high as the briquetting of the dry leaves. The amount of mass to be densified is 80% less than the original material. The carbonized leaf briquettes are expected to be sold at higher price (than the dry leaf briquettes) at 2.7 Baht/kg.

The annual cost has been found to be 34,639 Baht while the income is 64,438 Baht.

8. CONCLUSION

The project has accomplished all commitments. The survey of the rubber plantation wastes revealed a tremendous amount of energy available from these wastes. The total nationwide wastes is estimated as $2432.11 \times 10^3$ tons, $167.99 \times 10^3$ tons and $132.2 \times 10^3$ tons of dry leaves, fallen branches and seeds, respectively. When compared with other agricultural wastes, the rubber plantation wastes rank number 5 in terms of weight and energy. The availability in term of energy is $5.8283 \times 10^{16}$ Joules or $1,364.9 \times 10^3$ toe annually. This amount of energy represents about 5.95% of the whole energy consumption of the country.

Handling of the rubber plantation wastes is very difficult. Dry leaves can not be densified without heating process. Briquetting of the dry leaves is not economically feasible as far as electricity is required. At present situation, the densified leaves cannot compete with the fuelwood. However, the leaves can be converted to carbonized leaf briquettes and sold at a price high enough to be feasible. The carbonization of the dry leaves can be achieved by the indirect fired method. The densification
is achieved by using 10% cassava starch as a binder. The annual income to cost ratio was found to be 1.86.

9. RECOMMENDATION

The rubber plantation wastes themselves have negative value. The use of these wastes in a productive manner is therefore highly recommended. Feasibility study aiming to energy production revealed that the rubber plantation waste is an interesting energy source. Its potential is $5.8283 \times 10^{16}$ J/year which is equivalent to $1,364.9 \times 10^3$ toe/year. The availability is plentiful but handling is the major problem. In conclusion this study recommends that,

a) Energy from the wastes should be obtained in the form of carbonized leaf briquettes rather than briquettes of the dry leaves.,

b) Comprehensive economic analysis is needed for the production of carbonized leaf briquettes. Appendix B gives a preliminary discussion on this aspect only.,

c) Other products made from the leaves such as fertilizer, filler in particle board manufacturing should receive attention.,

d) It is anticipated that the real problem in the use of rubber plantation wastes is the difficulties in the acquisition of the wastes. This merely because of the weed and irregularity of the