



# Energy efficiency in South Asia: Trends and determinants

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## ABSTRACT

The efficient use of energy can reduce energy demand, improve energy security and economic competitiveness, and reduce environmental degradation. Using data from the United Nations Statistics Division, the paper analyses the trends in energy efficiency across countries in South Asia (SA) and identifies the determinants of the same. Unlike other studies in the context of SA, this study considers energy consumption of all energy-types taking place in all sectors of the economy. The study applies Logarithmic Mean Divisia Index-I to decompose the change in energy consumption during 1990–2014 into activity, structure, and intensity effects. The results show that the expansion in economic activities mainly drives energy consumption, and the shift toward energy intensive sectors further augments it. However, the decline in energy intensity restrains energy consumption in all the South Asian countries barring Nepal and Bhutan. The Composite Energy Intensity Index and the Fisher Ideal Intensity Index are also estimated to check the robustness of these results. The estimation of a panel regression model identifies endowment of energy resources, production of renewable energy, crude price, population density and GDP per capita as significant factors influencing energy efficiency in SA. These results have significant implications for energy use policy.

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## 1. Introduction

The availability of and accessibility to affordable energy are critical for a country's economic growth. However, the consumption of energy, especially of fossil fuels, and associated greenhouse gas emissions, especially of CO<sub>2</sub>, raise concern about environmental degradation [1]. Thus, the issues of energy security, energy equity, and environmental sustainability often present an energy trilemma for a country. Balancing these three dimensions of energy trilemma, while maintaining economic competitiveness, is a major challenge for economies ([2]). Even a developed region, like the Euro-Mediterranean, also faces challenges posed by the increase in energy demand as well as uncertainty of supply and environmental sustainability ([3]).

The countries in South Asia (SA) are home to 24% of world's population, but these countries rank very low in the World Energy Trilemma (WET) index developed by the World Energy Council.<sup>1</sup> The WET index tracks the advances made by the national energy

systems in each of the three dimensions of energy trilemma over the past 20 years. The 2019 WET index provided ranking for 128 countries. The five major South Asian countries, namely, Sri Lanka, India, Pakistan, Bangladesh, and Nepal occupied 85, 109, 110, 114, and 117 ranks, respectively, in terms of the WET index.<sup>2</sup> Except for Sri Lanka, the remaining four countries occupied the last positions among all the Asian countries included in WET ranking.<sup>3</sup> The lower ranks of these South Asian countries reflect their poor performances across the three dimensions of the energy trilemma.

A focused effort on improving energy efficiency can significantly reduce energy demand as well as increase energy security and economic competitiveness ([2]).<sup>4</sup> In the developed countries, the improvements in energy-efficiency have cut the effective demand for energy by 40% over the past 40 years ([2]). The Euro-Mediterranean economies have dealt with their energy trilemma by boosting energy efficiency investments and developing renewable energy sources ([4]). Ref. [5] acknowledges the importance of

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<sup>1</sup> The authors based on World Bank Database have computed the share of the countries in South Asia in world population.

<sup>2</sup> WET Index information extracted from <https://trilemma.worldenergy.org/>.

<sup>3</sup> WET Index-Regional profile information extracted from <https://trilemma.worldenergy.org/#!/regional-profile>.

<sup>4</sup> [85] describes energy efficiency as the way of managing and restraining growth in energy consumption. In simple words, something is more energy efficient if it delivers more services for same energy input or same services for less energy input.