

## India's Energy Transition, Pathways for Green Economy

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**Abstract :** In modern economy, energy is fundamental to virtually every product and service in use. It has been developed on the dependence of abundant and easy-to-transform polluting fossil fuels. On one hand, increase in population and income levels combined with increased per capita energy consumption requires energy production to keep pace with economic growth, and on the other, the impact of fossil fuel use on environmental degradation is enormous. The conflicting policy objectives of protecting the environment while increasing economic growth and employment has resulted in this paradox. Hence, it is important to decouple economic growth from environmental degeneration. Hence, the search for green energy involving affordable, low-carbon, and renewable energies has become global priority. This paper explores a transition to a sustainable energy system using the socio-economic-technical scenario method. This approach takes into account the multifaceted nature of transitions which not only require the development and use of new technologies, but also of changes in user behaviour, policy and regulation. The scenarios that are developed are: baseline business as usual (BAU) as well as green energy (GE). The baseline scenario assumes that the current trends (energy use, efficiency levels, etc.) will continue in future. India's population is projected to grow by 23% during 2010 -2030, reaching 1.47 billion. The real GDP, as per the model, is projected to grow by 6.5% per year on average between 2010 and 2030 reaching US\$5.1 trillion or \$3,586 per capita (base year 2010). Due to increase in population and GDP, the primary energy demand will double in two decades reaching 1,397 MTOE in 2030 with the share of fossil fuels remaining around 80%. The increase in energy use corresponds to an increase in energy intensity (TOE/US \$ of GDP) from 0.019 to 0.036. The carbon emissions are projected to increase by 2.5 times from 2010 reaching 3,440 million tonnes with per capita emissions of 2.2 tons/annum. However, the carbon intensity (tons per US\$ of GDP) decreases from 0.96 to 0.67. As per GE scenario, energy use will reach 1079 MTOE by 2030, a saving of about 30% over BAU. The penetration rate of renewable energy resources will reduce the total primary energy demand by 23% under GE. The reduction in fossil fuel demand and focus on clean energy will reduce the energy intensity to 0.21 (TOE/US\$ of GDP) and carbon intensity to 0.42 (ton/US\$ of GDP) under the GE scenario. The study develops new 'pathways out of poverty' by creating more than 10 million jobs and thus raise the standard of living of low-income people. Our scenarios are, to a great extent, based on the existing technologies. The challenges to this path lie in socio-economic-political domains. However, to attain a green economy the appropriate policy package should be in place which will be critical in determining the kind of investments that will be needed and the incidence of costs and benefits. These results provide a basis for policy discussions on investments, policies and incentives to be put in place by national and local governments.

**Keywords :** energy, renewables, green technology, scenario

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