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### Enquiry into Scotland's Energy Supplies

I have long been interested in this subject. Although not in a technical post in my later working life, I started off in an electrical business and have never stopped "pottering" in electrical matters. Perhaps not the strongest recommendation for a possible helper in a high level enquiry, but my later years experience, where lateral thinking has always been my forte, have helped me see some of the basic weaknesses in the present arrangements which require attention before we get round to the more mundane subject of "which fuel to use."

I would greatly love to be able to feed my views into your study and I hope you may be so generous as to allow me an opportunity for this. I truly believe that I have many points which you will find novel, but, I am sure, useful. I am strongly of the opinion that we need to look at ways to improve the present systems by large-scale changes and I hope I may get the opportunity to explain them to you. Too often, nowadays, action is taken seeking to cure the symptoms, not the basic disease. I am sure you do not wish to go along that line!

I can write a short paper, or I could meet, at a suitable place, either your good self or one of your associates for a quick chat.

I look forward to hearing from you, hopefully, accepting my offer.

Yours sincerely

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PRELIMINARY CONSIDERATIONS REQUIRED BEFORE  
RE-PLANNING ELECTRICITY SUPPLY

## INTRODUCTION

There have been many reviews into a wide variety of subjects over recent years. Some have produced good ideas, which have been taken aboard, but many have fallen by the wayside, either because they spell out truths which the recipient doesn't want to hear, or because they have started their thinking from the current situation. In my view, the supply of electric energy is now made through systems which are now not the best and it is necessary to go back to the beginning and envisage a considerable change in the infra-structure.

## INFRA-STRUCTURE

There has been little change in the way in which electric power has been generated and distributed for many years. Production has been concentrated on (relatively) few major generating stations and the power distributed by means of the National Grid. There has been a case for this set-up, but many developments now cast serious doubt on whether this is the best arrangement. Also, we have maintained as standard 240volts Ac as the basic supply for this country and this is also well worth challenging in the light of many developments in recent times. Further, nuclear power has become a favourite and, despite many set-backs, there is still a powerful belief that it should form the basis of future plans. Other possible views are outlined in the following paragraphs.

(a) The Grid. With its content of electricity at some 130,000 volts, we have long accepted this as being a good way to transfer power in a very flexible way. But against the advantage of flexibility there are many disadvantages :-

Expensive. The pylons and lines are massively expensive;

Inefficient. They absorb a high proportion of the power they aim to transport;

Intrusive. They are ugly and are certainly worse than an occasional groups of wind turbines, which currently get violent opposition because they despoil beauty spots;

Vulnerable. They are eminently vulnerable to wind and weather damage, more so in this age where terrorism cannot ever be ruled out;

Radiation. Although it has never been proved, there is still widespread suspicion that there is an adverse effect on children from power lines which are too near occupied houses. Yet more research has been put in hand recently.

(b) Voltage. Britain is one of only a few countries which adheres to 240 volts. Are we satisfied that this is still the best given that most electrical devices now transform it to a lower level. Changing to a lower level would have significant and beneficial repercussions for the entire industry.

(c) AC/DC. We have become accustomed to regarding Alternating Current as the essential supply type. Is this still the case? Given the massive steps achieved in the design and storage capacity of batteries, we should look at the possibilities of DC

being used for some of our supply. This would be the obvious means of overcoming the weakness of some of the "green" methods which are not continuous;

(d) Nuclear Power. Since it was first introduced in the wake of massively costly research, many of the weaknesses of this method have been revealed. The explosion at Chernobyl with its long-lasting effects and the near crisis at Three-Mile Island show how vulnerable it is to accident and hence, terrorism. The problems of disposal of nuclear waste have not been solved. The immense cost of decommissioning has now been recognised and the commercial interests running our present stations have needed serious Government aid in order to keep going. To consider further use of this fuel means committing a huge amount of our future wealth, along with assuming problems which have not yet, and might never be, solved.

There are sufficient points in the above to support searching research to the present arrangements. It is felt that detailed study will support a case to make changes.

## CHANGES TO CONSIDER

After considering and evaluating the effects of the foregoing, we will then be in a position to consider some alternatives. Thoughts might then be directed to three main constituents, Systems, Fuels and Waste.

**Systems.** There would seem to be considerable advantage in pondering the network as it existed some years ago, viz with many local sources of power. Transmission costs were significantly less; the high voltages needed for the Grid were unnecessary; supply could better be adjusted to local needs; advantage could be taken, in some cases, of a local fuel, eg fast-flowing water, persisting wind conditions, or, and this is the most exciting, household and industrial waste. It was also common for groups of local stations to have an interlink so that each could support another in times of exceptional load.

**Fuels.** All the talk tends to be about wind and wave power, but there are certainly other possibilities which must be considered.

(a) Hydro-power. In the Fifties, a huge effort was put in to take advantage of the extensive water supplies in Scotland. Sadly, the next government did not favour this and the programme fizzled out, before completion. What is the position now?

(i) There are still lochs, not yet used, which could provide this form of power.

(ii) It is reasonably possible that existing hydro schemes could give increased output, either by installing bigger generators or by installing second generators in the water outlet after the existing primary machine. Or it may also be found possible to re-use the water as in the Loch Sloy scheme, where the power generated in the night period is used to pump water back to the primary loch. There could be astonishing results from examining, with an open mind, the existing schemes.

(iii) There are strong water flows, natural and man-made, not yet used. If we are to provide more local generation, then quite small streams could provide power to smaller communities. And in the upper reaches of larger, constantly-flowing rivers, large-bladed wheels could also drive generators to service smaller areas.

(iv) And what about man-made flows? The main water-pipes serving our large cities pass a huge amount of water per hour. There seems no reason why this could not pass through generators, perhaps more than once.

(b) Wind Power. We are all familiar with the large windmills which are now used quite widely. However they are not always accepted because they intrude into the scenery. Why has no-one designed a different format<sup>9</sup> With so much design talent about, there must be some ideas for producing a machine which looks good, or does not obtrude as do the present brood. At one time, windmills were regarded as attractive additions to the rural scene . Why not now?

(c) Wave Power. This looks attractive and research should continue on this possibility with some urgency.

(d) Incinerators. An exciting prospect is the cleaning of the effluence from incinerators of waste material. This clearly puts them well above Land-fill as the best way of disposing of this ever-growing problem. For some reason, there has been little advance in this direction and land-fill continues to destroy huge valuable resources, yet the heat they produce could also become the ideal fuel providers for the generation of electricity. With these located reasonably locally, they would serve both purposes admirably. I understand that a generator of this type is already in operation and I know of a factory which has managed to fuel its boilers with used tyres without any adverse public reaction. There is thus great scope for pursuing this method of providing the heat to create electricity. The research could equally look at the possible use of the all-too-easily-discarded resource, coal the technology for "clean" burning of which is at an advanced stage

(e) AC/DC Under the heading of Fuel, we could also think of the possibility of using DC as a twin or secondary supply to houses and some business premises. As mentioned above, supply from eg an individual windmill, could be stored and used later. There may even be a means of transferring surplus from one building to others. At low voltages it will be quite safe.

2.3 **Waste (of energy).** At present, the electricity industry pumps out huge amounts of heat into, either the atmosphere or the sea, as part of the cooling process for their operation. From time to time, there has been mention of using this asset for a district heating scheme, but few, if any, have been installed. There are often good reasons why such use of the heat is not possible, but lack of enthusiasm is more likely the reason why such ideas have not been pursued.

There are, however, other good ideas for using such heat. We spend a great deal of foreign currency importing fruit, vegetables and flowers. These are mostly grown in greenhouses, in some cases with government subsidy. Scotland was once a land of greenhouses, especially for tomatoes — "Scotch" tomatoes were rightly considered the best, with a taste rarely encountered now — but these days are long gone as fuel costs soared and foreign supplies became cheaper. However, if the "waste" heat from electricity plants were used to service greenhouses, the position could be massively altered. This is an area which should be given high

priority in the researching of changes to the industry, given that it could also have significant effect on the Nation's Balance of Payments. In the process, it is likely that other positive uses could be found for this valuable unused commodity.

#### SUMMARY.

I am recommending that the study should commence with a critical review of the present system. I believe that there are major defects, which can be overcome by lateral, or "joined-up" (as Tony Blair once called it) thinking. This achieved, we can look forward to a secure future for this essential industry as it takes on "green" credentials more widely than at present.