



Rainer Quitzow
Environmental Policy Research Centre (FFU)
Freie Universität Berlin
rainer.quitzow@fu-berlin.de
<http://kooperationen.zew.de/en/lead-markets>
www.fu-berlin.de/ffu

Assessing strategies for promoting environmental innovation: a case study of India's National Solar Mission

LEAD MARKET 

SPONSORED BY THE



Federal Ministry
of Education
and Research

 **FONA**
Economics
for Sustainability
BMBF

Goal of the paper

- **To present a comprehensive framework for assessing policies for the promotion of environmental innovation based on the concept of strategy**
- **To apply this framework for the assessment of India's National Solar Mission**

Outline of the Presentation

1. Introduction: From a „smart policy mix“ to „strategy“
2. Strategy concepts and the strategic framework
3. Key approaches to studying environmental innovations: differences and complementarities
4. Integrating policy lessons
5. Conclusion and next steps: integrating political factors

What is smart policy for promoting environmental innovation?

- The literature on innovation-oriented policy tells us that promoting environmental innovations requires a „smart policy mix“ – **but what does this actually mean?**
- Most importantly, it means that policies need to be adapted to the particular context – **but how can this be done?**
- Approaches from the current literature on sustainable innovation policy only provide partial answers to these questions
- Hence, none of these approaches represents a sufficient basis for assessing policies for promoting environmental innovation

Strategy: a holistic framework for assessing policies for promoting environmental innovation

- The paper proposes to take a step forward in better defining a „smart policy mix“ by introducing the concept of strategy.
- The concept of strategy offers a framework for assessing policies for promoting environmental innovation that is
...comprehensive, coherent and dynamic...
... and that is able to integrate findings from the existing literature on promoting environmental innovation.
- The concept of strategy is mainly adapted from the strategy literature in the management sciences as well as the few existing contributions from political science

The basic strategy framework

- **Guiding principles of strategy:** Strategies require clear objectives and corresponding policy measures to achieve those goals (Drucker, 1954; Jänicke, Kunig, Stitzel, 2003).
- **Analytical dimension of strategy:** To guide the choice of policy measures, strategy development requires a systematic approach to analyzing the external environment in relation to the tools and measures at the disposal of the respective organization or decision-maker (Drucker, 1973; Andrews, 1971, Mintzberg et al., 2009)
- **Process dimension of strategy:** The process of strategy development and implementation is an ongoing and iterative process, which requires continuous and systematic review and adaptation of policy measures (Drucker, 1973; Steurer and Martinuzzi, 2005)
- **Dimension of strategic capacity:** Strategy should both build on available capacities and seek to develop and expand the required capacities for strategy development and implementation (Raschke and Tils, 2007; Teece, 2009).

Strategies for promoting environmental innovations

The strategic framework for promoting environmental innovation integrates lessons from five streams of literature, all with a basis in evolutionary perspectives on innovation and technological change:

- Innovation-oriented environmental policy
- Lessons for sustainable innovation policy from the OECD's project on Governing Innovation Systems
- Sustainability transitions (Transition Management / Strategic Niche Management)
- Time-strategic ecological innovation policy
- Systems of innovation and sustainable innovation policy (system functions approach)

Strategic framework for promoting environmental innovation (1)

Guiding Principles:

- Ambitious policy **targets**, **coherence** across different policy domains, **flexibility**, **stringency** in regulatory measures

Analytical dimension

- System functions framework provides entry points for identifying policy interventions **in support of an emerging technological innovation system**
- Time-strategic perspective highlights the importance of **timing** in the context of competing technological trajectories and offers guidance for preparing, creating and utilizing “techno-economic windows of opportunity”

Strategic framework for promoting environmental innovation (2)

Strategy process:

- Importance of dialogue and stakeholder involvement, coordination of policy and reflexivity/policy learning
- Multi-level, cyclical governance framework for engaging stakeholders offered by Transition Management
- Procedural steps for Strategic Niche Management

Strategic capacity

- M&E arrangements, strategic councils, networks of strategic intelligence and public-private interfaces

Background on India's National Solar Mission

- One of eight national missions initiated within the context of the National Action Plan on Climate Change (NAPCC)
- Represents a formalized strategy for promoting environmental innovation
- Launched officially in 2010 with a timeframe of 12 years
- Officially led by the Ministry of New and Renewable Energy (MNRE) with the mandate from the NAPCC
- Estimated budget of approximately \$1 billion up to 2013

Background on India's National Solar Mission

- The National Solar Mission aims to:
 - To create an enabling policy framework for the deployment of solar power
 - To simultaneously reduce the cost of solar power as a pre-condition for scaling up the deployment of solar power
 - To create favourable conditions for solar manufacturing in India

S. No.	Application segment	Target for Phase I (2010-13)	Target for Phase 2 (2013-17)	Target for Phase 3 (2017-22)
1.	Solar collectors	7 million sq meters	15 million sq meters	20 million sq meters
2.	Off grid solar applications	200 MW	1000 MW	2000 MW
3.	Utility grid power, including roof top	1,000-2000 MW	4000-10,000 MW	20000 MW

Assessing India's National Solar Mission: Guiding Principles

- The National Solar Mission formulates policy objectives that are **clear**, that may be considered **ambitious** for the Indian context and are **flexible**
- However, not all policy objectives in the NSM are created equal:
 - quantitative targets only exist for deployment
 - strong support for grid-connected power despite large off-grid potential in India
- Stringency of regulatory measures is yet to be seen regarding the Solar Renewable Purchase Obligation (RPO)
- Policy coherence is in place for deployment, but less so for industrial development

Assessing India's National Solar Mission: Analytical dimension

Time-strategic perspective

- The NSM is explicitly taking a phased approach, enabling the government to adapt measures to the evolving dynamics of technology development.

System-based approach

- The NSM explicitly seeks to build an „eco-system“ for solar energy in India, but the emphasis is on deployment rather than industrial development.
- It seeks to close gaps in most of the seven system functions identified by Bergek et al (2008), but there is a clear emphasis on market formation and legitimation.

Assessing India's National Solar Mission: supporting the seven system functions (1)

- Legitimation: Strong endorsement by Prime Minister and high profile of the NSM is a strong factor in support of legitimizing solar energy in India.
- Market formation:
 - A host of measures aim at developing the conditions for developing a market that can be sustained without government support in the medium-term.
 - Most important instruments: reverse-bidding process & Solar RPO
- Influence on the direction of search:
 - NSM sends strong signal in favor of solar energy to the private sector.
 - The government is explicitly counter-balancing the established trend towards PV by committing 50 percent of funds to CSP in the first phase.
- Knowledge development and diffusion:
 - A „Solar Research Strategy“ is in place, but it lacks a transparent and systematic approach and lags behind market formation.

Assessing India's National Solar Mission: supporting the seven system functions (2)

- Resource mobilisation:

- Financial resource mobilisation is a big challenge that has not been sufficiently addressed (despite ad hoc creation of government guarantee fund).
- Human resource development has been initiated, but at a relatively small scale.

- Entrepreneurial experimentation:

- Requires more support, despite recent creation of INFUSE (\$25 million-fund to support innovative start-ups in cleantech).

- Development of positive externalities:

- Little focus on leveraging positive externalities.
- Example: Lesson-learning across State governments is not systematically promoted.

Strategy process (1)

Stakeholder involvement

- Informal consultations during strategy development
- Ad hoc consultations during early implementation
- More formalized consultations planned via Industry Advisory Council and Solar Research Council

Policy coordination

- Policy coordination takes place primarily between MNRE, M. of Power, and the Central Electricity Regulatory Commission and focuses on deployment; to a lesser extent also with the M. of Finance, Planning Commission, M. of Commerce, M. of S&T, M. of Human Resources Development

Policy learning / reflexivity

- Ongoing monitoring and review takes place when it comes to the competitive bidding process
- A formal evaluation is planned after each phase

Strategic capacity

- Political mandate: Strong endorsement by NAPCC and Prime Minister provide MNRE with a strong political mandate
- Organizational capacity: MNRE has created a Solar Energy Corporation for implementation of the NSM in Phase 2
- Institutional arrangements for policy coordination: steering committee with 6 ministers
- M&E arrangements: Development of an electronic system for monitoring of solar energy projects
- Networks of strategic intelligence: Solar Energy Centre + build up of Centers of Excellence for Solar Energy at IIT Bombay and IIT Jodhpur; need for stronger linkages to policy development
- Strategic council: Solar Research Council
- Public-private interfaces: Industry Advisory Council but more private sector involvement needed

Conclusion

- „Quality“ of policy targets prove to be a good indicator of actual commitment
 - Deployment of grid-based solar energy systems: ambitious quantitative targets coupled with strong policy measures
 - Industrial development is only a qualitative target and lacks commitment and policy coherence
- Reflexivity is at the core of the NSM, but based on a top-down approach to policy making; horizontal learning and visioning is largely neglected
- System-based approach is also clearly in place, but with a strong focus on market formation
- Build up of medium- to long-term strategic capacity is an important focus of the NSM, although with a primarily top-down approach



Rainer Quitzow
Environmental Policy Research Centre (FFU)
Freie Universität Berlin
rainer.quitzow@fu-berlin.de
<http://kooperationen.zew.de/en/lead-markets>
www.fu-berlin.de/ffu

Towards a strategic framework for promoting environmental innovations

LEAD MARKET 

SPONSORED BY THE



Federal Ministry
of Education
and Research

 **FONA**
Economics
for Sustainability
BMBF