

# Technology Options for Emission Mitigation in Indian Residential and Transport Sectors

Manmohan Kapshe<sup>1</sup>, Satish Yawale<sup>2</sup> and Aashish Deshpande<sup>3</sup>

## Abstract

It is well established that energy is a fundamental component for economic development and in turn any development is associated with immense growth in energy demand. Technology options in combination with choice of energy sources are the key factors to analyze energy related emissions. In recent years, technology choices, especially in residential and transport sector of India, have attracted the attention of policymakers because of their ability to mitigate emissions. People have also become interested in adopting new technologies because of growing purchasing power and easy availability. It is expected that the mitigation from residential and transport sector would be long lasting for local and global environment as it would also bring out lifestyle changes. Further, it would be easier to bring about changes in residential and transport sector due to short life span of endues technologies and comparatively lower costs. This research therefore focuses on mitigation of energy emission via technology options in Indian residential and transport sector.

In this research a bottom-up linear optimization modelling tool 'AIM/Enduse' is used to analyze the technology selection within the system. A detailed database of technologies for Indian residential and transport sector has been prepared for the analysis. The purpose of the study is four fold, first is to study the drivers of service demand and understand how they affect emissions from residential and transport sector. Second is to identify fuel mix for future energy supply. Third is to find out optimal end-use technology options and the last is to develop suitable scenarios for carrying out analysis that helps in reducing energy demand and emissions.

In the present work, to reduce the CO<sub>2</sub> emissions from both the sectors, four scenarios are described. The Business-as Usual (BaU) scenario assumes continuation with present trend. Constraint on Carbon (CoC) scenario is developed to estimate the mitigation potential. Taxes on Carbon (ToC) scenario is based on the assumption of energy and emission taxes. The fourth scenario is Renewable Energy Technology (RET) scenario. This scenario is helpful in moving towards low carbon development and understanding the policies required for encouraging renewable energy technologies.

The major findings from the analysis show that in ToC scenario, transport sector has higher potential to mitigate emission where as in RET, residential sector takes the prominent position. This indicates that with lifestyle change people are more adapted towards renewable technologies. It is estimated that advances in technologies and upcoming renewable options can bring down the CO<sub>2</sub> emission by 42% in year 2050 in comparison to the BaU Scenario. Modelling output from the present work has projected upcoming technology combination in alternate scenarios. The output of the research will be helpful in providing required insights for future actions and defining renewable energy technology share, enabling low carbon development in India.

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<sup>1</sup> Maulana Azad National Institute of Technology, Bhopal, India

<sup>2</sup> NRI Institute of Information Science and Technology, Bhopal, India

<sup>3</sup> National Institute of Technical Teachers' Training and Research, Bhopal, India