

Low Carbon Industry and Agriculture

by Asoka Abeygunawardana

Industry

The energy use in the industrial sector can be divided into three components: biomass thermal (68%), fossil oil thermal (14%) and electrical (18%). It is clear that 68% of the energy requirement at present is satisfied with carbon neutral energy sources. Changes in power generation plans can further improve it to cover 86%. It is necessary to stop using fossil oil for industrial thermal applications if we are to reach carbon neutral status in the industrial sector. Annual fossil oil requirement in the industrial thermal energy sub sector is about 430,000 tons.

These are primarily furnace oil, diesel, kerosene and LPG used in boilers, furnaces, kilns, air heaters, ovens etc in different industries. It is possible to use sustainably grown fuel wood together with modern technologies to progressively eliminate the use of fossil fuels in industries as examples of such successful conversions already exist proving that one ton of oil can be replaced by 4 tonnes of fuel wood. For this purpose it is necessary to have a fuel wood supply of 2 million tonnes per annum, which is possible once the current 40% fossil subsidy on furnace oil is removed. (Source: Bio Energy Association of Sri Lanka) If the market prices for furnace oil prevail without any subsidies, then the natural incentive of energy cost savings of at least 50% would have encouraged the industries to convert to use of fuel wood along with the emergence of an acceptable price level for wood supplies.

Agriculture

The energy consumption in the agriculture sector can be broadly divided into two categories: direct and indirect uses. Direct consumption includes land preparation, planting, water pumping, harvesting whereas indirect consumption includes fertilizer, pesticides, hybrid seeds and feed supplements. Fertilizers are the largest energy consumers, accounting for about a third to half of all energy consumed in crop production. On average, 150 - 200 kg of fertilizer is applied per hectare and it could go all the way up to 300 - 500 kg in the case of crops such as potato. The energy consumption is distributed as follows: fertilizer - 43%, field operations - 20%, overhead - 17%, harvest - 8.5%, irrigation - 7.5%, Pesticides - 4% (Source: Dr. Gamini Kulathunge). The fossil fuel used for such applications is releasing carbon into the atmosphere and contributing to global warming. In addition the agricultural sector contributes 60% and 50% of global anthropogenic emissions of Methane (CH₄) and Dinitrogen Dioxide (N₂O₂), respectively. Unlike other sectors it is necessary to address all these issues in order to find a permanent solution to the climate catastrophe from an agrarian perspective.

Industrial type agriculture concentrates on one target crop for ease of operation using heavy machinery in land preparation and harvesting. The present form of agriculture based on energy-intensive inputs is no longer deemed viable. This could be seen from the evidence of massive agricultural subsidies given to farmers not only in the developing countries but more so in the developed countries. The solution to the agricultural sector is to combine production, consumption and disposal of waste into smaller units based on multiple crops so that large scale processing and transport is avoided. Further, this will cut down the off-farm energy requirements and labour-intensive small farms will hugely contribute to poverty

reduction. This will create opportunities to supplement soil fertility by integrating waste and by-product management into farming activity. Since organic systems receive no chemical inputs for fertility, weed or pest control, the yields would be lower in the organic systems during the first few years. However, in subsequent years, organic systems will actually outperform conventional systems. Small farms are no less technically efficient than large farms and increasing their productivity will have a major impact on production.

Comparative analysis of trials on energy inputs, found that organic farming systems use just 63% of the energy required by conventional farming systems largely because of the massive amounts of energy required to synthesize nitrogen fertilizer. The Rodale Institute's 28-year findings show that organic grain production systems increase soil carbon by 15 to 28% while soil nitrogen is increased by 8 to 15%. Further, the crop is sustained during drought years, which is an important finding in the face of anticipated climate instability.

The Coconut Research Institute (CRI) has carried out extensive research into the use of Gliricidia in coconut plantations and their findings are: The ability of soil to retain moisture content is enhanced by approximately 50% when Gliricidia is grown as a multi-crop under coconut plantations; Gliricidia multi-cropping improves the organic matter content of soil by 40% at a depth of 15 cm; 50 kg of processed Gliricidia leaves can reduce annual chemical fertilizer requirements yielding the equivalent of 0.8 kg Urea, 0.25 kg Eppawala Phosphate, 0.6 kg Mu of Potash and 0.5 kg Dolomite; Solar radiation utilization on a plantation is increased from 6% to 94% in the presence of Gliricidia. (Source: Dr Jayantha Gunethilaka). The Kohomba Estate (140 acres) in Kakkapalliya owned by Vidya Jothi Dr. Ray Wijewardana has clearly demonstrated during the last 10 years that Coconut multi-cropped with Gliricidia will give the maximum benefit to the planter. The crop yield and quality of the nuts have tremendously improved after replacing chemical fertilizer with green manure. It is true that organic farming is labour intensive (roughly about 50% more than chemical agriculture), however, it should be noted that organic farming is much more profitable in addition to creating employment opportunities. There is no need to give subsidies to organic farming but the government should refrain from giving subsidies to fossil fuel, chemical agriculture and stop spreading false information on so-called "good farming" in the name of agricultural extension services.

A considerable amount of energy spent could be categorized under postharvest technology that deals with threshing, drying, baling and storage under managed conditions. The next stage of processing would involve milling, grinding, blending in the case of grains, and minimal processing in the case of fruits and vegetables. Cleaning and grading, too, are energy-intensive operations normally carried out to meet specific market needs. These requirements will be satisfied without burning fossil fuels, with the introduction of renewable energy and energy efficiency technologies for power generation and industrial thermal applications.