

Innovations in Renewable Energy Generation and Development

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Abstract

Among the various renewable energy technologies, hydro power is a well proven technology. This is followed by wind, biomass, solar and geothermal. As it is difficult to provide full details of innovations in all types of renewable, I present here the details of two types of renewable, namely the solar and geothermal, with a more focussed attention to the examples from India.

Solar energy generation through photo voltaic (PV) technology is well known to energy engineers for a long time. It's first invention was during 1839 by Alexandre Edmond Becquerel. He observed the photovoltaic effect via an electrode in a conductive solution exposed to light. It has now crossed many hurdles from lab scale models to industrial and commercial scale. It is a well proven and matured technology presently coming with a long guarantee period of more than two decades for the solar panels. The present day cost almost reduced to more than 50% compared to 2011 level. Several materials have been experimented like Silicon mono crystalline, Silicon poly crystalline, amorphous Silicon, Indium Gallium Nitride etc. Graphene is another material found to be promising in SPV in recent years. A few breakthrough innovations on the properties of graphene showed that this material will pave a way for further reducing the cost of solar panels. Apart from the research in material science, innovations are made in application of solar energy at different locations both in on-grid and off-grid and also on the policies for implementation of the projects.

Geothermal energy is a natural heat available inside the Earth. Power generation from geothermal is possible, if we can harness it. Power generation using the natural heat is also a matured technology outside India. For a long time, this sector was not given it's due importance in India. Majority of the geoscientists and decision managers felt there is no need to focus on this energy in India as there are no volcanoes and thus no possibility of any geothermal resource. This was proved wrong with the breakthrough result of Puga geothermal region by NGRI, Hyderabad. Through deep geophysical investigation, large hidden heat source was discovered. This is the driving force to look into other geothermal regions of India for possible exploitation. It is now known that Tatapani geothermal region in Chattisgarh, Surajkund region in Jharkhand, Cambay region in Gujarat, Bakreswar region in West Bengal, West coast region in Maharashtra are also potential geothermal regions. In view of the above, a road map is provided for implementation by the Government of India to give a boost to this untapped resource. In the present discussion, the efforts being made by Government of Gujarat for the development of solar and geothermal energy are presented.