Title

Key driving forces of energy consumption in a higher education institution using the LMDI approach: The case of the Universidad Autónoma de Chile.

Abstract

Energy consumption in universities is a crucial issue as they aim to balance growing operational demands with environmental sustainability. This study employs the Logarithmic Mean Divisia Index method to assess energy consumption variations at Universidad Autónoma de Chile from 2017 to 2022, demonstrating the method's efficacy and simplicity in decomposing energy use into its determinants. The analysis reveals a 19% increase in energy consumption, primarily fueled by heightened energy intensity from increased research activities and rising enrollment. However, weather conditions and infrastructural efficiencies have mitigated this increase. Notably, the 2020 remote learning period saw a 45% decrease in energy consumption, largely due to reduced energy intensity. This study validates the LMDI method for individual institutions and provides a clear, interpretable framework for understanding energy variations. It highlights the impact of the Chilean accreditation system, which indirectly induces energy consumption expansions in universities by requiring enlargements in gross floor area. The findings also emphasize the significant effect of weather on energy usage in extreme climates. Recommendations for Universidad Autónoma de Chile include implementing behavioral change programs, enhancing climate control, and lighting systems, conducting energy audits, pursuing building retrofitting, and considering a partial shift to remote learning to further reduce energy consumption. © 2024 Elsevier Ltd

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