PEER REVIEWED

New Modern Energy Consumers: Challenges for efficient cooking fuels in the Greater Mekong Subregion

Keywords: Energy efficiency; Cambodia; Modern energy consumers; Cooking fuels; Greater Mekong Subregion

The MECON project is investigating the design and implementation of energy efficiency policies targeting New Modern Energy CONsumers (MECON) in the Greater Mekong Subregion. Drawing on the results of a household survey and market analysis, this article discusses the use of biomass cookstoves and other cooking appliances in Cambodia, Laos, Myanmar, Thailand and Vietnam. It highlights the experiences of one of these countries, Cambodia, to draw attention to the experiences and challenges of encouraging the uptake of improved biomass cookstoves.

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Picture 1: Traditional three stone stove (Source: San Vibol)

Introduction

Energy efficiency offers multiple benefits, including reduced household energy expenditure, enhanced energy security and improved productivity. For developing countries, energy efficiency is vital because it curbs demand growth, thereby reducing fossil fuel imports, lowering additional power capacity needs and facilitating cheaper, faster energy access to populations. Improved energy efficiency will also reduce energy consumption, leading to lower energy bills for consumers. Energy efficiency can make it easier for lower income households to pay energy bills, freeing up funds for other needs (Sarkar and Singh, 2010). The adoption of energy efficiency measures has technical challenges, and there remains important non-technical barriers, such as high upfront costs and energy illiteracy, particularly at the household level. As a result, many of the potential energy efficiency gains remain untapped.

MECON: Investigating energy efficiency in the Greater Mekong Subregion

The MECON project is one of the projects under the 'Understanding Sustainable Energy Solutions' (USES Network), a EPSRC-DECC-DFID funded programme. MECON is investigating the design and implementation of energy efficiency policies in the Greater Mekong Subregion (GMS: Cambodia, Laos, Myanmar, Thailand and Vietnam). In particular, it is focusing on the 'new Modern Energy CONsumers' (MECON), those who have access to electricity but who live on low daily incomes (US$ 2-5 per capita, purchasing power parity (2005)). Our analysis of World Bank data reveals that in 2008, between a third and a half of the populations of the GMS countries lived on US$ 2-5/ capita (PPP). The proportion of those classified as MECON has increased over the past 20 years due to improved access to electricity and increasing

MECON is a two year project, which began in June 2013 and will run until May 2015. MECON has six project partners: the Royal University of Agriculture (RUA, Cambodia), the National University of Laos (NUL, Lao PDR), the Myanmar Engineering Society (MES, Myanmar), the Joint Graduate School of Energy and Environment (JGSEE, Thailand) University College London (UCL, UK) and the Hanoi University of Science and Technology (HUST, Vietnam). The project is funded by the UK Research Councils' Energy Programme, the Department for International Development, and the Department for Energy and Climate Change, and managed by the Engineering and Physical Sciences Research Council.

The use of energy for cooking is just one aspect being investigated and MECON will also focus on lighting and electrical appliances. Future work will involve policy and cost-benefit analysis, as well as investigation of the institutional conditions within which energy efficiency policies will be designed. Further detail about MECON is available at http://meconproject.com

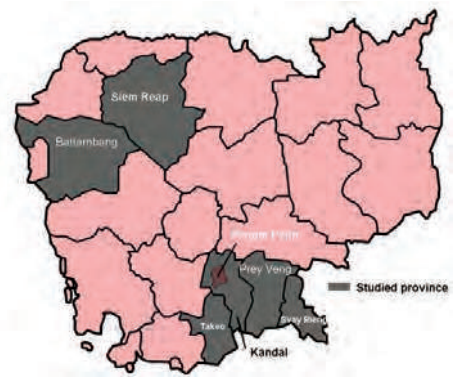

Figure 1: Study sites, Cambodia (MECON Project)

household incomes. In Cambodia, for example, the share of MECON has increased from 14% in 1994 to 40% in 2008. However, in other countries, particularly Thailand, continued economic growth and increasing household income are likely to lead to a reduction in the proportion of people who fit the definition of a MECON.

According to the OECD (2012), it will be these consumers, i.e. the emerging middle classes, who will be responsible for a large share of expected increase in energy demand and thus GHG emissions. Individuals and their energy choices influence patterns of energy consumption and therefore the supply-side options developed to meet them (Sovacool, 2014). Understanding how the MECON currently consume energy, and how these patterns may change in the future will be vital for informing and developing policies that promote energy efficiency. The project will assess the opportunities and barriers to energy efficiency by focusing on a range of energy services, including lighting, heating, cooling and use of electrical appliances, as well as fuels for cooking and transport. In this article, we draw on the results of a household survey to discuss the use of cooking technologies by the MECON in the GMS. The article then analyses one country, Cambodia, to highlight some of the challenges to the adoption of more energy efficient cooking technologies.

Use of cooking technologies by New Modern Energy Consumers in the GMS

A household survey was undertaken in order to establish an evidence base on energy use, and to identify the opportunities and barriers to the adoption of energy efficient technologies, measures and policies amongst the MECON in the five GMS countries. The survey was designed to gather information on the use of energy for cooking, lighting and electrical appliances. A total of 1660 questionnaires were carried out between January and May 2014 in both rural and urban areas. Surveys were undertaken in communities using numerous enumerators. It was important for surveys to be conducted face-to-face in order to encourage a higher response rate.

Initial analysis reveals some commonalities and differences amongst the MECON in the five GMS countries. The definition of a 'new Modern Energy CONsumer' is that households have access to electricity and, across the five countries, grid electricity is the most common form of electricity access. Only in Cambodia do decentralised, community grids account for a substantial percentage of households (26%). In addition to electricity, MECON households across the GMS utilise other fuel types, such as kerosene, liquid petroleum gas (LPG), charcoal and biomass. For cooking, most households use more than one cooking appliance, including biomass stoves, LPG stoves, electric stoves, rice cookers and microwaves. Kerosene stoves are not commonly used, with less than 1% of households stating they use kerosene for cooking.

With specific regard to the use of biomass for cooking, both traditional and improved biomass stoves are widely used by the MECON in both rural and urban areas. For example, in Myanmar traditional and improved biomass stoves are used by 22% and 21% of households respectively; traditional cookstoves are most widely used in urban areas. By comparison, in Lao PDR these figures are 58% and 51% respectively. Surprisingly, in Thailand, the most economically developed country of all the GMS, 58% of households surveyed use traditional biomass cookstoves, with no respondents reporting to have used an improved cookstove (ICS). In Vietnam, of the 36% of households that utilise biomass, just 20% use improved biomass cookstoves and many of these households continue to also use traditional stoves. The use of traditional biomass cookstoves is therefore still widespread in the GMS and not limited to the poorest households, their use remains important to the emerging middle classes. The use of electricity for cooking, whether for electric stoves, rice cookers and/ or microwaves, is also common amongst the MECON.

Multiple cooking preferences in Cambodia

Cambodia has one of the lowest electrification rates in South East Asia and just 34% of the population have access to electricity (World Development Indicators, 2014). Electricity access is concentrated in urban areas, while transmission lines from Thailand and Vietnam now provide some provinces with imported electricity. In order to investigate the MECON, the household survey deliberately focused on the capital city, Phnom Penh, and six provinces that import electricity from neighbouring Thailand and Vietnam (see Figure 2). A total of 484 households were surveyed; 36% were located in rural areas, and households had an average of five members. While all households surveyed had access to electricity, other sources of energy, including biomass, charcoal and LPG, were also important.

Fuelwood is the most common source of energy for the majority of the population of Cambodia. Fuelwood and charcoal are often referred to as traditional fuels, yet they remain the dominant source of energy for cooking and boiling water to drink. The 2008 Statistical Yearbook reported that fuelwood was the most commonly used as fuel for cooking purposes, and was used in 85% of Cambodian households (National Institute of Statistics, 2008). Earlier research by San et al. (2012a, 2012b) on the adoption of ICS in Cambodia revealed a number of barriers, including the affordability, availability and distribution of the appliance. An additional barrier was that people preferred to use the three stone stove for boiling water, because it could be resized in order to fit bigger pots (see Figure 2). The ability to resize the stove meant that most families raising pigs (an important source of income in rural areas) similarly preferred the three stone stove when preparing pig feed.

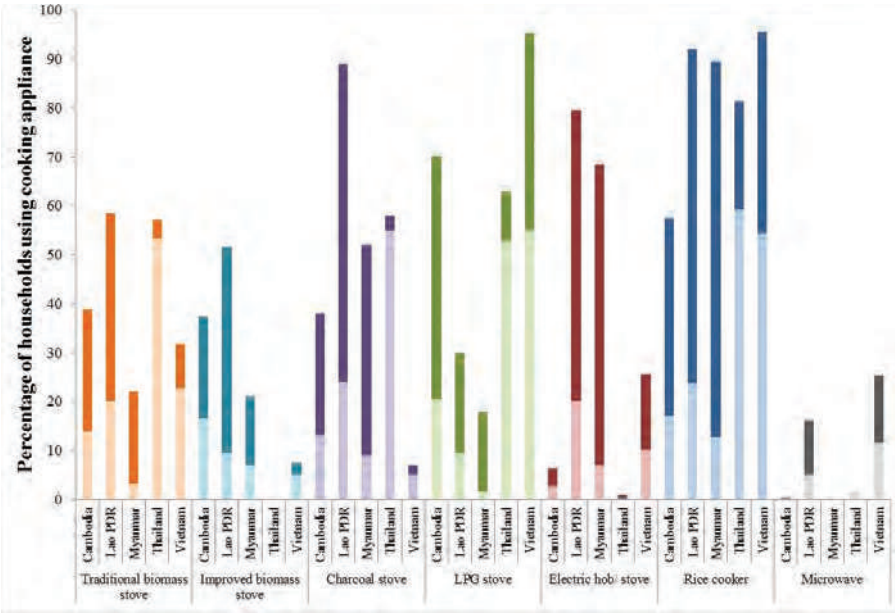

Figure 2: Use of cooking technologies amongst the MECON in the GMS. The darker shades show the percentage of urban households using each appliance, while the lighter colours show the percentage of rural households. Percentages do not add up to 100% because of fuel stacking

The survey revealed that, even with access to electricity, 69% of MECON households use biomass as a cooking fuel. Of these, the majority (77%) also use one or more other type of cooking fuel, such as LPG and/ or electricity; a minority continue to use only biomass or charcoal for cooking. There is no significant difference between households in rural and urban areas. Of the households that use biomass, 39% use a traditional biomass stove, as well as non-biomass fuels, but do not use an ICS. Those households that did not use biomass (31%) use one or more other fuel types for cooking, including LPG and electricity.

The use of multiple cooking fuels, or fuel stacking, is therefore a common practice amongst those we surveyed. It is recognised by scholars and practitioners that the transition away from so-called 'traditional' to more 'modern' appliances is not linear, and this research provides further evidence to support this argument. In other words, as incomes increase, households do not stop using traditional fuels and cooking methods, but rather continue to use a combination of fuels and appliances. There may be a number of reasons for this including, cooking behaviours, cultural preferences, and the availability, dependability and affordability of fuels and appliances. Indeed, many of the barriers to the uptake of ICS in rural areas of Cambodia, as revealed by San (2012a, 2012b), are likely to apply to the MECON and to the adoption of other more efficient cooking technologies. Understanding how energy demand, behaviours and aspirations change with increasing household income and wellbeing is critical if appropriate policies to promote energy efficiency are to be designed.

Conclusions

In the GMS, continued economic growth and improved social wellbeing will lead to changing consumption patterns and energy demand. The MECON project focuses on the emerging middle classes – the new Modern Energy CONsumers – who are expected to drive many of these changes. The initial results presented in this article provide evidence for a shift in consumption patterns amongst the MECON away from traditional biomass and towards more energy efficient cooking fuels. However, it also suggests this transition is not linear, with households consuming multiple fuels, known as 'fuel stacking'. Many of the barriers relevant to the adoption of ICS amongst rural populations also apply to the uptake of more efficient fuels and appliances by the MECON, particularly cooking and consumption habits, affordability, availability and dependability, and cultural factors. As the percentage of those living on US$ 2-5 increases in the GMS, it will be important to consider current and future energy needs, consumption habits and behaviours. While many challenges will be specific to particular contexts, there are likely to be commonalities across the five GMS countries. This provides opportunities to learn from others and to develop appropriate policies that target the needs of this increasingly important demographic.

References

IEA, 2012. World Energy Outlook 2012. International Energy Agency: Paris.

National Institute of Statistics, 2008. Statistical Yearbook 2008: General Population Census of Cambodia. National Institute of Statistics, Ministry of Planning: Phnom Penh, Cambodia.

OECD, 2012. An Emerging Middle Class. OECD Yearbook: Paris.

San, V., Spoann, V., Ly, D., Chheng, N.V., 2012a. Fuelwood consumption patterns in Chumriey Mountain, Kampong Chhnang Province, Cambodia. Energy, Volume 44, pp. 335-346.

San, V., Sriv, T., Spoann, V., Var, S., Seak, S., 2012b. Economic and environmental costs of rural household energy consumption structures in Sameakki Meanchey district, Kampong Chhang Province, Cambodia. Energy, Volume 48, pp. 484-491.

Sarkar, A., Singh, J., 2010. Financing energy efficiency in developing countries: lessons learnt and remaining challenges. Energy Policy, Volume 38, pp. 5560-5571.

Sovacool, B.K., 2014. What are we doing here? Analysing fifteen years of energy scholarship and proposing a social science research agenda. Energy Research & Social Science, Volume 1, pp. 1-29.

World Development Indicators, 2014. Cambodia: access to electricity. Available from: http://data.worldbank.org

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