factory worker is not very different from his agriculturist counterpart. In the reviewer’s opinion, a list of personality traits is not essential to the purpose and scheme of the study. At least, the book without the chapter in question would not have missed anything of value, Perhaps Nash consistently follows the “elasticity-coexistence” model here, making personality coexist with social institutions.

On the whole, *Machine Age Maya* is an illuminating study. It is undoubtedly an original contribution to knowledge, shedding new light on the problem of industrialization of simple societies. The conspicuous absence of pictorial illustrations, and the sparse use of tables and charts add to its attraction instead of detracting from it. Even those concerned with industrial policy will find it extremely useful. The practical suggestion at the end of the book is very valuable, and is further proof that social anthropologists deal with observable reality, and do not live outside the everyday world.

M S University of Baroda.
December 1950.

**Domestic Fuels in India**

L K

Statistics of India’s pattern of energy consumption are sadly lacking and it is only in the fast few years that attempts have been made to analyse the situation.

It has been generally known that the major proportion of the country’s domestic heat is generated from secondary fuels such as firewood (as used in the text of this review it includes agricultural wastes such as bagasse straw, twigs etc), charcoal and cattle dung but the total quantities of such secondary fuels consumed in both urban and rural areas has remained largely speculative, ranging from 40 to 131 million tons coal equivalent (MTCE).

If secondary fuels can be displaced by primary fuels (such as coal, electricity and oil), dung can be used as a manure, thus increasing agricultural production, and deforestation prevented.

It was in this context that the Ministry of Heavy Industries commissioned the National Council of Applied Economic Research to assess the current demand for domestic fuels, future needs by 1965-66 and, since India has large reserves of low grade coal, the possibilities of substitution of secondary fuels by the development of a rationally planned coal-based processing industry.

The title of the report of the Council is *Domestic Fuels in India*—somewhat of a misnomer since apart from a few incomplete comments here and there, the report is devoted to an analysis of the problem presented by the current and future demand for domestic fuels for providing heat for cooking. In the rest of the discussion we talk of the consumption of fuels in these terms only.

The total quantity of primary fuels consumed has already been estimated by the Council in their study *The Utilisation of Primary Energy in India* — the constituent units are 2 million tons of soft coke, 150,000 tons of Kerosene and 140 million KWh of electricity, in all 2.5 MTCE. This is assumed to be consumed almost entirely in the urban sector.

**SECONDARY FUELS**

It is in attempting to estimate the quantity of secondary fuels consumed that difficulties arise. By far the greater part is consumed in the rural areas and most of it is neither bought nor sold. Previous attempts to assess one of the important constituents, Dung, have been based on such intractable variables as average measurable quantities of wet dung output per annum, amount actually collected, proportion of this burnt, livestock population etc. Only the National Sample Survey has published some details about the consumer expenditure on ‘fuel and lighting’ but provides separate figures only in respect of Kerosene, Gas and Electricity (on the basis of their figures, India’s consumption of Kerosene would work out at 2.5 million tons! In fact it is about 1.5 m tons!

**DUNG CONSUMPTION**

The methodology adopted is interesting. In estimating the total dung consumption to be 37 MTCE, the report confesses that it is “at best an intelligent guess” and that the ‘figure should be considered as indicating the order of magnitude . . . the actual figure probably lies between 35 and 15 MTCE. The table alongside is finally built up. The report calculates that the total consumption, in the urban areas is likely to grow from 20 MTCE to 31 MTCE by 1970 and in the rural areas from 77 MTCE to 85 MTCE. These estimates are certainly an improvement on previous ones and the margin of error has been reduced.

The economic consequences of burning such large quantities of secondary fuels are clear. Some what dramatically the report points out that burning 35 MTCE of dung in the rural areas is equivalent to burning 900,000 tons equivalent of nitrogen (equivalent to 12 Sindris) and 150,000 tons of Phosphorous Pentoxide - in terms of food 9 million tons of foodgrains, every year. In respect of the disproportionate consumption of wood fuel outside the forest areas, it warns that ‘conditions are being created in which the annual rate of loss of soil is approaching that associated with completely barren land’.

**Fuel Consumption (MTCE)**

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Urban</th>
<th>Rural</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>2.0</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.2</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Kerosene</td>
<td>0.3</td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Dung</td>
<td>4.0</td>
<td>35.0</td>
<td>39.0</td>
</tr>
<tr>
<td>Firewood:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid*</td>
<td>8.5</td>
<td>23.5</td>
<td>32.0</td>
</tr>
<tr>
<td>Waste</td>
<td>5.0</td>
<td>18.5</td>
<td>23.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20.0</td>
<td>77.0</td>
<td>97.0</td>
</tr>
</tbody>
</table>

* Including charcoal.
PROBLEM OF RURAL ENERGY

In order to evolve a policy designed to displace secondary fuels, the report examines the current and future availability of primary fuels and comes to the conclusion that the only primary fuels which could provide the answer are those based on coal. Fortunately we possess 50,000 million tons of coal of which 96 per cent is low grade, and can be processed to provide soft coke or gas or both.

Centres of consumption in rural areas are both ‘small’ and wide spread and the location of coal deposits entails very heavy investment in transport capacity which would render the cost of fuel supplied prohibitive. Even the simplest dung gas plant costs Rs 350; Solar Cookers are not yet practicable. The report therefore suggests that local answers have to be found for the rural energy problem and accepts the view of Dr Pal (Indian Agricultural Research Institute) that it is possible to provide the total requirements of secondary fuel in the form of fuel wood by growing trees on one side of each village for which 50 acres per village would be required.

50 ACRES PER VILLAGE!

The preface claims that detailed suggestions as to how this is to be applied are given in the concluding chapter of the report. Hardly,—to paraphrase Wellington—if the Council believes this, it can believe anything! The peasants are perfectly aware of the value of dung as a manure. The Government of Madras survey of the pattern of consumption of fuels in Chingleput District (1951) quoted in the report shows quite clearly that peasants prefer to use firewood when available. So do other studies not mentioned in the report, so much so that McKim Marriot was many times ‘cordially requested by one or another Hindu farmer to please perform my natural functions in his field, so a- to enrich it’. (‘Technological Change in Over-developed Rural Areas’, Economic Development and Cultural Change, December 1952; see also M N Srinivas ‘Village Studies and Their Significance, Eastern Anthropologist March-August 1955). Mac-Kim Marriot goes on to observe that the ‘supply of manure has a direct connection with population and the pressure of population on land’.

How is it proposed to obtain 50 acres per village for growing firewood, what sort of organisation acceptable to the peasants is necessary to look after this and prevent destruction by goats, cattle, etc? Such questions remain unanswered. These are critical questions and the proposal of the Ministry of Agriculture to intensify agricultural development in selected districts provides an excellent opportunity to experiment with various types of schemes designed to solve the rural fuel problems.

COST OF SUBSTITUTION

Urban areas are almost wholly monetised and on page 23 the report states that their sample surveys of the pattern of consumption of fuels in Calcutta, Delhi and Bombay indicate that ‘price and availability are the only, factors of consequence’. Yet on page 119 it is admitted that ‘both social and economic conditions are responsible factors influencing the choice of fuels’—some of them appear to be accommodation conditions, convenience, cleanliness, initial and recurring costs of appliances (pp 98, 113) and even consumer resistance to change (p 119).

The report considers the cost of substituting the present pattern of fuel consumption by available alternative fuels in the three cities surveyed taking into account the relative efficiencies of the fuels used (a factor insufficiently understood by consumers at present) and builds up a table on page 127. Primary fuels (except electricity) are found to be cheaper than secondary fuels but the figures for soft coke (found to be the cheapest) are misleading. Elsewhere is mentioned that soft coke requires for ignition 20 to 25 per cent by weight of charcoal for a certain amount of Kerosene both more expensive fuels. If allowance is made for this the ‘effective’ price difference between soft coke and Kerosene is toned down considerably and the latter begins to appear as a ‘disturbing’ competitor—‘disturbing’ since it means importing further quantities of Kerosene which is already costing the country about Rs 27 crores of foreign exchange.

This gets more serious since the report assumes that the price of soft coke will remain constant—surely a somewhat doubtful assumption, since soft coke is being produced at present by cheap but crude plants using high grade coal and not low grade coal, which is proposed to be the basis for a large carbonisation programme. The difficulty in arriving at a more realistic estimate lies in the admission that not enough is known of the kind of processes which can use the varieties of low grade coal available in the country. This also vitiates the attempt to assess the many aspects of a carbonisation programme such as economics of coal gas versus soft coke, location of plants—whether near the mines or adjacent to centres of consumption and if the latter where, investment required etc.

FURTHER RESEARCH NECESSARY

Coal gas avoids the disadvantages of soft coke but costs of distribution are prohibitive except perhaps in areas of high concentration of population. The general solution to the problem of finding a primary fuel to displace much of the secondary fuel used in urban areas has to be based largely on coal, although marginal use may be found for other primary fuels—for instance the forecast surpluses ‘thrown up as a result of the imbalance between pattern of refinery production and internal demand could be utilised to augment gas supply. Further research and economic investigation is necessary. The report is an interesting introduction to the problems posed by the present pattern of consumption of domestic fuels. The time has surely come for much greater coordination between the many parts of Government concerned with the production and supply of primary and secondary fuels.

Record Automobile Production

The production of automobiles in the country showed an appreciable rise in 1959, the main contributing factors being the rapidly increasing indigenous content of cars, trucks and vehicles and liberal imports of components allowed to the manufacturers.

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A break-down of the 959 figure shows that production of cars. (including station wagons), trucks (including buses) and jeep vehicles amounted to 11,993, 19,099 and 5,376 respectively.
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*M One of the styles in which the beautiful South Indian women wear their saris is the draperly worn more typifying the "Ayamgar Style" preferred by orthodox Vaishnavite women. These colourful saris are usually eight yards in length.

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