# Enhancing Diversity and Efficiency to Achieve Energy Security: The Electricity Sector in Mexico

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Energy plays a central role in the development of economies and societies and Mexico is no exception. Oil extraction and production is the largest industry in the country and it has been controlled by state owned company PEMEX since 1938, when oil was expropriated and the State gained total control of fossil fuel resources. PEMEX operates through an independent structure and a small fraction of its shares are publicly listed, still high taxes which contribute to around 40 per cent of the federal budget, are imposed to the company.

Due to the increasing inaccessibility of oil reserves in Mexico and lack of technology, oil extraction peaked in 2004 and has been decreasing ever since. In Mexico there is a need for a structural reform that can help sustain the growth of this industry and overall economic growth of the country. Along with oil production decline, growing environmental concerns are forcing countries to commit with a reduction of emissions from fossil fuels to stop Climate Change. This information proves that the country needs diversification of its energy mix not only to secure supply in the future but to sustain economic growth. Despite the evidence, the government is not actively pursuing a comprehensive strategy to address the issue yet and the few reform proposals have not been successfully implemented.

The research is intended to develop a framework for evaluating long and short term security of the electricity system and its sustainability in general. The study is based on the idea that diversification is a mean to prevent disruptions to energy supply or mitigate their effects should they occur (Stirling, 2010). Therefore an assessment of diversity in the Mexican electricity sector was conducted using the Mean Variance Portfolio Theory and the Shannon Wienner Diversity index. The impact of this diversification on the overall efficiency of the system was incorporated into a two criteria analysis. Results show that current electricity planning in Mexico Is not looking for diversification and improvements on the current generation mix can be achieved.

Keywords: Electricity, diversity, efficiency, Mean Variance Portfolio

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