

Renewable Energy Market Transformation Initiative

Scaling Up Deployment of Grid-Connected Renewable Energy Technologies for Power Supply Diversification





Transforming the Renewable Energy Market

In recent years, energy has become a global issue that does not discriminate between borders. Developing countries are more susceptible to challenges inherent in securing affordable energy supplies to support sustainable economic development. This adversely impacts the

balance of payments, accelerates inflation, slows growth, and prolongs financing gaps for expanding energy infrastructure. Access to reliable energy supplies, especially in the poorest developing countries, also remains an issue. Inadequate electricity supply inhibits growth and the high cost of providing quality energy supplies, including connections, affects remote and dispersed rural areas, as well as poor consumers in rapidly growing urban slums and peri-urban areas.

Climate change further exacerbates these challenges. Stabilizing greenhouse gas concentrations in the atmosphere and limiting climate impacts require the accelerated broad-based deployment of existing and more mature low

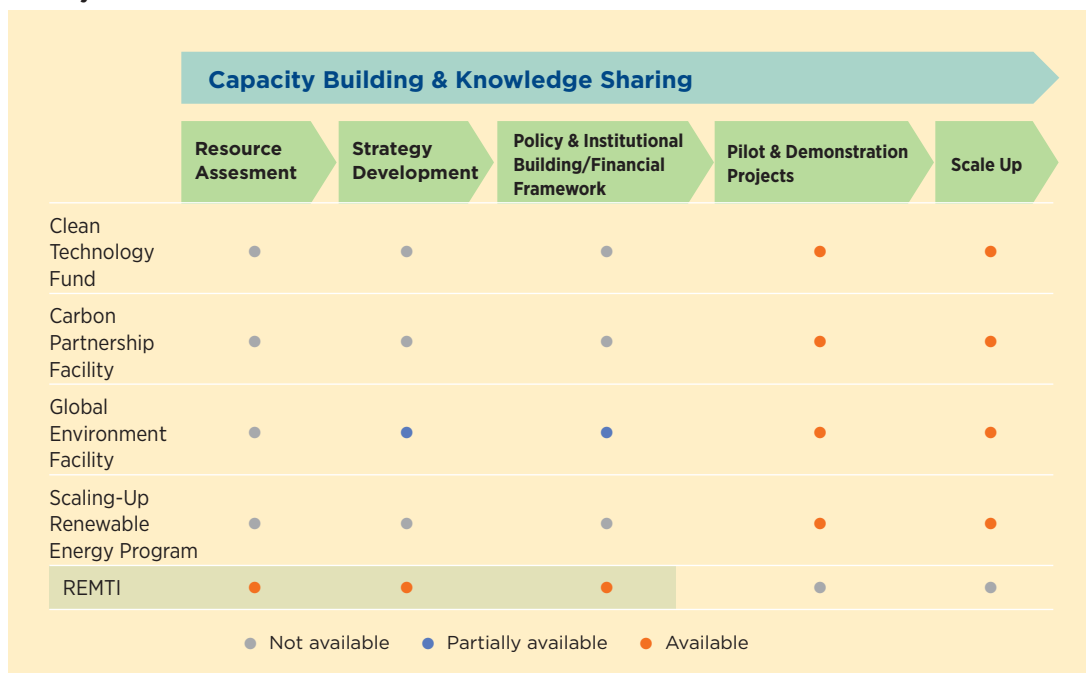
carbon technologies. It also calls for a global build-up for deployment of new, cutting-edge technologies to sustain a low carbon global economy. Together these issues underpin the need for concerted efforts to accelerate the transition from a fossil fuel-based energy system to a diversified system that includes renewable energy (RE).

A number of multilateral initiatives and facilities—the Climate Investment Funds (including Clean Technology Fund and Scaling-Up Renewable Energy Program), the Global Environment Facility, and the Carbon Partnership Facility—have been created to augment financial support to scale up RE investments in developing countries. Typically, they focus on the end of the program development chain, providing grants and / or concessional loans for RE pilot projects or programs to scale up RE deployment. The Energy Sector Management Assistance Program (ESMAP) is

Factors Affecting Sustainable Energy Sector Development in Developing Countries

1. Rapid energy-demand growth caused by urbanization
2. Turbulence in global capital markets
3. Record high and volatile prices on global markets for fossil fuels
4. Increased costs for equipment and materials for energy infrastructure projects

Primary Focus Areas of REMTI



supporting the RE development process through the **Renewable Energy Market Transformation Initiative (REMTI)**. REMTI will help countries address the preparatory work needed in the earlier stages of program development by providing technical assistance, knowledge sharing activities, and capacity building training to facilitate access to financing.

REMTI targets developing country governments and private sector stakeholders engaged in the adoption, adaptation, and deployment of identified RE technologies for grid-connected power generation. REMTI aims to enhance institutional capacity of clients to develop, plan, and implement policies and strategies to scale up deployment of these technologies for grid-connected power.

REMTI focuses on four areas of engagement:

- **Country RE Market Transformation Strategies** that support the role of RE technologies in achieving broader client goals of enhanced energy security, access, and supply diversification, as well as climate change mitigation.
- **RE Technology Deployment Roadmaps** to scale up investment by private/public developers in grid-connected power generation facilities using RE resources.

- **RE Market Development Support Mechanisms** to help reduce the associated financing risks of private/public developers of grid-connected power generation facilities using RE resources.
- **Knowledge Exchange** to share ESMAP lessons learned and foster capacity building with clients using knowledge products generated from country RE market transformation strategies and RE technology deployment roadmaps—modeling toolkits, best practices, “how to” guidance, and interactive training.

COUNTRY MARKET TRANSFORMATION STRATEGIES

The country market transformation strategies create a platform to enhance policy-making by clients on four basic questions:

- How much RE for grid-connected power generation is justified with and without considering externalities?
- How realizable is the RE target for grid-connected power generation?
- Other than economic efficiency, how do various policy options perform (e.g., in terms of employment generation, supply diversification, or practical application)?
- What is the most appropriate policy implementation framework?

REMTI’s country-specific “market transformation strategies” aim to scale up deployment of RE systems for grid-connected power supply.

REMTI-supported country market transformation strategies are developed in two stages. First, clients are assisted to conduct country *RE resource assessments* to identify and map resource potential and to determine economically optimum quantities of RE for grid-connected power generation. Second, clients are supported with analytical and advisory tasks to inform development of country-specific *policy implementation frameworks* that also consider policy trade-offs.

Country Strategies | At a Glance

China

China has embarked on an ambitious plan to sharply boost the share of RE in its total primary energy consumption—from 7.7% in 2005 to 10% by 2010 and 15% by 2020. In 2007, China issued principles to implement new efficient power system dispatch practices,¹ which are being piloted in five provincial grids—Henan, Jiangsu, Guangdong, Sichuan, and Guizhou. REMTI is assisting two additional provinces—Shandong and Fujian—to identify and address critical RE policy implementation barriers,

¹ The Energy Fuel Saving Dispatch, 2007



thereby paving the way to achieve key government goals: improve efficiency of thermal power dispatch to maximize savings and reduce emissions; reduce electricity energy intensity through the use of RE, including large hydropower; ensure system reliability; achieve sustainable power sector development; and promote power market reform.

India

REMTI is assisting India's Ministry of New and Renewable Energy, state governments, regulators, and other stakeholders to conduct an assessment of the Investment Climate for Renewable Energy in India. Stakeholders will be given a sound basis for assessing the investment climate and developing a RE market transformation strategy. This involves the design of a framework of regulatory, policy, and market interventions, and an indicative economic valuation of the country's RE sources. It looks at the availability of renewable resources and technologies and the economic and financial costs of alternative generation options. The resultant recommendations will contribute to policy-making on RE investments required to achieve India's target of 10% RE of total generation capacity by 2012.

Philippines

The Philippines Energy Plan seeks to enhance energy security and independence; implement market sector reforms; and ensure proper supply of a growing energy demand by 2014. REMTI is assisting the Philippine government to develop a comprehensive policy implementation framework to meet its RE goals and thereby transition to a low carbon power sector. Through this, the Energy Regulatory Commission of the Philippines is able to conduct a comparative assessment of international practices and lessons learned in integrating RE into power markets. The government is using this knowledge to develop an effective RE policy implementation framework, including measures and regulations to ensure compatibility with the country's ongoing power sector reform. REMTI is supporting specific types of analytical and advisory tasks, such as RE pricing and contracting mechanisms, power generation pricing, a regulatory framework and power transmission planning for scaling up RE, strategic development of mid-size geothermal and other RE sources, knowledge dissemination, and policy consensus.

Mexico

Energy diversification through RE has great potential in Mexico. Mexico's Renewable Energy Development and Financing for Energy Transition Law aims to regulate the use of RE resources and clean technology, as well establish a national strategy and financing instruments to allow



the country to transition to a RE power sector. REMTI is assisting the Government of Mexico to develop an action plan to increase the use of RE resources for grid-connected power generation, which will help the government to calculate and set realizable RE national targets (in MW and MWh) for Mexico's power sector. To eliminate entry barriers, the plan focuses on the requisite regulatory and environmental policies, renewable pricing, and contracting rules. It also identifies financing incentives for the development of RE projects, including a governmental RE fund.

RE TECHNOLOGY DEPLOYMENT ROADMAPS

REMTI focuses on four generic RE technologies where significant and largely untapped potential exists—concentrated solar power (CSP), geothermal, small hydropower, and wind. These four technologies are at varying stages of maturity and market readiness, and require their own unique solutions to attain full-scale commercial deployment. With the exception of CSP, which has specific identified obstacles—such as low capacity factor and high water requirements—the other technologies do not present major technical challenges.

To accelerate the deployment of these RE technologies in developing countries, REMTI provides technical assistance for “roadmap” development. These roadmaps contain recommendations and step-by-step instructions to help countries improve their technical, regulatory, and institutional frameworks, as well as increase their knowledge of various RE technologies. Building on these roadmaps, client countries are able to access funding from multilateral facilities, such as the Clean Technology Fund, Global Environment Facility Fund, Carbon Partnership Facility, and Scaling-Up Renewable Energy Program.

Deployment Roadmaps | At a Glance

Wind | Roadmap for Egypt

Egypt is experiencing a rapidly expanding economy and increasing demand for electricity. The rate of growth of electricity demand in Egypt has exceeded 6.5% per year over the past 10 years and is expected to remain in the 6-7% range over the next 10 years. Thus, the Government of Egypt has planned large-scale development of wind energy with private sector participation in line with their target of 20% RE installed capacity by 2020. REMTI has assisted with the development of a commercial framework for resources to foster the creation of a sustainable wind power generation market, which has guided Egypt in securing financing from the Clean Technology Fund.

CSP | Roadmaps for MENA and India

Solar energy represents an enormous resource in many of the Middle Eastern and North African (MENA) countries. Over the next 6-8 years, the region plans a 1 GW-level deployment of CSP from 8–10 commercial-scale power plants in multiple countries, which represents 10% of the planned global capacity. Following an ESMAP regional-level assessment of policy and technical issues related to CSP scale-up in the region, REMTI is following up with technical assistance to assess the potential of the local industry’s role in the MENA CSP Scale-Up Program. This includes developing an action plan to harness the region’s ability to locally manufacture CSP components. The MENA CSP Scale-Up Program will also identify selection criteria for CSP sites and conduct an economic analysis, along with a policy and regulatory framework assessment, to facilitate integration of CSP into interlinked energy systems. Finally, REMTI is helping to develop power system planning tools for better integration of RE into interconnected regional grids and will provide training for country stakeholders.



India is developing a multi-year program with REMTI aimed at facilitating deployment of and investments in CSP technologies; building knowledge and strengthening capacity of energy sector specialists and local partners in technical and institutional aspects of utility-scale CSP applications; and building expertise on related project development and implementation. Specifically, India's CSP Scale-Up Program will help develop and advocate breakout pricing mechanisms that properly value and encourage rapid development of large-scale solar power generation. It will also tailor and enhance India's existing regulatory framework and business practices to meet industry requirements.

Small Hydropower | Roadmap for Peru

Small hydropower has great potential to alleviate the growing electricity demand in Peru at relatively low cost and with limited environmental and social impact. The country's small hydropower potential is estimated to exceed 1,600MW and REMTI is assisting Peru to meet this goal by reassessing the role of small hydropower in the country's energy mix and developing an appropriate operational framework to enable private/public investments in small hydropower. Additionally, REMTI supports dissemination of design and contracting/construction standards and procedures; promotion of domestic manufacture of ancillary components, such as control and communications equipment; and training in operation and maintenance of these plants.



Geothermal | Roadmap for Central America

To help stimulate the electricity market and the development of regional power projects in Central American countries, REMTI is supporting governments and other public and private stakeholders in Costa Rica, El Salvador, Guatemala, Nicaragua, Honduras, and Panama to tap into their geothermal potential for large-scale regional power generation. This scale-up project involves an assessment of the countries' existing data on geothermal resource potential, identification of development opportunities for power generation, and an assessment of the overall economic viability of geothermal projects in the region. This information, coupled with global lessons learned on market failures with respect to the financing of RE projects, will enable REMTI to assist these countries—individually and collectively—to develop appropriate legislative and regulatory frameworks for effective implementation.



MARKET DEVELOPMENT SUPPORT MECHANISMS

Making RE technology more commercially viable faces a multitude of challenges. The critical issue for governments is selecting the most appropriate policy mix to overcome systemic disadvantages that affect RE technologies compared to conventional fossil fuel-based power generation options. Two types of policy instruments are being piloted across the globe:

1. *Quantity-Based Instruments* that set targets for RE deployment with the expectation that the market will determine the prices for the power supplied.
2. *Price-Based Instruments* in the form of mandated tariffs or “feed-in tariffs,” leading to a market-determined quantity.

In developing countries, the tariffs paid by consumers for electricity from conventional sources are usually lower than the indicated market price, as most of the governments provide some sort of subsidy. In this context, scaling up the deployment of RE power, for which cost recovery tariffs exceed those of conventional power generation sources, would require innovative solutions. One of REMTI’s approaches is through the design

and piloting of *output-based revenue support*, to help close the gap between the regulated or mandated feed-in tariffs and the actual cost recovery revenue profile required to fully amortize the investments made by private/public developers of the RE power generation facilities.

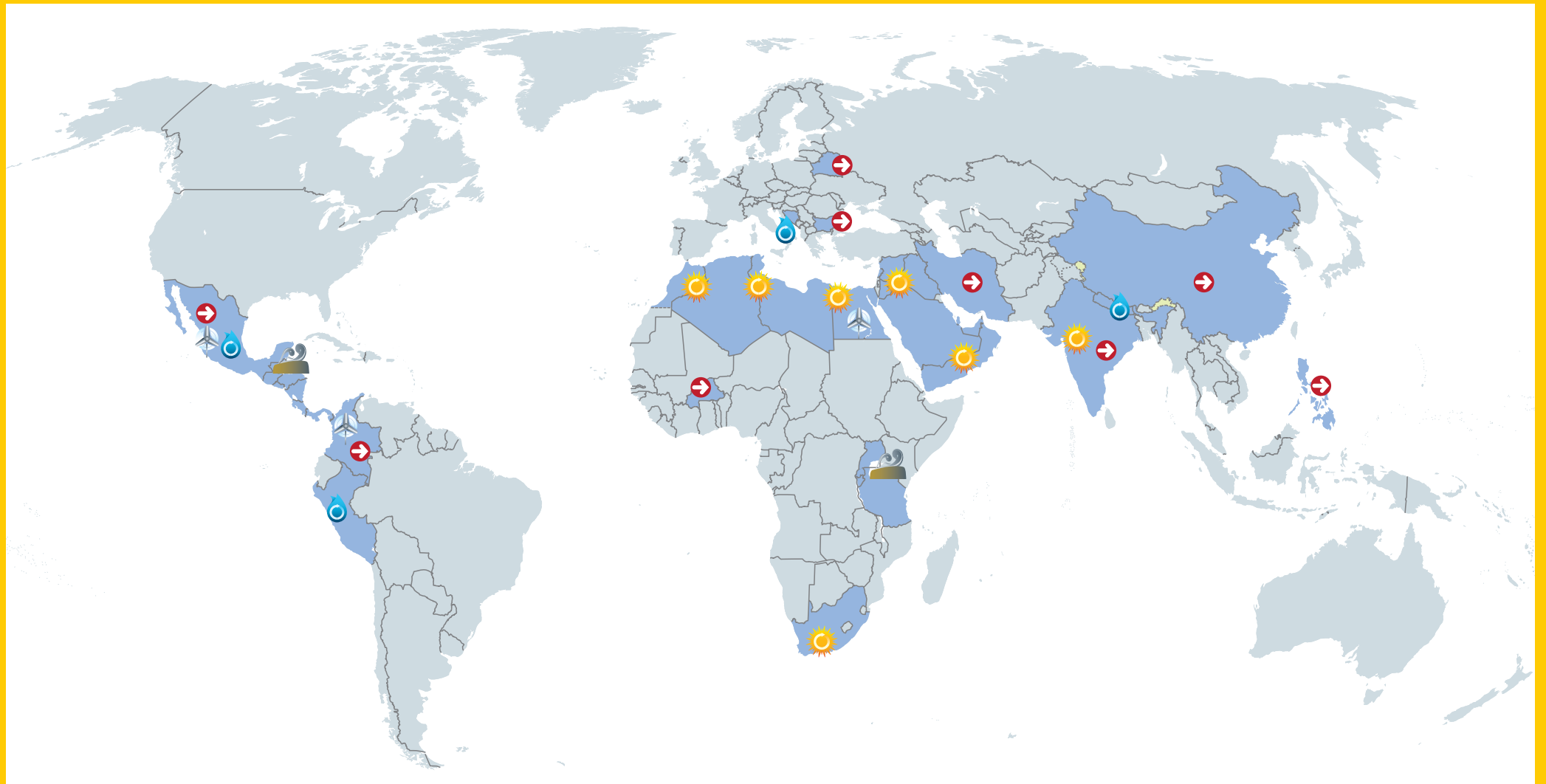
KNOWLEDGE EXCHANGE

REMTI will use a variety of avenues—workshops, conferences, publications, and web-based tools and learning—to share knowledge and best practices from around the world on cost effective ways to scale up deployment of select RE technologies for grid-connected power generation. REMTI knowledge exchange events will target practitioners in policy making, local planning, and regulatory institutions and utilities engaged in RE development. To ensure a broader outreach for its knowledge products, REMTI is exploring partnership arrangements with other global institutions, including the International Renewable Energy Agency (IRENA).

REMTI Knowledge Exchange Activities

- Annual RE Practitioners' Forum
- Knowledge Exchange Workshops on CSP and Geothermal applications
- Best Practice Guidelines (e.g., for Mesoscale Wind Mapping, Small Hydropower Development)

REMTI GLOBAL ACTIVITY (as of 12.2009)



Country Strategies

Mexico
Philippines
India
China
Bulgaria
Colombia
Iran
Belarus

RE Technology Deployment Road Maps

CSP: India, MENA, South Africa, Sahel
Geothermal: Central America, East Africa
Rift Valley
Wind: Egypt, Columbia, Mexico
Hydro: Peru, Nepal, Bosnia, Mexico

-  Country Strategies
-  CSP
-  Geothermal
-  Wind
-  Hydro

Country and regional activities are driven largely by resource potential.

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The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank and assists low- and middle-income countries to acquire know-how and increase institutional capability to secure clean, reliable, and affordable energy services for sustainable economic development.

For more information on the Renewable Energy Market Transformation Initiative or about ESMAP's work in the deployment of renewable energy, please visit us at [HYPERLINK "http://www.esmap.org"](http://www.esmap.org)www.esmap.org or write to us at:



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