

Sustainability assessment of biomass utilization in ASEAN

In order to achieve sustainable biomass utilization in ASEAN, indicators for sustainability assessment are imperative. LCSAL encourages the use of life cycle thinking in the evaluation of sustainability in ASEAN countries using indicators such as greenhouse gas emissions, total value added, employment generation and access to modern energy.

WHY IS SUSTAINABILITY OF BIOMASS UTILIZATION FOR ENERGY A CHALLENGE?

Biomass utilization for energy or fuels has been attracting the world's attention due to its potential to contribute to rural development and employment generation. It may also help diversify energy supply and decrease dependency on fossil fuel based generation particularly in East Asian countries. However, there are some negative issues recognized through the increased demand of feedstock for bioenergy and implementation of policies for an enhanced use of bioenergy. These issues are mainly related to environmental or social concerns about increase in Greenhouse Gas (GHG) emissions, loss of biodiversity, unwanted impacts on livelihoods of local communities, food insecurity, etc. With increasing concerns on the above issues, several initiatives on the assessment of sustainability of bioenergy have emerged in recent years. These initiatives are working on developing the sustainability criteria, indicators, certification systems and legislations for the processing of bioenergy feedstock and production and consumption of bioenergy. The *Life Cycle Sustainability Assessment Lab (LCSAL) of JGSEE-CEE* has been working on these issues vis-à-vis the context of Thailand for the past decade (Gheewala, 2012). For the past few years, LCSAL has also contributed its experience to initiatives in the ASEAN region.

HOW WAS LCSAL INVOLVED AND CONTRIBUTING TO ERIA'S WG ON SUSTAINABILITY OF BIOMASS UTILIZATION IN ASEAN AND EAST ASIA?

In 2007, the Economic Research Institute of ASEAN and East Asia (ERIA) started supporting activities related to sustainable utilization of biomass for the East Asian region. An ERIA's expert working group (WG) was formed comprising researchers specialized in any one or more aspects of sustainability and working in the East Asian Countries. LCSAL was invited to join the ERIA's expert Working Group (WG); it was particularly involved in activities focusing on

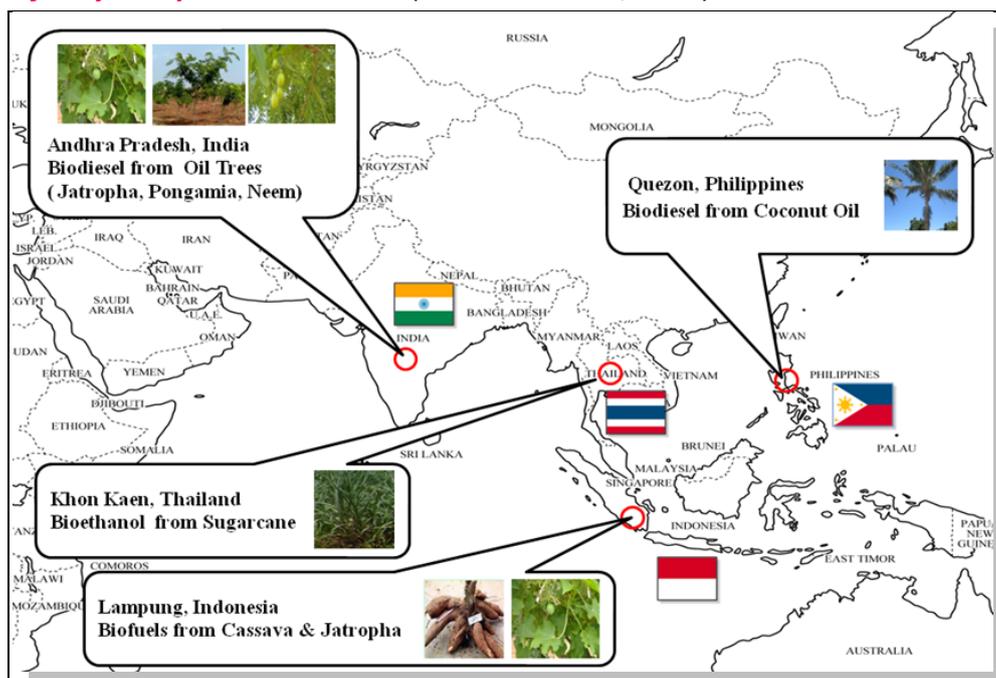
Life Cycle Sustainability Assessment Laboratory (LCSAL)

The focus of the lab is to develop tools and conduct sustainability assessment of various energy technologies, conventional as well as alternative, in a life cycle perspective. The results of such research will provide support to decision makers in Thailand vis-à-vis the sustainability implications of energy conversion and use. Research in LCSAL focuses on 2 main areas which are:

- (1) Sustainability assessment of energy systems and
- (2) Energy and environmental policy support tools.

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environmental sustainability of biomass utilization as well as methodological development and integration of indicators for policy decision making. As there were no well-established sustainability initiatives on bioenergy at the very beginning of these activities, the WG started with discussions on a **“Sustainable Biomass Utilization Vision in East Asia”**. These activities took place during 2007-2008 and policy recommendations were suggested and framed in the form of **“Asian Biomass Energy Principles”**, which were endorsed by the Energy Ministers Meeting of the East Asian Summit in Bangkok in August 2008. In response to the request from the energy ministers of the region to develop a methodology to assess the environmental, economic and social impacts of biomass utilization for energy by taking into account specific regional circumstances, the WG performed investigations during 2008-2009 to come up with **“Guidelines for Sustainability Assessment of Biomass Utilization in East Asia”**. As part of these activities the WG identified indicators for each aspect of sustainability. Subsequently, during 2009-2010, the WG tested its guidelines through field studies by conducting four pilot studies, one each in India, Indonesia, Thailand and the Philippines. The sustainability of a variety of feedstocks being utilized for bioenergy was investigated in these countries (ERIA, 2010). LCSAL was in charge of the study for Thailand focusing on **“Sustainability Assessment of a Biorefinery Complex in Thailand”** (Gheewala et al., 2011).

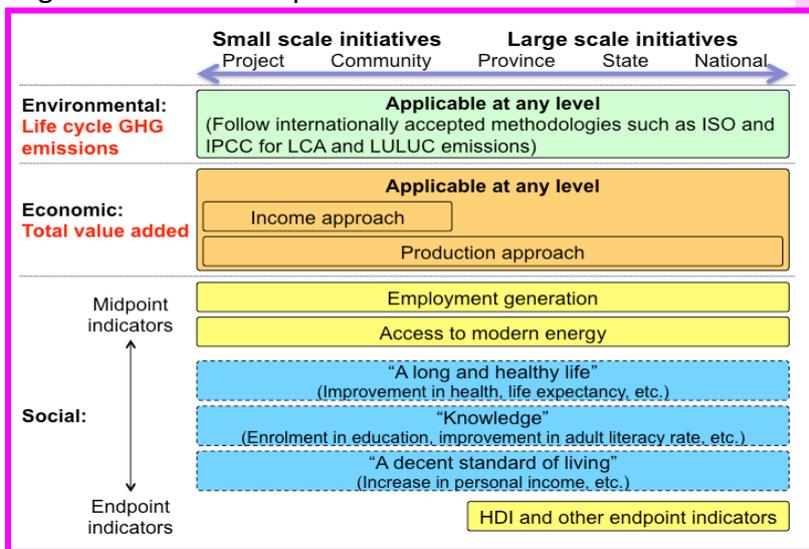


During 2010-2011, based on the lessons learned from the pilot studies, the WG discussed the applicability of the indicators and proposed some specific and practical indicators to assess environmental, economic, and social aspects of sustainability of biomass energy utilization for both small and large scale initiatives (ERIA, 2011). During 2011-2012, with increased worldwide activities in development of a variety of sustainability assessment initiatives, the WG reviewed methodologies of some major initiatives and extended its methodology from an ex-post assessment tool to an ex-ante assessment tool, so that it could support appropriate decision making and ensure the sustainability of biomass projects at the planning stage (ERIA, 2012).

WHAT ARE THE INDICATORS IDENTIFIED FOR SUSTAINABILITY ASSESSMENT OF BIOMASS UTILIZATION IN EAST ASIA?

Life cycle greenhouse gas (GHG) emissions, total value added (TVA) and the Human Development Index (HDI) of the United Nations Development Programme were the main shortlisted indicators of the three pillars of sustainability. However, not all indicators are applicable to all scales of biomass utilization. Also, secondary indicators are required for more detailed analysis. Details of the indicators and an illustration of the overall sustainability framework are given below:

- Life cycle GHG emissions as environmental indicator are applicable for biomass initiatives at any scale.
- 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.



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