



RESPONSE TO DRAFT PRELIMINARY DISCUSSION PAPER ON THE BIOMASS POTENTIAL STUDY OF VICTORIA 1985

*The discussion paper by the Victorian Solar Energy Council (now Sustainability Victoria) was an example of an earlier generation of biofuel proposals which responded to high fuel prices of the 1970's and early 1980's. The main proposal in the report was an ethanol industry in northern Victoria (to supply of 20% of Victoria's liquid fuel, by 2000, from Jerusalem artichokes). Low world oil prices through the 1980's and 1990's prevented this and other agricultural biofuels become reality in Australia. My critique and questioning of the original proposal's bias towards agriculture rather than forestry as a source of sustainable biofuels is very relevant to the renewed debate over net energy yields (or losses) of these alternatives to oil. See Article 35 - **Biomass Fuels from Sustainable Land Use: A Permaculture Perspective**, for a more recent overview of the sustainability and net energy of biofuel alternatives. The recent rises in fuel prices marking the peak of global conventional oil production, has spawned a huge number of new biofuel projects and proposals with the debate now reaching the mainstream media. This like many other issues around global oil peak are tending to fracture both mainstream economic and ecological thinking along surprising lines creating new divisions and alliances.*



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27th June 1985

Mr Ron Mendelsohn
Victorian Solar Energy Council
10th Floor, 270 Flinders St.
Melbourne, 3000

Dear Mr Mendelsohn,

Following our conversation yesterday I am writing to comment on the *Draft Preliminary Discussion Paper* on the *Biomass Potential Study of Victoria* carried out by the V.S.E.C. As requested, I am including information about myself and the type of work I do. Enclosed is a general C.V. and a business brochure.

I would like to comment on a number of issues raised by the study not as an 'expert' with specialized knowledge but as someone concerned with the development of sustainable land use systems.

SOLID FUEL

The almost complete lack of information on the use of wood fuel is recognised in the study. The wood industry is growing rapidly but has been largely ignored in energy planning. I believe this is partly because its grass roots growth independent of government and large corporate investment has been contrary to the expectations of economists and planners. The harvesting of firewood as an enterprise is almost completely ad-hoc gathering of dead wood from forests and farmlands with little control over the resource or management of it. A large but unknown proportion of firewood utilization is completely outside the monetary economy through people gathering their own. This aspect must be considered in any planning for more systematic utilization of firewood resources. Wood fuel is a natural by-product of any silvicultural land use. Although specific firewood plantations may be justified in some cases, in general the net energy balance of such schemes is likely to be less favourable than integrated silviculture of mixed forests (both existing and those established by low input techniques such as direct seeding) for multiple products and functions. In this context urban forestry should not be ignored in either its present ad-hoc contribution to firewood resources through pruning and removal of urban trees or the great potential to use waste land in and near urban areas for multi-purpose forests managed on a coppice with standards system. In considering the pollution from wood burning technology, the species of wood and the degree of cure should not be ignored in any assessment. Some combinations of equipment and fuel could be most suited to urban areas.

AGROFORESTRY

Agroforestry is a simple example of integrated land use which attempts to balance pastoral and forestry values. Large scale development of systems such as wide spaced Radiata pine could significantly reduce available animal fodder over whole regions. To maintain pastoral productivity, fodder trees such as tree lucerne, willow and poplar should be considered. Agroforestry of sugar pod trees such as carob or honey locust should be investigated but will require more research and longer lead times than the use of fast, easy to grow species mentioned above.

SUGAR TUBERS

The study's findings that Jerusalem Artichokes have more potential than sugar beet agrees with my own impressions. However, I am sceptical that large scale cropping of any root crop could be carried out on land at present under pasture in the northern irrigation areas without acceleration of soil degradation processes including erosion, compaction and structure loss. New methods of cropping and return of some organic matter may help but in my opinion any change of use must not only maintain the present status of our soils but reverse present decline if such systems are to be sustainable. As with agroforestry for fuel crops, sugar tuber cropping will reduce available pasture for animals. The study does not consider how mash from alcohol fermentation could be used as animal feed. Could it offset the loss of pasture in terms of total feed value? Would it require animals concentrated in feed lots around ethanol plants? If so what are the implications in terms of nutrient recycling/effluent disposal? How would the energy budgets of such systems affect the overall calculations of energy efficiency?

NET ENERGY YIELDS

The last question above raises a fundamental doubt I have about projections of net energy yield in the study. Howard Odum, ecologist and foremost authority on energy analysis had this to say about biomass conversion in *Energy Basis For Man And Nature* Odum and Odum, McGraw-Hill '81.

'Whereas solar production of biomass can yield a small net energy, it is negative if too much high quality energy is fed back in the process. For example food and wood to heat homes can be supplied in small amounts as a continuing renewable product from solar energy. But concentrated conversion to higher quality energy such as fuels or electricity becomes a negative net energy. In the future when fossil fuels are gone we probably will make our liquid fuels from biomass. But this will be a form of energy consumption not a rich source to stimulate the economy the way fuels have been up to now. We need small pilot plants for research now so the process will be ready when needed. As long as only wastes

are used the conversion may save energy provided that taking biomass away from the soil does not reduce agricultural fertility.'

Calculations by Odum (in fossil fuel equivalent units) for a conversion project in NZ using sugar beet show a yield ratio of 1.6 but when lost farm production is considered the yield becomes negative at 0.9. Even assuming Jerusalem Artichoke is considerably more efficient, the net yield of 5.6 quoted in the report (table 6) is vastly different to Odum's. Without knowing the details of the methods and assumptions used, I suspect that not all the indirect inputs have been considered and that conversion ratios to equate energy inputs of differing 'qualities' have not been used. Although the figures in Table 6 may be useful for some comparisons of different biomass options the issue of net energy yield is simply not academic.

Despite reservations about the energy efficiency of liquid fuel production from biomass and the environmental impact of large scale fuel crop production, I am very interested in the potential for integrated systems providing solid and liquid fuels among other products. I commend the V.S.E.C. for its contribution in this important field and look forwards to further contact.

Yours faithfully,

David Holmgren.