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Tamil Nadu Climate Change Mission

ACTION PLAN FOR DECARBONISING RAMESWARAM LPA

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Action Plan for Decarbonising Rameswaram LPA

"Tamil Nadu has always led the nation in showing how growth and responsibility can go hand in hand. We are steadily building on our actions toward becoming a Net-Zero economy well before 2070. These District Decarbonisation Action Plans take this commitment deeper by bringing climate action closer to the people, to our villages, towns, and industries. When every district and every citizen joins hands, Tamil Nadu will demonstrate how sustainability can take root in local action and collective responsibility."

Thiru M.K.Stalin

Honourable Chief Minister of Tamil Nadu

“For Tamil Nadu, economic progress and environmental care go hand in hand and they are central to how we plan and govern. These District Decarbonisation Action Plans reflect our commitment to ensuring that development also builds climate resilience. They will guide each district to grow responsibly, aligning prosperity with the health of our land, air, and water. This is how we see the future of Tamil Nadu where fiscal discipline, environmental stewardship, and people’s well-being move forward together.”

Thiru Thangam Thennarsu

Honourable Minister for Finance,
Environment and Climate Change, Tamil Nadu

“The District Decarbonisation Action Plans strengthen Tamil Nadu’s commitment to integrating climate priorities into development planning. They bring together policy, people, and business to act on shared goals of resilience and sustainability. This approach reflects our focus on turning data and collaboration into practical outcomes that safeguard our environment and support inclusive growth. This is where the strength of Tamil Nadu truly lies, in turning science and policy into action that uplifts people and protects nature.”

Tmt. Supriya Sahu, I.A.S.

Additional Chief Secretary to Government, Environment, Climate Change & Forest Department, Tamil Nadu

“The District Decarbonisation Action Plans reflect Tamil Nadu’s participatory and bottom-up approach to climate action. They combine data, local experience, and cross-sector coordination to help districts plan and act with clarity. Through collaboration between departments, industries, and communities, TNGCC is working to ensure that every local effort contributes meaningfully to the state’s long-term climate goals.”

Thiru A.R. Rahul Nadh, I.A.S.

Director, Department of Environment and Climate Change, Tamil Nadu

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Preamble

Rameswaram is a gateway to the Gulf of Mannar Biosphere Reserve, and a vital economic center driven by tourism and fishing. Yet its low-lying geography, with an average elevation of barely 10 metres above sea level, makes it highly vulnerable to climate impacts. As a cultural and spiritual hub of Tamil Nadu, there also lies a tremendous opportunity for the Local Planning Area to develop itself into a centre of sustainable tourism.

This Decarbonisation Plan has therefore been developed with a clear vision—to build a low-carbon, climate-resilient, and economically inclusive future for Rameswaram. Grounded in emissions mapping, energy modeling, and climate variability analysis, this plan identifies sector-specific strategies, emission trajectories, and actionable interventions tailored to the LPA's distinctive needs and opportunities. Building on its rich spiritual heritage and natural assets, the plan envisions Rameswaram as an eco-spiritual hub and a Net-Zero Pilgrimage Corridor—where responsible tourism harmonises with conservation and low-carbon development.

Interventions such as electrifying fishing and road transport fleets, development of solar powered cold storage infrastructure, including e-iceboxes for fish transport, transitioning households to clean cooking fuels, and improving waste management may involve short-term costs and behavioural change, but their long-term benefits are transformative: lower emissions, reduced energy dependence, improved air quality, and cost savings for vulnerable communities. A key pillar of the plan is ecosystem-based carbon removal, leveraging Rameswaram's mangrove, seagrass, and seaweed-rich coastlines for significant sequestration potential, while boosting fisheries, ecotourism, and climate resilience.

This plan outlines a forward-looking approach that integrates decarbonisation with ecosystem restoration and adaptation measures, positioning Rameswaram for not only meeting Tamil Nadu's carbon neutrality targets but to serve as a national model for sustainable, inclusive coastal development.

About Rameswaram Local Planning Area (LPA)

Rameswaram is one of Tamil Nadu's most significant coastal towns, both culturally and economically. The Rameswaram LPA falls in the eastern part of the island in Ramanathapuram district of Tamil Nadu, covering **53 sq.m** and accommodating **~56,000** individuals across **~13,000** households.

Geographical boundary (the highlighted portion in yellow) of Rameswaram LPA from google satellite and shape file (April'25) Verified by the Municipal Commissioner of Rameswaram City

Rameswaram is a pilgrimage and tourist hub. Hence, its economy is centralised around tourism.
As a key Hindu pilgrimage site and part of the Char Dham circuit, it attracts over **~1.8-2 crore visitors annually**[1], contributing to its economy through boosting service and transport demand, alongwith its fishing and maritime sectors due to its coastal span of 76.5 km.

Recent developments, including announcements under the TN State Budget 2025-26, will further give an impetus to the tourism activities in Rameswaram
With Tamil Nadu allocating **Rs. 300 crores for development of modern infrastructure facilities in Rameswaram** and other tourist hubs, the inauguration of the **New Pamban Bridge** and the **new train service** connecting Rameswaram and Tambaram (Chennai), the tourist influx in Rameswaram is predicted to only increase in the coming years.

Due to its low-lying geography, the LPA is also highly exposed to climate threats, with an increasing need to build local resilience.

In addition to the mounting pressure of energy demand, Rameswaram with its low-lying geography and an average elevation of just 10 metres above the sea level is also threatened by climate change in the form of sea level rise, inundations, and coastal erosion.

This underlines the significance of a low-carbon and climate resilient development in Rameswaram.

The LPA faces a threat on the account of both climate induced and anthropogenic activities. The decarbonisation and climate action plan takes cognisance of this necessity of reducing emission footprints of the LPA with sectoral interventions, while boosting urgent, community-based climate action. The subsequent sections provide,

- An analysis of the current sectoral priorities and concerns.
- GHG emissions profile for Rameswaram (2022), with sectors and fuel sources.
- Sectoral pathways with abatement potential for pursuing a low-carbon and resilient future.

Demographic, Economic, and Climate Profile of Rameswaram Municipality

As a unit of urban governance at the city level, Rameswaram Municipality handles water supply, waste management, street lighting, permits etc.

Rameswaram Sanpshot

	10 m above sea level	**53 sq.km** Municipal area	**76.50 kms** Coastline	**74%** Sandy soil
	7.2 sq.km (14%) of built up area	**2 sq.km (3.8%)** of reserved forests	39.2 sq.km (64.8%) of sand dunes and dry land	Remaining land covered by quarry etc.
	13,386 Households	**44,856** Population (2011)	**55,928** Population (2024)	**21** Wards
	20,000 Visitors daily[2]	**50,000** Visitors on weekends	**3 lakhs** Visitors on special occasions	**50-80** Tourist lodges
	Hot-dry weather	**33.6°C** Max temperature	**21.3°C** Min temperature	**817.8 mm** Average annual rainfall
	Apr – Jun Hottest months		**Oct - Dec** NE Monsoon	

Sources: As indicated by the Municipality; Ramanathapuram District Statistical Handbook 2022-23

Economy

Overview[3]

- Key occupations: Fishing, trade, tourism services
- Industrial presence: Coral and handicraft industry
- Cottage industries: Fish processing units

Recent Developments[4]

- PRASHAD scheme & Swadesh Darshan scheme (coastal circuit) for the development of Rameswaram island to enhance tourist experience (community based ecotourism)
- Proposed four-lane (NH-87) linking Rameswaram under Madurai-Dhanushkodi corridor project

Concerns[5]

- Both tourism and fishing are highly exposed to weather variability, sea conditions, and climate events
- Tourism is impacting the sensitive ecology of Rameswaram Island
- Low-lying coastal areas and fish landing sites are vulnerable to tidal inundation
- Livelihood insecurity
- Peak tourism congestion, fueled by the rise of small passenger vehicles, the NH-87 bottleneck, and inadequate public transport alternatives.

Energy Overview

Overview[6]

- 100% electricity access from mainland via HT feeder and distributed locally through transformers
- Total distribution capacity: 21.4 MVA
- Current demand: 7.5 MVA (ample reserve capacity)
- Backup systems: Diesel generators used during outages (hotels & lodgings, commercial establishments, individual homes, temple related establishment are key users)

Key Developments[7]

- Carbon neutral city pilot project in 2023 for electrification of e-autorickshaw fleets, solar deployment across municipal assets (on going)
- Renewable Energy Technology Knowledge Park (proposed)

Concerns

- The entire power supply relies on a single HT feeder from the mainland, making the island vulnerable to supply disruptions during cyclones & storms.
- Reliance on diesel generators during power disruptions contributes to increased GHG emissions
- High operational and maintenance costs
- High electricity demand during summer months due to increasing space cooling requirement in the residential and commercial buildings

Water Access

Overview[8]

- Total daily water supply: 2.97 Million Litres per Day (MLD)
- Estimated daily demand: 5.42 MLD
- Gap: 2.45 MLD
- Water source: Freshwater source (primary) and groundwater (secondary)

Ongoing work[9]

- Ramanathapuram Mega Drinking Water Supply Project – to provide 55 litres per capita per day (LPCD) for rural households.
- Proposed installation of water harvesting structures at all public places and renovation of traditional water bodies for better water storage
- Building water security through revival and rejuvenation of water bodies (Green Resilient Rameswaram project on going)

Concerns[10]

- In areas where dependence on fragile coastal aquifers is high, saltwater intrusion is of concern.
- Challenges for agriculture due to saline irrigation water
- Dependence on the mainland for pipe water supply

Waste Management

Overview[11]

- Daily waste generation: 22.13 Metric Tonnes
- Solid waste collection efficiency: 100%
- Sewage Treatment Plant (STP) capacity: 4.08 MLD

Ongoing work[12]

- Underground sewerage project (₹52.6 crore): 46% complete as per latest updates. The town is partially covered by an Underground Sewerage System (UGSS). The scheme is designed for the ultimate stage by the year 2049.

Concerns[13]

- STP located near the coast, is vulnerable to sea-level rise, storm surges, and coastal erosion
- Peak tourist seasons result in higher waste generation adding strain on waste management
- Inadequate drainage and sewer blockages lead to urban flooding and waterlogging during rainfall events
- Contaminated surface runoff resulting in water pollution

Climate Disaster

Coastal Erosion:
A significant threat which is likely to escalate with intense storms and rising sea levels.

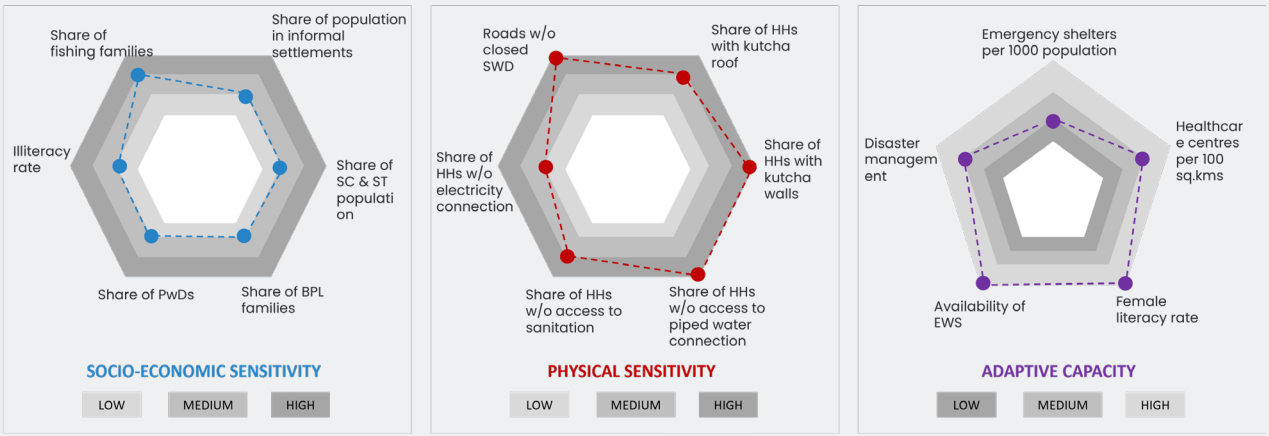
Sea Level Rise:
Projected to worsen with climate change through continued ocean warming.

Floods:
Expected to intensify due to rising sea levels, increased frequency of extreme rainfall and cloud bursts.

Water Scarcity:
Seasonal scarcity due to altered rainfall patterns and increased evaporation.

Heatwaves:
Currently not a concern but likely to increase posing future risks to public health and economic growth.

Climate Vulnerability



Vulnerability category - **High:** 67-100, **Medium:** 34-66, **Low:** 1-33; analysis based on Census 2011

- A significant proportion of families depend on fishing, making their livelihoods highly sensitive to climate change (due to sea-level rise, cyclones, etc.).
- While open SWD exists, a closed SWD is important to address flooding.
- Buildings with kutcha walls (unburnt bricks, bamboos, mud, grass, reeds, thatch, loosely packed stones) heightens vulnerability to flooding and cyclones.
- Need for increased capacity of emergency shelters.
- Considering, Rameswaram is an island, developing a city disaster management plan will support in emergency and recovery management.

SWD: Storm Water Drains | PwD: Persons with Disabilities | EWS: Economically Weaker Section | HH: Households

GHG Estimates and Sectoral Decarbonisation Plan

An Overview of Low Carbon & Resilient Rameswaram

Rameswaram is on a development path that brings both opportunities and new challenges, including the need to manage rising demand and growing climate risks such as sea-level rise, coastal erosion, and extreme weather.

Anchored in scientific analysis and energy and climate projections, this Action Plan sets out sectoral strategies, emission trajectories, and actionable interventions tailored to Rameswaram's unique social, economic, and ecological context.

Key Components

GHG Profile / Identifying Key Emission Drivers

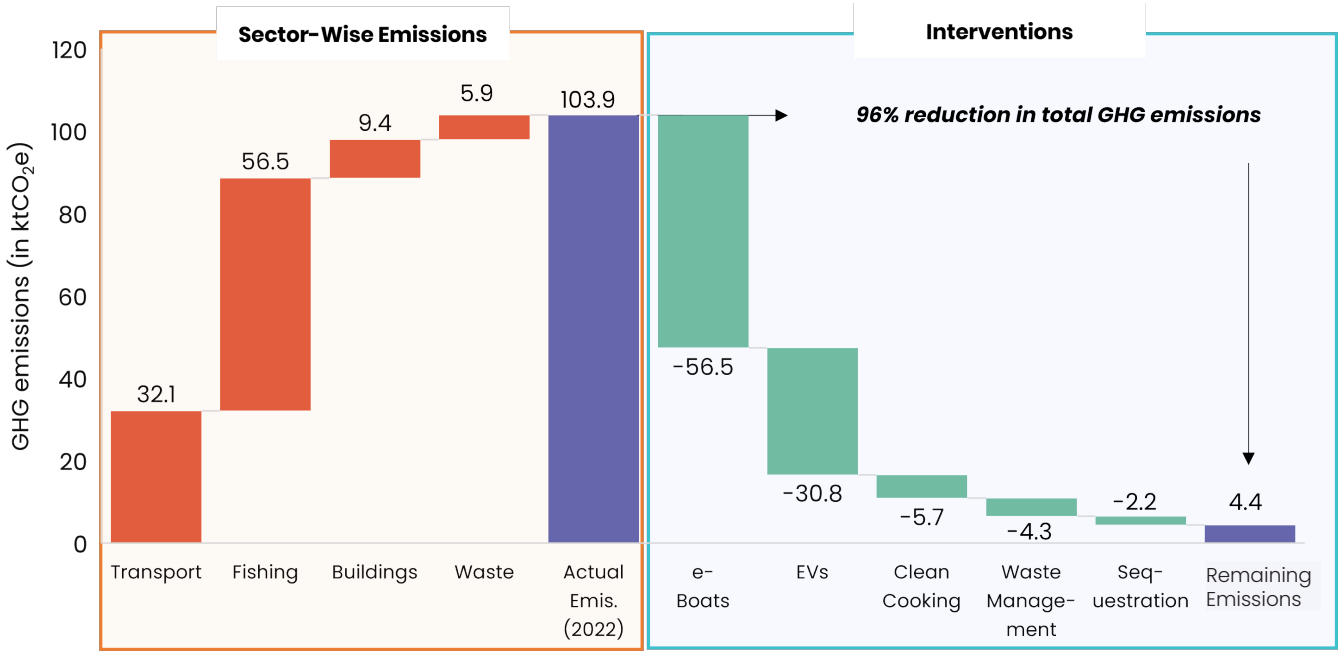
- GHG emissions covering Energy, AFOLU, and Waste sectors – developed using IPCC Guidelines in line with India's NATCOMs and BURs for the year 2022

Decarbonisation and Climate Action in Rameswaram

- Key sectoral interventions (in the form of ready to implement projects) identified with its abatement potential
- Allied practices from other States provided as case studies

As much as **94%** of all GHG emissions in Rameswaram are contributed by the **energy sector**. These emissions accrue to **fossil fuel use** in **fishing boats, vehicles** and **commercial buildings** – making them top emitters with **54%**, **31%** and **9%** emission share respectively.

Other emissions are contributed largely by the waste sector.



Sector-wise composition of emissions in Rameswaram in 2022, and abatement potential by interventions

GHG Profile for Rameswaram (2022) and Abatement Potential

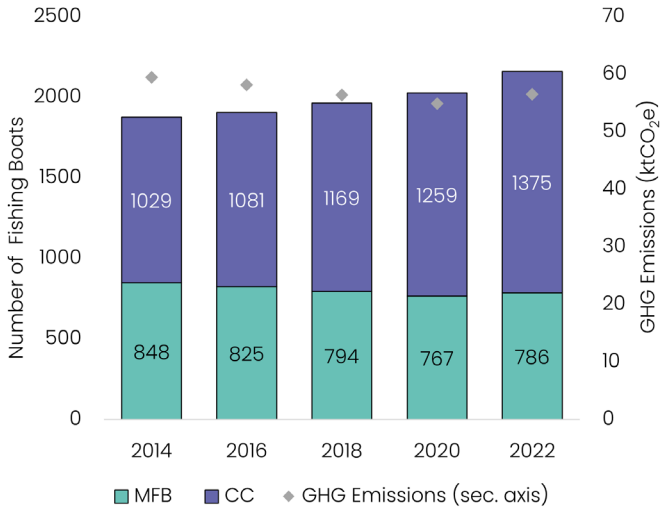
These interventions proposed can abate nearly 96% of the total emissions —driven largely by decarbonisation of fishing and transport sector, and supported by interventions in waste management and enhancement of land sequestration, **demonstrating the feasibility of near-complete decarbonisation of Rameswaram**.

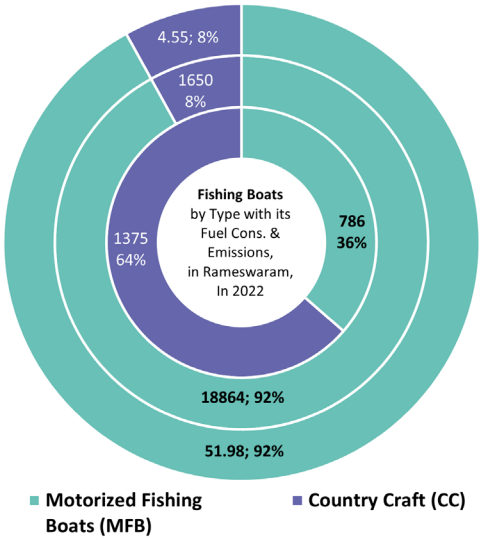
	Sub-Sector wise Interventions	Projected GHG Emissions ($ktCO_2e$) in 2022	Percentage Share of the Total	Emissions avoided ($ktCO_2e$)	Residual Emissions ($ktCO_2e$)
Energy Sectors	**A.1 Fishery**	56.5	54%	56.5	0
	Electrification of 1375 Country Craft (CC) Boats			4.5	
	Electrification of 786 Mechanised Fishing Boats (MFB)			52.0	
	A.2 Transport	32.1	31%	30.8	1.2
	Electrification of 15000 2-wheeler (2W)			8.1	
	Electrification of 4000 3-wheeler (3W)			6.5	
	Electrification of 3000 4-wheeler (4W)			8.7	
	Electrification of 85 Buses & Heavy Goods Vehicles (HGVs)			7.6	
	A.3 Buildings (Residential & Commercial)	9.4	9%	5.7	5.7
	Electric Cooking			4.7	
	Bio-methane for Household Use*			1.0	
	A. Total for Energy Sector (A.1+A.2+A.3)	98.0	94%	93.0	4.9
Non-energy Sectors	**B.1 Total Waste sector**	5.92	6%	4.31	1.61
	Domestic wastewater	5.34		4.31	1.03
	Solid Waste Disposal	0.57			0.57
	Industrial wastewater	0.01			0.01
	B.2 Carbon Sequestration			2.23	-2.23
	B. Total for Non-Energy Sector (B.1 + B.2)	5.92	6%	6.54	-0.62
Total (A+B)		**103.9**		**99.6**	**4.4**

Sector Focus

Fisheries

Emissions in fisheries accrue primarily to diesel consumption in fishing boats. In 2022, emission from fishing sector were 56.5 $ktCO_2e$





Diesel consumption-based emissions have marginally reduced between 2014 and 2022, owing to decrease in the number of Motorised Fishing Boats (MFBs).

This is temporary effect, and may reverse with increase in MFBs driven by sectoral growth.

Inside to Outside:

Layer 1: Number of Fishing Boats

Layer 2: Estimated Average Annual Fuel Consumption (in kl)

Layer 3: Emissions in $ktCO_2e$

Decarbonisation of the fishing sector must target fuel switching and electrification of boats instead

Electrification of the propulsion systems with solarisation for auxiliary energy needs in fishing boats can **fully abate 56.5 $ktCO_2e$** of sectoral emissions

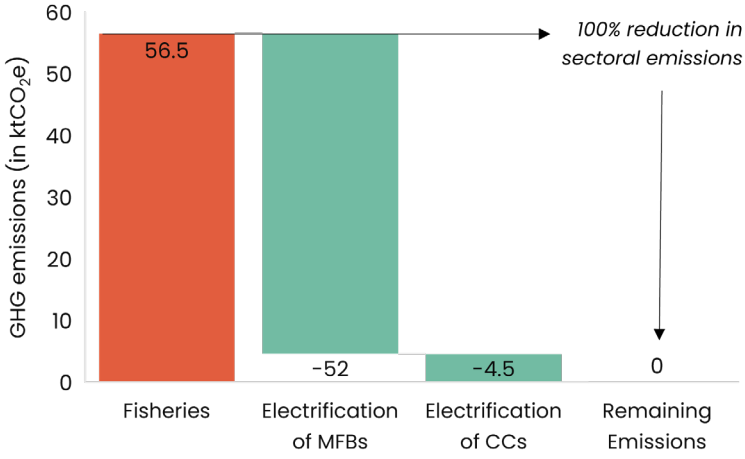
- Convert the existing 786 MFBs to solar-electric – fully avoiding average annual diesel consumption of 18,864 kl

Abatement Potential: 52.0 $ktCO_2e$

- Similarly, convert the existing 1375 CC Boats to solar-electric to cut average annual diesel consumption of 1650 kl

Abatement Potential: 4.5 $ktCO_2e$

Total cost of ownership (TCO) for solar-assisted electric boats is approximately 60% lower than for petrol or diesel operated boats.



Additional Recommendations

Biodiesel (e.g. from fish processing waste or algae), green hydrogen and ammonia (NH_3) could be another alternative to cut emissions from fishing sector. Potential assessment and subsequent adoption of these technologies could be further explored

Development of solar-powered cold storage infrastructure, including e-iceboxes for fish transport and storage will further enhance the sustainability of the fishing sector.

- Community led models, with fishermen cooperatives owning the subsidised/financed fishing boats, including a service model where cooperatives lend the boats to small fishermen who cannot afford purchasing one, could quickly build confidence and promote adoption
- Training modules, integrated into schemes like the Pradhan Mantri Matsya Sampada Yojana (PMMSY), could generate awareness and build local capacities
- Initial capital support with subsidies aligned to PMMSY norms, supplemented with low interest loans from NABARD or other cooperatives, could further support the adoption of solar/electric boats

Case Study 1: Adoption of Electric Fish Boats

Pilots pertaining to solar electric fishing boats have already been conducted in Kerala, proving viability for a full scale implementation

Solar electric fishing boat

Cost of Ownership

- Designed to provide fishermen with a sustainable, cost-effective, and environmentally-friendly alternative to traditional fishing boats.
- Powered by a combination of solar panels and battery storage.
- By adopting solar electric boats, fishermen can transform these colossal fuel expenses into substantial profits.

Specifications of Fishing boat

Optional plug and charge	25 kWh Electricity Generation	Max speed of 7 knots
6 passengers	2kWp Solar Panel Capacity	10m long x 3.6m wide
70 km range	2 x 6 kW Electric Motor Capacity	

Case Study 2: Solar-Powered Cold Storage Infrastructure

Solar power could run cold storage, saving fishermen trips to town or nearby villages for sourcing ice to keep fish fresh. Solar-powered cold storage as a service can enable wider access and adoption of this solution.

Solar-powered cold storage as a service in Bihar

- **Problem:** Post production losses of agricultural produce due to lack of proper storage facilities. Solar-powered cold storage had low uptake due to high upfront cost of installation.
- **Solution:** A solar-powered cold storage unit, run on a service based model
- **Outcome:** Wider access to decentralised energy solution, especially for farmers who couldn't afford units on their own; lower food spoilage and wastage
- **Forward Linkage:** Self-Help Groups (SHGs) can act as owners of these units, earning per usage and using a part of that income for maintenance and repair purposes.

Sources: Oonnayan website

Additional Sustainable Fishing Practices

- Enforce seasonal fishing bans during breeding periods, backed by compensation schemes for fisher families to avoid livelihood loss.
- Prohibit bottom trawling, pair trawling, and push nets in the Gulf of Mannar Biosphere Reserve; enforce use of selective fishing gear like square mesh cod ends to protect juvenile fish stocks.
- Promote traditional low-impact practices such as Kattumaram (catamaran) sailing, hook-and-line fishing, and reviving indigenous marine closure periods.

Sector Focus

Buildings

Emission Profile

- Emissions in the Building sector are linked to LPG usage in residential and commercial cooking (Scope 1), and use of fossil-fuel driven electricity (Scope 2) in these buildings.
- LPG use in cooking, including in hotels and lounges within commercial sector, account for 9.4 $ktCO_2e$ of Scope 1 emissions.

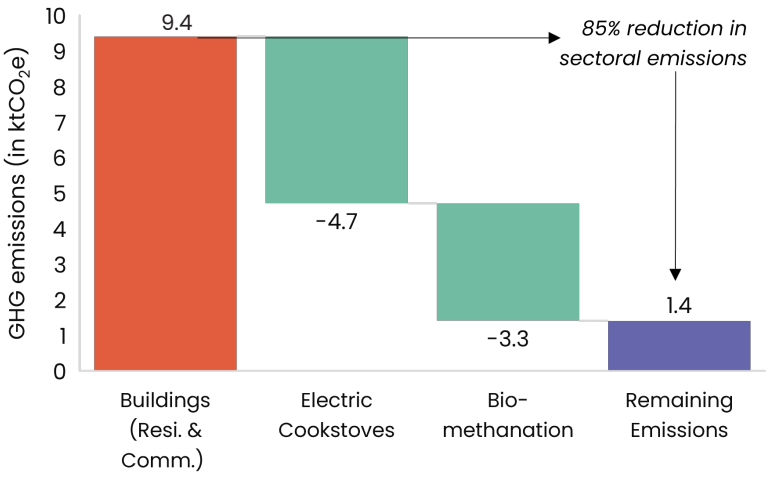
Clean cooking solutions and bio-methanation can abate 8 ktCO2e of these emissions from residential and commercial cooking.

- Promoting partial adoption **(50%)** of electric cookstoves, in both residential and commercial cooking

Abatement Potential: 4.7 $ktCO_2e$

- Installing bio-methanation plants in 50% buildings have potential to generate 3,000 m3 biogas per day (11 MT)

Abatement Potential: 3.3 $ktCO_2e$ annually



Case Study 3: Promoting Bio-Methanation from Kitchen Waste

Potential and applicability of bio-methanation has been tested in India, including Rameswaram, and serves as a proof of concept for scaling up

Rameswaram has 17 Bio-methanation plant, each of a capacity ~1 m^3 per day. This can be further scaled up for a higher impact.

Bio-Methanation

- Suitable for both rural and urban areas.
- The plant features different capacities (500 to 1500 liters of gas), is easy for relocating, and can be kept on terrace.
- Feed material includes waste from domestic and commercial kitchens, vegetable markets, waste material from flour mill etc. Cow dung act as catalyst.
- Apart for cooking, gas can be converted into **electricity** or **C.B.G**.
- Pay back period of plant is **1 to 2 years**.

Intervention for LPA

- To utilise 50% (~11 MT) of the total biodegradable waste generated from various sources, there is a need to install total bio-methanation plant capacity of ~3,000 m^3 per day.

This biomethane/CBG can be used for cooking and heating in commercial and domestic sector. This will cumulatively abate **3.3 $ktCO_2e$** of emissions per year.

5 kg kitchen waste = 1m3 of Shakti Surabhi gas = 0.43 kg CBG

Bio-methanation plant in Rameswaram (Model: Shakti Surabhi; Make: VK-NARDEP)

Source: Green Rameswaram Trust

Box Item
Harnessing Renewable Energy in Buildings

Rameswaram has a tremendous opportunity for harnessing solar power to fuel its building sector – abating 57 $ktCO_2e$ of Scope 2 emissions

Solar Rooftop Potential in Rameswaram **LPA: ~52 MW @30%** effective rooftop area (0.256 sq.km), equivalent to ~82 GWh would abate Scope 2 emissions of 57 $ktCO_2e$.

Assessment is done through deep learning model that uses google satellite image of buildings in Rameswaram LPA to estimate rooftop solar potential

Decarbonisation can be attained through electrification of the buildings, with priority to public and commercial establishments

Residential		Commercial		Public Infrastructure (Educational + Governmental)	
11629 Buildings	0.49 sq.km built up area	825 Buildings	0.19 sq.m built up area	331 Buildings	0.06 sq.m built up area

**Data as received from the Rameswaram Municipality*

Sector Focus

Transport

Emissions in Road Transport in Rameswaram are closely linked with tourism growth. As a heritage pilgrim destination, Rameswaram draws a significant number of tourists each year.

Rameswaram accounts for 90-95% of all tourist visits in Ramanathapuram – boosting local economy through food, lodging and transport needs.

Year	Domestic Tourist Visit	Foreign Tourist Visits	Approx. Tourist in Rameswaram
2019	1,48,11,305	3,706	1,33,33,510
2020	30,14,555	1,985	27,14,886
2021	24,35,327	174	21,91,951
2022	1,83,35,979	293	1,65,02,645
2023	2,55,25,600	2,618	2,29,75,396
2024 (P)	1,98,53,203	17,341	1,78,83,490

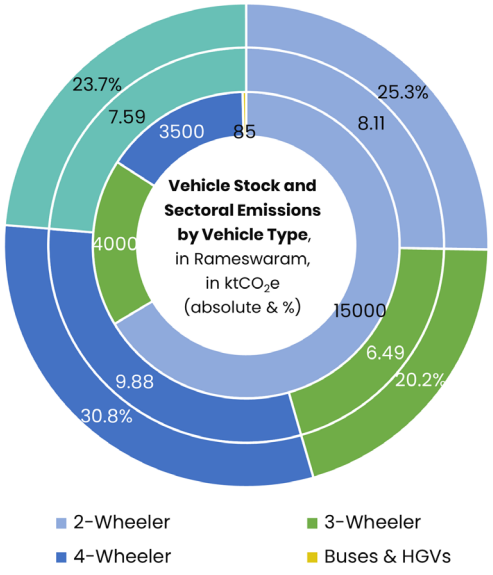
COVID-19 Impacted Years

Source: Tamil Nadu Tourism Department
Note : city-wise data of tourist is not maintained by R&A division of Ministry of tourism

Road Transport, driven majorly by tourism, contributes 32.1 $ktCO_2e$ of GHG emissions. Electrification of 2W, 3W, 4W and buses can abate 98% of these emissions.

Emission Profile

- About **51%** of emissions in Rameswaram's road transport is driven by ~4000 3Ws and ~3500 4Ws, mostly commercial with trips connecting major tourist hotspots to the lodging and railway/bus stand. The **bus fleet** is Rameswaram is small (~85), but contributes another **24%** to the transport emissions.
- **Planned replacement of ICE vehicles to EVs, especially for tourists' movement in Rameswaram and around hotspots, could almost completely abate these emissions. This includes,**
  - 100% electrification of public transport i.e., ~**85** buses, ~**4000** autos/3Ws and ~**3000** commercial 4Ws from railway station/ bus stand to tourism hotspots such as Ramanathaswamy temple, Dhanushkodi etc.
  - Additional electrification of ~15000 private 2Ws.
  - Development of allied infrastructure (charging stations, fast chargers etc.) in alignment with the electrification of such a large fleet.
  - Dedicated Non-Motorised Transport corridors to restrict the vehicular movement at highly dense tourist hotspots.



Layer 1: Number of Vehicles
Layer 2: Emissions by Vehicle Type
Layer 3: Emissions by Vehicle Type in Share

Road Transport emissions of 32.1 $ktCO_2e$ can be nearly abated through:-

- Electrification of ~**15000** e-2Ws, majority of which are locally owned and operated non-commercially

Abatement Potential: 8.1 $ktCO_2e$

- Deployment of **85** e-buses, **4000** e-3Ws, **3000** e-4Ws within the LPA boundary to commute to the temple and popular sites to form Net Zero Pilgrimage Corridor

Abatement Potential: 22.5 $ktCO_2e$

Data Source: Tamil Nadu Tourism Department, data compiled from the Research and Analytics (R&A) division, Ministry of Tourism

Sector Focus

Solid Waste Management

Current Status

Total solid waste generation: 22.13 TPD

Wet waste: 11.73 TPD

(fully treated via MCC, OCC, windrow composting)

Source Segregation & Collection

- Install colour-coded bins at high-footfall zones (AgniTheertham, Ramanathaswamy Temple entrances, beach promenades)
- Create segregation zones with clear signage for public awareness
- Partner with temple authorities and vendors to ensure strict implementation of no-plastic and leaf/cloth -based packaging

Special Waste Streams Management

- Establish collection points for cloth waste(discarded after sea dip or temple rituals) with designated bins and textile recycling tie-ups
- Introduce separate collection and composting pits for temple pooja waste (flowers, biodegradable offerings) to prevent marine litter

Decentralised Processing & Recycling

- Expand dry waste recovery centers for plastics, textiles, and other recyclables

Policy & Enforcement

- Scale up ban on single-use plastics (carry bags, water sachets, flower packaging) across the municipality
- Strengthen monitoring & penalties for non-compliance

Awareness & Engagement

- Organise targeted campaigns for pilgrims, vendors, and residents
- Promote “Clean Rameswaram, Sacred Rameswaram” as a shared civic responsibility

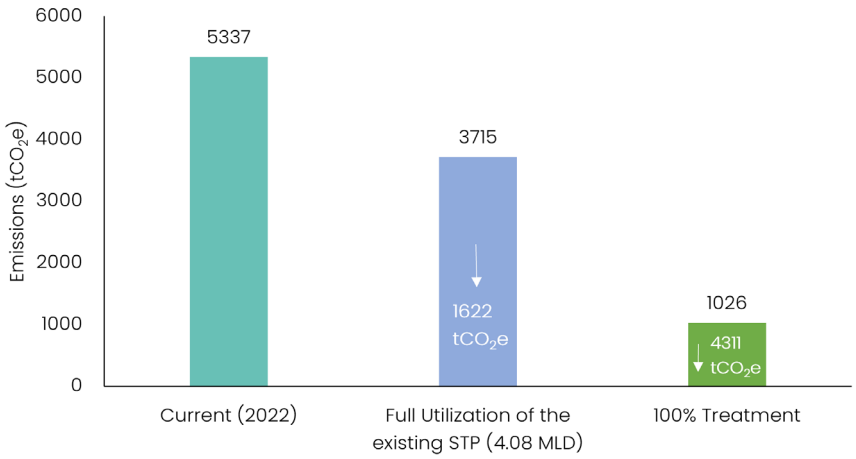
Sector Focus

Domestic Wastewater Management

Current emissions (2022): 5,337 tCO_2e
Current treatment capacity: 4.08 MLD STP with a utilisation of 0.4 MLD

Full utilisation of existing STP (4.08 MLD)
Mitigation potential: 1,622 tCO_2e
Residual Emissions: 3,715 tCO_2e

100% wastewater treatment:
Mitigation potential: 4,311 tCO_2e
Residual Emisisons: 1,026 tCO_2e



- Expand sewer network coverage in high population urban areas and prioritise intercepting wastewater from nalas and diverting it to treatment plants, to ensure 100% utilisation of the existing STP.
- An additional 11 MLD composite treatment system—comprising a centralised STP for key urban areas, Decentralised Wastewater Treatment Systems (DEWATS) for isolated commercial establishments like hotels, and septic tanks for rural households—to enhance treatment capacity and minimise untreated discharge.

Sector Focus

Enhancing Carbon Sequestration

In Rameswaram, barren and wasteland account for approximately 19% of the total geographical area of the Local Planning Area (LPA). These lands are well-suited for plantations and mangrove interventions, in addition to development activities, thereby enhancing carbon sequestration and restoring ecosystem services.

Total Barren/Waste Land: 989.79 ha
Proposed area for agro/social forestry : ~297 ha
Projected carbon sequestration : 2.23 $ktCO_2e$

- Encourage community plantation drives in public and common spaces.
- Establish community nurseries and promote native species suited for coastal, drought, erosion, and sand dune stabilisation.
- Promote salinity-tolerant plantations using native halophytes and coastal tree species.
- Restore and expand mangrove plantations, seagrass and seaweeds in degraded coastal areas for blue carbon sequestration, shoreline protection and support marine biodiversity.
- Promote silviculture and hortipasture systems, including bund planting and farm boundary plantations.

Climate Smart and Resilient Rameswaram

Decarbonisation

Fisheries Sector

- Electrification of **1375** country craft and **786** motorised fishing boats
- Shared financing and community ownership models for initial adoption and pivot

Transport Sector

- Electrification of transport fleet, with focus on public transport through adoption of **~85** electric buses, **~4000** autos/3Ws and **~3000** taxis/ commercial 4Ws.
- Development of non-motorised transport zones including (pedestrian walkways, cycle routes, EV buggy) in and around temple and heritage sites

Building Sector

- Promotion adoption of electric cookstoves in both commercial and residential cooking; and install biomethanation plants in at least 50% of the buildings to support generation of clean cooking fuel.
- Mitigate Scope 2 emissions through robust RE integration into the grid.

Climate Resilience

Built Environment

- Implement urban cool islands (parks, shaded plazas) in heat-vulnerable public zones like bus stands, market areas, temple area
- Promote cool roofs and reflective building materials to reduce heat
- Scale up native tree plantation under Green Rameswaram initiative

Economy

- Expand access to insurance for risk protection during climate related risks (fishing community)
- Identify and promote eco-tourism zones across the island. Integrate with training and employment opportunities for local youth and fisherwomen

Resilient Infrastructure

- Update coastal building codes to mandate elevated structures, cyclone-resistant designs
- Ensure that infrastructure development in Rameswaram complies with CRZ 2019 guideline and is planned with consideration for local coastal hazards and ecological sensitivity

Biodiversity

- Develop urban wetlands as flood buffers in low-lying zones
- Conserve and restore mangroves and sand dunes

Governance

- Establish a dedicated disaster risk management cell as a decentralised local authority tasked with coordinating multi-hazard preparedness, early warning dissemination and long-term resilience planning for the island city.

Water Security

Interventions

- Enhance the storage capacity of overhead water tanks to ensure alternative and reliable water supply incase of disrupted water supply from the mainland.
- Extend the coverage of closed stormwater drains across the city
- Develop retention ponds in high flood-risk areas, including specific wards, temple precincts, and vulnerable residential zones such as Annanagar and Thiruvalluvar Nagar.

Policy and Regulation

- Decentralised rainwater harvesting (RWH) systems across public buildings and tourist hubs

Strengthen Ongoing Work

- Scale up treatment of wastewater and promote its reuse for non-potable applications such as landscaping and gardening
- Strengthen the ongoing efforts in reviving temple tanks and local resources

Spiritual and Ecotourism Hub

Monitoring, Governance and Engagement

- Sustainable Tourism Council with local voices
- Citizen science & school eco-initiatives
- Annual 'Spirit of Rameswaram' report

Green Mobility & Infrastructure

- Pedestrian paths, cycling lanes, battery shuttles
- Solar rooftops in temples &public buildings
- Zero-waste precincts & bio-toilets

Sacred Ecology & Spatial Zoning

- Identify and protect ecologically sensitive zones (e.g., coral reefs, theerthams, sand dunes) through zoning regulations.
- Map and connect sacred, ecological, and heritage landmarks—including Kalam's Memorial—into a unified spatial plan

Pilgrimage & Coastal Clean-Up

- Zoned pathways & crowd flow during peaks
- Water quality monitoring at theerthams
- Campaigns to reduce polluting offerings

Eco-Cultural Spiritual Circuits and Digital Interpretation

- Curate integrated visitor experiences linking temples, marine ecology centres, Kalam's legacy sites, and local folklore.
- Deploy storytelling kiosks, mobile apps, and interpretive signage to highlight mythology, biodiversity, and civic values.

Community Tourism and Capacity Building

- Train youth, women, temple staff as guides
- Support homestays, food stalls, souvenir co-ops

Endnotes

1 Significant GHG emissions arise from the heavy pilgrim tourist footfall, fishing operations, hotels, restaurants, and other anthropogenic waste-generating activities

2 The visitors' number is specific to the temples, and does not account for the whole of the Rameswaram Municipality

3 https://dwiep.ncscm.res.in/Island/IslandDetails/INTN004

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7 https://www.thehindubusinessline.com/news/national/rameswaram-rajapalayam-to-be-carbon-neutral-as-tn-ratchets-up-climate-action/article66754320.ece
https://www.greenrameswaram.org/areas-of-work/#brxe-ogljlg

8 As indicated by the Municipality

9 Green Rameswaram project

10 Senthil Kumar, M., Kumar, S., Jenifer, A. R., & Kumar, R. (2023); https://ieeexplore.ieee.org/document/10855054

11 Rameswaram Municipality Town Profile 2024; https://www.twadboard.tn.gov.in/content/major-water-supply-schemes-1522

12 https://www.tnurbantree.tn.gov.in/rameswaram/amrut-reforms/

13 https://www.sciencedirect.com/science/article/pii/S2577444120300253; https://timesofindia.indiatimes.com/city/madurai/steps-to-solve-agnitheertham-garbage-issue/articleshow/106559575.cms

Notes

Notes

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