

# Low Carbon Strategies for Nepal: Preliminary Results from AIM/Enduse Model Analysis

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## Summary

The overall objective of this study is to identify strategies for cost effective low carbon development in the case of Nepal. The country is heavily dependent on traditional biomass energy as a large fraction of population is yet to have access to cleaner energy sources, road transport and modern amenities. Oil consumption is growing rapidly mainly due to rapid growth in the demand for the fuel in transport and residential sectors and the cost of oil import is no longer covered by the country's total export revenue. As the country is at its early stage of industrialization and infrastructural development, it offers a significant opportunity and potential for the adoption of low carbon strategies for a more sustainable development of the country. In order to identify the cost effective low carbon options over a long term, a least cost energy system model of Nepal has been developed using the AIM/Enduse modeling framework. The specific objectives of the present study include analyses of energy system mix, technology mix and emissions of greenhouse gases and local/regional level pollutants in Nepal during 2010-2050 under a reference scenario (or base case) and selected low carbon scenarios. The study also analyzes co-benefits of low carbon development in terms of improvements in energy security and local/regional environment.

Three different low carbon scenarios (i.e., with low, medium and high carbon reduction targets) are considered in the study besides the base case (i.e., without any climate policy).

The main findings of the study include the following:

1. In the base case, the total primary energy supply (TPES) of Nepal in 2050 would be almost twice the value (i.e., 2010) in 2050. However, the TPES in 2050 would decrease by 3.7%, 8.6% and 15.8% in Low, Medium and High GHG emission reduction target scenarios respectively as a consequence of the deployment of both energy efficient technologies and cleaner energy resources under the low carbon scenarios.
2. The share of oil products in TPES is found to increase from 10.6% in 2010 to 38.7% by 2050 and the share of hydropower is found to increase by 14.4% during 2010-2050 in the base case. In the low carbon scenarios, there would be a significant improvement in energy security with a substantial decrease in oil consumption and a large increase in the use of renewable energy (especially hydropower) as compared to the base case.
3. In the base case, total GHG emissions would increase by over four folds during 2010-2050. The cumulative GHG emission during 2010-2050 would decrease by 13.8%, 20.4% and 34.4% respectively under Low, Medium and High GHG reduction scenarios. Transport sector accounts for 79% to 85% of the total GHG emission reduction under the low carbon scenarios, followed by the residential sector and others. The low carbon transport options found cost effective are vehicles using electricity (based almost entirely on hydroelectricity in the case of Nepal) and hybrid vehicles and electric railways. Cost effective cleaner options in the residential sector under the low carbon scenarios include energy efficient and electric cooking devices.