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MINISTRY OF
POWER

Whitepaper on

State Energy Efficiency Action Plan for Lakshadweep

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CONFEDERATION OF INDIAN INDUSTRY

Confederation of Indian Industry

Contents

Background

India is a diverse country with diverse energy consumption patterns in different states/UTs. Broadly, the energy consumption is divided in six major sectors i.e., Buildings, Transportation, Municipalities, DISCOMs, Agriculture and Industries. A need for a focussed sector-based energy efficiency approach by states/UTs has been felt. For instance, there may be states with lesser urbanised areas and therefore lesser number of high energy consumption buildings. Such a state may need more focus on energy efficiency in sectors such as Transportation, Agriculture, or others.

Similarly, Industry sector has 53% of total primary energy demand in India, and more than 30% in most States, however, the level of energy efficiency initiatives and programmes is not commensurate with the energy consumption in this sector. Most states are yet to set energy saving targets for industry, apart from targets set for the PAT programme. Most states focus primarily on energy conservation for PAT Designated Consumers (DC) and monitor DCs for energy audits and compliance with specific energy consumption (SEC) targets. Only a few states have mandated energy audits for specific categories of industry other than PAT DCs and provision to provide financial incentives for implementing energy efficiency in industrial units.

In the transport sector, there is a need to include and promote energy efficient public transport besides policy level intervention for efficient or clean fuel vehicles. Several states have come forward with a state level incentivisation for Electric Vehicles. Policy and framework for electric vehicles at the state level needs further focus. Though energy efficiency is a multi-dimensional subject, defining key focus areas to bridge gaps is the need of the hour. While some states may have the potential to improve efficiency in a particular sector, there may be gaps in terms of identification of these sectors.

If, for instance, a state with many MSME industrial units, may focus on energy efficiency in the industrial sector alone, a large potential of achieving energy efficiency may be unearthed. This may involve activities and resource mobilization to create awareness in industry, replacement of appliances and machinery with the help of ESCOs, setting up and utilization of Revolving Investment Fund, besides others.

Identification of the focus sectors

The objective of this plan is to ensure that resource allocation aligns seamlessly with the specific requirements of the state, thereby fostering progress towards achieving state-specific goals related to sustainable development. Identifying the focus sectors or areas assumes a pivotal role in this process, primarily because certain sectors within a state exhibit higher energy consumption, necessitating targeted interventions to enhance energy efficiency and promote sustainable practices.

The process of identifying focus sectors for Lakshadweep's energy efficiency initiatives followed a comprehensive methodology. This involved several key steps, including analyzing the state's energy consumption patterns to identify sectors with significant energy use, emissions from different sectors, Gross State Value Addition (GSVA) analysis of the sectors contributing most to 's economy, while policy gap analysis helped identify challenges and areas requiring targeted interventions. Stakeholder input

and feedback, including insights from government agencies, played a crucial role in shaping the selection of focus sectors. Furthermore, alignment with the state government's vision and long-term development goals ensured that the chosen sectors were in accord with the state's strategic direction.

Based on the above parameters, Transport, Building and Fisheries are the identified focus sectors for Lakshadweep.

Proposed Strategies

This chapter discusses the proposed strategies outlined in the action plan for the identified focus sector along with their potential impact in terms of energy efficiency and emission reduction. These proposed strategies are stated below with actionable measures and implementation methodology.

1. Transport

Lakshadweep is a group of 36 islands located in the Arabian Sea, approximately 200-440 km off the west coast of India. The islands cover a total area of 32 sq. km. Due to their remote location, the islands are not well connected to the mainland, and the transport sector is limited. Transport infrastructure involves core basic facilities and services that are essential for smooth economic activities. Major modes of transport in Lakshadweep are roads, waterways and airways. The water transport is gaining more importance in the Island and as per the 2015-30 Perspective Plan of Ministry of Home Affairs, 9 ships are allotted for the UT, out of which 6 are for passenger transport, 1 for LPG Cylinder transport and 2 for multipurpose cargo transport.

As per the inputs from stakeholder consultation meeting, the UT is going to ban the use of conventional fuel vehicles for promoting EVs. Currently, the ownership of the conventional vehicles can't be transferred to another person. That is, no one can sell their petrol/diesel vehicles within the UT. The UT also has a 'E-Rickshaw Sevan' Scheme, under which the residents of the islands can purchase a new E-Rickshaw with a subsidy of 50%.

In terms of vehicle categories, Lakshadweep has a significant number of two-wheelers, followed by three-wheelers and four-wheelers. As per the latest statistics, the UT has over 23 thousand registered vehicles, out of which 88% are two-wheelers, 6% are three-wheelers, and the remaining 6% are cars and commercial vehicles.

The diesel consumed by ships for passenger as well as goods transport is dominating in the UT, followed by petrol & ATF. In terms of vehicles on roads, the most commonly used fuel is petrol, followed by diesel.

Strategy 1: Conversion of existing fleet into EVs by setting more aggressive target

Electric vehicles are significantly more efficient than their petrol or diesel counterparts. While electric vehicles can convert around 60% of the electrical energy from the grid to power the wheels, petrol or diesel cars can only convert 17%-21% of the energy stored in the fuel to the wheels, resulting in a wastage of around 80%. Thus, electrification of road transport is a good way to reduce energy

consumption and emissions, particularly as the grid becomes greener with increased use of renewables.

Implementing Agency: State Transport Department, LEDA

Actionable Measures

1. **Awareness**
   a) Launch public awareness campaigns about the benefits of electric vehicles and the environmental impact of electrified road transport, following the model of Delhi's "Switch Delhi" campaign.

2. **Setting target thresholds for ICE vehicles**
   a) Setting target thresholds for ICE vehicles: The government can establish target thresholds for ICE vehicles in different categories, such as two-wheelers, sedans, hatchbacks, buses, etc.

   b) These targets can be based on emission levels, fuel efficiency, or other relevant criteria. The targets should gradually become more stringent over time to encourage a shift towards zero-emission vehicles.

3. **Licensing restrictions for ICE vehicles**
   a) Once the target thresholds are defined, the government can enforce licensing restrictions for ICE vehicles that exceed the established targets. Beyond a certain threshold, ICE vehicles would not be eligible for registration or license renewal in A & N Islands. This approach will create a clear market signal for manufacturers to prioritize the production and sale of zero-emission vehicles.

4. **Adoption of Battery Swapping for 2 & 3 Wheelers**
   a) Pilot Projects: Identify 2-3 model cities such as Kavaratti for launching pilot battery swapping projects. Collaborate with EV manufacturers and service providers.

   b) Infrastructure Investment: Allocate funds for the setup of battery swapping stations and ensure they meet safety and technical standards.

   c) Consumer Incentives: Offer incentives such as reduced swapping fees or subscription-based packages to encourage adoption.

5. **State Govt Fleet Electrification**
   a) Electrify the state government's fleet of vehicles, following the lead of Himachal Pradesh, which has announced electrification of all its official vehicles

6. **Promoting Retrofitting**
   a) Encourage vehicle retrofitting by providing incentives for retrofit kits. For instance, in Rajasthan, 15% of the retrofit kit cost (including taxes) is reimbursed, up to ₹10,000 per vehicle. This can motivate individuals and businesses to convert their existing vehicles into electric ones, reducing the carbon footprint.

7. **Scrap Policy**
    a) Establish a "Cash for Clunkers" program, modelled after Delhi's initiative, to provide incentives for replacing old, polluting vehicles with electric ones.

8. **Mobile Maintenance Units**
    a) Introduce mobile EV maintenance units equipped with essential tools and spare parts that can travel across islands to perform basic servicing and repairs on-site.

9. **Local Skill Development**
    a) Partner with vocational training institutes to train local technicians in EV maintenance and repair, ensuring they are equipped to handle common EV issues without needing mainland assistance.

10. **Service Hub Agreement**
    a) Establish a partnership with a mainland service hub (e.g., in Kochi) that provides scheduled island visits for more complex maintenance tasks that cannot be handled locally. This could be arranged quarterly or biannually depending on demand.

Strategy 2: Minimum RE integration for Charging stations

Lakshadweep, being an island territory, heavily relies on imported fossil fuels for meeting its energy requirements. To reduce its dependence on fossil fuels and to promote the use of electric vehicles (EVs), it is necessary to establish a network of charging stations powered by renewable energy sources (RES) like solar, wind, and biomass.

Implementing Agency: DISCOMs, LEDA

Actionable Measures

1. Gradually replace older, less energy-efficient autos with newer models that comply with energy conservation standards and adopt hybrid or electric autos where feasible.
2. Implement measures to ensure optimal fuel usage, such as fuel-efficient driving practices, fuel quality monitoring, and exploring the use of cleaner alternative fuels.
3. Establish necessary infrastructure, such as charging or refueling stations for electric, hybrid, autos.

2. Buildings

In Lakshadweep, the building sector is the largest consumer of electricity. In the building sector both domestic & commercial consumers are included. The major consumption in Domestic sector is from electricity & accounts for 91% of the total energy consumption. The consumption of SKO is more than LPG. However, the use of LPG is increasing, which is evident from the CAGR growth of 20% between FY 2015 & FY 2020. The Figure 18 shows the energy consumption pattern in the domestic sector.

Strategy 1: Implementation of ENS– Residential Buildings and ECBC-Commercial Buildings

Eco Niwas Samithi (ENS) is a program launched by the Ministry of Power to promote energy efficiency in residential buildings. The importance of ENS for energy efficiency lies in its potential to reduce energy consumption and greenhouse gas emissions, which are major contributors to climate change. By promoting energy-efficient practices in residential buildings, ENS can help reduce the demand for energy and promote the use of renewable energy sources. This, in turn, can help in achieving the country's goal of reducing its carbon footprint and mitigating the impact of climate change.

The Energy Conservation Building Code (ECBC) is applicable to all new commercial buildings with a connected load of 100 kW or more, or a connected load of 120 kVA or more. This includes buildings used for office, institutional, healthcare, retail, and other commercial purposes. ECBC is also applicable to major retrofits of existing commercial buildings, where the total connected load is increased by 50% or more, or where the conditioned area is increased by 50% or more. ECBC is mandatory for all the states and union territories of India, and compliance with the code is a legal requirement under the Energy Conservation Act, 2001

I**mplementing Agency**: Bureau of Energy Efficiency (BEE), LEDA, PWD

Actionable Measures

1. **Development of Compliance Portal:**
   Develop and maintain an Energy Conservation Building Code (ECBC) compliance portal. This portal can serve as a resource for builders, architects, and contractors to access information on energy-efficient and green materials and technologies.

   ECBC Cell and Standards: Energy Conservation Building Code (ECBC) cell should be established in Lakshadweep. This cell would be responsible for ensuring that new buildings, especially the upcoming hotels and resorts, comply with ECBC standards. Implementing these standards would significantly reduce energy consumption in the building sector

2. **Market Outreach and Awareness:**
   Conduct market outreach campaigns to promote ECBC-compliant products. Utilize various communication channels such as radio jingles, social media, and awareness programs to educate the public about the benefits of energy efficiency.

3. **Pilot Projects for Super ECBC and Net Zero Buildings:**
   Initiate pilot projects to showcase the of benefits of Net Zero (Energy) Rating. Select an initial set of 20 buildings as case studies to demonstrate the feasibility and advantages of higher energy efficiency standards.
4. **Mandatory Labelling for New Construction:**
   Draft legislation to mandate BEE's Energy Efficiency Labelling for all new residential construction projects. Ensure that builders and developers comply with energy efficiency standards and obtain the appropriate label before occupancy permits are granted. Lakshadweep Islands can consider a threshold of 300 m2 and all residential buildings with a built-up area exceeding this threshold would be subject to mandatory labelling.
   Mandate the integration of the Bureau of Energy Efficiency's (BEE) Energy Conservation Sustainable Building Code (ECSBC) and Energy Efficiency Labelling (EEL) for Residential Buildings into the building byelaws of Lakshadweep Islands.

5. **Financial Incentive**
   It is imperative to motivate construction builders to prioritize energy efficiency and this can be achieved with effective structure financial incentive. For example, the state can offer a 10% discount in property tax for three years for residential buildings with a five-star rating.

6. **Energy Efficiency Certification Rebate:**
   Introduce a rebate program for homeowners who obtain BEE's Energy Efficiency Labelling certification. The rebate could be a percentage of the energy-efficient equipment or building materials' cost, up to a predetermined limit.

7. **Low-Interest Energy Efficiency Loans:**
   Collaborate with local banks to provide low-interest loans for homeowners undertaking energy-efficient renovations. These loans can cover expenses related to insulation, energy-efficient windows, and high-efficiency appliances.

8. **Local Builder Incentives:**
   Offer incentives to builders who construct energy-efficient residential buildings. Incentives could include reduced permit fees, faster approval processes, or recognition for their sustainable construction practices.

9. **Home Energy Efficiency Financing Program:**
   Establish a dedicated financing program that provides affordable loans for homeowners looking to improve the energy efficiency of their homes. Offer financial mechanisms, such as low-interest rates and flexible repayment options.

10. **Local Government Demonstration Projects:**
    Encourage local government departments to undertake energy efficiency upgrades in their residential buildings as demonstration projects. Share the success stories and cost savings to inspire homeowners to follow suit.

11. **Consumer Education Initiatives:**
    Develop and distribute educational materials and online resources about BEE's Energy Efficiency Labelling and its benefits in the local language.
    Create a user-friendly online platform where homeowners can calculate potential savings and access information about energy-efficient products and services.

12. **Awareness Campaigns:**
    Conduct regular workshops and training sessions in collaboration with local authorities and educational institutions. Offer these workshops to builders, architects, and homeowners to educate them on energy-efficient building practices and the significance of BEE's Energy Efficiency Labelling.

13. **Behavioural Energy Efficiency Program (BEEP)**
    Behavioural interventions have the potential to achieve energy savings of 5-15% in households. Applying this to Lakshadweep Islands residential sector could translate to substantial energy cost reductions and emission reductions. Implementing a BEEP program based on the BRPL model holds immense potential for reducing energy consumption and promoting sustainable behaviour in the union territory. By prioritizing affordability, localization, and community engagement, the program can empower residents, achieve energy savings, and contribute to the state's clean energy goals.

Strategy 2: Deepening of Standard & Labelling Programme

The Bureau of Energy Efficiency (BEE) in India has implemented a standard and labelling program to promote the use of energy-efficient appliances. Under this program, old and inefficient appliances are encouraged to be replaced with new ones that meet the minimum energy performance standards (MEPS) set by the BEE.

The labels help consumers make informed choices, thereby reducing energy consumption and costs. In the context of domestic buildings, the S&L Programme can significantly reduce energy consumption by promoting the use of energy-efficient appliances, lighting, and building materials. This, in turn, will help in mitigating greenhouse gas emissions, reducing energy bills for consumers, and promoting sustainable development.

Implementing Agency: Bureau of Energy Efficiency, LEDA, PWD

Actionable measures

1. Bulk-purchase initiatives for energy efficient fan technologies

a) Fans play a vital role in the daily lives of people across India, especially in a region like Andaman and Nicobar Islands with a tropical climate. However, it is also important to note that fans are one of the largest consumers of electricity in households and commercial spaces. In the U.T, the energy consumption by fans is estimated to be around 12% of the total energy consumption, which is significant.

To address this issue and promote energy-efficient fans, the government can initiate a bulk-purchase scheme for technologies like BLDC (Brushless Direct Current) fans. These fans are known for their energy efficiency and can save up to 50% of energy compared to traditional fans. This can significantly contribute to energy conservation efforts in U.T and reduce the energy consumption of fans.

The scheme can be implemented in partnership with manufacturers, promoted through awareness campaigns, and made easily accessible to consumers with the help of local distribution companies.

The scheme can be implemented by partnering with manufacturers of BLDC fans and offering bulk purchase orders at discounted rates. The scheme can also be extended to government offices, public institutions, and commercial buildings. Additionally, the existing five-star rating for fans can be promoted to become the new one-star minimum. This will encourage manufacturers to produce more energy-efficient fans and drive down the prices of energy-efficient fans further.

b) To ensure the success of the scheme, the state designated agency (SDA) can collaborate with the Bureau of Energy Efficiency (BEE) to create awareness among the public about the benefits of energy-efficient fans and the importance of purchasing energy-efficient products. The SDA can also work with local distribution companies to ensure that energy-efficient fans are available and easily accessible to consumers.

c) This action plan can be modelled after Delhi's "BEE 5 star rated Super Energy Efficient Fan Replacement Scheme".

2. Accelerating Access to Energy-Efficient Air Conditioners (ACs)

a) Andaman and Nicobar Islands, being a tropical region is experiencing rising demand for air conditioning due to increasing heatwaves and urbanization. However, this reliance on traditional, less efficient ACs leads to increased energy consumption, emissions, and strain on the electricity grid.

b) By adopting a multi-pronged approach combining policy, financial incentives, awareness campaigns, market development, and continuous monitoring, A & N Islands can effectively accelerate access to energy efficient ACs. With successful initiatives like BEE and CLASP, the union territory can pave the way for a future where efficient and sustainable cooling solutions are accessible to all.

3. **Promote Energy-Efficient and Low-GWP Refrigerant-Based Cooling:**

   a) Launch awareness campaigns highlighting the benefits of energy-efficient and low-GWP refrigerant-based cooling systems for public and private stakeholders.

   b) Introduce financial incentives, such as rebates or tax credits, for the purchase and installation of energy-efficient cooling systems.

   c) Enforce regulatory measures that mandate the use of low-GWP refrigerants in cooling systems to reduce environmental impact.

4. **Energy-Efficient Public Procurement:**

   a) Establishing a certification process for service technicians to ensure proper installation and maintenance of cooling systems.

   b) Regularly update the Public Works Department (PWD) Schedule of Rates (SoR) to incorporate the latest energy-efficient materials and technologies in procurement projects.

5. **Promotion of Heat Pumps:**

   a) Provide subsidies and financial incentives to consumers and businesses for the installation of heat pumps for space cooling and hot water supply.

   b) Collaborate with manufacturers to promote research and development in heat pump technology and offer market-based incentives for adopting this technology.

6. **Mandatory Use of 4-Star Rated Appliances:**

   a) Enforce regulations requiring the use of 4-star rated appliances in all commercial and government buildings to reduce energy consumption and greenhouse gas emissions.

   b) Establish a monitoring and enforcement mechanism to ensure compliance with the mandatory rating requirements.

Strategy 3: BEE Star Rating of Buildings, Green Buildings

BEE star rating program for buildings can help to promote energy efficiency and sustainability in Lakshadweep, offering benefits to building owners, residents, and the environment. Lakshadweep Government can promote the construction of green buildings by declaring incentives in the UT like in Kerala. In Kerala, the Local Self Government Department has approved up to 50% reduction in One time building tax, up to 1% reduction in Stamp duty and up to 20% reduction in Property tax for projects obtaining green building certifications like IGBC. The incentives can promote the green building construction in the UT and will help to have a large green building footprint.

Implementing Agency: Bureau of Energy Efficiency (BEE), LEDA, Department of Housing & Urban Development, Town Planning Department

Actionable measures

1. **Home Energy Auditor Training:**

   Establish training programs for home energy auditors. Create a compliance structure that rewards residential projects for energy savings achieved through energy-efficient measures, such as insulation and lighting upgrades.

2. **Government Building Energy Audits and BEE Star Rating Target:**

   Issue directives to all government departments to conduct comprehensive energy audits of their buildings. Set specific targets for achieving BEE (Bureau of Energy Efficiency) Star Ratings for government-owned buildings. This will serve as a leading example for energy efficiency in the state.

3. **Capacity Building for Professionals:**

   Develop training and capacity-building programs for architects, building professionals, and developers focused on energy-efficient building design and construction practices. Encourage them to incorporate energy-efficient technologies and designs into their projects.

4. **Transformation of Iconic Government Buildings:**

   Identify and select iconic government buildings for transformation into Net-Zero energy buildings. Implement energy-efficient retrofits, renewable energy integration, and smart technologies to showcase the possibilities of sustainable construction and operation.

5. **Building management system (BMS)**

   Mandate building management system (BMS) to centrally manage and monitor lighting, HVAC, and other building systems for optimized energy consumption.

6. **LEDs & Occupancy Sensors**

   Accelerate adoption of all lighting to LED fixtures. Utilize occupancy sensors in public areas and daylight harvesting strategies (e.g., light shelves) to further reduce lighting energy use.

7. **Mandatory Temperature Set Point for ACs:**

   Enforce a mandatory minimum set point of 24°C for air conditioners in all government buildings.

8. **Cool Roof Programme:**

   Mandatory cool roofing for all the government, government-owned, non-residential and commercial buildings irrespective of site area/built up area.

9. **Mandatory Rooftop Solar Installation:**

   Implement a phased approach for mandatory rooftop solar installation on all new commercial and residential buildings above a specific size threshold (e.g., carpet area).

   Existing buildings can be incentivized to install solar through subsidies, tax breaks, or low-interest loans. Collaborate with architects, developers, and builders to integrate solar design considerations into new construction projects.

3. Fisheries

Agriculture and allied sectors hold a major role in employing people, providing food, and ensuring food security in any development process. It also has a significant position in achieving the Sustainable Development Goals (SDG) of no poverty, zero hunger, and good health and well-being.

In Lakshadweep, the major agriculture allied sectors are Crops, Marine Fishery and Livestock. The major agricultural produce in the UT are Coconut, Fruits and Vegetables. The UT administration is in process of constituting 35 'Dweep Mahila Sangam' like the 'Kudumbashree of Kerala', to promote agricultural activities and women empowerment.

Speaking about the Fisheries sector of Lakshadweep, tuna-based fishery is predominant. Tunas are most economically underutilized fisheries in Indian waters with more than half of their potential located around the Lakshadweep waters. As per the IBEF report, the estimated potential of marine fishery resources in Lakshadweep is about one lakh tonnes of tuna and tuna such as fished and shark. In 2017-18, the fishery production in Lakshadweep was 21,000 tonnes against 29,800 tonnes in 2016-17. As of 2018, 100 GPS units were issued to the fisherman in the islands at 75% subsidy, to help fishermen in navigation purposes like reaching specific locations for fishing activities.

The energy consumption in the agricultural sector of Lakshadweep is not available as the energy consumption in the sector is very less.

Strategy 1: Energy efficiency across value chain of fisheries

The fisheries sector in India encompasses a wide range of activities, from fishing to processing, marketing, and distribution of fish and fish products. Improving energy efficiency across all value chains in the fisheries sector can lead to significant environmental and economic benefits, including reduced greenhouse gas emissions, decreased energy consumption, and cost savings for fishers and processors.

In the processing and packaging stages, energy is mainly consumed for cooling, freezing, and drying of fish products. The use of energy-efficient refrigeration and drying equipment can significantly reduce energy consumption and associated costs. Additionally, adoption of renewable energy sources such as solar and wind can further reduce energy consumption and greenhouse gas emissions.

The transportation and distribution of fish and fish products also require significant energy input, mainly in the form of fuel for vehicles and refrigeration systems. The use of energy-efficient vehicles and refrigeration systems, as well as improved logistics and distribution systems, can reduce energy consumption and transportation costs.

Overall, improving energy efficiency across all value chains in the fisheries sector in the state can bring numerous benefits, including reduced greenhouse gas emissions, cost savings for fishers and processors, and increased competitiveness in the global market.

Implementing Agency: Department of Fisheries, LEDA

Actionable measures

1. **Skill Development:**
    a) Launch training programs for boat operators on fuel-efficient navigation through route optimization software, gear selection based on catch data and weather forecasts, and proper engine maintenance techniques.

    b) Partner with ICAR to develop and deliver state-specific training modules on efficient fishing practices and gear selection for Lakshadweep Islands' diverse fishing grounds.
2. **Awareness Campaigns:**
    a) Conduct workshops in major fish processing centres focusing on energy-efficient equipment like variable-speed drives for compressors, LED lighting upgrades, and automated cleaning systems.

    b) Develop and distribute technical manuals in Hindi detailing best practices for optimizing cooling systems, waste heat recovery, and water management in fish processing plants.
3. **Financial Incentives:**
    a) Offer subsidies for replacing traditional engines with Bureau of Indian Standards (BIS)-approved energy-efficient models.

    b) Implement a "scrap and replace" scheme for outdated vessels, incentivizing lightweight fiberglass designs with higher fuel efficiency.
4. **Pilot Projects:**
    a) Collaborate with local fishing communities in Visakhapatnam and Kakinada harbours to pilot energy-efficient fishing vessels with advanced navigation systems and automated gear deployment.
5. **Energy Efficient Fishing Vessels:**
    a) In the islands, there are around 2,000 motorized fishing boats, which consume a considerable amount of diesel fuel. By adopting energy-efficient engines and reducing vessel weight, fuel consumption can be reduced. According to a study -efficient engines in fishing vessels can reduce fuel consumption by up to 40%.

    b) Promote the adoption of solar-powered accessories like navigation lights, bilge pumps, and onboard refrigeration units to reduce reliance on diesel generators.

    c) Develop and disseminate guidelines for safe and efficient installation and operation of solar panels on fishing vessels, considering marine environment and safety regulations.
6. **Guidelines for BEE Star-Rated Products:**
    a) Develop and distribute state-specific guidelines highlighting the benefits and availability of BEE Star-rated equipment for fishing vessels, processing units, and cold storage facilities.

b) Organize awareness campaigns in fishing communities and processing centers to educate stakeholders on identifying and choosing energy-efficient equipment.

c) Collaborate with equipment manufacturers and distributors to promote and stock BEE Star-rated products in the A & N Islands.

7. Partial Support for Energy Audits

a) Offer partial financial support or subsidies for conducting energy audits in fishing vessels, processing units, and cold storage facilities, similar to the program available for MSMEs.

8. Mandatory Data Collection and Reporting

a) Consider mandating ISO 50001 energy management system certification for larger processing units to ensure effective data collection and continuous improvement in energy efficiency.

b) Standardization of Cold Chain Technologies.

c) Develop and maintain a state-specific database of standardized cold chain technologies for fisheries, covering investment costs, Return on Investment (ROI), energy specifications, vendor information, and operational benefits.

d) Regularly update the database with new technologies and best practices, disseminating information through industry workshops and technical manuals.

e) Collaborate with research institutions and industry experts to evaluate and endorse energy-efficient cold chain technologies.

9. First and Last Mile Transportation:

a) Phase Changing Materials (PCM) Technology: Encourage the adoption of PCM coolers/freezers for transporting fish, reducing reliance on ice and maintaining consistent cool temperatures during transport.

b) Energy-Efficient Aerators: Promote the use of energy-efficient aerators in aquaculture farms to optimize oxygen levels and reduce energy consumption.

c) EV adoption: Collaborate with fisheries departments and EV manufacturers to explore expanding the use of electric three-wheelers or small cargo EVs for fish transportation within cities and urban areas.

10. Cold Storage and Processing:

a) Solar PV Systems: Incentivize the installation of rooftop solar PV systems for fisheries and cold storage facilities through subsidies, net metering policies, and technical assistance programs.

b) Ammonia/CO2 Brine Systems: Promote the adoption of efficient Ammonia/CO2 brine systems in cold storage facilities, offering higher cooling efficiency compared to traditional systems.

c) Evaporative Condensers: Encourage the use of evaporative condensers for cooling in processing units and cold storage facilities, utilizing ambient air and water evaporation for heat rejection.

d) Low Charge Ammonia Systems: Consider exploring the feasibility and safety of adopting low charge Ammonia refrigeration systems in suitable scenarios, minimizing refrigerant use and potential leaks.

4. Opportunities for DISCOM

Lakshadweep currently relies entirely on diesel generators for its electricity generation. This dependency on diesel not only results in significant carbon emissions but also places a burden on resources and operational efficiency due to the high costs and logistical challenges of transporting diesel fuel to the islands. The Lakshadweep Electricity Department ensures round-the-clock power supply to consumers across the islands, but the current energy scenario remains unsustainable in the long term. The Indian government has taken a strategic initiative to promote the use of natural gas, aiming to increase its share in the primary energy mix to 15% in the coming years.

Under the 12th City Gas Distribution (CGD) Bidding Round, substantial progress has been made in expanding the gas pipeline network across the country, with over 23,500 km of gas pipelines operational. However, the pipeline infrastructure has not yet extended to remote regions such as Lakshadweep. The government's vision of "One Nation, One Gas Grid" by 2030 highlights the importance of expanding access to cleaner fuels such as Piped Natural Gas (PNG) and Compressed Natural Gas (CNG) to all parts of the country, including the islands.

Extending natural gas infrastructure to Lakshadweep and other remote areas could significantly reduce the region's carbon footprint by transitioning away from diesel-based power generation. This would involve transporting liquefied natural gas (LNG) via cargo ships to these islands, where it could be converted to PNG and CNG to fuel generators and other applications

Strategy: Gas based dual Fuel for Diesel Gensets

One potential solution to reduce emissions and improve energy efficiency in Lakshadweep is the deployment of PNG-based Dual Fuel Kits for diesel generators. This innovative technology integrates Piped Natural Gas (PNG) into the combustion process, working in tandem with the existing diesel fuel. The Dual Fuel Kit injects PNG into the generator's combustion chamber, where it combines with air and diesel vapor to create an optimal mixture for combustion.

The system's control unit monitors and adjusts the ratio of PNG to diesel based on factors such as engine load, speed, and temperature. This ensures efficient operation across varying conditions, allowing operators to minimize diesel consumption while maximizing the use of PNG. The flexibility of the system enables it to replace up to 80% of the diesel fuel with PNG, significantly reducing emissions and operational costs.

By leveraging PNG-based Dual Fuel Kits, Lakshadweep could see a reduction in carbon emissions, lower fuel costs, and improved operational sustainability. This strategy aligns with the broader national objectives of increasing natural gas usage and reducing reliance on more polluting fuels.

Financing Mechanism

Financial mechanisms are structured systems put in place to facilitate the funding and implementation of energy-efficient measures in buildings and industries. These mechanisms encompass a range of financial tools, including loans, grants, subsidies, tax incentives, and other instruments, aimed at providing essential financial support for energy efficiency initiatives. To achieve energy efficiency targets and significant cost savings, states must implement a diverse set of energy efficiency policies and programs. To secure the necessary funding for these initiatives, the Bureau of Energy Efficiency (BEE) has introduced several financial mechanisms that states can leverage for implementation. A notable program under the National Action Plan on Climate Change is the 'National Mission for Enhanced Energy Efficiency (NMEEE).' Within this framework, the following financial mechanisms have been initiated:

1. **Energy Efficiency Financing Platform:** Under the National Mission for Enhanced Energy Efficiency, this platform facilitates interactions between financial institutions and project developers. It serves as a crucial interface for the effective execution of energy efficiency projects, streamlining the flow of financial resources.

2. **Framework for Energy Economic Development:** This framework is designed to simplify the financing of energy efficiency projects through diverse fiscal instruments. It enhances stakeholder convenience by implementing schemes such as the 'Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)' and the 'Venture Capital Fund for Energy Efficiency (VCFEE).

3. **PRGFEE (Partial Risk Guarantee Fund for Energy Efficiency):** PRGFEE addresses credit risks and transaction structuring barriers. It engages financial institutions and strengthens their capacity to finance energy efficiency projects on a commercially sustainable basis. The guarantee period extends up to a maximum of 5 years, with the Government of India allocating approximately INR 312 crores for PRGFEE.

4. **VCFEE (Venture Capital Fund for Energy Efficiency):** VCFEE offers risk capital support for energy efficiency investments in new technologies, products, and services.

5. **Revolving Funds:** These financial tools are designed to support sustainable development projects across various sectors, such as agriculture, small businesses, and community infrastructure. These offer loans at favorable interest rates and are intended to support these sectors. Repayments from these loans replenish the fund, ensuring a continuous cycle of financing for new borrowers.

6. **Green Bonds:** Green bonds are financial instruments specifically crafted to fund projects and initiatives with environmental benefits. They are typically issued by governments, municipalities, corporations, or other entities to raise capital for endeavors that promote sustainability, renewable energy, energy efficiency, climate change mitigation, and other environmentally friendly goals.

7. **Soft Loans:** Also known as concessionary or subsidized loans, soft loans are financial instruments provided under more favorable terms compared to standard commercial loans. These loans typically feature lower interest rates, longer repayment periods, and flexible terms. Governments, international financial institutions, or development agencies often offer soft loans to support specific objectives such as economic development, social welfare, or sustainability.

Summary

The "State Energy Efficiency Action Plan" report for Lakshadweep provides a roadmap for the UT to achieve its energy efficiency goals. It outlines opportunities for energy savings and greenhouse gas emissions reductions across multiple sectors, including industry, buildings, transportation, water supply and fisheries. The proposed strategies are designed to help the UT allocate resources to meet its targets in line with the NDCs. To successfully implement the action plan, it is essential to create a task force or working group comprising representatives from government, industry, NGOs, energy experts, and other stakeholders. This group should establish priorities, timelines, and progress monitoring. Adequate funding, including grants, loans, and public-private partnerships, must also be secured to support the plan. Additionally, innovative financing mechanisms, such as energy efficiency bonds, can be used to attract private investment in energy efficiency projects.

In light of this projection, the action plan identifies Transport, Building & Fisheries as the key focus sectors. It further analyses sector-specific strategies to achieve energy savings. In the moderate scenario, the implementation of this plan is expected to result in a reduction of 6,022 toe in total energy consumption by FY 2031. In the ambitious scenario, the reduction is projected to be 10,401 toe. Additionally, this plan aims to generate awareness at a mass level and create a market potential of approximately Rs. 19 crores in the energy efficiency sector. Furthermore, it is anticipated to contribute to a reduction of 18,850 tCO_2 in the moderate scenario and 32,557 tCO_2 in the ambitious scenario in terms of CO_2 emissions by FY 2031.