CHAPTER 5
CONCLUSIONS

This study consisted in assessing the GHG performance and cost viability of using mango peel as feedstock for biogas production in a mango factory instead of open dumping as currently practiced.

In terms of life cycle GHG emissions, it was found that the open dumping of mango peel waste from the factory in nearby mango fields would lead to GHG emissions amounting to 25.87 tonne CO_{2eq}/yr. On the other hand, the alternative case consisting in producing biogas from mango peel waste and using it as a substitute of LPG in the mango factory would bring GHG emission credits. This includes also the utilization of solid digestate, a co-product generated along with biogas, to substitute chemical fertilizers used in the mango plantations supplying the factory. It was found that the GHG emissions associated with biogas production would amount to 8,607 $kgCO_{2eq}$/yr and that the substitution of LPG by biogas and chemical fertilizers by solid digestate would bring GHG emissions down to 1,923 $kgCO_{2eq}$/yr. As compared to the BAU scenario, the biogas system appears to be an environmentally friendlier, and therefore, a preferred option.

However, in terms of financial assessment, the biogas system investigated appeared not to be viable as the NPV was found to be negative and the IRR too low. This is mainly because of limitation in the amount of feedstock (mango peel waste) available for the biogas system, as only generated during the mango season (120 days only). Based on this amount, the volume of biogas produced can only replace 17% of the annual requirement in LPG by the factory for mango processing. Also the amount of solid digestate produced from the biogas system is limited substituting only 1% of the annual amount of chemical fertilizers used in the mango plantations. For the system to be economically viable, additional feedstock (e.g. similar organic waste from nearby factories) would be required during the rest of the year to continue operating the fermenter and optimize its performance.