



Feasibility Study on Green Hydrogen Potential in Maldives

National Green Hydrogen Policy Framework

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Contents

List of Tables	3
List of Figures	3
1. Introduction	4
1.1 Background and Context	4
1.2 Purpose and Scope	4
1.3 Objectives	5
2. The Case for Green Hydrogen	5
2.1 Energy Landscape and Challenges	5
2.2 Key Feasibility Findings	6
2.3 Use Case Prioritization	7
3. Technology Implementation Roadmap	9
4. Investment Needs	10
5. Existing Policy and Regulatory Framework Assessment	11
6. International Green Hydrogen Strategy Benchmarking	13
7. Barriers to Green Hydrogen Adoption	15
8. Policy Framework for Green Hydrogen Development	17
8.1 Target Setting	17
8.2 Supply-Side Measures	18
8.3 Demand-Side Measures	19
8.4 Policy Implementation Timeline	21
8.5 Monitoring Framework and Key Implementation Risks	23
9. Financial Strategy for Policy Implementation	24
10. Conclusions	25
References	27

List of Tables

Table 1 Energy Sector Challenges and the Role of Green Hydrogen in the Maldives	5
Table 2 Medium Scenario Assumption on Hydrogen Adoption of the Total Addressable Market	6
Table 3 Key Hydrogen Deployment Metrics under the Medium Scenario (2030)	7
Table 4 Prioritisation of Green Hydrogen End-Use Applications	7
Table 5 Projected Deployment Milestones under the Medium Scenario	10
Table 6 Assessment of Existing Policy and Regulatory Framework for Green Hydrogen Development	12
Table 7 International Benchmarking of Green Hydrogen Strategies and Policy Measures	13
Table 8 Key Barriers to Green Hydrogen Deployment in the Maldives	15
Table 9 Phased Policy Implementation Timeline (2026-2035)	21
Table 10 Key Implementation Risks and Monitoring Indicators	23

List of Figures

Figure 1: Projected Investment Requirements for Green Hydrogen Deployment (2026-2035)	10
Figure 2 Projected Hydrogen Demand by End-use Sector (2028-2035)	11
Figure 3 Recommended Policy Framework for Green Hydrogen Development in the Maldives	17



1. Introduction

1.1 Background and Context

The Maldives relies almost entirely on imported diesel for electricity generation and heavy transport, resulting in annual fuel expenditures exceeding USD 500 million (around 13% of GDP)^{iv}. This dependence exposes the economy to global fuel price volatility and creates a significant fiscal burden.

At the same time, the country is facing urgent climate risks. With an average elevation of 1.5 metres, the Maldives is highly vulnerable to sea-level rise. Maldives' NDC 3.0 sets a national target of 1.52 Mt CO₂ reduction by 2035ⁱⁱ, requiring immediate integration of low-carbon solutions into infrastructure and energy planning.

Although solar photovoltaic deployment has progressed, structural challenges such as dispersed islands, limited land availability, seasonal variability and the absence of an interconnected national grid, limit the ability of renewable electricity alone to meet demand. Hence, reliable, dispatchable energy solutions are essential. Moreover, continued reliance on diesel also limits domestic value creation and contributes significantly to emissions.

Green hydrogen presents a complementary pathway alongside solar and batteries for decarbonising high emitting sectors particularly power generation in outer islands and inter-island marine transport. The feasibility assessment conducted under the UNEP-CTCN Technical Assistance in March 2026, indicates that green hydrogen could achieve cost parity with diesel in power generation by around 2030, even in the absence of policy support. This is driven majorly by high diesel costs, leading to a high cost of electricity.

It is also important to note that green hydrogen systems require significant upfront capital investment to setup the electrolyser and to develop renewable energy assets to power this electrolyser for hydrogen production. Whereas, conventional diesel supply chains reflect the substantial upstream refinery costs embedded within diesel prices. For a fair comparison, the delivered cost of energy should be the basis of comparison for both these fuels. In addition, the development of a domestic green hydrogen value chain offers potential co-benefits, including enhanced energy security, reduced import dependence, job creation and increased retention of economic value within the Maldives. These considerations support the inclusion of green hydrogen within the country's long-term energy transition strategy.

Against this backdrop, there is a clear need for a structured and forward-looking policy framework to guide the development and deployment of green hydrogen in the Maldives. Such a framework would be critical to address existing market and institutional barriers, provide regulatory clarity and enable coordinated investments across the value chain. It should establish clear targets, define institutional roles and responsibilities, and introduce appropriate financial and non-financial support mechanisms to accelerate adoption. In doing so, the policy framework can translate the identified technical and economic potential into implementation, supporting the Maldives in achieving its climate commitments while strengthening long-term energy security and economic resilience.

1.2 Purpose and Scope

The purpose of this report is to outline and recommend a policy framework that can support the Government's policy direction on green hydrogen, specifying the potential policy measures that should be considered across supply and demand to ensure a holistic planning of GH₂ development in the country. It encompasses the full value chain from production to end use applications, along with the deployment

timeline, lead executing agencies, risks and recommended measures. The framework is developed based on the findings of the feasibility study, validated through direct consultations with STELCO, FENAKA, MTCC, Ministry of Tourism and Environment (MOTE) and resort operators during the stakeholder consultation workshop and bilateral meetings held during mission visit.

The proposed framework is intended to provide a basis for further consideration and does not constitute a final Government policy. Its implementation will be subject to review, validation, and approval by the Government of Maldives and the relevant authorities. The proposed measures, timelines, institutional responsibilities, and implementation arrangements may therefore be refined based on Government priorities, stakeholder feedback, and further technical, economic, and regulatory assessment.

1.3 Objectives

The policy framework is underpinned by below strategic objectives:

- **Energy security:** Establish domestic production capacity to serve the priority sectors by 2030, cutting exposure and reliance on imported fuel
- **Climate action:** Contribute to the NDC 3.0 emission reduction target. The feasibility study puts hydrogen's share at around 4.7% of the 1.52 Mt CO₂ reduction by 2030 and 6.9% by 2035ⁱ ⁱⁱ
- **Economic development:** Attract the investment by developing an ecosystem that improves or supports the techno-economics of hydrogen production, storage, transportation, distribution and end-use applications and create job opportunities in the sector
- **Cost competitiveness:** Establish parity with diesel in power generation and marine transport as early as 2028 with transitional support.
- **Small Island Developing States (SIDS) leadership:** Demonstrate success with pilot deployment case and share learnings with other island nations facing the similar challenges
- **Inclusive and equitable transition:** Ensure that the green hydrogen sector creates employment opportunities accessible to women and outer island communities, with gender-responsive capacity building embedded in all training and certification programmes, consistent with the CTCN's Gender Assessment and Action Plan (GAAP) commitments.ⁱⁱⁱ

2. The Case for Green Hydrogen

2.1 Energy Landscape and Challenges

The economic case for green hydrogen in the Maldives is structurally distinct from that in continental markets, where hydrogen must compete against electricity supplied from an interconnected grid at comparatively low cost. In the Maldives, green hydrogen competes against diesel burned in isolated generators on islands with no supply alternative. Outer island electricity costs range from USD 0.42 to USD 0.60 per kWhⁱ, among the highest in the region. The cost gap that hydrogen must close is therefore substantially narrower than global benchmarks indicate.

Table 1 Energy Sector Challenges and the Role of Green Hydrogen in the Maldivesⁱ

Challenge	Current Situation	Hydrogen Opportunity
Import Dependence	100% fossil fuel imported; 786 M litres/year; USD 500M+ annual bill (~13% GDP)	Domestic production from solar; reduced import exposure; improved energy sovereignty

Challenge	Current Situation	Hydrogen Opportunity
High Electricity Cost	Outer islands: \$ 0.42-0.60/kWh (FENAKA); Greater Male: \$ 0.30-0.35/kWh (STELCO) ⁱ	H2 fuel cell achieves LCOE of USD 0.247/kWh by 2030 (54% savings vs. diesel, with policy) ⁱ
No Grid Interconnection	200 islands with independent diesel generators; no submarine cable prospect	Hydrogen as transportable, storable dispatchable fuel; distributed production viable
Seasonal Variability	Monsoon (May-Nov) drops solar output 40-60%; shipping disrupted 3-5 days	Multi-day energy storage; buffer against supply interruptions
Marine Economy	~142 M litres diesel/year in marine transport	H2-ICE and fuel cell propulsion; cost parity by ~2028 with policy support
Tourism	190 resorts with autonomous diesel generators (50 kW to 5 MW)	On-site micro-plants eliminate transport cost; LCOE as low as USD 0.106/kWh by 2030 ⁱ

Source: pManifold Analysis

2.2 Key Feasibility Findings

The feasibility study developed a techno-economic model of the full hydrogen value chain, tested against consultations with utilities and major operators. Given high diesel costs and solar resource at a capacity factor of approximately 20 percent, a landed hydrogen cost of USD 6.68/kg in 2030 already confers cost advantage over diesel on the outer islands. Costs are projected to decline to USD 5.17/kg by 2035 as global electrolyser and solar PV manufacturing continues to matureⁱ.

The medium scenario represents the central planning case adopted in the feasibility study. It is a conservative boundary case, a realistic deployment pathway based on current techno-economic conditions. The scenario assumes a gradual and conservative transition from fossil fuel-based assets to hydrogen across the priority sectors, with hydrogen adoption increasing over time as it becomes economically competitive. The assumed adoption rates are based on the addressable market in each sector and reflect a measured pace of technology uptake rather than an accelerated transition. The table below summarizes the share of hydrogen in each sector over the years.

Table 2 Medium Scenario Assumption on Hydrogen Adoption of the Total Addressable Market

Use Case	2026	2028	2030	2035
U1: Power	0.0%	2.0%	5.0%	12.0%
U2: Road	0.0%	0.0%	2.0%	5.0%
U3: Marine	1.0%	5.0%	12.0%	25.0%
U4: Aviation	0.0%	1.0%	3.0%	8.0%

Source: pManifold Analysis

These adoption rates across the use cases translate into 18 production plants, operational by 2030, with the metric highlighted in Table 3. To put that in context, a single plant under this scenario is roughly the size needed to serve one outer island cluster or one large resort, not an industrial facility, but a modular unit that can be replicated across the archipelago. Demand in this scenario is not imposed as a target; it is derived from economics. As the cost of hydrogen falls toward diesel parity, adoption is assumed to follow a gradual S-curve, reaching 5% of the addressable power generation market by 2030. The scenario also assumes a

declining government production incentive of USD 5 per kilogram at the start, tapering to USD 1 per kilogram by 2035, to bridge the cost gap during the early years.

Table 3 Key Hydrogen Deployment Metrics under the Medium Scenario (2030)ⁱ

Metric	Value (2030, Medium Scenario)
Projected hydrogen demand	4,610 tonnes/year
Electrolyser capacity required	82.7 MW
Solar PV required	144.7 MW
Cumulative investment (2026-2030)	USD 198 million
Landed hydrogen cost	USD 6.68/kg
CO2 avoided	71 kt/year
Contribution to NDC 3.0 target	~4.7%

Source: pManifold Analysis

2.3 Use Case Prioritization

The feasibility study assessed four end-use sectors against a multi-criteria framework covering economic gap, technology readiness, GHG impact and strategic alignment. That assessment determines the allocation of policy priority and capital across sectors.

Table 4 Prioritisation of Green Hydrogen End-Use Applicationsⁱ

Use Case	H2 Demand 2030 ,t/yr (Medium Scenario)	Share	Score (/20)	Priority	Cost Parity
Power Generation	3,691	80%	19	Primary	~2025 (with policy support)
Marine Transport	511	11%	17	Primary	~2028 (H2-ICE, with policy)
Road Transport	44	1%	11	Low	~2028 (with policy support)
Aviation (SAF)	363	8%	5	Long-Term	~2036 (with policy support)

Source: pManifold Analysis

The scoring is based on four key criteria: economic gap, technology readiness, GHG impact, and strategic alignment, with each criterion assessed on a 1-5 scale. Economic gap evaluates how close hydrogen is to cost parity with diesel, while technology readiness considers the commercial maturity and proven application of the technology. GHG impact reflects the potential for emissions reduction, and strategic alignment assesses the sector's consistency with national priorities such as NDC objectives, energy security and economic development. Higher overall scores indicate greater suitability and priority for hydrogen adoption.

Power generation receives a score of 19/20. The outer island diesel power costs between USD 0.4- 0.60/kWh creates an economic window wide enough that hydrogen is cost-competitive around 2030, before any policy support is applied. The use cases for power generation are divided into three distinct archetypes to cover a broad spectrum of deployment possibilities.

Three deployment archetypes are identified within the **power generation** sector:

1. **FENAKA outer island microgrid:** Fuel cells replacing diesel generators across the outer island network. LCOE of USD 0.247/kWh by 2030ⁱ, representing a 54% saving against the current diesel cost
2. **Resort hydrogen integration:** On-site micro-plants with dedicated solar, cutting out transport and logistics cost entirely. LCOE as low as USD 0.106/kWhⁱ, the best economics of any archetype
3. **STELCO ammonia co-firing:** A 10-20% ammonia blend in the Greater Male generator sets. Doesn't reach parity until around 2034, but the volume anchors hub-scale production economicsⁱ

Marine transport scores 17/20, reflecting an ageing fleet, a pressing IMO decarbonisation timeline and a technically well-established H₂-ICE retrofit pathway. Together these two sectors account for over 91 percent of projected 2030 hydrogen demand.

Two deployment pathways are identified for the **marine transport** sector:

1. **H₂-ICE retrofit of the existing MTCC ferry fleet:** Retrofitting existing high-speed ferries operating on fixed inter-island routes offers the most practical near-term pathway. H₂-ICE technology requires lower upfront investment than fuel cells, can utilise existing engine platforms with modifications, and is projected to achieve cost parity with diesel by approximately 2028 under the proposed policy support mechanisms. The feasibility study recommends initially targeting 5-10 MTCC ferries operating on the highest fuel-consumption corridors to maximise operational learning and emissions reductions.
2. **Hydrogen fuel cell propulsion for new-build vessels:** As hydrogen costs decline and fuel cell technologies mature, new passenger ferries can transition to fuel-cell propulsion, offering higher efficiency, zero local emissions and lower operating costs. This pathway is particularly suitable for environmentally sensitive routes and long-term fleet renewal beyond 2030.

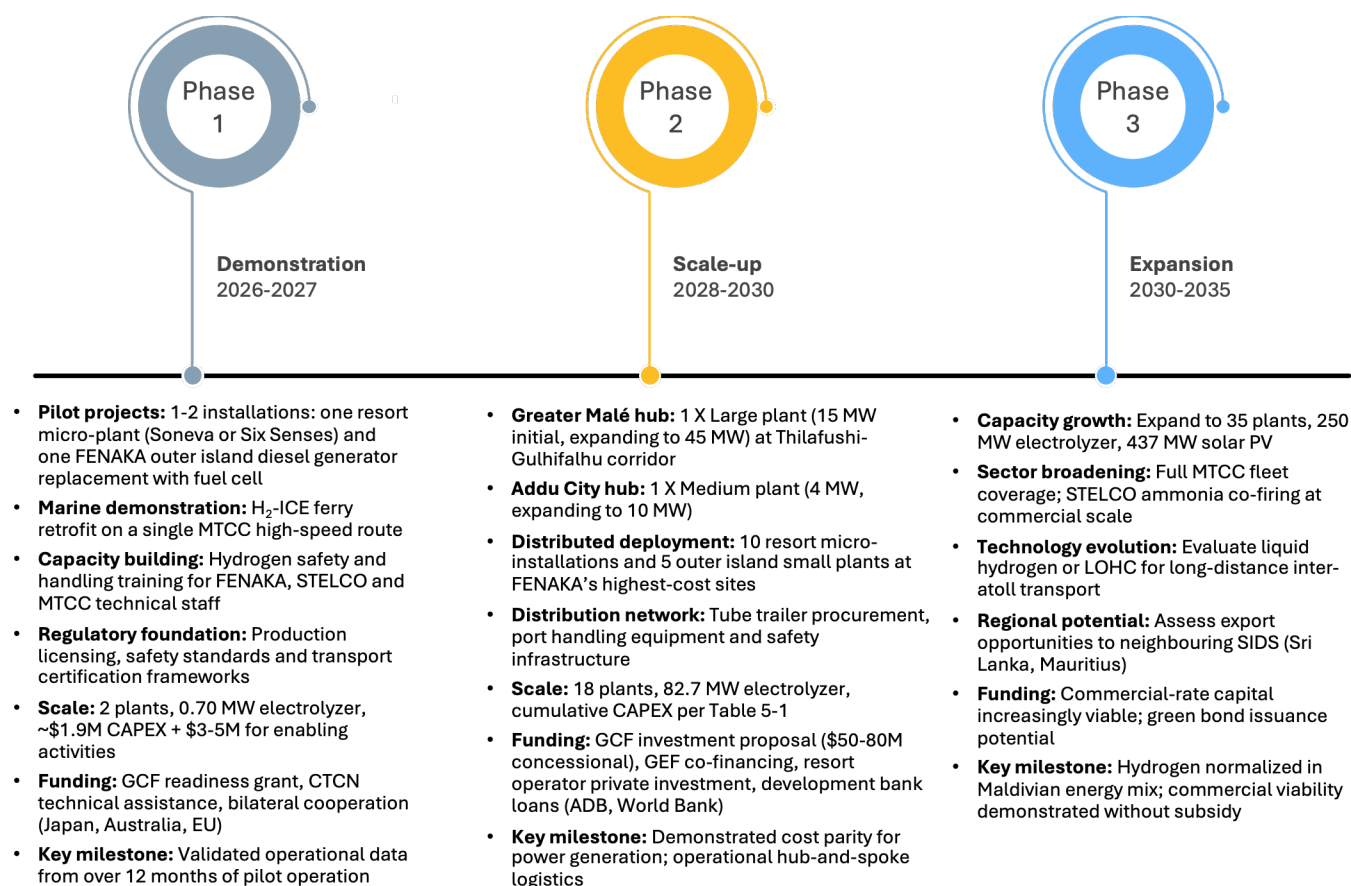
Road transport and aviation presents a weak economic case for hydrogen. The predominant vehicle type is the short-range motorcycle, which is more cost-effectively served by battery electrification. Sustainable aviation fuel does not reach cost parity until approximately 2038 and would require a refining infrastructure of a scale not justified by available volumes or land area. Neither sector warrants near-term policy commitment.

The prioritisation assessment provides the basis for sequencing green hydrogen deployment in the Maldives. Power generation and marine transport have been identified as the priority sectors due to their favourable techno-economic characteristics, high emissions reduction potential and strategic importance for national energy security. Within these sectors, deployment should initially focus on applications that offer the highest implementation readiness and strongest demonstration value, namely FENAKA outer island microgrids, resort-based hydrogen systems and an H₂-ICE retrofit of the MTCC ferry fleet. These early applications are expected to generate the technical, operational and institutional experience required to support subsequent commercial deployment and wider sectoral expansion.

Building on these priorities, the technology implementation roadmap adopts a phased approach that progresses from pilot demonstrations to commercial-scale deployment. The roadmap recognises that technology performance, costs and institutional readiness must be validated under Maldivian operating conditions before larger capital investments are undertaken. Accordingly, each implementation phase is linked to defined technical and operational milestones, with progression to subsequent phases contingent upon the successful completion and evaluation of the preceding phase.

3. Technology Implementation Roadmap

Based on the findings from the feasibility study, the suggested technology implementation roadmap adopts a three-phase deployment structure with a formal phase review between each stage. The reviews will ensure that capital commitments for subsequent phases are authorised on the basis of validated operational and cost data from the preceding phase rather than on projected figures alone. The review at the end of each phase will also assess operational performance, actual LCOH against the feasibility study's projections, logistics costs and institutional readiness, before any further capital commitments are approved. Scale and funding figures below are drawn from the feasibility study's medium scenario and will be confirmed at each review on the basis of actual Phase 1 and Phase 2 data respectively.



Source: *pManifold Analysis*

The next phase of the TA which is the GCF concept note preparation will focus on Phase-1 Demonstration of the technology implementation roadmap. The proposed pilot is anchored in the role of green hydrogen for power generation, specifically to complement solar PV and battery systems. As highlighted during the workshop, solar PV with battery storage remains the least-cost and primary solution for daytime and short-duration needs. The pilot, therefore, focuses on addressing the residual demand that cannot be economically met by solar and batteries, including:

- Night-time and monsoon-period demand, where hydrogen-based fuel cells can displace diesel generation
- Islands with land or space constraints, where solar-plus-battery deployment may not be fully feasible, and centralized hydrogen production with distribution can offer a practical alternative

The pilot would likely involve a centralized green hydrogen production hub (powered by renewables), coupled with fuel-cell-based power generation (1 hub & 5 spokes) either at the same location or across selected islands. This approach is intended to demonstrate a scalable pathway to reduce diesel dependence, while aligning with the country's long-term decarbonization goals.

4. Investment Needs

Under the medium scenario of hydrogen adoption, the cumulative capital requirements reach USD 198 million by 2030 and USD 485 million by 2035ⁱ for the deployment of 82.7 MW and ~250 MW of electrolyser along with the required solar PV for the respective years. In 2026 to 2027, direct CAPEX amounts to USD 1.9 million, within the reach of existing climate finance mechanisms. The USD 66 million required in 2028 alone reflects the transition from pilot installations to hub-scale construction, at which point a blended finance structure is required.

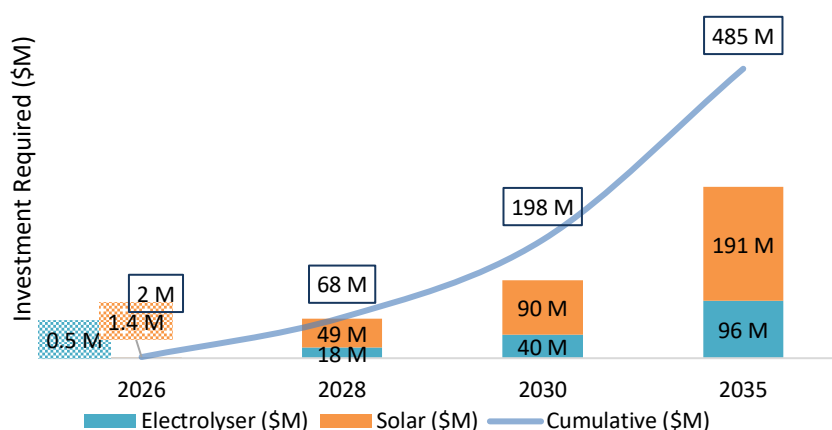


Figure 1: Projected Investment Requirements for Green Hydrogen Production (2026-2035)ⁱ

Source: pManifold Analysis

Solar PV constitutes the dominant cost component, representing approximately 55 percent of cumulative CAPEX through 2035. Electrolysers account for approximately 25 percent and balance-of-plant for the remaining 20 percent. Given that the cost structure is heavily weighted toward upfront capital expenditure rather than ongoing fuel cost, financing terms exert a disproportionate influence on overall project economics. The feasibility study demonstrates that reducing the discount rate from 10 to 8 percent through concessional lending reduces LCOH by approximately USD 0.40/kgⁱ. The cost and terms of capital accordingly constitute as consequential a policy variable as the subsidy rate.

The physical milestones underpinning the investment trajectory are set out below.

Table 5 Projected Deployment Milestones under the Medium Scenarioⁱ

Year	H2 Demand (t/yr)	Plants (#)	Electrolyser (MW)	Solar PV (MW)	Cumulative CAPEX (\$M)
2026	38.5	2	0.70	1.23	1.9
2028	1,650	6	29.6	51.8	68.3
2030	4,610	18	82.7	144.7	198.4
2035	13,910	35	249.5	436.7	485.2

Source: pManifold Analysis

The 2028 milestone is the most consequential in the deployment trajectory. Six plants with 29.6 MW of electrolyser capacity and a cumulative investment of USD 68.3 million mark the transition from pilot to commercial-scale operation. By 2030, the system reaches 18 plants and 82.7 MW of electrolyser capacity, requiring 144.7 MW of solar PV and serving a projected 4,610 t/yr of hydrogen demandⁱ. The financing structure across phases draws on GCF grants and concessional loans, GEF co-financing, bilateral programmes with Japan, Australia and the EU, ADB and World Bank lending, resort operator co-investment in Phase 2 and green bond issuance in Phase 3 once a commercial track record is established.

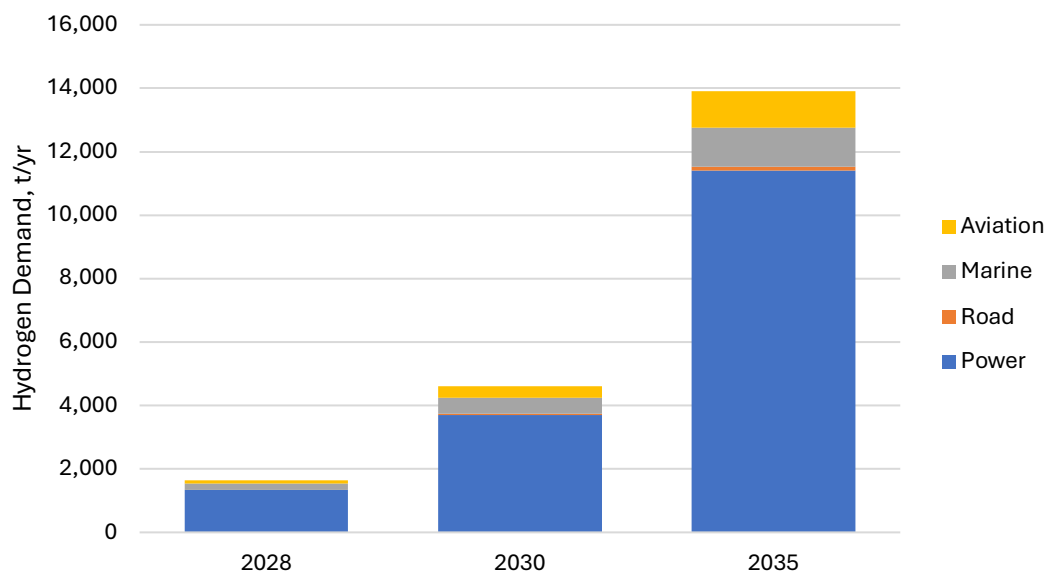


Figure 2 Projected Hydrogen Demand by End-use Sector (2028-2035)ⁱ

Source: pManifold Analysis

While the projected investment requirements are technically and financially achievable, their successful mobilisation is contingent upon an enabling policy and regulatory environment. Investors and development partners require regulatory certainty, transparent approval processes and long-term policy direction before committing capital to emerging technologies such as green hydrogen. Accordingly, the next section assesses the existing policy and regulatory framework in the Maldives, identifies the principal gaps and outlines the institutional measures required to support the investment pathway presented above.

5. Existing Policy and Regulatory Framework Assessment

The Maldives has established a robust policy foundation for accelerating renewable energy deployment through the Energy Act (2021), the Energy Policy and Strategy (2024-2029) and the Energy Roadmap (2024-2033). Together, these instruments provide strategic direction for renewable energy deployment, energy security, institutional strengthening and decarbonisation, while recognising the potential role of green hydrogen in the country's long-term energy transition. However, the existing policy framework primarily focuses on renewable electricity and cleaner fuels and does not yet establish the regulatory, institutional or market mechanisms necessary to enable commercial deployment of green hydrogen. The assessment presented in below table identifies the principal policy gaps and the measures required to establish an enabling environment for hydrogen development in the Maldives.

Table 6 Assessment of Existing Policy and Regulatory Framework for Green Hydrogen Development^{iv}

Existing policy / regulation	Current provisions	Gap identified	Implications for green hydrogen deployment	Lead / Supporting institutions
Energy Roadmap (2024-2033)	Identifies "exploring green hydrogen options" as one of the flagship interventions for the energy transition	Lacks green hydrogen definition and deployment targets, implementation roadmap or priority end-use sectors for hydrogen	Green hydrogen remains an aspirational technology without a defined pathway for implementation	Ministry of Tourism and Environment (MOTE)
Energy Policy and Strategy (2024-2029)	Promotes renewable energy, cleaner fuels, institutional strengthening, research and innovation	Lacks dedicated provisions governing hydrogen production, storage, transport or utilisation	Regulatory uncertainty limits investment and project development	MOTE
Energy Act (2021)	Establishes the legal framework for energy sector development and renewable energy promotion	Lacks legal definitions, licensing framework or permitting requirements for hydrogen infrastructure	Uncertainty regarding project approvals and regulatory oversight	MOTE, Utility Regulatory Authority (URA)
Grid Planning and Renewable Energy Integration	Focuses on solar PV deployment, battery storage, grid modernisation and renewable integration	Hydrogen is not considered as a flexibility resource or long-duration energy storage option	Missed opportunity to improve renewable energy integration and utilise surplus renewable electricity	URA, STELCO, FENAKA
Institutional Capacity and Research	Supports institutional strengthening, international cooperation and energy research	Lacks dedicated hydrogen standards, certification framework, workforce development programme or demonstration mechanism	Limited national capability to regulate, operate and maintain hydrogen systems	MOTE, Ministry of Higher Education, Labour and Skills Development, academic institutions

Source: pManifold Analysis

6. International Green Hydrogen Strategy Benchmarking

Globally, more than 40 countries have released their green hydrogen strategy, plan and policies. Several Small Island Developing States (SIDS) also have begun exploring hydrogen through national energy strategies, feasibility studies and pilot initiatives, there remains no widely recognized hydrogen policy framework specifically designed to address the unique economic, geographic and institutional characteristics common to SIDS. In the absence of directly comparable frameworks, this assessment draws upon key five established international hydrogen strategies those of Japan, Singapore, Chile, Australia and Germany as relevant reference cases to inform the development of a Maldives-specific approach. These strategies have been systematically evaluated across key dimensions, including production targets and deployment goals, demand-side measures, supply-side enablers and institutional frameworks. While none of these models are directly transferable, each provides valuable insights that can be selectively adapted to the Maldivian context, particularly with respect to phased implementation, import-oriented system design, market development mechanisms and infrastructure planning for island energy system

Table 7 International Benchmarking of Green Hydrogen Strategies and Policy Measures

Country	Targets	Supply-side Measures	Demand-side Measures
Japan (2017, rev. 2023) ^v 	- Hydrogen Use: 3 Mt H₂/year by 2030, 12 Mt by 2040 - Cost target: ~\$3/kg by 2030	~\$5.1 billion (¥800 billion) Green Innovation (GI) Fund allocation for hydrogen-related technologies to finance technology development and demonstration efforts toward commercialization - Capex subsidies covering up to 50% for electrolyzers and infrastructure - International supply chain funding (Australia, Middle East partnerships) - R&D funding for electrolysis and liquefaction technologies	- Contracts for Difference (CfD)-like mechanism to bridge cost gap between fossil fuels and hydrogen (exact value varies, est. ~\$4/kg support for fuel for commercial vehicles – buses/ trucks) - Subsidies for hydrogen power generation and co-firing in thermal plants - Support for FCVs and hydrogen mobility (~¥2–3 million per vehicle subsidy historically)
Singapore (2022) ^{vi} 	- No fixed volume target - Hydrogen to meet up to 50% of power demand by 2050 (import-based)	- Low Carbon Energy Research Funding (~SGD 55 million initial tranche) - Government co-investment in hydrogen/ammonia import infrastructure - No large direct production subsidies (due to land constraints), focus on international partnerships	- Demand creation through power sector decarbonization mandates - Carbon tax rising from SGD 25/tCO₂ (2024) to SGD 50-80/tCO₂ by 2030, indirect hydrogen demand support - Pilot tenders for hydrogen-ready power plants
Chile (2020) ^{vii} 	- Lowest-cost hydrogen: \$1/kg by 2030 5 GW electrolysis by 2025, 25 GW by 2030	\$50 million initial public funding for pilot projects \$1 billion+ financing mobilized via multilateral banks - CORFO grants covering up to 60% of project costs (pilot phase) - Tax incentives and land concessions for renewable-linked hydrogen projects	- Public procurement of green ammonia and fuels - Incentives for mining sector adoption (no fixed subsidy per unit but backed via concessional financing)
Australia (2024, updated) ^{viii} 	- Leading hydrogen exporter by 2030s - No single national volume target, but strong export focus	- AUD 2 billion Hydrogen Headstart Program (production subsidies via competitive bidding) - ARENA funding (~AUD 1.88 billion total energy innovation funding pool; significant portion to hydrogen)	- Hydrogen Headstart Program: AUD 2 billion to bridge price gap via production credits (~AUD 2–3/kg expected support) - Domestic use in industry (steel, ammonia) via pilot funding

Country	Targets	Supply-side Measures	Demand-side Measures
Germany (2020, updated 2023) ^{ix} 		- State-level subsidies (e.g., Western Australia grants for hydrogen hubs) - Capex grants for electrolyzers and export infrastructure	
	10 GW electrolysis capacity by 2030 - Imports to meet ~70% of demand	€9 billion National Hydrogen Strategy funding: €7 billion domestic market development, €2 billion international partnerships - IPCEI Hydrogen projects: billions in state aid (individual projects receiving €100M-€1B+) - Electrolyzer capex subsidies up to ~40-60% - H2Global mechanism: €900 million for import subsidies via auctions	- Carbon Contracts for Difference (CCfD): covering industrial decarbonization gap (~€1-3/kg equivalent support depending on sector) - Hydrogen quotas in industry (steel, refining) - EU ETS carbon pricing (~€80-100/tCO₂) driving demand
India (2023) ^x 	5 MTPA GH₂ production by 2030 125 GW RE capacity dedicated to hydrogen	₹19,744 crore (~\$2.4B) National Green Hydrogen Mission: ₹17,490 crore for SIGHT program (production incentives) - Electrolyzer manufacturing incentives: ₹4,440 crore - GH₂ production incentives: ₹13,050 crore (~₹30-50/kg support range depending on tranche) - Waiver of ISTS charges for 25 years for RE used in hydrogen - Land allocation and renewable bundling support	- Green Hydrogen Consumption Obligations (under development) - Incentives for green ammonia use in fertilizers and refining - Viability Gap Funding (VGF) for end-use sectors (not fully quantified yet)

Source: pManifold Analysis

Several design principles recur across all five strategies and are reflected in the present framework: phased deployment with formal go/no-go decision gates; technology neutrality pending determination of the lowest-cost production pathway; a dedicated institutional body with statutory authority; long-term offtake agreements as the foundation for producer project finance; and early gazettal of safety standards as a prerequisite to deployment.

7. Barriers to Green Hydrogen Adoption

The transition to green hydrogen in the Maldives is at a nascent stage and is constrained by a set of interrelated technical, economic, regulatory and institutional barriers across the value chain. To better understand these challenges, stakeholder consultations were conducted during the February 2026 mission with key entities including STELCO, FENAKA, MTCC, MOTE and resort operators. These discussions, complemented by findings from the feasibility assessment, highlight systemic gaps that could impede large-scale adoption if not addressed proactively. Notably, the absence of a regulatory framework and a critical shortage of skilled human resources emerged as cross-cutting concerns. The barriers identified span the entire hydrogen value chain from production and storage to end-use deployment and financing and provide a grounded basis for prioritizing policy interventions.

Table 8 Key Barriers to Green Hydrogen Deployment in the Maldives

Barrier Category	Identified Barriers
Economic & Financial Barriers	• High upfront CAPEX for electrolyzers and solar PV • High conversion costs for fuel cells and H₂-ICE engines • High perceived risk for first-mover projects • Limited domestic capital markets • No established financing models for hydrogen assets • High cost of capital reflecting sovereign risk • Currency risk associated with USD-denominated equipment • Island logistics premium increasing project costs
Infrastructure & Supply Chain Barriers	• Limited land availability on constrained islands • No existing hydrogen production, storage or handling infrastructure • Maritime logistics complexity for compressed hydrogen • Monsoon-related supply disruptions • No hydrogen refuelling infrastructure • Reliance on global supply chains for hydrogen equipment • Low volumetric energy density of compressed H₂ increasing transport requirements
Market & Technology Barriers	• Limited commercial availability of H₂-compatible equipment • No operational experience among utilities and operators • High conversion requirements for existing power and marine assets • Limited established business models for hydrogen deployment • Uncertainty around early hydrogen demand and offtake
Policy, Regulatory & Standards Barriers	• No hydrogen-specific safety regulations • No production or transport licensing framework • No building codes for hydrogen infrastructure • No interoperability or classification standards • Safety certification gaps for hydrogen transport and handling • No established hydrogen certification framework
Skills & Institutional Capacity Barriers	• No domestic hydrogen technical expertise • Limited STEM workforce pipeline • No certification programmes for hydrogen handling

- Dependence on international specialists for technical activities
- Limited institutional capacity and experience to regulate, operate and oversee hydrogen systems

Source: pManifold Analysis

In summary, the barriers to green hydrogen adoption in the Maldives are multifaceted and deeply interconnected, reflecting both the structural constraints of a Small Island Developing State and the early-stage maturity of hydrogen technologies globally. Addressing these challenges will require a coordinated and phased approach, combining targeted policy support, regulatory development, supporting ecosystem development, capacity building and access to concessional finance. Importantly, early action on enabling frameworks particularly in policies/ regulations/ standards development, defining fiscal incentives and enabling off-taker agreements will be critical to de-risk initial investments and build stakeholder confidence. The insights derived from stakeholder consultations and techno-economic analysis emphasize the need for a pragmatic and adaptive policy framework that can systematically mitigate these barriers while enabling pilot-scale deployment and long-term market development.



8. Policy Framework for Green Hydrogen Development

Building on the identified barriers across the green hydrogen value chain and identified policy measures adopted globally, this section presents a structured policy framework to guide the development and scale-up of a domestic green hydrogen sector in the Maldives. The framework adopts a systems-level approach, linking demand creation, supply enablement and institutional readiness through clearly defined policy levers. It integrates targets, demand-side measures and supply-side interventions to address constraints spanning technology, infrastructure, financing, regulation and skills.

To drive coordinated and sustained implementation of this framework, this report recommends that the Government of Maldives (preferably under Ministry of Tourism and Environment) forms a dedicated national mission namely **Maldives Clean Hydrogen Mission (MCHM)** focused on accelerating the development of a green hydrogen ecosystem and also establish a **National Hydrogen Steering Committee** to support implementation of the policy framework. The proposed Mission can be built upon this policy framework, translating its elements into actionable programs, institutional mandates and phased targets.

Such a mission-led approach would ensure that policy actions are not only comprehensive but also strategically sequenced and mutually reinforcing, enabling a transition from pilot-scale deployment to a commercially viable hydrogen ecosystem. It would also provide a central platform for stakeholder coordination, international collaboration and mobilization of climate and concessional finance, aligned with the country's unique geographic and economic context.

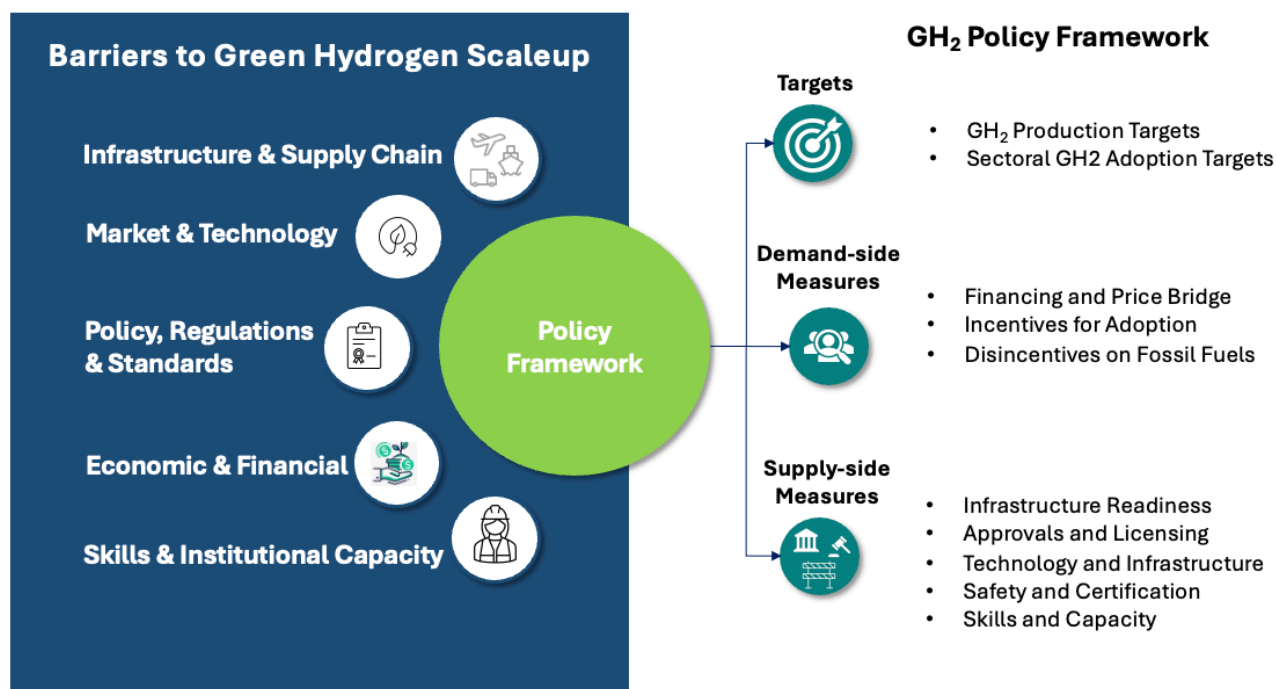


Figure 3 Recommended Policy Framework for Green Hydrogen Development in the Maldives

Source: pManifold Analysis

8.1 Target Setting

Within the policy framework outlined above, target setting serves as the primary mechanism for establishing direction, sequencing interventions and anchoring stakeholder expectations across the green hydrogen

value chain. Given the fiscal and institutional constraints of the Maldives, this framework adopts a phased and evidence-based approach to target formulation rather than committing to fixed, long-term quantitative targets at the outset. Hard production and adoption figures are therefore deferred to a dedicated target-setting exercise to be undertaken following Phase 1, when pilot projects provide verified data on costs, performance and system integration. The indicative values referenced in this section are drawn from the feasibility study's medium scenario and are intended solely to guide initial policy direction.

The target-setting framework is structured across two core dimensions: production and sectoral adoption. Each dimension is designed to provide clear, enforceable signals to producers, utilities and investors, while retaining sufficient flexibility to adjust based on emerging evidence and market conditions.

SN.	Measure	Description
M1.1	GH₂ Production Target	Establishment of a phased green hydrogen production target to provide long-term direction for market development and investment planning, with periodic review based on deployment progress and market conditions
M1.2	Sectoral Adoption Prioritization	Identification of priority sectors for green hydrogen adoption to focus policy support on applications with the strongest techno-economic potential during the initial deployment phases

Source: pManifold Analysis

8.2 Supply-Side Measures

The supply-side measures outlined below will translate the policy framework into implementable actions that would enable the development of a domestic green hydrogen production ecosystem in the Maldives. Aligned with the framework's focus on regulations, infrastructure, standards and capacity, these measures establish the foundational conditions required for production to be planned, financed and operated at scale. They are sequenced to precede and support the defined targets, ensuring that institutional readiness, regulatory clarity and infrastructure availability do not become bottlenecks during scale-up.

The measures address critical barriers identified across the value chain by creating investible conditions for private sector participation, reducing project risk and ensuring technical and operational feasibility within the Maldivian context.

A. Infrastructure Readiness

SN.	Measure	Description
M2.1	Grid Upgradation & System Readiness	Strengthening of electricity infrastructure to support higher renewable energy penetration and facilitate reliable operation of green hydrogen production facilities
M2.2	RE Access and Preferential Tariff	Introduction of a dedicated electricity tariff for electrolyzers to reflect the cost of renewable electricity and improve the competitiveness of green hydrogen production
M2.3	Land Availability	Identification and allocation of suitable land and lagoon areas for hydrogen production facilities to minimise project development delays and reduce land-use conflicts

Source: pManifold Analysis

B. Approvals and Licensing

Ref	Element	Description
M2.4	Single-Window Production Licensing	Establishment of green hydrogen production as a distinct licensed activity with streamlined permitting procedures and compliance requirements proportionate to project scale

Source: pManifold Analysis

C. Technology and Infrastructure

SN.	Measure	Description
M2.5	Hydrogen-Ready Procurement Mandate	Integration of hydrogen-readiness requirements into utility procurement to ensure new generation assets can accommodate hydrogen-based technologies and facilitate future fuel switching
M2.6	Technology-Neutral Production Standard	Definition of green hydrogen based on emissions intensity rather than production technology to enable qualifying production pathways to compete on cost and carbon performance on equal terms

Source: pManifold Analysis

D. Safety and Certification

Ref	Element	Description
M2.7	Maldives Hydrogen Safety Code	Development of a national hydrogen safety code adapting international standards to tropical, saline and island-specific operating conditions
M2.8	National Green Hydrogen Certification Standard and Registry	Establishment of a national green hydrogen certification standard and registry to support incentive payments, carbon credit issuance, emissions verification and potential export requirements

Source: pManifold Analysis

E. Skills and Capacity

Ref	Element	Description
M2.9	Capacity Building	Development of hydrogen skills, training and certification programmes emphasizing women participation to build technical, operational and institutional capacity across the green hydrogen value chain

Source: pManifold Analysis

8.3 Demand-Side Measures

The demand-side measures below would establish the financing structures, price mechanisms and fiscal instruments required to make green hydrogen commercially viable for Maldivian utilities, operators and investors. They are ordered so that instruments creating financial returns for the Government and the utilities take precedence, with the carbon pricing instrument on fossil fuels placed last, to be activated only once competitive hydrogen alternatives are available in each affected sector.

A. Financing and Price Bridge

Ref	Element	Description
M3.1	Concessional and Blended Financing	Facilitation of concessional and blended finance to reduce financing costs and improve the investment economics of green hydrogen projects during the early stages of market development
M3.2	Subsidy for GH₂ Production	Introduction of a targeted and transitional production support mechanism to bridge the cost difference between green hydrogen and imported diesel during the market development phase

Source: pManifold Analysis

B. Incentives for Adoption

Ref	Element	Description
M3.3	Hydrogen Production Tax Credit	Introduction of a refundable production tax credit to improve investment certainty and reduce administrative complexity for green hydrogen producers
M3.4	Carbon Credit and Revenue Mechanism	Establishment of a domestic carbon credit mechanism to create additional revenue opportunities from verified emissions reductions and support the commercial adoption of green hydrogen

Source: pManifold Analysis

C. Disincentives on Fossil Fuels

Ref	Element	Description
M3.5	Carbon Tax on Diesel	Introduction of a phased carbon levy on imported diesel to improve the competitiveness of low-carbon fuels and generate revenues for clean energy initiatives

Source: pManifold Analysis

8.4 Policy Implementation Timeline

The table below sequences the enactment and operationalisation of each policy instrument across the three deployment phases. Phasing reflects the sequencing logic of the framework. Progression to each subsequent phase is subject to the phase gate review process set out in the Implementation Roadmap.

Table 9 Phased Policy Implementation Timeline (2026-2035)

Ref	Instrument	Responsible Agencies		Short-term (2026-28)	Medium-term (2029-32)	Long-term (2033-35)
1. Target Setting						
M1.1	GH ₂ Production Target	MOTE	Establishment of a phased green hydrogen production target to provide long-term direction for market development and investment planning, with periodic review based on deployment progress and market conditions.			
M1.2	Sectoral Adoption Prioritization	MOTE	Identification of priority sectors for green hydrogen adoption to focus policy support on applications with the strongest techno-economic potential during the initial deployment phases.			
2. Supply-Side Measures						
M2.1	Grid Upgradation & System Readiness	MOTE, FENAKA, STELCO	Strengthening of electricity infrastructure to support higher renewable energy penetration and facilitate reliable operation of green hydrogen production facilities.			
M2.2	RE Access and Preferential Tariff	MOTE	Introduction of a dedicated electricity tariff for electrolyzers to reflect the cost of renewable electricity and improve the competitiveness of green hydrogen production.			
M2.3	Land Availability	MOTE, Ministry of Fisheries, Agriculture and Ocean Resources	Identification and allocation of suitable land and lagoon areas for hydrogen production facilities to minimise project development delays and reduce land-use conflicts.			
M2.4	Single-Window Production Licensing	MOTE	Establishment of green hydrogen production as a distinct licensed activity with streamlined permitting procedures and compliance requirements proportionate to project scale.			
M2.5	Hydrogen-Ready Procurement Mandate	MOTE	Integration of hydrogen-readiness requirements into utility procurement to ensure new generation assets can accommodate hydrogen-based technologies and facilitate future fuel switching.			

M2.6	Technology-Neutral Production Standard	MOTE	Definition of green hydrogen based on emissions intensity rather than production technology to enable qualifying production pathways to compete on cost and carbon performance on equal terms.			
M2.7	Hydrogen Safety Code	MOTE through National Hydrogen Steering Committee	Development of a national hydrogen safety code adapting international standards to tropical, saline and island-specific operating conditions.			
M2.8	National Green Hydrogen Certification Standard and Registry	Maldives Standards and Metrology Institute	Establishment of a national green hydrogen certification standard and registry to support incentive payments, carbon credit issuance, emissions verification and potential export requirements.			
M2.9	Capacity Building	Ministry of Higher Education, Labour and Skills Development	Development of hydrogen skills, training and certification programmes to build technical, operational and institutional capacity across the green hydrogen value chain.			
3. Demand-Side Measures						
M3.1	Concessional & Blended Financing	Ministry of Finance and Public Enterprise	Facilitation of concessional and blended finance to reduce financing costs and improve the investment economics of green hydrogen projects during the early stages of market development.			
M3.2	Subsidy for GH ₂ Production	Ministry of Finance and Public Enterprise , National Hydrogen Steering Committee	Introduction of a targeted and transitional production support mechanism to bridge the cost difference between green hydrogen and imported diesel during the market development phase.			
M3.3	Hydrogen Production Tax Credit	Ministry of Finance and Public Enterprise	Introduction of a refundable production tax credit to improve investment certainty and reduce administrative complexity for green hydrogen producers.			
M3.4	Carbon Credit & Revenue Mechanism	MOTE, National Hydrogen Steering Committee	Establishment of a domestic carbon credit mechanism to create additional revenue opportunities from verified emissions reductions and support the commercial adoption of green hydrogen.			
M3.5	Carbon Tax on Diesel	Ministry of Finance and Public Enterprise, MOTTE	Introduction of a phased carbon levy on imported diesel to improve the competitiveness of low-carbon fuels and generate revenues for clean energy initiatives.			

Source: pManifold Analysis

8.5 Monitoring Framework and Key Implementation Risks

The successful implementation of the proposed policy measures will require regular monitoring to assess progress, identify implementation bottlenecks and enable timely corrective actions. Monitoring should be coordinated by the Ministry of Tourism and Environment (MOTE) in collaboration with the relevant implementing agencies. Table 9 presents the principal implementation risks and suggested monitoring indicators for each category of policy measures.

Table 10 Key Implementation Risks and Monitoring Indicators

Ref	Policy Instrument	Key Risk if Not Implemented	Suggested Monitoring Indicator
M1.1	GH ₂ Production Target	Absence of a clear production target will create policy uncertainty, discourage investors, and delay project pipeline development.	GH ₂ production targets notified; annual progress against target (%)
M1.2	Sectoral Adoption Prioritization	Without sector prioritization, demand signals remain unclear, leading to fragmented investments and slow adoption across sectors.	Hydrogen demand by priority sector (t/yr); number of projects in priority sectors
M2.1	Grid Upgradation & System Readiness	Lack of grid upgrades will prevent renewable integration, leading to unreliable hydrogen production and higher costs.	Renewable energy connected (MW); grid reliability; electrolyser utilisation (%)
M2.2	RE Access and Preferential Tariff	Without preferential tariffs, electrolysers will face high electricity costs, making GH ₂ economically unviable compared to diesel.	Electrolyser electricity tariff (USD/kWh); average LCOH
M2.3	Land Availability	Failure to reserve land/lagoon space will create site constraints, delaying projects and increasing land-use conflicts.	Land/lagoon area allocated; number of sites approved
M2.4	Single-Window Production Licensing	Complex and slow permitting processes will increase project delays, transaction costs, and investor risk perception.	Average permitting time; number of licences issued
M2.5	Hydrogen-Ready Procurement Mandate	Continued procurement of diesel-only assets will lead to carbon lock-in and stranded assets.	Share of hydrogen-ready assets procured (%); number of H ₂ -ready generators/ferries
M2.6	Technology-Neutral Production Standard	Absence of a clear definition will create ambiguity in incentives, certification and investor eligibility.	National GH ₂ definition adopted; compliance framework established
M2.7	Hydrogen Safety Code	Lack of safety standards will increase operational risks, accident probability and public resistance.	Hydrogen Safety Code adopted; number of safety inspections; reportable incidents
M2.8	National Green Hydrogen Certification Standard and Registry	Without certification systems, Maldives will be unable to access carbon markets or export opportunities.	Certification registry operational; certified hydrogen production (t/yr); carbon credits issued
M2.9	Capacity Building	Lack of skilled workforce will result in operational inefficiencies, safety risks and dependence on foreign expertise.	Number of personnel trained and certified; capacity-building programmes conducted
M3.1	Concessional & Blended Financing	High cost of capital will make projects financially unviable, especially during early deployment.	Climate finance mobilised (USD); average financing cost (%)
M3.2	Subsidy for GH ₂ Production	Without subsidies, GH ₂ will remain costlier than diesel, preventing market uptake.	Hydrogen price gap (USD/kg); subsidy disbursed (USD); hydrogen production supported (t)
M3.3	Hydrogen Production Tax Credit	Absence of stable incentives will create policy uncertainty and reduce investor confidence.	Tax credit mechanism operational; number of eligible projects

M3.4	Carbon Credit & Revenue Mechanism	Without carbon credits, projects lose additional revenue streams, weakening business cases.	Carbon credits generated (tCO ₂ e); carbon revenue (USD)
M3.5	Carbon Tax on Diesel	Continued low diesel prices will distort market signals, making hydrogen uncompetitive.	Carbon levy implemented; annual levy revenue; diesel consumption (ML)

Source: *pManifold Analysis*

Progress against the monitoring indicators should be reviewed annually by MOTE in coordination with the relevant implementing agencies. The monitoring process should inform periodic reviews of the policy framework, enabling adjustments to policy instruments, implementation priorities and investment mechanisms based on technology maturity, market response and lessons learned from demonstration projects.

9. Financial Strategy for Policy Implementation

The successful implementation of the proposed green hydrogen policy framework in the Maldives will depend on a carefully structured financing strategy that leverages a combination of domestic resources, international climate finance and private sector participation. Given the fiscal constraints typical of small island developing states, the framework adopts a blended finance approach that prioritises concessional capital, minimizes direct public expenditure and aligns financial flows with measurable outcomes such as emissions reductions and verified production.

At the early stage of sector development, funding requirements are primarily institutional and regulatory in nature, including target setting, policy design, standards development and capacity building. These activities are well aligned with the mandates of international climate finance mechanisms such as the Green Climate Fund (GCF) and the Global Environment Facility (GEF), which provide readiness and technical assistance support to strengthen national institutions and enable low-carbon transitions. Complementary support from agencies such as the United Nations Development Programme (UNDP) and International Renewable Energy Agency (IRENA) can further assist in developing regulatory frameworks, certification systems and workforce capacity. Moreover, any financing accessed under this framework will comply with the respective institutions' gender mainstreaming requirements and that gender-disaggregated results will be reported under each climate finance instrument.

As the sector transitions toward infrastructure development and project implementation, financing shifts toward capital-intensive investments in renewable energy, hydrogen production and associated infrastructure. These investments are best supported through multilateral development banks such as the Asian Development Bank (ADB) and the World Bank, alongside private sector participation facilitated through blended finance structures. Concessional funding from the Green Climate Fund can be used to reduce the overall cost of capital, while institutions such as the International Finance Corporation can mobilise private investment by de-risking projects and providing structured financing solutions.

To ensure long-term financial sustainability, the framework incorporates domestic revenue-generating mechanisms, most notably a carbon levy on imported fossil fuels. Revenues from this levy are ring-fenced within a National Hydrogen Fund and recycled into key market-enabling instruments such as the hydrogen price bridge, production tax credits and strategic green hydrogen infrastructure. As hydrogen deployment expands and dependence on imported diesel declines, the resulting reduction in government expenditure on diesel subsidies can also be progressively redirected towards supporting green hydrogen infrastructure and other energy transition investments. This approach is consistent with international best practice, where carbon pricing and fossil fuel subsidy reform are used not only to discourage emissions but also to finance the transition to clean energy systems.

In parallel, the framework enables the Maldives to access emerging international carbon markets under mechanisms such as Article 6 of the Paris Agreement, administered under the United Nations Framework Convention on Climate Change. By establishing a robust national certification and registry system, the country can generate tradable carbon credits linked to verified hydrogen production and use. These credits create an additional revenue stream for the Government, utilities and private sector participants, further reducing reliance on public finance.

Finally, international partnerships and climate diplomacy play a critical role in mobilising grant funding, technical assistance and co-investment. Bilateral cooperation with countries actively investing in hydrogen value chains can position the Maldives as a strategic demonstration hub for small island systems, unlocking additional financial and technical resources.

10. Conclusions

This roadmap concludes that the Maldives presents one of the few contexts where the economic case for green hydrogen does not depend on achieving the cost targets that dominate international policy discussions. High diesel generation costs, abundant solar resources and the absence of a national electricity grid create favourable conditions for green hydrogen deployment. The feasibility assessment indicates that green hydrogen could achieve cost parity with diesel-based power generation by approximately 2030 under current market conditions, or as early as 2025 with appropriate policy support.

While the technical and economic foundations appear favourable, the principal challenge lies in establishing the policy, regulatory and institutional framework necessary to enable investment and implementation. Delays in these areas could postpone pilot projects and reduce the opportunity to build experience before larger-scale deployment becomes viable. Accordingly, this roadmap recommends that, subject to the approval and adoption of this framework by the Government of the Maldives, implementation should commence in a phased manner beginning with the pilot projects identified herein. Operational experience from these pilots should then be used to validate assumptions, refine policy instruments and inform subsequent investment decisions.

Priority Recommended Actions:

1. Adopt the Green Hydrogen Roadmap and establish the enabling policy framework. Formal adoption of this roadmap and the associated production payment mechanism would provide the policy certainty required for private sector participation and engagement with development partners
2. Establish the National Hydrogen Steering Committee and should be provided with appropriate statutory authority, a multi-year budget and dedicated personnel responsible for licensing, safety oversight and international cooperation
3. Commission the Phase-1 pilot projects following framework approval. The proposed FENAKA outer island fuel cell replacement project and the resort micro-plant should serve as demonstration projects. A minimum of twelve months of operational data should be collected to support the preparation of the Phase-2 investment case and associated climate finance proposals.
4. Develop and gazette the Maldives Hydrogen Safety Code as a nationally recognised safety and regulatory framework will be essential for project licensing, financing, insurance and safe operation
5. Prepare and submit a readiness funding application to the Green Climate Fund (GCF). Early engagement with international climate finance mechanisms is recommended to ensure that financing arrangements are in place ahead of Phase 2 deployment

6. Establish national workforce development and certification programmes. Training and certification for hydrogen-related occupations should commence sufficiently in advance of pilot commissioning to ensure the availability of qualified personnel
7. Integrate hydrogen deployment with broader renewable energy strategies. Green hydrogen should be developed as a complementary technology alongside solar photovoltaic systems, battery energy storage and electrification initiatives, thereby strengthening overall energy system resilience and reducing long-term costs.

The conditions necessary for green hydrogen deployment in the Maldives are increasingly favourable, and this roadmap provides a structured pathway for progressing from feasibility assessment to implementation. Subject to its adoption by the Government of the Maldives, the recommendations contained herein are intended to guide the phased development of the country's hydrogen economy through coordinated policy action, targeted pilot projects and progressive institutional development.

Beyond improving energy security and reducing dependence on imported fossil fuels, successful implementation would position the Maldives as an important demonstration case for other Small Island Developing States (SIDS) seeking pathways towards low-carbon and resilient energy systems. By documenting implementation experiences, technical performance and policy outcomes, the Maldives could contribute valuable knowledge to the wider international transition to green hydrogen.



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