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INDIA'S LEADERSHIP IN THE INTERNATIONAL SOLAR ALLIANCE: CATALYZING SOLAR ENERGY TRANSITION IN DEVELOPING NATIONS

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Abstract

This paper explores how India has emerged as a key driving force behind the International Solar Alliance (ISA) and what this means for expanding solar energy across the developing world. Launched by India and France in 2015, the ISA stands out as a rare, South-led global initiative with the ambitious goal of mobilizing USD 1 trillion by 2030 to install 1,000 GW of solar power. By examining India's domestic solar journey, policy choices, and leadership within the ISA, the study shows how India's climate action is closely tied to its broader foreign policy goals. While India's own progress has been impressive—solar capacity crossed 90.76 GW by September 2024, and renewables now account for nearly half of its installed power capacity—the ISA has struggled to convert ambition into large-scale projects, especially in smaller and less-developed member countries. Even so, India's experience offers practical lessons for other solar-rich nations aiming to shift toward clean energy. The paper argues that for the ISA to truly deliver on its promise, it will need stronger and more consistent financing, deeper capacity building, and better coordination among its members.

Keywords: International Solar Alliance, Solar Energy, India, Renewable Energy, Climate Change, Developing Countries, Energy Transition, Sustainable Development

Introduction

The global energy landscape is undergoing a fundamental transformation as nations worldwide grapple with the dual challenges of meeting growing energy demands while mitigating climate change impacts. Solar energy has emerged as a cornerstone of this transition, offering a clean, renewable, and increasingly cost-effective alternative to fossil fuels. Within this context, the International Solar Alliance (ISA) represents an innovative multilateral framework designed to accelerate solar energy deployment, particularly in countries located between the Tropic of Cancer and the Tropic of Capricorn—regions blessed with abundant solar resources but often constrained by financial and technical barriers.

Launched on November 30, 2015, during the Paris Climate Conference (COP21), the ISA was conceived as a joint initiative between India and France, reflecting a new paradigm in climate cooperation led by developing nations. The timing of this announcement was strategic, signaling India's willingness to be an active player in global climate cooperation at a time when the country faced intense scrutiny over its role in securing or potentially derailing the Paris Agreement.

India's involvement in establishing and leading the ISA is more than an environmental initiative; it represents a deliberate instrument of economic statecraft that aligns the country's domestic clean energy priorities with broader foreign policy objectives. With an installed solar capacity that has grown from negligible amounts in 2014 to approximately 90.76 GW by September 2024, India's domestic achievements provide credibility and practical experience to guide other member nations through their own renewable energy transitions.

This research paper examines India's leadership role in the ISA, analyzing both the successes and challenges encountered in promoting solar energy across developing nations. The study investigates how India's experience in scaling solar infrastructure, coupled with its strategic positioning within the Global South, enables it to serve as both a role model and facilitator for countries embarking on similar energy transitions.

Literature Review

Global Solar Energy Transition

The global solar energy sector has experienced explosive growth, with installed capacity surging from 1.22 GW in 2000 to nearly 1,419 GW by 2023, fueled by a 90% drop in utility-scale PV costs since 2010. Manufacturing

capacity is projected to surpass 1,100 GW in 2024—over twice the demand—driving further price cuts, while renewables created 16.2 million jobs in 2023, including 7.1 million in solar (a 44% rise from 2022). Despite this progress, expansion remains uneven: China led with 62% (216 GW) of the 345 GW added in 2023, and over 80% of investments cluster in developed economies, China, and India, leaving smaller developing nations underserved—a gap the International Solar Alliance (ISA) seeks to bridge for equitable access.

India's Renewable Energy Trajectory

India ranks as the world's fourth-largest renewable energy producer and third-largest solar power producer, with total renewable capacity hitting 203.18 GW by October 2024, including a 30-fold solar surge from 3 GW in 2014 to 90.76 GW by September 2024. This expansion stems from ambitious goals like 500 GW non-fossil capacity by 2030 under Paris NDCs, the 2010 Jawaharlal Nehru National Solar Mission's incentives, and 2024's PM Surya Ghar initiative, which installed 700,000 rooftop systems in ten months. Adding a record 24.5 GW of solar in 2024—double the 2022-2023 total—India exemplifies rapid scaling, bolstering its leadership in the International Solar Alliance (ISA) to guide other members.

Multilateral Climate Cooperation Frameworks

The International Solar Alliance (ISA) pioneers multilateral climate cooperation by zeroing in on solar energy and emerging from the Global South, sidestepping the North-South frictions in frameworks like the UNFCCC over equitable responsibilities and climate finance. Echoing India's push for differentiated obligations, technology transfer, and funding for developing nations, the ISA streamlines solar-specific resource mobilization to bypass wider diplomatic logjams. Ratified by 107 members and signed by over 120 countries as of August 2025, its 2017 Framework Agreement enforces collaboration through an Assembly, Standing Committee, and four Regional Committees spanning Africa, Asia-Pacific, Europe & Others, and Latin America & the Caribbean.

Barriers to Solar Energy Adoption in Developing Countries

Solar energy deployment in developing nations faces interconnected barriers, foremost among them financial hurdles like insufficient capital and high-risk perceptions that inflate interest rates and erode project feasibility. Compounding these are infrastructural shortcomings, including outdated grids, instability, limited transmission, and absent storage solutions, alongside technical skill shortages in system design, installation, maintenance, and policy formulation. Regulatory uncertainties—such as missing power purchase agreements, interconnection standards, and stable long-term policies—further deter domestic and foreign investments, perpetuating deployment challenges.

Technology Transfer and Capacity Building

True technology transfer extends beyond hardware supply to encompass holistic knowledge sharing, institutional strengthening, and fostering local manufacturing through training, platforms, and value chain development, as research highlights for sustainable success. The International Solar Alliance (ISA) advances this via Solar Technology and Application Resource (STAR) centers, partnering with local entities to train experts and enhance capabilities. Its STAR-C Initiative, unveiled at the 7th ISA Assembly, bolsters solar skills in developing economies with targeted programs and exchange networks.

Climate Finance and Investment Mobilization

To meet its USD 1 trillion solar investment target by 2030, the International Solar Alliance (ISA) leverages innovative de-risking tools like guarantees, concessional loans, and viability gap funding (VGF) to draw private capital into high-risk developing markets, moving beyond conventional aid. The ISA's VGF Scheme offers 10-35% of project costs for least developed countries (LDCs) and small island developing states (SIDS), provided the balance is sourced elsewhere, ensuring grants spur rather than supplant commercial funding. Key partners include the World Bank (endorsed in 2016), France's AFD (€900 million pledge), and India's EXIM Bank ($1.4 billion commitment) to amplify solar finance flows.

India's Energy Diplomacy and Foreign Policy

India's stewardship of the International Solar Alliance (ISA) dovetails with its foreign policy ambitions to emerge as a responsible global leader and champion for developing nations, leveraging climate action to elevate its

diplomatic profile while safeguarding domestic energy needs. By honing in on solar energy—a tangible, less divisive arena—India upholds its stance on equitable responsibilities and climate finance, delivering verifiable successes that bolster its diplomatic clout. Its proven expertise in swiftly expanding solar infrastructure equips India to mentor peers, imparting practical insights, technical know-how, and adaptable policies tailored to akin developmental landscapes.**2.8 Implementation Challenges and Organizational Effectiveness**

Despite operating since 2017, the International Solar Alliance (ISA) faces persistent implementation setbacks, with few large-scale projects completed—such as Cuba's 60 MW solar plant still in development and initiatives in Africa and Latin America mired in preparatory stages. Key impediments include chronic underfunding and staffing shortages that curtail technical aid and oversight, bureaucratic snags between the ISA Secretariat and India's Ministry of New and Renewable Energy, and the organization's facilitator role, which hinges on members' uneven capacities and commitments. Smaller developing nations confront heightened barriers like limited solar execution expertise, scarce local developers, and fragile regulatory frameworks that repel foreign investment irrespective of ISA involvement.

Recent Developments and Strategic Initiatives

At the 7th ISA Assembly in New Delhi (November 3-6, 2024), key initiatives like the SolarX Startup Challenge—revived from COP27—to foster solar innovations, and the Global Solar Facility to boost investments in underserved areas, especially Africa, were unveiled. Targeted programs include the Scaling Solar Applications for Agricultural Use (SSAU) for irrigation and cooling, and the Scaling Solar Mini-Grids Programme for off-grid rural communities. These mark the ISA's pivot from policy advocacy to hands-on operations, though success relies on ongoing funding, expertise, and scalable national execution.

Knowledge Gaps and Research Contributions

While prior scholarship explores solar deployment, multilateral climate efforts, and India's renewables in isolation, scant attention addresses their convergence within the International Solar Alliance (ISA) framework. This study fills critical voids by evaluating India's solar successes in shaping ISA leadership; dissecting barriers to operationalizing ISA ambitions; contrasting the ISA's South-led model against North-centric regimes; linking ISA roles to India's foreign policy aims; and charting strategies to amplify ISA's solar transition facilitation in developing countries. Ultimately, it advances scholarly insights and actionable policies for equitable solar advancement in the Global South.

Research Objectives

This study aims to:

1. Analyze the institutional framework and governance structure of the International Solar Alliance
2. Examine India's domestic solar energy achievements and their relevance to ISA objectives
3. Evaluate the challenges faced by ISA member countries in implementing solar projects
4. Assess the effectiveness of ISA's initiatives in mobilizing finance and technology transfer
5. Explore the intersection between India's climate leadership and foreign policy goals
6. Identify strategic recommendations for enhancing ISA's impact in developing nations

Research Methodology

Research Design

This study employs a mixed-methods approach combining qualitative analysis of policy documents, institutional frameworks, and expert perspectives with quantitative analysis of solar deployment data, investment flows, and capacity additions. The research design is structured around three primary components:

1. **Documentary Analysis**: Systematic review of official ISA publications, government policy documents, international reports from organizations such as IRENA, IEA, and the World Bank, and academic literature on renewable energy deployment and climate cooperation.

2. **Comparative Case Study**: Examination of India's solar energy trajectory as a case study demonstrating successful scaling of renewable infrastructure in a developing country context, with implications for other ISA member nations.

3. **Institutional Analysis**: Evaluation of the ISA's governance structures, programmatic initiatives, and implementation mechanisms to assess organizational effectiveness and identify areas for improvement.

Data Sources

Data for this research was gathered from multiple authoritative sources:

- **ISA Official Documents**: Framework Agreement, Assembly proceedings from the 7th Session (November 2024), World Solar Reports, program guidelines, and strategic planning documents
- **Government Publications**: India's Ministry of New and Renewable Energy (MNRE) reports, Press Information Bureau (PIB) releases, National Institute of Solar Energy (NISE) assessments
- **International Organizations**: IRENA Renewable Energy Statistics, World Bank energy sector reports, IEA Global Energy Review, UNDP solar initiative evaluations
- **Academic Literature**: Peer-reviewed articles on renewable energy policy, climate diplomacy, technology transfer, and development finance
- **Industry Reports**: Solar Energy Corporation of India (SECI) auction results, private sector investment data, solar market analyses from research firms

Analytical Framework

The analysis employs a multi-dimensional framework examining:

1. **Policy Effectiveness**: Assessment of how ISA initiatives translate into measurable outcomes in member countries

2. **Institutional Capacity**: Evaluation of organizational structures, resource availability, and operational capabilities

3. **Financial Architecture**: Analysis of funding mechanisms, investment mobilization, and resource allocation patterns

4. **Technology Transfer Mechanisms**: Examination of knowledge-sharing platforms, capacity-building programs, and local capability development

5. **Geopolitical Context**: Understanding of how the ISA fits within broader climate diplomacy and India's foreign policy objectives

Limitations

This research acknowledges several limitations:

1. **Data Availability**: Comprehensive project-level implementation data from all ISA member countries is not publicly available, limiting granular analysis of on-ground outcomes

2. **Temporal Scope**: The ISA is a relatively young organization (established 2017), constraining assessment of long-term impacts

3. **Generalizability**: While India's experience provides valuable insights, differences in political systems, economic structures, and resource endowments mean lessons may not be uniformly applicable across all developing nations

4. **Rapidly Evolving Context**: The renewable energy sector is experiencing rapid technological and market changes that may alter the relevance of current findings

The International Solar Alliance: Institutional Framework and Objectives

The International Solar Alliance (ISA) was launched in 2015 by India and France to help solar-rich developing countries overcome financial, technical, and institutional barriers to solar energy deployment. Its vision centers on expanding energy access, enhancing energy security, and supporting the global energy transition, aligned with key Sustainable Development Goals. Membership has expanded to over 100 countries worldwide, with a governance structure comprising an Assembly, Standing Committee, Regional Committees, and a Secretariat headquartered in India. The ISA's "Towards 1000" initiative targets mobilizing USD 1 trillion, deploying 1,000 GW of solar capacity, and providing energy access to 1 billion people by 2030. It operates through focused programs on agriculture, finance, mini-grids, startups, capacity building, and viability gap funding. Supported by multilateral banks, governments, and the private sector, the ISA is a treaty-based organization aimed at translating solar potential into tangible development and climate outcomes.

India's Solar Energy Transformation: A Case Study in Renewable Deployment

Historical Context and Policy Evolution

India's rise as a solar energy leader reflects a rapid transition from heavy fossil fuel dependence to large-scale renewable deployment. Solar capacity expanded from under 3 GW in 2014 to about 90.76 GW within a decade, one of the fastest growth rates globally. This progress was driven by strong policy support, notably the Jawaharlal Nehru National Solar Mission, and sustained political commitment. Ambitious targets were repeatedly raised as costs fell and deployment accelerated. Although the 100 GW solar goal for 2022 was not fully met, India has since pledged 500 GW of non-fossil capacity by 2030, with solar expected to play a central role.

Enabling Policy Framework

India's solar success rests on multiple policy pillars:

Financial Incentives

Capital Subsidies: The government provides upfront capital subsidies for rooftop solar installations, particularly targeting residential consumers. The PM Surya Ghar: Muft Bijli Yojana (Prime Minister's Solar Rooftop Scheme) offers subsidies covering 30-60% of installation costs depending on system size.

Accelerated Depreciation: Commercial and industrial consumers can claim accelerated depreciation on solar assets, improving project returns and reducing payback periods.

Viability Gap Funding: For projects in remote or economically challenging locations, the government provides VGF to bridge the gap between project costs and commercially viable returns.

Tax Benefits: Generation-Based Incentives (GBI), accelerated depreciation, and exemptions from customs duties on imported components have made solar investments more attractive.

Regulatory Mechanisms

Renewable Purchase Obligations (RPOs): State electricity distribution companies (DISCOMs) are mandated to procure a minimum percentage of their power from renewable sources, creating guaranteed demand for solar electricity.

Renewable Energy Certificates (RECs): This market-based mechanism allows generators to sell environmental attributes separately from electricity, providing additional revenue streams.

Net Metering Policies: Rooftop solar owners can feed excess generation back to the grid and offset their consumption, improving project economics.

Standard Power Purchase Agreements: Standardized long-term PPAs reduce transaction costs and provide revenue certainty for project developers.

Institutional Framework

Solar Energy Corporation of India (SECI): This public sector entity conducts competitive auctions for utility-scale solar projects, aggregates demand, and provides a single interface for developers.

National Institute of Solar Energy (NISE): NISE conducts research, provides technical expertise, and supports capacity building initiatives.

State Nodal Agencies: Each state has designated agencies responsible for implementing renewable energy programs and coordinating with the central government.

Deployment Mechanisms

Competitive Reverse Auctions

India pioneered the use of competitive reverse auctions for solar capacity allocation, where developers bid the lowest tariff at which they are willing to sell electricity. This mechanism has driven remarkable cost reductions—solar tariffs in India fell from over ₹18/kWh in 2010 to below ₹2/kWh by 2020, making solar competitive with or cheaper than coal-based generation.

SECI and state DISCOMs conduct regular auctions for various categories:

- Plain Vanilla Solar: Standard ground-mounted projects
- Solar-Wind Hybrid: Combined solar and wind generation
- Solar with Storage: Projects incorporating battery systems for dispatchable power
- Floating Solar: Systems on water bodies
- Rooftop Solar: Aggregated residential and commercial installations

Solar Parks

The government launched the Solar Park Scheme to address land acquisition challenges and accelerate deployment. Under this scheme, large tracts of land (typically 500+ MW capacity) are identified, developed with basic infrastructure (roads, transmission lines, water supply), and made available to developers. This reduces project development time and cost while enabling economies of scale.

India has approved 50 solar parks with an aggregate capacity exceeding 37 GW across various states. The Bhadla Solar Park in Rajasthan (2,245 MW capacity) is among the world's largest and has achieved some of the lowest solar tariffs globally through competitive auctions.

Rooftop Solar Programs

The PM Surya Ghar: Muft Bijli Yojana aims to install rooftop solar systems on 10 million households, providing up to 300 units of free electricity per month. Launched in 2024, the program had facilitated 700,000 installations within ten months, demonstrating rapid uptake driven by attractive subsidies and simplified procedures.

The program includes:

- Online portal for application and approval
- Empanelled vendors ensuring quality standards
- Direct subsidy transfer to consumers

- Technical assistance and after-sales support

Off-Grid and Decentralized Systems

Recognizing that millions of rural households lack grid connectivity, India has promoted off-grid solar applications:

- Solar Home Lighting Systems
- Solar Street Lights
- Solar Agricultural Pumps (particularly through the PM-KUSUM scheme)
- Solar-powered Cold Storage Facilities
- Solar Mini-Grids for remote villages

The off-grid solar segment recorded 182% growth in 2024, adding 1.48 GW, furthering energy access goals in rural areas.

Quantitative Achievement Analysis

India's Solar Expansion:

Capacity Growth:

- Solar capacity rose from ~3 GW (2014) to ~91 GW (2024), with record annual additions in 2024.
- Solar now accounts for ~20% of total power capacity and nearly half of renewable capacity.

Technology Mix:

- Predominantly utility-scale projects, supported by growing rooftop, off-grid, floating, and hybrid systems.

Cost & Investment:

- Over USD 50 billion invested, with strong domestic and foreign participation.

Key Challenges & Responses:

- Grid integration, DISCOM finances, land acquisition, and import dependence addressed through grid upgrades, financial reforms, solar parks, and manufacturing incentives.

Relevance for ISA Members:

- India demonstrates that large-scale solar is feasible in developing contexts.
- Its policy tools, cost-reduction strategies, diverse deployment models, and technical expertise offer replicable lessons for other ISA countries**.**

India's Leadership Role in the ISA: Motivations and Mechanisms

India's Leadership in the ISA: Rephrased with Shortened Bullet Points

Strategic Motivations

- Climate Leadership: Positions India as a responsible global actor and strengthens its role in multilateral governance while emphasizing development-friendly climate action.
- Economic Statecraft: Promotes Indian solar exports and services through ISA-linked financing, especially via EXIM Bank credit lines.
- Energy Security: Collective solar deployment reduces fossil fuel imports, price volatility, and external dependence for India and partner countries.

- South–South Cooperation: Reinforces India's leadership among developing nations through peer-based collaboration rather than donor–recipient dynamics.
- Soft Power: Builds diplomatic goodwill and influence across Africa, Asia, and Latin America through climate cooperation.

Mechanisms of Leadership

- Institutional Support: Hosting the Secretariat and providing initial funding ensures organizational stability and strategic direction.
- Technical Assistance: Training, feasibility studies, and policy support through Indian institutions like NISE.
- Concessional Finance: USD 1.4 billion EXIM Bank lines of credit for ISA projects, linked to Indian procurement.
- Diplomacy: Active promotion of ISA through embassies and high-level political engagement.
- Knowledge Sharing: Best practices, peer learning, workshops, and digital platforms.
- Demonstration Projects: Small, visible solar projects to build confidence and local acceptance.

Balancing Interests and Goals

- Exports vs. Local Capacity: Tension between promoting Indian firms and supporting local value creation.
- Resource Allocation: Limited funds require prioritization among member countries.
- Leadership vs. Inclusivity: Need to guide without dominating decision-making.
- Domestic vs. Global Priorities: Justifying international commitments amid pressing domestic needs.

India vs. Traditional Donors

- Peer Approach: Shared development experience rather than top-down assistance.
- Low Conditionality: Focus on technical and financial support without policy imposition.
- Technology Transfer: Emphasis on building local manufacturing and skills.
- Catalytic Role: Smaller funding used to unlock larger investments through pilots and capacity building.

ISA Implementation: Achievements, Challenges, and Performance Assessment

Quantitative Achievements

Membership Growth

The ISA's expansion from initial signatories to 103 member countries represents significant diplomatic success. This growth demonstrates broad recognition of the initiative's relevance and potential value. The 2020 amendment opening membership to all UN states while maintaining tropical countries' decision-making primacy was strategically astute, expanding the alliance's financial and technical resource base without diluting its core focus.

Recent additions of European nations (Spain, Malta) signal growing recognition among developed countries that supporting ISA objectives serves broader global interests in climate action and sustainable development.

Financial Mobilization

While falling short of the USD 1 trillion 2030 target, the ISA has mobilized substantial commitments:

- **EXIM Bank of India**: USD 1.4 billion in concessional credit
- **French Development Agency (AFD)**: EUR 900 million

- **Asian Development Bank**: Support for multiple projects
- **World Bank**: Technical assistance and knowledge partnerships
- **Various bilateral and multilateral partners**: Collectively adding to financial resources

The 7th Assembly discussions centered on strategies to accelerate investment mobilization, particularly for smaller projects in least developed countries that struggle to attract commercial financing at scale.

Capacity Building

Quantifiable capacity building achievements include:

- **Training programs**: Thousands of personnel from ISA member countries trained through NISE and other institutions
- **STAR Centers**: Establishment of Solar Technology Application Resource Centers in multiple countries providing localized training
- **Study tours**: Delegations from member countries visiting Indian solar installations
- **Technical assistance**: Feasibility studies, regulatory framework development support, and policy advisory services provided to dozens of countries

The STAR-C Initiative, launched at the 7th Assembly, aims to systematize and expand these capacity-building efforts through structured curricula and certification programs.

Knowledge Products

The ISA has produced valuable knowledge resources:

- **World Solar Reports**: Annual assessments of global solar deployment, technology trends, and policy developments
- **Global Solar Atlas**: Free online tool (developed with World Bank) helping identify optimal solar project locations
- **Best Practice Compendia**: Documentation of successful policy frameworks and implementation approaches
- **Technical Standards**: Development of common standards facilitating technology interoperability and quality assurance

Implementation Challenges

Despite these achievements, the ISA faces significant implementation obstacles that constrain its transformative impact:

Project Implementation Delays

The most critical challenge is the limited number of completed operational projects. The first ISA-facilitated project—a 60 MW solar plant in Cuba—remains in development stages years after initiation. Similar delays affect projects across Africa and Latin America.

These delays stem from multiple factors:

- **Bureaucratic processes**: Lengthy approval procedures in member countries
- **Regulatory uncertainties**: Absence of established frameworks for PPAs, grid interconnection, and utility regulation
- **Land acquisition**: Difficulties securing suitable land with clear titles
- **Grid infrastructure deficits**: Inadequate transmission capacity to evacuate power from solar installations

- **Political instability**: Governance challenges in some member countries creating investment uncertainty

Funding Constraints and Inefficiencies

While substantial commitments have been pledged, actual disbursement has been slower. The Viability Gap Funding scheme, designed to catalyze projects in LDCs and SIDS, has faced utilization challenges:

- **Eligibility complexities**: Stringent criteria excluding many potential projects
- **Co-financing requirements**: VGF requires securing 90% of funding from other sources, but many countries lack capacity to arrange this financing
- **Administrative burden**: Application processes requiring extensive documentation and technical capacity often unavailable in target countries

Furthermore, the ISA's operational budget remains constrained. Staffing limitations restrict the Secretariat's ability to provide sustained technical assistance and project oversight. The organization relies heavily on seconded personnel from India and France, creating potential capacity and continuity issues.

Coordination Challenges

Effective ISA functioning requires coordination among multiple actors—member country governments, the Secretariat, MDBs, DFIs, private sector, and civil society. This coordination has proven challenging:

- **Overlapping initiatives**: Multiple organizations (IRENA, IEA, World Bank, regional development banks) support solar deployment, sometimes creating duplication or confusion about roles
- **Bureaucratic interfaces**: Coordinating between ISA Secretariat, India's MNRE (which maintains significant operational control), member country energy ministries, and implementing agencies involves complex bureaucratic navigation
- **Communication gaps**: Information asymmetries where potential opportunities are not effectively communicated to relevant stakeholders

Technical Capacity Deficits in Member Countries

Many ISA member countries, particularly smaller nations and LDCs, lack sufficient technical capacity for:

- **Project development**: Conducting feasibility studies, securing land, obtaining permits, designing systems
- **Regulatory framework**: Developing appropriate policies for grid interconnection, net metering, PPAs
- **Financial structuring**: Creating bankable project structures that attract private investment
- **Procurement**: Conducting competitive, transparent equipment and service procurement
- **Operations and maintenance**: Ensuring long-term system performance

While capacity building programs exist, the scale and depth required to meaningfully address these deficits across 100+ member countries far exceeds current resource availability.

Private Sector Engagement Limitations

Sustainable solar deployment requires substantial private sector investment. However, attracting private capital to higher-risk markets remains challenging despite ISA facilitation:

- **Perceived risks**: Political instability, currency volatility, regulatory uncertainty, and payment risks from financially weak utilities
- **Transaction costs**: Small project sizes in many developing countries make transaction costs prohibitive relative to returns

- **Information asymmetries**: Limited understanding of market conditions, regulatory frameworks, and local partner capabilities
- **Exit mechanisms**: Uncertainty about ability to divest investments when desired

The SolarX Startup Challenge and other private sector engagement initiatives represent positive steps but have yet to catalyze the scale of investment required.

Geopolitical Complexity

The ISA operates in a complex geopolitical environment:

- **Great power competition**: Growing strategic competition between China, the United States, India, and others in the renewable energy sector creates tensions
- **Debt sustainability concerns**: Many potential recipient countries face high debt burdens, making additional borrowing (even for productive investments like solar) politically sensitive
- **North-South tensions**: Underlying disagreements about climate responsibility and financing continue to affect cooperation

Comparative Assessment: Expectations vs. Reality

Evaluating the ISA's performance requires balancing ambitious initial expectations against the inherent difficulties of multilateral initiatives in complex domains:

Vision vs. Implementation

The ISA's visionary "Towards 1000" goals (USD 1 trillion, 1,000 GW, 1,000 million people with energy access by 2030) were intentionally ambitious, designed to inspire and mobilize action. However, seven years after the Framework Agreement entered into force, progress toward these targets remains limited.

Realistic assessment suggests that achieving these goals by 2030 would require dramatic acceleration in implementation speed, financing mobilization, and member country commitment—a challenging prospect given current trajectories.

Process vs. Outcome Orientation

The ISA has achieved notable process successes—establishing governance structures, building membership, creating programs, facilitating dialogues. However, ultimate success must be measured by actual solar capacity deployed, people gaining energy access, and emissions avoided.

By this outcome-oriented metric, impact has been more modest. While attributing specific solar deployments to ISA influence is methodologically challenging (countries might have proceeded with projects independently), the limited number of completed ISA-facilitated projects suggests that transforming process into tangible outcomes remains the primary challenge.

Catalytic vs. Implementational Role

The ISA was designed as a facilitator and catalyst rather than a direct project implementer. This lighter-touch approach has advantages—limited bureaucracy, leveraging existing institutions, respecting member country sovereignty. However, it also means impact depends heavily on member countries' own capacities and commitment levels.

Countries with stronger institutions and technical capabilities can effectively utilize ISA resources, while weaker countries struggle to translate ISA support into completed projects. This risks creating a two-tier outcome where stronger developing countries benefit substantially while the neediest countries—often small island states and African LDCs—continue facing acute barriers.

Strategic Recommendations for Enhancing ISA Impact

To strengthen the International Solar Alliance's effectiveness, reforms are needed in financing, institutional capacity, strategic focus, partnerships, governance, and political engagement. Key priorities include expanding and simplifying viability gap funding, developing aggregation and blended finance mechanisms, and introducing stronger risk-mitigation tools to attract private capital. Institutional capacity should be enhanced through a better-resourced Secretariat, systematic capacity-building programs, and dedicated technical assistance for project development. Strategic prioritization—focusing on high-impact countries and technologies such as utility-scale solar and mini-grids—can help demonstrate results. Clear division of labor with partner institutions, stronger private-sector engagement, results-based management, and closer integration of ISA initiatives with national climate commitments are essential to translate ambition into measurable outcomes.

India's Climate Diplomacy and Foreign Policy Implications

ISA as Foreign Policy Instrument

The ISA reflects India's use of climate cooperation as economic and strategic statecraft to advance broader foreign policy goals. By leading a treaty-based, South-led institution, India enhances its global standing, reinforces South–South leadership, and reduces reliance on Northern-dominated frameworks. The ISA also supports economic diplomacy by promoting Indian exports and services through climate finance mechanisms. At the same time, it generates soft power and diplomatic goodwill that strengthens India's influence in bilateral and multilateral arenas.

Balancing Climate Action with Development Rights

India's leadership of the ISA helps balance its role as a major emitter and a developing country by framing climate action in development-friendly terms. By emphasizing solar deployment rather than emissions targets and focusing on a single technology, India avoids contentious debates over coal and growth constraints. Presenting solar energy as a tool for energy access, security, and economic development enhances domestic acceptance of climate initiatives. The ISA also operationalizes the principle of differentiated responsibility by channeling support toward developing countries without imposing binding obligations.

Implications for Traditional Climate Diplomacy

The growth of the ISA has important implications for global climate governance by highlighting a shift toward specialized, action-oriented initiatives that can complement the UNFCCC's broader negotiating role. It demonstrates greater agency by developing countries in shaping and leading climate action, potentially altering traditional power dynamics. By mobilizing finance outside UNFCCC-linked mechanisms, the ISA may diversify or compete with existing funding channels. Additionally, its work on standards and best practices could influence global renewable energy norms, either reinforcing or reshaping those developed by other institutions.

Challenges to India's Leadership

India's leadership of the ISA is constrained by limited financial resources compared to major powers, making it difficult to fund the alliance's ambitious goals independently. Strong domestic development priorities compete with international commitments, requiring clear national benefits to sustain political support. India's continued dependence on coal creates credibility challenges in championing renewables globally, while persistent domestic issues in its own solar sector limit the extent of expertise it can export. Additionally, geopolitical competition—especially from China's well-funded renewable initiatives under the Belt and Road framework—poses strategic challenges to India's influence in developing countries.

Conclusion

The International Solar Alliance (ISA) is a South-led initiative aimed at accelerating solar energy deployment in developing countries through cooperation, technology transfer, and shared capacity building. Led by India, the ISA builds on India's rapid domestic solar expansion to enhance global climate leadership and reshape traditional climate governance. While the alliance has expanded its membership and institutions, it faces challenges in financing, project execution, and measurable on-ground impact. Its success will depend on shifting focus from institution-building to implementation, outcomes, and accountability. Strengthening financial mechanisms,

prioritizing high-impact projects, and enhancing institutional capacity are essential. Ultimately, the ISA's effectiveness will be judged by its ability to deliver affordable energy access and meaningful emissions reductions across member countries.

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