IEA Bioenergy
Technology Collaboration Programme

Bioenergy in remote Indigenous communities

Summary

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Utilising woody waste from mine clearing in northern Australia

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Project Summary

Remote Indigenous communities around the world are socioeconomically disadvantaged and highly reliant on fossil fuels for their energy needs. Indigenous community-owned forests are often cleared and burnt ahead of mining developments. The potential for forest biomass salvaged from mine-clearing to support the energy needs of the remote Indigenous community of Aurukun and two nearby potential bioenergy hubs in western Cape York Peninsula in northern Australia is evaluated. Results show at least 88,100 dry tonnes of forest biomass per year are available in the first thirteen years (from 2021) and 99,300 dry tonnes/year between years 14-40. Modelled power yields from gasification show promising results, providing over 60% of the energy demand in two of the three bio-hubs in the next 13 years. Pyrolysis power yields are low, however, additional biochar yields can be used for local mine rehabilitation and could provide new local Indigenous employment and business opportunities. The findings can inform the mining sector in making more informed land use and energy decisions, and bioenergy industry policymakers and investors wanting to support remote Indigenous community development in places where extractive industry developments are clearing large areas of forest. The full report can be accessed using the following link <insert link>.

"This case study integrates the energy and mining sectors, Indigenous communities, local sawmills, and forest management practices in one of the most remote places in the world. Practical implications related to the use of forest biomass are emphasised to benefit economic development in remote Indigenous communities, not only in Australia but globally."

OBJECTIVES AND APPROACH

Within the Weipa-Aurukun region of western Cape York Peninsula, the case study evaluated:

- a 40-year forecast of forest biomass resources potentially available for commercial generation of bioenergy and biochar at a regional level using forest product inventory and aboveground biomass assessment of the region's woodlands;
- the spatial and temporal distribution of forest biomass availability for three potential community-based bioenergy hubs in the region according to the anticipated annual forest clearing rate and different supply-demand scenarios; and
- the suitability of wood-fired gasification and pyrolysis systems that could be installed at the proposed hubs using yield-calculations of power and biochar.

PROJECT CONCLUSIONS

Large quantities of chip logs and harvest residues are readily available from salvage harvesting of forests ahead of mining in western Cape York Peninsula. Additional chip logs can be obtained from silvicultural treatment, and sawmill residues from a local community sawmill could also make a substantial contribution to the biomass supply. In combination, these supplies of currently wasted woody biomass could substitute a proportion of the diesel use at three potential remote Indigenous community-based bio-hubs located in western Cape York Peninsula. The projected power yields are highly dependent on biomass conversion technology. Conversion of biomass to pellets is an important consideration in establishing consistent local biomass supply chains. Biochar production could support improved mine site rehabilitation.

Assessment of forest biomass availability	Assessment of the spatial and temporal distribution of forest biomass availability	Assessment of the suitability of different wood-fired energy conversion systems
Large amounts of forest biomass available in the study region: • Chip logs: 54.58 tonnes/ha • Harvest residue: 68.04 tonnes/ha • Silvicultural treatment: 23.12 tonnes/ha • Sawmill residue: 19,421.50 tonne/yr *all values presented with a moisture content of 12% air-dry.	Harvesting rates differ between regions in the mining lease depending on the rate of salvage harvesting operations. Temporal rates across the mining lease indicate biomass availabilities of: • 88,146.74 tonne/yr for years 1-13 • 99,344.81 tonne/yr for years 14-40 Biomass storage will facilitate even distribution of biomass during the mining period.	Gasification is the most cost-efficient solution for small-scale power generation in remote locations, meeting on average 54% of the region's energy demand. Pyrolysis can on average meet 27% of the region's energy demand. Small-scale mobile pyrolysis facilities could provide a smart solution to produce char for mine site rehabilitation.