Chapter 6

Conclusions and Recommendations

Sustainability Assessment of Biomass Utilisation in East Asia Working Group

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6. CONCLUSIONS AND RECOMMENDATIONS

In the fourth phase of ERIA WG on "Sustainability Assessment of Biomass Utilisation in East Asia" in 2010-2011, the WG summarised the experiences and lessons learned from the four pilot studies in selected East Asian countries (ERIA, 2010) that had been conducted to field-test the WG's sustainability assessment methodology (Sagisaka, 2009).

From the lessons learned from the four pilot studies, the applicability of the indicators as environmental, economic and social pillars of sustainability can be summarised as follows:

- Life cycle assessment (LCA) is a well established, standard technique for quantifying GHG emissions. Life cycle GHG emissions as environmental indicator are applicable for any biomass initiative.
- Total value added (TVA) as economic indicator is also applicable for any biomass initiative. However, TVA alone gives not much meaning to the sustainability of biomass utilisation; understanding the components of TVA, namely, net profit, personnel remuneration, tax revenue and foreign exchange earnings will help decision makers decide whether to proceed with or continue the biomass initiatives or not.
- Human development index (HDI) represents the endpoint social impact by employment. HDI can be used for macro scale (national, state or province level) initiatives but is difficult to assess for micro scale (community or project level)

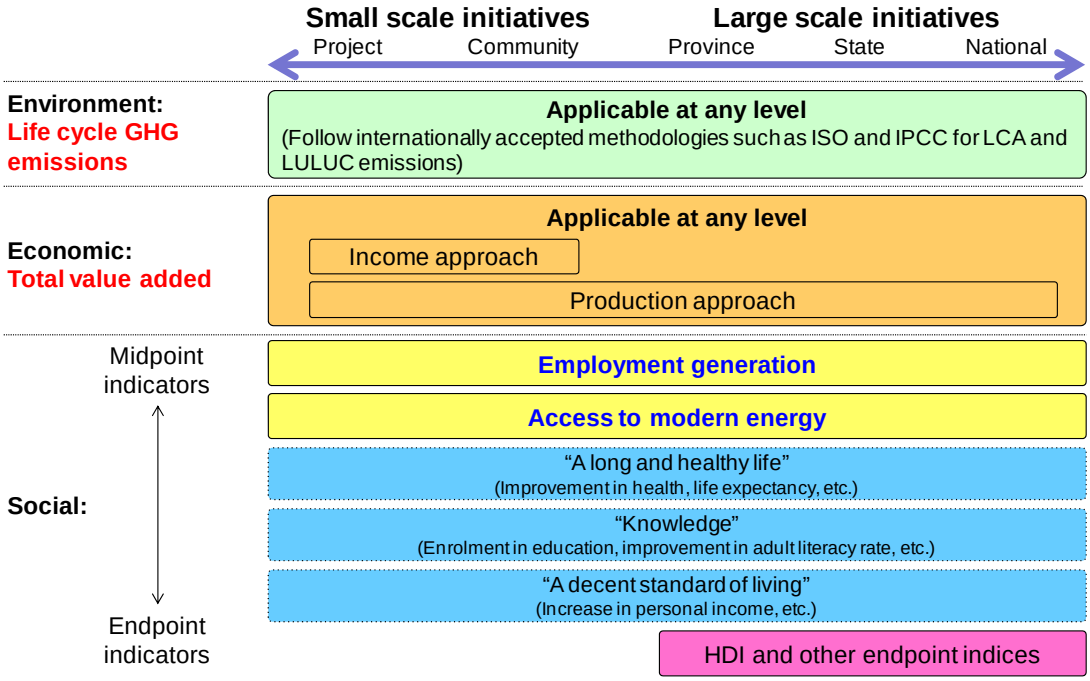
initiatives because of data unavailability. Therefore, midpoint indicators that can directly capture the social benefit by implementing biomass energy utilisation initiatives might be suitable for quantitative evaluation.

By reflecting the lessons learned and the latest worldwide discussions for bioenergy sustainability, the WG proposed an upgraded methodology so that the sustainability indicators for each sustainability pillar could be applied to both small and large scale biomass utilisation initiatives, be more scientific and practical for decision makers in the Southeast and East Asian countries, as can be described as Figure 6-1:

- Life cycle GHG emissions are applicable for both small and large scale initiatives as an environmental indicator. However, it is recommended that the profile should follow internationally accepted methodologies such as ISO for LCA and IPCC for LULUC emissions. Since the environmental impact caused by biomass utilisation as energy is not only global warming, other impact categories can also be quantified by LCA, according to the environmental concerns of the sites where biomass utilisation initiatives are planned or already implemented.
- TVA can quantify economic sustainability for any biomass utilisation initiatives. For small scale initiatives at the community or project levels, the income approach can be used to add up all the income earned by the project or in the community, as had been provided in the WG guideline (Sagisaka, 2009). On the other hand, the product approach that calculates the market value of goods and services produced in the economy can be applied to for both small and large scale initiatives, in the same manner as measuring GDP.

- Although HDI and other indicators can be used as social indicators to evaluate social sustainability at endpoints, they may be only applicable for large scale biomass utilisation initiatives because of the data unavailability at community level. To quantify the social impact by biomass utilisation, the midpoint social indicators such as employment generation and access to modern energy are suggested as more relevant to capture social impacts and that could trigger endpoint social impact such as “a long and health life”, “knowledge” and “a decent standard of living” at both small and large scale initiatives.

Figure 6-1. Sustainability Indicators at Different Levels



The final goal of the WG project is to propose a sound and standardised methodology for sustainable biomass utilisation in East Asian countries in line with worldwide trends

for biomass sustainability so that it can contribute to policy support on what kinds of biomass utilisations should be implemented in each country.

Among the sustainability indicators shown in Figure 6-1, the WG had already confirmed the applicability of life cycle GHG emissions and TVA using income approach as environmental and economic sustainability indicators and recognised the difficulties for the application of HDI as social indicator at small scale biomass utilisation initiatives, whereas the appropriateness of the other indicators are derived from the lessons learned from the four pilot studies in selected East Asian countries. The WG thinks it important to check the applicability of the other sustainability indicators to biomass utilisation initiatives based upon plan-do-check-act (PDCA) cycle. In addition, since East Asian countries are abundant in biomass resources, the biomass feedstocks to produce energy are not limited to Jatropha, cassava, coconut or sugarcane; other feedstocks such as oil palm and other oil trees or cellulosic biomass have high potential as energy as well. The results of the sustainability assessment are different depending on the feedstocks, technologies adopted in the energy conversion processes or the scale of the initiatives. Therefore it is recommended to accumulate the WG research experience by conducting case studies based upon the upgraded WG methodology and evaluate the sustainability of both small and large scale biomass energy initiatives using various kinds of feedstocks in East Asian countries.

East Asian countries also have high potentials for other renewable energy sources such as hydropower, photovoltaics, wind, geothermal and wave energy. However, it must be noted that the WG's sustainability assessment methodology is tailored only for

biomass resources and may not be applicable for comparison with other renewable energy sources. Although sustainability encompasses the environmental, economic and social pillars, the specific indicators and mode of calculations including the boundaries and scope of comparison will differ. It may be imperative to discuss the role of biomass energy within the total energy system in East Asian countries by comparing with the sustainability of other renewable energy sources.

The WG recognises the importance of disseminating the WG methodology. The calculations of all the indicators for the three pillars of sustainability are not an easy task. Without proper training for the users of the WG methodology, the use of these indicators may lead to unreliable results. It is suggested that hands-on training/seminars on the calculation of these indicators be conducted for East Asian country representatives so that there will be transfer of knowledge. These participants will then conduct a trainers' training to disseminate widely the use of the guidelines for the assessment of the sustainability of biomass utilisation in their home countries.

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