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Energy use amongst 'new modern energy consumers' in the Greater Mekong Sub-region

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Abstract:
Energy consumption is expected to rise over the next century, and much of this increased demand will be located in Asia. In particular, it is the emerging middle classes who are expected to drive future consumption patterns. This paper presents the results of a household survey that investigated energy consumption and energy efficiency amongst 'new Modern Energy CONsumers' in the Greater Mekong Sub-region (Cambodia, Laos, Myanmar, Thailand and Vietnam). New modern energy consumers are defined as those who live on US$2-5 per day, and who have access to electricity. This paper focuses on patterns of household energy consumption (for cooking, lighting and appliances), and awareness of energy efficiency. It finds that fuel stacking is common practice amongst this income group, both for cooking and lighting, and that biomass continues to be a widely-used cooking fuel. The use of electrical appliances, such as cookstoves, mobile phones and refrigerators, is also common across the five countries. Operating costs are an important factor for households, while energy efficiency labels have a positive influence on purchasing behaviours. This paper concludes that further work will be required to raise awareness of energy efficiency labels.

Keywords: Energy efficiency; socio-economic survey; comparative analysis; household; new modern energy consumer; GMS

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1. Introduction

Energy efficiency (EE) improvements offer multiple benefits, such as reduced household energy expenditure and improved productivity, thus contributing to economic growth, enhancing energy security and facilitating cheaper and faster energy access to populations. The 2012 World Energy Outlook highlights the importance of EE in reducing greenhouse gas (GHG) emissions in the coming decades: EE is responsible for 75% of emissions reductions by 2020 in a 2°C temperature rise scenario (IEA, 2012). For developing countries, EE will be important since it curbs demand growth, thereby reducing additional power capacity needs and facilitating cheaper and faster energy access to populations. Improved EE will also reduce energy consumption, leading to lower energy bills for consumers as well as lower fossil fuel imports. Moreover, EE can make it easier for lower income households to pay energy bills, freeing up funds for other needs (Sarkar and Singh, 2010). Although the adoption of EE measures has few technical challenges, and numerous energy efficient technologies exist, there remain important non-technical barriers, such as high upfront costs and energy illiteracy, particularly at the household level. As a result, many of the potential efficiency gains remain untapped. In the Greater Mekong Sub-region (GMS), it will be the 'new Modern Energy CONsumers' (MECON, i.e. those who have access to grid electricity but who live on low incomes (USD 2-5 per day per capita, PPP (2005))), who will be responsible for a large share of expected increase in energy demand and thus GHG emissions (OECD, 2012). Individuals and their energy choices matter since they 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 promote EE amongst the MECON. This paper draws on the results of a household survey to examine current patterns of energy consumption for cooking, lighting and electrical appliances and discusses awareness of EE amongst the MECON.

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2. Material and methods

The primary data was obtained from socioeconomic questionnaires carried out with MECON households in five GMS countries: Cambodia, Laos, Myanmar, Thailand and Vietnam. A total of 1,660 questionnaires were carried out between January and May 2014 in both rural and urban areas. Surveys were carried out in communities using numerous enumerators, because it was important for surveys to be conducted face-to-face in order to encourage a higher response rate. The questionnaire was made up of three sections: the first elicited information about the respondent and their household, including gender, age, education, income, household size and who in the household made decisions about energy; the second section investigated current household energy use, including electricity and other fuels that households use for different energy services; the final section focused on awareness of energy efficiency. All survey data were inputted using the online survey tool, Survey Monkey. The survey data were then analysed using Excel and SPSS.

3. Results

Sample profile. The sample for this study included only those classified as 'new Modern Energy CONsumers' i.e. those living on USD 2-5 per day per capita, with access to electricity. In terms of demographic factors, slightly more than half of respondents (56%) were women, while 39% lived in rural areas. Household size ranged from 1 to 15 people. The vast majority (86%) owned their own home, while just 3% had their homes provided by relatives, and the remainder (11%) rented their accommodation.

Electricity access. Access to electricity was most commonly via the national grid (see Fig. 1), although a quarter of households (26%) in Cambodia accessed electricity through decentralised, community grids. In addition to electricity, MECON households across the GMS utilise other fuel types, such as kerosene, liquid petroleum gas (LPG), charcoal and biomass.
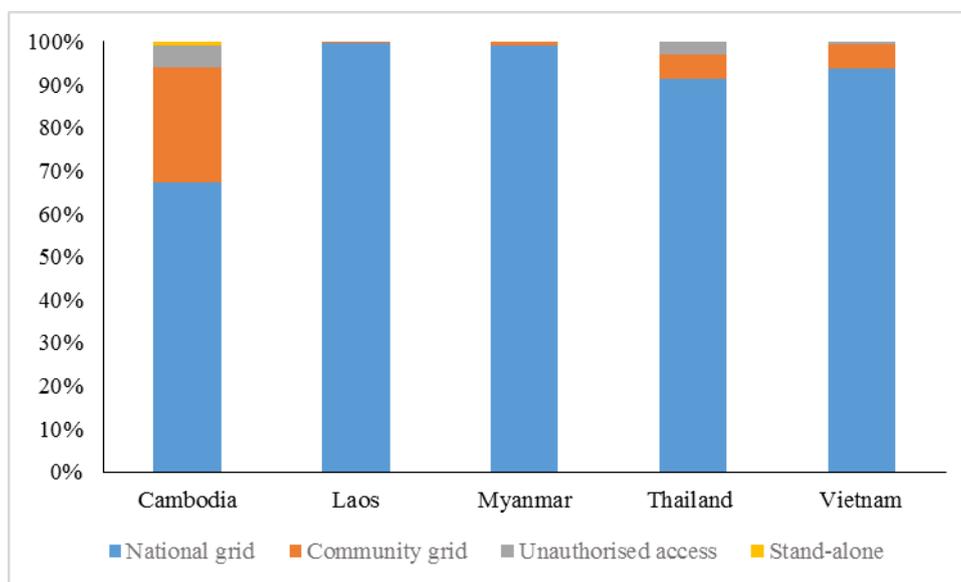

Fig. 1 Type of electricity access.

Cooking. For cooking, as shown in Fig. 2, most households use more than one cooking appliance, including biomass stoves, LPG stoves, electric stoves, rice cookers and microwaves. Kerosene stoves were not commonly used, with less than 1% of households stating they used kerosene for cooking. Fig. 2 shows that the use of multiple cooking fuels, or fuel stacking, common practice amongst those households surveyed. For example, in Cambodia, of the 69% of households that used biomass, the majority (77%) also used one or more other type of cooking fuel, such as LPG and/ or electricity; a minority continued to use only biomass or charcoal for cooking. Those households that

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did not use biomass (31%) used one or more other fuel types for cooking, including LPG and electricity. These findings were common across the five countries.
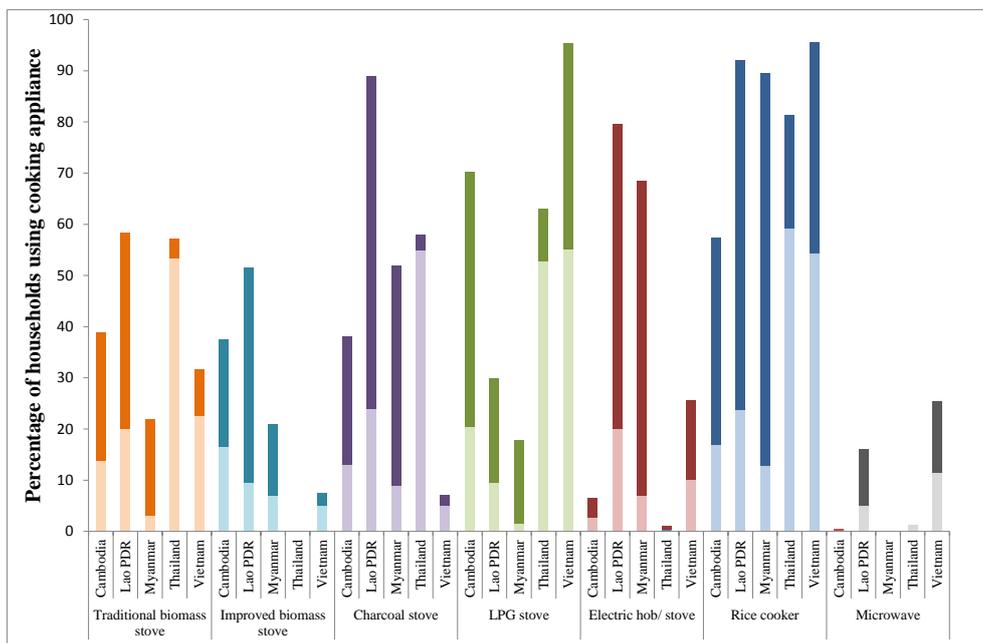

Fig. 2 Cooking appliances.

Lighting. As with cooking, households used multiple methods of lighting their homes. Across the five countries fluorescent lighting was the most commonly used, with between 84-97% of homes using this method (see Fig. 3). Kerosene was not commonly used for lighting; only in Cambodia, where it was used by 8% of households was this fuel used for lighting. Only in Myanmar were LED used for lighting (23% of households), with most of these households also continuing to use candles.
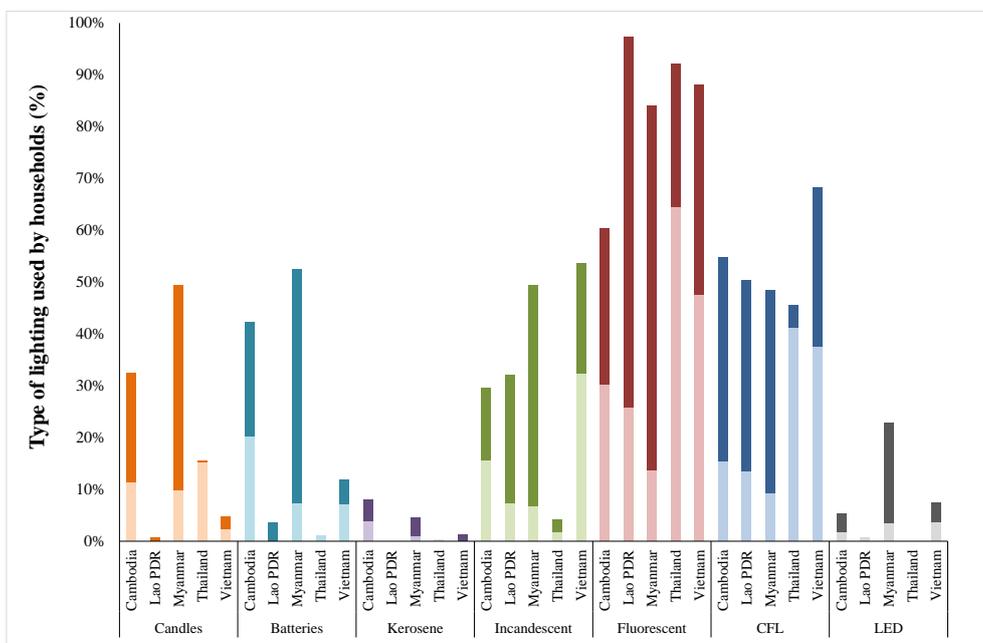

Fig. 3 Lighting.

Appliances. In terms of electrical appliances, the vast majority of households (95%) owned a TV – either a more efficient flat screen (30%) or CRT TVs (74%), 8% of households owned both. The

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majority of households also owned mobile phones and electric fans (both 88%), while fridges (64%) and electric irons (63%) were also appliances owned by a majority of households. Only in Vietnam were heating appliances used. When asked why they bought/ rented appliances, the most common reasons were to have an appliance they had not had previously (40%) or to replace an appliance (41%). This provides insights into the rationale behind decision-making rationale, and suggests critical moments to influence purchasing behaviours. Understanding future energy demand will therefore be key to developing strategies to promote EE amongst this income group.

Energy efficiency. For the MECON, the cost of running an appliance was an important factor with 77% of respondents stating that it was important, fairly important or very important. While more than half of respondents (54%) had seen the EE label, only 64% of these knew what the label demonstrated. However, of those who knew what the EE label showed, the vast majority (85%) indicated that it would influence their purchasing behaviour. This suggests that the EE label has a positive impact on the purchasing behaviours amongst those who knew what it demonstrated, but that further work is required to raise awareness of the label.

4. Discussion and conclusion

This is the first survey of its kind in the GMS, and represents an important first step in assessing the energy demand amongst this critical income group i.e. the emerging middle classes. In terms of how the MECON currently use energy, this research has shown that households use multiple fuels, or 'fuel stacking' for cooking and lighting. 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. For example, households use both candles and batteries, as well as more efficient types of lighting such as CFL and LED. It has been recognised by scholars and practitioners that the transition away from so-called 'traditional' to more 'modern' appliances is not linear, and this research therefore provides further evidence to support this argument. There may be a number of reasons for this including, behaviours, cultural preferences, and the availability, dependability and affordability of fuels and appliances.

MECON households also typically owned more than one electrical appliances, with TVs and mobile phones being most common. This highlights the importance of appliances that provide communication and entertainment services, rather than those that facilitate household tasks – perhaps because such services may be provided, at low cost, elsewhere. Further research will be required to understand future energy demand and the constraints on purchasing behavior, this should include qualitative research in order to fully unpack the complexity of factors that influence energy demand.

5. Acknowledgements

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