

## EXECUTIVE SUMMARY

The fourth phase of the working group culminated several years of developing and testing methodology for assessing sustainability of biomass utilisation in East Asia. After review of existing indicators for environmental, economic and social pillars, relevant for biomass systems, one indicator was identified for each of the pillars, based on importance and relevance particular to the East Asian context. Life cycle greenhouse gas (GHG) emissions, total value added (TVA) and the Human Development Index (HDI) of the United Nations Development Programme were the shortlisted indicators of above three pillars, respectively, which were then tested for actual application at four study sites. The studies confirmed the applicability of the indicators but also revealed shortcomings with respect to requirement of extensive data collection for all the indicators and interpretation of results.

In this phase of the working group's effort, discussions were made on the applicability of the indicators for various scales. As the previous case studies were mainly at the project scale, suggestions are made on the applicability of the indicators at the macro scale. Life cycle GHG emissions can easily be applied at the macro scale though the data requirements will increase correspondingly. TVA is amenable to be applied at the macro scale; the sub-indicator foreign exchange in fact being particularly relevant for the macro scale. HDI has been envisaged anyway as a national-level indicator, hence, its applicability at the macro level is obvious. However, for the local level, employment generation and access to modern energy were identified as more

practicable indicators for assessing social impact of biomass energy.

Also, the need for additional indicators for each pillar was identified. For the environmental pillar, biodiversity, energy resource depletion, water resource scarcity, and degradation of air, water and soil quality would be relevant for evaluating biomass systems. For the economic pillar, income (wages), net profit and tax revenue could complement TVA. For the social pillar, as mentioned earlier, employment generation and access to modern energy could complement HDI. These indicators should be field-tested in the near future to identify the practicability of using them as well as to adapt them to the context of East Asia.

An overall observation for the whole exercise of field-testing the sustainability methodology and indicators was that their application requires a certain level of expertise. Hence, it is proposed that “training of the trainers” should be initiated whereby a certain group of personnel from the countries in East Asia are trained to use these indicators; they can then train others in their own countries.