# APPLICATION OF GASIFICATION IN LIME PRODUCTION

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Lime production is an important part of the rural economy in some parts of Sri Lanka. Since the extraction of coral lime is banned, lime production completely depends on the burning of inland lime stones. In this sense Digana and Matale in the Central Province are key areas for Lime Production industry. However, the lime producers in these areas have faced several difficulties related to accessibility of firewood and due to tightening environmental regulations.

Dwindling sources of firewood coupled with the restriction of transport of timber has created problems so as to drive many lime kiln owners out of business. The current lime kilns operate using large sized logs stacked in alternative layers with lime stones. These kilns offer no flexibility to utilise small fire wood or any other biomass. In addition, due to the nature of operation, the wood in the upper part of the kiln is subject to pyrolysis, generating vast quantities of pollutants and wasting considerable amount of energy.

In this investigation, initially the effect of process parameters such as kiln configuration, bed height and loading pattern on pollution generation was studied. Carbon monoxide was selected as the representative pollutant. The results indicate that the pollution formation is mainly due to the pyrolysis of wood in the upper part of the kiln and by improving air flow pollution formation can be reduced to a certain extent.

The applicability of gasification is tested as a solution for both the problems of emission and lack of fire wood. A downdraft gasifier was coupled to an existing kiln and *Glircidia* was used as the fuel. According to the results combustion of gasification products generates sufficient energy to burn lime stones and at the same time reduces the CO emission considerably. Economic evaluation indicates this to be an expensive option still, mainly due to initial investment needed for the gasifier. However, if the gasification technology is freely available, fabrication of the unit can be done locally reducing the cost. In gasification process, biomass is gasified in a gasifier and the produced gas is burnt to generate energy for lime burning. This approach provides the flexibility to use short rotational crops such as *Glircidia* and thereby reducing the burden on remaining forests. In addition this can be developed as another income source for the villagers as the suppliers of required biomass. Importantly this will prevent the incomplete combustion that takes place in the conventional lime kilns and hence reduce the generation of harmful air pollutants.