

Chapter 7

Conclusion and Policy Recommendations

Shigeru Kimura

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The total final energy consumption (TFEC) of the Lao People's Democratic Republic (Lao PDR) will increase at an average rate of 4.7% per year from 2015 to 2040. Industry sector consumption will grow the fastest (8.3%), followed by the transport sector (6%), and others (1.3%). The low growth in the other sectors will be due to the slowing of biomass consumption as the residential sector shifts to liquefied petroleum gas (LPG) and more efficient biomass stoves. In terms of energy type, electricity will grow the fastest at 8.1%, followed by coal at 7.7%, and oil at 6.1% but the coal share (13%) will be much smaller than electricity and oil (28% and 44%, respectively).

Electricity production will increase to 70 terawatt hours (TWh) by 2040 from 17 TWh in 2015 at an average rate of 5.8% per year. Around 53% of the electricity produced will be to meet the export target, particularly of Thailand. Hydropower sources will remain dominant in the country's power generation but with a declining share, accounting for around 77% in 2040 from 85% in 2015. The remaining share will be that of coal resources (22%) and other renewables (1%).

The total primary energy supply (TPES) will reach 13 million tons of oil equivalent (Mtoe) in 2040, increasing at an average rate of 4.4% per year from 2015. As a major supply for power generation, hydro sources will increase at an average rate of 8.7% per year over the projection period. Coal supply will also have a remarkable share in power generation. Its growth rate will on average be 4.5% per year. Oil will grow at an average rate of 6.1% per year to meet particularly transport demand.

Based on the case studies, the highest reduction in the TFEC compared to the Business-As-Usual (BAU) scenario will be achieved if the Lao PDR implements a 20% energy efficiency and conservation (EEC) target (EE20) by promoting energy efficiency measures in all sectors of the economy. Slower growth of the gross domestic product (GDP) by 1% from the BAU scenario (GDPL) will also reduce the TFEC by 16%. Increasing the price of oil from the BAU scenario (OILH), will result in a not significant reduction of the TFEC. The promotion of EEC will be one of the important energy policies to mitigate energy consumption under stable economic growth.

Implementing the EE20 will also reduce the TPES by 17%, but not as much as in the 20% renewable energy target (RE20). Although the TFEC of RE20 is higher than the EE20, substituting coal in power generation with solar and wind power will result in a slightly lower

TPES than the EE20 due to the different thermal efficiency between coal-fired power plants and solar and wind power systems. The share of coal in the TPES of RE20 will only be 8%, while in the EE20 it will still be around 38%.

The TPES per GDP (energy intensity) will reach 274 toe/million US\$ in 2040 under the BAU scenario. A greater improvement of the energy intensity can be expected through the implementation of the EE20 (17% lower than in the BAU scenario). Implementing the RE20 will further improve the intensity, reducing almost 22% from that of the BAU scenario.

Carbon dioxide (CO₂) emissions under the BAU scenario in 2040 will be four times from the 2015 level. Implementing the RE development programme can reduce CO₂ emissions significantly; 22% and 45% lower than BAU for the renewable energy target (RE10) and RE20, respectively. Implementing an EE20 policy will reduce CO₂ emissions by 15% more than in the BAU scenario, while a 10% energy efficiency target (EE10) will only result in 7% CO₂ emissions reduction.

Implementing the EE20 and RE20 will be beneficial for the Lao PDR since they significantly save energy consumption, improve energy intensity, and reduce CO₂ emissions. However, in case of the RE20, the import dependency will increase to 31% from 26% in the BAU scenario. Implementing the RE20 will reduce domestic coal production, thus increasing the import dependency to 31%. It is a controversial issue for the Lao PDR to balance CO₂ emissions and energy supply security.

To avoid increasing import dependency under the RE10 or RE20, one idea for the Lao PDR is to shift from internal combustion engines to electric vehicles in the road transport sector, which would use electricity from renewable energy sources including large hydropower generation. It can be expected to reduce consumption and the importation of gasoline and diesel oil.

Concluding the energy outlook of the Lao PDR, the following policies are recommended:

- ✓ Promote energy efficiency is a top priority energy policy for the Lao PDR for contributing to a reduction of energy consumption, CO₂ emissions, and money outflow from the Lao PDR to import petroleum products such as gasoline.
- ✓ Increase of renewable energy including large hydropower plants is a second energy policy for the Lao PDR. Combining electrification in the road transport sector will contribute to a reduction in the consumption of transport fuel, mitigate CO₂ emissions, and saving the money flow out of the country.
- ✓ In this regard, the Lao PDR will have appropriate and implementable energy policies such as:
 - Set up the Lao PDR basic energy plan (which will show energy direction in the long term)
 - Several energy master plans will be set up:
 - EEC master plan
 - RE master plan
 - EV master plan