

## Sectoral

### Renewable Energy

#### 1. What is the list of solar cities under 'Development of Solar Cities Programme'?

Under the 'Development of Solar Cities Programme', there are in total 60 solar cities identified which can be accessed from the link.

#### 2. What is a solar city?

The Solar City aims at minimum 10% reduction in projected demand of conventional energy at the end of five years, through a combination of efforts for enhancing supply from renewable energy sources in the city and energy efficiency measures. The basic aim lies in motivating the local Governments for adopting renewable energy technologies and energy efficiency measures. In a Solar City, all types of renewable energy based projects like solar, wind, biomass, small hydro, waste to energy etc. may be installed along with possible energy efficiency measures depending on the need and resource availability in the city.

#### 3. What are the new technologies undertaken by the government in this sector?

The Ministry of New and Renewable Energy (MNRE) has taken up various programmes on new technologies. As part of these programmes, various projects pertinent to research, development and demonstration have been initiated. These initiatives have been at various research, scientific and educational institutes, universities, national laboratories, industry, etc. These projects are helping in the development of indigenous research and industrial base, expertise, trained manpower and prototypes/devices/systems in the country a. Hydrogen Energy b. Chemical Sources of Energy (Fuel Cells) c. Battery Operated Vehicles d. Geo Thermal Energy e. Ocean Energy f. Biofuels

#### 4. What is strategy related to R&D?

R&D for technology development in industry -driven and goal oriented. 1. Involvement of industry and scientific establishment. 2. Access technological development elsewhere avoiding 'Reinventing the

wheel'. 3. Indigenous R&D for new and emerging technologies and improvement of available technologies. 4. Time bound specific tasks for identified R&D activities to be assigned to recognized / identified industry and institutions with clear understanding on the achievement of results.

## 5. What are the focus areas of the sector?

Research, design and development efforts should invariably lead to manufacture of complete systems, even if these efforts are required to be shared among different institutions. Thus, there would be a need for system integration broadly covering the following areas: - 1. Alternate Fuels (hydrogen, bio & synthetic) to supplement and eventually substitute liquid hydrocarbons; 2. Green Initiative for Future Transport (GIFT) based on Alternate Fuels for land, air & sea applications to supplement and eventually substitute fossil-fuel systems; 3. Green Initiative for Power Generation (GIPS) based on Alternate Fuels for stationary & portable power generation applications to supplement and eventually substitute fossil-fuel systems; 4. Standalone new and renewable energy products to provide cost-effective energy for cooking, lighting and motive power; 5. Distributed new and renewable energy systems to provide cost-competitive energy supply options for cooking, lighting and motive power; 6. New and renewable energy products for urban, industrial and commercial applications, including energy recovery from urban and industrial wastes and effluents; and 7. MW scale grid interactive renewable electricity systems to contribute towards supplement and eventually substitute fossil-fuel based electricity generation.

## 6. What is the state-wise electricity generation capacity?

The electricity generation capacity is listed state wise, which can be accessed from the link.

## 7. What is ocean renewable energy or marine renewable energy?

Ocean renewable energy or marine renewable energy are terms used to describe all forms of renewable energy derived from the sea including wave energy, tidal energy, ocean current energy, salinity gradient energy and ocean thermal gradient energy.

## 8. What is OTEC?

Ocean Thermal Energy Conversion (OTEC), uses ocean temperature differences from the surface to depths lower than 1,000 meters, to extract energy. A temperature difference of only 20°C can yield usable energy. Research focuses on two types of OTEC technologies to extract thermal energy and

convert it to electric power: closed cycle and open cycle. In the closed cycle method, a working fluid, such as ammonia, is pumped through a heat exchanger and vaporized. This vaporized steam runs a turbine. The cold water found at the depths of the ocean condenses the vapor back to a fluid where it returns to the heat exchanger. In the open cycle system, the warm surface water is pressurized in a vacuum chamber and converted to steam to run the turbine. The steam is then condensed using cold ocean water from lower depths.

## 9. What is the expected Potential of OTEC in India?

OTEC has a potential installed capacity of 180,000 MW in India.

