recommendations**

As the government provides stimulus assistance for revival and to counter impacts of COVID-19 on the construction industry, policy imperatives can be put in place to provide a thrust to the green building sector as well. Some measures that can be undertaken include the following.

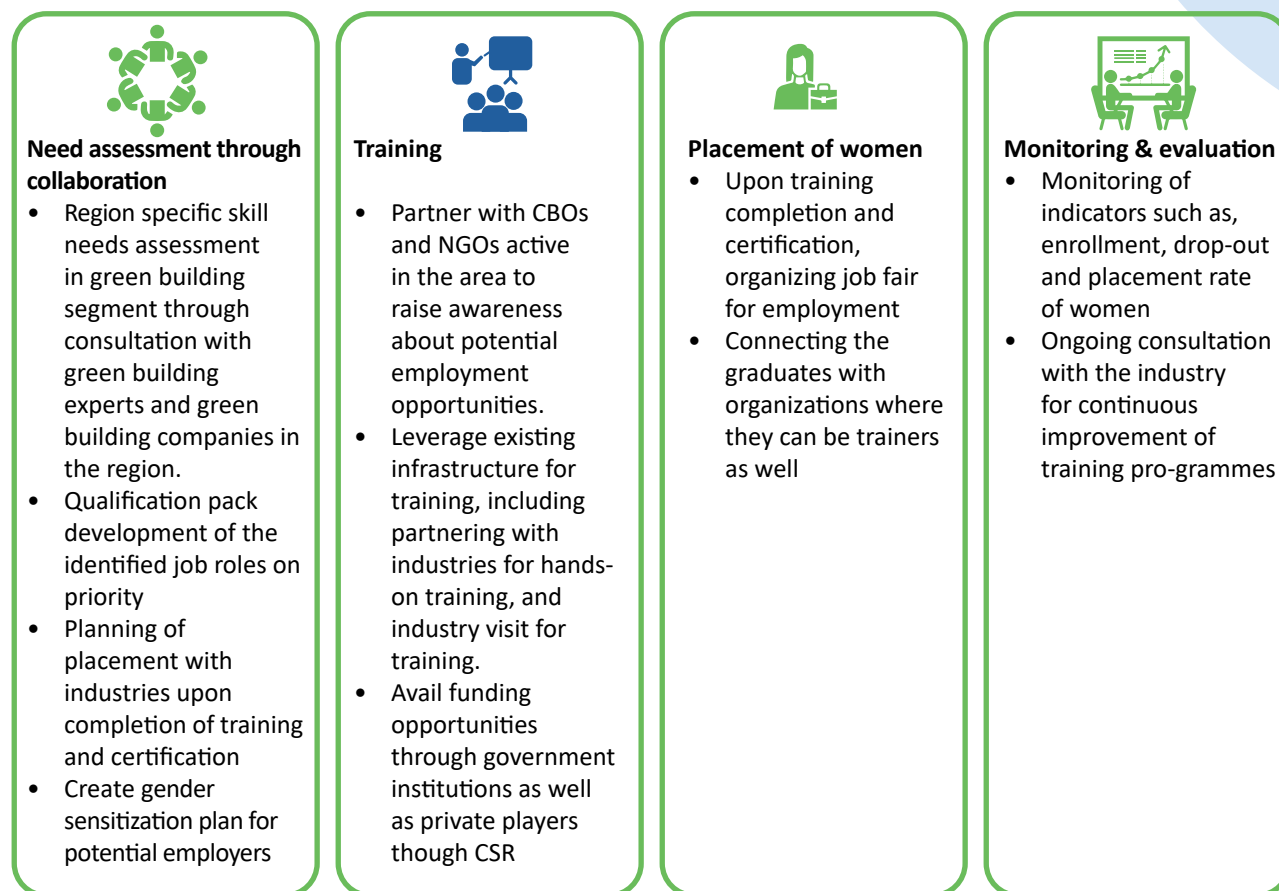
#### **Skilling Infrastructure**

- Strengthening the training infrastructure by creating training programmes focused on skills pertinent to the green building sector, leveraging public-private partnerships as well as the current institutional infrastructure.
- Recognition of prior learning should be done to formally recognize the existing skills of women engaged in the sector.

#### **Establishing Decentralized Training Centre**

- Some common barriers to skill development for women are accessibility of the training centre. Decentralized skill centres established based on skill requirements in the region identified, based on industry consultations, would provide women with skills that are in demand in specific local areas, thereby enhancing their employability.
- Decentralized training centres aim to address the issue of first- and last-mile connectivity and would enhance the employability of women from rural and remote areas while bridging the gap between industry demand and availability of a trained workforce.

**Figure 5:** Framework for enhancement of women’s employability



**Financing Eco-entrepreneurship**

- Women should be made aware of the schemes that offer financial assistance to boost entrepreneurial undertakings. Some of these schemes are:
  - Prime Minister Employment Generation Programme;
  - Credit Guarantee Trust Fund for MSMEs;

- PMMY; and
- National Rural Livelihoods Mission.

- Other potential funding agencies are CREDAI CSR Foundation, Asian Development Bank, Women Entrepreneurs Finance Initiative, etc.

There are several job roles for which QPs should be developed so that training modules can be created to impart training to women for those roles.

**Table 9:** Jobs roles with existing QPs and those that require QPs

Jobs roles with existing QPs	
<ul style="list-style-type: none"> <li>Helper Mason – NSQF-1 (CSDC)</li> <li>Assistant Mason – NSQF-2(CSDC)</li> <li>Mason General – NSQF-4 (CSDC)</li> <li>Helper Electrician – NSQF-2 (CSDC)</li> <li>Assistant Electrician – NSQF-3 (CSDC)</li> <li>Plumber – NSQF-3 (Plumbing Industry)</li> <li>Safai Karamchari – NSQF-3 (SCGJ)</li> <li>Helper Construction Painters NSQF-1 (CSDC)</li> <li>Safety and Health Steward – NSQF - 4 (CSDC)</li> </ul>	<ul style="list-style-type: none"> <li>Recyclable Waste Collector &amp; Segregator – NSQF-4 (SCGJ)</li> <li>Helper Façade Installer – NSQF-1 (CSDC)</li> <li>Assistant Façade Installer – NSQF-2 (CSDC)</li> <li>Assistant Construction Fitter (CSDC) – NSQF-2</li> <li>Wastewater Treatment Plant Helper NSQF-3 (SCGJ)</li> <li>Bamboo Grower – NSQF-2 (Agriculture and Allied)</li> </ul>

## Job roles for potential of QP Development

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• HVAC installers</li> <li>• Energy auditors</li> <li>• Facility manager</li> <li>• Material testing technician</li> <li>• Energy efficiency analyst</li> <li>• Alternate construction material entrepreneur</li> </ul> | <ul style="list-style-type: none"> <li>• Green products certifier</li> <li>• Technician for CSEB &amp; fly ash bricks</li> <li>• Alternate material expert</li> <li>• Sales and marketing of certified green products</li> <li>• HVAC technician</li> </ul> |
|--|---|

### Some Action Plans for Consideration

An action plan to increase the number of women-owned and -operated eco-entrepreneurship units is discussed here.

**Table 10:** Action plan to establish women-run entrepreneurial enterprises

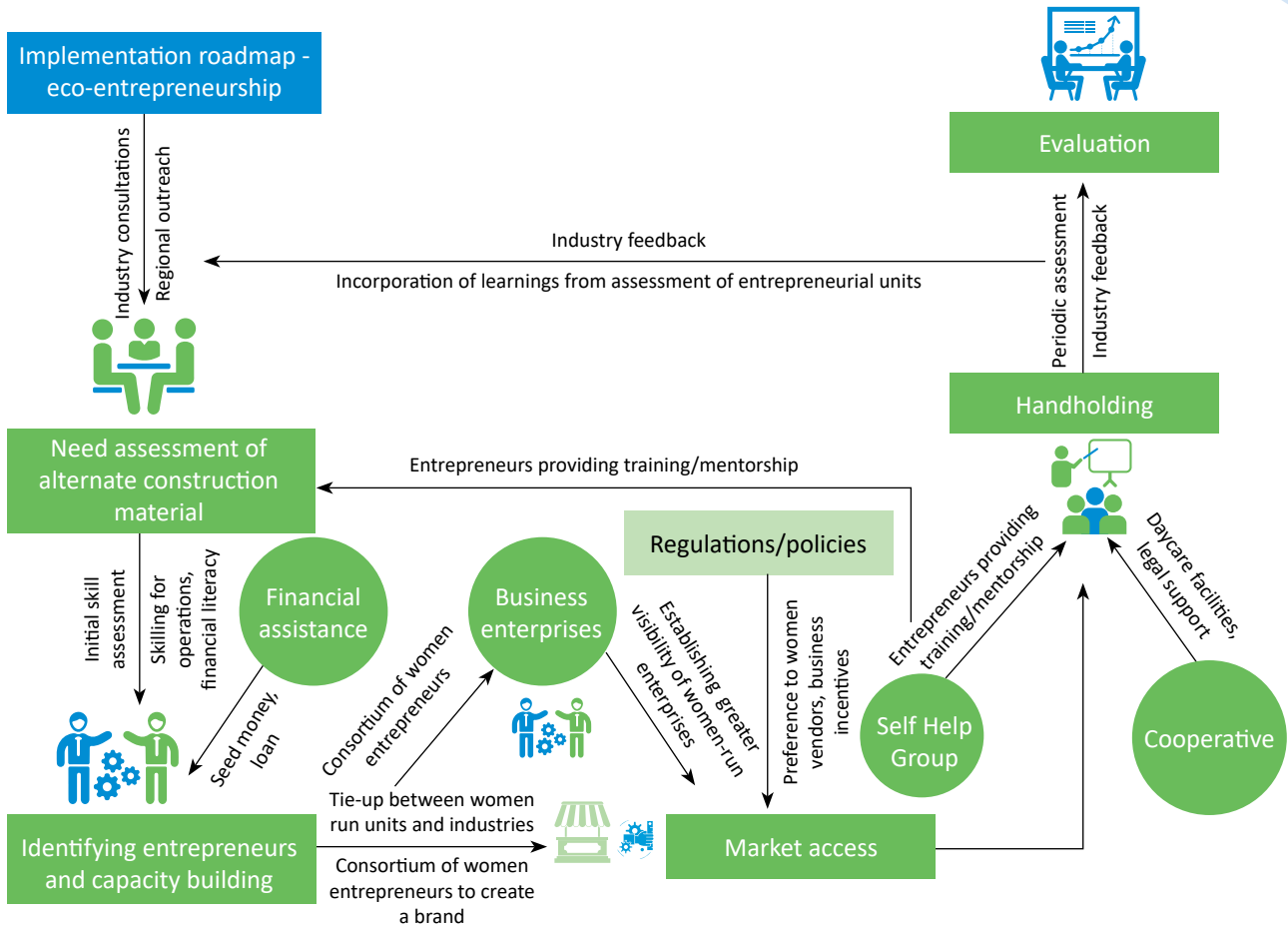


### Aligning policy/regulatory landscape

- Government institutions to implement regulation around giving preference to women vendors
- Incentives designed for industries that source a certain percentage of the construction material from women-run entrepreneurial units.

The action plan illustrated in Table 10 is discussed below in detail along with the model illustration shown in Figure 6.

**Figure 6:** Model to establish a woman-operated eco-entrepreneurship unit



**Need Assessment of Alternate Construction Material**

This initial phase is focused on region-specific assessment of the need for alternate construction material. Consultations with the industry existing in the region will ensure that the endeavour of establishing entrepreneurial units is guided by a sound assessment of demand by the industry:

- Industry consultations to identify demand of a construction material and its supply in the region;
- Measures to raise awareness about self-employment opportunities in this segment would be undertaken in this phase, which would also nudge women to break gender norms in the community; and
- Women should also be made aware of the potential financial assistance they may receive from the government through schemes such as PMMY, Prime Minister Employment Generation Programme, Credit Guarantee Trust Fund for MSMEs, etc.

**NEED ASSESSMENT OF ALTERNATE CONSTRUCTION MATERIAL**

**POTENTIAL PARTNERS**

**Private:** Larsen & Toubro Limited, Ambuja Cement Limited, DLF Limited

**Other:** Construction Skill Development Council, Building Material and Technology Promotion Council, Mahila Housing SEWA Trust, Sector Skill Council for Green Jobs

## Identifying Entrepreneurs and Capacity Building

Identification of a potential entrepreneur should be based on an assessment of the woman's initial skill level, financial awareness, entrepreneurial inclination, etc. Institutions should collaborate to provide infrastructural and institutional support which can be leveraged to impart trainings for:

- Financial literacy;
- Skilling for operation and maintenance of the equipment;
- Skilling for raw material sourcing, processing as well as grading the end-product;
- Training on regulatory aspects of establishing and running a business unit from the compliance perspective; and
- Partnership with the training institute for training and, in turn, also to be a trainer.

### IDENTIFYING ENTREPRENEURS AND CAPACITY BUILDING

#### POTENTIAL PARTNERS

**Private:** L&T Construction Skill Training Institute, Ambuja Cement Limited, DLF Limited, L&T Financial Services

**Government:** State nodal institutes such as Maharashtra States Skill Development Council, Skill Development, Entrepreneurship and Livelihood Department (Karnataka), Ministry of Women and Child Development, Ministry of Skill Development and Entrepreneurship

**Other:** Skill Council for Green Jobs Construction, Skill Development Council, Building Material and Technology Promotion Council, The Nudge Foundation, Sehgal Foundation, Development Alternatives, Mahila Housing SEWA Trust, TATA STRIVE, Sobha Developers



## Funding

Agencies that will be able to provide the seed money to women entrepreneurs would be engaged at this stage so that the entrepreneur can acquire the necessary equipment to establish the manufacturing/processing unit.

Some government funding schemes for entrepreneurs that could be considered include:

- PMMY;
- Credit Guarantee Trust Fund for MSMEs; and
- Small Industries Development Bank of India (SIDBI).

Other potential funding agencies can include industry organization foundations, angel funds as well as multilateral/international organizations.

### FUNDING

#### POTENTIAL PARTNERS

**Government:** Small Industries Development Bank of India, Credit Guarantee Trust Fund for Micro & Small Enterprises, Micro Units Development and Refinance Agency (MUDRA) Bank

**Other:** CREDAI CSR Foundation, Sobha Developers, Asian Development Bank, the World Bank - Women Entrepreneurs Finance Initiative (We-fi)



## Market Access

Sound synthesis of the entrepreneurial unit with construction companies/developers is crucial and begins by establishing market access. Market access can be strengthened if entrepreneurs organize to form a larger unit:

- Tie-ups should be encouraged between women-owned entrepreneurial units and industries in the region with demand for alternate construction material;
- A consortium of women entrepreneurs should be formed to create a brand, which provides greater visibility for their green products in the market enhancing their saleability;
- Women in this consortium should be trained for job roles in material testing and marketing and selling; and



- Women entrepreneurs should be made aware of digital platforms such as Mahila E-haat<sup>24</sup> that can be used to market and sell their products.

### MARKET ACCESS

#### POTENTIAL PARTNERS

**Government:** State nodal institutes such as Maharashtra States Skill Development Council Skill Development, Entrepreneurship and Livelihood Department (Karnataka), Ministry of Women and Child Development; Mahila E-haat

**Private:** Construction companies/developers such as L&T, Ambuja Cement Limited, DLF Limited, K Raheja Corp, Biome Environmental Solutions, Industree Foundation, Space Design Consultants



#### Handholding Support

Once the enterprise is established, the entrepreneurs are likely to need support with respect to day-care facilities, on-going mentoring as well as legal advice, where applicable. To address this need, they should be connected with the existing network of support systems in the region. Simultaneously, women who are established as successful entrepreneurs should also be organized into a self-help group (SHG) that guides new entrepreneurs.

### HANDHOLDING

#### POTENTIAL PARTNERS

**Government:** Ministry of Women and Child Development - Support to Training and Employment Programme for women (STEP), Working Women Hostel

**Other:** Mahila Housing SEWA Trust, SEWA, Ministry of women and child Development - Rajiv Gandhi National Creche scheme for the Children of Working Mothers, Startup India, Startup Oasis, Women Entrepreneurs for Transformation (WEFT), Women Entrepreneurs India (WEI)



### Monitoring

Continuous and regular monitoring is critical to identify aspects that facilitate and enhance women's entrepreneurship. Periodic monitoring and evaluation should be conducted to identify factors that persist as challenges and those that facilitate the successful operation of the business unit. Such assessment also guides the upgradation/implementation of upcoming business plans:

- Implementing agency to conduct periodic assessment to assess the viability of the business;
- Seeking industry feedback on the quality and timeliness of supply of material; and
- Incorporating the feedback in future implementation of new units.

### MONITORING

#### POTENTIAL PARTNERS

**Government:** Construction Skill Development Council, Sector Skill Council for Green Jobs, Start up India,

**Other:** SEWA, Construction companies/ developers such as, L&T, Ambuja Cement Limited, DLF Limited, K Raheja Corp, Women Entrepreneurs for Transformation (WEFT)



#### Aligning Regulatory Landscape

A supportive regulatory landscape acts an enabler throughout the implementation of the eco-entrepreneurship roadmap. Policy-level initiatives should be designed to boost market access of women entrepreneurs and facilitate sourcing of their products in the market through industry tie-ups:

- Policy should be designed to provide incentives and encourage women vendors; and
- Incentivizing industries that source a certain percentage of the construction material from women-run entrepreneurial units.

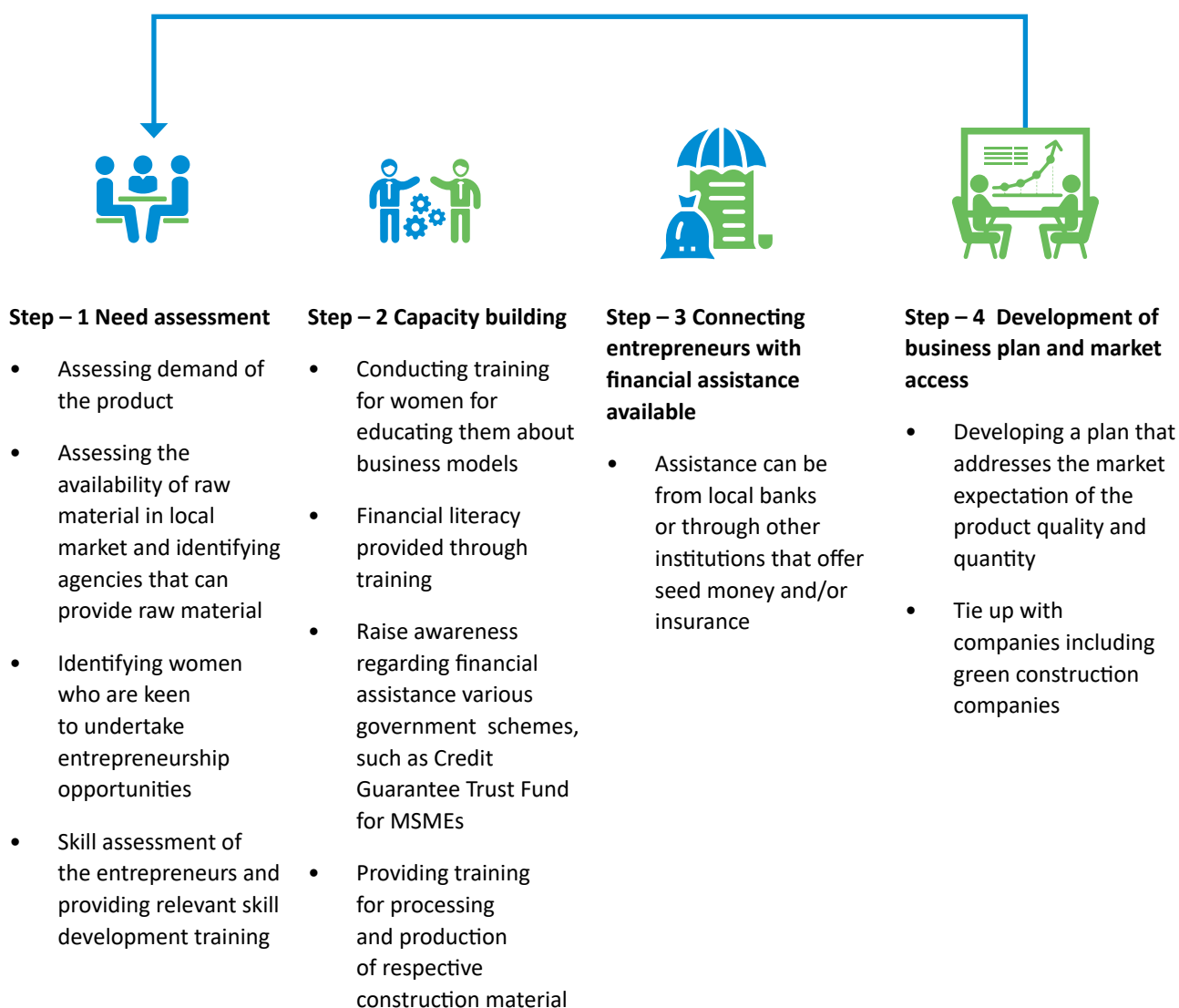
<sup>24</sup> Mahila E-haat, Ministry of Women and Child Development.

## Eco-entrepreneurship

Entrepreneur for alternate construction material such as fly ash bricks, compressed stabilized earth blocks, bamboo, etc., can be involved for setting up the unit and generate self-employment. The units producing

alternative construction material by sourcing local raw material would allow local buyers to source these alternative construction materials locally as well. There are success stories in this sphere, which should be scaled up with women-targeted approach.

**Table 11:** Evaluation framework for entrepreneurial units post six months and one year



3.

Green Transport



**T**ransport drives economic and social development, offering opportunities to the poor and enabling economies to be more competitive. Transport infrastructure links people to jobs, education and health services, builds markets and facilitates trade. This sector accounts for about 64 percent of global oil consumption, 27 percent of all energy use and 23 percent of the world's energy-related carbon-dioxide emissions. Within the sector, road transport accounts for nearly 75 percent of cumulative greenhouse gas (GHG) emissions and the trend is projected to increase in the future if it continues unabated.

In India, 14 percent of the gross domestic product (GDP) is spent on the transport and logistics sector. Automobiles make a 7.1 percent contribution to the GDP and employment whereas the auto components industry has a 2.3 percent share.

The automotive sector in India primarily depends on the internal combustion engine which utilizes fossil fuels as a source of energy. Combustion of fossil fuels releases large amounts of toxic gases that pose a serious threat to the environment and human life. All these issues

necessitate an innovative solution in terms of hybrid vehicle technology to fulfil the world's requirement for a greener environment.

The study mainly focuses on **electric vehicles (EVs) including passenger and commercial vehicles**. Taking into consideration all the health and environmental advantages, this industry has the potential to grow and offer various employment opportunities in the future. Further, the government has set a target of 30 percent e-mobility in the country by 2030. It is focussing on making the transport sector electric through various national and state level schemes/initiatives, offering tax benefits and subsidies to make the EV space the centre of the green transport sector.

### KEY FINDINGS

In the automotive sector, green jobs can include both hybrid and electric vehicle production, sales and repair. The demand for these specialized roles increases as the hybrid and electric car industry flourishes. Some of these green job roles have been listed in Table 12.

**Table 12:** Job roles with available QPs

Job Roles	Description	NSQF Level
Tool Designer and Tool Room Supervisor	Responsible for accommodating new electromechanical components such as electric motors and generators, control and sensing devices which are added to for all battery related operations	5
Tool Room Operator/ Technician		4
Heat Treatment Shop Supervisor	To be trained to supervise a team handling thermal management at an electromechanical front on the shop floor. Responsible for ensuring cooling of power technology and static devices at the shop floor level	5
Assembly Line Supervisor	Reskilling required on battery handling and on handling AC and DC circuitry	5
Maintenance Assistant	Reskilling required to gain additional knowledge of electric systems that drive train and electric components	2
Vehicle Test Driver	Since the final product would be an electrically driven vehicle, the same job role would persist but with reskilling with respect to more mechatronics knowledge is required	5
Sales Consultant (Automotive Finance)	With respect to the changes in the car, new specifications of the car and the functioning of an EV, reskilling is required for the sales team	4
Sales Training Manager		6
Accessory Fitter		4
Sales Executive (Accessories Value Added Services)		4
Trainer-Service		Some amount of reskilling with respect to mechatronics knowledge is required as the final product would be an electrically driven vehicle

Job Roles	Description	NSQF Level
Automotive Service Technician	Regular repair workers are able to carry out a majority of the routine servicing but the electrical systems and drivetrain will often need reskilling of workers to make them more familiar with EVs	4
Automotive Engine Repair Technician		4
Automotive Electrician		4
Maintenance Technician-Service Workshop		4

### Skill Gap Analysis

Skills or knowledge around particular segments in the value chain are lacking.<sup>26</sup> Some broader skill gaps thus identified are:

- Since it is an upcoming industry, insufficient knowledge in fields such as battery cell manufacturing, assembly of battery packs, component manufacturing and digital technology;
- Limited knowledge about the manufacturing of EV powertrains and batteries;
- Incompetence in manufacturing basic semiconductor and power electronics components;

- Lack of knowledge about lithium ion batteries and their functioning; and
- Lack of training for EV charging stations.

### Training Infrastructure

Within the EV sector, specific training programmes have been organized by certain organizations to impart the necessary skills and bridge skill gaps. These training programmes help in building a conceptual understanding of the basics in engineering and branches of science related to EV technology and industry, hence offering job opportunities and career growth options in the EV sector. Table 13 provides a list of organizations currently providing training in this sector.

**Table 13:** Organizations currently providing training in the transport sector

Name of the Institute	Description
<b>Azad Foundation</b>	Azad Foundation provides livelihoods with dignity for resource-poor women living in urban areas. The foundation, through its programmes, provides training and employment opportunities to women from underprivileged backgrounds
<b>VIDYA</b>	Vidya is an NGO that works towards empowering and transforming the lives of people through education. The VIDYA Bhagini Women Empowerment Centre at Mali Foundation in Bengaluru is focused on training women by imparting skill-based vocational training through various courses including driving
<b>CADD Centre</b>	CADD Centre offers courses that pack theoretical knowledge on and practical training in design, simulation and analysis of the parts that go into making a complete battery system for EVs
<b>Verzeo</b>	Verzeo is an upskilling e-learning platform headquartered in Bengaluru. It imparts technical knowledge and skills related to hybrid and electric vehicle systems and their components
<b>Autobot India</b>	Autobot India provides specialized and customized training and development programmes such as EV design, prototype and testing, EV & heavy EVs: edrives, powertrain and lithium battery technology, li-ion battery: technology, safety and BMS, etc.
<b>Advance Electrical Design and Engineering Institute</b>	The institute provides training in EV designing, training in light EVs designing, training in heavy EV design and hybrid vehicles training

<sup>26</sup> NSDC, Human Resource and Skill Requirement in the Auto and Auto Components Sector (2013-17, 2017-22).



Name of the Institute	Description
<b>National Power Training Institute</b>	The institute provides a comprehensive overview of the e-mobility and charging infrastructure and is ideal for working professional who wish to upgrade their skills
<b>Academy of EV Technology</b>	The academy's mission is to meet the needs of the emerging growth in the EV industry by providing high value services while supporting clean, sustainable and healthy transportation for the community at large

## GROWTH POTENTIAL

- According to estimates from NITI Aayog, employment will increase from 500,000 to 850,000 by 2030 in the EV segment. Powertrain manufacturing is the main segment that is viewed as a significant growth area specifically with reference to domestic assembly of battery packs. The Council on Energy, Environment and Water along with the Shakti Sustainable Energy Foundation has published a report estimating jobs in the EV sector by considering two different scenarios.
- In 2018, the total number of jobs in internal combustion engine car powertrain manufacturing was 1,85,333. It has been estimated that, in 2030 (with 30 percent electric car penetration), the total number of jobs will increase to 3,83,913 indicating an overall increase of 7 percent between 2018 to 2030.
- While, on the one hand, there will be fewer jobs in the manufacturing of powertrains, new jobs can be created by indigenizing the assembly of battery packs. Thus, indigenization of battery pack assembly in the EV30 scenario will lead to the creation of about 11,019 to 14,167 additional jobs.
- Within the EV sector, specific training programmes can be organized for women to impart the necessary skills and bridge the skill gap. These training programmes help build conceptual understanding of the basics in engineering and branches of science related to EV technology and industry, hence offering job opportunities and career growth options in EV sector.

facilitate women in the workplace; there is also an absence of role models for women; and

- Lack of a clear policy on EV deployment and clarity in the legislative framework.
- **Limited Access to Finance**
  - Another issues that poses a challenge is the high upfront cost of EVs due to low performance and high cost of batteries; and
  - Lack of training opportunities for women, technical capability and capacity and skill development to gain relevant skills required for the specific line of work in the sector. Financing of education and training to acquire the relevant skills thus becomes a challenge.
- **Others**
  - Lack of reliable, accessible and affordable charging infrastructure along with the high cost of setting up of the charging station;
  - Limited land availability and higher expectations of rent for charging stations also poses a hurdle;
  - Non-availability of fast chargers, lack of local supply chains for EV supply equipment and the fact that imported chargers are unreliable and incompatible in Indian weather conditions also creates hindrances; and
  - Longer charging times of EVs when rapid chargers are not available is another matter of concern.

## CHALLENGES TO GROWTH IN THE SECTOR

- **Lack of Regulatory Framework**
  - Inadequate corporate policies that promote fair recruitment among men and women or that

## KEY RECOMMENDATIONS AND SOME ACTION PLANS FOR CONSIDERATION

While the overall workforce participation in the EV segment remains low, female employment in the sector

is significantly lower as compared to the auto industry numbers. At present, women's participation exists in the following areas:

- Service technician;
- Driver;
- Sales consultant;
- Manager;
- Customer service personnel; and
- Assistant.

However, there is a huge gap that needs to be identified by in-depth analysis of the EV value chain and ecosystem.

### **KEY RECOMMENDATIONS**

Women's skills and perceptions are key to addressing different gender requirements in access to transport and mobility and responsiveness of transport systems to the needs and preferences of women, including safety and security. Some of the recommendations to enhance their participation in the sector are elaborated on here.

#### **Skill Development**

- Imparting training to semi-skilled and unskilled women in various parts of the value chain such as operating and maintaining of charging stations, battery swapping and battery management systems for EVs.
- Training of semi-skilled and unskilled women in the areas of customer service and after-sales services such as showroom host, accessory fitter, sales/ service trainer, etc., for the EV domain.
- Increasing female enrolment through making suitable provision for scholarships/ funding support for higher education evening classes in training institutes and offering paid internships and conducting training for women as a part of the corporate social responsibility expenditure.
- Setting up of training institutes specifically for women and organizing practical training sessions on various areas of the EV ecosystem, for instance, the Women on Wheels programme designed specifically for empowering resource poor women to help them become independent. The programme, developed by Azad Foundation, is aimed at training these women to become professional drivers.

#### **Policy Changes**

- Interest-free loans for first three years to women buyers and employee provident refund to enterprises employing over 40 percent women in the workforce. A similar policy recommendation was incorporated in Industrial Investment and Employment Promotion Policy 2017.
- Employee provident fund reimbursement: 50 percent of the employer's contribution on direct employment of 100 or more unskilled workers and additional 10 percent to units generating direct employment of 200 skilled/unskilled workers.
- Introduction of policies for EV enterprises/start-ups owned and run by women to provide additional capital subsidy and reduced collateral requirements for loans such as under Start-up India.

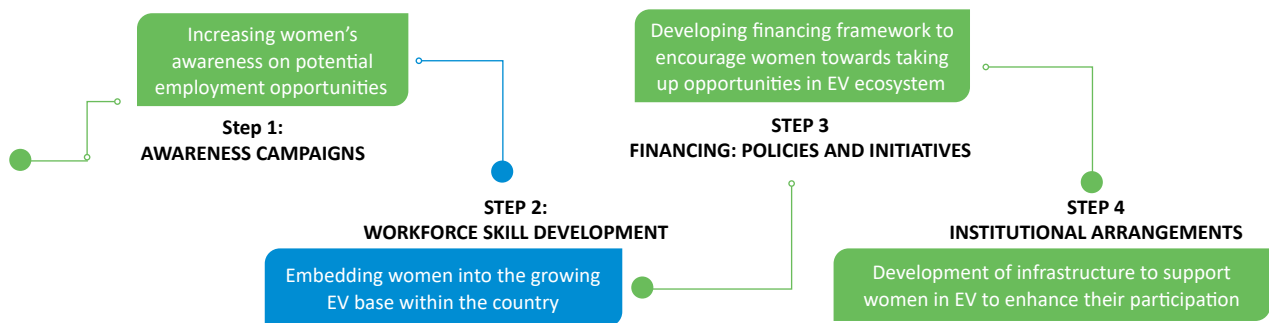
#### **Financing of Entrepreneurship**

- Increased lending to local women entrepreneurs for the EV industry and training grants to women start-ups seeking to employ local women can boost their participation in the sector. For example, to mainstream electric mobility in the country, the government has devoted INR 10,000 under Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme and 5 percent Goods and Services Tax (GST) reduction on EVs. Similarly, special arrangements can be made specifically for women under these schemes to support EV uptake by women.
- The Fund of Funds Scheme, an initiative under Atmanirbhar Bharat Abhiyan, is one scheme that aims to provide financial assistance to the MSME sectors by infusing INR 500 billion equity into MSMEs. Women entrepreneurs may be offered additional benefits under this scheme.

### **SOME ACTION PLANS FOR CONSIDERATION**

The transition towards electric mobility with higher participation of women requires investments in certain areas of the EV ecosystem along with policy support and fiscal stimulus in terms of subsidies. The study identified four priority areas and actions against each area have been mapped in Figure 7.

**Figure 7:** Action plan for enhancing women’s participation in green transport



**Awareness Campaigns**

- Lack of awareness among women about potential employment options is a big challenge within the industry. Actions required to address this issue involve:
  - Increase public awareness about job opportunities available for women by organizing national and state level workshops and job fairs by entering into partnerships with educational institutes and through use of social media platforms;<sup>27</sup> and
  - Develop recruitment campaigns targeting women by:
    - Partnering with schools and colleges to promote careers in the industry and further expose young women to potential employment opportunities; and

- Working with colleges to assess recruitment strategies for programmes where female students are significantly under-represented.

**Workforce Skill Development**

- EV manufacturing in the country will lead to the creation of new industries, thereby generating jobs within the sector. The EV charging infrastructure ecosystem is also anticipated to be an area of growth, leading to the generation of ample employment opportunities.
- Actions for embedding women into the growing EV base within the country include:
  - Tying up with trainings institutes to introduce courses that offer specialized and customized

**AWARENESS CAMPAIGNS**

**Government Organizations:**

- Automotive Skill Development Council
- Ministry of Environment and Forests, Government of India

**Industry associations:**

- Society of Indian Automobile Manufacturers (SIAM)
- Society of Manufacturers of Electric Vehicles (SMEV)

**WORKFORCE SKILL DEVELOPMENT**

**Training institutes:**

- Advance Electrical Design and Engineering Institute
- Automotive Skill Development Council
- National Power Training Institute, etc.

**Private OEMs:**

- Hero Electric
- Mahindra

<sup>27</sup> Electric Mobility Roadmap for Smart Cities in India, WRI India.

training and development programmes to women on various areas of the EV ecosystem;

- Creating training modules to upgrade the capacity of the existing female workforce; and
- Encouraging re-training of unskilled and semi-skilled women workers in the automotive industry

#### Financing: Policies and Initiatives

- A well-designed financing framework is required to encourage women to take up opportunities in the EV ecosystem.<sup>28</sup> This includes:
  - Developing policies for charging service provider companies to conduct in-house training for women;
  - Relaxations in tender allotments to enterprises owned and run by women and employing a specific percentage of women;
  - Defining standards for adopting recycled/secondary products and having corporate mandates to train women in this area;
  - Tax benefits to corporates co-investing in women-run enterprises;
  - Fiscal support to carry out market awareness campaigns, skill development and capacity building for women users;

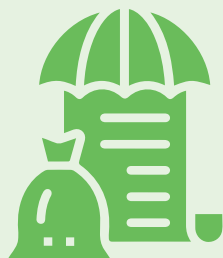
#### FINANCING: POLICIES AND INCENTIVES

##### Government Organizations:

- NITI Aayog
- Ministry of Heavy Industries & Public Enterprises
- Ministry of road transport & Highways

##### Industry Associates:

- Confederation of India Industry
- Society of Manufacturers of Electric Vehicles
- Society of Indian Automobile Manufacturer



- Shaping policies and regulatory measures against indecent behaviour in the work environment and offering women employees benefits at the workplace such as maternity leave, comfortable working hours and shift timings; and
- Special provisions in FAME II (under the National Electric Mobility Mission Plan (NEMMP)) for women in the EV manufacturing space.

#### Institutional Arrangements

- Development of infrastructure to support women in EV by the government and corporates is required to enhance their participation within the sector. This includes:
  - Creation of new skill centres specifically for women by collaborating with industry, academia and the government;
  - Allocation of space by the government for women-run service stations with lower transfer duty and other exemptions; and
  - Mobilization of public and private players to set up hard infrastructure, which may then be operated by women (in the capacity of service providers).

#### INSTITUTIONAL ARRANGEMENTS

##### Government Organizations:

- Ministry of Housing & Urban Affairs
- Automotive Skill Development Council
- Ministry of Road Transport & Highways



#### Eco-entrepreneurship

In the green transport sector, eco-entrepreneurship as an opportunity may be exploited by both genders. As far

<sup>28</sup> Chandra, Sayandeep and Mazumdar, Shubhankar, 2020. Roadmap for Electric Vehicle Implementation in India.

as the involvement of women is concerned, there are some models that can witness their participation in the near future. Some are outlined below:

### PROPOSED INITIATIVE 1

#### **Women entrepreneurs as ‘third party service’ providers for last-mile connectivity**

- Business-to-consumer (B2C) companies in India have set ambitious targets to ensure last-mile delivery to households. This presents a significant opportunity to enhance women’s participation in the sector. While women may be hired as delivery executives to increase employment, we look at it as an avenue to kick start the entrepreneurial journey for many. We propose the following business model.

**Table 14:** Stakeholders in business model 1

Stakeholders	Role	Examples
B2C Firms	<ul style="list-style-type: none"> <li>- Engage women entrepreneurs as third party service providers to forward the agenda of last-mile delivery</li> <li>- Firms to enter into partnerships with financial bodies (public and private) to seek subsidized loans for women to purchase electric two- or three-wheelers</li> <li>- Firms to enter into tie-ups with certain original equipment manufacturers (OEMs) to seek discounted price of EVs for women entrepreneurs wanting to purchase electric two- or three-wheelers</li> <li>- Firms to enter into legal contracts with women (buying electric two- or three-wheelers) to purchase services for last-mile delivery at a fixed rate or with clearly defined price floor to ensure guarantee of minimum return to women entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>- Big basket: Aims to increase EVs to 1,000 vans and 2,000 bikes within the next one year</li> <li>- Swiggy: Piloting EVs in 10 cities</li> <li>- Amazon: Planning to roll out 10,000 EVs by 2025</li> <li>- Flipkart: Aims to convert 40% of its delivery fleet into EV by March 2020</li> </ul>
Women Entrepreneurs	<ul style="list-style-type: none"> <li>- Women to purchase EVs with loan assistance from funding agencies (contracted by B2C firms)</li> <li>- Women entrepreneurs to guarantee services to B2C firms at the rate defined in the contract</li> <li>- Women entrepreneurs to undertaking relevant training on driving and maintenance of the EVs</li> </ul>	<ul style="list-style-type: none"> <li>- Potential women entrepreneurs</li> </ul>
Financial Bodies/ Funding Agencies (Public/ Private)	<ul style="list-style-type: none"> <li>- Agencies to offer loans to women entrepreneurs at subsidized rates</li> <li>- These bodies should reduce collateral requirements for loans for women entrepreneurs</li> <li>- Offer additional capital subsidy</li> </ul>	<ul style="list-style-type: none"> <li>- Finance companies such as Bajaj Allianz</li> <li>- Bank loans with low interest rates: SBI Green Car Loan</li> </ul>
OEM Players	<ul style="list-style-type: none"> <li>- Corporates to enter into partnerships with B2C firms to offer EVs to women at a discounted rate</li> <li>- Corporates to provide subsidized servicing/maintenance rates to women entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>- Hero Electric</li> <li>- TVS</li> <li>- Okinawa Autotech, etc.</li> </ul>



Stakeholders	Role	Examples
Training Partners	- Training institutions to offer trainings to these women entrepreneurs on driving, operation and maintenance of electric vehicles	- Advance Electrical Design & Engineering Institute - Automotive Skill Development Council - Autobot India, etc.
Multilateral Agencies	- Act as facilitator between corporates and local agencies such as government bodies, women's SHGs and local NGOs to mobilize potential women entrepreneurs	

**Business Model:** B2C firms such as Big Basket, Swiggy, Zomato, etc., engage with women entrepreneurs (owning an EV) to act as 'third party service providers' to forward the corporate agenda of last-mile delivery.

**Objective:** The model has twin objectives:

- Increased women's participation in the green transport sector and increased opportunities for women entrepreneurship in the EV industry; and
- Enhanced EV penetration in the country.

- Financial institutions to tie-ups with corporate to offer:

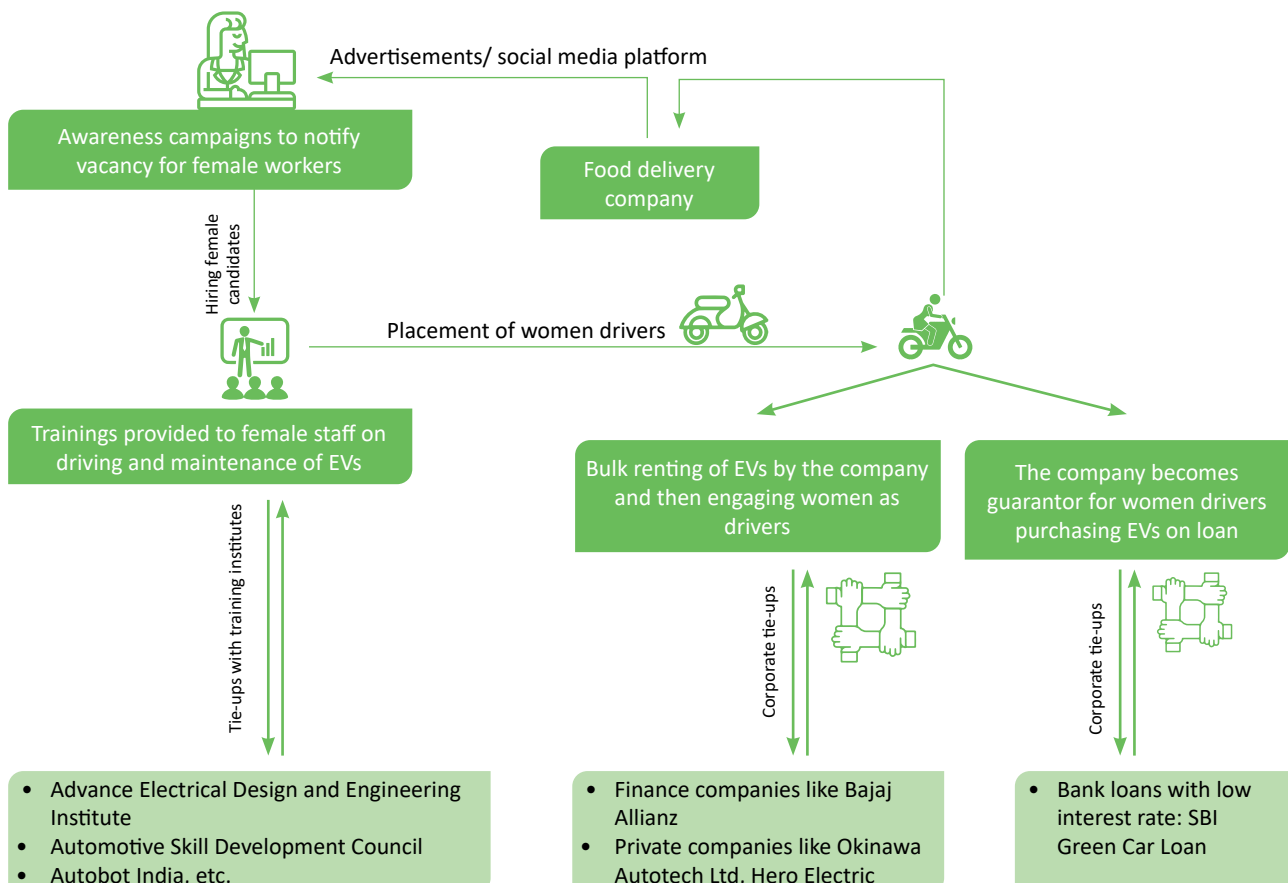
- Subsidized interest rates/ interest free loans; and
- Reduced collateral requirements.

- Corporates can play the role of a guarantor for securing vehicle loans for women entrepreneurs.
- The government to offer subsidies to women users in terms of:
  - Central GST refund;
  - State GST refund; and
  - Interest-free loans for up to three years.

### Financial Feasibility of the Model

#### a. Investor landscape

**Figure 8:** Business model for last mile delivery



**b. Revenue stream/income generation**

- Women entrepreneurs purchasing EVs to enter into legally binding contracts with B2C companies to act as ‘third party service providers’ for last mile delivery.
- B2C companies offer competitive remuneration to cover the following:
  - Monthly instalment/EMIs of the EV;
  - Monthly charging cost/expenses of the EV; and
  - Economic profit for the women entrepreneurs.

**Alternative Model**

**Employing women as delivery executives**

- In case women entrepreneurs are unable to purchase the EVs, B2C companies may encourage women’s participation in the sector by bulk renting of the EVs and then engaging these women applicants as delivery executives. This leads to:
  - Increased women’s participation in the sector; and
  - Improved income standards for women.

**PROPOSED INITIATIVE 2**

**Women entrepreneurs as EV service station owners**

- The government’s ambitious target of 30 percent EV penetration by the year 2030 creates demand for setting up of an EV infrastructure to fuel EV uptake in the country. This offers significant employment opportunities for women entrepreneurs to boost their participation in the sector by setting up of EV service and repair stations.

**Business Model:** Service stations owned and run by women may be set up in exclusive tie-ups with private OEM players in the electric space to ensure market availability/demand for services.

**Objective:** The model may be promoted with the twin objective of scaling up infrastructure for the growing EV demand by elimination of demand-side blockages and enhancing entrepreneurship opportunities for women in the EV sector.

**Table 15:** Stakeholders in business model 2

Stakeholders	Role	Examples
OEM Players	<ul style="list-style-type: none"> <li>- Setting up service station for women entrepreneurs</li> <li>- Tie-ups with financial bodies to seek loans for initial upfront costs of hard infrastructure as well as for day-to-day expenses</li> <li>- Offering on-the-job trainings to women entrepreneurs</li> <li>- Tie-ups with private training institutes to train women entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>• Hero Electric</li> <li>• Okinawa Autotech</li> <li>• Kinetic Green</li> <li>• Mahindra Electric</li> <li>• Mitsui &amp; Co., etc.</li> </ul>
Women Entrepreneurs	<ul style="list-style-type: none"> <li>- Own, operate and run the service stations and conduct maintenance and repair activities for EVs</li> <li>- Undertake relevant training on servicing and repair and technology-related components including telematics</li> <li>- Hire/offer employment opportunities to women in the service stations</li> </ul>	<ul style="list-style-type: none"> <li>• Potential women entrepreneurs</li> </ul>
Financial Bodies/ Funding Agencies (Public/ Private)	<ul style="list-style-type: none"> <li>- Agencies to offer loans to women entrepreneurs at subsidized rates</li> <li>- These bodies should reduce collateral requirements for loans for women entrepreneurs</li> <li>- Offer additional capital subsidy</li> </ul>	<ul style="list-style-type: none"> <li>• Finance companies such as Bajaj Allianz, Softbank Corporation</li> <li>• Bank loans with low interest rates: SBI Green Car Loan</li> </ul>

Stakeholders	Role	Examples
Training Partners	- Training institutions to offer training to the women entrepreneurs on servicing and repair and technology-related components including telematics	<ul style="list-style-type: none"> <li>Academy of EV Technology</li> <li>Advance Electrical Design &amp; Engineering Institute</li> <li>Automotive Skill Development Council, etc.</li> </ul>
Multilateral Agencies	<ul style="list-style-type: none"> <li>- Act as facilitators between corporates and local agencies such as government bodies, women's SHGs and local NGOs to mobilize potential women entrepreneurs</li> <li>- Act as facilitators between enterprises run by women and training partners</li> </ul>	

**Financial Feasibility of the Model**

**a. Investor landscape**

- Financial institutions to tie-up with corporates to offer:
  - Subsidized interest rates;
  - Interest free loans; and
  - Reduced collateral requirements.

- Corporates can play the role of a guarantor for securing vehicle loans for women entrepreneurs. They can also offer incentives or additional benefits to customers to approach these women-run service stations.

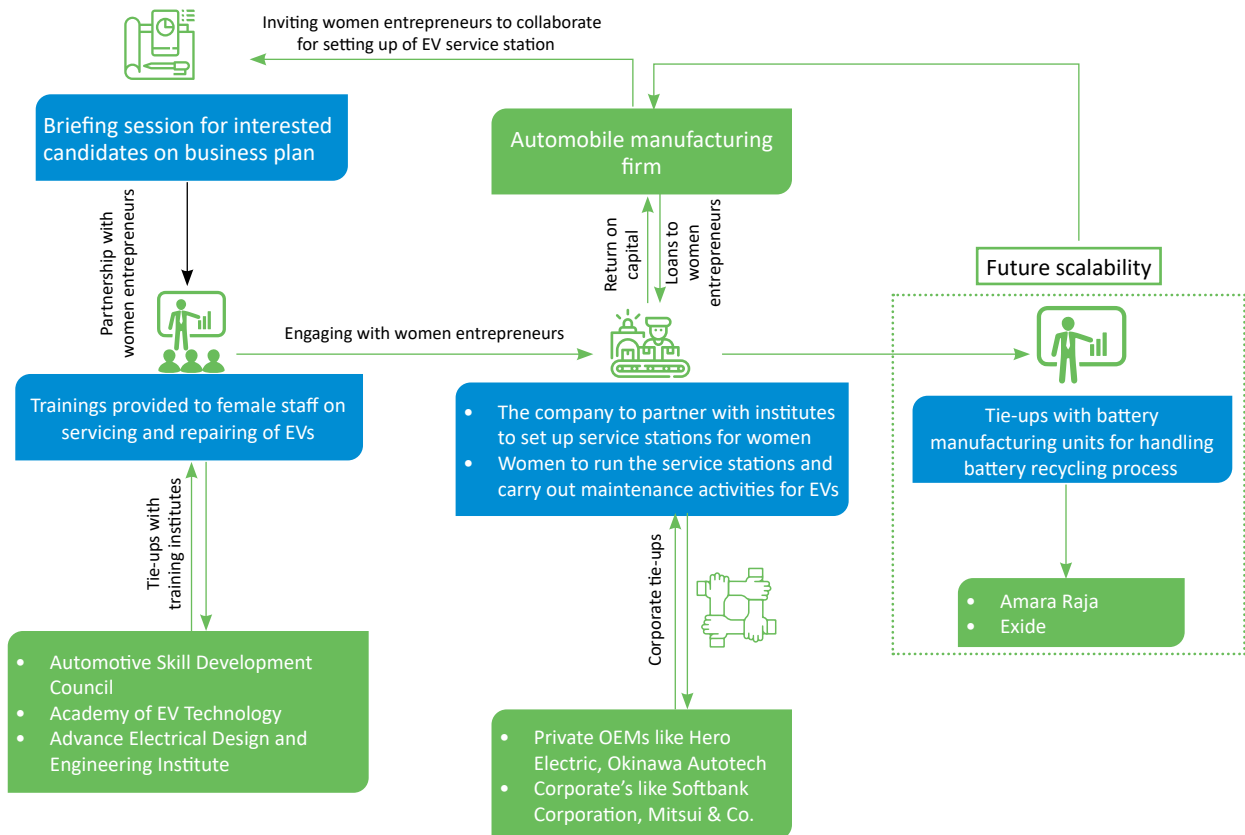
- Government to offer subsidies to women users in terms of:

- Central GST refund;
- State GST refund;
- Additional capital subsidy;
- Training grants; and
- Interest-free loans for up to three years.

**b. Revenue stream/income generation**

- Women entrepreneurs to enter into exclusive tie-ups with OEM players in the electric space to meet market demand.

**Figure 9: Business model for women-operated EV service stations**



## Future Scalability

- The corporates should enter into partnerships with battery manufacturing units such as Amara Raja, Exide, etc., to conduct battery recycling, reuse and remanufacturing activities within these service stations.
- Women entrepreneurs to be provided with training on areas of battery manufacturing, management and disposal.

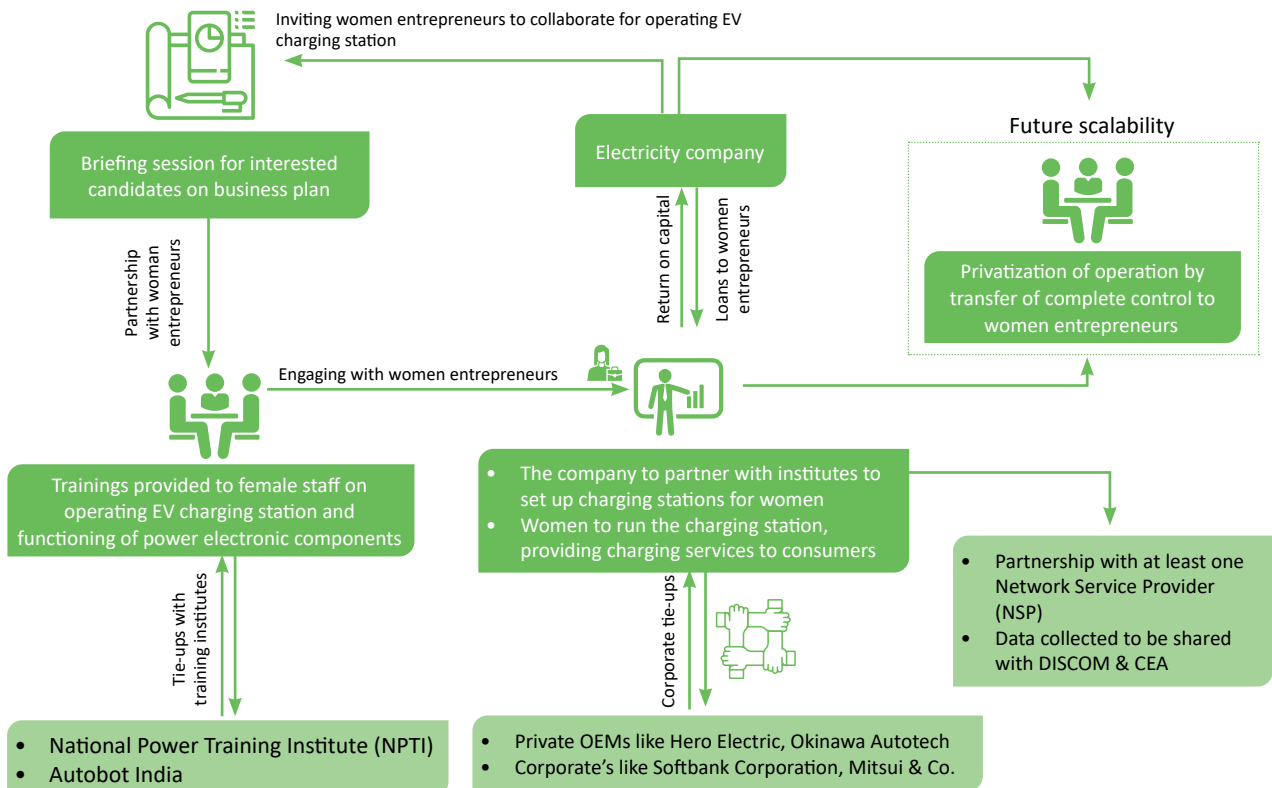
## PROPOSED INITIATIVE 3

### Women-operated charging stations

- One of the main barriers to EV adoption in the country is the lack of reliable, accessible and affordable charging infrastructure without which EV adoption will be difficult<sup>29</sup>. This creates demand for setting up of charging stations to fuel the growth of the EV industry in the nation.
- Women-operated charging stations may be encouraged with the twin objective of scaling up infrastructure for the growing EV demand and enhancing women's participation in green transport.

- Partnering with at least one network service provider to facilitate advance remote/online booking of charging slots is mandatory.
- Data collected from the owner has to be shared with the appropriate distribution company and also the Central Electric Authority so as to receive a clearance certifying that the station is ready to start servicing EVs<sup>30</sup>.
- Training may be provided on EV charging station designing, power electronics manufacturing, manufacturing of EV supply equipment chargers.
- Mobilization of public and private players to set up hard infrastructure, which may then be operated by women (in the capacity of service providers) is required.
- Investment in EV charging infrastructure with operational control in the hands of women may be extended as benefits under the social corporate responsibility policy.
- Policies for charging service provider companies to conduct in-house training for women may be developed.

Figure 10: Business model for women operated EV charging stations



<sup>29</sup> Soman, Abhinav, et al., 2019. India's Electric Vehicle Transition Impact on Auto Industry and Building the EV Ecosystem.

<sup>30</sup> [https://powermin.nic.in/sites/default/files/webform/notices/Charging\\_Infrastructure\\_for\\_Electric\\_Vehicles%20Revised\\_Guidelines\\_Standards.pdf](https://powermin.nic.in/sites/default/files/webform/notices/Charging_Infrastructure_for_Electric_Vehicles%20Revised_Guidelines_Standards.pdf)

4.

Water Management





**M**ore than 1.2 billion people globally do not have access to drinking water today and twice that number does not have access to sanitation.<sup>31</sup> While India makes up about 16 percent of the world's population, its geographical area covers only 2 percent, creating but natural stress on available resources.<sup>32</sup> Nearly 600 million of the country's 1.3 billion people face extreme water stress currently.<sup>33</sup> Its per capita water availability has fallen from 1,816 cubic metres in 2001<sup>34</sup> to 1,545 cubic metres in 2011 and demand for water is expected to double this number by 2030. To add to its challenges, nearly 70 percent of water is contaminated contributing to its 120th rank in the Water Quality Index calculated for 122 countries.<sup>35</sup> In this context, good water management practices become extremely relevant and vitally important.

At present, the water sector primarily constitutes water supply and treatment. Crucial areas of water management including water conservation and management and their potential for solving the water challenge as well as providing jobs to a large proportion of the population; the last has not yet received the attention it deserves. The potential of water management in providing jobs and entrepreneurship opportunities to women needs to also be looked at.

The sector report considers **watershed management and rooftop rainwater harvesting (RWH)** as focus areas.

## KEY FINDINGS

Major findings of the study are summarized below.

### Skill Gap Analysis

Cumulative jobs in water management are estimated to increase to 19 million by 2030 as opposed to 3 million in 2020. Having said that, a limited number of job roles have been identified in the sector so far:

- Under watershed management, QPs have been defined by the Agriculture Skill Council of India, viz., watershed community mobilizer, service technician-watershed, watershed assistant, watershed consultant, watershed engineer, watershed manager, watershed supervisor in addition to a few allied roles; and
- Job roles directly pertaining to rooftop RWH are not defined/available in the public domain yet.

In addition to the defined QPs directly pertaining to this areas of focus, a few relevant QPs under different occupational maps/ SSCs can be linked which are listed in Table 16

**Table 16:** Job roles with existing QPs

Watershed Management	Rooftop Rainwater Harvesting
<ul style="list-style-type: none"> <li>• Watershed Community Mobilizer (NSQF 5)</li> <li>• Watershed Consultant (NSQF 8)</li> <li>• Service Technician-Watershed (NSQF 4)</li> <li>• Watershed Engineer (NSQF 6)</li> <li>• Watershed Assistant (NSQF 3)</li> <li>• Watershed Manager (NSQF 7)</li> <li>• Watershed Supervisor (NSQF 5)</li> <li>• Soil and Water Testing Lab Analyst (NSQF 5)</li> <li>• Soil and Water Testing Lab Assistant (NSQF 4)</li> <li>• Soil Sampler/ Collector (NSQF3)</li> <li>• Micro Irrigation Technician (NSQF 4)</li> <li>• Aquaculture Technician (NSQF 4)</li> <li>• Aquaculture Worker (NSQF 3)</li> </ul>	<ul style="list-style-type: none"> <li>• Soil and Water Testing Lab Analyst (NSQF 5)</li> <li>• Soil and Water Testing Lab Assistant (NSQF 4)</li> <li>• Soil Sampler/Collector (NSQF 3)</li> </ul>

<sup>31</sup> Ministry of Urban Development, August 2013. Advisory on Conservation and Restoration of Water Bodies in Urban Areas.

<sup>32</sup> <https://dolr.gov.in/integrated-wasteland-development-programme>, accessed, 18 February 2020.

<sup>33,34</sup> NITI Aayog, June 2018. Composite Water Management Index.

<sup>35</sup> <https://pib.gov.in/newsite/printrelease.aspx?relid=119797>, accessed, 15 January 2020.

## Existing Training Infrastructure

- Across the country we have government and private institutes providing regular degree programmes and diplomas in water management and its conservation. Apart from this, NGOs and organizations working in on-ground implementation are also providing training in rural areas; and
- It is notable that, despite having seven watershed management job roles listed, no training provider has been designated by the SSCs yet to provide training for these job roles.

## Growth Potential

- **Ongoing projects:** Considering their magnitude and nature, watershed projects require a completion time of four to seven years. According to the Standing Committee on Rural Development report,<sup>36</sup> only 849 out of 8,214 projects sanctioned (between 2009-10 and 2014-15) have reported completion as on October 2017. The on-going projects have a potential to create employment as do the newly sanctioned ones.
- **Rainwater harvesting:** There has been increasing use of RWH for groundwater recharge. Reports suggest that the RWH market in India grew at a compound annual growth rate of 6.56 percent during the period 2017-2021<sup>37</sup> thereby improving the employment potential of the sector.
- **Infrastructure development:** Currently about 20 percent of the rural population has access to piped drinking water.<sup>38</sup> Providing access to clean drinking water and sanitation facilities is a priority for every government and also India's commitment under SDG 6. Setting up of rural water supply systems is an opportunity with the potential to create a significant number of jobs.
- **Technology:** Technologies for processes such as desalination and wastewater reuse have the potential to contribute positively to employment statistics. Desalination units are a potentially viable solution in freshwater

stressed areas. The country currently generates 140 billion cubic metres of wastewater every year. Wastewater has been found to be utilizable for multiple purposes such as aquaculture (stabilization ponds), wastewater irrigation, use in the livestock sector, etc.

## CHALLENGES TO GROWTH IN THE SECTOR

**Need for updated policies:** Considering the scarce nature of water today, a review of existing state policies and their subsequent implementation is essential. As more and more industries are being set up and per capita water availability is reducing, state policies need to be constantly updated to ensure equitable distribution of this scarce resource. While the National Water Policy is being updated with this objective, most states do not have an updated water policy at present. Maharashtra and Meghalaya are the only states where the water policy has been updated in recent times.

**Management of available funding:** Watershed management and water supply projects are infrastructure projects involving significant funds and implementation needs to be carried out with due planning.

**Component of multiple sectors:** What works as an advantage in some ways in the water sector is also a disadvantage in others. Water is multi-sectoral in nature, which means that skilled professionals in the field are also suited for work in certain other sectors (such as construction, textile, agriculture) and often make the switch as required. This results in a two-pronged disadvantage for the sector.

- **Floating workforce:** Firstly, the sector workforce for highly skilled professional as well as unskilled labour is itinerant. Because of the floating workforce at all skill levels, it is difficult to account for the number of people employed by the sector. Examples of this floating workforce include GIS expert (highly skilled); plumbers (semiskilled), construction labour (unskilled and semiskilled). Assumptions will have to be made to assign employment numbers to the sector when accounting is done; and
- **Allied area knowledge:** Secondly, skilled professionals working in the sector need to have knowledge of not only their area but also of allied areas. As an example, a geologist and

<sup>36</sup> [http://www.indiaenvironmentportal.org.in/files/file/Watershed%20Development%20Component%20of%20Pradhan%20Mantri%20Krishi%20Sinchayee%20Yojana\\_0.pdf](http://www.indiaenvironmentportal.org.in/files/file/Watershed%20Development%20Component%20of%20Pradhan%20Mantri%20Krishi%20Sinchayee%20Yojana_0.pdf), accessed: 25 March 2020.

<sup>37</sup> <https://www.prnewswire.com/news-releases/rainwater-harvesting-market-in-india-2017-2021-300485759.html>

<sup>38</sup> [https://jalshakti-ddws.gov.in/sites/default/files/JJM\\_Operational\\_Guidelines.pdf](https://jalshakti-ddws.gov.in/sites/default/files/JJM_Operational_Guidelines.pdf)

limnologist working in watershed management will need to identify the impact of their suggested intervention in the allied area as well, in the absence of which, sustainability of the project may be affected<sup>39</sup>. The impact may most be seen in cases where only one of these experts is on board.

## KEY RECOMMENDATIONS AND SUGGESTED ACTION PLANS FOR IMPLEMENTATION

The section below contains some key recommendations and actions for considerations.

### Key Recommendations

- **Skill development:** There is an urgent requirement to bring the sector up to speed with developing occupational maps, job roles, training infrastructure and monitoring of progress. Decentralized training needs to be ensured to utilize the existing rural infrastructure for increased women's participation:
  - Occupational map of rooftop RWH should be approved and, subsequently, QPs need to

be developed. The roles listed in Table 17 in watershed management and rooftop RWH have the potential for development into QPs post demand analysis; and

- Reskilling of the informal workforce (returning migrant labour) in a post COVID-19 world under various certification mechanisms is required.
- **Policy changes - tax incentives:** The government could incentivize organizations that employ a higher percentage of women by giving them tax subsidies.
- **Financing toward entrepreneurship:** Women-led SHGs could be offered increased access to credit under schemes such as PMMY and Credit Guarantee Trust Fund for MSMEs along with interest subvention plans.
- **Technologies:** Exploring technologies for processes such as desalination and wastewater reuse and business models involving water such as water quality trading and wetland banking would be very useful.

**Table 17:** Roles with potential for QP development

Watershed Management	Rooftop Rainwater Harvesting
<b>NSQF level 4 and above<sup>40</sup></b>	
<ul style="list-style-type: none"> <li>• Integrated Watershed Management Expert</li> <li>• Hydrologist/Water Resource Expert</li> <li>• Natural Resources/Environmental Expert</li> <li>• Geologist/Soil Expert</li> <li>• Limnologist</li> <li>• Social Science Expert</li> <li>• GIS/Remote Sensing/IT Expert</li> <li>• Watershed Policy Expert</li> <li>• Biodiversity Expert</li> <li>• Agronomist</li> <li>• Landscape Ecologist</li> <li>• Aquaculture Expert</li> <li>• Watershed Development Contractor</li> <li>• Stormwater Management Expert</li> <li>• Water Use Surveyor</li> </ul>	<ul style="list-style-type: none"> <li>• Rooftop RWH Consultant</li> <li>• Rooftop RWH Community Mobilizer</li> <li>• RWH Systems Design &amp; Operations Engineer</li> <li>• Rooftop RWH Surveyor</li> <li>• Sourcing Executive (Supply Chain &amp; Logistics)</li> <li>• Technical Expert (Roofing System Design)</li> <li>• Rooftop RWH Installer</li> </ul>
<b>NSQF level 4 and below</b>	
<ul style="list-style-type: none"> <li>• Watershed construction roles</li> </ul>	<ul style="list-style-type: none"> <li>• Supervisor (Plumbing &amp; Assembly)</li> <li>• Maintenance Supervisor (RWH Assembly)</li> </ul>

<sup>39</sup> Stakeholder consultations conducted for this study.

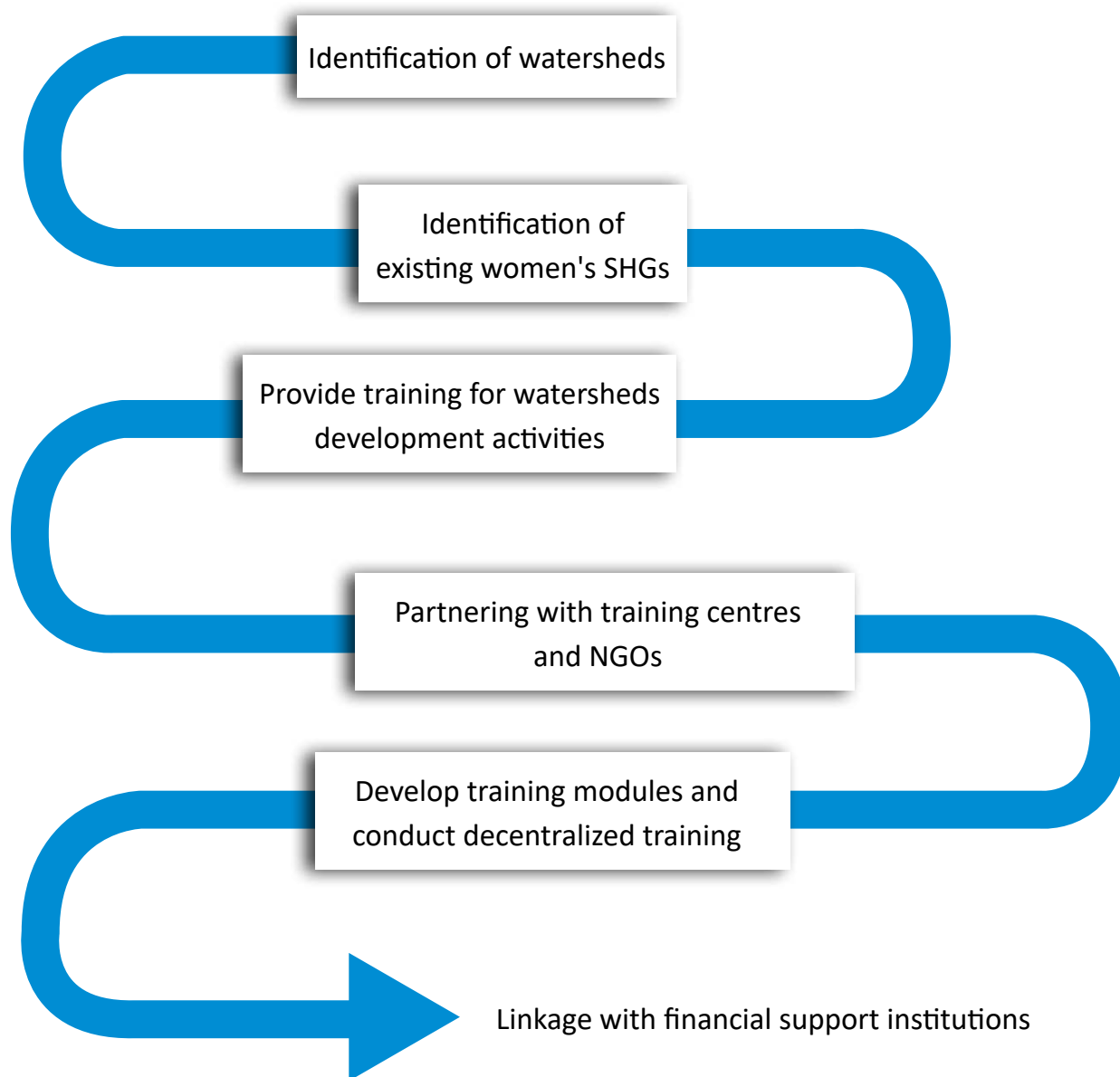
<sup>40</sup> Suggested levels based on stakeholder interactions and secondary research. A full scale study would have to be conducted by the respective SSCs in coordination with industry professionals to determine the actual skill level.

### Some Action Plans for Consideration

Exploring opportunities for women such as increased participation in watershed construction and rural water supply systems could be considered.

- **Entrepreneurs for watershed development-related construction activities:** The plan involves the development of women entrepreneurs to lead watershed development-related construction activities. Existing women's SHGs can be targeted during the initial stages, scaling up later to training individual women and facilitating dissemination of knowledge. The implementation steps for this model are shown in Figure 11.
- **Potential job creation opportunities for women in the rural water supply ecosystem:** The model would work together with the development of a rural water supply system. Construction activity required for the system would involve woman labour. Taps would be installed in every household and a water meter set up. Women would be trained to work as collectors and managers of water bills with a graded pricing based on usage. They would also be the contact point from the village in case of escalation of any issues. The initiative would be funded by a multilateral agency in addition to contributions from the centre and the states. The collected funds could be used to seed SHG-related entrepreneurship activities or for the development of the village.

Figure 11: Implementation steps



**Table 18:** Implementation steps





5.



Carbon Sinks: Forest

Globally, forest industries encompassing both timber and non-timber play a pivotal role in driving socio-economic development. More specifically, the role of non-timber forest products (NTFPs) and agroforestry is increasingly being observed in ensuring biological diversity, sustainable forest management, livelihood generation and food security. With Indian agriculture is also facing several challenges pertaining to surging demographic pressure, climate change, degradation of natural resources and the subsequently rising demand for food, timber, NTFPs, animal feed, fodder and pulp, there is immense scope for agroforestry as a means to solving these issues to a marked extent.

Agroforestry offers several livelihood opportunities through systems such as sericulture, apiculture and lac cultivation, to name a few. While the potential of 'green jobs' in the sector is explored, there is a strong argument to improve inclusivity in the sector and enhance women's participation. With the scope of this study primarily being NTFPs and agroforestry, the report aims at exploring the scope of marginalized women's participation in India's forest sector and providing recommendations to increase their participation via skill development and policy interventions.

## KEY FINDINGS

The potential of agroforestry and NTFP development as contributors to sustainable development has received emphasis from the Intergovernmental Panel on Climate Change and United Framework Convention on Climate Change as elements of climate-smart and sustainable agriculture. Additionally, the Nationally Appropriate Mitigation Actions and the United Nations Convention to Combat Desertification also discuss the role of agroforestry in agriculture, among other aspects.

### Skill Gap Analysis

Marginalized women belonging to forest-dependent communities mostly engage in jobs pertaining to harvesting and processing of forest produce. Given the current policy landscape and increasing focus on sustainable forest-based livelihoods, there is scope for increasing women's participation in value addition job roles. Skill gaps are mainly observed in value addition, sustainable harvesting practices, use of technology in processing activities, storage and preservation and marketing.

Table 19 lists job roles in the forest and agriculture sector covering NTFPs and agroforestry. Some job roles from food processing have also been included in the list, given the scope of processing of NTFPs and agroforestry produce covered in the report.

**Table 19:** Job roles in the forest and agriculture sector

Job Roles	Skills Requirements
Quality control supervisor	To check whether the produce meets quality standards
Warehouse executive/worker	Receive, sort, keep a record of and store the agriculture produce, help in documentation tasks, ensure safety of the stored products, and responsible for the transportation of products to customer locations
Harvest quality inspector	To check harvesting practices and also quality of harvest
Agri-warehouse supervisor	Supervision and coordination of tasks carried out by warehouse workers, monitoring the levels of stock
Primary sellers	Identifying markets, identifying and selling the produce to intermediaries, selling directly to final consumers
Wholesaler	Collecting produce from primary producers and selling the same to retailers
Comission agents	Act as sale agents for the primary producer and facilitates the sale of the produce
Packer/worker/helper/operator/loaders/ sorter/graders in processing	They mostly extend logistical support
Supervisors in processing	Supervising and coordinating production activities, application of knowledge, skills, machines, production methods and guiding workers

Job Roles	Skills Requirements
<b>Green Jobs</b>	
Nursery manager	Recruit people to work in nurseries, provide training on plant care, delegation of tasks to nursery workers, raisers and other employees working in the nursery, supervision of the tasks being carried out by employees in the nursery
Nursery entrepreneur	Recruit people to work in nurseries, provide training on plant care, delegation and supervision of tasks to nursery workers and other employees working in the nursery, care and maintenance of nurseries
Bamboo grower	Pre-cultivation, growing and managing crops, harvesting, post harvest processing, market identification
Harvest worker/NTFP collector	Identification of plant species, identify nationalized and non-nationalized NTFPs, sustainable harvesting practices
Forest nursery raiser/worker	Nursery chores, maintenance of nursery, maintain health and safety in the workplace, preparation of root stocks, cutting, layering, grafting
Plantation nursery raiser/worker	Nursery chores, maintenance of nursery, maintain health and safety in the workplace, preparation of root stocks, cutting, layering, grafting
Post-harvest specialist	Expertise in post-harvest handling practices, ability to provide technical training on post harvest handling of produce, expertise to identify and minimize microbiological contamination, ensure quality of water used in post harvest handling of the produce
Seed processing worker	Cleaning seeds by removing undesirable materials, drying of seeds to the desired moisture levels, taking samples for testing, treating, packaging and storing seeds in appropriate manner for the purpose of distribution
Machine operators and checkers in processing	Checkers require knowledge on grading and separation, have to adhere to quality requirements. Machine operators require knowledge of operating machines in the process line

While most of these job roles cover cultivation, harvesting and processing, there is scope for involving women in the following types of job roles and subsequently developing QPs for them:

- Auctioneer of NTFP and agroforestry produce;
- Accounting assistant for forest-based products;
- Monitoring field assistant (for supervision of forest areas);
- Operators and repairers of NTFP processing machines; and
- Seed suppliers to processing industries.

### TRAINING INFRASTRUCTURE

The Tribal Co-operative Marketing Development Federation of India Limited (TRIFED), Ministry of Tribal Affairs, Government of India, organizes capacity building and skill-upgradation training for NTFP gatherers and collectors. The training programmes cover aspects such as value addition, non-destructive/sustainable harvesting and primary processing of NTFPs. Over the past couple of years, TRIFED has successfully organized intensive training sessions on bamboo cultivation, tamarind, lac, marketing of honey, *donna pattal*<sup>41</sup> making, value addition and marketing of mahua flowers and gum karaya, among others.

In addition, there are similar training programmes offered by other ministries, government departments

<sup>41</sup> Leaf plates made of sal or siali leaves. These are mainly made by women from tribal communities.



and NGOs that focus on enhancing the skills of marginalized women engaged in forest-based livelihoods. For example, initiatives such as Swaniti that partner with government agencies and training institutes, organize training programmes on bamboo crafts with the objective of empowering underprivileged women, in particular, for better livelihoods and income security.

### Growth Potential

Gender inclusivity combined with 'green' growth is imperative for the sustainable development of the forest sector. A significant proportion of the existing job roles may be tailored to become 'green' in nature. Further, while women primarily engage in plantation and post-harvesting stages, there is a huge potential for skilling them in various green job roles such as plantation workers, NTFP collectors and labour for processing of the harvested produce. Additionally, they can also be trained to assume roles such as that of post-harvest specialists wherein their expertise in processing activities incorporating sustainable practices can be leveraged. Traditionally, men have dominated the space of marketing or market linkages whereas women possess adequate perseverance and aptitude to be trained as efficient marketing managers, provided they receive capacity building and skill development training.

While there is significant potential for women's participation in 'green jobs' in the sector, the engagement remains relatively low due to lack of adequate skills. The issue is not gender-specific, however, in conjunction with low representation in decision-making roles and male-dominated societal mind-set, it manifests as low productivity and participation of women.

### CHALLENGES TO GROWTH IN THE SECTOR

Key challenges pertain to sector-specific issues, hurdles faced by women's participation in the sector as well as major skill gaps. Overutilization of forest resources and lack of infrastructure as well as organized markets are a few other sector-specific challenges. Mainstreaming gender into the forest sector in India is fraught with several obstacles. Women-specific challenges include a patriarchal mind-set, lack of skills among marginalized women and their limited participation in decision-making and consultative roles. Skill gaps include limited skills in value addition and marketing, new methods of cultivation and harvesting and inadequate financial literacy.

Some of the main challenges have been elaborated on here:

**Low level of skilling in processing and marketing:** There are very few women at the grassroots level who are engaged in trading, retail and marketing activities of forest-based products. They lack the necessary skills in marketing and retail activities.

**Lack of knowledge in sustainable methods of cultivation:** Limited knowledge on the best practices in cultivation acts as a major skill gap that has several economic and environmental implications. Sustainable collection of NTFPs continues to be a challenge because the NTFP collectors/harvesters do not possess knowledge on sustainable harvesting practices.

**Poor representation of women in consultative roles in joint forest management committees:** Owing to lack of awareness about Forest Rights Act 2006, forest-dependent women often fail to occupy seats reserved for them in community forest management committees. Another factor that prevents the full participation of such women in forest-related consultative meetings is their unavailability during peak times when the meetings are organized. They have to attend to domestic tasks such as child-care, preparing meals and tending to domesticated livestock.

**Unavailability of gender-disaggregated data:** One of the biggest challenges to formulation of policies to enhance women's participation in the forest sector is the unavailability of evidence-based and sex-disaggregated data. Insufficient data and lack of information impede sound empirical conclusions and reduce effectiveness of policy interventions.

**Limited rights of women over assets:** The prevalence of complexities that arise from creating a distinction between men's and women's access and rights over property has always been a debilitating feature. This has led to differences in their rights over access to forest resources, trees and other species.

**Inadequate market linkages:** Marginalized women engaged in forest-based livelihoods mainly earn their living by harvesting and processing at the household level. They need greater awareness and assistance on the processing of NTFPs and agroforestry produce. They have limited inter-linkages with organized sectors such as food processing, among others.

### Limited knowledge on methods of acquiring credit:

Even though there are organizations such as the National Bank for Agriculture and Rural Development (NABARD), commercial banks and regional rural banks extending credit to people engaged in agriculture and allied activities, the lack of awareness among the targeted beneficiaries about such provisions is a major problem. Their lack of awareness leads them to borrow from informal parties and moneylenders.

While several measures have been undertaken at the individual and community levels to address the challenges described above, these haven't been adequate in fostering the kind of change desired at a broader scale.

### KEY RECOMMENDATIONS AND SOME ACTION PLANS FOR CONSIDERATION

Forests are vital ecosystems serving as a source of sustenance for a significant proportion of the marginal population, specifically women. This section of the society requires multi-dimensional support to thrive and secure sustainable livelihoods in the forest sector. The report proposes recommendations substantiated with relevant case studies to highlight how the participation of women in the NTFP sector and in agroforestry can be increased and sustained in the long run.

#### Key Recommendations

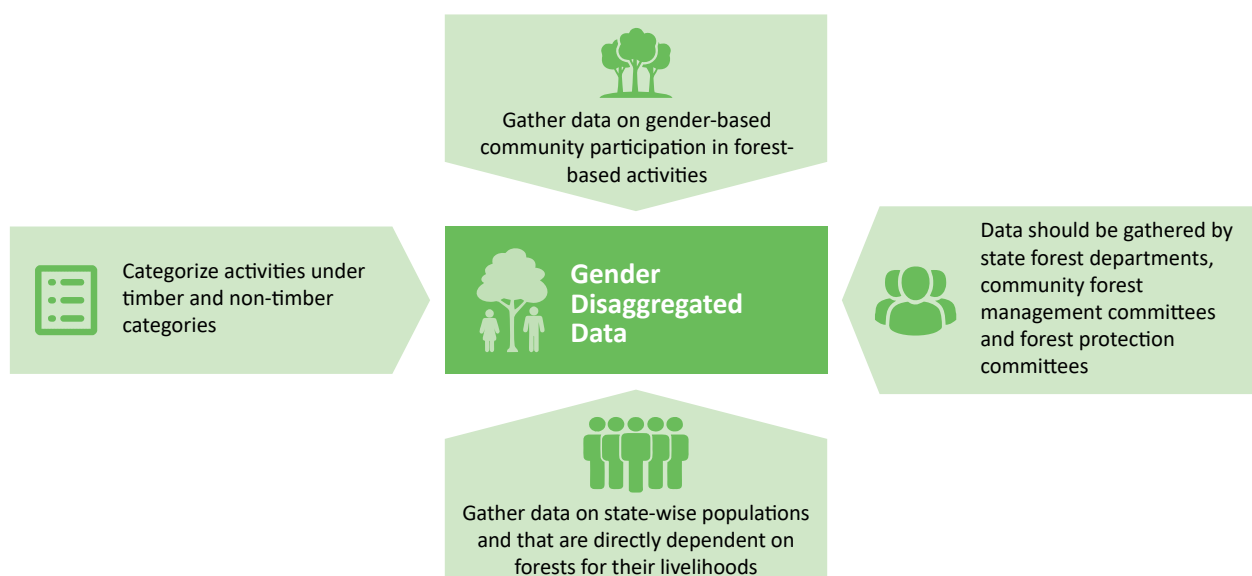
**Develop gender-disaggregated databases pertaining to the forest sector:** As a policy intervention, it should be a

requirement for states to have adequate data repository on gender-disaggregated information and on forest produce.

While the Ministry of Tribal Affairs provides details on the area-specific NTFPs and forest products grown in all states in India, the state agencies can take up the responsibility of identifying the state-wise population that is directly dependent on forests for their livelihoods. This would involve gathering data on gender-based community participation in forest-based activities. And these activities should be categorized as per timber and non-timber-based activities. This type of data should be gathered by state forest departments, community forest management committees and other forest protection committees. Acquiring this information can aid in capacity-building, training interventions, insurance cover, strengthening marketing information, R&D and agroforestry development.

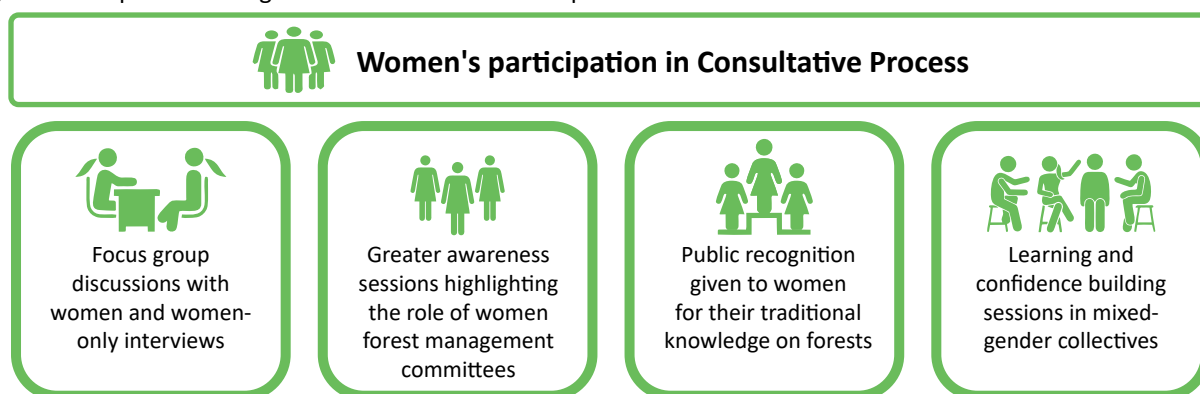
**Enhancing women's participation in the consultative process:** Reliance of women on forests for sustenance requires them to work longer hours and obsolete social structures often lead to 'gender-blind' approach in consultative process. Past experiences suggest that obtaining inputs from women about their strategic needs and opinions on a decision involving community benefits has led to long-term sustainable and positive impacts on the entire community. For example, in the pre-operation stage of a bridge construction project in Sri Lanka<sup>42</sup>, the community women were asked to give their inputs. Considering the fact that the bridge was

Figure 12: Framework for acquiring gender disaggregated data



42 Briefing note: On Gender, Peace, Security and Development.

**Figure 13:** Steps in involving women in the consultative process



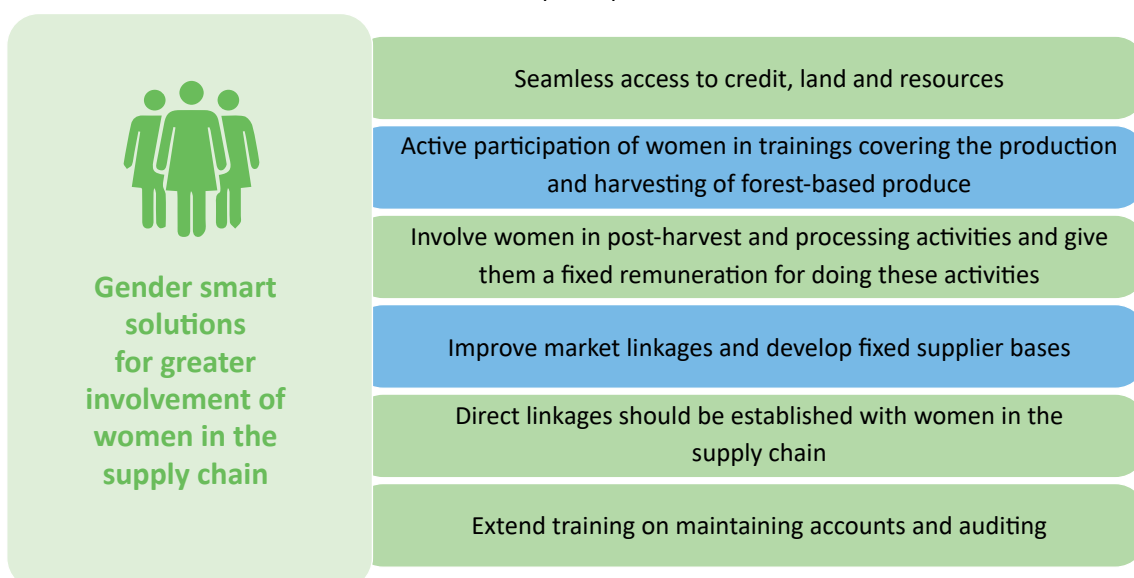
not only meant for vehicular movement but also for pedestrians involving women and children, a separate lane was constructed specifically for the safe movement of pedestrians.

Owing to domestic demands and familial constraints, women seldom have the time to attend the community meetings such as those organized by community forest management committees. In such a situation, gender-responsive participatory activities such as focus group discussions and interviews with women can be conducted to get their inputs for the decision-making process. Marginalized women belonging to forest-dependent communities need to be educated on and made aware of their role in community forest management committees. Public recognition of the traditional knowledge on forests that women possess can lead to greater involvement of women in decision-making roles. Mixed-gender collectives and similar groups should be encouraged to promote learning and confidence building.

**Extend financial literacy:** Owing to limited knowledge about credit offered by organized markets, most marginalized women in the forest sector obtain funds from private and local moneylenders which, in turn, increases their indebtedness and adds to their financial burden. It is therefore vital to establish financial linkages and provide assistance to beneficiaries to avail credit from banks, central and state government financial institutions, and bodies such as the National Scheduled Tribes Finance and Development Corporation (NSTFDC).

**Linking NTFP and agroforestry produce with the food processing industry and enhancing women's participation in the supply chain:** Commercial agroforestry systems involving eucalyptus, leucaena, poplar and casuarina have potential in different states of India. In fact the systems can thrive and flourish especially when industrial linkages can be established for them. This is also applicable to fruit-based processing industries when women producers and suppliers of NTFPs and agroforestry produce can be included in the food supply chain. It calls for gender-

**Figure 14:** Gender-smart solutions to enhance women's participation





smart solutions that would increase the participation of women in the entire supply chain.

Direct linkages should be established with women in the supply chain. This will not only enable them to have greater control over their assets but also benefit them greatly. For example, generally, male farmers receive payments on behalf of the women. However, if women are equipped with skills in maintaining accounts and auditing in agroforestry and NTFP-based activities, they themselves can directly interact with the buyers and thus ensure greater transparency in transactions. Such a measure can be introduced in existing women-based cooperatives, collectives and SHGs.

This also calls for investments in logistical support and cold storage facilities, particularly with regard to the marketing of fruits and aromatic and medicinal plants. Industries engaged in crop- and wood-based products can also explore products that are derived from agroforestry systems. The role of the private sector can be enhanced especially in bio-fuels and tree-borne oilseeds.

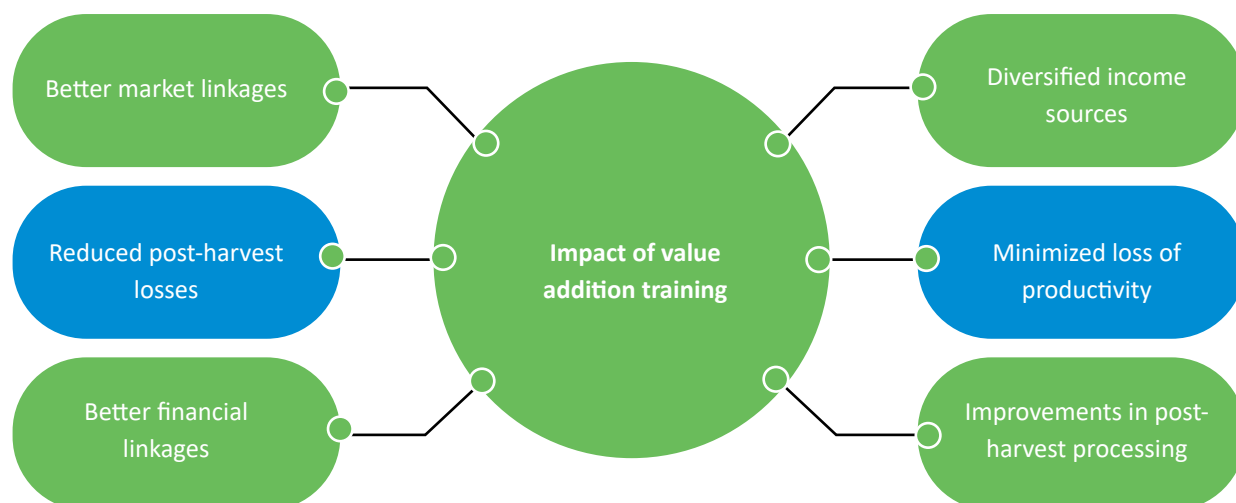
**Strengthening institutional set-ups:** Training in agroforestry and related practices should be provided to marginalized women through Krishi Vikas Kendras. These institutions should be strengthened so that capacity building workshops and training programmes can be held for women belonging to forest-dependent communities. Agriculture, being a state subject, should also include agroforestry as an important element. Krishi Vikas Kendras act as resource and knowledge

centres covering agricultural technologies for initiatives undertaken by private and public bodies to improve agriculture productivity in the particular district. They also undertake capacity development initiatives for farmers and extension personnel. Similar such training and capacity building initiatives can also be undertaken for marginalized women engaged in agroforestry and forest-based activities.

**Extend value addition training:** Value addition can help reduce post-harvest losses and wastage. Post-harvest losses can lead to a loss of productivity from anywhere between 5 and 25 percent. Marginalized farmers often refrain from growing certain types of farm produce because it does not have a readily available market. However, integrating agroforestry with regular farming practices can lead to income generation from diverse sources such as apiculture, lac, aromatic and medicinal plants, spices, gums and resins, among others. Training on value additions to farming and NTFP collection provided to marginalized women can help them to earn decent incomes.

For example, the Dona Pattal Project organized by TRIFED for women from tribal communities in Kandhamal district, Odisha, resulted in better market linkages and stable incomes for them<sup>43</sup>. TRIFED extended the training on value addition to sal leaves. The women used to earlier sell their handmade sal leaf plates in the local market and earn a monthly income ranging between INR 300-400. TRIFED identified a demand base for the sal leaf plates at Tirumala Tirupati Devasthanam Trust. It obtained an order from the trust

**Figure 15:** Impact of training in value additions



43 Success Stories on MFP Activities.

for the regular supply of sal leaf-plates. This led to the establishment of the Kandhamal Women's Leafplate Cooperative Ltd. by an SHG formed by PRADAN. TRIFED conducted training for nearly 156 tribal women belonging to 14 SHGs.

**Train women to become agro-dealers:** Agro-dealers are links between primary producers (NTFP collectors, agroforestry cultivators) and markets and traders. With the help of NGOs, women can be trained to become agro-dealers. In fact this would enable companies to expand their presence to rural and remote areas. The direct link created between such agro-dealers and companies would lead to greater brand loyalty, transparency of operations, higher access of women agro-dealers to inputs, and greater access to organized markets.

**Ecosystem service pricing:** The role of agroforestry holds good promise in the area of environmental services via the "ecosystem service pricing" mechanism. This would necessitate the establishment of a reward mechanism for the rural poor in providing services that lead to carbon sequestration, biodiversity conservation and also watershed protection. By resorting to agroforestry, marginalized women engaged in small-scale farming can supplement their farm-based incomes with additional earnings from agroforestry produce, thereby also ensuring conservation of natural resources.

## SOME SUGGESTED ACTION PLANS FOR CONSIDERATION

An example of fostering entrepreneurship in the area of herbal medicines and cosmetics has been used to develop the proposed action plan in the report. Key stakeholders involved are a herbal specialist who assumes the role of a master trainer, botanist, Ayurveda doctor, researcher of herbal medicine and a pharmacist of Ayurveda.

Figure 16 provides an illustration of the **proposed action plan**.

## ECO-ENTREPRENEURSHIP

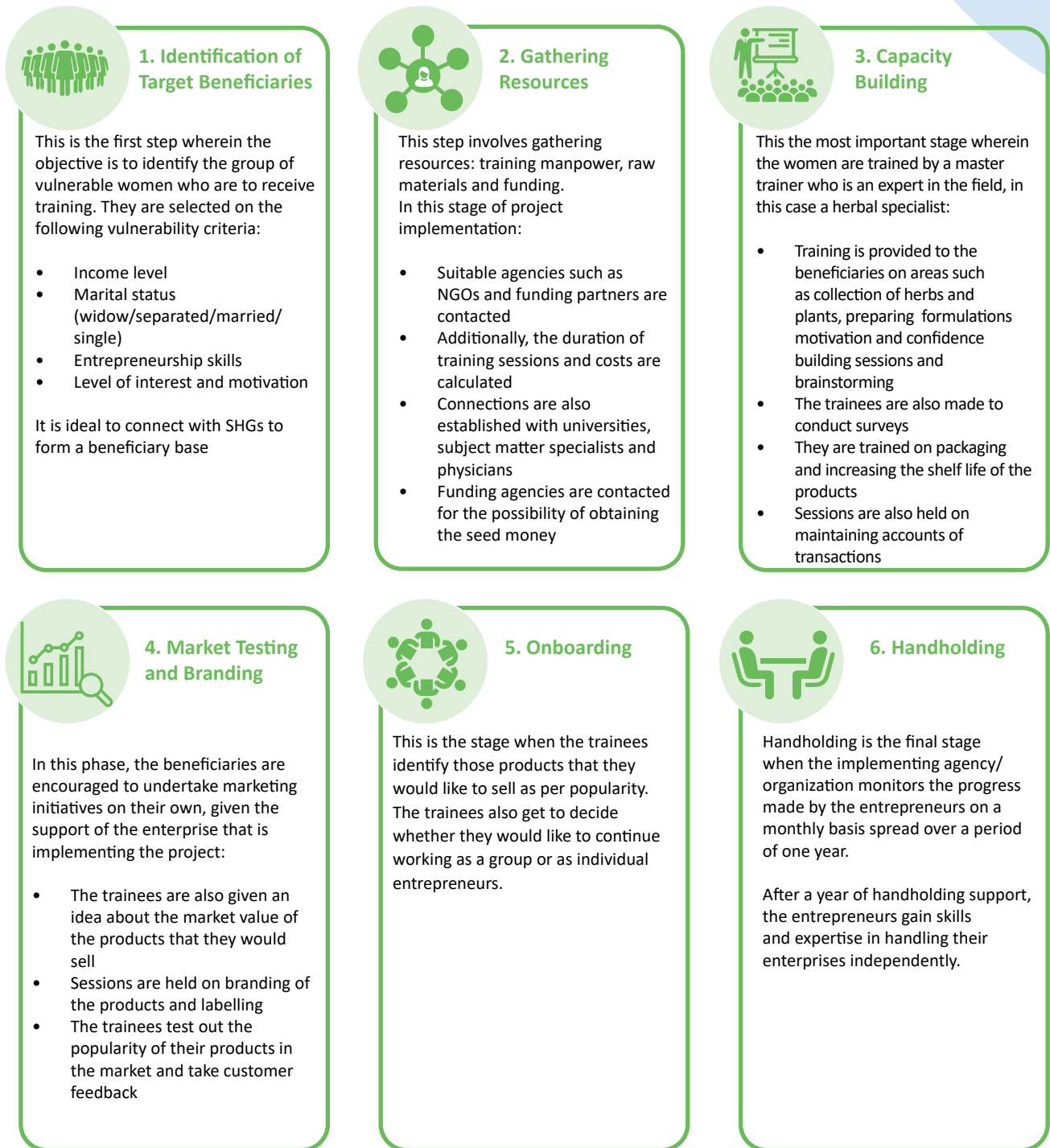
The report explores key aspects required to create a conducive environment for eco-entrepreneurial ventures with regard to NTFPs and agroforestry. Three case studies that have been illustrated highlight the scope for entrepreneurial ventures by marginalized women engaged in the forest sector. Key takeaways from the case studies are:

- Imparting short-term training to women on key specific areas such as sustainable harvesting practices and efficient processing techniques can help women to apply their skills commercially and turn them into a gainful source of income;





**Figure 16:** Proposed action plan to enhance women's eco-entrepreneurship



- Imparting financial literacy on deriving a high return on minimal investment is the type of training that marginalized women need to be familiarized with; and
- Developing innovative solutions can increase the probability of women participating in male dominated jobs thereby thwarting gender biases.

Four key aspects need to be considered while extending trainings for eco-entrepreneurial ventures: existing skill levels of the beneficiaries, available financial resources, training required and existing markets for the proposed product.



6.

A photograph of two women in a fish market, surrounded by large piles of fish, with a green overlay. The women are sitting on the floor, sorting through the fish. One woman is looking towards the camera, while the other is looking down at the fish. The background shows more fish and baskets.

# Carbon Sinks: Marine Fisheries



With the global population projected to rise to 9 billion by 2050, the need for ensuring food security will take centre stage in the course of meeting global nutritional requirements. Nearly 16 percent of animal protein consumed globally comprises fish. In addition, almost 820 million people around the world depend on fisheries and aquaculture for their livelihoods. These include both highly organized as well as small scale and informal livelihoods comprising a host of pre- and post-harvest activities in the fisheries sector. As the sector gains traction globally, it is projected to register positive growth over the next couple of years. In India, fisheries make a nearly 1.1 percent of contribution to the country's GDP. The rise in production domestically has been accompanied with increased workforce engagement, with over 14 million people employed in the sector.

The study mainly focuses on marine **fisheries and aquaculture**. According to the Handbook on Fisheries Statistics 2018, Government of India, Ministry of Fisheries, Animal Husbandry and Dairying Department of Fisheries, the average annual growth rate in marine fisheries was 1.73 percent in 2017-18 and inland fisheries grew by 14.05 percent. While the entire Indian fisheries industry continues to grow, we can anticipate an increased participation of women in marine fisheries

in India. The geographic scope of the study includes the states of Maharashtra, Karnataka, and Odisha.

## KEY FINDINGS

While fishing as an economic activity is not green, there is scope for introducing sustainable measures in the activities that are carried out in this sector.<sup>44</sup> The rising environmental concerns associated with the sector call for development and adoption of sustainable strategies such as genetic selection, biosecurity and disease control and digital innovation, with business developments in investment and trade.<sup>45</sup>

Other measures, such as maintaining recommended mesh size, preventing capture of juvenile fishes, increasing long-term sustainable yield and ensuring that sufficient fish survive to maturity<sup>46</sup> thus serving as a sustainable option for fishing. Destructive fishing practices may result in irreversible damage to aquatic habitats and ecosystems. Hence it is imperative to discourage these practices, leading to the preservation of the aquatic ecosystem.

Based on the sustainable activities described above, job roles that can be termed as green include deep sea fisher, small-scale fisher, net maker and mender, fish waste segregator, fish meal processor, to name a few.

**Table 20:** Job roles with available QPs

Job Roles	Description	NSQF Level
Fisheries Extension Associate	Responsible for mobilizing members of the fishing community for extension training and other activities at the community level	3
Aquaculture Fabricator	Responsible for carrying out day-to-day activities required for aquaculture fabrication in the aquaculture work site	4
Aquaculture Technician	Responsible for maintaining all aspects of the fish farm and cultured organisms	5
Aquaculture Worker	Responsible for carrying out culture operations at a fish farm under the guidance of an Aquaculture Technician	3
Fish Retailer	Responsible for assessing demand, procuring fresh fish and selling fish for retail purposes to consumers	3
Fishing Boat Deckhand	Responsible for the maintenance and upkeep of the fishing boat while underway at sea and at harbours	4
Fishing Boat Driver	Responsible for steering and navigation of fishing boat	4
Fishing Boat Maintenance Worker	Responsible for the maintenance and cleaning of decks and machinery spaces	3
Fishing Boat Mechanic	Responsible for the running and routine maintenance of all machinery on a fishing boat	4

<sup>44</sup> <https://greentumble.com/sustainable-fishing-practices/>

<sup>45</sup> Food and Agriculture Organization, 2020. The State of World Fisheries & Aquaculture Sustainability in Action.

<sup>46</sup> <http://www.fao.org/3/AC749E07.htm>

Job Roles	Description	NSQF Level
Fishing Equipment Technician (Electronics)	Responsible for ensuring proper maintenance/repair of electronic equipment on the fishing boat	4
Marine Capture Fisherman	Responsible for using different equipment, choosing the appropriate crafts and methods, catching fish and marine life and on-board handling of marine catches for public consumption, etc.	4

## SKILL GAP ANALYSIS

There are a host of skill gaps existing in the marine fisheries sector in India. Key skills gaps that need to be addressed for mainstreaming gender in the sector include:

- Limited knowledge on methods of preserving and storing fish:** Limited knowledge about alternate techniques of fish preservation among women if ice-based storage facilities are unavailable. Also, if the fish stock goes stale, they should be able to separate out the bony structures and other useless components of the fish and divert those into value-added applications.
- Unsustainable waste build-up:** Women fisher folk often fail to deal adequately with by-catch, juvenile catch and damaged catch, leading to discarding of waste in an unregulated manner.
- Use of incorrect mesh size:** There is lack of awareness among the women fisher folk about the importance of using the government-mandated mesh size for fishing.
- Unsustainable post-harvesting handling:** Since the women working in the fish handling stage lack the expertise to identify and segregate plastic waste components getting mixed with the fish catch, they end up discarding a major portion of the catch because of contamination. This leads to lower volumes of marketable catch.
- Limited knowledge of utilization of waste fish:** There is a limited knowledge and skill on the value adding applications of the discarded portions of fish. Discarded and waste fish can also be utilized effectively to produce value added products, which the women fishers may not be aware of.

### Training Infrastructure

Imparting appropriate training and providing technical assistance at various segments of the value chain is imperative to increase meaningful participation and improve knowledge and skills required in the sector.

**Table 21:** Organizations that provide training in the fisheries sector

Name of the Organization	Brief about the Organization
Department of Fisheries, Government of Maharashtra	The Department of Fisheries is an administrative department of the Ministry of Agriculture, Animal Husbandry, Dairy Development and Fisheries. Its other wings include: Maharashtra Fisheries Development Corporation, Mumbai; Taraporewala Marine Biological Research Station, Mumbai; Fisheries College, Konkan Krishi Vidyapeeth, Ratnagiri; Maharashtra Animal & Fisheries Science University, Nagpur
Karnataka Fisheries Development Corporation	Established under the Companies Act, 1956, Karnataka Fisheries Development Corporation is actively engaged in activities such as deep-sea fishing operations and training, construction of mechanized boats, establishment of cold chains, and marketing of marine fish in the state
Fisheries and Animal Resources Development Department, Government of Odisha	This department focuses on the welfare of the fisher folk community in the state and promotes scientific aquaculture. It lays down the schemes and guidelines pertaining to the fisheries sector.

## GROWTH POTENTIAL

The last marine fisheries census in India was conducted in 2010. Since the sector has grown significantly over the last decade, it is difficult to arrive at reliable estimates based on the census figures. Hence, job projections in this sector are primarily arrived at through stakeholder consultations:

- It has been estimated that, in the next few years, there will be an enhanced engagement of women in managerial roles; close to 7 to 8 percent increase is projected. Further, unskilled roles specifically with respect to small-scale fishing and local fish vending will witness increased participation of women by nearly 9 to 10 percent.
- Mass skilling efforts by various states and national bodies are expected to boost entrepreneurship opportunities for women and increase their participation in higher management roles.
- Imparting appropriate training and providing technical assistance at various levels of the value chain is another factor that can lead to meaningful participation of women in the sector and improve their knowledge and skills.

## CHALLENGES TO GROWTH IN THE SECTOR

- **Lack of regulatory framework:** A number of commercially viable activities such as breeding marine ornamental fish, marine cage breeding of fin fish, sea-weed culture, etc., remain largely unexplored due to the lack of a robust policy framework.
- **Limited access to finance:** Currently the subsidies available in the sector are primarily for fuel, modern fishing gear, fishing nets, ice plants and marketing infrastructure. Along with these subsidies, some welfare programmes provide financial support to fisher folk communities during the monsoon season, housing welfare, security and insurance<sup>47</sup>. However, these subsidies and incentives need to be expanded in the country to make fishing a more commercially viable occupation in the country:<sup>48</sup>
  - Fishermen and marginal farmers mostly resort to informal sources of finance owing

to the absence of a well-developed system of obtaining finance from the organized sector. The flow of credit into the marine fisheries and aquaculture sector is weak; and

- Lack of proper training, credit support and limited access to markets are some of the glaring issues in women's employment in the fishing industry, preventing them reaching their full potential.

## OTHERS

- Rearing and breeding of local area-specific varieties such as sea bass and crabs is yet to receive the necessary support in terms of technology development via in-depth R&D initiatives;
- Women in entrepreneurial roles sometimes lack the basic skills to assess the quality of the catch leading to loss of market and customer base; and
- Lack of knowledge around the existing markets and relevant expertise to tap into potential markets for selling marine catch/produce.

## KEY RECOMMENDATIONS AND SOME ACTION PLANS FOR CONSIDERATION

From the sustainability, livelihoods, resource use and nutritional security points of view, women in fisheries occupy an important role at the national and regional levels.

Women generally do not participate in deep-sea fishing since it entails extreme physical labour and is also time consuming. Also, women's role is generally limited to small-scale fishing since they have domestic responsibilities and familial commitments. Auctioning of fish catch at the landing harbours remains a male-dominated activity. While, wholesale and retail activities witness equal participation of men and women, local fish vending is usually carried out by women engaged in the sector.

### **Key Recommendations**

The shift towards green growth in the sector requires significant investments in the areas of green technology and awareness on sustainability of fisheries and aquaculture. Green technologies include low impact, fuel-efficient fishing methods; innovative

<sup>47</sup> <https://india.mongabay.com/2020/03/marine-subsidies-are-a-mess-say-small-scale-fishers-of-southern-karnataka/>

<sup>48</sup> UNCTAD, 2019. Advancing Sustainable Development Goal 14: Sustainable fish, seafood value chains, trade and climate.

multi-trophic aquaculture production systems using environmentally-friendly feeds; reduced energy use and greener refrigeration technologies; and improved waste management in fish handling, processing and transportation.

### Skill Development

- Imparting training on sustainable fisheries management to cooperative members and offering training grants to these cooperatives so as to conduct skill development workshops for women on sustainable fishing activities.
- Conduct financial literacy workshops for women to ensure marginalized women do not have to rely on informal sources of finance. Additionally, link cooperatives to local financial institutions to improve access to credit. For instance, Kerala State Cooperative Federation for Fisheries Development Ltd. offers interest-free loans to women vendors with the help of the state government to control informal credit mechanisms in the sector. The organization, as a part of their micro-credit scheme, also arranges credit linkages with the National Backward Class Finance & Development Corporation and National Minority Finance Development Corporation at 6 percent interest per annum for SHGs. These provisions, with support from local and state governments, can be made available to women in other states as well.<sup>49</sup>

### POLICY CHANGES

- Develop sector-specific and gender-specific schemes that take into account the various differences between the post-harvest and aquaculture sectors.
- Ensure sustainable fisheries and that tenure issues take into account the requirements of women such as better working conditions and wage disparity.

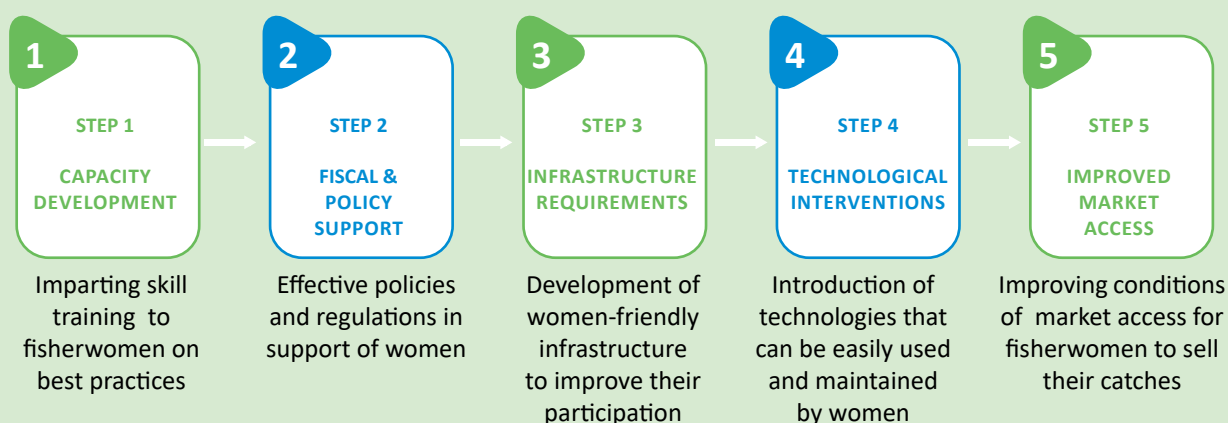
### FINANCING TOWARDS ENTREPRENEURSHIP

- Gender mainstreaming requires a push from industry bodies to encourage procurement from women-led enterprises and SHGs. Price floor and flow of technical skills around quality assessment and storage shall improve productivity and profitability of these enterprises.
- Legal contractual agreements with well-defined procurement quantities and price floor may also be introduced to guarantee income to small-scale farmers and enhance commercial attractiveness of the sector.

### SOME ACTION PLANS FOR CONSIDERATION

To enhance the overall participation of women in the sector, public-private sector partnerships, synergy between different industry bodies and a robust policy framework are required. Hence, five priority areas have been identified and the actions against each area have been mapped so as to bring a meaningful change in this sector in Figure 17.

**Figure 17:** Roadmap for enhancing women’s participation in fisheries



<sup>49</sup> <https://www.matsyafed.in/?q=self-employment-schemes>

## CAPACITY DEVELOPMENT

- Conducting skill development training programmes for women in various areas of the fisheries value chain and entrepreneurship opportunities is important<sup>50</sup>. This includes:
  - Appropriate technical assistance, training in fishing techniques, sustainable fishing practices, value addition and processing activities, latest methods of post harvesting, etc., should be designed to target women;
  - Training in less developed parts of the value chain can enhance meaningful engagement of women in the sector;
  - Conduct training for women to improve technical literacy (i.e., how to use digital finance services); and
  - Provide leadership, entrepreneurship and skill-building training for women civil society members, women's organizations, etc.

### CAPACITY DEVELOPMENT

#### **Government Organizations:**

- Agricultural Skill Council of India (ASCI)
- Central Marine Fisheries Research Institute

#### **State Organizations:**

- Fishfed Odisha
- Karnataka State Women Development Corporation (KSWDC)



## FINANCING: POLICIES AND INCENTIVES

- Government support and public-private partnerships at the grassroots levels are essential to promote commercial viability in the unorganized segment of this sector. Effective and favourable

policies and regulations to support women are important:

- The credit policy needs to be revamped so that women can have access to facilities without any collateral. For instance, the Matsyajibi Unnayana Yojana extends financial assistance to women SHGs to manage issues pertaining to marketing and procurement;
- Short-, medium- and long-term loans should be offered to women with lower interest rates;
- Special provisions must be made in legislation for women fisher folk for the lease of common property resources so that the lessee (women) can have the right of ownership over the property; and
- Shaping of policies for women to specifically address issues of post-harvest loss, including prevention and recovery.

### FINANCING: POLICIES AND INCENTIVES

#### **Government Organizations:**

- National Bank for Agriculture and Rural Development
- National Cooperatives Development Corporation

#### **State Organizations:**

- Vrutti (Karnataka)



## INFRASTRUCTURE AND SERVICES

- Setting up of infrastructure services that can easily be used and maintained by women is required to enhance their participation and reduce their workload<sup>51</sup>. This includes:
  - Setting up of childcare facilities for women;

<sup>50</sup> FAO, 2016. A Strategy for Sustainable Fisheries and Aquaculture in the Volta Basin Riparian Countries' Post-Harvest Chains and Regional Trade.  
<sup>51</sup> Ibid.



- Identifying issues arising due to centralization of fish landings from sea to harbours for women engaged in post-harvest activities in small-scale fisheries, and providing support through:
  - Safe public transport to harbours and markets
  - Access to fish through state procurement agencies.

### INFRASTRUCTURE & SERVICES

#### Government Organizations:

- The Department of Animal Husbandry, Dairying and Fisheries
- Department of Fisheries, Ministry of Agriculture and Farmers Welfare: Fisheries and Aquaculture Infrastructure Development Fund (FIDF)
- Marine Product Export Development Authority



### TECHNOLOGICAL INTERVENTIONS

- Development of technologies for women is important to make them aware of new methods being adopted in the market to reduce their time and efforts in fishing activities. This involves:
  - Introduction of technologies that can be used and maintained easily by women specifically with respect to handling, processing and transport of fish to increase shelf-life of the catch;
  - Adoption of modern tools of information technology for data communication and fish storage, improving the quality and timeliness of fisheries statistics; and
  - Conduct training for women on how to use, maintain and repair technologies associated with the value chain ecosystem<sup>52</sup>.

### TECHNOLOGICAL INTERVENTIONS

#### Government Organizations:

- Indian Agricultural Research Institute (IARI); similar to development of Agricultural Technology Information Centre, a robust ICT system dealing with concerns of small scale fisheries can also be developed
- Central Institute of Fisheries Technology (CIFT)



### IMPROVED MARKET ACCESS

- Establishing a loyal customer base is important for women to sell their catches. This is done by:
  - Ensuring access to secure, hygienic and regulated marketplaces; and
  - Introducing mobile applications for women to identify fish species, refer customers, or to inform price-setting or directly sell their catches to customers:
    - Dailyfish is an ecommerce website that deals with online sales of seafood. The website is aimed at targeting consumers in major cities of South India that do not have easy access to fresh fish. Another target audience is tech-savvy people who are used to order online products that get delivered at their homes<sup>53</sup>
    - Another start-up, Buyfish.in, launched in 2013, aims at providing online fish marketing services in Bengaluru. Orders can be placed on the app platform and products will be delivered at customers' doorsteps. With a staff strength of 27 people, infrastructural facilities such as cold storage and processing centres, the website serves around 1,800 customers in the city<sup>54</sup>.

<sup>52</sup> USAID, 2019. Advancing Gender In The Environment: Gender In Fisheries- A Sea Of Opportunities.

<sup>53</sup> <https://www.dailyfish.in/aboutus>

<sup>54</sup> <https://buyfish.in/>

## IMPROVED MARKET ACCESS

### Government Organizations:

- Indian Agricultural Research Institute
- Central Institute of Fisheries Technology (CIFT)



## PROPOSED INITIATIVE 1

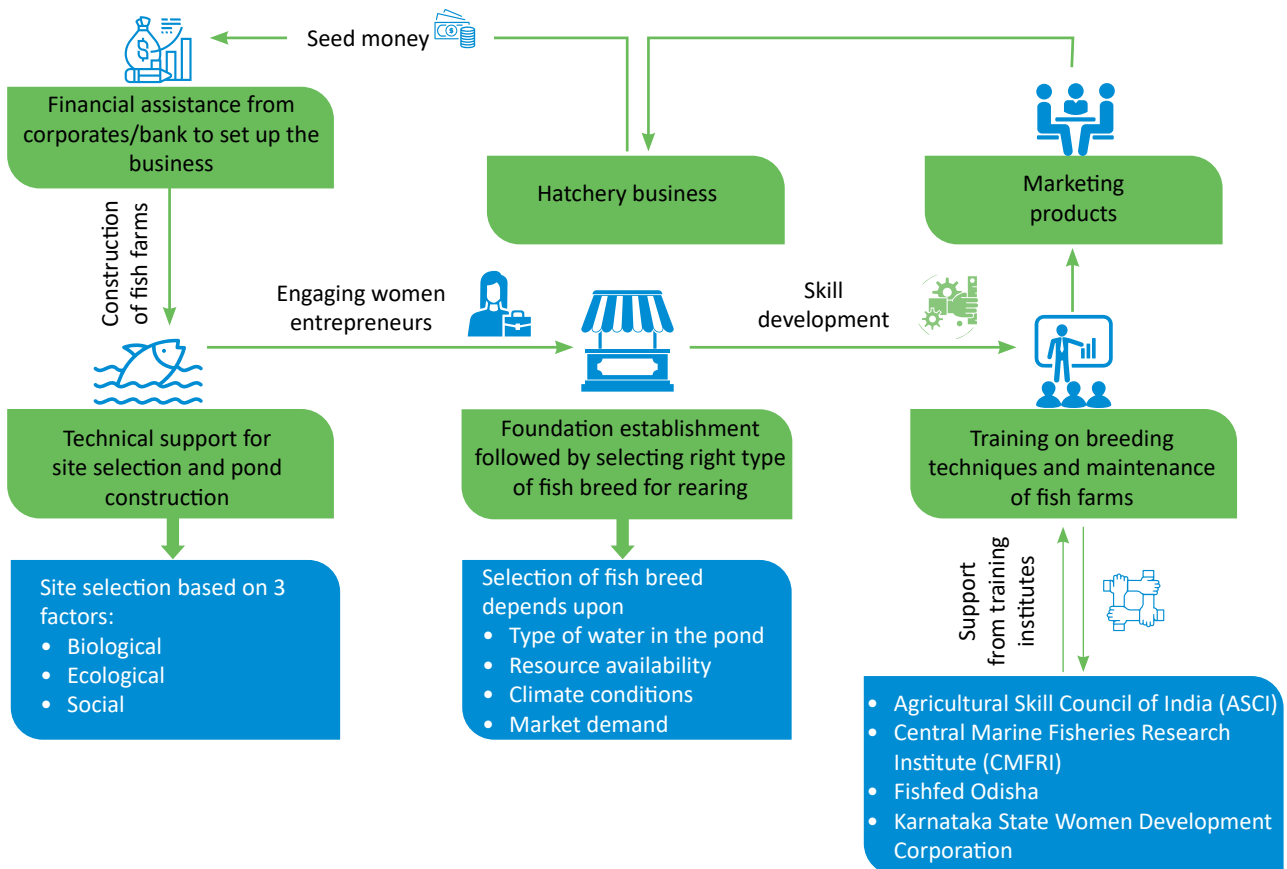
### Entrepreneurship model for hatchery management

- In order to set up fishponds, women must be supported through seed investment by the government or private organizations. Financial bodies such as NABARD and National Cooperatives Development Corporation may help these women entrepreneurs to start their businesses.
- This is followed by technical assistance by organizations such as the Central Marine Fisheries Research Institute and Central Institute of Coastal Engineering for Fishery to construct these ponds. Before construction activity begins, it is important to select the right type of site, with good water supply, depending on biological, ecological and social factors.
- After the construction activity has taken place, the next step is to decide on the right type of fish breed

## ECO-ENTREPRENEURSHIP

It is evident that women's participation is crucial to the growth and sustainable development of the fisheries sector. Inherent capabilities of women, critical to this sector, must be combined with skilling and adequate infrastructural support to improve efficiency and productivity.

**Figure 18:** Entrepreneurship model for hatchery management



for rearing purposes, which is influenced by factors such as the type of water in the pond, resource availability, climate conditions and market demand. While rearing fish in ponds, fish feeding is important so as to ensure that the fish attains maximum weight as per the market standards.

- Fish farming in India is a profitable business and thus it is critical for these women entrepreneurs to have sufficient knowledge about maintaining a fish farm. Giving them training on maintaining the water pH, occasional water treatments, establishing a customer base, etc., is important<sup>55</sup>.

## **PROPOSED INITIATIVE 2**

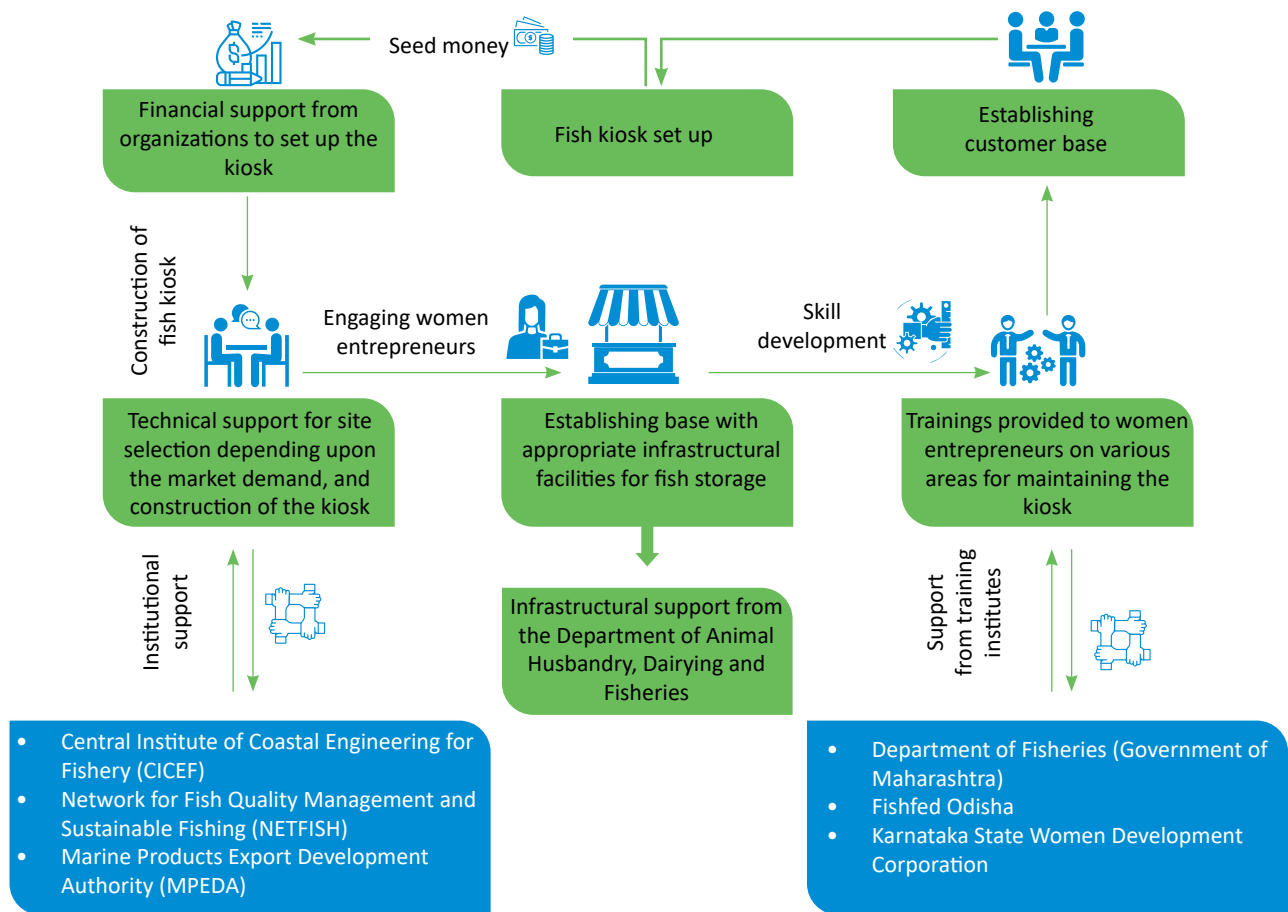
### **Entrepreneurship model for fish kiosks**

- Setting up of fish kiosks requires financial support from the government or corporates to women. Financial bodies such as NABARD, Vrutti (Karnataka) and National Cooperatives Development Corporation may help these women entrepreneurs to start their businesses.
  - This is followed by technical assistance by organizations such as the Central Marine Fisheries Research Institute and Central Institute of Coastal Engineering for Fishery to construct the kiosks, preferably close to marketplaces with high footfall
- making it easy to sell the fish products. Analysis of the site is required so as to check the availability of basic amenities including water supply, electricity supply, safety aspects for women, etc.
  - Setting up of the kiosk also requires appropriate infrastructural facilities such as storage centres, freezers for fish catches and fish products and toilet facilities for women.
  - Engaging women entrepreneurs to operate these kiosks demands some level of skill development. Thus, appropriate training in assessing the quality of catches, fish preservation and storage methods, marketing techniques, communication skills and negotiation techniques should be offered to women running these kiosks. Training in risk assessment, projecting costs and revenues and developing a business plan are imperative to expand their businesses.
  - To attract customers and develop a loyal consumer base, adoption of standard pricing methods at local or regional levels is important to set up fair prices for the catches, ensuring profit stability and reduced imbalance of negotiating power. Developing online marketplaces for these women entrepreneurs without middlemen interference and with a large consumer base and high profits saves on logistics and storage.



55 <https://www.farmingindia.in/fish-farming/#:~:text=Climate%2C%20soil%2C%20water%20and%20topography,have%20good%20water%20retention%20capacity.>

**Figure 19: Entrepreneurship model for fish kiosks**



The National Institute for Entrepreneurship and Small Business Development, in order to create more entrepreneurs in the area of dairy farming and fisheries businesses, has created an entrepreneurship

development programme to equip womenfisher folk communities with sufficient knowledge and help them set up their business<sup>56</sup>.

<sup>56</sup> <https://niesbud.nic.in/docs/2020-21/online-training/EDP-on-Dairy-Farming-Fisheries-Business-18-july-2020.pdf>



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# Annexures

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## ANNEXURE 1: SECTOR-SPECIFIC EXISTING POLICIES AND REGULATORY FRAMEWORKS

### RENEWABLE ENERGY

In order to promote renewable energy and its applications, the Government of India and state governments have outlined and implemented various renewable energy related policies and schemes at the

national and state-union territory level. MNRE is the nodal ministry which driving the renewable energy strategies in India.

Relevant renewable energy related policies or schemes implemented across the country are:

Policy/Initiative	Objective(s)	Relevant Institute
1. India's commitment for 175 GW Renewable Energy by 2022	The target of 175 GW of renewable energy capacity by 2022 has been undertaken by the Government of India. Of 175 GW, 60 GW is from wind energy. By 2019, India had achieved 37.5 GW (cumulative) from wind energy. Hence 22.5 GW is yet to be achieve	Ministry of New & Renewable Energy
2. PM KUSUM 2019	Under this scheme, agricultural diesel pumps will be replaced with solar water pumps and solarized grid connected agricultural pumps. It includes installation of 1.75 million stand-alone solar agricultural pumps and solarization of 1 million grid connected agricultural pumps	Ministry of New & Renewable Energy
3. Atal Jyoti Yojana Phase II	Under phase II, a total of 304,500 solar street-lights of 12 watt LED (200,000 in 2018-19 and 104,500 in 2019-20) to be installed in conjunction with Members of Parliament Local Area Development Scheme fund. The scheme is being implemented by EESL in the country	Ministry of New & Renewable Energy
4. National Wind-Solar Hybrid Policy	The primary objective of the policy is to provide a framework for the development of grid connected hybrid projects. The aim of this policy is to develop 10 GW capacity of wind-solar hybrid projects by 2022	Ministry of New & Renewable Energy
5. The New National Biogas and Organic Manure Programme	This scheme is being implemented to provide clean cooking fuel and to meet lighting, thermal and small power needs of farmers/ dairy farmers/ users including individual households. This programme helps rural people in many ways, i.e., it reduces the drudgery of woman, improve livelihoods, etc.	Ministry of New & Renewable Energy
6. Galvanizing Organic Bio-Agro Resources Dhan scheme	This initiative supports biodegradable waste recovery and conversion of waste into resources and provide economic and resource benefits to farmers and households along with clean villages which is the objective of Swachh Bharat Mission (Gramin).	Ministry of Drinking Water & Sanitation
7. IREDA NCEF Refinance Scheme	IREDA has published a revised refinance scheme with the support by NCEF on revival of operations of existing biomass power and SHP projects affected due to unforeseen circumstances	Indian Renewable Energy Development Agency
8. Make in India Policy	Building off India's National Manufacturing Policy, the Government of India created the "Make in India" initiative in 2014 to fortify India's domestic manufacturing industry by attracting investments, enhancing the manufacturing infrastructure and improving skill capacity in the Indian labour force. The campaign focuses on 25 industries in India, including the renewable energy sector	Ministry of Commerce and Industry

Policy/Initiative	Objective(s)	Relevant Institute
9. Skill India Mission	Skill India Mission aims to train over 400 million people in India in different skills by 2022. The aim is to provide vocational training and certification to Indian youth to ensure better livelihood opportunities and respect in the society	Ministry of Skill Development and Entrepreneurship
10. PMMY	The scheme provides loans of up to INR 1 million to the non-corporate, non-farm small/micro enterprises. MUDRA loan is extended for a variety of enterprises which provide income generation and employment creation. This includes equipment finance for micro units as well as transport vehicle loans	Micro Units Development and Refinance Agency Ltd.
11. Sustainable Finance Scheme by SIDBI	The objective of this start-up scheme by the government is to assist the entire value chain of energy efficiency/cleaner production and sustainable development projects which lead to significant improvements in sustainable development in the MSMEs which are presently not covered under the existing sustainable financing lines of credits. Under this scheme suitable assistance using term loan or working capital is granted to the energy service company that implements the renewable energy project. To be eligible for this grant, the energy service company must be an MSME or otherwise the unit to which it renders its services has to be an MSME	Small Industries Development Bank of India
12. Standup India by SIDBI	This scheme facilitates bank loans between INR 1 million and INR 10 million to at least one scheduled caste/tribe borrower and at least one woman borrower per bank branch, for setting up of a greenfield enterprise	Small Industries Development Bank of India
13. SIDBI Make in India Soft Loan Fund for MSMEs	The aim of this scheme is to provide soft loans, in the nature of quasi-equity, and term loans on relatively soft terms to MSMEs to meet the required debt-equity ratio for the establishment of new MSMEs and also to enable growth for existing ones. Fiscal incentive includes: for the general category, 10% of the project cost, subject to a maximum of INR 2 million is provided as the loan amount; 15% for the enterprises promoted members of the Scheduled Caste /Scheduled Tribe community, persons with disabilities and women, subject to a maximum of INR 3 million and persons belonging to these categories must own a controlling stake (i.e. 51% or higher)	Small Industries Development Bank of India

## GREEN CONSTRUCTION

To develop a future roadmap for green growth of the transport sector in India, the Ministry of Urban Development and Ministry of Road Transport and Highways have launched many policies to make transport green:

Policy/ Initiative	Prime Objective
<b>Pradhan Mantri Awas Yojana - Gramin</b>	<ul style="list-style-type: none"> <li>Pradhan Mantri Awas Yojana - Gramin, earlier called Indira Awas Yojana, is a flagship scheme of the Government of India. It has been providing assistance to families living below the poverty line that are either homeless or have inadequate housing facilities for constructing a safe and durable shelter<sup>57</sup></li> <li>The scheme aims to provide housing for all by 2022. The target set under the scheme is to build 7 million houses in 2020-21 and 6.5 million houses in 2021-22<sup>58</sup></li> </ul>
<b>Pradhan Mantri Awas Yojana - Urban</b>	<ul style="list-style-type: none"> <li>The mission was launched in 2015. It aims to provide housing for all in urban areas by 2022. Centrally assisted implementing agencies provide houses to all eligible families/beneficiaries against the validated demand for houses for about 1,120 million people</li> <li>One of the key features of the scheme is that it <b>encourages women to apply for loans and become homeowners. Additionally, developers and builders in charge of building houses under the scheme are instructed to construct the houses with eco-friendly construction material and technology</b><sup>59</sup></li> <li>To empower women, the mission has included a mandatory provision for the female head of the family to be the owner or co-owner of the house<sup>60</sup></li> </ul>
<b>Ministry of Environment, Forest and Climate Change (MoEFCC) (2011) notification regarding environmental clearance</b>	<ul style="list-style-type: none"> <li>MoEFCC to give priority consideration to building and construction proposals for obtaining environmental clearance that have obtained green building rating from LEED, Green Rating for Integrated Habitat Assessment, IGBC, etc.<sup>61</sup></li> </ul>
<b>Incentives provided by SIDBI</b>	<ul style="list-style-type: none"> <li>SIDBI provides financial assistance to green buildings certified by accredited rating agencies including Green Rating for Integrated Habitat Assessment and IGBC by offering concessional rate of interest<sup>62</sup></li> </ul>
<b>MoEFCC 2016 notification for use of fly ash</b>	<ul style="list-style-type: none"> <li>MoEFCC notification (2016) mandates the use of fly ash in construction material by developers within a certain radius of the coal/lignite based thermal power plants. The notification essentially mandates the currently operating thermal power stations and those that became functional after the notification to achieve a specific percentage of fly ash utilization in construction activities<sup>63</sup></li> </ul>
<b>Energy Conservation Building Code</b>	<ul style="list-style-type: none"> <li>The code is a energy efficiency standard for design and construction of buildings of minimum conditioned area of 1,000 square metres and a connected demand of power of 500 KW or 600 KVA</li> <li>Bureau of Energy Efficiency launched the code in 2007 to spur energy-saving building construction</li> </ul>
<b>Support to Training and Employment Programme for Women</b>	<ul style="list-style-type: none"> <li>Ministry of Women and Child Development administers the scheme as a central sector scheme<sup>64</sup> aimed at providing skills and competencies that enhance women's employability as well as equip them to become self-employed/ entrepreneurs</li> <li>Women over the age of 16 years are eligible</li> <li>The grant is given directly to an institution/organization including NGOs, and not the states or union territories</li> <li>Assistance is available in any sector for imparting skills related to employability and entrepreneurship</li> </ul>

<sup>57</sup> Pradhan Mantri Awas Yojana – Gramin.

<sup>58</sup> Target Number of Houses under Pradhan Mantri Awaas Yojana- Gramin (PMAY-G) from 2019-20 to 2021-22 Ministry of Rural Development.

<sup>59</sup> How the Pradhan Mantri Awas Yojana is a futuristic, beneficial scheme?, 2019, Banking Mantra, Bank of Baroda.

<sup>60</sup> Pradhan Mantri Awas Yojana- Urban.

<sup>61</sup> Out of turn consideration for environmental clearance in respect of building & construction sector projects having green rating – regarding, MoEFCC.

<sup>62</sup> SIDBI scheme for financing green buildings, 2014, SIDBI.

<sup>63</sup> Report on fly ash generation at coal/ lignite based thermal power stations and its utilization in the country for the year 2017-18, Central Electricity Authority.

<sup>64</sup> Support to Training and Employment Programme for Women (STEP), Ministry of Women and Child Development.

## GREEN TRANSPORT

To develop a future roadmap for green growth of the transport sector in India, the Ministry of Urban Development and Ministry of Road Transport and Highways have launched many policies to make transport green:

Policy/ Initiative	Prime Objective
<b>Green Urban Transport Scheme</b>	<ul style="list-style-type: none"> <li>Launched by the Ministry of Urban Development with central assistance of INR 250 billion, the scheme is aimed at lowering the carbon footprint along with development and improvement of a climate friendly transport system in urban areas across the country</li> <li>The scheme will help provide a sustainable framework for funding urban mobility projects with minimum recourse to budgetary support by encouraging innovative financing of projects<sup>65</sup></li> </ul>
<b>Green Urban Mobility Scheme</b>	<ul style="list-style-type: none"> <li>Launched by the Government of India in 2017 in 103 cities so as to promote the use of hybrid/electric vehicles and non-fossil fuels for public transport. The main aim of the scheme is to promote the use of green public transports<sup>66</sup></li> </ul>
<b>NEMMP 2020</b>	<ul style="list-style-type: none"> <li>NEMMP was launched by the Ministry of Heavy Industries and Public Enterprises in 2013 to achieve global leadership in manufacturing of EVs</li> <li>NEMMP targets to deploy 5 to 7 million EVs in the country by 2020. It also targets 400,000 passenger battery electric cars thus enabling fuel savings of 120 million along with decreasing carbon dioxide emissions. The total investment required will be INR 30 billion (US\$ 3 billion). The plan envisages: <ul style="list-style-type: none"> <li>Legislations to allow usage of EV in various areas, if not already allowed</li> <li>Use of legislation framework and regulations aimed at setting safety regulations, emission regulations, vehicle performance standards, charging infrastructure standards, etc.</li> <li>Fiscal policy measures: trade-related policies for shaping the market, imports and exports</li> <li>Manufacturing policies aimed at encouraging investments and specific policies aimed at incentivizing manufacturing and early adoption of EVs through demand creation initiatives</li> <li>Schemes and pilot projects for facilitating infrastructure creation and policy for facilitating R&amp;D<sup>67</sup></li> </ul> </li> </ul>
<b>FAME India</b>	<ul style="list-style-type: none"> <li>As part of the NEMMP 2020, the FAME India scheme with the objective to promote manufacturing of electric and hybrid vehicle technology and ensure its sustainable growth was formulated by the Department of Heavy Industry in 2015</li> <li>The first phase of the scheme was implemented through four focus areas: demand creation, technology platform, pilot project and charging infrastructure</li> <li>In the first phase, about 278,000 EVs were supported with a total demand incentive of INR 3.43 billion. In addition, 465 buses were sanctioned to various cities/states under this scheme<sup>68</sup></li> <li>The second phase of the FAME scheme was approved for a period of three years starting from 1 April 2019 with an amount of INR 100 billion</li> <li>The focus is to create demand for 7,000 e-buses, 500,000 e-three-wheelers, 55,000 e-four-wheeler passenger cars and 1 million e-two-wheelers</li> <li>The vehicles incentivized under this scheme include advanced battery and registered vehicles. The scheme will be applicable mainly to vehicles used for public transport or those registered for commercial purposes in e--three-wheeler, e-four-wheeler and e-bus segments. Privately owned registered e-two-wheelers are also covered under the scheme as a mass segment<sup>69</sup></li> </ul>

<sup>65</sup> Green Insights, 2017.

<sup>66</sup> <https://www.bankexamstoday.com/2017/10/green-urban-mobility-scheme-key.html>

<sup>67</sup> Innovation Norway, India EV Story Emerging Opportunities.

<sup>68</sup> <https://pib.gov.in/newsite/PrintRelease.aspx?relid=191377>

<sup>69</sup> [https://fame2.heavyindustry.gov.in/content/english/1\\_1\\_AboutUs.aspx](https://fame2.heavyindustry.gov.in/content/english/1_1_AboutUs.aspx)

## WATER MANAGEMENT

A snapshot of national level policies/schemes undertaken by various institutions relating to watershed development and RWH in India are listed here. As can

be seen, policies have been updated to make them more inclusive over the years through community participation and gender sensitive planning and decision making.

Policy/Initiative	Prime Objective(s)
Common Guidelines for Watershed Development 2001	Improved the 1994 watershed development guidelines so that it can have more participatory and project- specific focus with greater flexibility in implementation. Applicable to Integrated Wasteland Development Programme (IWDP), Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP), and other programmes notified by Government of India
Hariyali Guidelines 2003	Integration of community institutions effectively in DPP, DPAP and IWDP and simplify the procedures. Aimed to strengthen the role of local self-government bodies in watershed management
Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) 2005	Increase livelihood security in rural areas by providing at least 100 days of guaranteed wage employment a year to every household whose adult members volunteer to do manual works in soil and water conservation, afforestation, and land development, etc.
Integrated Watershed Management Programme (IWMP) 2009	Consolidated three programmes: IWDP, DPAP, and DPP. IWMP sought improvement of rural livelihoods through participatory watershed development focusing on integrated farming systems for enhancing incomes and livelihood security in a sustainable manner <sup>70</sup>
Common Guidelines for Watershed Development 2008 (revised in 2011)	Promote a fresh framework to guide all watershed development projects in all departments and ministries. This guideline was revised in 2011 with addition of features to ensure momentum to IWMP while strengthening its innovative features.  Watershed Guidelines 2011 were based on the principle of equity including: <ul style="list-style-type: none"> <li>• Enhanced livelihood opportunities for the poor</li> <li>• Improving access of the poor, especially women to the benefits</li> <li>• Enhancing role of women in decision making processes and their representation in the institutional arrangements</li> <li>• Ensuring access to usufruct rights from the common property resources for the resource poor</li> </ul>
National Water Policy (2012)	The policy advocates RWH and conservation of water and highlights the need for augmenting the availability of water through direct use of rainfall. It also, inter-alia, advocates that conservation of rivers, river bodies and infrastructure should be undertaken in a scientifically planned manner through community participation.  In view of the challenges pertaining to water scarcity in recent years, revision of National Water Policy 2012 has been envisaged by the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti and a drafting committee has been constituted on 5 November 2019 to revise the National Water Policy <sup>71</sup>
Guidelines on watershed management works taken up independently under MGNREGA or in convergence with IWMP 2014	Watershed management works taken up independently under MGNREGS, i.e., watershed management works can be taken up independently under MGNREGS where there is no IWMP project sanctioned.  Watershed management works under MGNREGS in convergence with IWMP, i.e., wherever the IWMP project is already sanctioned, it shall ensure that the material-intensive work must be taken up under IWMP and all the other labour-oriented works shall be done only under MGNREGS

<sup>70</sup> [http://www.swaniti.com/wp-content/uploads/2014/05/IWMP-v1\\_edited\\_formatted.pdf](http://www.swaniti.com/wp-content/uploads/2014/05/IWMP-v1_edited_formatted.pdf), accessed 14 March 2020.

<sup>71</sup> <https://pib.gov.in/PressReleasePage.aspx?PRID=1607166>, accessed 20 March 2020.



Policy/Initiative	Prime Objective(s)
WDC-PMKSY	<p>On approval of PMKSY in 2015, IWMP was subsumed as one of its components. At present IWMP is implemented as WDC-PMKSY. The Department of Land Resources is implementing 8,214 watershed development projects in 28 states covering an area of about 39.07 million hectare under WDC-PMKSY principally for development of rainfed portions of net cultivated area and culturable wastelands<sup>72</sup></p> <p>PMKSY has four sub-components: watershed development, Accelerated Irrigation Benefits Programme, Har Khet ko Pani and Per Drop More Crop<sup>73</sup></p>
Neeranchal, World Bank-2016 <sup>74</sup>	<p>Neeranchal is a World Bank assisted national watershed management project. It has been designed and implemented to further strengthen and provide technical assistance to WDC-PMKSY. It is being implemented in nine participating states: Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Telangana. The project has four components focusing on institutional strengthening, capacity building and improving rural livelihoods, among others</p>
Model Building Bye-laws, 2016 <sup>75</sup>	<p>The bye-laws mandate RWH for all types of buildings with plot size 100 square metres or more. The bye-laws detail qualification and competence of technical personnel who would plan, design and supervise such buildings/development work as registered professionals (including plumbers); 32 states and union territories have incorporated the provisions in their respective building bye-laws</p>

<sup>72</sup> <http://mowr.gov.in/sites/default/files/MeasuresForGW-Depletion.pdf>, accessed 20 March 2020.

<sup>73</sup> <https://pmksy.gov.in/AboutPMKSY.aspx#s1>, accessed 20 March 2020.

<sup>74</sup> <https://dolr.gov.in/programme-schemes/neeranchal-national-watershed-management-programme>, accessed 20 March 2020.

<sup>75</sup> <http://mohua.gov.in/upload/uploadfiles/files/MBBL.pdf>, accessed 15 January 2020.

## CARBON SINKS: FORESTRY

The Government of India has undertaken several measures to foster a more conducive environment for workforce engagement in the forest sector. Some of these national level policies have been listed below.

Policy/ Initiatives	Prime Objectives
<b>National Forest Policy, 1988</b>	<p>The National Forest Policy focuses on maintaining and restoring ecological balance while also laying emphasis on the role of communities in achieving the goal.</p> <p>Key features of the policy:</p> <ul style="list-style-type: none"> <li>• Highlights the importance of afforestation</li> <li>• Encourages participation of rural/tribal communities including women</li> <li>• Highlights the importance of minor forest produce in sustaining forest fringe communities</li> </ul>
<b>National Agroforestry Policy, 2014</b>	<p>The objective of this policy is to generate gainful employment and livelihood opportunities for rural households, enhancing productivity and meeting the demand for timber and non-timber products sustainably.</p> <p>Key features of this policy are:</p> <ul style="list-style-type: none"> <li>• Promote resilient farming practices and tree plantations</li> <li>• Extend training to people via Krishi Vigyan Kendras</li> <li>• Educate farmers on agroforestry and silviculture</li> <li>• Focus on sustainable agroforestry</li> </ul>
<b>National Policy on Biofuels, 2018</b>	<p>The National Biofuels Policy 2018 aims at achieving the indicative target of 20% blending of biofuels in fossil fuels by the year 2030 and thus focuses on energy efficiency greater domestic production of biofuels.</p> <p>Key features of the policy are:</p> <ul style="list-style-type: none"> <li>• Generation of employment opportunities via adoption of biofuels as an alternative energy source</li> <li>• Focus on achieving energy security</li> <li>• Improve the production of biodiesel and ethanol</li> </ul>
<b>National Bamboo Mission, 2006</b>	<p>The policy aims at the holistic development of the bamboo sector via a highly focused and strategic approach to increase bamboo cultivation and better marketing of bamboo.</p> <p>Key features of the policy are:</p> <ul style="list-style-type: none"> <li>• Bring greater land under bamboo cultivation</li> <li>• Focus on establishing primary processing units for better post-harvest management of bamboo</li> <li>• Focus on research and development for greater bamboo productivity</li> <li>• Extend skill development and capacity building trainings to farmers, entrepreneurs, officials and field functionaries</li> </ul>
<b>National Afforestation Programme</b>	<p>The rationale of the programme is to extend support to forest development agencies for the institutionalization of the concept of joint forest management.</p> <p>Key features of this programme are:</p> <ul style="list-style-type: none"> <li>• Focus on capacity building at the grassroots level</li> <li>• Promote ecological restoration of degraded forest land via afforestation activities</li> <li>• Improve livelihoods of marginalized forest fringe communities</li> </ul>
<b>National Mission for Green Mission, 2015</b>	<p>This mission focuses on enhancing carbon sinks, protecting vulnerable ecosystems and enabling forest dependent population to adapt to climate change via climate change adaptation and mitigation measures.</p> <p>Key features of the mission are:</p> <ul style="list-style-type: none"> <li>• Increasing yearly carbon dioxide sequestration by 50-60 million tonnes by 2020</li> <li>• Strengthening forest development agencies</li> <li>• Extending support to community-driven NTFP enterprises</li> <li>• Enhancing NTFP-based livelihood opportunities to reduce vulnerability</li> <li>• Increasing participation of local communities in village level administrative groups such as joint forest management committees and Van Panchayats</li> </ul>

Policy/ Initiatives	Prime Objectives
<b>Vanbandhu Kalyan Yojana, 2014</b>	<p>The main objective of this scheme is improving the lives of the tribal population in our country and focusing on their overall development.</p> <p>Key features of the policy are:</p> <ul style="list-style-type: none"> <li>• Creating greater employment opportunities in the agriculture sector</li> <li>• Increasing dairy-based activities and animal husbandry</li> <li>• Extending skill training to the tribal youth</li> <li>• Focus on areas such as irrigation, economic development, quality education, housing, universal electrification, urban development, health and economic opportunities</li> </ul>
<b>Van Dhan Scheme, 2018</b>	<p>This is a flagship programme of Ministry of Tribal Affairs and TRIFED with focused objective to improve income of tribal through value addition of tribal products. Key features of this programme are:</p> <ul style="list-style-type: none"> <li>• Provision for required building/infrastructure support to be established in one of the beneficiary's house/part of house or government/Gram Panchayat building</li> <li>• Equipment/tool kit comprising equipment such as small cutting and sieving tools, decorticator, dryer, packaging tool, etc., based on minor forest produce available in the area</li> <li>• Fully equipped training facilities for a batch of 30 trainees with provision for raw material for training purpose and supply of trainee kits (comprising of bag, scribbling pad, pen, brochures, training manual, booklet, etc.)</li> <li>• Provisioning of working capital for the SHGs through tie up with financial institutions, banks, National Scheduled Tribes Finance and Development Corporation, etc.</li> <li>• A cluster of 10 such SHGs within the same village shall form a Van Dhan Vikas Kendra. Subject to successful operations of the SHG in a Kendra, common infrastructure facilities (pucca Kendra) may be provided to the Kendra in the next phase in terms of building, warehouse, etc., for use of the SHG members</li> <li>• An illustrative list of major minor forest produce which may be covered under the initiative are tamarind, mahua flower, mahua seed, hill broom, chironjee, honey, sal seed, sal leaves, bamboo split, myrobalan, mango (amchur), aonla (churan/candy), seed lac, tez patta, cardamom, black pepper, turmeric, dry ginger, cinnamon, coffee, tea, sea buckthorn tea, etc.</li> </ul>

## CARBON SINKS: FISHERIES

The Government of India has implemented several measures to foster a more conducive environment for the growth of the fisheries sector. Some of these national level policies have been listed below:

Policy/ Initiative	Prime Objective
<b>National Policy for Marine Fisheries 2017</b>	<ul style="list-style-type: none"> <li>• The key objective of this policy is to ensure the ecological integrity and health of India's marine resources via sustainable measures. Its seven pillars are:               <ul style="list-style-type: none"> <li>- Principle of subsidiarity</li> <li>- Sustainable development</li> <li>- Precautionary approach</li> <li>- Partnerships</li> <li>- Gender justice</li> <li>- Socio-economic upliftment of fisher community</li> <li>- Inter-generational equity</li> </ul> </li> <li>• The policy sets aside provisions for sustainable fishing in the following aspects: minimum mesh size, fishing days, engine horsepower, maximum sustainability yield, fleet plans, creation of fisheries management areas, area of operation, gear size, minimum legal size, among other provisions</li> <li>• Via the direct benefit transfer scheme, the government will strengthen welfare measures for the fisher community. This also includes providing amenities such as housing, community welfare, and safety nets.</li> <li>• The policy also states that the government will take steps to strengthen the fisheries cooperatives via technical assistance, financial support and skill development. As regards gender equity, the government will continue to extend support for the welfare of women by way of introducing women-friendly financial support schemes, safe and secure working conditions, value addition activities, hygienic working conditions, and establishing women cooperatives.</li> </ul>
Draft National Fisheries Policy 2020	<ul style="list-style-type: none"> <li>• The policy released by the Department of Fisheries aims to offer a holistic approach to carry out fishing practices (capture and culture) in a responsible and sustainable manner<sup>76</sup></li> <li>• The policy entails a productive integration of various other schemes and policies relating to different aspects of fisheries</li> <li>• Main objectives of the policy include:               <ul style="list-style-type: none"> <li>- Enhancing fish production and productivity in a responsible and sustainable manner</li> <li>- Providing a robust regulatory framework for effective fisheries resource management</li> <li>- Modernizing and diversifying fishing practices in oceans and seas through the use of science and technology</li> <li>- Strengthening and modernizing the value chain</li> <li>- Generating gainful employment and entrepreneurship opportunities leading to the higher income of fishers and fish farmers and improvement of their living standards</li> </ul> </li> </ul>
National Scheme for Welfare of Fishermen	<ul style="list-style-type: none"> <li>• This scheme was implemented in 2015-16 with the main objective of extending financial assistance to the fisher community for construction of houses, common working areas, tube wells, recreation and community halls, etc.</li> <li>• One of the main rationales of this scheme is bettering the lives of fisher men and women in our country. The scheme operates on the following three components:               <ul style="list-style-type: none"> <li>- Development of model fishermen villages</li> <li>- Group accident insurance for active fishermen</li> <li>- Saving-cum-relief</li> </ul> </li> <li>• Under the model fishermen villages component, the selected fishermen/women would be given basic amenities as mentioned above. The respective states shall provide the required amenities and infrastructure.</li> </ul>

<sup>76</sup> [http://gov.in/PDF/National\\_Fisheries\\_Policy\\_2020.pdf](http://gov.in/PDF/National_Fisheries_Policy_2020.pdf)

Policy/ Initiative	Prime Objective
National Mariculture Policy 2019	<ul style="list-style-type: none"> <li>• National Mariculture Policy aims to ensure the production of farmed seafood in a sustainable and responsible manner and offer additional livelihood and entrepreneurial opportunities to coastal families for leading a better quality of life</li> <li>• The main objective of the policy is to boost the mariculture production in a sustainable way while contributing to the socio- economic development of the nation</li> <li>• The key objectives of the policy include:               <ul style="list-style-type: none"> <li>- To promote cooperative partnership in mariculture by encouraging infrastructural, technical and financial inputs</li> <li>- To adopt an environmentally sustainable approach for development of mariculture</li> <li>- To provide an enabling environment for sustainable development of mariculture by providing the required policy and legal framework and support to entrepreneurs venturing into the area of mariculture</li> </ul> </li> </ul>
Pradhan Mantri Matsya Sampada Yojana	<ul style="list-style-type: none"> <li>• Introduced in July 2019, the Pradhan Mantri Matsya Sampada Yojana aims at giving a boost to the processing activity in the fisheries sector in India. This scheme was established under the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying. One of the key objectives of the scheme is to foster a robust and dynamic fisheries management framework in the country.</li> <li>• With a view to promote the allied farm sector that includes fisheries, out of the total budget of INR 37.3 billion allocated to the ministry, INR 8.04 billion has been allocated solely to the fisheries department. The fund will be utilized for both marine and inland fisheries. The central government also intends to develop a system of attracting funds from the private sector</li> <li>• The scheme is expected to address gaps in the fisheries value chain with special focus on production, infrastructure, quality control, modernization, productivity and, importantly, post-harvest management. Also, it lays emphasis on the adoption of sophisticated technologies for the fisheries sector that would ultimately help to reach the production targets.</li> </ul>
Blue Revolution Scheme	<ul style="list-style-type: none"> <li>• In December 2015, the Cabinet Committee on Economic Affairs gave its consent for the implementation of the Blue Revolution which is an umbrella scheme for the fisheries sector in India. The key objective is the effective management and integrated development of fisheries in the country</li> <li>• The National Fisheries Development Board was the implementing agency for this scheme covering marine fisheries, inland fisheries and aquaculture. With an outlay of INR 30 billion, the Blue Revolution initiative also aimed at bettering the economic conditions of the coastal population in India</li> <li>• According to the Indian Ocean Rim Association, the Blue Revolution addresses the following issues:               <ul style="list-style-type: none"> <li>- Problem of food security</li> <li>- Poverty</li> <li>- Climate change impacts</li> <li>- Unemployment issues</li> <li>- Socio-economic challenges</li> </ul> </li> <li>• The Blue Revolution scheme is applicable to both marine and inland fisheries. In marine fisheries, the scheme set aside 75% grant in aid to be extended to women’s SHGs for creating modern and hygienic infrastructure for fish marketing amounting to almost INR 10 million</li> <li>• The scheme also covers extension of support to women’s SHGs by way of developing transportation infrastructure for fish marketing</li> </ul>



## ANNEXURE 2: CONSULTATIVE MEETING AND KEY STAKEHOLDERS LIST

Peer Reviewers to the sectoral studies

Sectoral Chapters	Peer Reviewer
Renewable Energy	Dr. Srinivas Shroff Nagesha Rao, <i>Chief Executive Officer, REC Foundation</i>
Green Construction	Suneel Padale, <i>Director Programs, CARE India</i>
Green Transport	Hitesh Vaidya, <i>Director, NIUA</i>
Water Management	Moho Chaturvedi, <i>Consultant Water Resources and Environment</i>
Carbon Sinks- Forests	Vishaish Uppal, <i>WWF India</i>
Carbon Sinks- Marine Fisheries	Ramya Rajagopalan, <i>Independent Researcher</i>

Multiple stakeholders were consulted across sectors for this scoping study as listed below:

SN	Name of Stakeholder	Organization	Designation
RENEWABLE ENERGY			
1.	Dr. Parveen Dhamija	Skill Council for Green Jobs	Advisor
2.	Dr. Preeti Kaur	Ministry of New & Renewable Energy	Scientist D
3.	Mr. Abhinav Jain	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH	Advisor, Indo German Energy Programme
4.	Dr. Nikhil PG	Consyst Group	Technical Director (Sustainable Technologies)
5.	Dr. B.K Swain	Odisha Renewable Energy Development Agency	Joint Director (Tech.)
6.	Mr. Ganesh Rai	Artech Solar	Individual Expert
7.	Mr. Sourav Dey	Ravi Engineering	Programme Manager
GREEN CONSTRUCTION			
1.	Mr. Vasudev Suresh	India Green Building Council	Chairman
2.	Ms. Aakriti Sachdeva	Green Rating for Integrated Habitat Assessment	Project Officer
3.	Ms. Alankrita Soni	Individual expert	NA
4.	Ms. Vandana Bhatnagar	National Skill Development Corporation	Chief Programme Officer
5.	Ms. Salonie Muralidhara	Self Employed Women's Association	Senior Associate
6.	Mr. Aditya Galotkar	L&T Financial Services	Senior manager, Group CSR & Sustainability

SN	Name of Stakeholder	Organization	Designation
<b>GREEN TRANSPORT</b>			
1.	Mr. Arindam Lahiri	Automotive Skills Development Council	CEO
2.	Mr. Amit Bhatt	WRI India	Director, Integrated Transport
3.	Mr. Vivek Chandran	Shakti Sustainable Energy Foundation	Associate Director, Transport
4.	Mr. Vivek Shrivastav	Shigan Evoltz	Individual Expert
5.	Mr. Tarun Songra	AECOM	Individual Expert
6.	Mr. Dinesh Goyal	Konark Energy	CEO
<b>WATER MANAGEMENT</b>			
1.	Mr. Ankit Magan	Retas Enviro Solutions Pvt. Ltd.	Director
2.	Mr. Ankur Gupta	International Association for Human Values	Project Management
3.	Mr. Deepak Awari	DHI India Water & Environment Pvt. Ltd.	Director – Strategy and Development
4.	Dr. Manoranjan Hota	Ministry of Environment, Forest & Climate Change	Advisor
5.	Dr. Parveen Dhamija	Skill Council for Green Jobs	Advisor
6.	Mr. Harsh Singh	United Nations Development Programme	Programme Advisor
7.	Mr. Satender Arya	Agriculture Skill Development Council	Chief Executive Officer
8.	Mr. S.M. Misra	Tetra Tech	Technical Expert
9.	Ms. Sreenita Mondal	South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERS)	Project Coordinator (SAWA)
10.	Ms. Sumita Singhal	Centre for Science and Environment	Waste Water Expert
11.	Ms. Vandana Bhatnagar	National Skill Development Council	Chief Programme Officer
<b>FORESTRY</b>			
1.	Mr. Pradeep Mohapatra	Udyama Odisha	Team Leader
2.	Dr. Pradeep Mehta	Central Himalayan Institute for Nature & Applied Research	Chairman
3.	Dr. T.R. Manoharan	Forest Stewardship Council	International Member
4.	Prof. Prodyut Bhattacharya	University School of Environment Management, GGS Indraprastha University	Professor, Natural Resource Management
5.	Mr. Narendra Mohan	Sustainable Business, WWF India	Manager, Forest Commodities
<b>FISHERIES</b>			
1.	Dr. Nikita Gopal	Central Institute of Fisheries Technology, Kochi	Principal Scientist
2.	Dr. Venkatesh Salagram	Food and Agriculture Organization	Independent Consultant and International Consultant
3.	Dr. Senthil Vel	College of Fisheries, Mangalore	Dean
4.	Dr. Anupam Sarkar	Agriculture Skill Council of India	Researcher

## NATIONAL-LEVEL CONSULTATION PARTICIPANTS

SN	Participant	Organization	Designation
1	Dr. Sunita Sanghi	Ministry of Skill Development and Entrepreneurship	Additional Secretary and Senior Adviser
2	Ms. Vandana Bhatnagar	National Skill Development Council	Chief Programme Officer
3	Dr. Sabina Mathayas		Consultant, Educational and Policy Studies
4	Ms. Nidhi Batra		Senior Consultant – Knowledge Management, Strategy & TVET Advisory
5	Dr. Praveen Dhamija	Skill Council on Green jobs	Advisor
6	Ms. Sudipta Bhadra	ILO	Senior Programme Officer
7	Ms. Anubha Prasad	PAGE	National Coordinator
8	Ms. Vishaish Uppal	WWF	Director, Livelihoods
9	Mr. Amit Kumar	UNDP	Team lead Inclusive Growth
10	Mr. Harsh Singh	UNDP	Advisor, Programme Development
11	Ms. Vasundhara Dash	UNDP	Expert, Employment Marketplace

**Disclaimer:**

Due to COVID-19 pandemic and travel restrictions, the report is purely based on secondary sources and information obtained by Ernst & Young LLP (EY) from organizations, experts and through stakeholder interactions. This report sets forth information based on the completeness and accuracy of the facts stated and any assumptions. The comments in the report are not intended, nor should they be interpreted to be legal advice or opinion.




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