



Webinar: Pioneering and scaling solar energy in India

21 June, 2016

Speakers:

Minal Pathak, Assistant Professor, CEPT University, Ahmedabad, INDIA

S.B. Patil, Deputy Director, Gujarat Energy Development Agency, INDIA

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Agenda

- Welcome and introductory remarks
- Overview of the LEDS GP
 - **Moderator name**
- Presentations – Panelists:
 - **Minal Pathak**
 - **S.B. Patil**
- Questions and answers
- Closing remarks
- Survey



LEDs in Practice

June 2016

Gujarat state: Pioneering and scaling solar energy in India

Minal Patnak, Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad, India

Scott Muller, Spatial Informatics Group (SIG), Pleasanton, CA, USA

"I saw more than glittering panels—I saw the future of India and the future of our world. I saw India's bright creativity, ingenuity and cutting edge technology."

UN Secretary General Ban Ki-moon, at inauguration of canal-top solar energy plant in Vadodara, Gujarat

Key messages

- For nearly 40 years Gujarat state has been an innovative leader in low emission development strategies. From small scale technologies such as solar cookers to larger projects including photovoltaic rooftops, solar parks, and canal-top solar power, the state has pioneered renewable energy projects and programs that have later been rolled out to other states and at national level. While remaining within the overall ambit of India's national policy, Gujarat state has led the nation and other states in solar power policies and initiatives.
- Gujarat's 2009 Solar Power policy, the first comprehensive solar policy in India, offered incentives to investors over a 25 year period. The robust policy framework, financing mechanism, and incentives contributed to creating an enabling green investment climate in the state and led to ambitious targets for grid connected solar power being achieved. By 2013, Gujarat had over 50% of the share of solar power capacity in the country. The 2015 Gujarat Solar Power policy now has a 2020 state target of 10,000 MW solar generation capacity.
- The Jawaharlal Nehru National Solar Mission, established in 2010, helped to align state and national initiatives and has led to major successes in solar power deployment at both state and national levels.
- The capacity of grid connected solar power in India has increased from 20 MW in 2010 to over 5,500 MW in 2016.
- The experience of Gujarat state shows how subnational governments can proactively lead and inform national policy and raise national government ambitions for more aggressive greenhouse gas mitigation commitments.
- Gujarat's success is due to several enabling factors: a very high solar power potential, availability of wasteland, good connectivity, transmission and distribution infrastructure, and efficient utilities—complemented by a strong political will and an investment friendly climate.

The LEDs GP Subnational Integration Working Group strives to accelerate climate resilient LEDs by supporting the coordination and vertical integration of climate action between national and subnational governments. Contact: snw@ledsgp.org

SUBNATIONAL INTEGRATION WORKING GROUP (SNI-WG)

MISSION:

To enhance capacity, capture synergies and improve and support the coordination and vertical integration of low emission development strategies among national and subnational governments.

ACTIVITIES:

- Mapping issues, activities and resources
- Capacity building, training
- Ongoing dialogue



Launched in 2013, the SNI Working Group of the LEDSGP has +540 members including governments, IGOs and NGOs



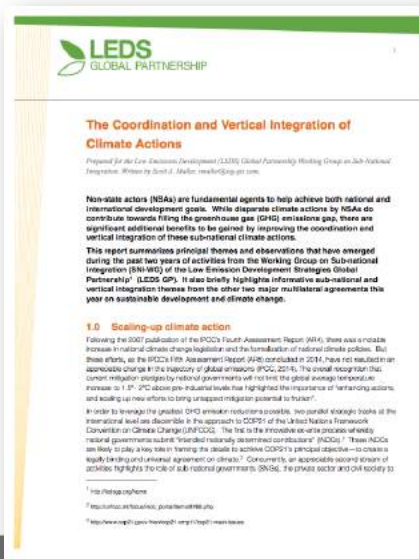
LEARNING: SNI Working Group Resources

- More info -

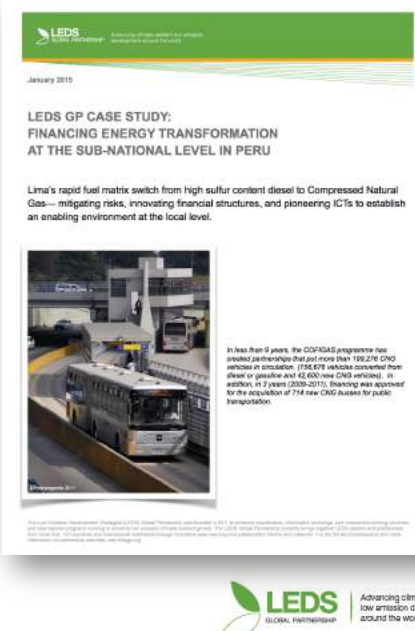
Synthesis of Trends and Good Practice



White Papers - WG Lessons Learned



Case Studies



The coordination & vertical integration of sub-national climate actions can:

- Raise national government ambitions for more aggressive GHG mitigation commitments.
- Help alleviate domestic political constraints.
- Scale up, as well as unlock, additional and new mitigation opportunities at the sub-national level.
- Accelerate the effective implementation of national targets, strategies and development priorities by “localizing” them. This can also provide opportunities for “bundled approaches” and increasing “co-benefits” by linking local priorities with diverse development objectives.

The coordination & vertical integration of sub-national climate actions can:

- Improve the consistency of sub-national and national climate data sets; strengthening MRV.
- Create a more bankable “low-risk” environment for infrastructure finance and private sector investments.
- Expand and accelerate the flow of international public and private climate finance to cities, urban infrastructure and local priorities.
- Enable safe learning and strengthen domestic institutions.
- Help address some of the persistent collective action challenges to multilateral climate agreements.

2016 Flagship Activity: Regional Assessments at the Country Level on the Coordination and Vertical Integration of Climate Actions

- Document innovative and cutting edge subnational LEDS policies and measures across the LEDS LAC and AfL Platforms
- Prepare comprehensive inventory of climate policies and actions linked to multi-level governance.
- Categorize and unpack common challenges
- Identify model programmes and good practices for coordination and vertical integration of climate actions.
- Outline recommendations to national and sub-national governments for future initiatives to improve coordinated and vertically integrated climate policies and actions that accelerate LEDS implementation.



SUBNATIONAL INTEGRATION WORKING GROUP

sniwg@ledsgp.org

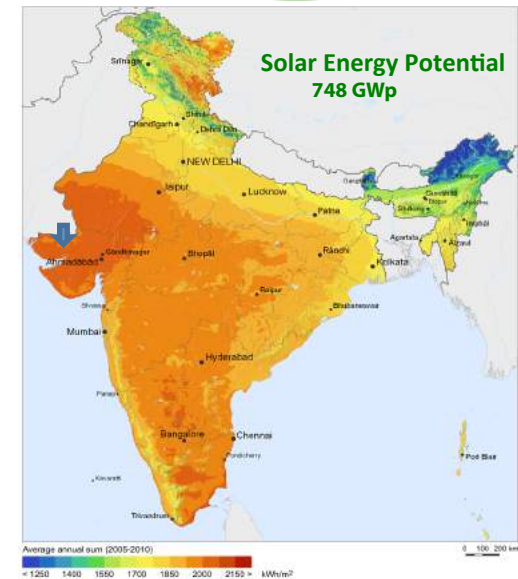
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Pioneering and scaling solar energy in India

21 June, 2016

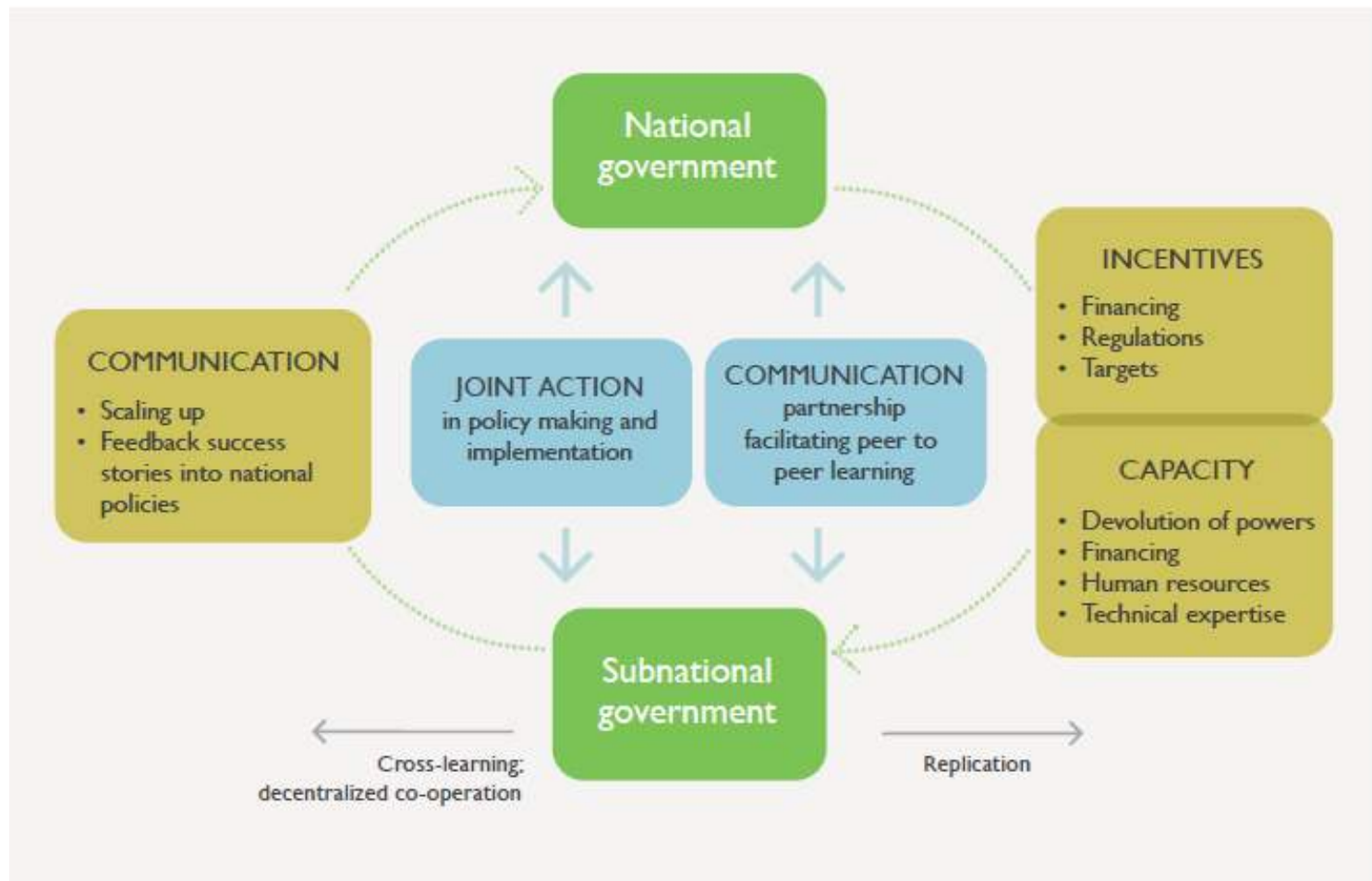
Minal Pathak, Assistant Professor, CEPT University,
Ahmedabad, INDIA

Introduction



- Gujarat is a forerunning industrial state
- High Entrepreneurial capacity
- High Solar Potential:
 - 36 GWp Potential
 - 300 sunny days

Framework: National-subnational integration



National Action Plan on Climate Change

Announced by the Prime Minister of India in 2008

8 Sub-missions:

- National Solar Mission
- Enhanced Energy Efficiency
- Sustainable Habitat
- Water
- Sustaining the Himalayan Ecosystem
- 'Green' India
- Sustainable Agriculture
- Strategic Knowledge for Climate Change

National Solar Mission

Goals:

- Target: To deliver 20 GW of solar power by 2022
- 15 million sq.m. solar thermal collector area by 2017 and 20 million sq. m by 2022
- Off-grid applications: 1 GW by 2017, 2 GW by 2022
- 20 million solar lighting systems for rural areas by 2022
- Favorable conditions for solar manufacturing capabilities

Actions:

- Phase I (2009 – 2012): Solar thermal, promoting off-grid solutions, modest capacity additions on grid
- Phase II (2013 – 2017) and Phase III (2017 – 2022): aggressive capacity additions

Gujarat's Solar Success Story

1979: Gujarat Energy Development Agency (GEDA)



First State Nodal Agency
in the country for
renewable energy and
energy conservation

1979: Solar Cooker Promotion Program



GEDA received Best Performance Awards for Solar Cookers for the years 1997-98, 1998-99, 2000-01 and 2001-02.

Between 1980 and 1988, annual sales had gone up six times

1979: Solar Street lighting



1989: Solar Water Heating Systems



- Large scale solar water heating systems successfully implemented in dairies, hotels, small establishments
- Thrust to local manufacturing



1980: Energy Plantations



1989: Grid-connected windfarms



2009: Gujarat Solar Power Policy

Objectives

- Promoting clean energy
- Appropriate Investment climate
- Productive use of wastelands
- Employment generation and skill building
- R&D and technology transfer
- Capacity building
- Local manufacturing

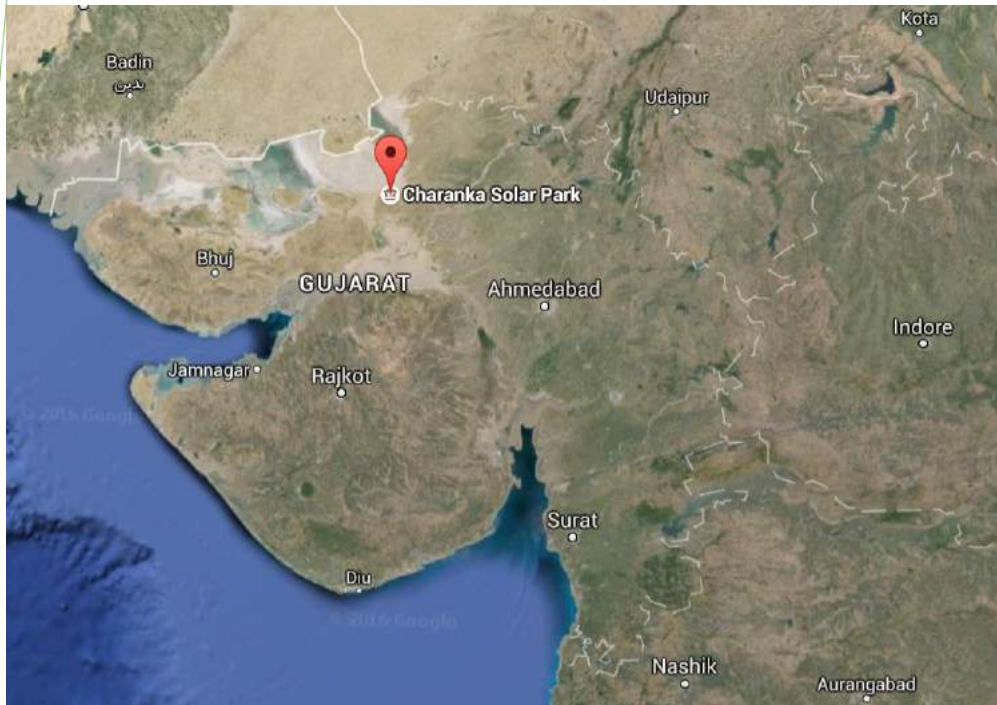
Incentives

- Tax benefits
- 25 year Power purchase agreement

Table 1: Tariffs for solar power generation under Gujarat Solar Power Policy 2009 (US\$ per kWh) at current prices

Projects commissioned before	Solar photovoltaic		Solar thermal	
	1-12 years	13-25 years	1-12 years	13-25 years
December 1, 2010	0.28	0.07	0.22	0.07
March 31, 2014	0.26	0.07	0.20	0.07

2010: Solar Park at Charanka



- Aim to create a concentrated solar power generation hub in a single location
- First of its kind in the country
- Large tracts of wasteland
- 214 MW Commissioned in 2012

Solar Park at Charanka



Highlights

- Implemented in a PPP mode
- Implementation on fast-track
- Government facilitated by easing land acquisition
- Land provided with infrastructure, including power transmission, roads, and water for commissioning of the power project put on fast track.

Replication and Scale up

- Solar parks planned in other states
- MNRE announced a scheme for development of solar parks and Ultra Mega Solar Power projects

Benefits



- Improved infrastructure that has benefitted local population
- Communication networks
- Employment generation for unskilled labour
- GHG emission reduction

Canal Solar Power Project



- An innovative project that combines solar power generation with water conservation in an extremely hot and dry region
- First ever solar power plant spanning a canal that provides 1MW of renewable energy

Multiple Benefits



- Reduced land acquisition issues
- 17.6 million units of Clean energy.
- Avoid evaporation of water per annum
- Saves land

Replication and Scale up

- The pilot 1 MW project led to another 10 MW project in the state
- Several other states planning similar projects
- National Pilot-cum-Demonstration Project for Development of Grid Connected Solar PV Power Plants on Canal Banks and Canal Tops

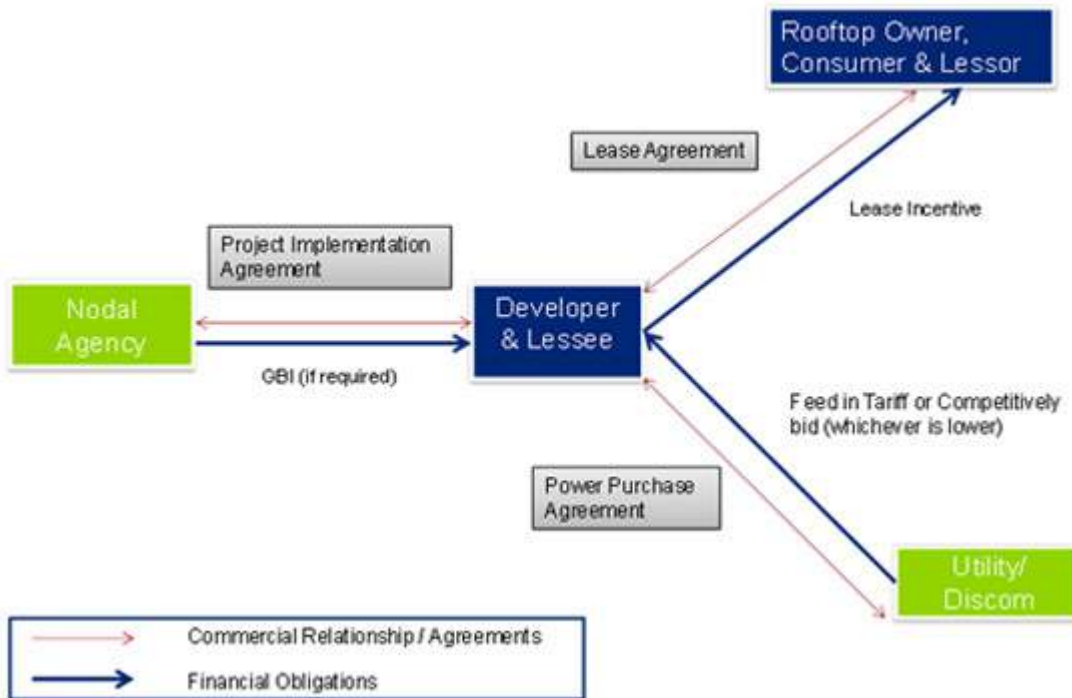


'Rent a Roof' Program



- First of its kind in Gandhinagar
- Innovative PPP model
- USD 12 million in funding
- Installs panels on anyone who owns a roof
- Multiple benefits to homeowners
 - Low risk
 - No Upfront capital costs
 - No system performance risk
 - Cheaper power
- Benefits to private players
 - Availability of rooftops
 - Economies of scale (at programme level)

Rent a Roof program: The model



- State subsidy + central subsidy
- Companies can rent the roof
- Roof-top owners paid 'Green incentive' based on the excess units of electricity generated

Program Impacts

- Grid connected Solar Roof Top Systems installed on 500 Private households.
- 125 Standalone Solar Roof top Systems at government residences
- Capacity addition to city grid

Replication and scale up

- Replicated in five other cities in Gujarat
- The lessons from program useful in implementing the solar rooftop policy in the national capital Delhi
- Other states working on similar lines



Gujarat Solar Policy-2015

- **Operative period:** Till 31-3-2020
- **Benefits Duration :** 25 years
- **Minimum Size of Project:** kW scale- 1 kW, MW scale – 1 MW
- **Eligibility:** Individuals, Residential, Govt., Comm, Industrial
- **Electricity Duty :** Exempted from Electricity Duty
- **CDM:** Benefits to be retained by the Consumer
- **Transmission & Wheeling:** Charges & Losses : As per OA charges.

Installed capacity – Gujarat

	In 2002		In 2015	
Fuel	MW	Share %	MW	Share %
Coal & Lignite	5599	64%	13343	55%
Gas	2196	25%	4774	20%
Hydro	547	6%	779	3%
Nuclear	315	4%	559	2%
Renewable	99	1%	4865	20%
Total	8,756	100%	24,320	100%

Renewable Energy Achievements and Impacts in Gujarat

- First solar PV installations in India were under the Gujarat state policy
- In 2013, India had an installed total of 1,440 MW of solar, and impressively over 1,000 MW of this had been installed in Gujarat.
- Presently, Gujarat holds **a share of 25 % (1034 MW)** of India's solar generation capacity
- Number of projects replicated within the state and in other states
- Scale up to national programs and targets

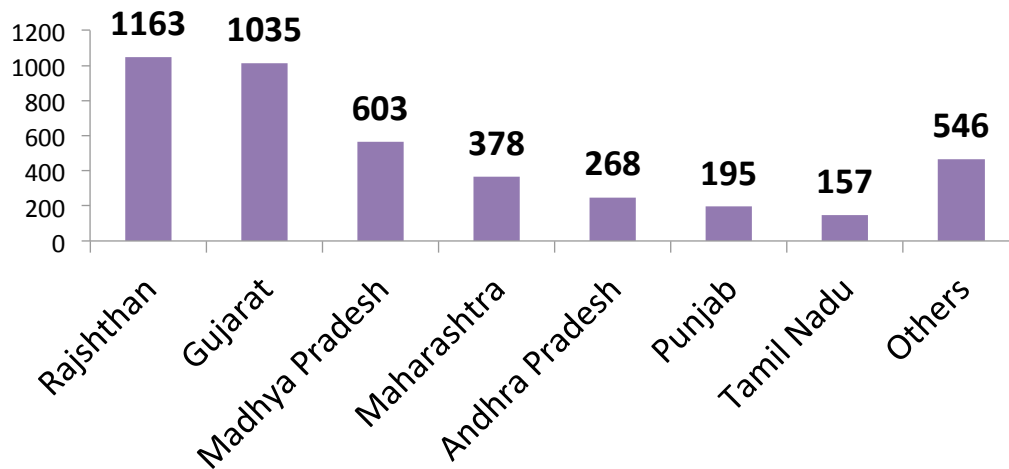


Renewable Energy Achievements and Impacts in Gujarat

- Annual Solar Energy Generation : 1654 MUs
- Annual Carbon Emissions avoided : 1.65 Million Ton CO₂
- Annual Coal Usage avoided : 1.15 Million Ton Coal
- Annual Employment Generation : 3500

Comparing with other states

State -wise Solar Installed Capacity, MW



1 MW Solar Power Plant at PDP University

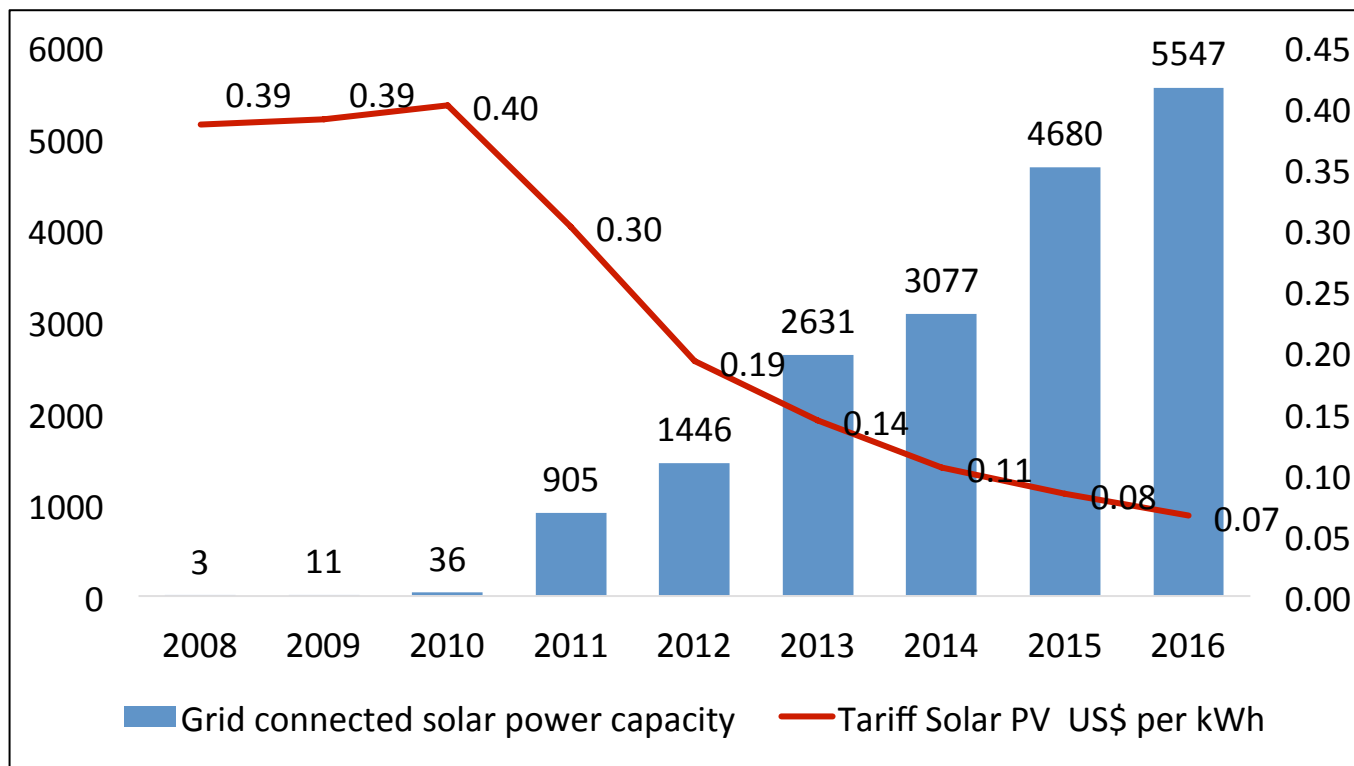


Gandhinagar Solar Rooftop Project

Highlights

- **National and state coordination**
- **Clear policy framework:** Gujarat Solar Power Policy 2009
- **Coordination among state agencies and departments**
- **Clear signal to private players** reducing uncertainty and created a more bankable, “low-risk” environment for investment.
- **Attractive financial incentives:** Targets & incentives over and above national policies
- **Efforts to address barriers through communication and speeding up clearances**
- **Proactive role in developing innovative models led to several success stories:** Gujarat Solar Park, Canal-top Solar Project and the Gandhinagar Photovoltaic Rooftop Programme

India: Cumulative grid connected solar power and tariff per kWh



In 2015, India significantly expanded its solar plans, targeting US\$100 billion of investment and 100 GW of solar capacity by 2022 communicated in India's INDCs



"I saw more than glittering panels—I saw the future of India and the future of our world. I saw India's bright creativity, ingenuity and cutting edge technology." – UN Secretary General Ban Ki-moon during inauguration of a new canal-top solar energy plant in Vadodara, Gujarat

Thank you for participating!

For more information

Details on Policies and guidelines

Ministry of New and Renewable Energy: <http://mnre.gov.in/>

Gujarat Energy Development Agency: <http://geda.gujarat.gov.in/>

Panelists/Organizing team

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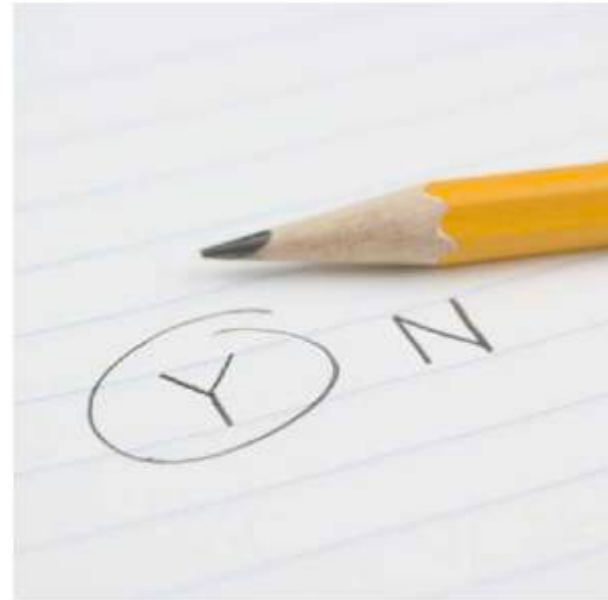
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Survey

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