

Energy efficiency in New Zealand's manufacturing industry: data envelopment analysis with emission-adjusted energy inputs and econometric analysis of management practices and firm's characteristics on energy efficiency

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Overview

The manufacturing industry in New Zealand consumes more than a quarter of national energy consumption and contributes to about 20 per cent of GDP. We develop the data envelopment analysis (DEA) model by introducing emission-adjusted energy inputs rather than using traditional energy inputs to measure energy efficiency and investigate the maximum energy saving potential in New Zealand's manufacturing industry. The emission-adjusted energy inputs accommodate emissions factor with types of energy use, allowing us to control 'clean' or 'dirty' energy effectively in the DEA model. Energy, as a discretionary input, its efficiency is measured by an extended DEA model with non-discretionary inputs. Then, we will use an econometric model to estimate the impact of firm's management practices (management initiatives, energy-saving area, and business priority), firm's characteristics (firm size, new or old firm, skilled firm, innovative firm, export-oriented firm, R&D firm etc.) on energy efficiency. The results will be of use to government officials projecting likely patterns of future energy demand and emissions, and providing useful information involved with energy policy or climate change policy. The findings could also assist business groups to better understand the potential economic gains from adopting energy management strategies.

Methods

- An extended DEA model with non-discretionary inputs
- An econometric model

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