CHANGING IRELAND

IRELAND'S CHANGING ENERGY BASE: THE BIOMASS CONVERSION PROGRAMME

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Many countries have had underlying weaknesses in their energy supply situation highlighted in recent years by shortages and disruption. In the Republic of Ireland, however, the adverse effects of these have been considerably exacerbated by the high rate of growth in the national economy, and consequently in energy demand, which prevailed throughout the second half of the past decade. Almost inevitably, one result of this has been a preoccupation with short-term supply problems relating either to external political or internal industrial difficulties. A neglect of long-term planning for future energy supplies has been apparent, a failure in policy sharply criticised by the International Energy Agency (O.E.C.D., 1978). Of particular concern has been the extent to which growth in energy demand has been met by increased imports of oil, in most years accounting for 70-80% of the energy market (EEC Commission, 1978). Such a high level of dependence is obviously undesirable both in the short and long term.

The difficulties of diversification in energy supplies are, however, only too apparent when Ireland's indigenous sources are appraised. In particular, the limited nature of existing reserves of coal and natural gas, the limited potential for further H.E.P. development, and the currently inconclusive results from oil exploration in the Porcupine Basin are all indicative of the magnitude of the problem. Moreover, it is a problem which is further compounded by the political difficulties being experienced in launching a nuclear power programme. In many respects the situation bears similarities to that which existed following independence when the response to a similar quest for greater energy self-sufficiency centred on the novel and imaginative policy of bogland development on a national scale, culminating in the establishment of Bord na Mona in 1946.

The decision to exploit peat was primarily a political one based on social rather than economic criteria. Yet while this reasoning may have seemed to lack any economic rationale at various times since, especially during the era of cheap oil in the 1960s, its farsightedness is now apparent. Not only so, but recent experimentation suggests that, following peat extraction, boglands have great potential for a variety of agricultural uses (Kearns, 1978). As a result, they should not be considered as wasting resources, far less as 'sodden deserts', a term commonly applied to them in the past. This attribute of resource renewability is one common to all well-managed organic resources and reflects their derivation from photosynthetic channels. They are essentially solar energy reservoirs, a fact which raises the possibility of tapping a renewable source of energy and explains the current high level of interest in photobiological sources.

Ecosystems are characterised by a frequently complex web o prey-predator relationships which accomplish the transfer of solar energ to plant and animal tissue. Odum (1957) in his classic work at Silve Springs, Florida, however, demonstrated that energy exchange across th trophic divides (plant-herbivore-carnivore) is not an efficient process du to losses in respiration and to the detritus food chain. For this reaso plant rather than animal biomass provides the most efficient harvest o solar energy.

In 1975 the EEC initiated two four-year energy research and develop- ment programmes to run until 1983, committing some £18 million t research into biomass conversion in the second stage from 1979 to 1983. Ireland's tradition of organic energy exploitation as well as its con- siderable climatic advantages enabled its representatives to successfully argue for a proportion of this expenditure being allocated to An Foras Taluntais. They, under the auspices of the National Board for Science and Technology, have since completed a considerable amount of research into the feasibility of growing crops for energy.

At an early stage, a feasibility study involving the growing of a wide range of plants at various locations indicated that the best prospects lay in some form of short-rotation forestry. This would probably utilise a high yielding perennial species capable of growing on a wide range of soil types (Neenan and Lyons, 1977). Such a system had previously been in- vestigated in the southern United States in connection with the pos- sibilities of wood production to supply the paper industry. Results from the programme suggested that yields of about 12 tonnes per hectare per year were obtained using the American sycamore (Dutrow and Saucier, 1976). Unfortunately, similar trials under European conditions were less successful and largely ruled out the species on the grounds of its suscep- tibility to frost and disease (Marquestaut and Thibout, 1975). Poplar and willow performed much better in Europe and have thus been the prin- cipal species considered for energy production. To avoid mutual shading the seedlings are planted one metre apart and harvested after three or four years. Thereafter the stumps sprout again and further harvests can be made at similar intervals for up to thirty years before replanting. Such a method of coppicing considerably reduces the high capital costs in- volved in annual replanting.

Growing trials commenced early in 1977 at five locations chosen on the basis of their soil types, ranging from the drumlin gleys around Swanlin- bar, Co. Cavan, to the grey brown podzols of Oakpark, Co. Carlow. Preliminary results suggest that poplar and willow may not be as suited to Irish climate and soils as was hoped, with the notable exception of the drumlin gley soils (Neenan, 1979). Other species such as lodgepole pine, sitka spruce, alder, birch and eucalyptus have fared better, although, in the case of some of the softwood varieties, they are not amenable to cop- picing. The viability of direct seeding is therefore currently under in- vestigation (McCarthy, 1979). Trials involving the combustibility of various types of wood chips are also presently being conducted. This is being carried out on a pilot scale at Bellacorick Power Station, Co. Mayo, following earlier experiments at Cahirciveen Power Station, Co. Kerry.

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TABLE 1

Country	*Population per sq. km*	*Energy consumption M.T.O.E. 1978*	*Per capita energy consumption T.O.E.*	*% Area under forest*	*% of land necessary to supply 10% energy from biomass at 4.7 T.O.E./Ha.*
Germany	247	271.0	4.4	29.0	23.2
France	98	183.6	3.5	27.3	7.2
Italy	187	135.5	2.4	20.9	9.6
Netherlands	336	64.8	4.7	7.5	33.5
Belgium	322	46.0	4.6	20.2	32.1
Luxembourg	137	4.5	12.7	31.9	36.8
United Kingdom	229	208.8	3.7	8.3	18.2
Republic of Ireland	45	7.8	2.4	4.9	2.4
Denmark	118	20.5	4.0	11.6	10.1

Source: Eurostat

tonnes of dried biomass per hectare per year is necessary, an energy output of about 4.7 tonnes of oil equivalent. Table 1 illustrates the amount of land which would be required at this yield to meet ten per cent of national energy requirements for each of the nine community members. For densely populated countries such as the Netherlands or Belgium with a high per capita energy demand the proportion of land necessary for even moderate biomass programme can be seen to be unrealistic. For others such as Denmark or Italy the proportion would bear comparison with the areas at present under forest. In the case of Ireland, both a low population density and a low per capita energy demand makes energy from biomass less consuming in relative areas than in any other country of the nine. The choice of Ireland as the Community's guinea pig is therefore logical. Failure in Ireland would seem to preclude further development elsewhere, while success would be of particular interest to France and possibly Denmark.

The principal difficulties facing the scheme in Ireland seem destined to centre on the geographical location of the plantations. The two obvious areas, marginal agricultural land in the west and cutaway bog in the midlands, both represent areas relatively suitable for short-rotation forestry. The nature of any future biomass programme is intimately connected with the choice to be made between these two regions, a choice with considerable social, economic and political ramifications.

Kearns (1978) outlined the land use dilemma apparent in deciding the future utilisation of cutover and cutaway bog. Compelling cases could be made for horticulture, for pastoral agriculture and for conventional forestry as alternatives to continued energy production down to the last half-metre of peat. Moreover the difficult questions of bogland ownership and farm size were also examined. Such problems are now further compounded by the advocates of a biomass programme since an equally compelling case can be made for this land use as a partial resolution of the energy-versus-agriculture debate. In particular, the absence of land tenure constraints and the expertise of an existing Bord na Mona labour force are both obvious reasons why An Foras Taluntais have earmarked the boglands for energy production. Proximity to existing power stations is also an attractive argument for the Electricity Supply Board, consciously aware of the higher transport costs involved in the movement of such a bulky fuel. Such a scenario of large-scale, highly mechanised monoculture in State owned plantations would not be received so enthusiastically by the influential agricultural lobby who see a different role for boglands with biomass plantations as small-scale individually managed additions to existing farms, harvested and marketed in relatively small units. Since energy crops prosper even on relatively infertile soils the social benefits of such a choice would be especially significant in marginal or disused agricultural land west of the Shannon. A clear conflict of interests thus exists between social, economic and political priorities.

Regardless of the outcome of the above clash of interests it should be stressed that only a small proportion of Ireland's future energy demand could be satisfied by biomass conversion, probably less than ten per cent by the turn of the century. Such a figure would nevertheless represent a

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significant contribution to an energy market satisfied by a greater variety of sources than today, and one in which hydrocarbon fuels in particular might well occupy a much reduced role. Recent estimates (Walker, 1981) suggest a diminution in the relative importance of oil from a present figure of 75 per cent of the energy market to about 27 per cent by the year 2000. Whether biomass conversion can provide the contribution hoped for, however, depends at least in part on the resolution of the land use dilemma described above. In the end choices will be politically motivated, reflecting the relative strengths of national and local interests prevailing at the time, a situation characteristic of all decisions concerning the utilisation of organic resources.

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