Chapter 6

Conclusion and Recommendations

1.   Conclusion

This project produced the EBTs of 2000–2009 based on existing primary energy data to expand the historical coverage of Cambodia's national energy statistics, which contains the EBTs of 2010–2018. But the existing data are historically incomplete. Therefore, the missing data must be estimated by applying extrapolation, referring to correlation with macroeconomic data such as GDP or historical trends.

For biomass consumption in the final sectors, such as industrial and residential, the missing data before 2006 are extrapolated based on the correlation between GDP and biomass or historical trends from post-2006. The firewood consumption for charcoal production is estimated using the charcoal consumption in the final sector estimated above and the conversion ratio defined as charcoal production/firewood consumption in 2007. The firewood consumption for power generation is estimated by biomass power generation data from the Electricité Du Cambodge; its thermal efficiency is calculated by 2007 data. The missing electricity consumption in the final sectors before 2002 is extrapolated based on a correlation between GDP and electricity consumption or historical trends post-2002. Based on the estimated electricity consumption and estimated T&D losses applying its historical trend from post-2002 data, missing electricity generation of hydro- and diesel power is estimated using their shares in 2003. For the fuel input of oil consisting of HFO and diesel oil, their historical data are inconsistent. So, we estimated the fuel input data before 2009 based on power generation data and estimated thermal efficiency referring to post-2010. For oil, as the GDP provided historical petroleum import data from 2000 to 2019, the import data of each petroleum product are distinguished to each final sector, which is industry, transport, commercial, residential, and others, using the historical shares. In addition, the 2019 primary energy data are added to the historical energy data in 2000–2018, which include several estimated data. The energy data in 2000–2019 were revised, if inconsistent. Finally, based on the complete primary energy data, the 2000–2019 EBTs were produced using interface software applying the Excel-VBA.

As a result, the TFEC increased from 1.32 Mtoe in 2000 to 4.97 Mtoe in 2019 at a 7.2% yearly growth rate compared to a 7.9% TFEC growth rate in 2010–2019. So, the longer energy trend in 2000–2019 looks moderate compared to the shorter trend in 2010–2019. The TPES also showed the same trend as the growth rate in 2000–2019, 6.9%. On the other hand, 2010–2019 TPES was 8.0%.

Using the longer historical energy data set, Cambodia's BAU energy outlook model has been updated based on the latest future macroeconomic assumptions. But the outlook results are

different from the previous results. The TPES growth rate in 2019–2050 is 5.4% per year compared to the previous one at 5.6% in 2018–2050 despite different GDP assumptions of 6.7% in the revised case and 6.4% in the previous one. Data coverage is extended from 9 to 19 years so that elasticity between GDP and energy consumption improves from 0.875 of the previous outlook results to 0.8 of this outlook results due to the longer estimation period (9 to 19 years).

2. Policy Recommendations

Through this project, Cambodia's National Energy Statistics, which includes national EBTs, are successfully extended from 2010–2018 to 2000–2019. It can contribute to formulating appropriate energy policies on promoting energy efficiency and conservation and variable renewable energy, such as solar photovoltaic systems, enhancement of petroleum supply security, and challenges of a low-carbon energy transition. Thus, the national EBTs should be updated annually by MME's GDE and GDP based on primary energy data from Cambodia's energy market players. Once the GDE and GDP get primary energy data, they can update the statistics using the primary energy data template and the interface software to produce the EBTs, provided by ERIA.

Diesel oil and LPG are widely consumed across the country's sectors – industry, transport, residential, and commercial. Thus, a detailed diesel oil and LPG energy consumption survey is necessary. Diesel oil is consumed in the industry, transport, commercial, and agriculture sectors. Its uses are heating boilers for thermal demand, auto-generation, and transport fuel of vehicles. On the other hand, LPG is used for cooking and as a transport fuel for vehicles. Therefore, the survey can achieve an appropriate breakdown of diesel oil and LPG across the sectors.

Next, the issues and challenges of each energy source are pointed out as follows. Coal in Cambodia is consumed for industrial activities, such as cement production and power generation. Domestic coal is mainly consumed for industry activities; on the other hand, coal for power generation is mainly imported. Therefore, a data collection system authorised by laws and regulations will be applied to coal mining companies and coal traders by the GDE. Petroleum import data come from Cambodia's Customs Office, so it should be accurate except for smuggling. But the demand side is still issued because there are no petroleum consumption data in the final energy consumption sectors. Thus, the GDP will start collecting petroleum sales data for each final sector from oil companies in Cambodia. Electricity data are robust because the Electricité du Cambodge (EDC) prepares the following data: power generation, fuel inputs, and electricity sales data to end users. However, the thermal efficiency of coal power generation seems inconsistent, so the EDC is suggested to collect more quality fuel input data to be consistent with the power generation data. Biomass will continue to be phased out from the Cambodian energy market. Although biomass will be unimportant, its share was still more than 20% in 2019. Thus, the GDE is suggested to conduct a biomass consumption survey across the sectors every 3 or 5 years.

Establishing appropriate energy policies depends entirely on high-quality energy statistics with a long historical coverage, and producing a meaningful energy outlook also needs reliable energy statistics. Therefore, ERIA would like to continue to support the GDE and GDP-MME to prepare quality national energy statistics.