

# Decomposing Residential Energy Use in Hong Kong

## 拆解分析香港住宅組別的能源最終用途

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## Abstract

The Chief Executive pledged at the Asia-Pacific Economic Cooperation Leaders' Declaration in Climate Change, Energy Security and Clean Development held in Sydney, Australia in September 2007 that Hong Kong will reduce energy intensity by at least 25% by 2030 (with 2005 as the base year) in joint effort to tackle climate change.

In response to an increasing actual end-use energy consumption as well as the Government's international commitment to reduce energy intensity and tackle climate change, it is therefore necessary to formulate a mechanism to measure, record and project the trend of energy intensity in Hong Kong with the aim that policy or measures can be timely implemented to mitigate the situation if necessary. As such, the Electrical & Mechanical Services Department engaged a consultant in 2009 to develop and establish an energy supply and demand model and to identify the key drivers of energy intensity on which the Government should focus and take appropriate actions.

Among the tasks to be undertaken by the consultant, one of the tasks is to decompose the historical end-use energy data in order to identify the major socio-economic factors which affect the energy consumption in the territories. Such factors will be used to project the energy demand in the model. In the decomposition analysis, the "Logarithmic Mean Divisa Index (LMDI)" methodology was deployed.

This paper will outline the methodology, elaborate on the decomposition analysis results in the 'Residential sector', which is one of the four sectors in the Hong Kong end-use energy database, and present the findings which may be overlooked in the past.

## 摘要

二零零七年九月，特首在悉尼發表的「亞太經合組織領導人關於氣候變化、能源安全和清潔發展的宣言」中，承諾香港會履行在二零三零年前將能源強度，在二零零五年的基礎上，達到至少降低25%的目標，以認付氣候變化。

為實踐香港政府以上的承諾，機電工程署在二零零九年聘用了顧問工程公司去建立一個能源供應及需求的推算模型，藉以設立機制去量度、紀錄和推算能源強度；作為政府及時去推行針對性政策的參考，來舒緩氣候變化。

在眾多顧問工程公司需要完成的事項中，包括一項分析香港過去能源的使用情況，以便找出主要影響能源消耗的社會經濟因素，用作模型中來推算將來能源需求的參數。在數據分析中，我們採用了“Logarithmic Mean Divisa Index (LMDI)”方法。

本文將論及該方法，並仔細分析“住宅組別”(四個香港能源最終用途組別之一)能源消耗的結果，其發現可能為人所忽畧。

## Biography

### Dr William CHUNG

Dr Chung is currently an Associate Professor in the Department of Management Sciences at City University of Hong Kong. He is also Director of the Energy & Environmental Policy Research Unit. His research interests include methodologies of energy-environmental model development, energy and environmental policy analyses, and algorithms for large-scale optimization and economic equilibrium models such as electricity-CO<sub>2</sub> trading permit model. He received his Ph.D. in Management Sciences from the University of Waterloo, Ontario, Canada.

### Ir M S Kam

Ir Kam is a member of the Hong Kong Institute of Engineers. He graduated from the University of Hong Kong in the 70's and later pursued degree and diploma in electronic design, computer science, information technology and other field. He joined the Electrical & Mechanical Services Department for more than 20 years. He is now the senior engineer in the Energy Efficiency Office, looking after the Hong Kong Energy end use database, as well as promoting energy efficiency and conservation programme to the public and within the government.

### Ir Raymond FONG

Ir Raymond Fong is a Principal Consultant of Hong Kong Productivity Council working in environmental consultancy services for over 20 years. He is specialized in air pollution control and energy management. Mr Fong possesses several professional qualifications such as Registered Professional Engineer of Hong Kong and Chartered Engineer of the United Kingdom. Mr Fong was appointed by the HKSAR Government as a co-opt member in the Energy Efficiency & Conservation Subcommittee in 2006, 2008 and 2010 to provide professional advice on energy management to help the Government in formulating energy policies.