Fuel and Fertilizer

The cost and availability of fertilizers is a matter of serious concern to the Asian farmer. Moreover, while artificial fertilizers will continue to be used for many years to come, excessive dependence on them is found to have a serious effect on the natural fertility of the soil. In countries like China increased application of chemical fertilizers went hand in hand with the traditional utilisation of compost and other natural fertilizers. In Japan, on the other hand, the use of chemical fertilizers has been excessive and now a policy of greater reliance on organic fertilizers is being adopted.

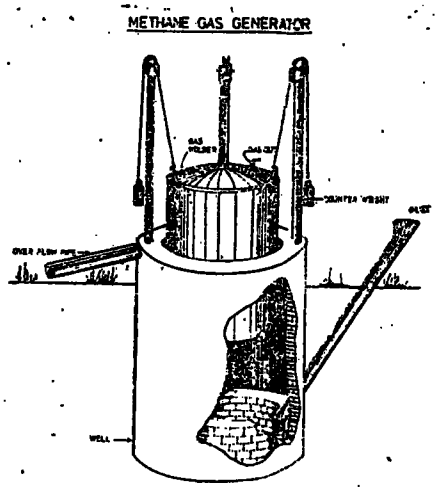
Our farmers also face a problem with regard to fuel. Firewood is becoming scarce and is costly and a conservationist attitude would regard the burning of our trees for fuel as a wasteful depletion of our natural resources. Kerosene is similarly expensive and is an imported commodity consuming valuable foreign exchange.

In Asia, cattle dung has traditionally been a source of either fuel or fertilizer and this dual potential is now being exploited on a large scale in the villages of India by means of a Methane Gas Plant. The plant can utilise cattle-dung, piggery or poultry droppings, night soil, animal carcass and agricultural waste, converting it into manure rich in nitrogen and humus, as well as generating a high quality fuel gas. The fully digested slurry has a nitrogen content of over 2% which is a substantial increase (over 25%) on the nitrogen content of dry manure. It is most profitably applied directly to the land by mixing with irrigation water or can be used for the rapid fermentation of compost. The odourless, innocuous gas consists of 55% methane and 45% carbon dioxide. It has a high thermal efficiency (60%) as compared with that of dung cakes (11%) and can be used for cooking, lighting or running engines.

The plant consists of a fermentation tank or digester — a well of masonry work below ground level — and a floating steel drum which fits like a cap inside the mouth of the well, collecting the gas generated by the digester and rising and falling according to the volume produced. Dung is mixed with water (in the proportion 4:5) in a surface trough and the mixture flows into the digester through a connecting pipe. As the well fills up, an equal quantity of slurry is discharged through an overflow pipe. The accumulated gas is released from the steel drum *via* a pipe provided at its top (gas out pipe) and leading directly to the required energy points — kitchen stove, gas lamps or gas engine. (See illustration).

The smallest plant producing 30 cu. ft. of gas requires a minimum of 2 head of cattle to maintain it in daily use. Five head of cattle, producing a daily average of 45 kgs. of fresh dung, would feed a gas plant of 60 cu. ft. in volume, sufficient to provide cooking fuel for a family of at least five members. (It is estimated that the average daily consumption of gas per person in a family is about 12 cu. ft. In community kitchens less quantity of gas may do the same amount of work). Of course, the more animals available, the bigger the plant. The Methane Gas Plant may be located close to a dwelling place as there is neither danger of explosion, nor is there any unpleasant odour produced. In fact, we have seen it operating immediately outside rural kitchens.

This plant is now being manufactured in India where it is used by thousands of farmers, technical assistance and credit facilities being available for collective and individual purchase. While our own cattle population has been depleted in recent years, with the growth of larger farm units and the development of animal husbandry, such a device could be readily and economically adapted to local conditions. The main problem in the Sri Lankan context would be the manufacture of the steel drum and the methane



gas cookers. The use of cheaper materials such as compressed wood fibre and glazed earthenware could also be explored.

About a year ago, a Methane or Soba ("natural") Gas plant was produced in Sri Lanka by workers/officers of the Industrial Development Board. They estimate cost of production to be about Rs. 1,600/- for a gas holder of 65 cu. ft. capacity. This could be cut by half if the well is sunk in firm soil, requiring no reinforcement. The plant, which may be seen functioning in the Board's premises at Katubedde, Moratuwa, is fed chopped creepers and other vegetable matter (1 lb of waste matter producing 3 cu. ft.), and generates a high-speed gas which can boil a litre of water in 5 minutes (*i.e.* faster than a kerosene stove or wood fire). The IDB has also manufactured a specially adapted burner for more efficient utilisation of the gas, costing in the region of Rs. 20/-.

The Methane Gas plant is ideal for our conditions, where vegetable matter rather than cattle dung is abundantly available. The plant could readily be adopted by the new cooperative farms or made available to small farmers with the aid of credit purchase schemes. A few pilot projects, initiated by agricultural extension service units or the Industrial Development Board, could break down initial resistance to the adoption of this most practical and efficient recycling machine.