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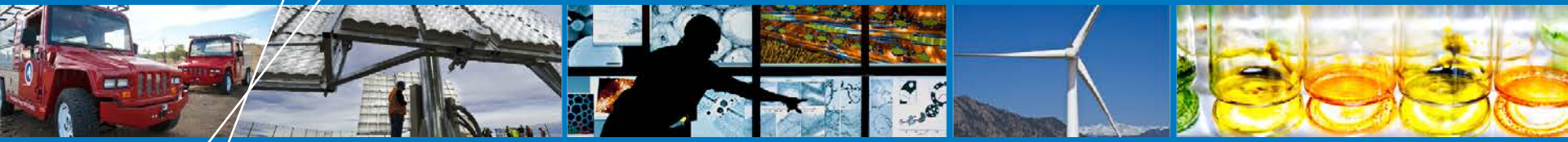
Indian Solar Cities Programme: An Overview of Major Activities and Accomplishments



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Presentation Overview

- Background
- India Solar Cities Programme Overview
- Master Plans
- Sample Master Plan: Agra
- Solar America Cities
- Synergies with Solar America Cities

India's Energy Use

- India's energy consumption has been increasing at one of the fastest rates in the world
- Existing energy supply-demand imbalance
- Over half of the citizens have no access to energy (Government of India's Ministry of New and Renewable Energy, 'Annual Report 2010-2011', page 1)

India's RE Goals

MNRE = Ministry for New and Renewable Energy

- India's government is aiming for 14,000 MW of RE installation from 2007-2012 ('Guidebook for Developing Solar City', ICLEI-South Asia, 2010, page 9)
- National Solar Mission (Government of India's Ministry of New and Renewable Energy, 'Annual Report 2010-2011', page 57)
  - 20,000 MW of grid-connected solar by 2022
  - 2,000 MW of off-grid solar
- Created Solar Cities Programme

Solar Cities Programme

- Supports 60 Indian cities in the development of EE and RE projects
- Aims to reduce conventional energy demand by 10% by 2013, compared to a baseline year of 2008
- Support provided to municipal corporations for preparing and implementing a master plan

Solar Cities Programme Objectives

- To enable/empower urban local governments to address energy challenges at a city-level;
- To provide a framework and support to prepare a Master Plan including assessment of current energy situation, future demand and action plans;
- To build capacity at the urban local bodies and create awareness among all sections of civil society;
- To involve various stakeholders in the planning process; and
- To oversee the implementation of sustainable energy projects through public-private partnerships.

Solar Cities Programme Support

- Setting up a solar cell in the city
- Organizing promotional activities
- Preparing and implementing master plans

Master Plans

- **Provide an overview of the city**
  - Location, population, growth, renewable resource, energy use
- **Outline total and sector-wide baseline data for 2008**
  - Energy use and GHG emissions
    - Electricity, petrol, diesel, kerosene, and liquefied petroleum gas (LPG)
  - Residential, industrial, commercial, municipal
- **Project energy demand and supply for future 5- and 10-year periods**

Master Plans (cont)

- **Outline annual targets for:**
  - Energy conservation
  - RE addition
  - GHG abatement and action plan
- **Outlines potential sources of funding**

➢ **Reductions must equate to at least a 10% reduction in projected total demand of conventional energy at the end of five years (end of 2013)**
  - A minimum of 5% of this reduction goal must be RE

Sample Master Plan: Agra City

City Overview:

- **Home to the Taj Mahal**
- **Population of 4,380,793 (2011)**
  - Represents a 20.96% growth from the 2001 census. http://censusindia.gov.in/2011-prov-results/data_files/up/Census2011Data%20Sheet-UP.pdf
- **Good average annual solar resource**
- **Wind resource data is not readily available**
- **Biomass resource data for the city is not available**

Sample Master Plan: Agra City

Energy Baseline:

- **Projections based on historical growth in consumption levels and population growth projections**
  - The 10% reduction goal is 248.48 million kWh. 'Development of Agra Solar City: Final Master Plan', page 4.

TABLE: ENERGY CONSUMPTION IN AGRA CITY IN 2008 AND ENERGY USE PROJECTIONS FOR 2013 AND 2018 IN MILLION KWH

'Development of Agra Solar City: Final Master Plan', page 38.

Year	2008	2013	2018
Electricity Consumption	1,206.43	1,804.77	2,423.67
LPG	151.39	213.41	275.34
Kerosene	325.75	466.64	607.98
Total	1,683.57	2,484.82	3,306.99

Sample Master Plan: Agra City

Renewable Energy Recommendations

- Agra's master plan sets a target of installing:
- 5.82 million litres per day (LPD) capacity SWH with a collector capacity of 0.116 million square meters (sqm)
- 12.40 MW cumulative solar PV systems
- 7,553 cubic meters (CuM) biogas systems
- 5.12 MW waste to energy projects
- 4,592 solar cookers

Sample Master Plan: Agra City

Energy Efficiency Recommendations

- Lighting retrofits
- Replacing conventional ceiling fans, AC, refrigerators, water pumps, motors with efficient ones
- Variable speed drives
- Daylight sensors for street lights

Sample Master Plan: Agra City

RE and EE strategy for Agra	Energy Savings Target over 5 years					% of Savings target to achieve	Emission Reduction/year
	1st Year	2nd Year	3rd Year	4th Year	5th Year		
RE Residential	11.42	28.54	51.37	79.91	114.15	45.94	84761
RE Commercial	0.6	1.49	2.69	4.19	5.98	2.41	3486
RE Industrial	1.25	3.13	5.63	8.76	12.52	5.04	11094
RE Municipal	.24	9.5	13.18	33.02	33.73	13.57	27322
Total RE Strategy	16.64	41.59	74.87	116.46	166.38	66.96	126664
EE Residential	8.68	21.70	39.70	60.77	86.82	34.94	70323
Ee Commercial	1.42	3.56	6.4	9.96	15.23	5.72	11522
EE Industrial	0.65	1.63	2.93	4.56	6.52	2.62	5278
EE Municipal	2.26	5.65	10.17	15.82	22.6	9.09	18305
Total EE Strategy	13.02	32.54	58.57	91.11	130.16	52.38	105429
RE and EE Combined	29.65	74.13	133.44	207.57	296.53		232092
	12%	30%	54%	84%	119%		

Solar America Cities

- In 2007 and 2008 the U.S. Department of Energy (DOE) designated 25 major U.S. cities as Solar America Cities
- Provided financial and technical assistance to help the cities develop comprehensive, city-wide approaches to accelerate the adoption of solar energy technologies.
- Only solar technologies, unlike India Solar Cities Programme

Solar America Cities Technical Support

Support provided to the cities fell into these categories:

- **Organizing and strategizing a local solar effort**
- **Making solar energy affordable for residents and businesses**
- **Updating and enforcing local rules and regulations**
- **Improving utility policies and process**

Solar America Cities Technical Support

Support provided to the cities fell into these categories (cont):

- **Creating jobs and supporting economic development**
- **Educating and empowering potential customers**
- **Leading by examples with installations on government properties.**
- **http://solaramericacommunities.energy.gov/solaramericacities/action_areas/**

Synergies Between the Two Programs

- **Draw upon experiences of Solar America Cities**
  - Share lessons learned and best practices
  - Facilitate dialogue between American and Indian cities

Synergies Between the Two Programs

- **Provide support in:**
  - Developing city plans
  - Implementation support for overall program development
  - Capacity building and training activities in the following areas:
    - Technology-Focused
    - Policy-Focused
    - Financing-Focused
    - Curriculum Development

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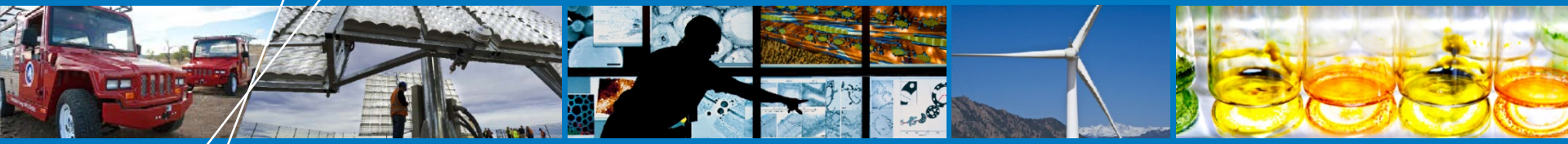
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