

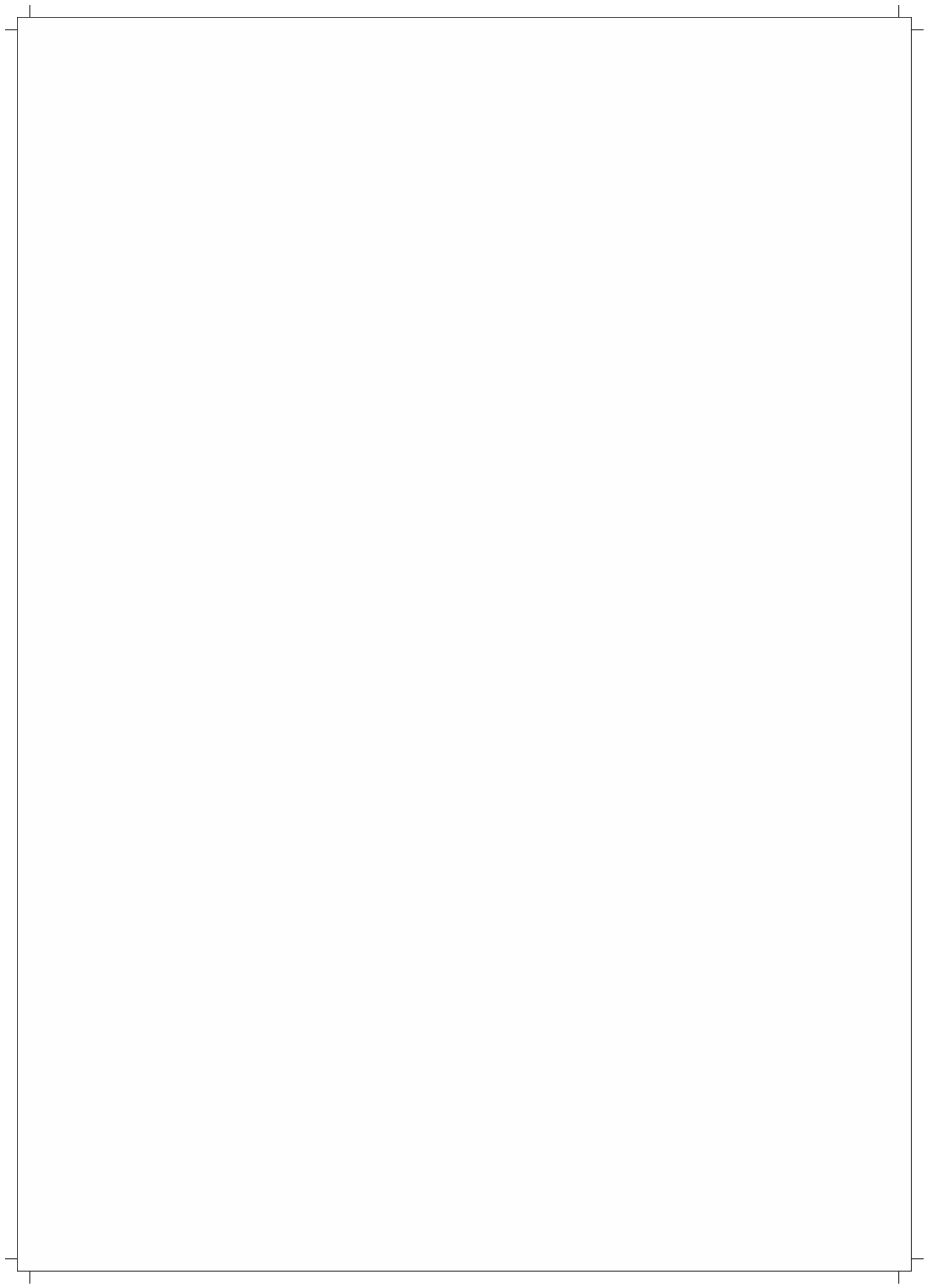


Elevating India's WIND TURBINE EXPORTS FOR GLOBAL MARKETS

(Aligned With 'Make In India For The World')



Consultative Paper



FOREWORD



Shri. Santosh Kumar Sarangi

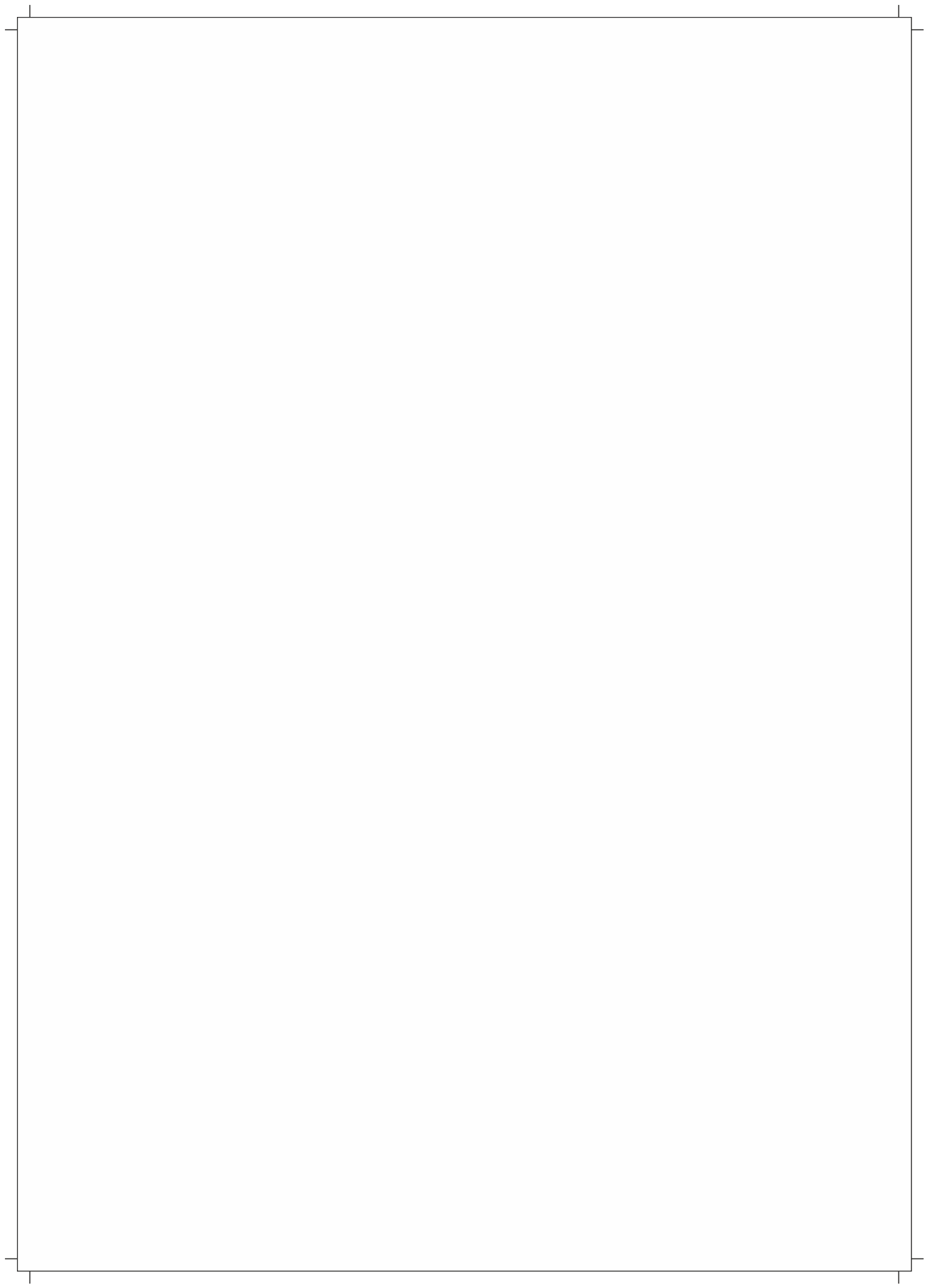
Secretary, Ministry of New and Renewable Energy
Government of India

India stands at a historic inflection point in its renewable energy journey. Over the past decade, through sustained policy commitment and industrial resolve, the country has built one of the world's most significant wind energy manufacturing ecosystems. Today, India commands an annual wind turbine generator (WTG) manufacturing capacity of approximately 24 GW, has deployed more than 56 GW of installed wind power, and is home to a comprehensive component value chain spanning blades, towers, nacelles, gearboxes, and converters. The question before us is no longer whether India can manufacture — it manifestly can. The imperative now is to ensure that this formidable industrial strength is fully converted into global export leadership.

The global wind energy market presents a compelling and time-sensitive opportunity. Annual worldwide wind capacity additions are projected to rise from approximately 178 GW in 2026 to 212 GW by 2030. As the world seeks to diversify supply chains and emerging economies across South and Southeast Asia, Africa, Central Asia, and Australia accelerate their wind build-out, India is uniquely placed to emerge as the pre-eminent alternative global supply base. India's cost competitiveness, manufacturing depth, geopolitical stability, and growing technological capabilities together constitute a powerful export proposition — one that resonates strongly with the vision of **'Make in India for the World.'**

This Consultative Paper provides a comprehensive analysis of India's wind turbine export potential. It maps the global market opportunity, assesses the competitive landscape of OEMs and identifies the binding non-manufacturing constraints — export finance depth, international certification, technology scale-up to 4–6 MW platforms, and global service presence — that have thus far moderated export growth. These findings can be translated to coherent, modular policy package to further strengthen the wind turbine manufacturing ecosystem with a particular focus on export.

I commend Indian **Wind Turbine Manufacturers Association (IWTMA)**, industry, knowledge partners, and all stakeholders who have contributed for this thoughtful and comprehensive report. I invite policymakers, OEMs, financial institutions, and industry associations to engage deeply with its findings and to collectively translate this roadmap into action. I strongly feel our wind industry has the potential to become a globally trusted supplier of wind turbines and components — powering the clean energy transition in India and across the world.



FOREWORD



Shri. Girish Tanti

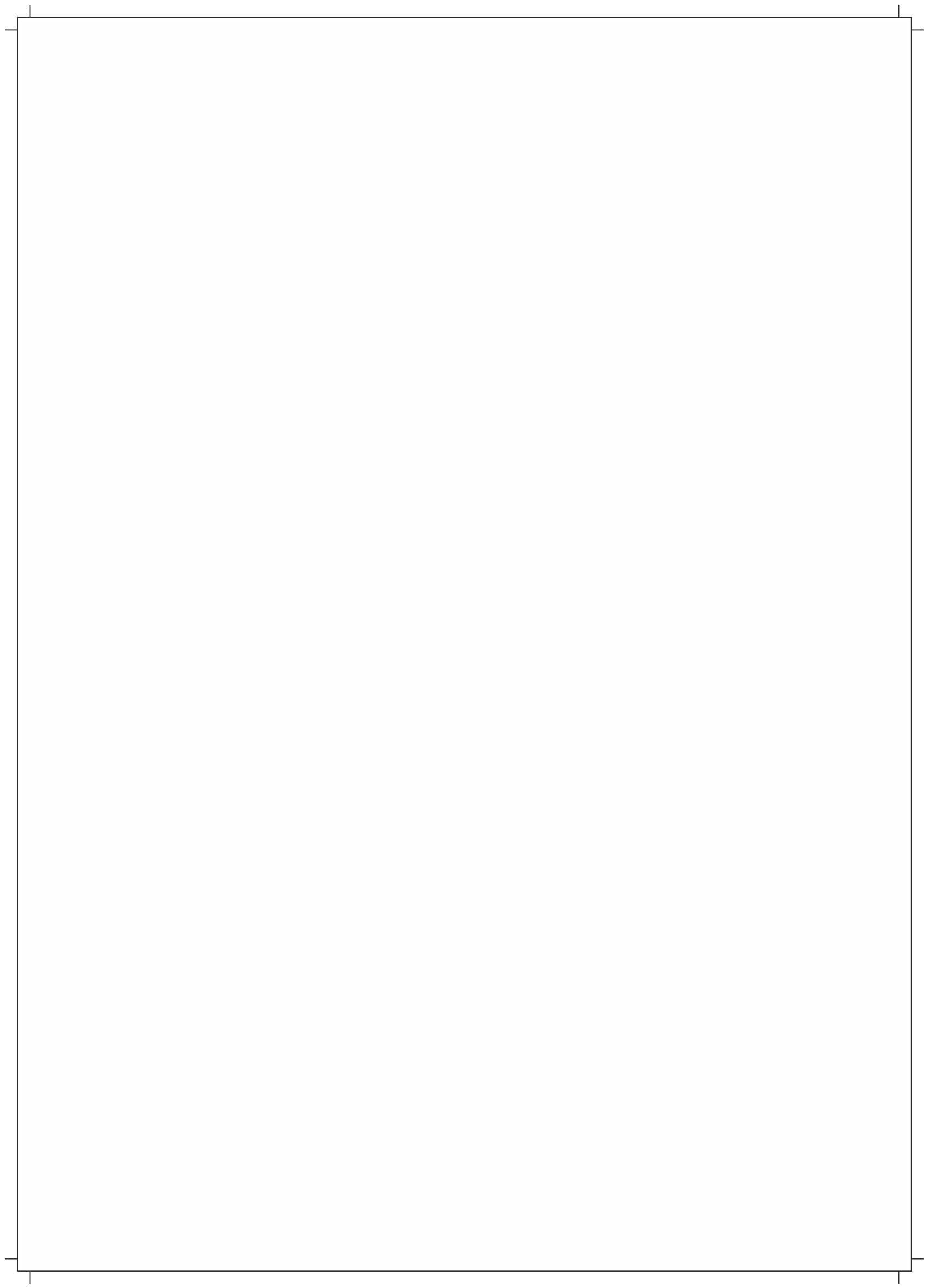
Chairman
Indian Wind Turbine Manufacturers Association

India's wind sector has reached a point where manufacturing strength alone is no longer the limiting factor; the central challenge now is to convert that strength into sustained export competitiveness. This report captures that shift with clarity. It recognises that India has already built meaningful manufacturing scale across wind turbine generators and key components, while global demand continues to expand and diversify. In that context, the opportunity before us is significant: to position India not merely as a domestic supplier, but as a trusted and cost-competitive global manufacturing hub aligned with the vision of **"Make in India for the World."**

The timing of this report could not be more consequential. Global wind installations are accelerating sharply, driven by Net-Zero commitments across Europe, the Americas, Southeast Asia, and Africa. Meanwhile, supply chain vulnerabilities exposed in recent years have prompted importing nations to actively seek credible alternative suppliers. India, with its established manufacturing base, engineering talent, cost competitiveness, and growing domestic deployment scale, is exceptionally well positioned to fill this strategic gap — provided the right enabling framework is put in place.

For policymakers in the Ministry and for industry leaders alike, the message is clear. Export success in wind will depend not only on factories and capacity, but also on the enabling ecosystem around them—price competitiveness, export finance, tax neutrality, certification, product bankability, after-sales service, and global market access. The report rightly highlights that India's manufacturing base is substantial, but that non-manufacturing constraints continue to limit the full realisation of export potential. Addressing these constraints will require coordinated action across policy, finance, logistics, quality systems, and technology development.

I commend this report for moving beyond diagnosis to practical recommendations. Its roadmap offers a credible pathway for strengthening domestic value addition, supporting export-oriented manufacturing, deepening market acceptance, and building the institutional confidence needed for Indian wind products to compete internationally. The task now is collective execution. With aligned policy support and industry ambition, India can emerge as a global wind export leader and secure durable industrial growth, employment, and strategic resilience.



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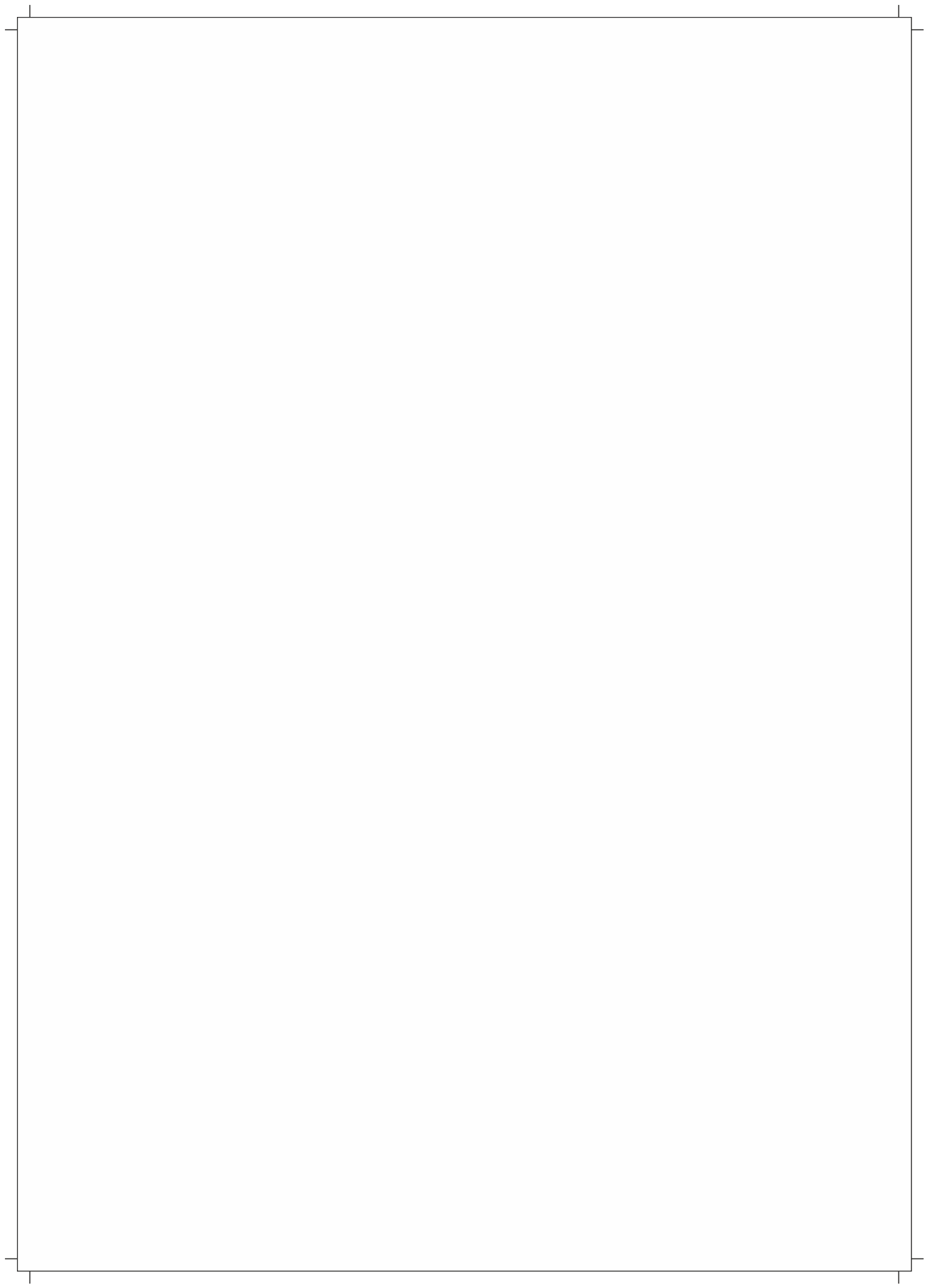
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Executive Summary

India's wind turbine manufacturing sector has reached an inflection point. With installed manufacturing capacity of **~24 GW per annum**, the domestic market — projected at ~10 GW of annual additions is already exporting more than **4–6 GW** of wind turbine components. Against a global wind market poised to scale to **~212 GW of annual additions by 2030**, exports must transition from a peripheral opportunity to the core growth engine of India's wind industry. This paper diagnoses the structural barriers limiting India's export ambition and prescribes a targeted, multi-dimensional roadmap to close them..

1. Establishing a Competitive Export Finance & Incentive Architecture

The single most immediate barrier to India's export competitiveness is the absence of an export-linked manufacturing incentive for wind turbines — a gap that stands in sharp contrast to the policy regimes of Denmark, Germany, China, and the United States. Indian OEMs contend with higher factory-gate costs, limited access to long-tenor export finance, and an absence of buyer-side risk mitigation, all of which erode competitiveness in price-sensitive emerging markets where concessional finance is often decisive.

The report recommends three interlocking interventions:

- (i) **an Export-Linked Wind Manufacturing Incentive (EL-WMI)** structured as an INR/MW or turnover-linked incentive for 5–7 years;
- (ii) **an Indian Wind Export Finance Facility (I-WEFF)** under EXIM Bank or IREDA offering long-tenor buyer's credit (15–20 years), local-currency lending in emerging markets, and supplier credit to Indian OEMs;
- (iii) **an ECA-backed Payment Deferral Facility** providing a 100% sovereign guarantee on export receivables — enabling Indian OEMs to offer deferred payment terms and compete credibly in high-value international tenders. Reinstating the Interest Equalisation Scheme for the wind sector and classifying wind turbine exports as 'project exports' to unlock corresponding guarantee and insurance cover are identified as near-term priorities.

2. Supply Chain Optimisation and Deep Localisation

While India's assembly-level localisation stands at ~70%, system-level localisation remains at ~50%, with critical high-value components — converters, generators, and specialty castings — still heavily import-dependent. This structural gap elevates total landed costs and introduces supply chain fragility. The report calls for a phased local-content roadmap under MNRE's ALMM framework, supported by manufacturing-linked incentives modelled on the PLI structure but calibrated specifically for wind components.

Concretely, this requires:

- (i) Duty realignment on specialty steel, establishment of cluster-based supplier parks near major ports, OEM-SME co-development partnerships, and collateral-free credit for Tier-2 vendors.
- (ii) Diversifying sourcing for rare-earth magnets and investing in magnet-light drivetrain technologies are highlighted as strategic imperatives to reduce exposure to China-controlled supply chains.

These measures, taken together, could meaningfully compress turbine CAPEX and strengthen India's position as a cost-competitive global supplier.

3. Closing the Certification and Global Bankability Gap

The absence of an IECRE-recognised certification body in India is a structural impediment to export bankability. Without internationally recognised type certifications, Indian turbines face higher project finance costs, lender scepticism, and exclusion from tenders in regulated markets. NIWE — India's primary inspection and approval body — is already NABCB and NABL accredited, creating a credible foundation for IECRE membership.

The recommended pathway involves:

- (i) NIWE establishing an independent certification division, actively pursuing IECRE membership, and the government co-funding IEC, UL, and DNV certifications for Indian OEMs.
- (ii) The creation of an **ALMM Export Track** — a parallel certification stream specifically for turbines destined for export markets — is proposed as a practical near-term mechanism to improve global market access without disrupting the domestic approval framework.

4. Bridging the Technology Gap Through Focused R&D

Indian OEMs predominantly manufacture 2–3 MW turbine platforms at a time when global demand is shifting decisively toward 5 MW+ smart turbines with advanced analytics, predictive maintenance, and lower LCOE profiles. This technology lag, if unaddressed, will progressively narrow India's addressable export market to lower-margin, commoditised segments.

The report advocates for a dedicated **Wind R&D Mission** with government co-funding for the development of 4–6 MW turbine platforms in partnership with global technology leaders. Priority R&D areas include:

- (i) Longer blade aerodynamics, adaptive control systems, digital twins for predictive maintenance, and automated manufacturing techniques.
- (ii) Raising localization from ~70% to 80–85% through targeted R&D in next-generation blade materials and gearbox/converter testing infrastructure is projected to reduce component costs by up to 20% – a critical lever for long-term competitiveness.

5. Building a Global Service and After-Sales Infrastructure

The recommended approach is a phased build-out of **regional service hubs and decentralised spare-parts logistics networks** near major wind clusters in priority export corridors (South Africa, Australia, the Philippines, and Central Asia). Training local technicians to GWO standards, deploying mobile expert teams for complex maintenance, and implementing SCADA-based remote monitoring with AI-driven predictive maintenance are identified as the foundational capabilities required to establish credibility as a full-lifecycle supplier.

6. Brand India Wind — Repositioning India's Global Perception

A coordinated 'Brand India Wind' strategy is recommended to systematically build credibility, visibility, and trust in international markets. The strategy rests on four pillars:

- (i) **A core brand message** anchored in manufacturing reliability, international standards compliance, and competitive total-cost-of-ownership;
- (ii) **Active promotion** through global expos, government trade missions, and digital/SEO campaigns;
- (iii) **Industry partnerships** with global EPCs, utilities, and development finance institutions; and
- (iv) **Measurable tracking** of market perception through structured surveys and analytics. The strategy must be government-backed, institutionally coordinated, and sustainable.

7. Strategic Partnerships for Market Entry and Technology Collaboration

The report calls for Indian OEMs to proactively identify partners in priority export corridors through international expos and bilateral trade platforms, and to structure alliances around **joint venture service hubs, co-manufactured local content, and revenue-sharing arrangements**. Government trade missions and diplomatic channels are identified as force-multipliers for partnership identification – an asset that is currently underutilised.



1

Market Context and Opportunity Assessment



1 Market Context & Opportunity Assessment



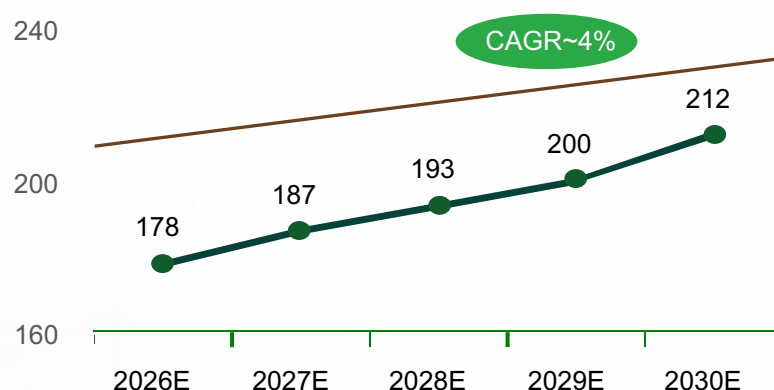
1.1 Global wind turbine market

Global energy markets are operating in an increasingly complex and evolving landscape shaped by geopolitical developments, including the Russia–Ukraine conflict, tensions in the Middle East, and persistent inflationary pressures. While these factors introduce uncertainty, they are also accelerating the global push toward energy security, diversification, and renewable energy adoption, creating opportunities for innovation and structural transition within the energy sector.

As of 2025, China continues to dominate the global wind power market, adding a substantial 130 GW of new capacity. This is followed by India with 6.3 GW, the United States with 6.2 GW, Germany with 4.6 GW, Vietnam with 2.5 GW, and Brazil with 2.2 GW¹. 2025 underscored the resilience and sustained momentum of the global wind sector, adding 169 GW, driven by strong growth in China and steady expansion across other key markets.

Despite ongoing geopolitical challenges, the global wind energy market is poised for robust growth. Annual wind capacity additions are expected to reach record breaking 178 GW in 2026, rising further to around 212 GW by 2030². This expansion represents a compound annual growth rate (CAGR) of ~4%, reinforcing the long-term structural shift toward renewable energy and the central role of wind power in global decarbonization efforts.

Figure 1: Global wind capacity addition 2026–2030 (Source: GWEC 2026)



¹ WWEA

² GWEC 2026





1.1.1 Key Drivers of Global Growth in New Wind Installations

Global demand for wind energy is accelerating as countries transition toward renewables to meet climate commitments and reduce dependence on fossil fuels. Declining costs and continuous technological advancements including more efficient turbines and the expansion of offshore wind have made wind power increasingly competitive. In parallel, energy security concerns and global decarbonization commitments are further strengthening adoption worldwide.

The regions expected to see the highest wind installations include North and Latin America, the Middle East, China, Europe, India, Africa, and the broader Asia-Pacific region.



Figure 2: Projected High Potential for New Annual Wind Capacity Additions in Highlighted Regions (Source: GWEC 2026)

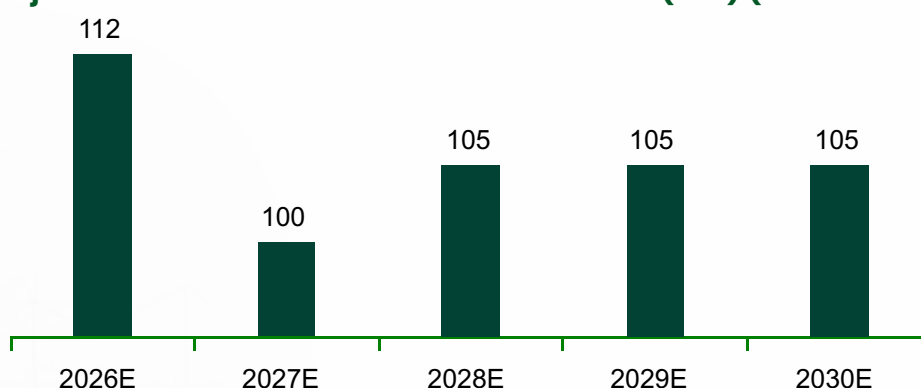


The projected growth in global wind installations is underpinned by the following regional drivers³:

China:

China continues to lead global renewable energy expansion, driven by its “30–60” climate pledge, with a long-term objective of sourcing ~80% of energy from non-fossil fuels by 2060 & 15th 5-year plan. Strong policy support and manufacturing scale underpin sustained wind capacity additions. China is expected to a total of 527 GW by 2030, an average annual addition of ~106 GW.

Figure 3: Projected annual new wind addition in China (GW) (Source: GWEC 2026)

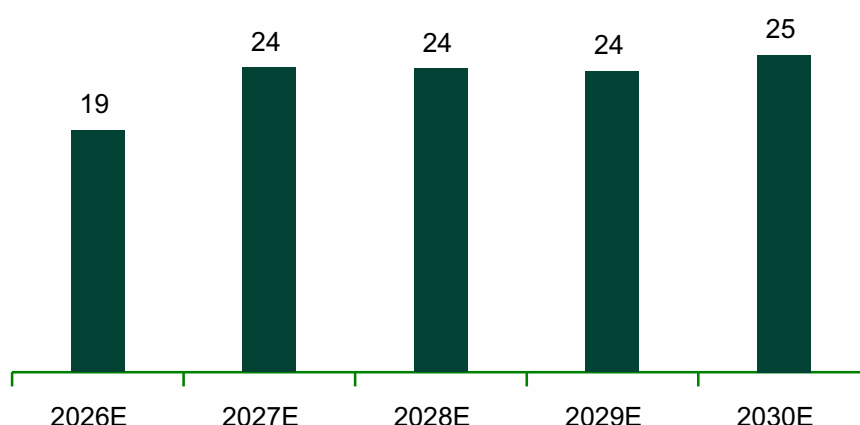


³ GWEC 2026

Europe:

In response to the Ukraine conflict and broader energy security concerns, Europe is accelerating renewable deployment. Initiatives such as the Clean Industrial Deal are reinforcing decarbonization efforts while supporting industrial competitiveness and energy independence. Europe is expected to a total of 117 GW by 2030, an average annual addition of ~23 GW.

Figure 4: Projected annual new wind addition in Europe (GW) (Source: GWEC 2026)



United States:

Despite periodic policy uncertainties, the US remains focused on scaling wind and clean energy technologies to meet rising electricity demand, support domestic manufacturing, and enable growth in energy-intensive sectors such as data centres and AI. North America is expected to a total of 40 GW by 2030, an average annual addition of ~8 GW.

Figure 5: Projected annual new wind addition in North America (GW)

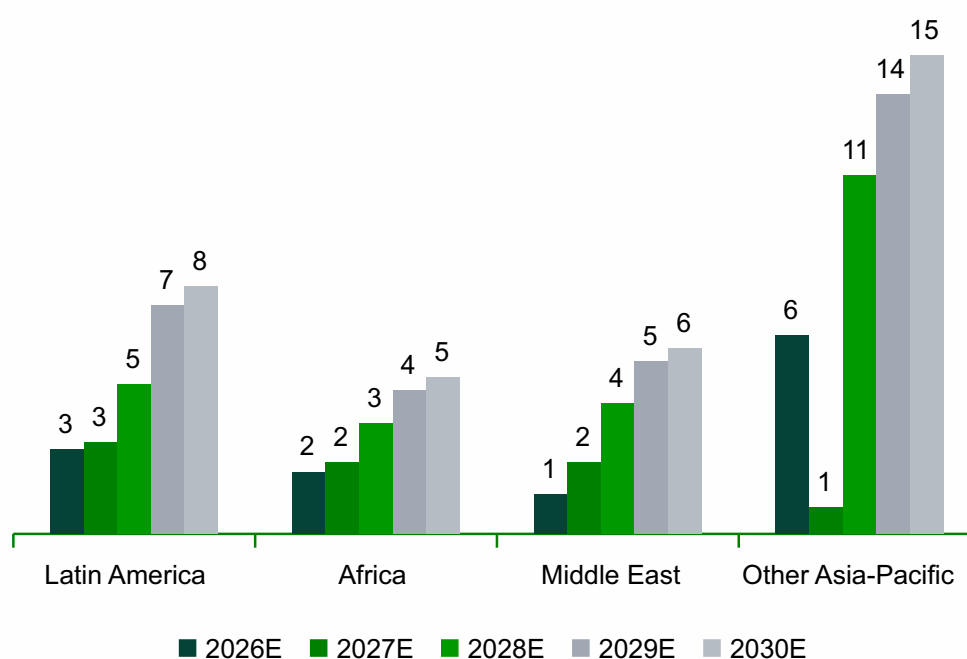


Other Emerging Markets:

Countries across Brazil, Africa, Australia, and Southeast Asia are expanding wind energy development, supported by favourable policies aimed at reducing carbon emissions, improving energy security, and leveraging abundant natural wind resources.

Global onshore wind capacity additions over the remainder of the decade are expected to be driven primarily by China and Europe, which together will account for approximately 77% of new installations between 2026 and 2030. Amid policy uncertainty in the United States, the Asia Pacific region (excluding China) is positioned to surpass the US as the third-largest contributor to global onshore wind growth during this period.

Figure 6: New wind addition across different regions (GW) (Source: GWEC 2026)



In the near term, China is projected to dominate installations, representing around 70% of global wind capacity additions in 2026. From 2026 onwards, development is expected to accelerate across Europe, India, and Australia, followed by increased momentum in emerging markets such as Southeast Asia, Central Asia, Africa, and the Middle East from 2027. By the end of the decade, the global onshore wind market is expected to become significantly more diversified, with nearly half of annual capacity additions originating from regions outside China.

Regional Growth Drivers in Emerging Wind Markets⁴

Emerging markets are driving strong wind energy growth. South Africa plans up to 53 GW of wind capacity over the next decade, supported by power market reforms. Southeast Asia, led by the Philippines and South Korea, is accelerating wind deployment through policy support and ambitious renewable targets. Central Asia and the Middle East, including Uzbekistan, Kazakhstan, and Saudi Arabia, are rapidly scaling wind capacity with aggressive targets and strategic investments to diversify their energy mix.

- **Africa (South Africa):**

South Africa's 2024 Renewable Energy Grid Survey outlines plan for approximately 53 GW of wind projects over the next 5–8 years, including ~33 GW by 2030. The Electricity Regulation Amendment Act (ERAA), effective January 2025, aims to establish a competitive electricity market by April 2026, accelerating power sector reforms. Together, grid planning, policy support, and market liberalization are driving strong growth in the country's wind energy sector.

- **Southeast Asia (Philippines and South Korea):**

Wind energy deployment in Southeast Asia is gaining momentum, led by the Philippines and South Korea. The Philippines ranks second⁵ in the Asia-Pacific region for renewable energy investment, supported by foreign ownership reforms and expedited project approvals. South Korea, under its latest energy plan, targets 100GW capacity by 2030, with wind power playing a central role. These developments underscore the region's strong focus on sustainable energy growth.

- **Central Asia and Middle East (Uzbekistan, Kazakhstan, and Saudi Arabia):**

Uzbekistan and Kazakhstan are rapidly scaling wind capacity, supported by ambitious government targets and favourable policies, with Uzbekistan aiming for ~20 GW by 2030. In parallel, Saudi Arabia plans to deploy 130 GW (16 GW wind) of renewable energy under its Vision 2030, accelerating development through comprehensive site surveys and streamlined approvals. This growth reflects strategic investments, policy-driven momentum, and a strong focus on energy diversification across the region.

⁴ GWEC 2025 & 2026

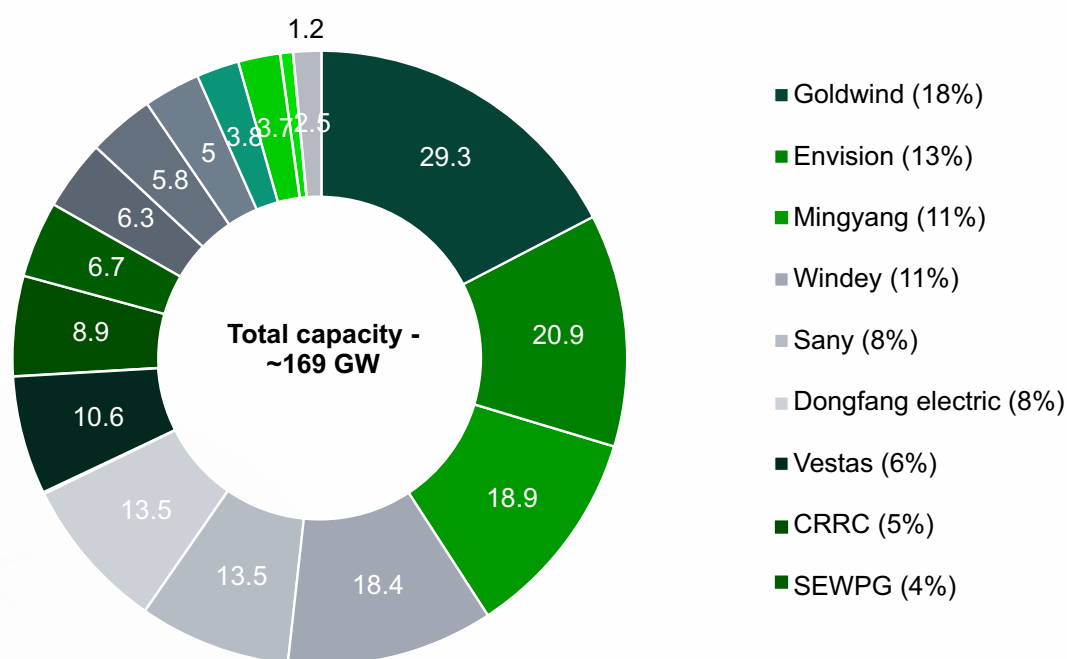
⁵ BNEF climate scope 2024

1.1.2 Outlook for Global OEMs

The global wind turbine original equipment manufacturer (OEM) landscape⁶ is undergoing significant transformation amid rapid capacity growth and shifting regional dynamics. Overall wind power installations are projected to expand strongly through the end of the decade, driven by both onshore and offshore additions with significant compound annual growth rates. This growth is underpinned by sustained demand for renewable energy sources globally and robust policy support in key markets.

In terms of competitive positioning, the market is increasingly led by Chinese manufacturers in recent years. Chinese OEMs such as Goldwind, Envision, Mingyang, and Windey have risen to occupy the top global positions for annual wind turbine installations, reflecting the scale of domestic deployment and export growth. This marks a notable shift from historical leadership by Western European firms.

Figure 7: Global WTG Installed Capacity (Total capacity - ~169 GW) by market share as of 2025 (GW) (Source: BNEF)



⁶ BNEF

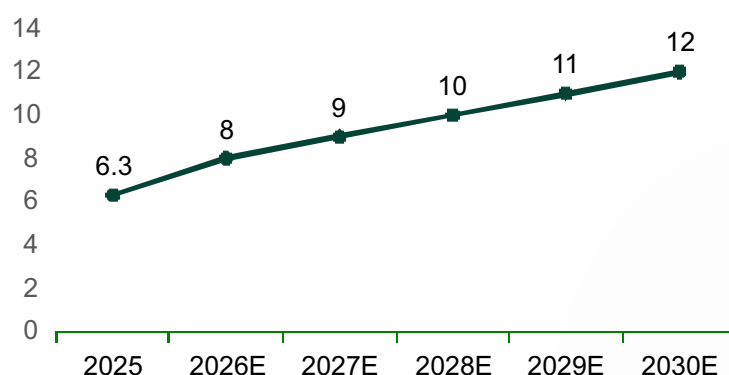
Outside China, Vestas Wind Systems (Denmark) has consistently held leading market share, while Siemens Gamesa (Vayona Energy), GE Vernova, Nordex SE, and Enercon remain major established players with significant footprints across Europe and the Americas. Adani, an Indian player, has emerged as the first entrant to the list of top players in terms of annual installations.

Regional segmentation is also pronounced: Chinese OEMs dominate in Asia and growing markets worldwide, Western suppliers retain leadership in European and North American offshore segments, and diversified portfolios are increasingly essential to capture service, maintenance, and repowering revenue streams alongside unit sales.

1.2 India's wind market

India currently ranks as the fourth-largest⁷ country globally in terms of installed wind power capacity, with approximately 56 GW⁸. This growth in wind installations is primarily driven by the Government of India's ambitious target of achieving 500 GW of non-fossil-fuel-based energy capacity by 2030, supported by policy measures such as wind Renewable Purchase Obligations (RPOs) and a defined annual bidding trajectory for wind and hybrid projects⁹. The country has identified eight key states with significant wind energy potential: Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, and Telangana.¹⁰ The projected annual onshore wind installations in India are illustrated in the accompanying figure.

Figure 8: Actual and Projected annual new wind addition in India (GW)



⁷ PIB

⁸ MNRE

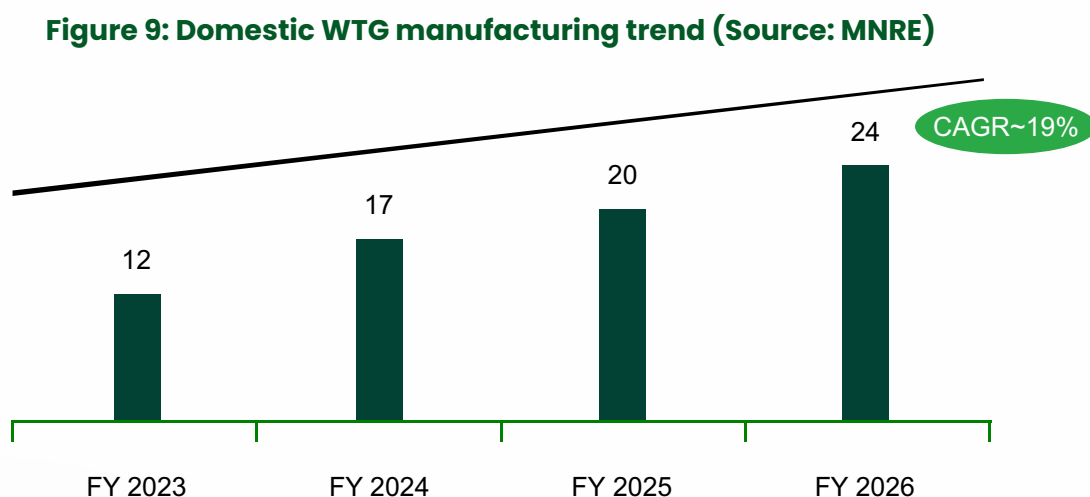
⁹ GWEC India outlook 2025

¹⁰ PIB

1.2.1 Indian wind turbine market

A steady and significant increase in wind turbine generator (WTG) manufacturing capacity over the period. Capacity has expanded from 12 GW in FY 2023 to 17 GW in FY 2024, and further to 24 GW in FY 2026, indicating strong momentum in domestic manufacturing. This growth reflects improving market confidence, rising order inflows, and sustained policy support, positioning India's WTG manufacturing ecosystem to effectively support the country's expanding wind energy deployment targets.

The Indian wind turbine market has historically been dominated by international original equipment manufacturers; however, the sector is now undergoing a structural transition. Strengthening domestic manufacturing capabilities, supportive government policies, and rising localization requirements are enabling Indian players to gain market share, gradually reshaping the competitive landscape.



**Table 1: Market share of OEMs (as per Nacelle capacity) in India as of 2026
(Source: IWTMA analysis)**

Sl. No.	WTG ¹¹ OEM	County of Origin	Capacity (GW)	% of Total Mfg. (~27 GW)
1	Vestas	Denmark	5.0	19%
2	Suzlon	India	4.5	17%
3	Nordex	Germany	3.6	14%
4	Envision	China	3.0	11%
5	Siemens Gamesa (Vayona Energy)	Spain-Germany	3.0	11%
6	Inox wind	India	2.5	9%
7	Adani	India	2.3	8%
8	Senvion	Germany	1.5	6%
9	GE Renewable	USA	1.0	4%
10	WEG	Brazil	0.4	1%

Suzlon, Adani, and Inox are the leading domestic players in India's wind market, collectively accounting for approximately 35% of manufacturing capacity. On the international side, Vestas, Nordex, and Envision represent the key foreign OEMs, with a combined share of around 43%. This positions the Indian wind market as a balanced mix of established domestic champions and global technology players, with competitive dynamics shaped by both local execution capabilities and international OEM expertise.

1.2.2 WTG component manufacturing in India¹²:

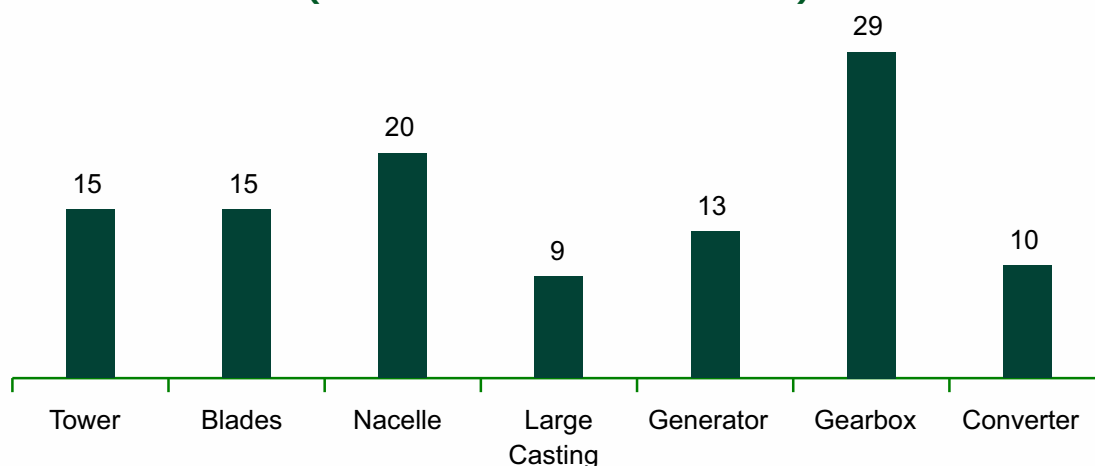
India has developed significant strength across the wind turbine generator (WTG) component manufacturing ecosystem, and this capability is expected to deepen further in the coming years. Targeted government policies and initiatives along with initiatives from manufacturers are playing a pivotal role in accelerating the shift toward domestic production, reducing import dependence, and reinforcing India's position as a competitive global manufacturing hub for the wind energy sector.

¹¹ Wind turbine generators

¹² MNRE; GWEC India outlook 2025; Companies website

Figure 10: WTG component manufacturing capacity in India (GW)

(Source: GWEC India outlook 2025)



1.2.2.1 Key Enablers Driving Localization:

- **Approved List of Models and Manufacturers (ALMM) for Wind¹³:** The ALMM (Wind) framework (2025) ensures that only wind turbine models incorporating key components sourced from approved Indian manufacturers are eligible for deployment, thereby promoting domestic manufacturing and reducing reliance on imports.
- **Strong Policy Support Creating Domestic Demand:** India's ambition to achieve 500 GW of non-fossil fuel capacity by 2030, including 100 GW from wind, has crossed the 50 GW milestone. Achieving the balance capacity over the next five years will require annual wind capacity additions of nearly 10 GW, supported by favourable government policies and incentives that create sustained domestic demand for the wind sector¹⁴. India currently has 20–55% unutilized manufacturing capacity across key wind turbine components, including towers, blades, nacelles, large castings, generators, gearboxes, and converters. This indicates that India possesses adequate manufacturing capacity to meet domestic demand while also being well positioned to expand its role as a competitive exporter in the global wind energy market.¹⁵

India is well positioned to emerge as a global export hub for wind turbine generators (WTGs) and components due to a confluence of structural, policy, and market-driven factors. Key reasons are outlined below

¹³ MNRE

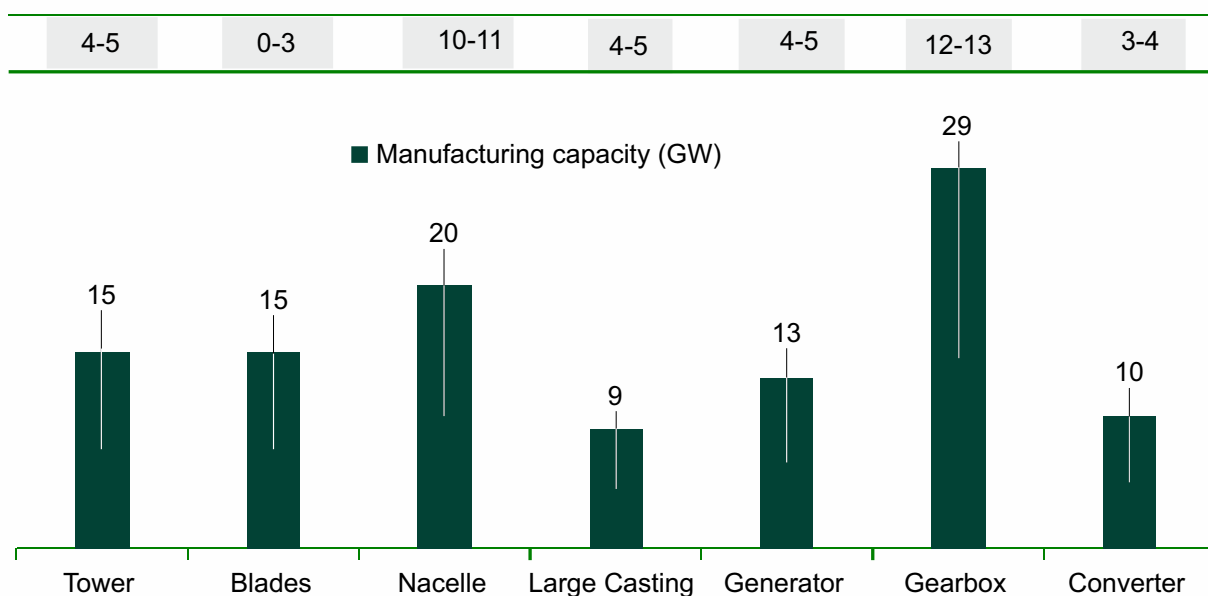
¹⁴ PIB; Bidding trajectory

¹⁵ GWEC India outlook 2025



Figure 11: Component manufacturing and underutilized capacity in India (Source: GWEC India outlook 2025)

Underutilized



• Strong and Underutilized Manufacturing Base

India has developed a comprehensive domestic manufacturing ecosystem across major WTG components including blades, towers, gearboxes, generators, castings, and converters with 20–55% surplus capacity. This underutilization provides immediate headroom to scale exports without significant incremental capital investment, enabling competitive pricing and faster delivery timelines.

• Cost Competitiveness and Scale Advantages

Lower labour and operating costs, improving manufacturing efficiencies, and large-scale production facilities allow Indian manufacturers to offer cost-effective solutions compared to European peers facing higher energy and labour costs. This cost advantage is particularly attractive for price-sensitive emerging markets and for global OEMs seeking to optimize supply chains.



- **Policy-Driven Manufacturing Depth**

Government initiatives such as the ALMM framework for wind have strengthened domestic supply chains and encouraged technology localization. These policies have improved quality, reliability, and depth of manufacturing, creating export-ready capabilities aligned with global standards.

- **Strategic “China+1” Supply Chain Positioning**

As with Global markets seek to diversify supply chains away from overdependence on China, India is increasingly viewed as a credible alternative. Its geopolitical stability, large industrial base, and growing trade linkages position it favourably as a “China+1” manufacturing destination for global wind OEMs.

- **Proximity to High-Growth Wind Markets**

India’s geographic location provides logistical advantages for supplying fast-growing wind markets in Southeast Asia, the Middle East, Africa, and Australia, while also serving European markets facing domestic capacity constraints. This enhances India’s role as a regional and intercontinental export hub.

- **Expanding Technology and Quality Capabilities**

Indian manufacturers are steadily moving up the value chain, supported by technology partnerships, global certifications, and increasing compliance with ESG and bankability requirements. This enhances acceptance of Indian-made WTGs and components in international markets.

With surplus capacity, competitive costs, strong policy backing, and shifting global supply-chain preferences, India is structurally positioned to evolve from a large domestic wind market into a globally significant export hub for wind turbines and components. The opportunity lies in converting manufacturing depth into sustained export-led growth through targeted market access and global partnerships.



1.3 Positioning India as a global export hub:

India currently has an export baseline of INR 12,840 cr. Positioning India as a global export hub drives multiple strategic, economic, and sectoral benefits for the wind energy ecosystem. Key drivers and outcomes include:

- **Export-led growth and capacity utilization:** Enables absorption of surplus WTG and component manufacturing capacity, improving plant utilization, operating leverage, and return on capital for OEMs and suppliers.
- **Global supply-chain diversification:** Strengthens India's role as a "China+1" manufacturing destination, offering global OEMs and developers a reliable, geopolitically stable alternative sourcing base.
- **Cost competitiveness and price stability:** Leverages India's structural cost advantages to supply price-competitive turbines and components to cost-sensitive emerging markets and supply-constrained mature markets.
- **Industrial and employment growth:** Currently, annual wind installations of ~3 GW generate approximately 37,000 jobs. Scaling installations to ~8 GW could create around 153,000 jobs, while achieving ~15 GW per year has the potential to generate nearly 307,000 jobs annually highlighting the strong employment multiplier of wind sector expansion.
- **Technology upgradation and value-chain advancement:** Encourages technology transfers, global partnerships, and movement up the value chain from component manufacturing to system integration, services, and O&M.
- **Foreign exchange earnings and trade balance improvement:** India's wind sector is increasingly emerging as a global export hub for blades, nacelles, and gearboxes, serving markets in Europe, the United States, and the Asia-Pacific. This momentum is reinforced by strong investor confidence, with foreign direct investment (FDI) inflows into the renewable energy sector exceeding USD 6.1 billion between April 2020 and September 2023 under the 100% automatic route.
- **Long-term sector resilience:** Reduces dependence on cyclical domestic tender volumes by diversifying demand sources, enhancing the long-term stability of India's wind manufacturing ecosystem.





1.4 Key prospective Export markets for Wind Technology:

- **South Africa:** With a 53 GW pipeline of wind and hybrid projects (33 GW by 2030) and 69–76 GW projected post-2030, wind is central to South Africa's energy transition. Deployment constraints related to land, grid, logistics, and skills create strong reliance on imported wind technology and expertise, making it a prime export market.
- **Australia:** Rapid onshore wind expansion, with 2.2 GW financed in 2024 and mega-projects such as Golden Plains (1.33 GW) and Macintyre (923 MW) under construction. Strong policy backing and large-scale investments position Australia as a high-potential market for wind turbine and component exports.
- **Philippines:** Emerging as a leading renewable market in APAC, supported by 100% foreign ownership, expedited approvals (EVOSS), and ambitious targets (35% RE by 2030; 50% by 2040). Limited local manufacturing and port readiness create significant dependence on imported turbines and components, offering a strong export opportunity.
- **Vietnam:** The revised PDP8 sets an ambitious target of 26–38 GW by 2030 and 113–139 GW by 2050. Along with these targets the market is moving from the FIT scheme to a competitive auction scheme. Along with policy reforms and government support in implementation, ex: site selection/allocation. Vietnam is the next major wind horse in Southeast Asia after China.
- **EU (Romania and Moldova)**
 - The European market is projected to witness an increase in wind power installations in the coming years. The India–EU Free Trade Agreement has opened up greater access to the European market, creating new opportunities in countries such as Romania and Moldova
- **Central Asia (Uzbekistan and Kazakhstan):**
 - Uzbekistan: Targets 20 GW of wind and solar by 2030, with 13 GW of wind announced; large projects depend on foreign OEMs due to limited local manufacturing.
 - Kazakhstan: Wind capacity nearing 2 GW, with 1.8 GW auction planned in 2025. Until local supply chains mature post-2026, demand for imported turbines and components remains strong.

With strong domestic manufacturing capabilities, cost advantages, and strategic geographic positioning, India has the potential to evolve into a key player in the global wind energy market.



As global supply chains seek diversification, India's "China+1" strategy offers an appealing alternative. There are substantial growth opportunities in markets like South Africa, Australia, EU, and Central Asia, which align well with India's cost-effective solutions. By enhancing technology, and attracting investment, India can strengthen its role as a reliable global supplier, supporting economic growth and sustainable development. Through strategic positioning and partnerships, India is on the path to becoming a significant contributor to the international wind energy landscape.

Section Summary

This section outlines the strong global momentum in wind energy driven by energy security, climate commitments, and improving economics, with China leading installations and rapid growth across Europe, India, and emerging markets. It emphasizes India's expanding wind manufacturing base, rising localization, and policy support, positioning the country as a competitive global export hub for wind turbines and components amid global supply-chain diversification.





2

Competitive Landscape and Challenge Analysis



2 Competitive Landscape & Challenge Analysis



The global wind turbine market is primarily led by Chinese OEMs, followed by European companies, with the first entry of an Indian player Adani into the list. Many of these companies already have a strong presence in India, creating competitive landscape for India's ambition to become an export hub. The absence of major Chinese players like Goldwind, Windey, and Mingyang, coupled with the gradual exit of European and U.S. firms such as Siemens Gamesa (rebranded as Vayona Energy in India and Sri Lanka) and GE, underscores the need for India to build scale and differentiation to compete globally.

Table 2: Global wind turbine top players and their share
(Source: BNEF) (2.5 GW Rest of the OEMs)

Sl. No.	WTG ¹⁶ OEM	County of Origin	Capacity (GW)	% of Total Installed (~169 GW)
1	Goldwind	China	29.3	18%
2	Envision	China	20.9	13%
3	Mingyang	China	18.9	11%
4	Windey	China	18.4	11%
5	Sany	China	13.5	8%
6	Dongfang electric	China	13.5	8%
7	Vestas	Denmark	10.6	6%
8	CRRC	China	8.9	5%
9	SEWPG	China	6.7	4%
10	Siemens Gamesa (Vayona Energy)	Spanish - German	6.3	4%
11	Nordex	Germany	5.8	3%
12	GE vernova	USA	5	3%
13	Enercon	Germany	3.8	2%
14	CSSC Haizhuang	China	3.7	2%
15	Adani	India	1.2	1%

¹⁶ Wind turbine generators

2.1 Challenges:

- **Cost competitiveness:** Wind turbines from India are priced lower than US and EU models, making India highly competitive. While Chinese turbines remain the cheapest around 20%¹⁷ less than US/EU, the gap between India and China is much smaller, positioning India as a cost-effective alternative with strong quality standards.
- **R&D:** While Chinese and European OEMs have advanced R&D capabilities for turbines in the 2–5 MW range, Indian manufacturers remain largely limited to 2–3 MW (as the country has limited 5+ MW turbine capabilities). This technology gap poses another challenge for India in scaling up and competing in the global wind turbine market.
- **Financial support:**
 - **India:** Financing is limited, mainly through EXIM Bank and IREDA, with higher interest rates, shorter tenors, and mostly domestic coverage. Global competitiveness is low.
 - **China:** Extremely aggressive financing via Sinosure¹⁸ and policy banks, offering low-interest, long-tenor loans bundled with EPC and turbine supply. Strong global penetration.
 - **Europe:** Robust ECA-backed financing (EKF, Euler Hermes) with guarantees, low rates, and long tenors (10–15 years). Globally recognized and preferred for large projects.

India offers strong cost competitiveness, with turbine prices lower than US/EU models and only a small gap with China, making it a viable alternative with good quality standards. However, global expansion is hindered by limited R&D focused on 2–3 MW (as the country has limited 5+ MW turbine capabilities) platforms versus China and Europe's advanced 4–8 MW designs, and weak financing support compared to China's aggressive policy-backed loans and Europe's robust ECA-backed credit. To scale globally, India must bridge gaps in technology, and financing while leveraging its cost advantage.

¹⁷ BNEF

¹⁸ China Export & Credit Insurance Corporation

2.2 Shifting Global Demand

- Offshore wind capacity surged from ~63 GW in 2022, with projections of reaching ~494 GW by 2030 under IRENA's 1.5 °C pathway, and ≥2.4 TW by 2050.¹⁹
- **Opportunities:** India can serve as an export hub for 60+ GW of impending global offshore capacity, primarily producing components like towers and blades²⁰ (Since the country has no operational offshore capacity). *With ~24 GW domestic WTG capacity, India can pivot surplus manufacturing toward premium offshore component exports.*
- IRENA projects global wind capacity exceeding 3.5 TW by 2030, with many turbines approaching end-of-life (20–25 years). Repowering replacing old turbines offers higher output without new land²¹
- **Opportunities:** India has a strong manufacturing base for wind turbines and components, and repowering broadens the application of these capabilities, creating a wider scope for India to serve both domestic and global markets.

¹⁹ IRENA

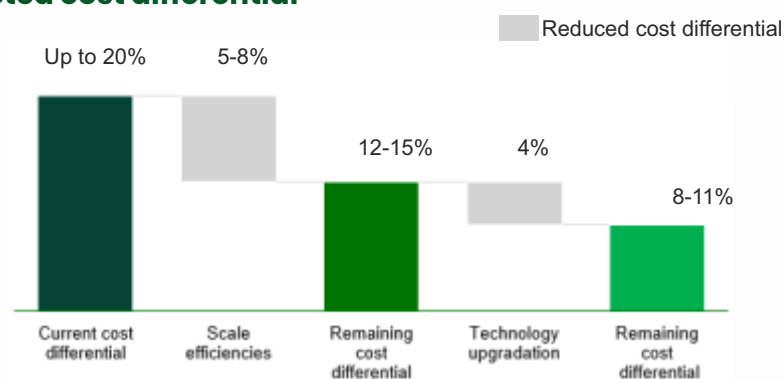
²⁰ S&P

²¹ IRENA

Table 3: Primary disadvantage faced by Indian WTG OEMs compared to Chinese competitors

Disadvantages	Details
Unmatched cost and scale	Cost comparison:²² The current cost differential between Chinese product and India product is up to 20%. The cost differential can be reduced by achieving scale efficiencies and upgrading technology, leading to a decreased gap of 8-11%. Chinese OEMs dominate due to massive domestic demand (~80 GW added in 2024) and 70%²³ share of global onshore additions, enabling economies of scale and serial production. Combined with state subsidies, preferential financing, and grid-parity pricing, this creates an almost insurmountable cost advantage
Rapid Tech leadership via State-backed R&D	China's OEMs lead in large turbine platforms and floating wind due to state-funded R&D and test infrastructure. - Dongfang Electric announced a 26 MW offshore turbine. - Goldwind launched a 22 MW deep-sea turbine. - Mingyang OceanX deployed a 16.6 MW floating platform. - SANY tested a 15 MW onshore prototype. These innovations outpace India's incremental growth in 2–3 MW classes
One stop offering ²⁴	Chinese OEMs increasingly offer integrated packages combining vendor financing, EPC, port logistics, and long-term O&M often backed by policy banks making their bids highly competitive and low-friction for emerging markets. GWEC notes China's globalized supply chain with Goldwind's factory in Brazil, Sinoma blades in Brazil, Envision's capacity in India and Kazakhstan, and Mingyang JVs in Korea and Italy, enabling full project solutions rather than just turbine supply

Figure 12: Projected cost differential



²² IWTMA and market analysis

²³ GWEC 2025 & 2026

²⁴ GWEC 2025 & 2026

2.4 Examine factors affecting product acceptance and established supply/service networks of competitors.

- **Global footprint:** Chinese OEMs maintain a strong global footprint and well-distributed supply chains, ensuring customers benefit from reliable service, quick spare-parts availability, and minimal downtime. Goldwind²⁵, for instance, operates seven regional service centers outside China, while MingYang collaborates in over 30 countries²⁶ while partnering with esteemed institutions in Denmark, Germany, Norway, and the UK. While Indian players lack presence of this scale.
- Chinese and European OEMs, with longer market presence, have built strong positions through advanced technology, cost efficiency. Given the high capital cost of turbines, brand reputation and proven track records dominate buyer decisions, making competition particularly challenging for Indian players.

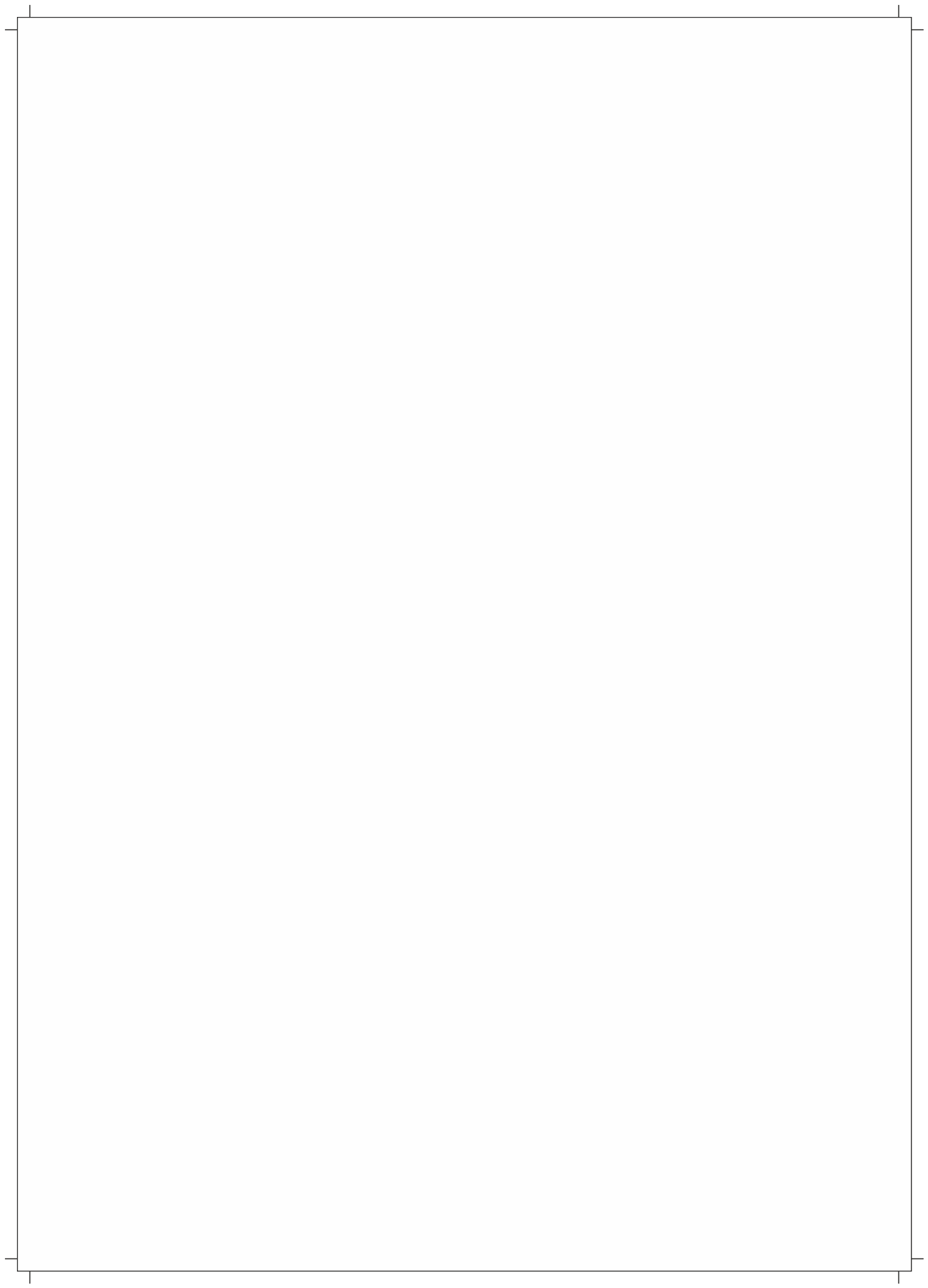
Indian wind turbine manufacturers face cost competition from dominant Chinese OEMs in the global market. While India offers cost-effective turbines, improvements in technology and financing are needed. Opportunities in offshore wind and repowering exist, but addressing scale and technology gaps is crucial. Enhancing R&D, leveraging cost advantages, and building a stronger international presence are essential for positioning India as a competitive player in the wind energy sector.

Section Summary

This section evaluates the global competitive landscape of the wind turbine industry, characterized by the dominance of Chinese manufacturers, a changing participation of Western OEMs, and the relatively limited global scale of Indian players. It highlights India's strengths in cost competitiveness and manufacturing depth, alongside key challenges related to technology scale, R&D capability, financing access, and the development of global service and supply networks. The section also identifies offshore wind components and turbine repowering as important strategic opportunities to enhance India's global competitiveness.

²⁵ Goldwind

²⁶ MingYang





3

Strategies for Price Competitiveness





3 Strategies for Price Competitiveness



India's wind turbine manufacturing sector operates within a complex and competitive global market. Price competitiveness is influenced not only by scale and manufacturing efficiency but also significantly shaped by the policy environment and financial support from the central government. The capital-intensive nature of wind manufacturing necessitates a detailed understanding of costs associated with taxes, incentives, logistics, and localization. The Export-oriented framework, guided by the Foreign Trade Policy (FTP) 2023, aims to mitigate tax burdens on inputs, capital goods, and exports. Simultaneously, fiscal measures from the central government provide essential capital influx that bolsters manufacturing capacities and fosters export growth. These combined efforts seek to enhance India's position on the global stage by systematically reducing operational costs.

However, the sector is constantly challenged by residual tax costs that hinder optimal competitiveness. Factors such as embedded Goods and Services Tax (GST) on civil works, capital assets, constraints in credit refunds, and dwindling duty-remission rates continue to elevate costs and stretch working capital requirements. These tax-related challenges disproportionately impact export-oriented and large-scale manufacturing facilities, pushing for a nuanced policy response to alleviate fiscal pressure. The effectiveness of these governmental measures fundamentally depends on the precise classification of products, import compositions, and the strategic operational frameworks adopted by manufacturers across domestic tariff areas (DTA) and export-linked regimes.

Beyond the realm of policy, the supply chain structure is crucial for cost management. Despite high localization levels at the assembly stage, the industry's reliance on imported high-value components, domestic vendor limitations, and the logistical hurdles associated with oversized equipment transportation remain persistent cost drivers. Addressing these challenges requires a concerted effort toward improved localization, manufacturing efficiency, and the development of a supportive ecosystem, underpinned by calibrated government policies. This report explores these complex dynamics in detail and proposes a series of strategic actions and actionable recommendations aimed at fortifying India's wind turbine manufacturing sector for sustainable competitiveness and innovation.

3.1 Developing Targeted Fiscal and Financial Support Mechanisms and Enhancing PLI and State-Level Schemes for Wind Turbine Manufacturing and Related Industries

India's wind energy sector is rapidly advancing with strong fiscal and financial support aimed at enhancing manufacturing and export capabilities. Central and state policies are pivotal in positioning India as a global leader, with a focus on offshore wind manufacturing and onshore challenges. Insights from Denmark, Germany, the US, and China inform strategies to boost competitiveness. A roadmap highlights the importance of production incentives, export-linked financing, and efficient supply chain management, crucial for India to excel in the global wind energy equipment market.

3.1.1 Fiscal and financial support mechanisms

The wind energy industry in India began in the late 1980s, with early projects in Tamil Nadu. During the 1990s, the sector grew steadily with government incentives, leading to infrastructure development.

Figure 13 Generation Based Incentive Timeline
(Source: Launch and reinstated; Ended)



Figure 14: Accelerated Depreciation Timeline
(Source: Launch and reinstated; Ended)



In the early 2000s, growth accelerated with private sector involvement, particularly in states like Gujarat and Maharashtra. The Accelerated Depreciation²⁷ (AD) scheme encouraged

²⁷ AD



investment by allowing significant tax depreciation, while the Generation Based Incentive (GBI²⁸) scheme rewarded actual energy production, promoting efficiency. These schemes were instrumental in rapid industry expansion. However, their phase-out introduced financial uncertainties and policy challenges. Despite new initiatives like competitive bidding, the lack of direct support schemes has constrained growth. The industry needs sustained policy support to align with national renewable energy target.

3.1.1.1 Central Government support

The Government of India has been progressively strengthening institutional, fiscal, and financial support frameworks to enable India's emergence as a globally competitive hub for wind turbine manufacturing and exports, with a growing emphasis on offshore wind and large capacity onshore platforms. While the wind sector has historically developed through state-level policies and private-sector leadership, recent central interventions are reshaping its long-term export and industrial trajectory. The following section talks about the support for the upcoming offshore wind manufacturing sector and the support provided by the government to the wind sector in general.

Strategic Viability Support for Offshore Wind Manufacturing

A major inflection points for India's wind industry came with the Cabinet-approved Viability Gap Funding (VGF) support for offshore wind, amounting to INR 7,453 crore for the first 1 GW of offshore wind capacity (500 MW each in Gujarat and Tamil Nadu)²⁹. This funding helps reduce the high upfront costs and early risks of offshore wind projects. Offshore wind also has strong potential for exports because it uses bigger turbines and more complex, specialized parts.

In addition, the Government has approved INR 600 crore for port infrastructure upgradation at key coastal locations to support offshore wind logistics. These port investments, targeting heavy-lift capabilities, blade handling yards, nacelle assembly zones, and deep-draft berth are

²⁸ GBI

²⁹ Press Release: Press Information Bureau



critical enablers for:

- Domestic production of large offshore turbines
- Export of blades, towers, nacelles, and foundations
- Integration with regional and global offshore wind supply chains

By focusing on project bankability and logistics readiness, the VGF and port modernization measures create indirect but powerful demand visibility for Indian-made offshore wind turbines and components, anchoring future export-oriented manufacturing investments.

Union Budget Allocations and Policy Signalling

In the Union Budget 2025 – 26, the Ministry of New and Renewable Energy (MNRE) allocated INR 500 crore for grid connected wind power, down from INR 800 crore in FY 2024 – 2025. This ~38% reduction in budgetary support underscores a growing policy gap in central level support for the wind sector, particularly for conventional onshore wind deployment³⁰.

Reduced central funding has weakened demand for wind projects and offers limited support for manufacturing scale up, technology upgrades, and exports. Unlike offshore wind, which benefits from targeted VGF, onshore wind lacks complementary central instruments such as production-linked incentives, interest subventions, or demand aggregation mechanisms.

As a result, wind turbine manufacturers face uncertainty in domestic order pipelines, constraining capacity expansion, and undermining India's ability to leverage its existing manufacturing base for export-led growth. The budget trend points to a misalignment between India's wind potential and the level of sustained central support, warranting targeted policy correction.

Green Energy Corridor and Export-Scale Grid Infrastructure

The GEC received an increased allocation of INR 600 crore in FY 2025 (up from INR 434 crore in FY

³⁰ Indian Budget

2024) to expand transmission infrastructure and evacuate renewable energy from eight high-renewable states: Tamil Nadu, Rajasthan, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Himachal Pradesh, and Madhya Pradesh³¹. This plays a critical enabling role for wind exports by strengthening evacuation and transmission infrastructure in these states.

Robust grid infrastructure serves wind component exports in two ways:

- Domestic market stability, which allows OEMs to maintain baseline production volumes.
- Predictable project execution, reducing risks for international buyers sourcing turbines or components manufactured in India.

Efficient power evacuation reduces curtailment risks and supports higher plant load factors, which in turn improves the bankability of wind projects that underpin manufacturing utilization and export readiness.

Concessional Financing and Export Enablers: IREDA

IREDA financing norms (updated Dec 2025), defines eligible sectors, interest rate bands, DSRA, special concessions for certain categories; include bridge loans against subsidies/VGF and direct discounting of MNRE claims, across solar & wind. IREDA raised capital via Tier II (7.74%) and perpetual (8.40%) bonds in 2025 to expand green lending³².

The IREDA Financing Norms do not function as a direct export policy, but they indirectly support wind turbine exports by strengthening the financial position of Indian wind turbine manufacturers, suppliers, and EPC players.

Wind turbine manufacturing and related components are explicitly eligible for IREDA financing, including export-oriented units based in India. IREDA allows high debt funding (up to 70 – 80% of project cost) for wind manufacturing projects, subject to eligibility conditions. This helps exporters scale capacity and remain competitive in global markets.

For export execution, IREDA provides Letters of Comfort (LoC) / Letters of Undertaking (LUT) to support the opening of Letters of Credit for foreign supply contracts, with a maximum tenure of three years. In addition, the Guarantee Assistance Scheme supports wind exporters by issuing guarantees for Bid securities, Performance guarantees and Advance payment guarantees. These instruments reduce reliance on costly bank guarantees³³ and support participation in international tenders. IREDA also offers short term and medium-term loans to manufacturers

³¹ Union Budget 2024 announcement

³² Market Analysis

³³ IREDA



and suppliers for working capital and contract execution, along with relatively competitive interest rates, which indirectly improve export competitiveness.

The document has no dedicated export credit or buyer's credit facility, unlike EXIM Bank or export credit agencies. There is also no export linked incentives, such as interest subvention or performance-based benefits tied specifically to exports.

Manufacturing Ecosystem: Existing Strengths and Policy Gaps

India already possesses a strong base of wind turbine OEMs and component manufacturers, particularly in blades, towers, castings, forgings, and electrical systems. However, unlike other renewable technologies, there is currently no dedicated Production Linked Incentive (PLI) or central manufacturing incentive scheme explicitly tailored for wind turbine components, such as Rotor blades, Nacelles and drivetrains, Gearboxes and generators, Offshore jackets, and foundations.

As a result, the sector continues to rely on:

- Established domestic OEM capabilities.
- Incremental capacity expansions driven by export orders.
- Competitive labour and engineering cost advantages

India doesn't yet have a wind-specific PLI scheme, so the industry can't scale up very quickly. But the Government's new push for offshore wind and better transmission lines is still helping create export opportunities, especially for bigger turbines and special parts.

Gaps in Central Government Support for Wind Turbine Exports

Central government support for wind turbine exports in India remains indirect and fragmented, with policy interventions primarily aimed at project viability, grid integration, and infrastructure development rather than strengthening domestic manufacturing and export competitiveness. The absence of a coherent export-oriented manufacturing strategy limits scale, technology upgradation, and demand visibility for wind OEMs.

Key Policy Gaps and Limitations

Table 4: Key policy gaps and limitations

Gaps	Limitations
Project Focused Policy Framework	Policy interventions prioritize wind project viability and deployment, while manufacturing development and export promotion remain secondary objectives.
Absence of Targeted Manufacturing and Export Incentives:	The lack of a dedicated incentive mechanism, such as a PLI type scheme for wind turbines and components, constrains capacity expansion, localization, and global competitiveness.
Limited Technology Upgradation and Scale Economies	Inadequate manufacturing support restricts investments in advanced turbine technologies, reducing productivity gains and cost efficiencies needed for exports.
Weak Linkages Between Offshore Wind Support and Manufacturing Outcomes	Offshore VGF support and port infrastructure upgrades enable early project development but are not tied to domestic manufacturing, local content, or export commitments, limiting spillover benefits
Erosion of Domestic Demand Visibility	Declining budgetary support and policy traction for onshore wind weakens demand certainty, affecting capacity utilization for export-oriented manufacturers.
Indirect and Fragmented Enabling Support	Transmission investments and concessional financing facilitate sector growth but lack export specific targeting and do not form part of a coherent wind turbine export strategy.

3.1.1.2 State Government support

State governments in India play a critical role in strengthening the wind turbine and component manufacturing ecosystem by complementing central government incentives with state-specific fiscal, infrastructure, and export-oriented policy measures. Key wind-manufacturing states such as Gujarat, Tamil Nadu, Maharashtra, Andhra Pradesh, and Karnataka offer a combination of capital subsidies, tax and duty exemptions, logistics and employment incentives, and land and power support. Together, these measures lower project costs, enhance export competitiveness, and encourage large-scale domestic and export-oriented manufacturing of wind energy equipment.



Gujarat

• Policy Framework

Gujarat promotes the manufacturing of wind turbines and components through the Gujarat Electronics Policy (2022-28) and the Atmanirbhar Gujarat Scheme, which together establish a robust fiscal framework for manufacturing and export.

• Manufacturing Support

- Wind turbine and component manufacturing units qualify under MSME, Large, and Mega/Ultra Mega categories, with eligibility beginning at INR 50 crore FCI for MSMEs and extending beyond INR 5,000 crore for Ultra Mega units.
- 100% stamp duty reimbursement significantly reduces project setup cost.
- Capital subsidy ranges from 20% of Eligible Fixed Assets (up to INR 1,000 crore) with additional incentives for investments beyond INR 1,000 crore.
- Electricity duty exemption (100%) lowers operational cost, especially for blade, tower, gearbox, and nacelle manufacturing lines.

• Export & Competitiveness Promotion

- A dedicated freight/logistics subsidy covering up to 25% of freight costs (capped at INR 5 crore/year for 5 years) directly supports export competitiveness of heavy wind components.
- SGST reimbursement at 80-100% for up to 10 years enhances cash flow including export-oriented plants.
- Turnover based subsidies linked to production and revenue reinforce scale-based export growth.
- Employment cost is reduced through 100% EPF reimbursement for up to 10 years, supporting export scale hiring.





Tamil Nadu

• Policy Framework

Tamil Nadu drives wind turbine and component manufacturing through the Tamil Nadu Industrial Policy 2021, complemented by SIPCOT/SIDCO land and infrastructure support.

• Manufacturing Support

- Eligible units include Sub Large (INR 50–300 crore), Large, Mega, and Ultra Mega investments with long investment realization windows (up to 4 years).
- Stamp duty concession of 50% for SIPCOT/SIDCO land (100% for certain categories) reduces upfront land cost.
- Capital subsidy of 15–20% of Eligible Fixed Assets, with additional incentives linked to employment generation.
- Electricity tax and duty exemption for 5 years, particularly beneficial for captive power intensive plants like foundries and forging units.

• Export & Ecosystem Promotion

- SGST reimbursement of 100% for up to 15 years for products made and sold from Tamil Nadu directly supports long term export operations.
- Turnover based subsidy providing 1.8% of annual turnover (capped) rewards export performance over a 10-year horizon.
- Training subsidy (INR 4,000 per worker/month) enables skilling for precision manufacturing required in wind equipment exports.
- Additional environmental infrastructure subsidy (25%) supports sustainable manufacturing aligned with global export norms.

Maharashtra

• Policy Framework

Maharashtra promotes wind turbine and component manufacturing through the Package Scheme of Incentives (PSI) 2019, with emphasis on large and employment intensive export units.



- **Manufacturing Support**

- Targets Large (INR 50 – 700 crore), Mega (INR 200 – 1,500 crore), and Ultra Mega (INR 4,000 crore) projects with incentives scaling by employment size.
- 100% stamp duty reimbursement for eligible units.
- Flexibility for 50 – 100% support on units located in notified industrial parks, improving cluster competitiveness.
- 100% electricity duty exemption during the incentive period reduces operating expense.

- **Export & Market Support**

- SGST reimbursement via IPS framework (up to 50% of gross SGST on first sale within Maharashtra) indirectly supports export linked manufacturing cash flow.
- The policy structure encourages industrial park-based manufacturing, enabling shared logistics and port connectivity (JNPA).
- Employment based classification makes Maharashtra attractive for export-oriented assembly and system integration units.

Andhra Pradesh Renewable Energy Export Policy, 2020

Andhra Pradesh is the only state in India to have notified a dedicated Renewable Energy Export Policy, explicitly linking large scale renewable power development with the promotion of renewable energy equipment manufacturing, including wind turbines and components. Unlike other states that rely on generic industrial or export promotion frameworks, Andhra Pradesh's Renewable Energy Export Policy, 2020 is uniquely designed to facilitate the export of renewable energy and renewable energy equipment beyond state boundaries, with clear priority accorded to developers who establish manufacturing facilities within the state.

- **Incentives and Benefits for Manufacturing Units**

- 100% electricity duty exemption for 10 years is available to renewable energy equipment manufacturing units, including wind turbine and component manufacturers, from the start of commercial operations.





- **Land Related Incentives & Infrastructure Support**

- The policy enables leasing of up to 5 lakh acres of land for renewable energy export projects through Land Aggregating Agencies coordinated by NREDCAP.
- Land is provided on a 30-year lease, with a base rental of INR 31,000 per acre per year, subject to 5% escalation every two years.
- Priority in land allocation is given to projects that combine renewable energy exports with manufacturing facilities in Andhra Pradesh.

- **Export Focused Power Generation Benefits**

- Power generated under the policy may be exported outside Andhra Pradesh without any purchase obligation on state DISCOMs.
- Power supplied within the state must follow the Open Access framework and comply with applicable APERC charges and regulations.
- Banking of power is not mandatory, and energy accounting is governed by prevailing open access and grid code norms.

By directly reducing fixed and operating costs while aligning manufacturing incentives with the objective of export led growth, Andhra Pradesh offers wind turbine and component manufacturers a distinct competitive advantage for serving interstate markets, positioning the state as a strategic hub for wind energy in India.

Karnataka

Policy Framework

Karnataka promotes wind turbine manufacturing under the Karnataka Industrial Policy 2025, focusing on large investments and employment linked incentives.

- **Manufacturing Support**

- Large units (INR 50 – 300 crores; 250 – 500 jobs) qualify across Zone wise classifications.
- Stamp duty reimbursement of 75 – 100% depending on zone.
- Capital subsidy via Value Fixed Assets (VFA) ranging from 10 – 25%, or alternatively a Production Linked Incentive of 1 – 2.5% of net sales.

- Employment and women workforce boosters increase incentive value by 3 – 5x minimum thresholds.
- **Export & Sustainability Support**
 - Incentives linked to turnover and net sales reward scale and export performance.
 - Additional green manufacturing bonuses, R&D co location incentives (+10%), and worker housing CAPEX subsidy support globally competitive manufacturing.
 - Power tariff concessions and renewable usage bonuses align exports with ESG expectations.

In alignment with central government policies, state governments enhance the investment landscape by offering targeted fiscal and infrastructure incentives aimed at attracting wind turbine and component manufacturing. Each state crafts its policy framework to draw more industry players by providing lucrative incentives, effectively complementing national efforts to strengthen the sector's foundation. This strategic alignment not only bolsters manufacturing capabilities but also enhances infrastructural development, making India an increasingly attractive destination for investment in wind energy. The table below provides a concise comparison of key state-level policies and incentives across leading wind manufacturing states in India.

Table 5: Comparison of key state level policies and incentives across leading wind manufacturing states in India

State	Policy Framework	Core Manufacturing Support	Dedicated RE Export Policy (outside state)
Gujarat	Electronics Policy 2022–28	Capex subsidy, stamp & power duty exemption	No
Tamil Nadu	Industrial Policy 2021	Capex subsidy, stamp & power tax relief	No
Maharashtra	PSI 2019	Stamp & electricity duty exemption	No
Andhra Pradesh	Industrial Policy 4.0 & RE Export Policy 2020	Capex subsidy, stamp duty, power tariff support, land leasing	Yes
Karnataka	Industrial Policy 2025	Capex or PLI option, stamp duty relief	No



- Overall, state government support significantly strengthens India's wind turbine and component manufacturing landscape by tailoring incentives to local industrial strengths, logistics advantages, and workforce capabilities. While Gujarat and Tamil Nadu emphasize scale and long-term tax support, Maharashtra, and Karnataka focus on employment-linked and cluster-based industrial growth. Andhra Pradesh stands out with a dedicated Renewable Energy Export Policy for exporting outside the state that explicitly integrates manufacturing and export-driven renewable energy development. Collectively, these state-level frameworks reduce capital and operating costs, encourage investments, and position India as a competitive global hub for wind energy equipment manufacturing.

3.1.3 Global Case Studies

3.1.3.1 Denmark

Denmark has played a pioneering role in wind energy for decades. With the development of the first onshore wind farms in the 1970s, Denmark started early in laying the foundation for a strong wind industry. By the 1980s, modern wind turbines were widely deployed in the Danish landscape, demonstrating the potential of large-scale wind energy. In 1991, Denmark made history as the first country to install a commercial offshore wind farm, marking a major milestone in the global transition to renewables.

In 2023, wind energy accounted for over 40% of Denmark's total energy technology exports, highlighting the sector's significant contribution to the national economy and its ongoing growth. The Danish wind value chain is comprehensive, spanning the entire life cycle of a wind turbine and supported by a tightly connected network of competencies and services that work seamlessly together. Denmark is home to around 500 companies operating within the wind industry, located near one another. This geographic concentration provides easy access to test facilities, innovation centres, production sites, and ports specifically designed to handle wind turbines.

At the core of this ecosystem are world-leading manufacturers like Vestas and Siemens Gamesa (Vayona Energy), who lead the way in wind turbine design and production. They are supported by a robust network of suppliers specializing in components, materials, advanced software, and digitalization, ensuring the industry's innovative edge³⁴.

This globally competitive wind ecosystem is strongly export oriented and reinforced by dedicated schemes that explicitly focus on enabling Danish firms to serve international markets. Through export credits, risk sharing mechanisms, and overseas project financing, these schemes systematically expand global demand for Danish manufactured turbines and components, anchoring Denmark's leadership in wind technology exports.

³⁴Market analysis

Green Investment Support Scheme 2025³⁵

The scheme aims to support and accelerate domestic production of key green technologies in Denmark, with a focus on wind energy technologies (including wind turbines, blades, nacelles, gearboxes, and other components) and Power to X³⁶/hydrogen technologies.

This scheme provides Direct financial subsidies of up to 15% of establishment or expansion costs for new green production capacity.

The Green Investment Support Scheme has a total budget of approximately DKK 657 million in 2025 and supports companies in establishing new or expanding existing green production facilities in Denmark.

Figure 16: Target beneficiaries under the scheme

- 1 Companies producing wind turbine technology and electrolyzers (technology for Power-to-X) in Denmark
- 2 Manufacturers of key components for wind technology and Power-to-X production in Denmark
- 3 Businesses involved in the extraction and production of critical raw materials for these industries

Danish Export and Investment Fund (EIFO)³⁷

The combination of domestic production support and aggressive export finance has helped Denmark create Global offshore wind dominance.

- EIFO has participated in financing over 190 wind farm projects worldwide and has been involved in more than 30% of total global offshore wind capacity (excluding China), a scale unmatched by any other export credit agency.
- EIFO has also announced its participation in the financing of the Baltica 2 offshore wind farm, a key project for the energy transition in Europe. With a guaranteed investment of €800 million, EIFO reaffirms its commitment to clean energy and the boost to Danish exports in the renewable sector.
- Most recently, Denmark further strengthened this leadership by backing Iberdrola's East Anglia Three project in the UK with a GBP 500 million EIFO guarantee, supporting one of Europe's largest offshore wind farms, scheduled to begin operations in 2026.

³⁵ Ministry of Foreign Affairs of Denmark, Invest in Denmark website

³⁶ Power to X

³⁷ Market Analysis

3.1.3.2 Germany

Figure 17: Actions implemented under the Fund

01	Global Project Financing Enabled Danish wind turbine exports by co financing 190+ wind farm projects globally, supporting exports from firms such as Vestas and Siemens Gamesa (Vayona Energy).
02	Export Credit & Risk Sharing Provides export credits, guarantees, and long-term project finance, absorbing risk and mobilizing private capital for large wind projects.
03	Creation for Danish Firms By financing overseas wind projects, EIFO drives international demand for Danish made turbines and components, strengthening global competitiveness.
04	Offshore Wind Leadership Participated in financing over 30% of global offshore wind capacity (excluding China), underscoring its systemic role in export led deployment.
05	Financial Structuring Expertise Adds value through specialized financing and risk hedging expertise, making capital intensive wind projects bankable at scale.

Germany is one of the largest wind energy markets worldwide. In 2023, the country ranked third in terms of installed wind capacity, only after China and the United States. Germany is also home to some of the largest wind turbine manufacturers worldwide. Siemens Gamesa (Vayona Energy), a German Spanish wind engineering company, accounted for 9% of the global turbine manufacturing capacity in 2022. Nordex and Enercon are two other leading wind manufacturers based in Germany. In 2023, Nordex generated revenue of more than 6.5 billion euros and employed over 10,000 people³⁸.

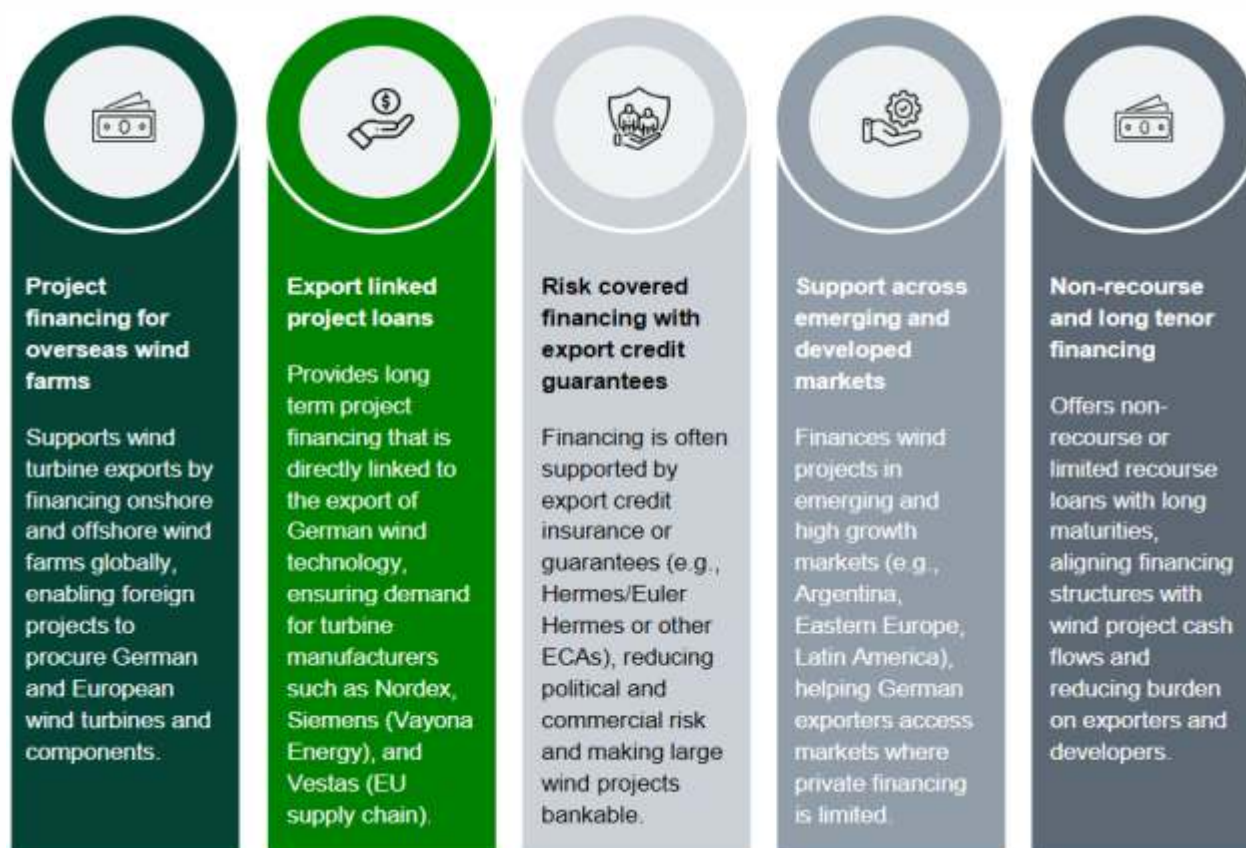
In 2023, wind energy accounted for 27% of Germany's gross electricity consumption, while total renewable electricity reached a historic high of 51.8%. This marked an increase of more than five percentage points compared to 2022, representing the highest share of renewables ever achieved in the country's power mix. Reflecting this momentum, Germany has significantly raised its offshore wind ambitions, targeting 30 GW of installed offshore capacity by 2030, 50 GW by 2035, and 70 GW by 2045. In parallel, the Land based Wind Energy Strategy focuses on removing permitting, land use, and grid barriers to accelerate onshore deployment, with capacity targets of 115 GW by 2030 and 160 GW by 2035. Supporting these long-term goals, a record 8.8 GW of new offshore wind projects were awarded in 2023, creating a strong future pipeline for installation and manufacturing demand³⁹.

³⁸ Statista data base and market analysis

³⁹ International Energy Agency – Wind Technology Collaboration Programme publication

Support through KfW IPEX Bank⁴⁰

Figure 18: Actions implemented under bank



Germany's export linked financing model has delivered tangible economic and industrial outcomes:

- KfW IPEX Bank has supported Argentina's onshore wind sector under the RenovAr programme through targeted export-backed financing. It funded the 126 MW Bicentenario wind farm with 35 Vestas turbines through ~USD 58 million in project finance, and the 101.4 MW Pomona wind farm with 26 Nordex turbines via USD 120.9 million in long-tenor, non-recourse financing backed by Euler Hermes. These investments strengthened project bankability and demand for German and European turbine manufacturers⁴¹.
- KfW IPEX Bank has supported Poland's offshore wind expansion by financing the Baltyk 2 and Baltyk 3 projects, each at 740 MW. As Mandated Lead Arranger, it participated in ~EUR 3 billion of financing per project, enabling the deployment of Siemens (Vayona Energy) Sg 14-236 DD turbines with strong European content. These investments strengthened Poland's offshore wind pipeline and supported export opportunities for German and EU turbine manufacturers and suppliers⁴².

⁴⁰ KfW IPEX-Bank (2026) Wind power – Energy business sector

⁴¹ KfW IPEX-Bank (2026) Onshore wind power, Financing case: Bicentenario wind farm

⁴² Market Analysis

- KfW IPEX Bank has financed major offshore wind projects in the UK and Northern Europe, including large North Sea developments that power millions of homes. These projects rely heavily on European turbines, foundations, and subsea infrastructure, strengthening demand for German and EU offshore wind technology and supporting global offshore wind expansion⁴³.

Through KfW IPEX Bank, Germany has enabled large scale overseas wind deployment while protecting export competitiveness in increasingly contested global markets. By anchoring German and European suppliers in international projects, the bank has strategically leveraged exports to sustain manufacturing capacity and reinforce the European wind supply chain.

3.1.3.3 United States

The United States is one of the largest wind energy markets in the world. In terms of installed capacity, the country ranks second worldwide, after China. As of end of 2024, the total wind power capacity installed across the United States stood at over 154 gigawatts.⁴⁴ The U.S. hosts 150+ wind turbine manufacturing and component facilities, concentrated in the Midwest, Great Plains, and Gulf regions, leveraging existing heavy industry and automotive supply chains.⁴⁵ An estimated 85,000 Americans are currently employed in the wind power industry and related fields. Many workers are found on wind farms, which are frequently located in the Midwest, Southwest, and Northeast regions of the United States⁴⁶.

To promote and sustain U.S. exports, the United States established the Export Import Bank of the United States (EXIM) as its official export credit agency.

- **Support through Export Import Bank of the United States (EXIM)⁴⁷**
 - Direct Export Financing for Overseas Wind Projects: Supported wind turbine exports by authorizing direct loans to wind power projects, enabling the purchase of U.S. manufactured wind turbines.
 - Long Term Direct Loans to Foreign Buyers: Allows foreign developers to access long tenor financing, with repayment periods of 16.6 to 17.3 years which is not readily available in private markets.
 - Support for First of Its Kind Renewable Transactions: These transactions represented EXIM's first renewable energy financings, helping U.S. wind technology enter a new international market and setting a precedent for future renewable export deals.

⁴³ KfW IPEX-Bank (2026) Offshore wind power, Financing case: Triton Knoll wind farm in the British North Sea

⁴⁴ Statista data base

⁴⁵ IBISWorld (2025) Wind Turbine Manufacturing in the US: Industry Analysis

⁴⁶ U.S. Bureau of Labor Statistics (BLS) Wind Energy page

⁴⁷ Export-Import Bank of the United States article



- Job Linked Export Support: The financing directly supported approximately 400 – 800 manufacturing jobs and indirectly benefited small – business exporters, reinforcing domestic supply chains tied to wind turbine exports.

Through the Export Import Bank of the United States (EXIM), the U.S. has successfully translated its manufacturing capacity into international wind turbine exports, particularly in early stage and emerging renewable markets. EXIM authorized its first renewable energy direct loans for wind projects in Peru, supporting the export of U.S. manufactured turbines for the Marcona and Tres Hermanas wind farms (129MW combined), setting a precedent for future renewable export transactions.

3.1.3.4 China

Wind power plays a vital role in China's green transition by improving the energy mix, enhancing energy security, and supporting climate goals. By the end of 2023, China's cumulative wind power capacity reached 441 GW, ranking first globally for the 14th consecutive year. In the same year, wind power generation totalled 885.9 billion kWh, accounting for 9.4% of national electricity generation and making wind the third largest power source after thermal and hydropower. Supported by the world's largest and most competitive wind manufacturing and supply chain, China has emerged as a global frontrunner in wind power technology and equipment production.⁴⁸ China's success in wind turbine exports is underpinned by a strong, state driven policy framework that combines large scale subsidies, industrial planning, and strategic support across the entire value chain. The coordinated policy initiatives have enabled rapid scaling, cost competitiveness, and accelerated global market entry for Chinese wind turbine manufacturers.

- Massive Direct Government Subsidies to Wind Producers: China provides extensive direct fiscal subsidies to wind turbine manufacturers, with overall industrial support estimated at three to nine times OECD levels, significantly lowering production costs and boosting global competitiveness.
- Near Universal Subsidy Coverage of Firms: Over 99% of listed Chinese firms received government subsidies in 2022, making support for wind manufacturers system wide rather than selective and creating broad export cost advantages.
- Strategic Use of Subsidies to Scale and Export: Subsidies are used strategically to accelerate technological development and scale production, enabling wind turbine makers to enter foreign markets with competitive export pricing once technologies mature.
- Preferential Access to Inputs and Critical Raw Materials: In addition to cash support, firms benefit from preferential access to critical raw materials and subsidized inputs, reducing costs across the wind turbine value chain.

⁴⁸Annual Report on China's Petroleum, Gas and New Energy Industry (2024), Springer



- Technology Transfer as an Enabling Mechanism: Subsidies have been coupled with technology transfers from foreign investors, accelerating domestic capability development in wind technologies and supporting subsequent export expansion⁴⁹.

As a result of sustained domestic policy support and large-scale industrial scaling, Chinese wind turbine manufacturers have achieved a dominant position in the global market. China accounted for around 65% of global wind turbine installations in 2023, placing four Chinese OEMs among the global top five for the first time. Companies such as Goldwind and Envision led global installations, driven by record deployment in China, which also enabled manufacturers to reduce costs and offer turbines at highly competitive prices. This shift has resulted in a structural rebalancing of global wind turbine exports, with Chinese manufacturers gaining market share while Western OEMs experienced mounting competitive pressure⁵⁰.

Table 6: Insights from international case studies on support for turbine manufacturers provided by the government

Incentive / Initiative	Support provided	Countries where this prevails	Key Takeaway
Domestic Manufacturing Subsidies	Direct capital subsidies for wind turbine and component manufacturing and capacity expansion	Denmark, China	Lowering manufacturing costs strengthens export price competitiveness
Export-Linked Project Finance	Buyer-side loans and co-financing tied to procurement of domestic wind turbines	Denmark, Germany, United States	Financing the buyer is the most effective way to pull exports
Export Credits & Guarantees	Government-backed export credits, guarantees, and insurance for wind projects	Denmark, Germany, United States	Public risk absorption unlocks private capital for exports
Long-Tenor / Non-Recourse Financing	Long-term, non-recourse or limited-recourse project loans	Denmark, Germany, United States	Long-duration finance is essential for capital-intensive wind exports
Market Creation & Demand Anchoring	Financing and backing overseas wind farms using domestic technology	Denmark, Germany, China	Export success depends on proactively creating foreign demand

⁴⁹ Kiel Institute for the World Economy (2024) China's massive subsidies for green technologies

⁵⁰ Market Analysis

Incentive / Initiative	Support provided	Countries where this prevails	Key Takeaway
Market Creation & Demand Anchoring	Financing and backing overseas wind farms using domestic technology	Denmark, Germany, China	Export success depends on proactively creating foreign demand
Input-Side & Supply-Chain Support	Preferential access to raw materials and subsidized inputs	China	Control over input delivers durable cost advantages in exports
Technology & Capability Building	Technology transfer mechanisms combined with state support	China	Capability building accelerates global competitiveness
Job-Linked Export Support	Export finance explicitly tied to domestic manufacturing employment	United States	Export finance doubles as an industrial and jobs policy tool

3.1.3.5 Wind Financing Cost of Capital Comparison

Financing conditions for wind developers vary materially across regions, reflecting differences in monetary policy, lender risk perception, project maturity and availability of concessional green-finance tools. Based on the available data, Europe shows the lowest cost of debt and WACC for wind, supported by mature project-finance markets and long operating track records. China benefits from policy-backed green lending and carbon-reduction facilities, while India has a materially higher debt-cost environment, although wind financing has converged with solar and no longer carries a meaningful technology-specific premium. Overall, the comparison highlights a clear regional financing spread. European wind developers benefit from the lowest financing costs, with debt pricing below 3%⁵¹ and WACC below 5%⁵². China's wind sector also appears comparatively low-cost, supported by dedicated green-finance mechanisms and carbon-reduction lending, although tenor data has been left blank for further validation. India remains the highest-cost market among the three, with wind debt pricing clustered around 8.5%–9.75%⁵³ and an onshore WACC of 9.6%.⁵⁴ However, the disappearance of the historical 50–100 bps wind premium versus solar suggests that lenders increasingly view Indian wind assets as mature infrastructure investments rather than higher-risk renewable projects.⁵⁵

⁵¹ Open Research Europe

⁵² IRENA

⁵³ IREDA

⁵⁴ <https://pmc.ncbi.nlm.nih.gov/articles/PMC12508428/#Sec9>

⁵⁵ IEEFA

Table 7: Comparison of key financials across India, China and EU (Sources: IRENA Reports, Open Research Europe, Griffith, IREDA, Renewable energy magazine)

Metric	India	China	EU
Average Interest Rates	8.5%–9.75%	2.5%–3.5%	1.9%-2.7%
Typical Loan Tenors	15-20 years	12-15 years	12-15 years
WACC for developers	9.6%	2.8%-4.8%	3.7%-4.7%

3.1.4 Recommendations for the gaps identified in section 3.1

While India has built a strong wind manufacturing base and a track record of demand side deployment support, its current policy framework does not adequately address the needs of export-oriented wind turbine manufacturing. Global leaders in wind exports such as Denmark, Germany, China, and the United States have complemented domestic deployment with targeted production incentives, export linked financing, and buyer side risk mitigations mechanisms to actively create and sustain overseas demand for domestically manufactured turbines and components. In contrast, Indian wind OEMs continue to face higher factory gate costs, limited access to long tenor export finance, and constrained ability to compete in emerging and frontier markets where concessional financing is often decisive.

To bridge these gaps and convert India's manufacturing capabilities into a durable export advantage, a focused package of export linked fiscal, financial, and market development measures is required. Such interventions would improve cost competitiveness, unlock scale, reduce market entry risks, and position India as a reliable long-term supplier in the global wind turbine value chain.

3.1.4.1 Recommendation 1: Establishment of an Export Linked Wind Manufacturing Incentive (ELWMI)

India currently lacks a manufacturing side incentive linked explicitly to wind exports, unlike solar or global peers such as Denmark and China. Wind turbine exports are highly price sensitive, even marginal cost disadvantages at the factory gate can decisively affect international tenders.

Introduction of a centrally administered export linked fiscal incentive for wind turbine and component manufacturers would directly offset higher input, logistics, and compliance costs faced by Indian OEMs in overseas markets. The incentives may be structured as:

- Manufacturing linked incentive for exports (INR/MW or % of FOB export value) for 5 – 7 years, or
- Turnover linked incentive for 5 – 7 years applicable only to exports outside India.

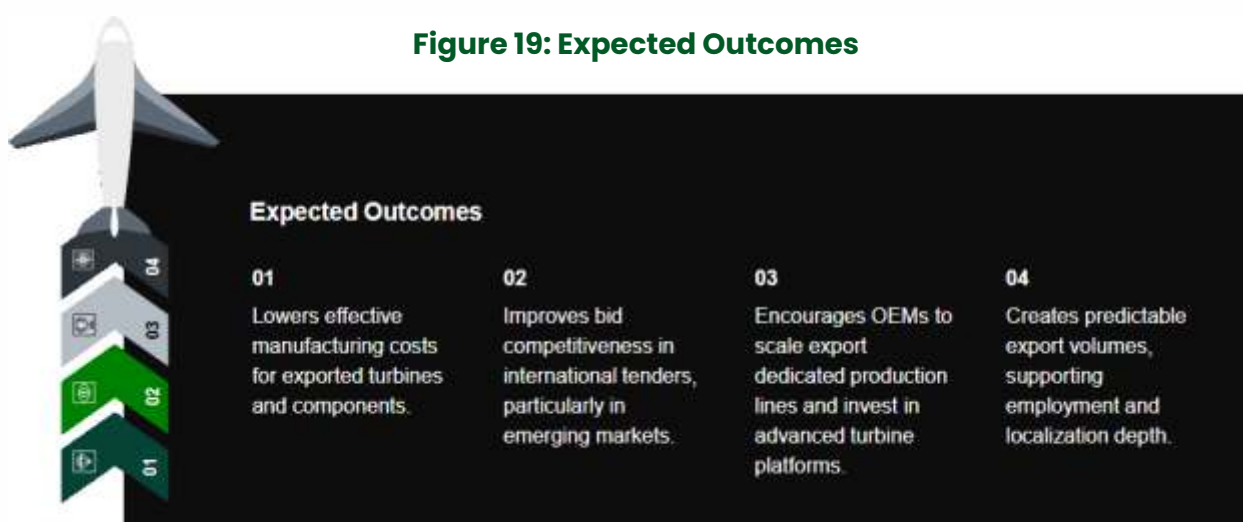
For instance:

Few leading wind manufacturing states performance linked incentives under their states industrial policies, directly rewarding higher output and sales, through time bound subsidies tied to net sales or export turnover. The above incentives can be structured on similar lines.

- Karnataka: Production-linked incentive of 1-2.5% of net sales for 7 yrs, capped at 60%/30% of Fixed Assets
- Tamil Nadu: 1.8% of Turnover, capped at 4% of fixed assets per annum for 10 years.
- Andhra Pradesh: 1% of annual export turnover for 3 years

This incentive will be available for Indian wind turbine OEMs and component manufacturers (blades, towers, nacelles, drivetrains, key sub systems). This will be eligible only for exports outside India, ensuring the incentive drives global market expansion. Both large OEMs and export-oriented Tier 1 suppliers will be benefited from this incentive.

Figure 19: Expected Outcomes



3.1.4.2 Recommendation 2: Creating an Indian Wind Export Finance Facility (IWEFF)

Competing wind exporting countries routinely provide long tenor, concessional buyer side financing, which in many wind project tenders is more decisive than turbine price alone. Indian OEMs, however, lack systematic access to buyer's credit, long term non-recourse project finance, and local currency lending mechanisms for exports. In the absence of such financing support, Indian firms are largely confined to self-financed transactions or a narrow set of markets with readily available commercial funding, limiting their ability to scale and compete globally.



To address this, a dedicated wind export financing window may be created under: EXIM Bank of India, or

- A new vertical co managed with SIDBI / NIIF / IREDA

This may offer various incentives:

- Buyer's credit for foreign wind projects procuring Indian turbines.
- Supplier's credit to Indian OEMs executing export EPC contracts.
- Long tenor project finance (15 – 20 years) aligned to wind cash flows.
- Local currency lending options in selecting emerging markets.

Table 8: Key beneficiaries of recommendation

Incentives	Beneficiary
Buyer's credit	• Foreign wind project developers, utilities, and independent power producers (IPPs) undertaking onshore or offshore wind projects outside India. • Projects that procure wind turbines, major components, or EPC services from Indian manufacturers • Both state owned and private developers in emerging and frontier markets where access to long tenor commercial finance is limited
Supplier's credit	• Indian wind turbine OEMs and EPC contractors executing turnkey or supply and install wind projects abroad. • Indian manufacturers supplying turbines, blades, towers, nacelles, and balance of plant equipment under export contracts. • OEM led consortiums or joint ventures responsible for delivery, installation, and commissioning in foreign markets.
Long tenor project finance	• Foreign special purpose vehicles (SPVs) set up for wind power projects using Indian supplied turbines. • Project developers whose revenue streams are governed by long term power purchase agreements (PPAs) or regulated tariffs. • Projects in markets where commercial banks cannot provide long tenor or non-recourse financing aligned with wind project lifecycles.
Local currency lending options	• Foreign wind project developers and utilities operating in emerging and developing economies with currency volatility risk. • Projects procuring Indian turbines where local currency revenues are mismatched with hard currency debt. • Indian OEMs and EPC contractors whose export contracts are denominated partly or fully in local currencies.

Expected outcome:

- Expands addressable export markets for Indian wind manufacturers.
- Anchors Indian turbines in overseas projects by making projects bankable.
- Reduces capital cost for foreign buyers, increasing preference for Indian suppliers.
- Positions India alongside established wind export finance providers globally

3.1.4.3 Recommendation 3: Establish a Project Development Fund (PDF) for Wind Exports

Indian wind developers face significant barriers in initiating overseas project due to the high upfront capital requirements and elevated risks associated with early-stage developments. Activities such as feasibility study, regulatory clearances, site identification, stakeholder alignment, off-taker credit risk, land and community issues, currency volatility, and local counterparty constraints in unfamiliar markets, demands substantial investments with uncertain outcomes, often discouraging both developers and financiers. As a result, many potentially viable projects fail to advance beyond the conceptual stage, limiting India's ability to establish a strong pipeline of bankable wind export opportunities.

To address this issue, a government-backed Project Development Fund may be created, dedicated to supporting Indian OEM-led wind and renewable projects in priority international markets.

- Provide catalytic equity and early-stage risk cover to help Indian developers secure initial project traction in partner countries.
- Recycle capital once projects are de-risked, enabling continuous deployment without long-term fiscal burden.
- Create Bundled "India Inc." offer. i.e. Indian OEM turbines + Indian EPC + Indian O&M + Indian capital (PDF equity + Exim buyer's credit). Will help compete head-on with Chinese "package" (technology + EPC + state bank finance).

Global Parallel: This mirrors blended-finance structures such as AREF and the Climate Finance Partnership, where public/DFI anchor capital de-risks early projects and mobilizes large-scale commercial investment.

This may be implemented by:

- Identifying target geographies where India has FTAs, strategic relations, or EXIM lines of credit to leverage existing diplomatic and sovereign frameworks.
- Inclusion of domestic content thresholds (e.g., 60–70% Indian turbines, towers, and BoP systems) to anchor export volumes.



- Introduction of caps by country, off-taker type, and technology mix to manage exposure and diversify risk.

This incentive will benefit the following:

- Indian Wind OEMs & Manufacturers: Gain assured export demand for turbines and components, improving scale, utilization, and global competitiveness.
- Indian Developers & EPC Companies: Access early stage capital and risk support, enabling entry into overseas markets and faster project origination, stage capital, and risk support, enabling entry into overseas markets and faster project origination.
- Indian O&M and Service Providers: Secure long term international service contracts, building recurring export revenues and global track records, term international service contracts, building recurring export revenues and global track records.
- Indian Financial Institutions: Benefit from a pipeline of de-risked, bankable projects that crowd in commercial finance and reduce development risk.

Expected outcome

The establishment of a Project Development Fund is expected to unlock a scalable pipeline of bankable wind projects led by Indian companies in priority international markets. By reducing early-stage development risk and providing catalytic capital, the fund would enable faster project origination, crowd in commercial financing, and strengthen India's ability to offer integrated, competitive renewable energy export packages. Over time, recycled capital would ensure sustained project deployment with limited fiscal burden, while supporting export growth for Indian manufacturers, developers, and service providers and reinforcing India's position as a trusted global partner in clean energy development.

3.1.4.4 Recommendation 4: Export Linked Tax Incentives & Cash Flow Support

Exporters often face significant working capital stress caused by delayed GST refunds and the inability to recover embedded taxes, which ties up liquidity that could otherwise be used for production and expansion. At the same time, high costs related to mandatory certifications, overseas marketing efforts, and technical adaptation to meet foreign market standards are insufficiently supported under existing schemes, placing an additional financial burden on firms.



These combined cash flow constraints particularly affect mid-sized exporters, limiting their capacity to scale operations, enter new markets, and compete effectively in global value chains.

To address this issue, fiscal measures that directly improve exporter's cash flow may be introduced:

- Refund of embedded taxes & duties on exported wind turbines
- Accelerated GST refunds (within 15 – 30 days) for renewable equipment exporters on quarterly basis.
- Allow weighted deduction for export related R&D, certification, and market development expenses.

For instance:

A few leading states already provide SGST reimbursement under their state industrial policies as a core mechanism to improve manufacturing cash flows and investment returns. Accelerated GST refunds and other export linked tax reimbursements at the central level can be designed on analogous lines, leveraging similar caps, tenure, and performance linked structures to support wind equipment exporters.

- Gujarat: 80% – 100% for 10 yrs on sale of final products, capped at 5.5 – 8% of eFCI p.a.
- Tamil Nadu: 100% for 15 yrs on sale of final products in the state
- Maharashtra: 50% of Gross SGST on first sale within Maharashtra
- Andhra Pradesh: 100% SGST for 5 yrs, on sale of final products

This incentive will benefit the following:

- Indian wind turbine OEMs and component manufacturers exporting complete turbines or major components such as blades, towers, nacelles, generators, and power electronics.
- Export oriented Tier 1 and Tier 2 suppliers engaged in manufacturing and supply of wind specific equipment and sub systems for international markets.
- Renewable energy equipment exporters incurring unrecovered embedded taxes, duties, and GST while supplying wind equipment outside India.
- Indian manufacturers and engineering entities undertaking export related R&D, international certification, grid code compliance, product customization, and overseas market development for wind turbines and components.
- MSME and mid-sized firms integrated into wind export value chains, for whom accelerated GST refunds and tax deductions materially improve liquidity and ability to scale exports.





Expected Outcome:

- Improves liquidity and reduces cost of capital for exporters.
- Shortens cash conversion cycles, enabling higher export throughput.
- Encourages sustained investment in export-oriented R&D and compliance.
- Strengthens participation of domestic suppliers in global wind markets.

3.1.4.5 Recommendation 5: Launch an India Wind Global Market Development Program

Indian wind turbine and component manufacturers currently have limited visibility and a weak demonstration footprint in international markets, making it harder to build credibility with foreign utilities and project developers. High upfront costs associated with international certification, compliance with country specific grid codes, and market entry requirements act as significant non price barriers, particularly for first time exporters. In contrast, global competitors actively leverage government backed demonstration projects abroad to showcase performance, reduce buyer risk, and create sustained demand pull, placing Indian manufacturers at a structural disadvantage without similar support mechanisms.

To address this issue, the following initiatives may be undertaken:

- Government backed wind export promotion missions.
- Co funded demonstration wind projects abroad using Indian turbines.
- Support for international certifications and country specific grid codes

The support will be targeted at Indian wind energy manufacturers and exporters across the value chain, with a focus on firms that have demonstrated technical capability but face entry barriers in global markets. This includes:

- Indian wind turbine manufacturers (OEMs) and component suppliers (such as blades, gearboxes, generators, towers, and power electronics) seeking to expand exports.
- Mid-sized and emerging exporters, for whom certification, overseas demonstration, and compliance costs are a significant constraint.
- Consortia of manufacturers, EPC companies, and developers participating in government backed export promotion missions and co funded demonstration wind projects abroad.
- Manufacturers targeting new or strategic markets, who require support for international certifications, country specific grid code compliance, and market entry approvals.

The mechanism may also extend facilitative support to industry associations and export promotion bodies acting on behalf of eligible firms, to jointly organize missions, demonstrations,



and certification initiatives that benefit the broader Indian wind manufacturing ecosystem.

Expected outcome:

- Builds international confidence in Indian wind technology.
- Accelerates acceptance of Indian turbines by overseas financiers and utilities.
- Reduces market entry time and risk for exporters.
- Establishes India as a credible long term wind technology supplier.

3.1.4.6 Recommendation 6: Strategic Input & Supply Chain Support

Key inputs such as steel, castings, and composite materials constitute a significant share of overall wind turbine costs, making manufacturers highly sensitive to input pricing and supply conditions. High energy intensity in manufacturing processes, combined with elevated domestic power tariffs and rising logistics expenses, erodes the export competitiveness of Indian wind equipment. Additionally, the fragmentation of supplier locations and the lack of adequate port adjacent manufacturing and storage infrastructure increase delivery timelines and execution risk, further weakening the ability of Indian firms to reliably serve global markets.

To address this issue, targeted support may be provided for:

- Steel, castings, and composites used in wind exports.
- Preferential power tariffs for export-oriented manufacturing
- Anchor supplier parks near ports with plug and play infrastructure.

Expected outcome:

- Reduces structural cost disadvantages at the input and energy level.
- Improves predictability and efficiency in export logistics.
- Enables scale manufacturing through integrated supplier parks.
- Strengthens India's end to end wind export value chain.

3.1.4.7 Recommendation 7: Launch an ECA-Backed Payment Deferral Facility (Similar to "The Vestas Approach")

The wind sector faces persistent challenges related to high upfront capital requirements, limited access to affordable long tenure financing, and weak payment security mechanisms in many international markets. These issues restrict Indian OEMs from offering competitive commercial terms such as deferred payments, which global developers increasingly expect in utility scale and IPP tenders. -tenor financing, and weak payment security mechanisms in many international markets. These issues restrict Indian OEMs from offering competitive commercial



terms such as deferred payments, which global developers increasingly expect in utility-scale and IPP tenders.

To directly address this bottle neck, ECGC (or a dedicated Export Credit Agency window) may be enabled to provide a 100% sovereign guarantee on export receivables, allowing Indian OEMs to offer deferred payment terms to global buyers.

Global Precedent: Vestas successfully used ECA-backed deferral structures in markets such as Australia, winning major projects by easing upfront capital burdens for buyers. A similar Indian mechanism would unlock high-value tenders for domestic OEMs.

This incentive will benefit the following:

- Indian OEMs – They can offer competitive deferred payment terms and win more global wind tenders.
- International wind project developers – Benefit from improved cash-flow and better project IRRs due to reduced upfront capital needs.
- Exporting Indian supply chain (towers, blades, nacelles, components) – Gains from higher export volumes enabled by stronger OEM order pipelines.
- Financiers and lenders – Receive greater payment security due to sovereign backed guarantees, backed guarantees.

Expected outcome:

- Enables Indian OEMs to offer 2 – 3 year deferred payments after project commissioning.
- Makes projects more attractive by improving bankability for global developers.
- Enhance project IRRs by reducing upfront capital burden on buyers.
- Help developers operating in cash flow constrained markets.
- Boosts India's competitiveness in IPP and utility scale wind tenders worldwide.
- Aligns Indian OEM offerings with global best practices used by competitors like Vestas.
- Opens access to larger, high value international wind tenders, value international wind tenders.

The recommendations collectively reinforce India's export readiness by improving manufacturing capability, easing financial and operational barriers, and enhancing competitiveness in global wind markets.

Table 9: Summary of Focus Areas Strengthened by the Recommendations

Focus Area	Recommendations	How the Recommendations Help
Export Ecosystem Development	Export Linked Wind Manufacturing Incentive, Indian Wind Export Finance Facility, Project Development Fund	Strengthened through targeted manufacturing incentives, export linked finance mechanisms, and overseas project development support.
Competitiveness Enhancement	Export Linked Tax & Cashflow Support, Global Certification & Market Development Programme	Improved via liquidity support, smoother tax processes, and assistance with international certifications and market entry requirements.
Supply Chain & Input Efficiency	Strategic Input & Supply Chain Support	Supported through optimized input costs, supplier park development, preferential power tariffs, and logistics facilitation.
Global Commercial Attractiveness	ECA Backed Deferred Payment Facility	Boosted by enabling flexible payment terms and improved bankability for international buyers.
Long Term Global Positioning	All Recommendations Combined	Reinforced by coordinated support across manufacturing, finance, market development, and supply chain readiness.

Section 3.1 Summary

India's wind sector is supported by measures such as offshore VGF, port upgrades, enhanced transmission networks, and concessional financing, creating a strong base for future expansion. With established OEM capabilities, supportive state policies, and emerging offshore opportunities, India is well-positioned to grow into a competitive global exporter of wind turbines. Realising this potential will require strengthening export-oriented manufacturing, improving access to export finance, and supporting international market entry. Introducing initiatives such as an Export Linked Wind Manufacturing Incentive, an Indian Wind Export Finance Facility, export-linked tax benefits, market development programs, and supply-chain optimisation can enhance India's global presence. Together, these steps can help India establish itself as a reliable long-term supplier in the international wind energy market while supporting continued sectoral growth.

3.2 Taxation Framework and Export Incentives for Wind Turbine Manufacturing in India

India's export-oriented tax framework integrates customs duties, GST, and targeted incentive schemes under FTP 2023 to enhance manufacturing competitiveness. For wind turbine manufacturers, which are capital-intensive and dependent on imported components, this policy ecosystem is critical.

Customs duty impacts are mitigated through mechanisms such as Duty Drawback, RoDTEP, Advance Authorization, DFIA, EPCG, and bonded regimes including MOOWR. In parallel, GST rationalization efforts seek to reduce structural distortions affecting SEZs and EOUs. At the state level, support is reinforced through capital subsidies, tax exemptions, production-linked incentives, and access to export finance and concessional credit.

However, several challenges persist, including embedded taxes on civil works and capital goods, delays in GST refunds, and declining remission rates under RoDTEP and Duty Drawback. Addressing these gaps will be critical to unlocking cost efficiency, scale, and global competitiveness for India's wind energy manufacturing sector.

General Tax Structure

India's tax framework for manufacturing and export-oriented activities is built on an integrated interplay of Customs Duties, the Goods and Services Tax (GST), and a suite of targeted export-promotion and duty remission mechanisms anchored in the Foreign Trade Policy (FTP) 2023 and related customs regulations. Customs duties play a dual role as both a revenue tool and an instrument of industrial policy, forming the primary levy on imported goods while being selectively calibrated to support domestic manufacturing and exports.

To enhance export competitiveness, the impact of customs duties is mitigated through schemes such as Duty Drawback, Remission of Duties and Taxes on Exported Products (RoDTEP), Advance Authorization (AA), Duty-Free Import Authorization (DFIA), and the Export Promotion Capital Goods (EPCG) scheme, as well as bonded and special regimes including Export Oriented Units (EOUs), Special Economic Zones (SEZs), and the Manufacture and Other Operations in Customs Warehouse (MOOWR) framework. Together, these instruments reduce the incidence of import duties on inputs and capital goods, supporting capital-intensive, export-linked manufacturing and improving India's global competitiveness.

Within the domestic economy, GST operates as a destination-based tax framework governing the supply of goods and services. Policy efforts are increasingly focused on better aligning special regimes such as SEZs and EOUs with the GST architecture to minimise structural distortions between export-oriented units and the Domestic Tariff Area (DTA), while continuing to preserve duty-free or duty-deferred treatment for inputs used in export production.

Together, this combination of customs policy, GST alignment, and FTP-linked incentive schemes forms the overarching tax and regulatory backdrop against which sector-specific manufacturing and export incentives must be evaluated. This framework is particularly relevant for capital-intensive industries such as wind turbine manufacturing, which depend on large upfront capital investments, imported components, and an integrated domestic supply base.

3.2.1 Key Product Classification

3.2.1.1 Possible Product Classification

The export of Wind turbines, Structural towers and Wind powered electricity generating sets are generally classified in three different HSN codes as provided below. The selection of correct HSN code for the product will determine the duty levy as well the related benefits available in the duty related schemes.

Table 10: HSN code for wind turbines and wind turbine components

HSN Code	Description
84128030	Wind turbine or engine
85023100	Wind-powered generating sets
73089090	Structures and Parts of Structures of Iron and steel - Others
8503	Parts suitable for use solely or principally with the machines of heading 8501 or 8502

3.2.1.2 Major Import Classification

Import of wind turbine parts attracts varied customs duty rates, generally ranging from 7.5% to 15%, depending on the specific part and its classification under the Customs Tariff Act. The applicable rate is determined by the Harmonized System of Nomenclature (HSN) code and the relevant chapter in the Customs Tariff Schedule. Most critical wind turbine components (such as nacelles, gearboxes, controllers, and other mechanical parts) are classified under Chapter 84 and 85 of the Customs Tariff Act.

The snapshot of major import of parts is provided below:

Table 11: BCD for different HSN code associated with major wind turbine component

HSN Code	Description	BCD
8503	Parts suitable for use solely or principally with the machines of Heading 8501 or 8502	7.50%
84 or any other Chapter	Below parts and sub-parts for the manufacture or the maintenance of wind operated electricity generator components: (a) Special bearings, (b) Gear box, (c) Yaw Components, (d) Wind turbine Controllers	5%#
84 or any other Chapter	Parts for the manufacture or the maintenance of blades for rotor of wind operated electricity generators	5%#
84 or any other Chapter	Balsa Wood, Carbon Fibre for the wind operated electricity generator blades	5%#
84 or any other Chapter	Permanent magnets for manufacture of PM synchronous generators above 500KW for use in wind operated electricity generators	5%*
73269099	Forged steel rings for manufacture of special bearings for use in wind operated electricity generators	5%#
73089090	Structures and Parts of Structures of Iron and steel - Others	10%

* 5% concessional rate is effective till 31st March 2026

5% concessional rate is effective till 31st March 2028

As stipulated in the table, the basic customs duty for certain parts in manufacture of wind operated electricity generator has been reduced to 5% from 01st Nov'25 with specific conditions as per Notification No. 45/2025 – Customs dated 24th Oct'25. This concessional rate is subject to a sunset clause and is applicable only up to 31st March 2026 or 31st March 2028 as stipulated in the table above.

3.2.2 Schemes Available for Exporter

India's policy framework offers a comprehensive suite of benefit schemes to exporters, with the Foreign Trade Policy (FTP) 2023 and allied customs/GST regulations functioning as the primary vehicles for reducing the incidence of duties and taxes embedded in exported goods and for improving export competitiveness.

These benefits broadly operate along three axes:

- Duty remission schemes (Duty Drawback, RoDTEP)
- Duty exemption schemes (AA, DFIA, EPCG)
- Special policy-based schemes (EOU, MOOWR, SEZ)

Collectively, these instruments are designed to ensure that exports are effectively zero-rated from a domestic tax and duty standpoint, while still maintaining a clear demarcation in tax treatment between supplies to the international market and those to the Domestic Tariff Area (DTA), thereby enabling exporters to integrate more competitively into global value chains.

3.2.2.1 Duty Remission Schemes

- **Duty Drawback Schemes:** The Duty Drawback Scheme provides for the refund of customs duties paid on imported inputs or excisable materials that are used in the manufacture of goods exported from India. This ensures that exported products are not burdened with taxes, thereby enhancing their price competitiveness abroad. The rates are notified by the Central Government and are periodically revised to reflect changes in input costs and duty structures.

Under the duty drawback scheme, there are broadly two levels of rates for exports under section 75 of the Customs Act, 1962:

- **All Industry Rate (AIR)** – These are standard drawback rates notified by the Government for various export products, based on average input duty incidence. If an export product is covered by a Schedule rate and conditions are met, the exporter simply claims this AIR.
- **Brand / Special Brand Rate** – If no AIR is available for the product, the exporter can apply for a

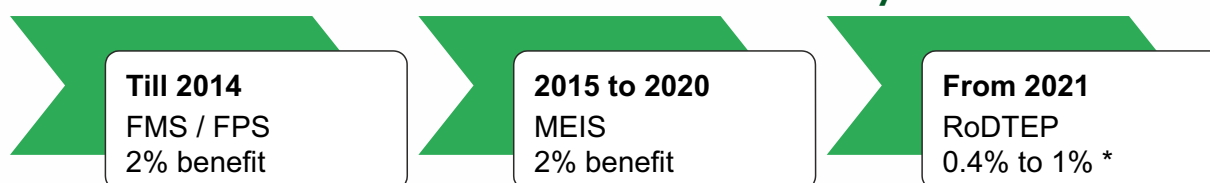
brand rate, based on actual duties paid on inputs used in that specific export product. If an AIR exists but works out to be less than 80% of the actual duties on inputs, the exporter (who has not taken AIR) can apply for a special brand rate, i.e. a higher, exporter specific rate reflecting actual duty incidence.

- **Remission of Duties and Taxes on Exported Products (RoDTEP):**

The RoDTEP scheme was introduced in 2021 to replace the erstwhile Merchandise Exports from India Scheme (MEIS). The benefit is provided as a percentage of the FOB value of exports and is credited in the form of electronic duty credit scrips, which can be used to pay Basic Customs Duty or transferred to other importers. It is pertinent to note that the RoDTEP benefits are applicable only till 31st Mar'26.

To understand in detail the benefit to the wind turbine manufacturers under the scheme, a roadmap has been illustrated below, comparing the erstwhile schemes which translated to RoDTEP currently.

Figure 20: Roadmap comparing the erstwhile schemes which translated to RoDTEP currently



* Based on HSN Classification and type of exports

3.2.2.2 Duty Exemption schemes

- **Advance Authorization (AA) and Duty-Free Import Authorization (DFIA):** The Advance Authorization (AA) and Duty-Free Import Authorization (DFIA) schemes allow exporters to import inputs required for manufacturing export products without payment of customs duty, subject to fulfilment of export obligations.
 - **AA** permits duty-free import of inputs physically incorporated in export products, subject to actual user conditions and value addition norms.
 - **DFIA** is a post-export benefit, allowing duty-free import of specified inputs, with the authorization becoming transferable after export obligation is fulfilled.

These schemes are critical for reducing the input cost of exported goods and are widely used by wind turbine manufacturers.

Export Promotion Capital Goods (EPCG) Scheme:



The EPCG Scheme allows wind turbine manufacturers to import capital goods including machinery, equipment, spares, tools, fixtures, dies, and moulds at zero customs duty, provided these are used for producing goods or services meant for export. Wind turbines and their components are explicitly classified as “green technology products” under the EPCG Scheme, ensuring coverage not only for complete turbine systems but also for critical components and related manufacturing machinery.

This classification provides an additional benefit in the form of a reduced export obligation (EO). Instead of the standard EPCG requirement of fulfilling an export obligation equivalent to six times the duty saved, wind turbine manufacturers are required to meet only 75% of the normal EO, i.e., 4.5 times the duty saved. This significantly lowers compliance burden and enhances the attractiveness of EPCG for capital-intensive wind manufacturing projects.

3.2.2.3 Special policy-based schemes

- **Export Oriented Units (EOU):** Export Oriented Units (EOU) continue to serve as an important pillar for export-led growth with the primary objective of producing goods and services for export. Under the EOU scheme, units are allowed duty-free import of capital goods and inputs, subject to meeting prescribed export obligations and value additional norms.
- **Manufacturing and Other Operations in Warehouse (MOOWR):** The MOOWR scheme is a modernized bonded manufacturing program under Indian customs law. It allows manufacturers to import inputs and capital goods without upfront payment of customs duties (deferred) and to undertake manufacturing and other operations in a custom bonded warehouse. The duty becomes payable only when the finished goods (or capital goods) are cleared into the domestic market. Unlike various existing schemes, the MOOWR scheme is delinked to the quantum / obligation of exports, and the benefit is also extended to the importers who import the goods for domestic clearance/sell.
- **Special Economic Zones (SEZ):** Special Economic Zones (SEZs) are specifically demarcated enclaves treated as foreign territories for certain trade and tax purposes, designed to promote exports, attract investment and create employment. The units established in SEZ zones enjoy duty-free import and special benefits for domestic procurement of goods and services as well.

3.2.3 Effectiveness of the above schemes (3.2.2)

- A short comparison is provided for better comparison of the different schemes available to exporters of wind turbines.



Table 12: Comparison of the different schemes available to exporters of wind turbines

Schemes	Benefit			
	Overview	Inputs	Input Services	Capital goods
Duty drawback	Refund of customs duty	✓	✗	✗
RoDTEP	Refund of unrefunded taxes and duties	✓	✓	✗
Advance Authorization	Duty free import	✓	✗	✗
DFIA	Duty credit after import	✓	✗	✗
EPCG	Duty free import	✗	✗	✓ (Only BCD exempted, GST to be paid)
EOU - Domestic procurement	Export oriented	✗ (GST to be paid)	✗ (GST to be paid)	✗ (GST to be paid)
EOU - Imports	Export oriented	✓ (Only BCD exempted, GST to be paid)	✗	✓ (Only BCD exempted, GST to be paid)
MOOWR - Domestic procurement	Duty free import for bonded manufacturing facility	✓	✗	✓
MOOWR - Imports	Duty free import for bonded manufacturing facility	✓	✗	✓
SEZ - Domestic procurement	Export oriented	✓	✓	✓
SEZ - Imports	Export oriented	✓	✓	✓

3.2.4 Taxes Embedded for Exporters under the Schemes

There are various nuances pertaining to the wind turbine manufacturers, being a capital-intensive sector, in comparison with other manufacturing units. The above schemes are analysed further to depict on the effectiveness of the schemes in eliminating the tax incidence in the exported products.

A comparative summary has been provided below which clearly depicts the indirect taxes to be remitted by the respective units on their costs after considering the Duty exemption and the Special policy-based schemes for the exporters.

Table 13: Comparison: Remittance of Indirect Taxes Considering Duty Exemptions and Special Exporter Schemes

Sl. No.	Taxes related to	DTA Units	EOU	Units under MOOWR	SEZ Units
A	Setup (Civil related)	GST	GST	GST	Exempted - 0
	Capital expenditure				
B	Domestic	* Challenges in recouping GST credit	* Challenges in recouping GST credit	* Challenges in recouping GST credit	Exempted - 0
	Import	* Challenges in recouping GST credit	Duty exempted; * Challenges in recouping GST credit	Taxes Deferred	Exempted - 0
	Operating expenditure				
	Inputs				
C	Domestic	GST is creditable	GST is creditable	GST is creditable	Exempted - 0
	Import	GST is creditable	Duty exempted; GST - creditable	Taxes Deferred	Exempted - 0
	Input services				
	Domestic	GST is creditable except for certain services	GST is creditable except for certain services	GST is creditable except for certain services	Exempted - 0
	Import	GST is creditable except for certain services	GST is creditable except for certain services	GST is creditable except for certain services	Exempted - 0
D	Non-GST expenditure (Electricity duty, Stamp duty, etc.)	Cost	Cost	Cost	Exempted - 0
E	Impact on input taxes if the goods are sold to DTA	Duty (cost) + GST (creditable)	Duty forgone	Duty forgone	Treated as Imports

* Refund of unutilized GST credits on capital goods is not permissible and will be a cost to the exporter.

Summary of taxes inbuilt in exported wind turbine products:

- GST on civil construction cannot be claimed as Input tax credit and will be a cost.
- GST is not creditable for certain services which will add to the cost of the products.
- Refund of unutilized GST credits on capital goods is not permissible and will be a cost to the exporter.
- Delayed unutilized GST credit refunds on inputs and input services entail a working capital impact on the business units.
- Schemes like SEZ which gives complete neutralisation of both import and local taxes are not efficient for a business entity undertaking both sales within India and exports.

3.2.5 Effectiveness of Duty Remission Schemes

3.2.5.1 Benefits for export under different HSN codes: With multiple HSN codes utilized for exports, the benefits under Duty drawback and RoDTEP schemes differ based on the classification. The current rates applicable for the different HSN are captured below.

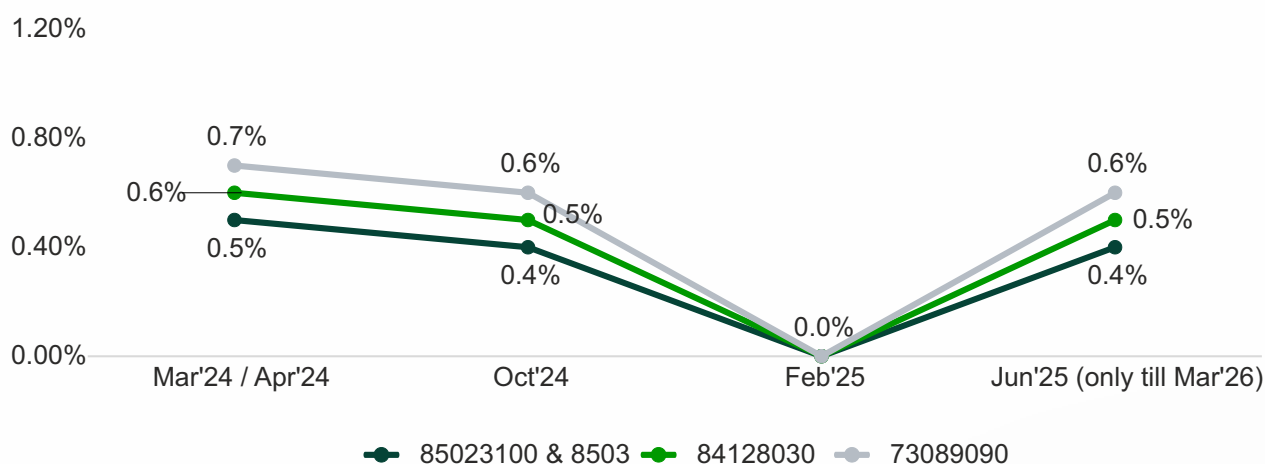
Table 14: Current rates applicable for the different HSN

Scheme	85023100 (WOEG ⁵⁶)	84128030 (Wind turbines)	73089090 (Steel structures)	8503 (Parts for 8502)
Duty Drawback	1.70%	1.50%	1.50%	1.70%
RoDTEP for DTA exports *	0.70%	0.90%	1.00%	0.70%
RoDTEP for SEZ, EOU, AA exports *	0.40%	0.50%	0.60%	0.40%

* Applicable only till 31st Mar'26. The rates considered are prior to the recent amendment in Notification No. 60/2025-26 dated 23rd Feb 2026 issued by DGFT

3.2.5.2 The benefits under the Duty remission schemes have been reducing consistently over the years. A visual depiction is provided below for the three possible export HSN codes to depict the trend over the past years in Duty drawback, RoDTEP benefits for DTA exports and RoDTEP benefits for AA / EOU exports.

Figure 21: Trend over the years for RoDTEP for SEZ, EOU, AA exports.



⁵⁶ WOEG- Wind operated electricity generating set

Figure 22: Trend of RoDTEP for DTA exports over the years

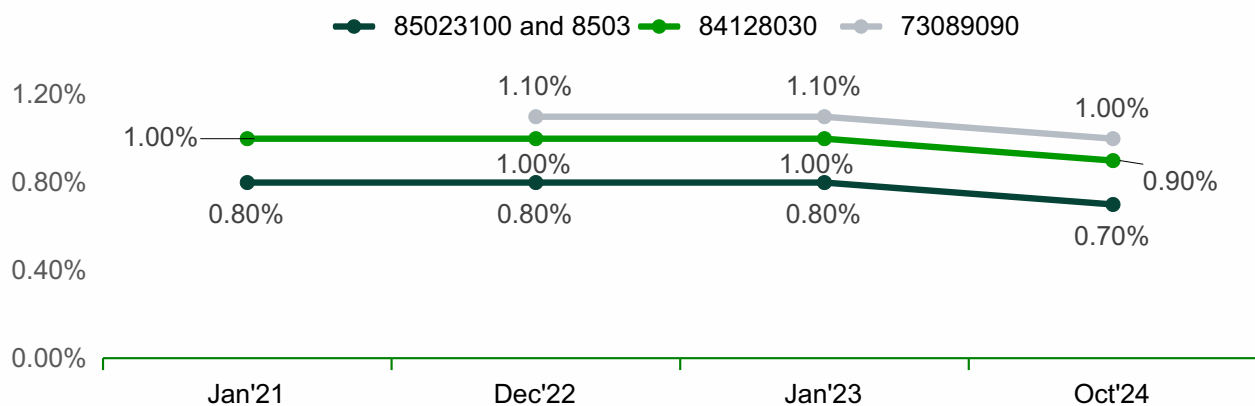
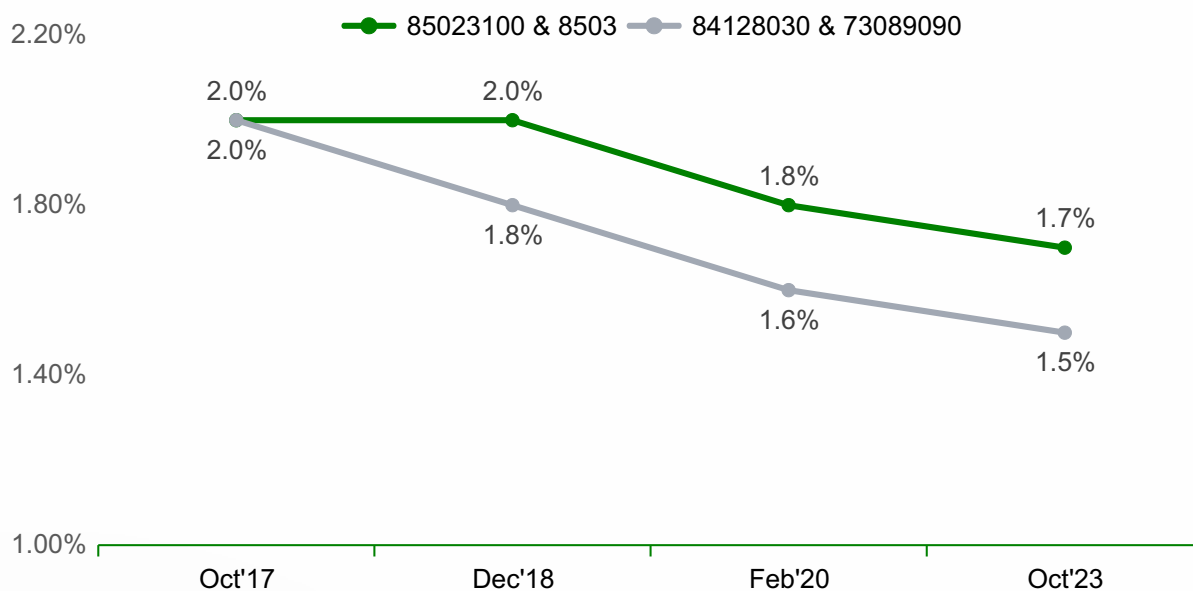


Figure 23: Trend over the past years in Duty drawback

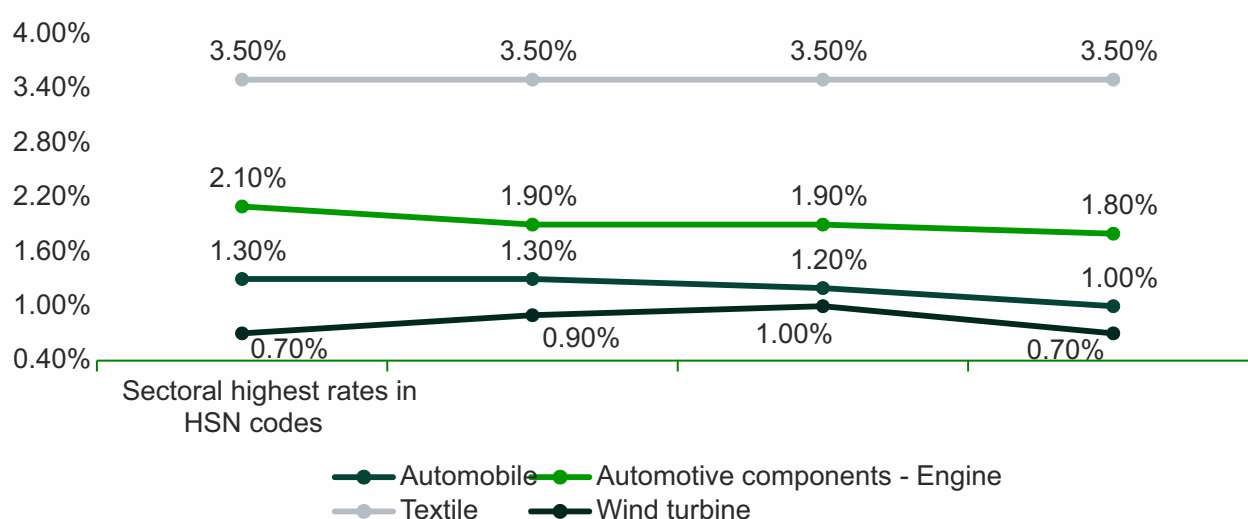


Note: RoDTEP benefits for SEZ, EOU and AA exports was applicable only till 05th February 2025 as per Notification No. 66/2024-25 dated 20th March 2025, post which the benefits were restored from 01st June 2025 vide Notification No. 11/2025-26 dated 26th May 2025.

The rates considered for RoDTEP are the rates prior to the recent amendment in Notification No. 60/2025-26 dated 23rd Feb 2026 issued by DGFT.

It is important to note that several products currently enjoy RoDTEP rates exceeding 1% on DTA exports, as reflected in the existing schedule for tariff headings from Chapter 24 onwards in Appendix 1. Further, a visual representation for the RoDTEP rates on DTA exports is provided below across Automobile, Automotive components (engine), Textile and Wind turbine manufacturing sectors considering sample HSN codes in each sector. The graph depicts that certain sectors are currently benefitting with higher rates in comparison with wind turbine manufacturing industry.

Figure 24: RoDTEP rates (%) on DTA exports is provided below across Automobile, Automotive components (engine), Textile and Wind turbine manufacturing sectors



Note: The HSNs considered for the chart along with RoDTEP rates for DTA exports are provided in Appendix 3. It is pertinent to note that the schedule provides for caps for the HSN codes, however the same have not been considered for rate comparison in the above chart.

The RoDTEP rates considered are prior to the recent amendment in Notification No. 60/2025-26 dated 23rd Feb 2026 issued by DGFT.

To ensure that benefit rates are appropriately calibrated, the industry should engage with the Government and submit detailed, sector specific data so that RoDTEP rates can be determined on a more accurate and representative basis.

Key observations:

- There are varied classifications with multiple HSN Codes pertaining to the exports of wind turbine products in the industry. As mentioned in the table 20, each HSN has a rate prescribed for the benefits and appropriate classification will determine the benefits applicable to the exporters as well.
- The benefit rates need to be fixed in consideration with the specific data pertaining to the industry, especially considering that the logistics cost for the wind turbine manufacturing sector is on the higher end.
- The trend analysis reflects a declining trend in the benefits provided in duty remission schemes.
- The wind turbine components specifics such as size, weight, high logistical costs, and energy consumption would have to be considered in determination of the remission schemes and not on a generalized level.

3.2.6 Export financing

Export financing refers to the set of credit facilities and financial instruments that enable exporters to produce, ship, and receive payment for goods sold to overseas buyers, typically through pre shipment and post shipment export credit provided by regulated entities such as commercial banks, co-operative banks, NBFCs, and all India financial institutions.

In the Indian context, export financing is supported and shaped by regulatory frameworks that allow specialised products like packing credit, pre shipment and post shipment export credit, and related working capital lines, whose tenors and repayment profiles can be adjusted in response to trade disruptions and global headwinds to ensure continuity of viable export businesses.

Recently, the Government of India has issued various measures which provides relief to the exporters. The details of the same are provided in the Appendix 2.

However, considering the quantum of benefits granted under the schemes and capital-intensive nature of the wind turbine manufacturing industry, it is suggested that the erstwhile 'Interest Equalisation' scheme which supported the exporters with reduced interest rates be restored and continued a long-term basis and made applicable to all exporters in the Wind energy sector.



Interest Equalisation scheme

The Government of India, through Interest Equalisation Scheme (IES) for pre and post shipment INR Export Credit, supported exporters with reduction in interest rates at 2% p.a applicable on export credit. This scheme has been withdrawn for large exporters from July 2024. With reduction in interest rates, the scheme was highly beneficial for wind turbine exporters in improving in the working capital finance and resulting in cost optimization for the exporters to be competitive in the global market.

Suggestion:

Considering the existing export finance framework and the capital-intensive nature of the wind turbine manufacturing industry, the following measures may be considered:

- The erstwhile 'Interest Equalisation' scheme which provided exporters with reduced interest rates may be reinstated, continued on a long-term basis and made applicable to all exporters in the Wind energy sector, rather than being restricted only to MSME exporters.
- As exports of renewable energy products are intrinsically linked to project implementation outside India and typically involve long-gestation, project-based contracts, it is suggested that such exports be brought within the ambit of "project exports", thereby enabling access to the corresponding support mechanisms, including export credit guarantees and insurance cover.
- Further, it is recommended that additional leverage may be provided on interest equalization under export finance credit schemes in Project exports.

3.2.7 Government Incentive Schemes

3.2.7.1 State-wise Incentives under Industrial Policy: Several Indian states have established policies that prioritize and incentivizes renewable energy sector, encouraging new and existing investments in the state. A comprehensive review of the latest industrial policies of five leading states has been undertaken with an objective to assess the landscape of incentives available to wind turbine manufacturers.

Overview of policy framework: There are various policies issued by a state which target specific sectors based on industry, size and key initiatives. For ease of comparison, only the Industrial policies of five specific states are analysed as below.



Table 15: Industrial policy

State	Policy Name	Notification Date	Effective From	Effective To
Gujarat *	Gujarat Industrial Policy 2020	7 August 2020	7 August 2020	6 August 2025
Tamil Nadu *	Tamil Nadu Industrial Policy 2021	January 2021	1 January 2021	31 March 2025
Andhra Pradesh	Andhra Pradesh Industrial Development Policy 2024-29	26 October 2024	26 October 2024	25 October 2029
Karnataka	Karnataka Industrial Policy 2025-30	8 February 2025	8 February 2025	7 February 2030
Maharashtra	Maharashtra Industries, Investment and Services Policy 2025	31st December 2025	31st December 2025	30th December 2030

* Gujarat and Tamil Nadu are yet to notify the new Industrial policy.

Projects Classification based on Size: The classifications of the units differ from state to state based on the specific criteria. Though the eligibility for the scheme depends on multiple factors, the classification of the units based on size has been depicted below for reference.

Table 16: Project classification based on size

States	Sub-large	Large	Special Large	Mega	Ultra Mega
Maharashtra		FCI > INR. 125 Crores) but not fulfilling minimum investment threshold prescribed for classification as Special large-scale industries	Minimum FCI between 150 to 750 crores depending on location (or) Minimum Direct Employment between 125 to 1000 people	Minimum FCI between INR. 200 to 1500 crores depending on location (or) Minimum Direct Employment between INR. 350 to 2000 people	Minimum FCI between INR. 750 to 4000 crores depending on location (or) Minimum Direct Employment between INR. 750 to 4000 people
Gujarat	Not clearly specified				
Tamil Nadu	Investment Commitment range in Plant and Machinery > INR. 50 Crore to 300 Crores	Investment Commitment range in Plant and Machinery > INR. 300 Crore to 1000 Crores		Investment Commitment range in Plant and Machinery > INR. 500 Crore to 5000 Crores	Investment Commitment range in Plant and Machinery > 5000 Crores
Andhra Pradesh	Investment Commitment range in Plant and Machinery > INR. 50 Crore to 500 Crores	Investment Commitment range in Plant and Machinery > INR. 500 Crore to 1000 Crores		Investment Commitment range in Plant and Machinery > INR. 1000 Crore to 5000 Crores	Investment Commitment range in Plant and Machinery > 5000 Crores
Karnataka		Investment Amount in Plant and Machinery > INR. 50 Crore to 300 Crores		Investment Amount in Plant and Machinery > INR. 300 Crore to 1000 Crores	Investment Amount in Plant and Machinery > 1000 Crores

Key Incentive Categories

- **Capital Investment Subsidy:**

States offer capital investment subsidies that typically start at a minimum of 10% of eligible fixed capital investment, with the range extending upwards depending on project size, location, and sectoral classification. For example, Gujarat provides capital subsidies beginning at 10% and going up to 25% for projects based on different categories whereas Karnataka's policy offers up to 35% based on the size of the projects and the location it is based at in the state.

- **Tax incentive:**

Tax incentives, such as stamp duty and electricity duty exemptions, are available in most of the states, with most offering 75% exemption and up to 100% exemption for eligible wind turbine manufacturing projects. For instance, Andhra Pradesh and Karnataka provide at least 75% stamp duty exemption, with 100% available for projects in designated areas or sectors.

State Goods and Services Tax (SGST) reimbursement is also a common feature, with reimbursement rates and periods varying by state and project profile, but generally available for a minimum of five years and often structured as a percentage of net SGST paid.

It is notable that Tamil Nadu provides for a specific refund of the Input SGST paid on capital goods within the standard investment period, to the extent input tax credit is admissible under GST laws since the stated refund is ineligible under CGST Act, 2017. This will facilitate in mitigation of working capital and reducing the costs for the manufacturers.

- **Priority Sector Bonuses:**

Wind turbine manufacturing is consistently recognized as a thrust or sunrise sector, making such projects eligible for enhanced incentives. Gujarat and Tamil Nadu provide additional subsidies for the eligible projects / units.

- **Production Linked Incentives:**

A growing number of states have introduced Production Linked Incentives (PLI) as a key component of their industrial policy frameworks. Under the PLI approach, eligible enterprises receive incentives based on a percentage of their net sales turnover, typically ranging from a minimum of 1% to 2.5% per annum, and in some cases higher, depending on the location and scale of investment.

For example, Karnataka’s policy allows investors to choose between a capital subsidy and a PLI, with the PLI available for up to seven years and capped at a percentage of the value of fixed assets, thus providing flexibility for both capital-intensive and high-revenue projects. Andhra Pradesh has also adopted similar models, offering a PLI “top-up” for projects that also qualify under central government schemes. This approach is designed to directly reward operational performance and output, aligning state incentives with actual manufacturing activity and export growth.

- **Skill Development and Export Promotion:** All states include provisions for skill development, training subsidies, and export promotion support. These incentives are generally available as a minimum baseline, with the possibility of higher support for projects that demonstrate significant employment generation or export potential.

3.2.7.2 Special policies in the states

With the importance of renewable energy highly increasing, the states started establishing separate policies specially focusing the sector with benefits granted under these policies. The details of 5 different policies are provided below for comparison.

Table 17: State renewable energy policy timeline

Policy title	Valid from	Valid to	Direct benefits available in the policy for wind turbine manufacturers?
Gujarat Renewable Energy Policy 2023	04-10-2023	30-09-2028	Yes
Karnataka Renewable Energy Policy 2022-2027	16-04-2022	15-04-2027	No
Andhra Pradesh Integrated Clean Energy Policy, 2024	30-10-2024	29-10-2029	Yes
Tamil Nadu Repowering, Refurbishment and Life Extension Policy for Wind Power Projects 2024	22-08-2024	31-03-2030	No
Maharashtra Non-conventional Energy Generation Policy – 2020	31-12-2020	31-03-2025	No



The active renewable energy policies are explained as follows:

Gujarat Renewable Energy Policy 2023

- The policy allows wind turbine manufacturers and renewable energy (RE) developers to install prototype wind turbine generators (WTGs) to take advantage of newer technologies such as higher hub heights and higher capacities.
- These prototype WTGs need to be installed specifically for type-testing to obtain a type-certificate from internationally accredited certifying agencies, as per MNRE's guidelines and procedures for prototype models.
- State Nodal Agency (SNA) will handle registration of such prototype WTGs and will issue the commissioning certificate or grid synchronization report as per guidelines notified by MNRE, NIWE or other competent authorities.
- Prototype WTGs must fully comply with all applicable guidelines, procedures, orders and regulations issued by MNRE, NIWE, CEA, GERC or any other relevant authority.
- All components/items used in manufacturing prototype WTGs must be new and unused; second-hand components or machines are not permitted.
- Components/items procured or imported for manufacture of prototype WTGs are eligible for customs and excise duty exemption as per the relevant notifications of the Customs and Excise Departments.
- Prototype WTGs must be owned by the wind turbine manufacturer and cannot be sold to any other party until that turbine model is included in the Revised List of Models and Manufacturers (RLMM).
- Energy generated from prototype WTGs will be treated as inadvertent energy until the RE developer signs a commercial arrangement for that prototype after the model is listed in the RLMM.

Andhra Pradesh Integrated Clean Energy Policy, 2024

The policy specifically provides for various incentives to wind turbine manufacturing facilities. The key financial benefits are provided below.

- Capital subsidy: Capital subsidy shall be provided on 25% of the Fixed Capital Investment (including captive generating plant), disbursed over 5 years from Commercial Operation Date of the manufacturing project.



- Land: The Government will facilitate procurement/acquisition of land at actual cost for the manufacturing plant. Priority allotment of revenue / government land on long term lease at INR 31,000 per acre per year, with 5% escalation every 2 years.
- Open access charge & energy banking: The policy provides exemption from open access charges for 10 years. Energy banking permitted as per GERC Regulations 2024.
- SGST reimbursement: 100% reimbursement of net SGST on sale of products for 5 years.
- Production Linked Incentive (PLI): Eligibility to receive production linked incentives, as per applicable MNRE guidelines (if any).
- Subsidy on power cost & electricity duty: Electricity tariff subsidy of INR 1.0/kWh for 10 years from Commercial Operation Date of the manufacturing plant. Reimbursement of electricity duty for 10 years.
- Industrial water support: Industrial water supply will be provided at the doorstep of the manufacturing facility and 25% exemption on industrial water charges for 10 years.

The following recommendations shall be taken into consideration on State Government schemes:

- Wherever an exporter has capitalized the unrealisable tax cost on capital goods due to prescribed refund mechanisms, any of the following options shall be take up with the Government:
 - The tax value capitalized needs to be included as part of eligible investment and be included for provided capital subsidy.
 - The tax value needs to be separately refunded by the Government to eliminate the tax cost embedded in the exported products.
- SGST reimbursement provided by the States are predominantly at 'Net' SGST payable level instead of 'Gross' level, as in the case of Maharashtra state. It is suggested that the states provide this reimbursement at 'Gross' level.

In conclusion, enhancing RoDTEP and duty drawback schemes is crucial for strengthening India's export landscape. Improvements in reimbursement processes, expansion to cover more product categories, and integration of industry-specific insights are needed. Additionally, state-specific incentives and the reintroduction of the Interest Equalisation scheme, which reduces interest rates for exporters, are vital. Together, these refinements will position Indian exporters as strong global contenders, aligning with economic growth and sustainability goals.



3.3 Supply chain optimization and localization

Strategies to reduce costs

India's wind energy manufacturing ecosystem has made commendable progress, achieving approximately 70% localization at the assembly level. However, system-level localization remains at only ~50%, leaving gaps in high-value components such as blade, large casting, gearboxes, generators, and power electronics. Critical sub-components forgings, large castings, bearings, and converter are still import-dependent, driving up costs and exposing the sector to global supply chain volatility. Additionally, oversized component logistics pose persistent challenges, inflating timelines and working capital requirements.

India's renewable energy ambitions hinge on scaling wind capacity efficiently and competitively. Indigenous manufacturing of critical components is not just desirable it is strategic. Localizing high-value parts will:

Figure 25: Impact of indigenous manufacturing



Maintaining momentum in wind capacity addition and realising India's potential as an export-oriented manufacturing hub will require timely, targeted actions across manufacturing, technology, and logistics.

Strategic Actions

To capitalize on this opportunity, India must adopt a **four-pronged approach**:

A. Optimize the supply chain to ensure efficient procurement of raw materials for wind turbine manufacturing

India must tackle the high cost of turbine capital expenditure, which forms about 70% of total CAPEX for wind projects, with 50–60%⁵⁷ of the turbine's mass being iron and steel. The competitive pricing of steel and copper from China, alongside limited domestic availability of rare earth metals, contributes to these challenges. The introduction of manufacturing linked incentives schemes, like Scheme 1.1,⁵⁸ aims to promote steel production used in turbine nacelles and generators. Meanwhile, accelerating the INR 7,280 crore Rare-Earth Permanent Magnet (REPM⁵⁹) scheme is vital to reduce dependence on China, which controls 80–90% of global magnet production⁶⁰. Building an integrated domestic REPM ecosystem and securing early offtake agreements will boost supply chain resilience. Concurrently, diversifying sourcing beyond China and investing in magnet-light drivetrain technologies will mitigate risks and enhance cost competitiveness.

B. Prioritize and incentivize indigenous manufacturing of key components

India must localize high-value parts blades, gearboxes, generators, and power electronics to reduce import dependence and logistics costs. Current localization is ~70% at assembly level but only ~50% at system level, with gaps in forgings, large castings, bearings, and converters. A phased local-content roadmap under MNRE's ALMM (Wind), backed by DPIIT's⁶¹ Make in India and manufacturing linked incentives -style incentives, can bridge the 10–20% cost gap⁶². Duty realignment for specialty steel and composites and cluster-based hubs will ensure scale and competitiveness. Table 24 shows the percentage of localization across different key components of wind turbines in India.

⁵⁷ GWEC India Outlook 2023

⁵⁸ PIB

⁵⁹ PIB

⁶⁰ Rare earth exchange

⁶¹ Department for Promotion of Industry and Internal Trade

⁶² GWEC India Outlook 2025; Climate scope 2025

Table 18: WTG Key components and their local content
(Source: GWEC India Outlook 2025) – * Nacelle assembly is localized; however, key components—generators, gearboxes, and others—are still largely imported.

Sl. No.	WTG key Component	% of Local content	Procurement rationale
1	Tower	100%	All OEMs procure towers domestically due to easy availability, high import logistics costs, and mandatory BIS certification requirements
2	Blade	~90%	Most blades are procured domestically, aided by a strong local supply chain and in-house manufacturing capabilities, although new entrants still rely on imports
3	Nacelle*	100%*	Following the 2016 government mandate for local nacelle assembly, all wind turbine generators are assembled domestically, ensuring ongoing localization.
4	Large casting	~55%	Robust local capacity supports the production of 2 MW turbines, whereas limited capabilities for 3 MW+ turbines necessitate a mixed procurement model
5	Generator	~45%	Procurement is a blend of domestic sourcing and imports, with imports favored for their cost advantages despite adequate local manufacturing capabilities
6	Gearbox	~55%	The gearbox market is dominated by a few global players, resulting in a high dependency on foreign procurement.
7	Converter	~30%	Largely driven by imports due to restricted domestic capabilities and intellectual property barriers.

To achieve cost competitiveness with China, India should follow the strategies suggested in table 25 to boost localization in four key components that need it the most based on local content (%) mentioned in table 24:

Table 19: Strategies for enhancing localization (Source: GWEC India Outlook 2025)

Sl. No.	WTG key Component	Strategies for Enhancing Localization
4	Large casting	Enhancing domestic capabilities for higher-rated turbines and attaining cost efficiency as production capacity expands
5	Generator	Supportive government policies combined with competitive pricing by Indian manufacturers will enhance localization efforts
6	Gearbox	Developing capabilities across various model ratings, along with the high logistics costs of imports, will further drive local procurement
7	Converter	Manufacturers should set up local production facilities to accommodate the increasing demand for wind turbine generators

C. Implement advanced manufacturing practices

Global benchmarks show lean, automation, and digital tools (MES/QMS, robotics) can cut blade and nacelle costs by 20–30%.⁶³ Indian OEMs should leverage Industry 4.0 schemes for upgrades. Logistics optimization multimodal transport, near-port finishing hubs, and FTWZ⁶⁴ staging can reduce oversized component transport costs by 25–40% (DPIIT logistics initiatives). An IWTMA led forum for route clearances and inventory planning will minimize delays and working capital strain.

D. Develop a robust domestic vendor base

Strengthening Tier-2 suppliers via MSME schemes (ZED, CGTMSE, cluster development) and targeted R&D for critical components.⁶⁵ OEM-SME partnerships modelled on Denmark's cluster approach can accelerate technology transfer and enforce PPAP/APQP standards.⁶⁶ Shared testing infrastructure and IP pools for converters and control systems will reduce foreign dependency, while export-readiness programs and collateral-free credit will enable SMEs to scale sustainably.

India's wind turbine manufacturing sector is poised for growth, contingent upon navigating existing challenges through targeted strategies. Optimizing supply chains, enhancing indigenous manufacturing, and adopting advanced practices are crucial steps forward. Although schemes like Duty Drawback, RoDTEP, and EPCG offer support, the sector must address embedded taxes and delayed GST refunds to improve competitiveness. Elevating these measures, with potential reinstatement of the 'Interest Equalisation' scheme, alongside state-level incentives such as capital subsidies, can drive this progress. By implementing these strategic actions, India is set to achieve its renewable energy goals and solidify its role as a global manufacturing leader.

⁶³ Case Study 1; Case study 2

⁶⁴ Free Trade and Warehousing Zone

⁶⁵ DPIIT; MSME policy

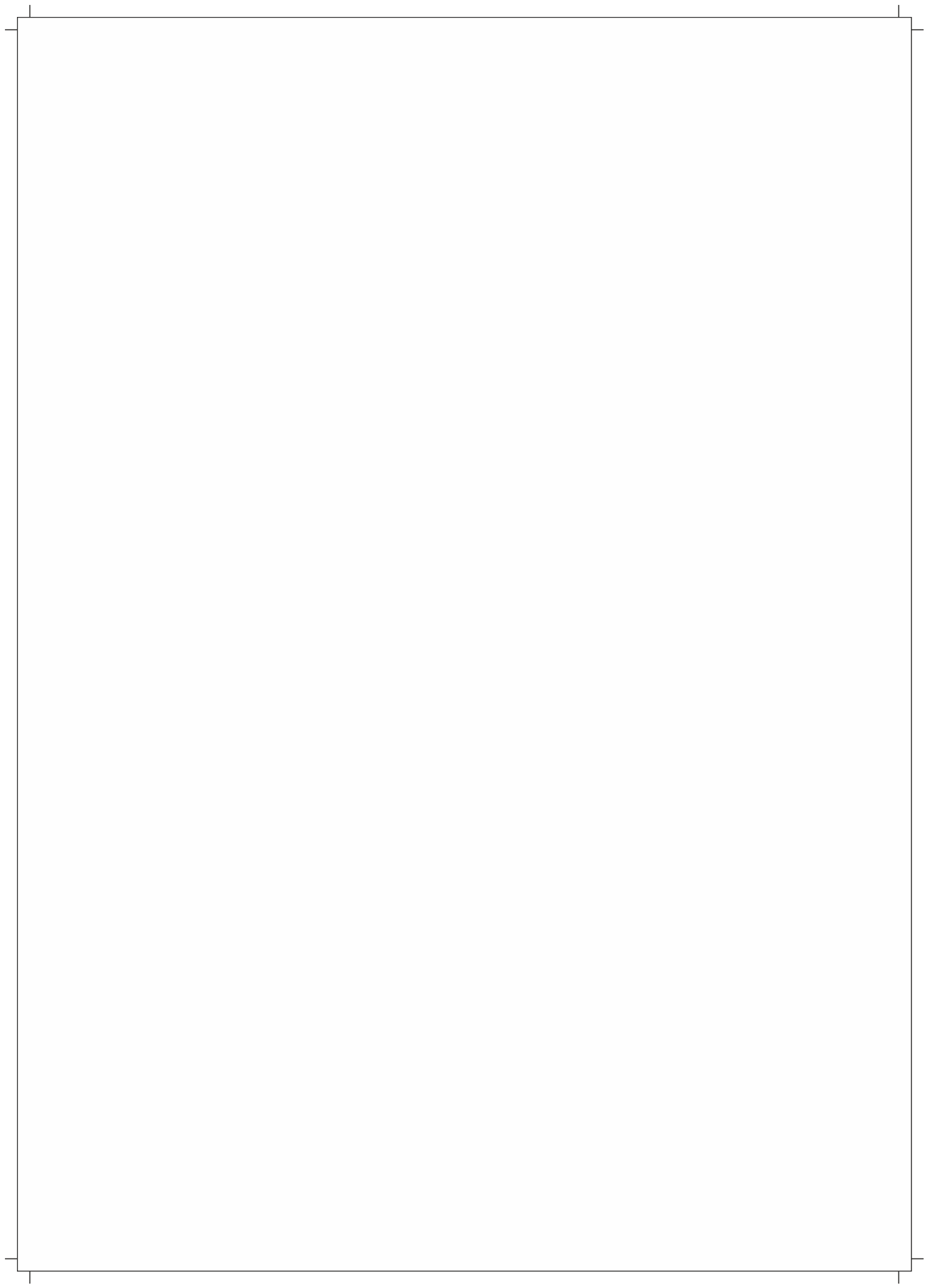
⁶⁶ GWEC 2025

Summary of Supply chain optimization and localization:

- Localization: ~70% assembly vs ~50% system; gaps in blades, gearboxes, generators, converters; oversized-component logistics add cost/time.
- Actions: diversify/raw-materials (incl. RE magnets), incentivize local manufacturing, adopt Industry 4.0 + logistics optimization, strengthen Tier-2 vendors.
- Status: towers 100%, blades ~90%, large castings ~55%, gearboxes ~55%, generators ~45%, converters ~30%; nacelle assembly 100% (internals often imported).
- Outcome: ~20–30% manufacturing and ~25–40% logistics savings possible; policies can close a 10–20% cost gap and enable exports.

Section Summary:

- Strong policy support—offshore VGF, port upgrades, grid expansion, concessional finance—underpins growth.
- Established OEM base, supportive states, and offshore prospects position India for export leadership.
- To realise this, strengthen export-oriented manufacturing, export-finance access, and international market entry.
- Enablers: Export-Linked Wind Manufacturing Incentive, Indian Wind Export Finance Facility, tax benefits, market development, supply-chain optimisation.
- Embedded tax frictions: non-creditable GST on civil construction and certain services increase costs.
- GST refunds: capital-goods credits non-refundable; input refund delays strain working capital; SEZs inefficient for mixed sales.
- Classification complexity: multiple HSN codes; correct classification determines duty-remission benefits.
- Benefit rates must reflect wind-sector data and high logistics costs; remission benefits show a declining trend; schemes must factor size/weight/energy use.
- Localization snapshot: ~70% assembly vs ~50% system; towers 100%, blades ~90%, large castings ~55%, gearboxes ~55%, generators ~45%, converters ~30%; nacelle assembly 100% but internals often imported.
- Priorities: diversify raw materials (incl. RE magnets), incentivise local manufacturing, adopt Industry 4.0 and logistics optimisation, and build Tier-2 vendors—targeting ~20–30% manufacturing and ~25–40% logistics savings to close a 10–20% cost gap and enable competitive exports.





4

Strategies for Product Acceptance & Market Penetration





4 Strategies for Product Acceptance and Market Penetration



India aligns wind turbine certification with international standards; manufacturers must hold IEC-based certifications from globally recognized bodies to demonstrate quality and performance for both domestic (India) and international markets. For inclusion on the ALMM, products must also be inspected and cleared by National Institute of Wind Energy (NIWE) accredited by the Ministry of New and Renewable Energy (MNRE) serving as the designated authority.

NIWE functions as both an inspection and certification body. NIWE's certification benefits from global recognition and legal acceptance, supported by its NABCB accreditation and the NABCB's association with the IAF MLA framework, which promotes the international mutual recognition of accredited certifications. To further elevate its position in the global market and enhance its appeal to international buyers, NIWE would gain by pursuing IECRE membership. This strategic enhancement is an excellent opportunity for bolstering its credibility and achieving even broader international acceptance. For export markets, turbines must secure certifications from recognized bodies like DNV, TÜV, or UL, comply with local grid codes, and obtain CE marking⁶⁷ for Europe. To proactively tackle market opportunities, investing in research and development for high-capacity turbines and leveraging advanced technologies like IoT and digital twins is essential. Additionally, enhancing the localization of components and expanding global presence and service networks will further strengthen the industry's position. This forward-looking strategy enhances competitiveness, boosts export readiness, and fosters greater self-reliance.

The deferral of mandatory prototype testing to Dec 2027 raises concerns about long-term quality assurance. Strengthening NIWE's global recognition is crucial for ensuring Indian certifications are respected worldwide, enhancing India's presence in the wind energy sector.

⁶⁷ TÜV

4.1 Below mentioned are the challenges:

- **Scale-up of R&D for Higher-Capacity Wind Turbines⁶⁸**

Indian OEMs have demonstrated strong R&D capabilities in 2 MW and 3 MW turbine platforms but trail in the development of higher-rated 4 MW and 5 MW models (the country has limited exposure to 5+ MW turbine), where Chinese and European manufacturers are more advanced. Addressing this shortcoming through greater focus on high-capacity turbine R&D can significantly reduce lead times and improve international competitiveness.

- **Gap in Global Track Record and Bankability Endorsements⁶⁹**

Global OEMs leverage long deployment histories and third-party endorsements to support investor confidence and access to financing. Indian manufacturers, while supported by a strong domestic deployment base, currently have more limited international operating track records, which affects perceptions of reliability and bankability in export markets. This difference leads to higher risk premiums and slower global adoption for Indian products. Figure 33 illustrates the contrast in international presence between Indian and global OEMs, highlighting the role that global reference portfolios play in supporting product acceptance and financing outcomes.

Financiers and lenders prefer turbines with proven reliability across varied geographies, supported by independent due diligence and LTA⁷⁰ opinions. Established OEMs enjoy benefits from extensive portfolio and successful financings, illustrated by DNV⁷¹ acting as LTA for Ørsted's Changhua offshore wind project, securing multi-bank financial closures.

Figure 26: International presence of Foreign OEMs – Envision (Source: Envision – Company website, Envision- Company website) and Siemens (Vayona Energy) (Source: Siemens – Company website) Vs Indian OEM – Suzlon (Source: Suzlon- Company website, Suzlon – Factsheet)

	Started operation: 1995 International installed capacity ~6 GW as of Sept'25
	Started operation: 2007 Began exporting: 2013 International installed capacity 3.5 GW as of 2024
	Started operation: Early 1980s Globally installed capacity 146 GW as of 2025 Maintains 91 GW globally as of 2025

⁶⁸ GWEC India outlook 2025

⁶⁹ GWEC India outlook 2025; Climatescope 2025

⁷⁰ LTA – lender technical advisor

⁷¹ DNV

• **Challenges in Speed and Complexity of Compliance Processes**⁷²

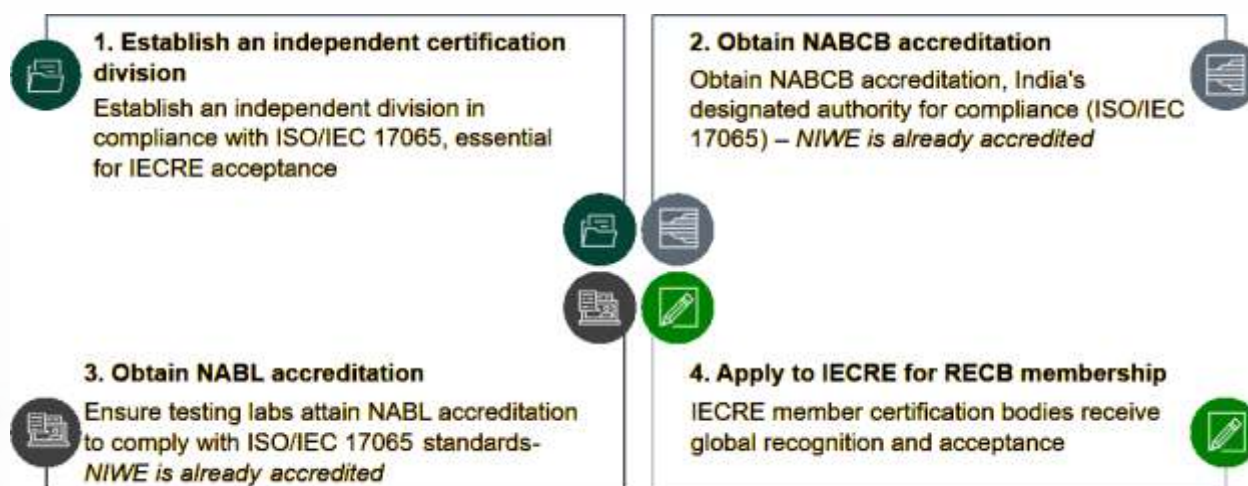
Indian firms face fragmented processes and longer timelines for meeting global compliance norms compared to well-resourced global players who benefit from streamlined pathways and state-backed support. Domestic schemes like ALMM help improve quality assurance, but coverage and awareness remain limited, slowing readiness for international markets. Has fewer compliance checks and no prototype testing mandates for locally manufactured components, raising reliability concerns and encouraging the import of well-tested components.

4.2 Way forward:

• **Roadmap for establishing a IECRE recognized certification body in India: NIWE**

NIWE's certification is globally recognized and legally accepted due to its NABCB accreditation and its recognition under the IAF MLA framework, which facilitates international mutual recognition of accredited certifications. To further enhance its competitive position in today's dynamic market and boost its acceptance among global buyers, NIWE should consider prioritizing IECRE membership. This strategic initiative is pivotal for enhancing its credibility and achieving a broader level of international acceptance.

Figure 27: Roadmap for IECRE membership (Source: IECRE, IECRE certification bodies)



⁷² GWEC India outlook 2025

- This underscores the importance of NIWE becoming a member of the IECRE. Gaining membership involves a rigorous assessment process, which accounts for the limited number of IECRE members. Below are the steps NIWE should follow to achieve IECRE RECB⁷³ membership. Post these steps NIWE then needs to get recognition from government bodies of each region.
- **Focused R&D initiatives to develop products tailored for global market needs⁷⁴**
 - The global market is evolving towards higher-rated turbines, with the average capacity of new installations expected to reach nearly ~5.5 MW by 2024⁷⁵ a 9% increase from 2023. Currently, in India, only Adani offers a turbine with a capacity 5.2 MW⁷⁶ developed in collaboration with Wind2Energy from Germany. Meanwhile, leading Indian manufacturers, produce turbines in the 2-3 Mw⁷⁷ range. This disparity highlights a gap between global demand and India's current production capabilities. To position itself as a major export hub, the Indian industry must pivot toward manufacturing higher-capacity turbines that align with global market requirements, while continuing to meet domestic needs.

Figure 28: Technological Gap: Smart Wind Turbines vs. Traditional Models

	Traditional Turbines	Smart Turbines
 Adaptive Control & AI	Traditional turbines rely on fixed logic and scheduled servicing	Smart turbines use AI and digital twins for real-time optimization and predictive maintenance
 Grid & Performance Intelligence	Traditional turbines lack advanced grid-aware features	Smart turbines dynamically manage grid compliance and maximize AEP (Annual Energy Production) under varying conditions
 Data-Driven Autonomy	Traditional turbines mostly depend on basic SCADA monitoring	Smart turbines integrate IoT, big data, and remote automation

⁷³ Renewable Energy Certification Body

⁷⁴ GWEC India outlook 2025

⁷⁵ GWEC

⁷⁶ Adani

⁷⁷ Suzlon

- The global wind turbine market is undergoing a transformation with increased integration of advanced technologies. Smart turbines are emerging as the future, incorporating features that differentiate them from traditional models. These innovations include enhanced data analytics, real-time performance monitoring, and adaptive systems designed to optimize efficiency. The figure 35 below illustrates the key differences between smart turbines and their traditional counterparts, highlighting the advancements driving this shift. Global leaders like Goldwind⁷⁸ and Envision⁷⁹ are pioneering the production of smart wind turbines. While Indian manufacturers, such as Suzlon,⁸⁰ have begun incorporating predictive components into their SCADA systems, they are not yet fully engaged in smart turbine production. To meet global demand and remain competitive, Indian manufacturers must accelerate R&D efforts and commence the production of smart turbines.
- Reducing the Levelized Cost of Energy for onshore wind demands smarter design and digital innovation. Increasing wind's role in hybrid solutions can cut transmission costs, making high-capacity turbines and predictive controls essential. R&D should focus on longer blades, advanced aerodynamic profiles, and adaptive control systems to maximize energy output, complemented by digital twins and IoT-driven predictive maintenance to boost reliability and minimize downtime. These advancements will strengthen project economics and mitigate curtailment risks.
- India's wind supply chain remains largely assembly-driven, with localization at about ~70% and critical Tier-2 components gearboxes, generators, converters still heavily imported. Scaling installations can push localization to 80–85%, delivering cost reductions of 10–20%. To close this gap, R&D should focus on next-generation blade materials, automated manufacturing, high-torque gearboxes, and grid-compliant converters. Building robust testing infrastructure for blades and drive train endurance, along with domestic electrical steel capabilities, will be essential to strengthen competitiveness and reduce import dependency.

⁷⁸ Goldwind

⁷⁹ Envision

⁸⁰ Suzlon

- **Strategies for establishing and strengthening global service and support networks**

Establishing a global presence is crucial for Indian wind turbine manufacturers aiming to remain competitive and capture larger market shares. While reducing costs is a key focus, expanding distribution networks and ensuring service and spare parts availability internationally are equally important. Leading international companies are already prioritizing their global reach, which allows them to effectively meet the needs of international clients, enhancing customer satisfaction and loyalty. For Indian manufacturers, developing an international footprint is vital to stay relevant and achieve long-term growth in the competitive global marketplace.

- **Establish Dedicated Local Service Centers / Strategic Partnerships**

- Local service hubs reduce turbine downtime by enabling rapid on-site response, local-language support, and familiarity with regional regulations. OEMs with broad service networks can manage preventative and corrective maintenance effectively across global fleets.
- Vestas: Operates a network of over 12,000 technicians servicing 159 GW of turbines in 71 countries.⁸¹
- Siemens Gamesa (Vayona Energy): Combines global reach with local expertise through tailored O&M solutions.⁸²
- Chinese OEMs: Entering Europe rely on local partnerships and joint service entities to overcome trust, certification, and compliance barriers⁸³.
- Global Market: Service excellence not turbine price alone drives global competitiveness.

Indian OEMs should set up regional service hubs in key export markets and/or form joint partnerships with local service providers. This ensures faster on-site response, compliance with local regulations, and builds customer trust. Local presence will improve asset availability and long-term client retention.

⁸¹ Vestas

⁸² Seimens

⁸³ MingYang

○ **Develop a Decentralized Global Logistics Network for Spare Parts**

- Regional spare-parts warehouses near major wind clusters reduce turbine downtime and mitigate supply-chain risks. OEMs like Vestas deploy multi-tier logistics systems to ensure that critical components such as gearboxes, converters, and blades are available within defined service radii.
- All the Major Chinese OEMs have regional offices to maintain inventory⁸⁴.
- Decentralized logistics: Improves O&M cost predictability and supports competitive, availability-based service contracts.

Indian OEMs should establish regional spare-part warehouses near major wind clusters to reduce turbine downtime and ensure timely O&M. Multi-tier logistics hubs will mitigate supply-chain risks and make service contracts more predictable and competitive in export markets.

○ **Invest in Training and Certifying Local Technicians + Mobile Expert Teams**

- Certified local technicians reduce reliance on expatriate staff while addressing global O&M skill shortages. Global OEMs often combine locally certified personnel with centrally deployed experts to handle complex maintenance and upgrades efficiently.

Indian OEMs should train and certify local technicians in export markets (e.g., GWO standards) and maintain a mobile team of expert technicians for complex maintenance. This hybrid workforce reduces repair cycles, lowers costs, and builds strong local workforce ecosystems for long-term.

○ **Deploy Remote Monitoring, Predictive Maintenance and Digital Tools⁸⁵**

- Enable real-time remote monitoring and diagnostics through digital twins and IoT-enabled systems, allowing continuous visibility into turbine health and performance without physical site visits.
- Adopt AI-driven predictive maintenance to detect anomalies early, optimize maintenance schedules, and prevent major failures minimizing downtime and extending component life.

⁸⁴ Goldwind; MingYang

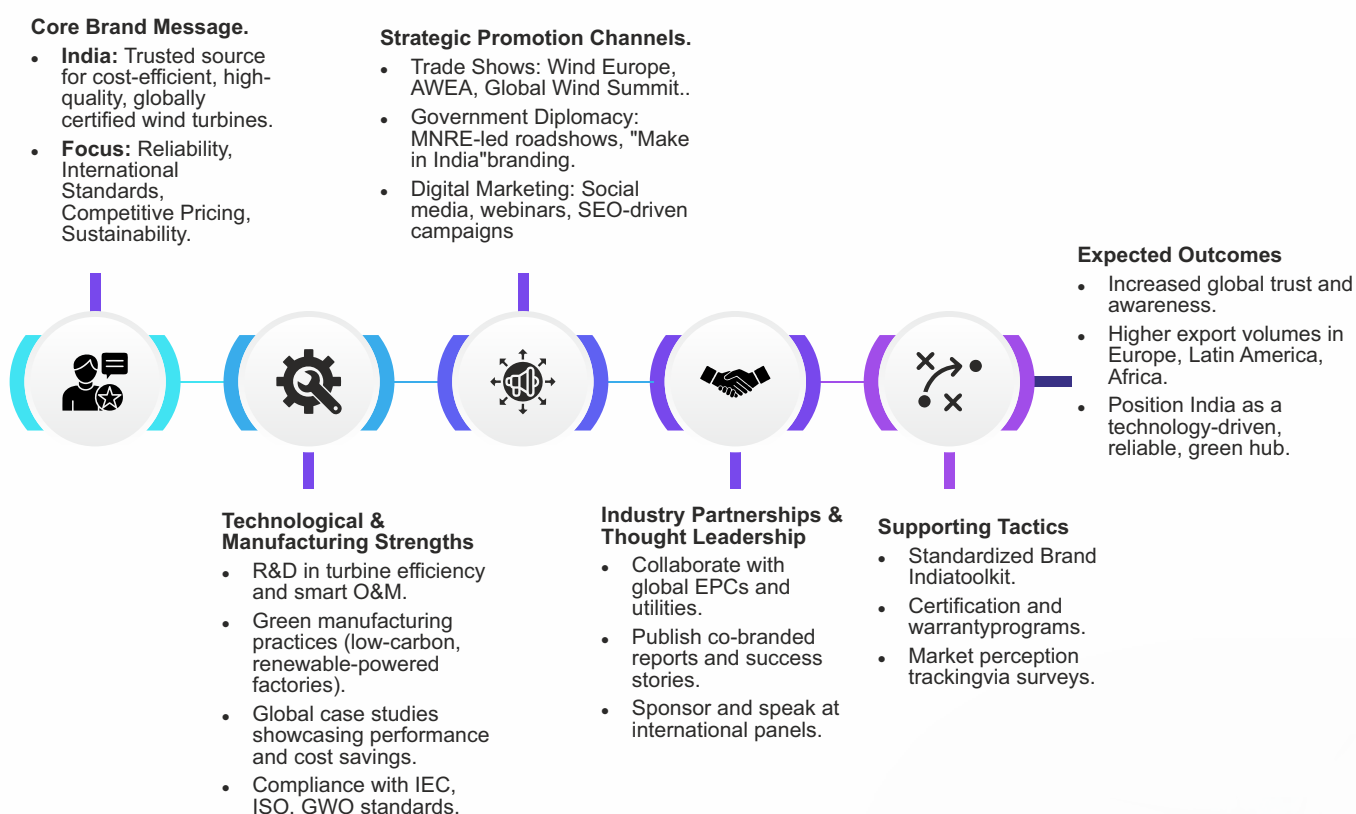
⁸⁵ GWEC 2025; GWEC India outlook 2025

- Leverage advanced digital troubleshooting and adaptive control to reduce on-site interventions, improve turbine availability, and lower LCOE while maximizing Annual Energy Production (AEP).

Indian OEMs should implement SCADA-based remote monitoring, predictive maintenance, and digital O&M platforms. This enables early fault detection, reduces unplanned outages, and minimizes on-site interventions, while scaling service operations efficiently across dispersed fleets.

4.3 "Brand India" strategy for wind turbines to enhance global perception

Figure 29: Brand India strategy





The "Brand India" strategy is designed to establish India as a reliable provider of high-quality, cost-effective wind turbines certified to international standards. It positions Indian turbines as competitive alternatives to European, Chinese, and American models by showcasing technological innovation and sustainable practices. Through strategic marketing, diplomacy, and partnerships, "Brand India" aims to elevate the global standing of Indian OEMs, enhancing their reputation and expanding their footprint in international wind energy markets

- **Core Brand Message**

- Positioning Statement: "India: Your trusted source for cost-efficient, high-quality, and globally certified wind turbines."
- Emphasize India's manufacturing reliability, adherence to international standards, and competitive pricing, showcasing Indian turbines as a viable alternative to European, Chinese, or American OEMs.
- Highlight long-term reliability, O&M capabilities, and sustainability, positioning Indian products not just as affordable, but as premium value solutions.

- **Promote India's Technological & Manufacturing Strengths**

- Showcase R&D achievements in turbine efficiency, smart O&M, and digital monitoring tools.
- Promote green manufacturing practices, e.g., renewable-powered factories, low-carbon production processes, and environmentally sustainable supply chains.
- Publish global case studies of successful Indian turbine deployments, including technical performance, cost savings, and reliability metrics.
- Support certifications and international quality benchmarks, such as IEC, ISO, or GWO compliance, to strengthen credibility in foreign markets.

- **Strategic Promotion Channels**

- International Trade Shows and Conferences
 - Target major wind and renewable energy expos (e.g., WindEurope, AWEA, Global Wind Summit)
 - Create a "Brand India Pavilion", showcasing multiple Indian OEMs, technological innovations, and live turbine demos or simulations.
- Government-Led Economic Diplomacy



- Collaborate with Ministry of New and Renewable Energy (MNRE), Commerce Ministry, and Indian Embassies to organize roadshows and B2B meetings in strategic markets.
- Integrate “Make in India” messaging, emphasizing India’s manufacturing scale, R&D, and green energy vision.
- Targeted Digital Marketing
- Launch country-specific digital campaigns targeting project developers, utilities, and policymakers.
- Use social media, LinkedIn, YouTube, and industry newsletters to highlight Indian innovations, O&M case studies, and sustainability credentials.
- Leverage SEO-driven content marketing: blogs, webinars, and technical whitepapers on cost-efficiency, reliability, and innovation.
- **Industry Partnerships and Thought Leadership**
 - Partner with global EPCs, utilities, and O&M service providers for joint demonstrations, pilot projects, and knowledge-sharing initiatives.
 - Publish co-branded reports and success stories to build trust and credibility in international markets.
 - Sponsor or speak at industry panels and technical workshops to establish India as a thought leader in wind technology.
- **Supporting Tactics**
 - Create standardized Brand India visuals and messaging toolkit for all OEMs to use in exhibitions, brochures, websites, and campaigns.
 - Develop certification and warranty programs that guarantee Indian turbines meet international reliability standards.
 - Track market perception via surveys and analytics, adjusting messaging based on feedback from target markets.
- **Expected Outcomes**





- Increased awareness and trust in Indian wind turbines globally.
- Strengthened perception of India as a technology-driven, reliable, and green manufacturing hub.
- Higher export volumes and participation in international projects, particularly in Europe, Latin America, and Africa.
- Long-term positioning of Indian OEMs as viable global competitors, not just cost-focused suppliers.

4.4 Strategic Partnerships for Market Entry and Technology Collaboration

In the global wind energy market, strategic partnerships are key for Indian wind turbine manufacturers aiming to expand internationally. Collaborations with local distributors, technology firms, and international organizations offer crucial benefits such as market access and risk mitigation. These partnerships facilitate faster entry and scaling by leveraging local regulatory knowledge and networks. Government and diplomatic channels, including trade missions and bilateral agreements, support these efforts. Ultimately, these alliances enhance credibility, access to advanced technologies, and foster long-term relationships, leading to quicker commercialization, repeat orders, and stronger brand recognition in foreign markets.

● Importance of Strategic Partnerships

Strategic partnerships are critical for Indian wind OEMs seeking to enter new markets or accelerate technology adoption. They offer:

- **Market Access:** Local partners provide regulatory knowledge, market intelligence, and established distribution networks, reducing entry risks.
- **Technology Collaboration:** Alliances with technology firms enable co-development of advanced turbine designs, O&M innovations, and digital solutions.
- **Shared Investment and Risk Mitigation:** Partnerships help distribute capital and operational risks, particularly in high-capex renewable energy projects.
- **Faster Scale-Up:** Leveraging local expertise and networks allows OEMs to accelerate project execution timelines and improve client confidence.



Case Example: European OEMs like Vestas and Siemens Gamesa often partner with local utilities, EPCs, and O&M service providers in Latin America and Asia to scale operations efficiently while complying with local regulations.

- **Proactive Partner Identification and Engagement**

- Local Distributors and Project Developers: Identify high-performing developers, EPC firms, and logistics partners to create joint project pipelines.
- Technology Firms: Collaborate with specialized firms for advanced turbines, digital O&M tools, or blade and nacelle innovations.
- Joint Ventures or Strategic Alliances: Structure agreements to share revenues, intellectual property, and operational responsibilities while aligning long-term goals.

Best Practice: Chinese OEMs entering European markets often form joint service entities or co-invested project development companies to build credibility and overcome barriers.

- **Utilize Government and Diplomatic Channels**

- Trade Missions and Expos: Participate in events like WindEurope, AWEA, and regional renewable forums to engage prospective partners.
- Government Platforms: Use EXIM Bank lines of credit, government-backed trade incentives, and bilateral renewable energy cooperation programs to facilitate collaborations.
- Industry Associations: Collaborate with organizations like GWEC, CII, FICCI, and national renewable councils to identify partners and co-develop market initiatives.

Example: India has bilateral renewable energy cooperation agreements with Germany, Denmark, and France that provide frameworks for technology sharing and joint R&D in wind and solar sectors.

- **Structuring Partnerships for Mutual Benefit**

- Market Access: Local partner provides regulatory guidance, permits, and client networks.





- Technology Transfer: Share expertise in turbine design, predictive maintenance, and digital O&M solutions.
- Co-Development: Collaborate on new product adaptations suitable for local climatic and grid conditions.
- Localized Manufacturing: Jointly invest in assembly or component manufacturing to reduce costs and improve delivery timelines.

Example: In offshore wind, European OEMs partner with regional shipyards and logistics firms to establish assembly hubs, improving both market responsiveness and local economic contribution.

- **Expected Outcomes for Indian OEMs**

- Reduced entry barriers and quicker commercialization in foreign markets.
- Enhanced credibility through partnerships with established local firms.
- Access to advanced technologies and R&D capabilities for competitive turbine designs.
- Stronger long-term relationships lead to repeat orders, local employment, and brand recognition.

Indian wind turbine manufacturers must focus on strategic partnerships, global standards compliance, and international presence to enhance competitiveness and growth. By aligning with global quality benchmarks, forming proactive partnerships, and leveraging diplomatic channels, they can overcome market entry barriers and drive technology innovation. Building robust supply chains and local service hubs, alongside R&D investments, is crucial. Implementing a "Brand India" strategy that highlights reliable, cost-effective, and sustainable solutions will strengthen global perceptions. These actions position Indian OEMs to expand export volumes and establish themselves as trusted leaders in the global wind energy sector..



Section Summary:

This section outlines strategies to improve global acceptance and market penetration of Indian wind turbines, noting that while NIWE certification is globally acknowledged, international buyers increasingly expect IECRE member certification body to strengthen confidence and reduce procurement risk. It emphasizes the need for accelerated R&D in larger turbine platforms and integration of advanced, digital, and smart turbine technologies aligned with global customer expectations. The section also highlights the importance of expanding international service networks, partnerships, and a coordinated “Brand India” approach to build trust, visibility, and long-term acceptance in global wind market.







5

Policy Recommendations and Implementation Roadmap

5 Policy Recommendations and Implementation Roadmap



In navigating the pathway to position India as a preeminent contender in the global wind energy sector, it is essential to synthesize the intricate dynamics and challenges outlined in this report. As we pivot to the policy recommendations and implementation roadmap, this section distils insights from our comprehensive examination of market dynamics, technological capabilities, competitive positioning, and financial frameworks into strategic directives.

India's wind energy sector has experienced steady growth, supported by policy measures and expanding domestic manufacturing capacity. As discussed in Section 1, this growth is occurring within a global market characterized by strong competition and pricing dynamics, particularly influenced by large-scale OEMs based in China. While our turbines are cost-competitive against Western counterparts, realizing true global competitiveness necessitates overcoming these pricing challenges through significant manufacturing and technological upscaling.

Central to these recommendations is addressing the pressing technology gap, highlighted in Section 2, as the global market shifts toward larger turbine platforms. India's current focus on 2–3 MW turbines (as the country has limited 5+ MW turbine capabilities) must evolve strategically to align with the international shift toward 4–6 MW units, necessitating robust R&D efforts and international technological collaborations.

In Section 3, we identified that the export finance mechanisms available to Indian stakeholders require enhancement to effectively rival those provided by China and Europe, which play a crucial role in making Indian turbines more attractive on a global stage. Additionally, extending India's service network internationally will enhance our footprint and assist in building a world-class service reputation.

Furthermore, to establish credibility on international platforms, intensifying efforts to develop an IECRE accredited body in India, as discussed in Section 4, is vital. The supply chain, while adept at assembly-level operations, requires fortification through increased localization, reducing dependency on imported components, thus optimizing cost efficiency.

Finally, evaluating and refining current policy frameworks, addressing embedded taxes, and easing export finance mechanisms will be pivotal in creating a fertile environment for the global expansion of India's wind energy exports.

Thus, this section endeavours to encapsulate holistic policies and a strategic roadmap that address these challenges head-on, paving the way for India to not only sustain but amplify its role as a leader in both domestic and international wind energy markets.

Based on the review of the sections the main challenges faced by the Indian wind turbine sector is as follows:

Challenges:

- **Cost gap vs China:** Despite being more competitive than Western peers, Indian OEMs still trail Chinese manufacturers who leverage economies of scale, state-backed financing, and integrated EPC packages.
- **Technology lag (4–6 MW platforms):** The global market is moving toward 4–6 MW and offshore platforms, while Indian OEMs remain majorly concentrated in the 2–3 MW range. Without accelerated R&D, India risks being locked out of high-growth segments.
- **Weak export finance and limited global service footprint:** Limited long-tenor credit and absence of overseas service hubs make Indian offerings less attractive compared to competitors who bundle financing, logistics, and O&M.

Opportunities

If India can decisively tackle its current bottlenecks closing the cost gap with China, upgrading turbine technology, and strengthening export finance and service networks it will unlock a transformative growth path. With 20–55% idle manufacturing capacity, the industry can scale exports almost immediately without heavy new investments. The timing is ideal: the global wind market is set to surge to ~212 GW annually by 2030, creating unprecedented demand. Beyond onshore growth, offshore wind and repowering segments offer premium opportunities where India's engineering depth can shine. Coupled with inherent cost competitiveness and a strong push for "Brand India" positioning, these factors can elevate India from a domestic player to a trusted global hub for wind technology and services.



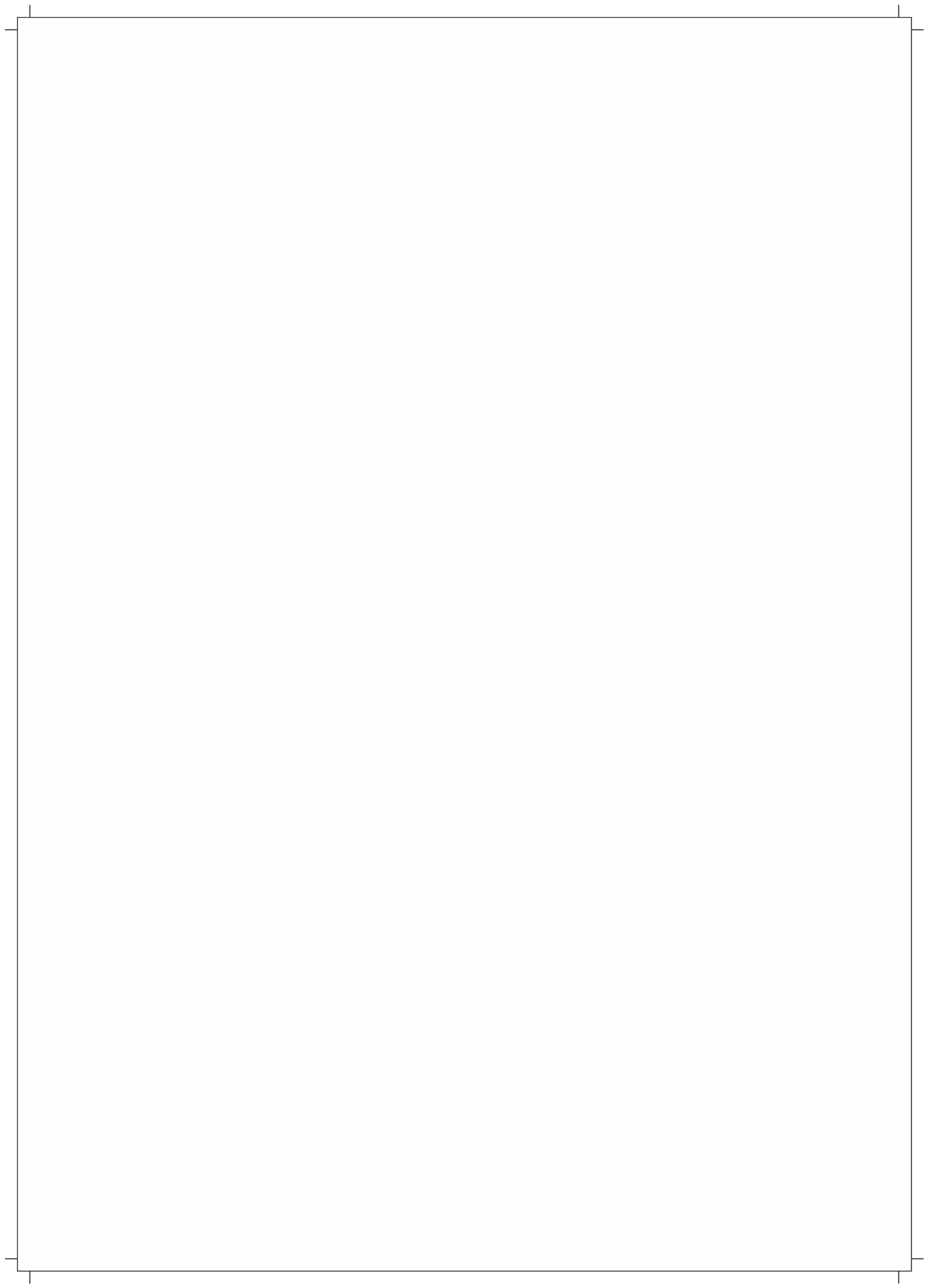
Recommendation on policies:

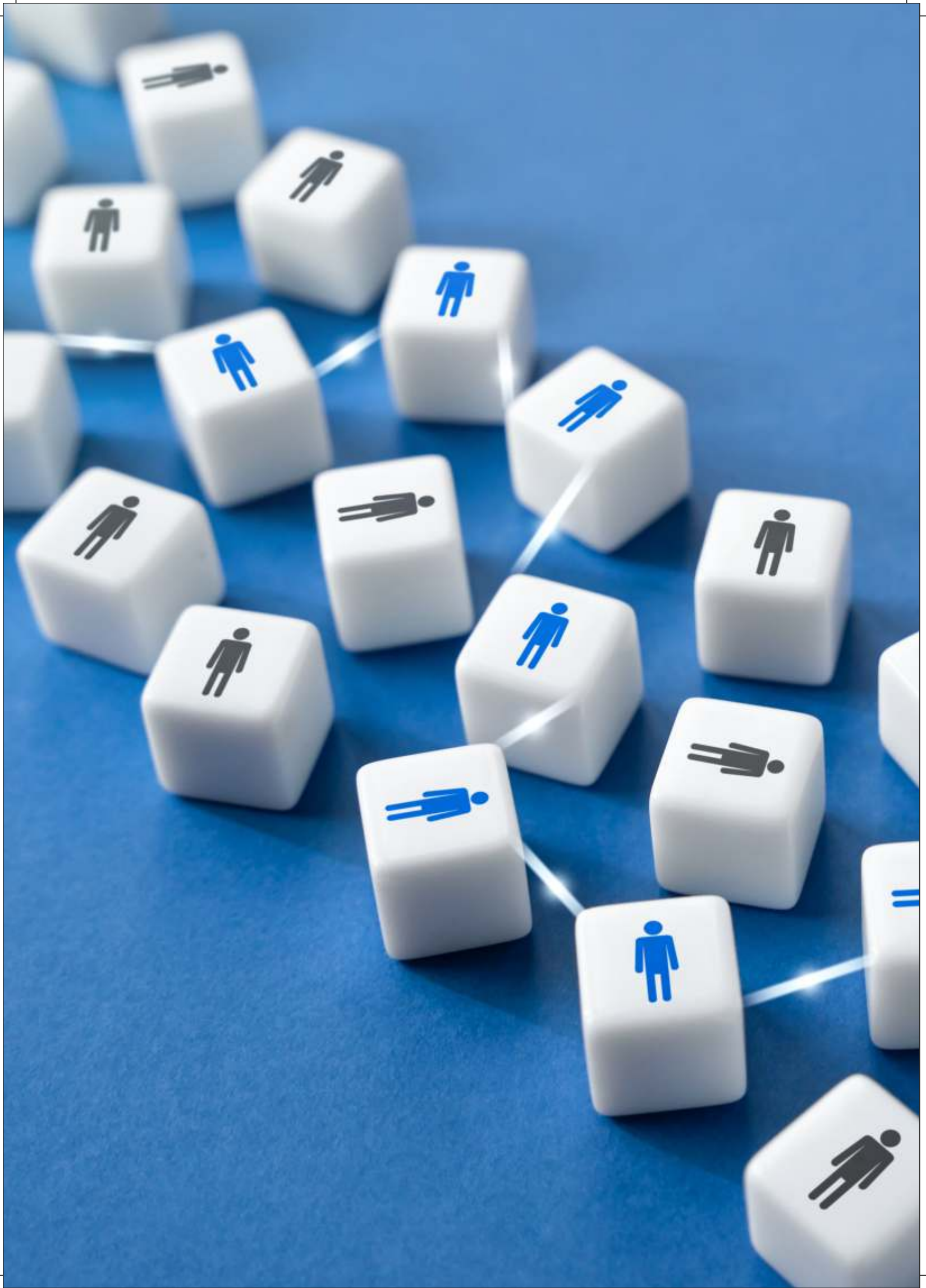
- Certification Accelerator: Fund IEC/UL/DNV certifications; create ALMM Export Track, Develop IECRE accredited certification body in India.
- Export Finance Upgrade: Long-tenor buyer's credit, sovereign cover, tied EPC packages.
- Manufacturing linked incentive 2.0 + Duty/Logistics Reforms: Incentivize blades, converters, generators; near-port hubs.
- Wind R&D Mission: Co-fund 4–6 MW platforms; offshore component grants.
- Brand India and Service Grants: Support overseas service centers, spares hubs, global marketing.

Industry Actions

- Indigenize high-value components; adopt automation and lean practices.
- Integrate global certification at design stage; publish bankability dossiers.
- Develop modular 4–6 MW turbines; invest in IoT/predictive maintenance.
- Form JVs for local service hubs; set up spare's warehouses in target markets.
- Launch global marketing campaigns with case studies and certifications.

These policy recommendations aim to bridge these gaps by accelerating global certifications, upgrading export finance, incentivizing high-value component manufacturing, and supporting R&D for next-generation turbines. Combined with branding and service network expansion, these measures will enable India to leverage its underutilized manufacturing capacity, cost advantages, and strategic location to capture a share of the projected 212 GW global wind market by 2030.





6

Unified Summary of Recommendations





6 Unified Summary of Recommendations



This section synthesizes and distills the recommendations articulated throughout the report into a cohesive overview. Its purpose is to provide readers with a comprehensive and succinct understanding of the diverse strategies and suggestions proposed, facilitating informed decision-making and strategic planning.

Section 3:

India has established a strong wind manufacturing base and a credible domestic deployment record. However, the current policy framework has limited alignment with the requirements of export-oriented wind turbine manufacturing. In contrast, leading wind-exporting nations such as Denmark, Germany, China, and the United States systematically complement domestic deployment with production-linked incentives, export-aligned financing, and buyer-side risk-mitigation mechanisms to actively create and sustain overseas demand. Indian wind OEMs, by comparison, continue to contend with higher factory-gate costs, limited access to long-tenor export finance, and reduced competitiveness in markets where concessional finance is often decisive.

Addressing these structural constraints will require targeted, export-linked fiscal, financial, and market-development interventions aimed at improving cost competitiveness, enabling scale, mitigating market-entry risks, and positioning India as a credible long-term supplier within the global wind turbine value chain.

Below table highlights the recommendations to tackle the challenges.

Table 20: Export recommendations

Recommendations	Reasoning	Action Items
Establishment of an Export Linked Wind Manufacturing Incentive (EL WMI)	India does not have a manufacturing incentive specifically for wind exports, unlike solar or countries like Denmark and China. Wind turbine exports are highly price-sensitive, and even marginal cost disadvantages at the factory gate can affect international tenders.	Introduce a centrally administered export-linked fiscal incentive for wind turbine and component manufacturers to directly offset higher input, logistics, and compliance costs in overseas markets. Possible structures: - Manufacturing linked incentive for exports (INR/MW or % of FOB export value) for 5–7 years, or - Turnover linked incentive for 5–7 years applicable only to exports outside India.
Create Indian Wind Export Finance Facility (I WEFF)	Competing countries offer financing that boosts export competitiveness, lacking in India.	Establish a facility under EXIM Bank or a new vertical with SIDBI/NIIF/IREDA. This facility may offer: - Buyer's credit for foreign projects using Indian turbines - Supplier's credit to Indian OEMs for export contracts - Long tenor project finance (15-20 years) aligned with wind cash flows. - Local currency lending options in emerging markets.
Establish Project Development Fund (PDF) for Wind Exports	High upfront costs and risks deter Indian wind projects abroad.	Create a government-backed fund to support Indian developers with equity and risk cover, facilitating bundled offerings (Indian OEM turbines, EPC, O&M, and capital) to compete globally.
Export Linked Tax Incentives & Cash Flow Support	Exporters face cash flow stress from delayed GST refunds and high certification costs, hindering growth and market entry.	Introduce fiscal measures to improve cash flow: - Refund embedded taxes on exported turbines. - Accelerated GST refunds for renewable equipment exporters. - Weighted deduction for export-related R&D and certification expenses.
Launch India Wind Global Market Development Program	Indian manufacturers have limited visibility and credibility abroad, facing high entry costs and non-price barriers.	Implement initiatives such as government-backed export missions, co-funded demonstration projects using Indian turbines, and support for international certifications and compliance with grid codes.
Strategic Input & Supply Chain Support	High input costs and fragmented supply chains weaken export competitiveness.	Provide support for key materials (steel, castings, composites), preferential power tariffs, and establish supplier parks near ports with ready infrastructure.
Launch an ECA-Backed Payment Deferral Facility	The wind sector faces challenges like high upfront capital needs and limited access to affordable financing, hindering Indian OEMs from offering competitive terms.	Enable ECGC or a dedicated Export Credit Agency to provide a 100% sovereign guarantee on export receivables, allowing deferred payment terms. This approach, similar to Vestas in Australia, can unlock high-value tenders and benefit stakeholders by improving cash flow, enhancing export volumes, and providing payment security.

India's wind manufacturing sector is well-positioned to expand its role globally due to its strong industrial base, cost-effective engineering, and domestic deployment experience. However, the absence of an export-focused policy hinders its competitiveness abroad. Proposed recommendations aim to address these gaps by boosting competitiveness, expanding access to long-term export finance, reducing market-entry risks, and improving global visibility. These measures could enable India to transition from a domestic-focused market to a credible global supplier, especially for emerging markets with growing clean energy needs.

Government Incentive Schemes

- **State-wise Incentives under Industrial Policy:** Several Indian states have established policies that prioritize and incentivizes renewable energy sector, encouraging new and existing investments in the state. A comprehensive review of the latest industrial policies of five leading states has been undertaken with an objective to assess the landscape of incentives available to wind turbine manufacturers.

The following recommendations shall be taken into consideration on State Government schemes:

- Wherever an exporter has capitalized the unrealisable tax cost on capital goods due to prescribed refund mechanisms, any of the following options shall be take up with the Government:
 - The tax value capitalized needs to be included as part of eligible investment and be included for provided capital subsidy.
 - The tax value needs to be separately refunded by the Government to eliminate the tax cost embedded in the exported products.
- SGST reimbursement provided by the States are predominantly at 'Net' SGST payable level instead of 'Gross' level, as in the case of Maharashtra state. It is suggested that the states provide this reimbursement at 'Gross' level.

The following recommendations should be taken on Interest Equalisation Scheme

Considering the existing export finance framework and the capital-intensive nature of the wind turbine manufacturing industry, the following measures may be considered:



- The erstwhile 'Interest Equalisation' scheme which provided exporters with reduced interest rates may be reinstated, continued on a long-term basis and made applicable to all exporters in the Wind energy sector, rather than being restricted only to MSME exporters.
- As exports of renewable energy products are intrinsically linked to project implementation outside India and typically involve long-gestation, project-based contracts, it is suggested that such exports be brought within the ambit of "project exports", thereby enabling access to the corresponding support mechanisms, including export credit guarantees and insurance cover.
- Further, it is recommended that additional leverage may be provided on interest equalization under export finance credit schemes in Project exports.

Supply chain optimization and localization strategies to reduce costs

India's wind energy sector stands at the cusp of transformation, driven by a strategic push towards cost reduction and enhanced localization. With ambitious renewable energy targets, the focus is on optimizing the supply chain, incentivizing indigenous manufacturing, implementing advanced practices, and developing a robust domestic vendor base. By addressing key challenges and leveraging targeted strategies, India aims to strengthen its manufacturing capabilities, reduce import dependencies, and position itself as a leader in global wind energy markets. The following recommendations outline a comprehensive approach to achieving these goals efficiently and competitively.



Table 21: Supply chain recommendations

Recommendations	Reasoning	Action Items
Optimize Supply Chain	High costs in turbine CAPEX, with reliance on imports for critical materials, increase overall project expenses and supply chain risks.	Promote competitive pricing of turbine materials and reduce dependency on China through manufacturing linked incentives schemes and the Rare-Earth Permanent Magnet (REPM) scheme. Diversify sourcing and invest in magnet-light drivetrain technologies.
Incentivize Indigenous Manufacturing	Current localization at assembly level (70%) but system-level (50%) remains low, particularly in high-value components, increasing import costs.	Implement a phased local-content roadmap under MNRE's ALMM, supported by Make in India and manufacturing linked incentives - style incentives. Realign duties for specialty steel and create cluster-based hubs for scale and competitiveness.
Implement Advanced Manufacturing	Global benchmarks show significant cost reductions through lean practices and automation, yet logistics challenges persist.	Utilize lean, automation, and digital upgrades. Optimize logistics with multimodal transport and near-port hubs to reduce transport costs. Form forums for route clearances and inventory planning.
Develop Domestic Vendor Base	Strengthening local suppliers can reduce dependency on imports, enhance technology transfer, and improve market competitiveness.	Support Tier-2 suppliers via MSME schemes and OEM-SME partnerships. Establish shared testing infrastructure and IP pools to reduce foreign dependency. Implement export-readiness programs and offer collateral-free credit.

By strategically optimizing supply chains, promoting indigenous manufacturing, adopting advanced technologies, and fostering a strong domestic vendor ecosystem, India is well-positioned to navigate existing challenges and elevate its wind energy sector. These initiatives will not only bolster local capabilities but also reduce costs and import dependencies, setting the stage for India to become a pivotal player in the global renewable energy landscape. With continued commitment and implementation, India can achieve its renewable energy ambitions and establish itself as a leader in sustainable energy production.

Section 4:

This section outlines a strategic plan to elevate India's wind turbine industry internationally through five key areas. It includes establishing IECRE recognized certifications, driving focused R&D to align products with global needs, and building robust service networks to improve market presence. The "Brand India" strategy enhances global perception, while strategic partnerships facilitate market entry and technology collaboration. Together, these initiatives position India as a leading player in the global wind energy sector.

Roadmap for establishing a IECRE recognized certification body in India: NIWE

The table below emphasizes the need to establish a IECRE recognized certification body for wind turbines. NIWE, as India's main inspection body, currently approves turbine models for inclusion in the ALMM lists. NIWE must gain membership in prestigious organizations like IECRE and enhance its technical capabilities through stringent accreditation processes.

Table 22: Pathway for NIWE to become globally recognised certification body.
(Source: IECRE, IECRE certification bodies)

Recommendations	Reasoning	Action Items
NIWE to become a member of IECRE	In To further enhance its competitive position in today's dynamic market and boost its acceptance among global buyers, NIWE should consider prioritizing IECRE membership. This strategic initiative is pivotal for enhancing its credibility and achieving a broader level of international acceptance	- Establish an independent certification division - Obtain NABCB accreditation – already accredited - Obtain NABL accreditation- already accredited - IECRE member certification bodies receive global recognition and acceptance

Focused R&D initiatives to develop products tailored for global market needs

The table below highlights the imperative for India to strengthen its wind energy sector through focused research and development initiatives tailored to meet global market demands. As the wind turbine industry pivots towards higher-capacity smart turbines and cost-effective solutions, Indian manufacturers face the challenge of aligning production capabilities with international standards. To maintain competitiveness and reduce dependency on imports, it is crucial to enhance local production by advancing technological innovation, increasing localization, and minimizing costs while meeting worldwide energy needs.

Table 23: R&D initiatives required to develop products for global market.
(Source: Company website, GWEC global and India outlook 2025)

Recommendations	Reasoning	Action Items
Develop higher-capacity turbines aligned with global market needs.	The global market is shifting to turbines with capacities around 5.5 MW by 2024, but Indian manufacturers predominantly produce 2-3 MW turbines, creating a gap between demand and capabilities.	Initiate R&D to develop turbines with higher capacities, focusing on collaboration with global partners.
Enhance R&D for smart turbine production.	Smart turbines featuring advanced analytics and real-time monitoring are the future, yet Indian manufacturers are not fully engaged in smart turbine production compared to global leaders like Goldwind and Envision.	Accelerate R&D to incorporate smart technologies and commence production of smart turbines.
Focus on reducing the Levelized Cost of Energy (LCOE) through design innovations.	Lowering LCOE requires smarter designs, predictive controls, and hybrid solutions, which will maximize energy output and improve project economics.	Invest in R&D for longer blades, advanced aerodynamics, adaptive systems, and digital twins for maintenance.
Increase localization in wind supply chain and reduce import dependency.	Localization in India is approximately 70%, with critical components still imported. Increasing to 80-85% can reduce costs by up to 20%.	Focus R&D on next-gen blade materials, automated manufacturing, and develop testing infrastructure for components like gearboxes and converters.

Strategies for establishing and strengthening global service and support networks

The table below outlines essential strategies for Indian wind turbine manufacturers seeking to establish and strengthen global service and support networks. In the competitive landscape of wind energy, maintaining a robust international presence is crucial for capturing larger market shares and ensuring long-term growth. By expanding distribution networks, enhancing service and spare parts availability, and leveraging advanced digital tools, Indian OEMs can improve operational efficiency and customer satisfaction. These strategic initiatives are designed to reduce downtime, optimize logistics, and build a competitive edge in the global market, aligning with best practices demonstrated by leading international companies.

Table 24: Approaches to Develop and Strengthen International Service and Support Infrastructure

Recommendations	Reasoning	Action Items
Establish Dedicated Local Service Centers / Strategic Partnerships	Local service hubs can reduce downtime, provide regional regulatory compliance, and foster customer trust by offering tailored on-site and linguistic support.	Set up regional service hubs and form partnerships with local service providers in key export markets.
Develop a Decentralized Global Logistics Network for Spare Parts	Regional spare-part warehouses near major wind clusters reduce downtime and supply-chain risks while supporting competitive service contracts.	Establish multi-tier spare-part logistics hubs near major wind clusters to improve O&M efficiency.
Invest in Training and Certifying Local Technicians + Mobile Expert Teams	Training local technicians reduces reliance on expatriate staff and efficiently addresses global O&M skill shortages, enhancing maintenance capabilities.	Train local technicians to GWO standards and deploy mobile expert teams for complex maintenance tasks.
Deploy Remote Monitoring, Predictive Maintenance, and Digital Tools	Digital tools enable real-time monitoring, predictive maintenance, and adaptive control, reducing downtime and extending component life effectively.	Implement SCADA-based monitoring and AI-driven maintenance to optimize operations. Use digital failures and IT systems for diagnostics, and apply AI for scheduling, minimizing failures, and reducing on-site interventions.

“Brand India” strategy for wind turbines to enhance global perception

The following table outlines the “Brand India” strategy, aimed at positioning Indian wind turbines as competitive, high-quality, and cost-effective solutions in the global market. By promoting technological advancements and sustainable manufacturing practices, and emphasizing India’s compliance with international standards, the strategy seeks to enhance the global perception of Indian OEMs. Through strategic marketing initiatives, international collaborations, and industry partnerships, “Brand India” aims to build trust and expand India’s footprint in the wind energy sector, positioning its products as viable alternatives to European, Chinese, and American counterparts.

Table 25: Brand India Roadmap

Recommendations	Reasoning	Action Items
Core Brand Message	Establish India as a trusted, cost-effective source for high-quality wind turbines, emphasizing reliability and sustainability as premium solutions.	Create a positioning statement highlighting manufacturing reliability, international standards, and competitive pricing. Communicate long-term reliability and O&M capabilities.
Promote Technological & Manufacturing Strengths	Showcase India's R&D achievements and sustainable practices to build credibility and attract foreign markets.	Highlight R&D in turbine efficiency, green manufacturing practices, and global case studies. Support certifications and compliance with international benchmarks.
Strategic Promotion Channels	Utilize trade shows, economic diplomacy, and digital marketing to enhance global visibility and market penetration.	Participate in international expos, organize roadshows, and launch digital campaigns using SEO techniques and targeted content.
Industry Partnerships and Thought Leadership	Form strategic partnerships and engage in knowledge-sharing to build trust and demonstrate thought leadership in wind technology.	Partner with global EPCs and utilities, publish co-branded materials, and sponsor industry panels.
Supporting Tactics	Develop standard visuals and messaging while ensuring international standards and adjusting strategy based on market feedback.	Design a toolkit for brand messaging, create certification programs, and track market perception using surveys and analytics.

Strategic Partnerships for Market Entry and Technology Collaboration

The table below explores the vital role of strategic partnerships in facilitating market entry and technology collaboration for Indian wind turbine manufacturers on the global stage. By forming alliances with local distributors, technology firms, and international organizations, Indian OEMs can access market intelligence and leverage regulatory expertise, reducing entry risks and enabling quicker scaling. Utilizing government and diplomatic channels enhances these efforts, fostering credibility and long-term relationships. Through structured partnerships, Indian manufacturers can benefit from shared investment, co-development, and localized manufacturing, establishing themselves as reliable and innovative players in the international wind energy sector.

Table 26: Strategic partnership for global acceptance and reach

Recommendations	Reasoning	Action Items
Importance of Strategic Partnerships	Strategic partnerships provide market access, technology collaboration, shared risk, and faster scaling, crucial for Indian wind OEMs expanding internationally.	Identify partners for regulatory knowledge and technology co-development, focusing on shared investment and risk mitigation strategies.
Proactive Partner Identification and Engagement	Collaborate with local distributors, developers, and technology firms to create joint pipelines and co-develop advanced solutions.	Identify high-performing distributors and technology firms for joint ventures, and structure alliances with shared goals.
Utilize Government and Diplomatic Channels	Leverage trade missions, government-backed platforms, and industry associations to identify and engage prospective partners.	Participate in international expos and use government programs and associations for partner engagement, aligning with bilateral agreements.
Structuring Partnerships for Mutual Benefit	Ensure mutual benefits through market access, technology transfer, co-development, and localized manufacturing to reduce costs and improve timelines.	Collaborate on regulatory guidance, technology sharing, and local manufacturing, structuring agreements to share revenues and expertise.

The strategies presented aim to solidify India's position in the global wind turbine market. Through recognized certifications, R&D innovation, and expanded service networks, Indian OEMs are poised to enhance their international footprint. The "Brand India" strategy and strategic partnerships will further reinforce India's reputation, increase exports, and foster international relationships for sustained growth in the renewable energy landscape.

Section 5:

This section presents a condensed overview of strategic recommendations to address the key challenges facing India's wind energy sector. With competitive pressures from China, a deficiency in and bankability, technological lag in turbine platforms, and limitations in export finance and service networks, the need for targeted actions is evident. By implementing measures such as certification accelerators, R&D advancements, financial enhancements, and strategic service expansions, India can bolster its position as a formidable player in the international wind energy market. These suggestions aim to refine the existing frameworks and elevate India's capabilities to meet global demands effectively.

The table below outlines the primary challenges and corresponding recommendations for addressing them.

Table 27: Key challenges in the industry as per the report and recommendations

Challenges	Recommendations	Action Items
Cost Gap vs China	Manufacturing linked incentive 2.0 + Duty/Logistics Reforms	Incentivize blades, converters, generators, and establish near-port hubs to compete effectively against economies of scale.
Certification accelerator and Global Bankability Deficit	Certification Accelerator	Fund IEC/UL/DNV certifications and create an ALMM Export Track for enhanced global market access and credibility. Become an IECRE accredited body
Technology Lag (4–6 MW Platforms)	Wind R&D Mission	Co-fund development of 4–6 MW platforms and provide offshore component grants to advance technological capabilities.
Weak Export Finance and Limited Global Service Footprint	Export Finance Upgrade & Brand India and Service Grants	Provide long-tenor buyer's credit, sovereign cover, tied EPC packages; establish overseas service centers and spares hubs.

Addressing these key challenges with targeted recommendations is essential for strengthening India's wind energy sector and enhancing its global competitiveness. By implementing strategic reforms in certification, technology development, financial support, and service networks, India can transform these obstacles into avenues for growth and innovation, establishing itself as a formidable player in the international wind energy landscape.



Appendix

RBI (Trade Relief Measures) Directions, 2025

The Reserve Bank of India (RBI) has issued the “Reserve Bank of India (Trade Relief Measures) Directions, 2025” on 14th November 2025 to mitigate debt-servicing stress caused by global trade disruptions and to preserve the viability of otherwise sound businesses. They apply to a broad set of “Regulated Entities” (RDEs): commercial banks; primary (urban) co-operative banks, state co-operative banks, and central co-operative banks; non-banking financial companies (including housing finance companies); all India financial institutions; and, for specific provisions, credit information companies.

Eligibility Criteria

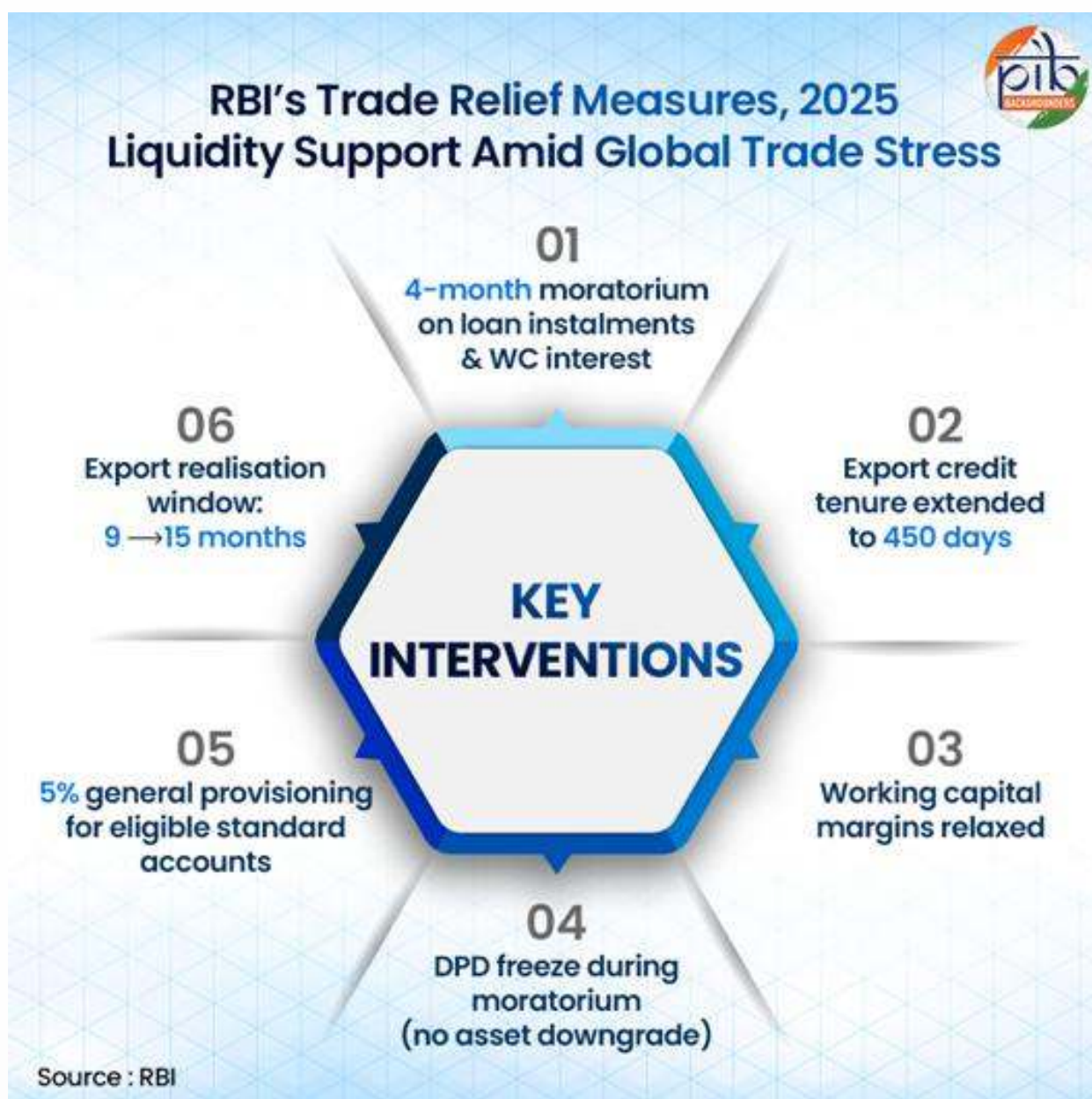
A borrower qualifies for relief under these Directions only if all the following conditions are met:

- The borrower is engaged in exports in one of the “eligible sectors.”
- The borrower had an outstanding export credit facility from an RDE as of 31st August 2025.
- All the borrower’s accounts with all RDEs were classified as “Standard” on 31st August 2025.

Where the relief is being considered by an RDE that did not originally sanction the export credit facility, it may rely on a certification from the lending RDE(s) that the borrower meets the criterion of having outstanding export credit as on 31st August 2025.

The eligible sectors include products under HSN Chapter 73, 84 and 85 thereby rendering measures applicable to the wind turbine exporters.

Figure 30: Trade Relief Measures



Key Pointers:

- **Moratorium on Term Loans:** RDEs may grant a moratorium on payment of all instalments (principal and/or interest) falling due between September 1, 2025, and December 31, 2025 (the “Effective Period”).
- **Deferment for Working Capital (CC/OD):** For working capital facilities in the form of cash credit or overdraft, RDEs may defer recovery of interest applied during the Effective Period.
- **Interest Accrual Terms:** During the moratorium/deferment, interest continues to accrue but only on a simple interest basis, with an explicit prohibition on compounding (i.e., no “interest on interest”).
- **Funded Interest Term Loan (FITL):** The interest accumulated during the moratorium/deferment may be converted into a funded interest term loan, repayable in one or more instalments after March 31, 2026, but not later than September 30, 2026.
- **Revision of Drawing Power:** RDEs may, at their discretion, recalculate drawing power for working capital facilities by reducing margins and/or reassessing working capital limits during the Effective Period, with any subsequent review after the Effective Period based on regular assessments.
- **Extension of Tenor for Export Credit:** The Directions provide specific relief concerning export credit.
 - RDEs eligible to undertake export financing may allow an enhanced credit period of up to 450 days for pre shipment and post shipment export credit disbursed till March 31, 2026.
 - For packing credit facilities availed on or before August 31, 2025, where dispatch of goods could not take place, RDEs may permit liquidation of such facilities from any legitimate alternate sources, including domestic sale proceeds of the goods or substitution of export contracts by proceeds of another export order.

Credit Guarantee Scheme for Exporters (CGSE)

The Credit Guarantee Scheme for Exporters (CGSE) is a government-backed programme designed to provide guarantee coverage for credit assistance extended to eligible exporters including MSME exporters. The core purpose is to support export-oriented enterprises by providing a 100% guarantee cover on additional term loan or working capital term loan facilities, thereby enabling lenders to extend credit with significantly reduced risk.



The scheme is operated through a dedicated trust fund, the Credit Guarantee Fund for Exporters (CGFE), constituted by the Department of Financial Services (DFS), Ministry of Finance, and managed by the National Credit Guarantee Trustee Company Limited (NCGTC) as Trustee.

The scheme is available until guarantees for loans totalling INR 20,000 crore have been issued, or until 31st March 2026, whichever is earlier.

Eligibility Criteria

The scheme covers both direct and indirect exporters, with explicit thresholds on export linkage.

- **Direct exporters** (Export of products in specific sectors to US – covers Engineering Goods)
 - MSME units with at least 5% of their turnover through exports.
 - Non MSME units with at least 20% of their turnover through exports.
- **Indirect exporters**
 - MSME units that supply at least 30% of their total turnover to the above direct exporter units.

These conditions can be satisfied with reference to either of the two preceding financial years, 2024 or FY 2025. MSMEs must have a valid Udyam Registration Number, and direct exporters must have active export working capital limits, while indirect exporters must have active domestic working capital limits with an eligible Member Lending Institution (MLI) at the time of sanction or disbursement of the CGSE facility.

Borrower accounts must be in the “Standard” category (excluding SMA 2) with not more than 60 days overdue across all lenders as on September 30, 2025, and must not be NPA at the time of sanction/disbursement under CGSE.

Key features of the scheme

- **Nature of Support: The support is structured as an additional term loan/working capital term loan operated as a separate loan account**
- **Quantum per borrower:**
 - Direct exporters: up to 20% of sanctioned export working capital limits (fund based and non-fund based).



- Indirect exporters: up to 20% of sanctioned domestic working capital limits (fund based and non-fund based).
- **Maximum loan size:** INR. 50 crore per borrower, in INR currency only, with the working capital limits as on September 30, 2025, forming the base for calculation of the CGSE facility.
- **Guarantee cover:** 100% of the amount in default, subject to conditions.
- **Tenor of the loan:** 4 years fixed, including a 1-year moratorium, with repayment in equal monthly instalments thereafter.
- **Interest rate:** 1% below the rate on any existing working capital facility of the MLI on the date of issue of guidelines, capped at 10% p.a. for banks/FIs and 14% p.a. for NBFCs, subject to RBI norms. If the MLI has only foreign currency working capital facilities with a borrower, CGSE support must be priced at 1% below the rate that would otherwise apply for INR export credit to that borrower, subject to the same cap.

Export promotion Mission

The Export Promotion Mission (EPM) is a six-year, unified framework approved by the Government of India with a total outlay of INR 25,060 crore for FY 2025–26 to FY 2030–31 to strengthen India's export competitiveness, with particular focus on MSMEs, first time exporters and labour-intensive sectors.

It consolidates multiple-fragmented export support schemes into a single, outcome based, digitally driven architecture, implemented through the Directorate General of Foreign Trade (DGFT) via a dedicated online platform aligned with trade and customs systems.

EPM is embedded in an institutional framework involving the Department of Commerce, Ministry of MSME, Ministry of Finance, Export Promotion Councils, Commodity Boards, financial institutions, industry associations, and state governments, ensuring coordinated policy and financial support for exporters across sectors and regions.

Two Integrated Sub Schemes: EPM operates through two integrated sub schemes that together address the core enablers of export performance:



- **Niryat Protsahan (Financial Enablers)** – focused on improving access to affordable trade finance for MSME exporters.
- **Niryat Disha (Non-Financial Enablers)** – focused on market readiness, compliance, branding, and logistics support.

Figure 31: Export Promotion Mission (EPM)³¹



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38	PIB / Press Information Bureau
39	Rare earth exchange
40	S&P
41	Siemens Website
42	Statista database
43	Suzlon Website
44	TUV Website
45	U.S. Bureau of Labor Statistics (BLS) Wind Energy page
46	Union Budget 2024 announcement
47	Vestas Website
48	WWEA

Abbreviations

Abbreviation	Full form
AA	Advance Authorisation
AD	Accelerated Depreciation
AEP	Annual Energy Production
AI	Artificial Intelligence
AIR	All Industry Rate
ALMM	Approved List of Models and Manufacturers
AP	Andhra Pradesh
APAC	Asia-Pacific
APERC	Andhra Pradesh Electricity Regulatory Commission
APQP	Advanced Product Quality Planning
AREF	African Renewable Energy Fund
B2B	Business-to-Business
BCD	Basic Customs Duty
BNEF	Bloomberg New Energy Finance
BoP	Balance of Plant
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CE	Conformité Européenne
CEA	Central Electricity Authority
CGFE	Credit Guarantee Fund for Exporters
CGSE	Credit Guarantee Scheme for Exporters

Abbreviation	Full form
IEC	International Electrotechnical Commission
IECRE	IEC System for Certification for Renewable Energy
IES	Interest Equalisation Scheme
INR	Indian Rupee(s)
IoT	Internet of Things
IP	Intellectual Property
IPP / IPPs	Independent Power Producer(s)
IREDA	Indian Renewable Energy Development Agency
IRENA	International Renewable Energy Agency
IRR	Internal Rate of Return
IWTMA	Indian Wind Turbine Manufacturers Association
JV	Joint Venture
kWh	Kilowatt-hour
LCOE	Levelized Cost of Energy
LoC	Letter of Comfort
LTA	Lender Technical Advisor
LUT	Letter of Undertaking
MEIS	Merchandise Exports from India Scheme
MES	Manufacturing Execution System
MLI	Member Lending Institution
MNRE	Ministry of New and Renewable Energy

Abbreviations

Abbreviation	Full form
CGST	Central Goods and Services Tax
CGTMSE	Credit Guarantee Trust for Micro and Small Enterprises
CII	Confederation of Indian Industry
DFI	Development Finance Institution
DFIA	Duty-Free Import Authorisation
DFS	Department of Financial Services
DGFT	Directorate General of Foreign Trade
DISCOM	Distribution Company
DNV	Det Norske Veritas
DPIIT	Department for Promotion of Industry and Internal Trade
DSRA	Debt Service Reserve Account
DTA	Domestic Tariff Area
ECA	Export Credit Agency
ECGC	Export Credit Guarantee Corporation
eFCI	Eligible Fixed Capital Investment
EIFO	Danish Export and Investment Fund
EL WMI	Export Linked Wind Manufacturing Incentive
EO	Export Obligation
EOU	Export Oriented Unit(s)
EPC	Engineering, Procurement and Construction
EPCG	Export Promotion Capital Goods

Abbreviation	Full form
MOOWR	Manufacture and Other Operations in Warehouse Regulations
MSME	Micro, Small and Medium Enterprise
MW	Megawatt
NABCB	National Accreditation Board for Certification Bodies
NABL	National Accreditation Board for Testing and Calibration Laboratories
NBFC	Non-Banking Financial Company
NCGTC	National Credit Guarantee Trustee Company Limited
NIIF	National Investment and Infrastructure Fund
NIWE	National Institute of Wind Energy
NPA	Non-Performing Asset
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
PDF	Project Development Fund
PDP8	National Power Development Plan VIII
PLI	Production Linked Incentive
PM	Permanent Magnet
PPA	Power Purchase Agreement
PPAP	Production Part Approval Process
PSI	Package Scheme of Incentives
QMS	Quality Management System
R&D	Research and Development



Abbreviations

Abbreviation	Full form	Abbreviation	Full form
EPF	Employees' Provident Fund	RBI	Reserve Bank of India
EPM	Export Promotion Mission	RDEs	Regulated Entities
ESG	Environmental, Social, and Governance	RE	Renewable Energy/ Rare Earth
EUR	Euro	RECB	Renewable Energy Certification Body
EVOSS	Energy Virtual One-Stop Shop	REPM	Rare-Earth Permanent Magnet
EXIM	Export-Import	RLMM	Revised List of Models and Manufacturers
FCI	Fixed Capital Investment	RoDTEP	Remission of Duties and Taxes on Exported Products
FI / FIs	Financial Institution(s)	RPOs	Renewable Purchase Obligations
FICCI	Federation of Indian Chambers of Commerce & Industry	SCADA	Supervisory Control and Data Acquisition
FIT	Feed-in Tariff	SEZ	Special Economic Zone
FITL	Funded Interest Term Loan	SGST	State Goods and Services Tax
FOB	Free On Board	SIDBI	Small Industries Development Bank of India
FTA	Free Trade Agreement	SIPCOT	State Industries Promotion Corporation of Tamil Nadu
FTP	Foreign Trade Policy	SMA	Special Mention Account
FY	Financial Year / Fiscal Year	SME	Small and Medium Enterprise
GBI	Generation Based Incentive	SNA	State Nodal Agency
GBP	British Pound	SPV	Special Purpose Vehicle
GEC	Green Energy Corridor	TW	Terawatt
GERC	Gujarat Electricity Regulatory Commission	UL	Underwriters Laboratories
GST	Goods and Services Tax	US	United States
GW	Gigawatt	USD	US Dollar
GWEC	Global Wind Energy Council	VFA	Value of Fixed Assets
GWO	Global Wind Organisation	VGF	Viability Gap Funding
HSN	Harmonized System of Nomenclature	WACC	Weighted Average Cost of Capital
I WEFF	Indian Wind Export Finance Facility	WTG	Wind Turbine Generator
IAF MLA	International Accreditation Forum Multilateral Recognition Arrangement	ZED	Zero Defect Zero Effect

