India

Developing renewable energy targets and supporting strategies

Activity	Evolution of Federal energy targets and supporting strategies
Country	India
Sector(s) involved	Energy
Time frame	2003–2013

Case summary

Over the years India has successfully created a positive outlook necessary to promote investment in, demand for, and supply of, renewable energy. India's strategy on renewable energy is driven by the objectives of energy access and energy security, aided by the increasing concerns of climate change and grounded in existing policy making processes. It has evolved over the years through increasingly stronger political signals at federal level, reflected in the creation of a separate Ministry for New and Renewable Energy (MNRE) and the National Action Plan on Climate Change (NAPCC).

The success of India's renewable energy strategy relies in the dynamic policy making which allows for incremental target setting along with identification and removal of various barriers through the process. The removal of barriers through implementing policies like an accelerated depreciation scheme, generation based incentives and renewable purchase obligations have played an integral role. Decentralised implementation is a core component of this dynamic policy making, where the state governments are allowed to develop their own policy targets and regulations in line with, but independent from, federal policy. The institutional network that is responsible to implement and achieve these targets is overseen by the Ministry of New and Renewable Energy at federal level and supported by a number of national and sub-national autonomous bodies, particularly the Electricity Regulation Commissions. This network of institutions provides a nation-wide capacity and awareness building platform for renewable energy.

A key lesson learned in the process is that while a favourable policy environment is crucial for promoting renewable energy technologies, a supporting strategy for indigenous/domestic manufacturers and investment in research and development is crucial for achieving higher long-term targets.

Distributed Solar PV system for rural electrification

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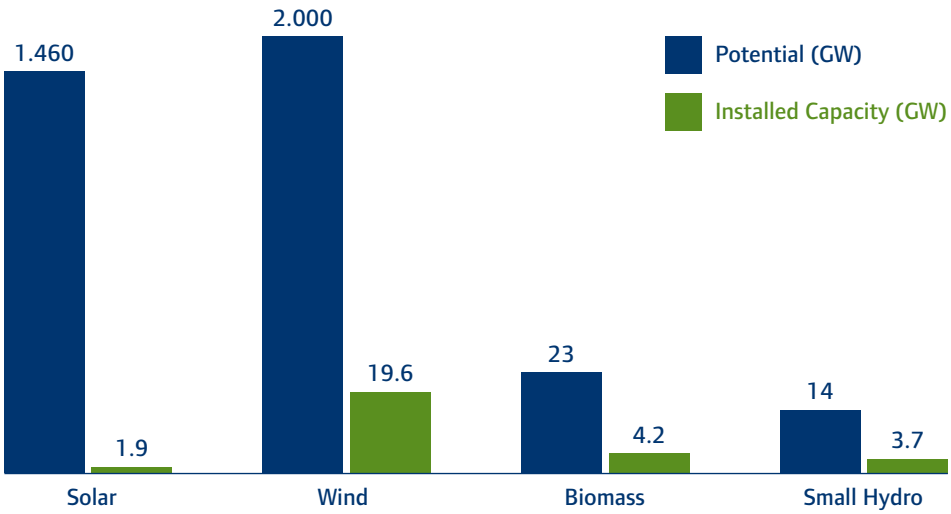
Background

Despite possessing huge sources of fossil and non-fossil energy, India has traditionally been dependent on energy imports and much of its energy infrastructure is based on fossil fuels. However, as a result of energy security concerns, India became the world's first country to set up a Federal Department of Non-Conventional Energy sources in the 1980s which was converted into the Ministry of Non-conventional Energy Sources in the 1990s later renamed as the Ministry of New and Renewable Energy in 2006. The India Electricity Act of 2003 has enabling provisions for the promotion of grid connected renewable energy across the country. The Act provides for regulatory interventions that govern tariffs, Renewable Purchase Obligations (RPO), which created provisions for the creation of market and other supporting institutional networks (GoI, 2003).

In 2006, India prepared its Integrated Energy Policy (IEP) and adopted it in 2008 in the context of multiple development goals to 2030. While recognising that fossil fuels will remain a key source of energy in the immediate future, it also envisioned a clear road map for increasing the share of renewables in the energy mix (GoI, 2006) (see figure below). Subsequently, the MNRE launched targeted policies to exploit various sources of renewable energy, including the National Solar Mission under the NAPCC. These initiatives have followed a general pattern of time-bound targets and a range of supporting policies and mechanisms for industry, including exemptions on import duties, tax concessions, generation-based incentives, renewable purchase obligations and tradable Renewable Energy Certificates (RECs). With increasing recognition of the role that renewable energy can play in mitigating climate change, without compromising on developmental aspirations, the most important mission came in the form of the National Solar Mission under the National Action Plan on Climate Change (NAPCC) focusing on promotion of solar

Potential vs. Installed Capacity of RE in India



Source: PACE-D (Partnership to Advance Clean Energy- Deployment, between USAID-India & Government of India) (2013), Financing Renewable Energy in India, Page 6. Available at www.pace-d.com/wp-content/uploads/2013/10/RE-Finance-Report.pdf

energy (MNRE 2008).

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Activities

- Target Setting: The aspirational targets for different renewable energy sources are set in line with the cycle of Five Year Plans, which are then broken down into annual targets (Maithani, 2014). For example, the National Solar Mission targets 20GW of grid connected solar energy by the end of the 13th Five Year Plan, broken down into three phases. Other targets include the National Bio-fuel Policy target of 20 % of bio-fuel blending by 2017 (MNRE, 2009) for which the MNRE is the designated coordinating agency. Overall the 12th Five Year Plan sets a target of 30 GW capacity addition from renewable energy sources (Planning Commission 2012: 146)
- Supporting Strategies: The renewable energy targets were supported by a range of regulatory and policy interventions. The National Action Plan on Climate Change outlined that 5 % of total grid purchase should come from renewable energy sources during 2010–11 and that this should subsequently increase by 1 % every year for the next 10 years (GoI, 2008). In addition, the state regulators are mandated to set renewable energy purchase obligations (RPOs) to distribution companies (GoI, 2003). An important recent development is the guideline related to the specification of a certain percentage of the RPOs to be met through solar energy, which varies from state to state. This has been done in response to the 2011 amendment in the National Tariff Policy, increasing the prescribed solar-specific RPO from a minimum of 0.25 % in 2012 to 3 % by 2022 (MNRE, 2014).
- Regulations: The Implementation of India's renewable energy program is driven by supporting regulations. The federal regulator, the Central Electricity Regulation Commission (CERC) issues notifications and guidelines regarding the determination of tariffs. The State Electricity Regulation Commissions (SERCs) determine detailed state level regulations and decisions accordingly. The SERCs may appeal to the SERCs for determining tariff rates using a levelised tariff approach bundling all sources of electricity together.

  The CERC in 2010 announced the renewable energy certificate (REC) scheme under which a generator gets an opportunity to earn RE certificates on generation of 1 MWh of electricity. The RECs are exchanged at two market places, the India Energy Exchange (IEX) and the Power Exchange of India (PXIL).Accredited generators are allowed to sell and purchase RECs, which is a likely reason for underperformance of the REC market (Sethi, 2014).
- Financial incentives: The financial incentives include: capital subsidies, electricity duty exemptions, interest subsidies, low interest loans, tax rebates, and VAT (value added tax) exemptions. Infrastructure related support includes provisions for grid-evacuation, land access and single window clearance. Other supporting policies and programs include electricity distribution reforms and policies on transmission and distribution losses (Vasudha Foundation, 2013).
- Capacity building and consultations: Another important feature of India's strategy to promote renewable energy has been a simultaneous and continuous capacity building and consultation process. The MNRE organises regular technical workshops and consultations with experts and renewable energy entrepreneurs to promote deeper penetration of renewable energy technologies with an objective of reducing the costs (MNRE, 2011).

Institutions involved

The Planning Commission of India; Ministry of Finance; The Ministry of New and Renewable Energy; The Central Electricity Regulation Commission; The State Electricity Regulation Commissions; State nodal agencies; IREDA: Indian Renewable Energy Development Agency Ltd. (dedicated financial institution for renewable energy projects); IEX: India Energy Exchange; PXIL: Power Exchange of India

Cooperation with

Global Environment Facility (GEF); Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); United Nations Development Programme (UNDP); USAID; UK Department for International Development (DFID).

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Finance

Renewable energy development in India is financed through the following sources:

- Budgetary allocations to the various programs of the MNRE in line with the Five Year Plans/annual plans
- Funding from the Global Environment Facility and bilateral channels.
- Institutional finance provided through credit lines provided by IREDA and other banking institutions.
- Taxon coal production to support development and diffusion of clean energy technologies.

Impact of activities

- Installed capacity: As of 31 January 2014, more than 30 GW of grid connected power generation capacity and approximately 1 GW of off-grid installations were using various renewable energy sources. This includes: 10.2 GW of wind energy; 1419 MW of small hydro power and 1419 MW of biomass power. The most remarkable success has been observed with the exponential increase in the installed capacity of solar power, from just2 MW at the end of 9th FYP to more than 2 GW at the end of 11th FYP. This is the result of a comprehensive policy in the form of the National Solar Mission, which sets ambitious time bound targets along with concrete fiscal and policy incentives at federal level.
- Growth in manufacturing: Another remarkable success has been the growth of manufacturing base in India for wind energy, with Suzlon emerging among the top seven wind energy companies globally.
- Reduced renewable energy price: Over the last ten years the price of renewable energy has come down significantly with wind energy being almost at grid parity with conventional energy. Solar energy is expected to attain grid parity in next two plan periods.
- Development of markets: RPOs have helped in both creating markets as well and demand for renewable energy in India. More than 70 MW of solar capacity have been accredited and 26 MW registered under the REC scheme. Although, REC covers a small component of RE market, a total of 11,729 solar RECs were issued by February 2013and 10,830 Solar RECs were redeemed during May 2012 and February 2013 at an average price of approximately USD 200 (MNRE, 2013).
- Strengthened institutional capacity: The mixture of centralised target setting with necessary financial and technical support along with de-centralised regulatory and implementing agencies has over the years built national capacity and processes of stakeholder participation which have enabled India to plan and implement renewable energy targets at an increasingly larger scale. Many state governments have recently announced specific renewable energy targets and supporting policies.

Why is it good practice

- India's renewable energy policy is an example of good practice for it has both short-term (energy access) and long-term (energy security, sustainable development, mitigation) relevance. It is grounded in a country-driven development process (linked with Five Year Plan cycles) with commitment at the highest political level and leadership through the Ministry of New and Renewable Energy.
- The achievement of targets over the long-term is critically dependent upon the successful compliance of regulation. Coordinated regulation at different levels of governance is recognised as the core feature of India's renewable energy governance (Maithani, 2014). Although, it is also recognised that poor compliance with RPOs on account of limited financial capacities of state distribution companies restricts the achievement of federal RE targets (Sethi, 2014; Garud, 2014).
- The evolution of India's RE policy is also a good example of a dynamic updating process, particularly through regular review of tariffs, RPOs, incentive structures, introduction of newer mechanisms such as tradable RECs, and a fund for the development and deployment of renewable energy technologies through a tax on coal production (Garud, 2014). As a result, scalability is inbuilt in the process of

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policy design both in term of setting targets as well as building the capacities of states to develop ambitious policies. Since the targets are also according to different types of renewable energy, there are proven examples of cross-learning and transferability of combination of policies.

» The fact that India's approach has been built around concrete measurable targets and implemented in a decentralised and consultative manner it is easy to measure its success and it has provided insights into developing nationwide technology-centric policies.

Success factors

» Political support: Through establishing a separate ministry and preferential Purchase Agreements (PPAs).

» Legal backing: Through the Electricity Act of 2003 and supportive policy and regulatory measures.

» Integrated in national development planning: The processes are integrated into key policies and plans, such as the Energy Policy of 2006 and Five Year Plan targets and budgetary allocations. They are also aligned with national strategic priorities such as improving energy access and energy security.

» Decentralized implementation: With autonomous federal as well as state regulators.

» Large domestic renewable energy potential.

» Budgetary support: Commitment through generation based incentives (GBI), technology development, demonstration etc.

» Tariff policy: To determine tariffs for different renewable energy sources differently (Sethi, 2014)

Overcoming barriers/ challenges

What were the main barriers/challenges to delivery?
How were these barriers/challenges overcome?

Capacity

A lack of domestic manufacturing capabilities as well as low levels of R&D has been recognised as a challenge which is likely to manifest itself more in multiple forms (e.g. rising imports) as India moves to higher targets.

The issue of manufacturing capabilities has been addressed by making imports easier and cheaper. In the case of wind energy, the private sector (Enron and Suzlon) took the initiative of setting up manufacturing units in economic zones which offered various incentives (subsidised land, tax concessions etc.) for manufacturers. They could do so for the wind technologies since wind energy was already mature and a supportive policy environment had created a global market.

Financial

Rapid penetration of RE critically depends on making it economically viable through financial instruments. High capital costs and commercially unviable cost of production of renewable energy made it unattractive to private investors and financial institutions.

The main strategy has been to build confidence among the private sector. To start with, India began with smaller projects to demonstrate economic viability and acceptability of RE options. Besides sending strong policy signals through setting increasingly higher targets and instituting RPOs, the main support instruments have been feed-in-tariffs and generation-based-incentives over a ten to twenty-five years' time frame, along with public procurement commitments. In addition, various financial incentives and arrangements for international finance through IREDA has also built enough confidence for the private sector to come forward. The planned budget expenditure for RE, has also played an important role in sending out positive signals for mobilising private finance and investments in the sector (Garud, 2014, Maithani, 2014). India's Accelerated Depreciation Scheme for wind sector was instrumental in attracting private sector by ensuring economic viability of wind energy in its early phase.

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Institutional

Tapping widely distributed renewable energy resources required wider institutional capacities at sub-national level to scientifically assess potential and develop capacities to develop policies.

The scientific assessment of potential from different sources is a continuous activity and carried out through specialized technical institutions such as CEWRT etc. associated with MNRE CERC developed guidelines for achieving the targets at sub-national levels.

Information

Being a geographically diverse country, assessment of precise technologically and commercially viable renewable energy potentials at specific locations is difficult and will be an important factor in achieving future targets.

Autonomous institutions for scientific and technical aspects of renewable energy potential in India like National Institute for Renewable Energy, CEWRT, etc. have been setup by MNRE, and collaboration partnerships with other national and international research institutes have been forged. (Sethi, 2014)

Lessons learned

- Clear and explicit links with immediate and long-term development goals enhance political acceptability: Introduction of a tax on coal production and generation based incentives for promoting RE were received positively (Garud, 2014).
- Integrating in existing policy making processes is important for sustainability of actions: To ensure evolution, innovation and necessary changes in the policy framework and supporting institutional infrastructure as the circumstances change or needs arise (Maithani, 2014).
- Clear regulatory and policy environment along with necessary institutional arrangements: A prerequisite for creating markets for new technologies. The Electricity Act of 2003 and The National Tariff Policy of 2006 created conditions that enabled capacity addition in the 11th five year plan period (Sethi, 2014).
- The local manufacturing base has a positive impact on implementation: as manufacturers work as active stakeholders for promoting market conditions and policy innovations. For example, Suzlon and Enron, after setting up their manufacturing units for wind turbines, also began to set up generation units (Sethi, 2014).
- Coordinated regulatory arrangements: Build necessary institutional and technical capacity for policy development and implementation.
- Creation of long term demand: Government guarantees in the form of generation based support or through purchase agreements helps in building confidence among private investors, which in turn helps bringing the costs as well as the need for government support down. The guaranteed GBI for ten to twenty-five years were given in the first phase of the National Solar Mission, which has brought down the price of solar energy by one third, and similar guarantees are not needed in the next phases.

How to replicate this practice

- Establish an institution to plan and implement RE policy: This institution should reflect political commitment and leadership.
- Identify renewable energy potential: Identify the scale and type of renewable energy potential that can be economically exploited.
- Identify implementation challenges through stakeholder consultations: Since renewable energy is understood to offer long-term and sustainable solutions to energy needs, replicating India's experience could be enhanced by a more rigorous bottom up consultation process at the beginning of the planning process, involving investors, producers, distributors and technology providers. These consultations help build confidence and cooperation among various stakeholders and offer insights into the range and types of support mechanisms that are needed to make the whole supply chain economically viable.
- Set achievable targets: Ensure adequate public support to build confidence among consumers as well as private sector investors. If the potential is considerably large then simultaneous targets for setting up domestic manufacturing capacities and R&D infrastructure should be set.

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	» Policy and regulatory arrangements: Should be dynamic; there should be an inbuilt mechanism to adjust, innovate and grow. It is important to note that the scope and scale of Indian experience is critically dependent on the fact that there is plenty of scope to scale up the experience due to large RE potential in different types of RE technologies.
Contact for enquiries	» Ministry of New and Renewable Energy, Government of India, http://mnre.gov.in/mission-and-vision-2/people/division-heads/
Further key resources	» GoI (2006), Integrated Energy Policy, New Delhi, Planning Commission of India, Govt. Of india » Vasudha Foundation (2013), State Policies from Climate Perspective, New Delhi, Vasudha Foundation
Website(s)	» The Ministry of New and Renewable Energy, www.mnre.gov.in » The Central Electricity Regulatory Commission, www.cercind.gov.in
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