Technology Fact Sheet for Mitigation

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Technology Name:	**Biomass combustion and co-firing for electricity and heat**[i]
Introduction	
Biomass can be used to produce power and electrification especially in rural area. Several feedstock and conversion technology combinations are available to produce power and combined heat and power (CHP) from biomass. Two technological options involve burning biomass; standalone units and co-firing it with fossil fuels in standard thermal power plants.	
Technology characteristics	
What is practiced in Laos is stand alone biomass-based power plants for electricity production. It is a common technology that converts solid biomass fuels to energy through combustion. In the biomass-based power plants, electricity is produced by direct biomass combustion in a boiler and via a steam turbine or engine. It is reliable and low cost technology although electrical efficiency of the steam cycle is not high (IEA Bioenergy,2009).	
Potential of application in the country	
The national strategies, policies, energy demand, availability biomass and existing practice can indicate potential of application of this technology in Laos. The long term strategy on renewable energy, strategy on climate change, agriculture development and forestry recognize that biomass is one of the potential sources of energy in future and defined promotion and development biomass is one of the priorities. In addition, the policy positioning Laos to be battery of ASEAN countries as well as increase demand for energy implies that Laos would use most energy sources or potential in order to realize the goal. Of which, biomass can be the source. Based on the estimate made by ministry of energy and mining (2010), biomass including agricultural residues-based energy has a potential of electricity production of 938 MW throughout the country. This also means there is great potential for biomass-based electricity to be developed compare to current situation which only 160 kW of electricity is be produced with the use rice husk. In addition, the policy on the promotion of foreign investment and growth of private sectors in Laos can also be opportunity for the development of this technology.	
Status of technology in the country	
The development of agricultural residues based power plant is in its nascent in Laos and lack of information. Only one pilot project which generates energy from rice husks, with a capacity of 160 kW was recorded (MEM, 2011). However, based on the estimate by ministry of energy and mining (2011), biomass including agricultural residues-based energy has a potential of electricity production of 938 MW throughout the country. And this technology is identified and promoted in the strategy on renewable energy development (MEM,	

2011).

Benefits to Economic development

- Enhance energy security while reducing the dependence on fuel wood, coal and other energy sources.
- Diversifying the industrial sector and enterprises;
- Supporting rural electrification with all its developmental benefits.

Benefits to Social development

- Increased income and jobs in the agriculture and forestry sectors, which now supply part of the feedstock used in power and heat production (agricultural and forest residues)
- Job creation in the industrial sector for designing, building and operating the plants.
- Increasing inclusion in the economic system: well-organized farmers unions can gain access to energy markets.

Benefits to Environment development

- Reduced GHG emissions from the power sector. Many agricultural and forest residues can be assumed to be carbon neutral, which leads to significant attributable GHG emission reductions.
- Reduced NOX and SOX emissions compared to coal combustion. NOx emissions can be further reduced by implementing primary and secondary emission reduction measures.

Climate change mitigation potential

The climate change mitigation potential includes reduction of GHGs from agricultural residues burning, left to decay and direct input to soil. In addition, this technology also reduce energy consumption elsewhere especially coal, oil and fuel wood. MEM (2011) stated that there are huge amount of agro-forestry residues or wastes generated every year from agro-forestry production, such as rice straws/husk, sawdust, corn cobs which can produce and generate around 500 MTOE.

Financial requirements and costs

Although the renewable strategy is in place, but estimate of financial requirement is unclear. However, the practice in other country suggest that investment cost is about 3,500 Euro/kWe for a 5 MWe plant, but goes down to about 2,000 Euro/kWe for a 25 MWe plant. One example of sugar manufacturer in Kenya, which developed Co-generation agricultural residues power plant based on the conventional steam power cycle involving direct combustion of biomass (bagasse) in a boiler to raise steam to offset 1,295,914 tCO_{2e} under CDM in the period of 10 years required USD 20,000,000 for investment.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Mitigation – Laos. You can access the complete report from the TNA project website http://tech-action.org/**