

Energy resources and their utilisation

1.1 Introduction

Renewable energy is energy which comes from natural resources such as sunlight, wind, rain, tides, and geothermal heat, which are renewable (naturally replenished). About 16 per cent of global final energy consumption comes from renewables, with 10 per cent coming from traditional biomass, which is mainly used for heating, and 3.4 per cent from hydroelectricity. New renewables (small hydro, modern biomass, wind, solar, geothermal, and biofuels) accounted for another 2.8 per cent and are growing very rapidly. The share of renewables in electricity generation is around 19 per cent, with 16 per cent of global electricity coming from hydroelectricity and 3 per cent from new renewables.

While many renewable energy projects are large-scale, renewable technologies are also suited to rural and remote areas, where energy is often crucial in human development. As of 2011, small solar PV systems provide electricity to a few million households, and micro-hydro configured into mini-grids serves many more. Over 44 million households use biogas made in household-scale digesters for lighting and/or cooking, and more than 166 million households rely on a new generation of more-efficient biomass cookstoves.

Climate change concerns, coupled with high oil prices, peak oil, and increasing government support, are driving increasing renewable energy legislation, incentives and commercialisation. New government spending, regulation and policies helped the industry weather the global financial crisis better than many other sectors. According to a 2011 projection by the International Energy Agency, solar power generators may produce most of the world's electricity within 50 years, dramatically reducing the emissions of greenhouse gases that harm the environment.

1.2 India's energy resources

India's need to increase energy provision for its population and fast growing economy poses a formidable challenge which is perceived as both a great opportunity as well as a necessity for the country to increase the share of

2 Advanced renewable energy systems

renewables in the overall energy mix. India has been making continuous progress in conventional as well as renewable power generation. India's approach is to meet its energy needs in a responsible, sustainable and ecofriendly manner.

The country has made a remarkable growth in last 2–3 years in the field of renewable energy power generation. The past few years saw a record addition of 2332 MW of renewable energy sources i.e. solar, wind, biomass, geothermal and hydro, etc. which could make important contributions to sustainable development. All these development have taken place in 11th plan period. The bulk addition is in wind generation at 1565 MW, small hydro power segment recorded an addition of 305 MW, cogeneration 295 MW and biomass 153 MW. The lowest additions were in the solar at 8 MW and waste-to-energy segments at 4.7 MW. A target of 14,000 MW capacity addition has been set for the 11th Plan (2007–08 to 2011–12).

The need for renewable energy arises as energy Security is important to our country. As per World Energy Outlook report, India will become the third largest net importer of oil before 2025 after the United States and China. This will not be sustainable in the long run given the high volatility of international crude oil prices. Coal imports are also likely to increase from 12 per cent in 2005 to 28 per cent in 2030. In order to insulate itself from any future supply disruption and price shocks of fossil fuels and furthermore to achieve energy security and also meet global climate change objectives, renewables are a must and has indeed caught the imagination of India.

Riding on the crest of a high growth trajectory and in pursuit of sustainable sources to meet its rising domestic energy demand and access to energy for overall development, the country is focusing on harnessing renewable energy production through maximising the utilisation of renewable energy.

Currently, their exploitation in commercial markets is low, being constrained by costs and uncompensated benefits, as well as intermittent supplies and other technical and institutional considerations. But they have hold on social consideration for:

1. Enhanced energy security by providing supplies that are abundant, diverse and indigenous.
2. Reduced global and local atmospheric emissions when used in place of fossil fuels.
3. Improved options in rural areas and in newly industrialising and developing countries.
4. Increased local and regional employment opportunities in energy infrastructure manufacturing, installation and maintenance for developed and developing countries.