

# TOWARDS SURVIVAL

&

Information for Survival Digest

**NOVEMBER 1973**

**17**

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Ring in the New

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Oil Shortages and Transport

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Nuclear Fusion

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The Man/Food Equation

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*plus* Motorway Supplement

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Editorial 1

## Articles

Ring Out the Old—Ring in the New 2

*Margaret Laws Smith*

The Effects of Oil Shortages on Transport 4

*B. W. Loveless*

Nuclear Fusion and its Prospects *Keith Hudson* 8

The Man/Food Equation *Val Stevens* 13

## Information for Survival Digest

Highland Front *Roy Bridger* 20

Poetry 22

Correspondence 22

Reviews 24

Announcements 27

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TOWARDS SURVIVAL

## Editorial

At the time of writing the latest Arab-Israel war is in its eighth day and a drama of unpredictable consequences is unfolding.

It is prosaic that our glistening civilisation is based upon oil—the product of rotted vegetation. Our advanced technologies and standard of living depend predominantly on ancient compost heaps under the ground. Unfortunately these deposits are not uniformly distributed over the face of the globe. Western Europe and Japan are already heavily dependent on those found in the Middle East and the United States soon will be as her own resources run out.

Almost as soon as the conflict started Iraq nationalised two more Western-owned oil companies and Saudi Arabia threatened through diplomatic channels to reduce exports to the United States from 8.5 million barrels of oil a day to 7 million barrels. Already Western Europe is embarrassed by a shortfall of 1.5 million barrels a day because the pipeline through Syria and Lebanon has been turned off or blown up.

Although the level of supplies which obtained nine days ago may be restored after the war is over, there is every reason to expect that the Middle East exports from now onwards will not match the rising demands of the advanced nations. The Arabs and the rest of the OPEC countries will be observing long term conservation policies for their own future.

It is therefore quite amazing that the press is talking of this war almost exclusively as a political and military crisis. For the West it could also be the beginning of an economic crisis.

Another notable event of the past month was the controversial speech by Lord Rothschild at the Letcombe Agricultural Laboratory. Afterwards he was carpeted by the Head of the Civil Service, the Secretary to the Cabinet and, if that were not enough, by the Prime Minister the next day. As Head of the Central Policy Review Staff, the “think tank” (and nominally *not* part of the Civil Service), Lord Rothschild is well aware of the energy situation in this country because they studied it at length last year. His strictures about the folly of grandiose projects such as the EEC, Concorde, Maplin airport and the Chunnel, must therefore be given great respect. Later he had to deny that he was talking about any particular items, but there was little doubt that they were not a hundred miles from the forefront of his mind when he delivered his speech.

World events are moving very quickly indeed and we appear to be reaching the end of the era of growth too soon for most politicians and economists to adjust to comfortably—or even understand. As in all major crises in history we cannot wait for the official experts to diagnose the problems for us. While thanking Lord Rothschild for his candour, a rare event these days, it is very much up to us to work as diligently and efficiently as possible through all the available constitutional channels for the steady-state society. Our grandchildren may yet thank us for our efforts and that will be a high honour.

## Ring Out the Old—Ring in the New

Margaret Laws Smith

The change from a stapled collection of duplicated sheets to print is as significant in the life of a magazine as is the death of one king and the crowning of another in the life of a monarchy. *Towards Survival* is dead: Long live *Towards Survival*. A new year, a new reign, is marked journalistically by a summing up of the achievements of the past as a prelude to expectations about the future, and so far as our theories of survival are concerned this is what we are attempting here.

Organisation for survival is not simply a rational/intellectual problem or an historical one, but a combination of both. We have to use our minds to work out what changes must take place in our economic system if we are to base it on policies of conservation of scarce resources, but we do not believe that nationally we can develop the will to put these policies into effect in a growth situation. Growth continues to produce a constant increase in material prosperity whose effects are too insidious. Against our insights and against our intelligent forecasts or understanding of forecasts it produces a lulling feeling of security; of security which pads us round with food and warmth and the prospects of better jobs or higher earnings.

Therefore we expect that the demand for policies of reversal from growth to conservation will come when the shortages of fuels, foods and metals begin to bite into our lives, and we begin to feel in our bones, not just to understand with our minds, that we are facing the beginnings of a crisis which will go on developing until it threatens our own lives and the prospects of human survival. With the fuel crisis looming up in any issue of the daily press this is just beginning to begin now.

\* \* \*

From the end of the Middle Ages, from the Peasants' Revolt and the jingle "When Adam delved and Eve span who was then the gentleman?", the right of some groups to high incomes while others lived in poverty and died from it has been questioned. Questioned first on the ground that the earth and its fertility was the common possession of all men, and later on that the wealth resulting from the complex of trade and the subdivision of labour was the common product of all those contributing to it in which it was the right of all men to share. All forms of socialist thought, including communism and syndicalism, have been suggestions for giving practical realisation to this sense of right. The English socialism of the Labour Party, stemming equally from the passion of Keir Hardie and the thinking of the Webbs and the Fabians, has resolved itself into a program of nationalisation.

Since the early nineteenth century the prospects of technology have suggested that more and more goods could be produced in an ever increasing abundance, and thus the idea of socialism became more and more that of a promised land of plenty. Abundance for all was possible. It was only necessary to develop the will to achieve it by revolution, by syndicalist industrial take overs or by nationalisation by parliamentary democracy and it could be realised.

The idea that socialism will come on a rising tide of abundance is something that now has to go, but the basic necessities of survival will emphasize the truth of the case for common ownership in a way it has never been felt before. As food and agricultural resources become scarcer and scarcer in relation to need our common dependence on the limited extent of the cultivatable lands of the earth's surface will become more and more evident. As fuels and minerals which are the basis of our technology become scarce our common dependence on a basic skeleton of technology to keep society going will be seen. The facts of life will compel the universal recognition of the common principles which socialists in their different theoretical manifestations over succeeding centuries have seen to be true.

The prospects of the severe fuel shortage which lie ahead (see the *Supplement* to this issue) present us with the probability of a crisis emerging on two fronts. On the one hand there will be the economic crisis of high unemployment and declining profits arising from the running down of the car industry and of the plastics and chemical industries which depend on oil as their raw material. On the other, arising simultaneously from the same cause, there will be a social crisis involved in maintaining the pattern of life which has developed with motor transport over the past forty years. This has seen the spread of large populations from town centres into suburbs far from their work; super market shopping; the concentration of children in large schools to which they are brought by buses and the concentration of clinics, hospitals and other social services in large centres.

To prevent the economic crisis with great unemployment reverberating through society in a downward spiral we shall need to maintain the incomes of the unemployed at something like their level when employed. This will enable them to maintain their demand for goods not affected by shortages, or not so much affected by shortages, and will prevent the spread of unemployment to these industries. It will also ensure that those unemployed not from their own fault but from the inevitable drying up of some natural resources will still keep their pull over the production of goods for which resources are not scarce or not so scarce. If this is not done all production will be directed to the needs of those still in jobs, still receiving incomes from office and ownership, and the unemployed will drop out.

The social crisis demands plans which will provide jobs to create a new pattern of living for the age of scarcity. Plans to redevelop

derelict industrial land to provide housing without taking land from agriculture; to reorganise water supplies to reduce dependence on energy for pumping; to de-centralise some social services, and so on. We have to have plans for work to provide the incomes which will have to be paid to maintain a bearable degree of economic stability.

The institution of a stable level of total demand is the buttress against economic crisis but it is also—and this is where it is important for committed conservationists—the monetary framework within which the steady state economy, wherein scarce resources can be conserved, can be constructed. Thus the measures necessary to deal with the crisis which will result from the impingement of scarcity upon growth can be the basis of the survival economy which must succeed the growth economy.

A steady state means the absolute end of the creation of new equipment. In this journal we have always spoken of a stable economy in which it is not absolutely abolished but much slowed down and controlled. We have shown at various times that interest depends on the expansion of the economy and that in stable conditions it would come to an end as profits tended to fall to the point where they covered the wages of management only.

The way forward into a survival economy is to recognise that unearned incomes either from the ownership of capital or of land are no longer possible. The attempt to preserve them will perpetuate a privileged class whose demands will weigh more and more heavily on the mass of us as the scarcity of resources causes an increasing need to cut back total production.

## The Effects of Oil Shortages on Transport

B. W. Loveless

It is against the background of a critical world shortage of oil (see the *Supplement* to this issue) that a sudden change has occurred from a buyer's to a seller's market. Threats of large price increases and actual shortages of petroleum are emerging. At present oil is still an extremely cheap fuel, cheaper than coal and nuclear energy, but as supply falls short of demand, even if only by a few per cent, the price is likely to rocket. As the major function for which oil is used is for transport it is in this field that economies can best be made. In the 1950s and 60s oil was so cheap that the fuel consumed was only a minor factor in transport costs and the major part of the expense of running trains, lorries, buses, planes and most cars was composed of capital depreciation, labour and tax. Consequently, modes of transport which used fuel efficiently had little economic advantage over those which used it extravagantly. However, this situation is now beginning to change.

It is therefore worth discussing the relative efficiencies of fuel utilisation of the two principal forms of freight transport, rail and road, and of the three modes of passenger transport, rail, road and air. It is also relevant to consider the extent to which these transport systems can continue to operate in the absence of oil.

### Freight Transport

When a wheeled vehicle moves over a level surface, either road or railway, it is subject to retarding forces. Hence energy must be provided continuously to maintain a steady speed, the amount of energy required being proportional to the magnitude of the resistance. At the speeds at which lorries and freight trains normally operate the most important retarding force that must be overcome is known as the *rolling resistance*. This is a function of the fundamental mechanical characteristics of the materials constituting the wheels of the vehicle and the surface of the track or road. The rolling resistance of steel wheel on steel rail is far lower than that of rubber tyre on asphalt or concrete<sup>1</sup>, and so considerably less energy is required to move the same load by rail than by road. In practical terms the efficiency of fuel utilisation for transport is measured in payload ton-miles per gallon of fuel: the greater the ton-mileage, the more efficiently is the fuel being used.

The largest (32 ton) and most efficient type of lorry, travelling at about 40 mph under normal driving conditions gives less than 150 payload ton-miles per gallon of diesel oil<sup>2</sup>; but a diesel hauled train moving at the same speed gives over 450 payload ton-miles per gallon<sup>3</sup>. So less than a third of the amount of fuel needed to haul a given load by lorry would be consumed if instead it were transported by train. The recent studies by Hirst and Moyers suggest that under actual operating conditions (taking into account the fact that many lorries and railway wagons travel only partly loaded and in some cases completely empty in one direction) the relative energy consumption is even more in favour of the railways. On average less than a quarter of the energy used for moving one ton mile by road is required than when the freight is carried by rail, as shown in the following Table:

Table 1  
Energy consumed for intercity transport

Mode	Energy (Btu/ton-mile)
Pipeline	450
Railway	670
Waterway	680
Truck	2,800
Airplane	42,000

(From "Efficiency of Energy Use in the United States", Hirst, E. & Moyes, J. C., *Science*, 30 March 1973, pp 1299-1300)

Also, rail transport can be easily electrified, whereas the electric lorry has not yet been developed beyond the milk float stage. As oil is depleted the ability to make use of electric power will become of paramount importance, since the energy sources of the future—fusion, fission, solar and geothermal power—will all be utilised in stationary plants which transmit their power as electricity.

### Passenger Transport

A large modern airliner such as the Tri-Star seats 400 passengers, flies at about 600 mph, and consumes approximately 2,000 gallons of fuel per hour, producing 120 passenger-miles per gallon. A five seater car giving an optimistic 30 miles per gallon produces 150 passenger-miles per gallon of petrol. In contrast, a bus, having a much lower proportion of deadweight per passenger than the car, can give up to 700 passenger miles per gallon<sup>3</sup>; and under favourable conditions a train can give 1,400 passenger-miles per gallon of fuel<sup>14</sup>—nine times more than the private car.

Unfortunately, estimating the actual energy efficiency of passenger transport under practical conditions is fraught with far more difficulties than for freight transport. For example, few cars carry their full capacity of passengers; many travel with only one occupant, thereby producing the abysmal energy utilisation of 30 passenger-miles per gallon. Also it makes a certain amount of difference whether one takes as being typical of their respective modes of transport the slow, crowded suburban train or the more rapid and spacious intercity express, the double decker bus or the long distance luxury coach, the jumbo jet or the incredibly wasteful Concorde.

Nevertheless it is apparent that transporting people by train and bus uses only a fraction of the fuel required by plane and car. Furthermore, both trains and buses (on a local scale) can be electrified.

### Action

In order to avert the unpleasant effects of a sudden withdrawal of oil from our addicted transport system a start should be made soon on the task of reversing the proliferation of fuel-squandering modes of transport which occurred during the petroleum-besotted 50s and 60s. Both freight and passengers must be transferred to efficient forms of transport wherever practicable. However, whenever any suggestion is made of a transfer of freight from road to rail, the powerful road haulage lobby produces figures to 'prove' that such a course of action is either impossible or would not produce any significant changes. A classic example of this occurred during the recent Commons debate on railways when Mr. Peyton, Minister for Transport Industries, stated that "a 50 per cent increase in rail freight would only reduce total road traffic by 2 per cent and would reduce goods traffic on the roads by less than 8 per cent".

Transport 2000 has shown that these figures are extremely misleading<sup>6</sup>, since of the total 1,735 million tons moved by road in 1971, the major proportion travelled only a short distance. A more realistic measure of traffic than simple tonnage is given by ton-mileage, in which case the figures look considerably different; the 200 million tons which moved over distances greater than 50 miles accounted for 40 per cent of the total road traffic in terms of ton-miles.

In 1972 the railways moved some 95 million tons of freight more than 50 miles. Therefore, if railway carryings over 50 miles were increased by 50 per cent up to 142 million tons per year, the heavy long distance road traffic (which is the most wasteful of fuel and damaging to the environment and human life) would be reduced by 24 per cent. In fact, the railways are so underutilised that they could accommodate far more than a 50 per cent increase in freight, so the savings in fuel consumption could be quite considerable.

A programme to encourage the development of more efficient freight transport might include the following provisions:

(a) No further rail closures. Structures of abandoned lines and disused goods yards to be retained until required again.

(b) Taxation of lorries to make them pay for the damage that they cause; for example, the wear and tear on road surfaces as the fourth power of the axle-load, and 40 per cent of all car occupant deaths are caused by collision with lorries, even though lorries constitute less than 10 per cent of all road vehicles<sup>7</sup>.

(c) Main line electrification to be extended.

(d) The re-equipment of the railways with modern wagons and freight handling facilities, especially for numerous small, local, automatically operated road-rail interchanges<sup>8</sup>.

(e) Generous grants to firms for installation of private sidings and purchase or lease of wagons.

Substantial fuel savings are also possible in the field of passenger transport. Current moves by several cities to give priority to buses over cars are certainly a step in the right direction. But services should be extended and made more frequent, and experiments in free bus travel could be tried. The re-introduction of electric trolley buses might be given serious consideration for heavily used routes. The provision of reserved cycle ways, totally separated from motorised traffic, would also be very useful.

For longer distances, steps should be taken to encourage the use of intercity trains by extending services, increasing frequencies and holding down the price of fares by government subsidy if necessary. Preparations should be made soon for the huge sudden increase in numbers of long distance rail passengers which will occur when the cost of a car journey approaches that of rail travel; for individuals travelling alone the critical point will come when the price of a gallon of petrol rises to 50 or 60p in present days terms, and this could occur within five years.

Construction of the Channel Tunnel should be given priority since high speed electric trains running between major British and European cities will be able to replace short distance air journeys. Facilities for uninterrupted rail freight hauls may also encourage hauliers to transfer goods from the roads.

### Individual Action

At the level of local passenger transport the individual can do a great deal to encourage efficient use of energy by campaigning for the expansion of bus and local rail services, the removal of cars from city centres, the provision of reserved cycle ways, and so on. But in the matter of promoting a far sighted national freight and passenger transport policy, large scale co-ordination of effort is needed, especially to counteract the anti-rail propaganda disseminated by the wealthy road haulage barons whose vested interests exert great pressure behind the scenes and influence policies at the highest levels of government.

Two small, though increasingly active, groups exist to publicise the case for rail transport<sup>9</sup>. Their membership fees are moderate and their publications will be of great interest to anyone concerned with establishing a rational policy.

#### References:

1. Kempe's *Engineers' Year Book* 1971, pp 31 and 1079
2. *Commercial Motor*, 13 July 1973, p 41.
3. Mr. A. Tayler, Sulzer Bros. Ltd., Personal communication.
4. *Information for Survival*, Number 4 p. 10.
5. *Getting the best from British Rail*, p. 2 (*Transport 2000*).
6. *Facts on Freight (Transport 2000)*.
7. *British Medical Journal*, 13 January 1973, p. 67.
8. See *New Scientist*, 30 August 1973, p. 505.
9. *Railway Inigation Society* (Membership Sec. Mr. D. J. Bradbury, 59 Dore Road, Dore, Sheffield); *Railway Development Association* (Hon. Sec. Mr. I. G. Crighton, 19 Oakdale Avenue, Kenton, Harrow.)

## Nuclear Fusion & Its Prospects

Keith Hudson

Energy was first obtained from fusion in November 1952 when the first hydrogen bomb was exploded on the Pacific island of Elugelab. In less than a second the fireball grew to a diameter of three miles, the island disappeared and a crater a mile wide and two miles deep was produced. This was an awesome demonstration of fusion power. Since then intense efforts have been made in the United States, the Soviet Union and this country to find a controlled method of releasing such energy.

Nowadays controlled thermonuclear fusion is frequently advanced by technological optimists as the answer to the looming energy crisis. This is highly unlikely. Even if the process proves feasible it is probable that the first fully operational fusion reactor will not be available until after the turn of the century.

### Fusion and Fission

Fusion must not be confused with fission. All the present nuclear power stations, whether breeders or non-breeders, are *fission* reactors—that is, the energy output is gained from the splitting of very heavy fissile atomic nuclei such as uranium-235. In splitting into smaller nuclei a small amount of mass is lost and this appears as radiation and heat as described by Einstein's formula  $E = mc^2$  ( $E$  = energy,  $m$  = mass,  $c$  = the velocity of light). The heat is taken from the core by circulating liquids or gases to drive conventional steam turbines supplying electricity to the grid.

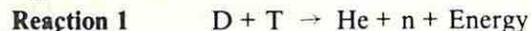
On the other hand a *fusion* reactor is hoped to work on the principle that energy is released from the slight mass lost when very light atomic nuclei are *built up* into larger units. Many reactions have been suggested and almost all involve deuterium and tritium.

Both deuterium (D) and tritium (T) are the heavier isotopes of ordinary hydrogen (H) and contain two and three neutrons respectively in their central nuclei instead of the usual single one. However, because all three isotopes contain one electron each in orbit, they are chemically identical. For this reason they can all form water when combined with oxygen—ordinary water ( $H_2O$ ), heavy water ( $D_2O$ ) and tritiated water ( $T_2O$ ). Tritiated water is not usually found in nature because the tritium nucleus is radioactive and unstable, having a half-life of only 12.34 years. Heavy water is stable, however, and one such molecule is found in every 6,500 ordinary water molecules—in the atmosphere, in rivers and in the oceans.

### Fusion Reactions and Resource Lifetimes

Of the many possible fusion reactions proposed two are considered particularly hopeful. They are the deuterium-tritium reaction and the deuterium-deuterium reaction.

In the *deuterium-tritium* reaction the nuclei combine to form a heavier helium nucleus (He), a neutron (n) and a large amount of energy from a small mass loss:



The deuterium for **Reaction 1** can be obtained by electrolysis of ordinary sea or river water and by subsequent separation of deuterium gas from hydrogen gas. Although heavy water is only slightly heavier than ordinary water, deuterium gas is twice as heavy as hydrogen and physical separation is relatively simple by various methods. Tritium, however, as already stated, is not found in nature and it is envisaged that sufficient can be formed by means of bombarding the nucleus of a light metal called lithium-6 with neutrons obtained from **Reaction 1**:

**Reaction 2**  $\text{Li} + \text{n} \rightarrow \text{He} + \text{T} + \text{Energy}$ 

Besides yielding the required tritium this reaction also involves a slight mass loss and thus considerable energy is released.

The overall deuterium-tritium process therefore depends on there being sufficient resources of deuterium and lithium-6. Lithium is the limiting resource because deuterium is found everywhere where there is water. Lithium-6 is a 7.4 per cent fraction of ordinary lithium (Li-7) and is found in ore bodies of lithium oxide mainly in the United States, Canada and Rhodesia.<sup>1</sup>

Interestingly, lithium may also be recoverable from the tipplings from Cornish china clay workings.<sup>2</sup> It may also be able to be recovered from the sea.

In the *deuterium-deuterium* fusion process five nuclei coalesce into helium nuclei, together with a hydrogen nucleus and two neutrons. The overall reaction results in a slight nuclear mass loss once again and thus releases copious amounts of energy:

**Reaction 3**  $5\text{D} \rightarrow 2\text{He} + \text{H} + \text{Energy}$ 

The resource lifetimes for fusion technology therefore depend on which process is being considered. The following figures are taken from Gough and Eastland<sup>3</sup>.

Process	Resource Estimates	
	Life expectancy or reserves (years) at:	
	0.17Q (1968 world energy consumption) and 2.8Q	
<b>Deuterium-Tritium</b>		
Lithium-6 from land	48,000+	2,900+
Lithium-6 from oceans	120,000,000	7,000,000
<b>Deuterium-Deuterium</b>		
Deuterium from oceans	45,000,000,000	2,700,000,000

These enormous reserve longevities illustrate the immense attraction of fusion technology for scientists, governments and scenario-makers.

**The Development of Fusion Energy**

The easiest process to initiate is considered to be the deuterium-tritium process but even this requires an ignition temperature of about 100 million°C. This is easy enough to supply for a hydrogen bomb because all one needs to do is to explode a smaller fission bomb, but in the case of controlled fusion it is a different matter. The principal approach hitherto has been to devise means by which a low density plasma (nuclei, or atoms stripped of electrons) can be held in the centre of a vacuum vessel, to heat it to the temperature necessary and to prevent the plasma escaping through the walls of the vessel, as it is wont to do. The objective sought is to exceed what is known as the *Lawson Criterion*. This is a product of density and time ( $10^{14}$  secs/cc) and means that the plasma must be concentrated for a

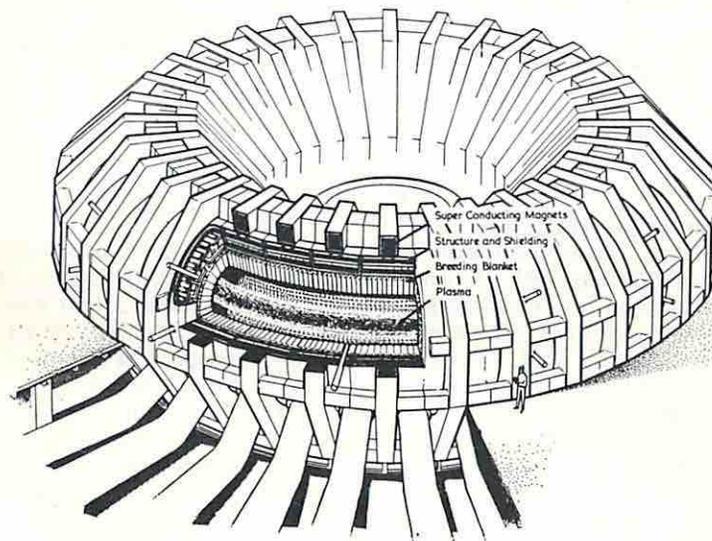
long enough period. If Lawson's Criterion can be reached then the initiating temperature can be obtained for long enough for fusion to proceed.

This has not proved possible so far. Although both the requisite ignition temperature and adequate confinement times have been reached, this has only been so in different experimental reactors designed to maximise one goal or the other. Both have not been reached at once in the same apparatus and the best combined result has fallen short of Lawson's Criterion by a factor of 100.

Controlled fusion research in the last twenty years has involved a variety of reactors of which the most promising have been the Russian *Tokamak*, the British *Zeta* developed at Harwell and the *Stellarator* from the United States. The main differences between these lie in the shape of the vacuum vessel and in the pattern of the externally wound magnetic coils which are needed to "pinch" the plasma into the centre of the vessel.

**An Idealised Reactor**

The consensus of scientific opinion points to a toroidal, or tyre-shaped, reactor and the illustration below gives an idealised picture of what it might look like:



General view, in part section, of a conceptual 2500 MW(e) toroidal fusion reactor constructed in 32 segments

Such a design contains some fundamental engineering dilemmas. The breeding blanket contains liquid lithium at its melting points of about 1,000°C while the powerful super-conducting helium-cooled magnets, only 6½ feet away, must be maintained at about -270°C. Exceptionally effective insulation must therefore be devel-

oped. Another difficulty is whether a material can be found which can be used for the surface of the blanket that faces the plasma. This material would have to be very thin in order to allow the lithium to take up the plasma heat efficiently, but also robust enough to stand up to the most intensive bombardment of neutrons from the plasma. These neutrons, of course, are necessary to produce the tritium according to **Reaction 2**.

#### Future Research

Before even a prototype electricity-producing deuterium-tritium reactor can be built a range of very difficult problems have to be overcome. The director of one of the leading research centres in the world, Culham laboratory, considers that there are three distinct steps involved.<sup>2</sup>

(a) *Toroidal Reactor* Toroidal Reactors are being built in the US and USSR but more are needed in order to demonstrate plasma stability and reach Lawson's Criterion. Such an apparatus, called the Joint European Tokamak and hopefully capable of producing 100 million°C and confinements of 1 second or more, is now being discussed between Culham and the European Atomic Energy Agency (Euratom).<sup>4</sup>

(b) *Fuelling* Assuming that the above is successful in due course, the second step is for further apparatus to study how to refuel an intensely hot plasma with relatively cold fuel—deuterium from outside the reactor and tritium from the lithium blanket. The injection of new fuel must be carried out without sensibly altering the plasma temperature or the process will be extinguished.

(c) *Electrical Generation* The last step is that of the extraction of the heat produced in order to generate electricity.

#### Will it be possible?

Because of the complexity of the experiments and the financial investments required, European countries are already having to co-operate in fusion research. Even the partial successes that have been achieved so far have been due to close liaison between scientists in the US, the USSR, Japan, Italy and this country. The pursuit of controlled fusion is, without doubt, the most difficult task that man has ever yet attempted. Even though some of the most brilliant minds in the world are engaged in this research it is impossible to forecast whether fusion will ever be successfully achieved. Success would appear to be at least decades away.

#### References:

1. Hubbert, M. King, "Energy Resources", essay in *Resources and Man*, National Academy of Sciences—National Research Council, US (W. H. Freeman and Company, 1969).
2. Pease, R. S., "Culham Laboratory", *Atom*, Number 200, June 1973.
3. Gough, William C. & Eastland, Bernard J., "The Prospects of Fusion Power", *Scientific American*, February, 1971.
4. Wright, Pearce, Science Report, *The Times*, 10 October 1973.

## The Man/Food Equation

Val Stevens

(A two-day symposium on the relation between world population and food resources and the individual and his diet, in health and disease, held at the Royal Institute, London, 20/21 September, 1973).

Some startling new angles came out of this symposium, creating even more difficulties in drawing any conclusion about whether we can balance the man/food equation. The work of Professor Sukatne and Dr. Narain of FAO purported to smash the idea of the world protein crisis. Professor Borgstrom passionately re-classified the underdeveloped countries as already 'overdeveloped' in terms of space, water, soil and forests. When several clinicians and biochemists had concluded their papers on diet-induced diseases in Western man, one wondered whether it was not marginally better to be a slightly undernourished African bushman! The output from the seas could be doubled only once more at best (Sidney Holt, FAO) and the Green Revolution was killing off its future starting material by ousting indigenous grains all over the world (Dr. Williams).

Expanding a little more on these topics the thinking now on protein requirements is that provided a man has *enough* to eat; that is about 2,200 calories per day, then he is most probably getting enough protein. Protein needs have been revised downwards and those derived from vegetables, grains and legumes are rated as perfectly adequate for health. Protein deficiency symptoms occur even when protein in the diet is adequate but when *calories* are lacking. In order to metabolise proteins, there must be a sufficiency of energy food. Thus the problem must be seen as a calorie-protein problem; they are not separable. Of course, that does not change the appalling problems of hunger and malnutrition in the Third World. It means that when we try to help we shouldn't simply think in terms of increasing available protein—that could be a huge waste of effort and investment.

In the light of this the papers dealing with methods of increasing protein by extraction from leaves, from residues of crops, from microbial action on hydrocarbons, and from total synthesis, seemed rather irrelevant. What were we worrying about protein for, if half the world had great excesses of it and the other half basically enough? However, the attraction of Dr. Worgan's methods of utilising every part of a crop is undeniable:

Pea plant → Peas (protein)  
 → Leaves (protein) → Spent juice (fungal protein)  
 → Fibre (fungal protein)

The total yield from one plant may be as much as ten-fold the traditional product. Against this we have to set the large energy inputs needed. The technical considerations also would tend to preclude such developments in those parts of the world where extra food is most needed. Additionally, this 'mining of the soil' is complete when no plant residues are returned.

The only woman speaker, Erica Wheeler, a nutritionist, pointed out that our knowledge of man's nutritional needs is pathetically thin. Much is based on measuring what healthy people normally eat! She criticised the Green Revolution which, while it produced larger total amounts of food, led to social displacement, resulting in increasing numbers of economically disadvantaged people actually having less to eat.

Her point was emphasised by Professor Crawford, a biochemist, who deplored the fact that factors of intelligence and longevity were left out of calculations for nutritional requirements. What we have in the West, with all our technical expertise, is a "civilisation being undermined by degenerative disease". The question of lipids was neglected, yet linoleic and linolenic acid (unsaturated fats in leaf and seed protein) were essential, especially to brain development. Intensive methods of meat production produced flesh with up to three times the amount of saturated fat within the meat fibre, compared to range beasts. Not content with undermining our own health we are already persuading Third World people to follow suit. We inundate them with massive sales and promotions of such commodities as Coca-Cola and substitutes for breast milk. There is also the promise of unnecessary synthetic protein.

The point about Western diets was further driven home by Ben Rheingold from the US and by Dr. Painter (our MRC) and Professor Burkitt, who argued the case for more fibre in our diet. Our appalling incidence of appendicitis, diverticular disease and cancer of the large intestine was unknown where traditional diets were eaten, in say, Africa, and could largely be avoided by eating wholemeal bread or adding bran to food. Burkitt's exposition was a superb bit of showmanship, and the symposium almost finished on a hilarious note with the screening of colour-slides of different kinds of faeces!

At this point we all seemed to have become pre-occupied with reforming our own diet, and had forgotten the starving millions. It took another passionate speech from Borgstrom to bring us back to the central theme. He stressed that there must be more technological help in storage of food, both to minimise wastage and destruction and to form food banks to insure against periodic crises due to weather.

As at Stockholm, the problems all ended up as political problems (given an ongoing programme to check population growth, which had to be presumed as a pre-requisite for any long term balance of the equation). Thus, the potentials for increasing yields, synthesising protein, supplementing diets, were all there, but until gross inequalities in income and purchasing power between nations and

between people within a nation were removed, then these potentials would be irrelevant. Until there is social justice there will be starving people.

And so the symposium drew to a close, with the situation somehow less critical, but more hopeless. All is possible, but at what cost in investment? energy? health? social stability? I think I agree with Arthur Bourne (Symposium chairman) that "the equation may be starting to run backwards". If I understand him he means that our massive interference with the natural systems that make the upwards spiral for food-chasing-population possible, is likely to cause the spiral to turn downward. After all, the man/food equation always does balance—at the expense of many millions of starving people; if we make it balance at the expense of the myriad other organisms that 'compete' with man then that could be even worse for us in the long run.



# Information for Survival Digest

Editor: Dr. Kenneth E. Barlow

## SOCIAL ORGANISATION

### The Wicked Winkler

Winkle-picking has been banned on the seven mile stretch of the East Coast between Marshall Meadows and Cocklawburn, near Berwick. Dr. Ian Fraser, the area medical officer, said yesterday that tests had shown contamination and winkles should not be collected for human eating.

People collecting them, or having contaminated winkles for sale, could be committing an offence under the Food and Drugs Act. —

*The Scotsman*. 16.7.73  
Ref: 000,481.

### Who is punished?

In 1970, the working party on Sewage Disposal, chairman Mrs. Lena Jeger, MP, in their report "Taken for Granted" (HMSO) pointed out that of some 5,000 sewage treatment plants in Britain, upwards of 3,000 were discharging effluent inadequately treated, because the plants were either ageing to the point of senility, or inadequately maintained, or undermanned, or just simply overloaded.

The Rivers (Prevention of Pollution) Act 1961 takes a stern view of potentially harmful discharges to rivers, and lays down elaborate regulations for their control. The Act lays down, in section 12, elaborate regulations concerning the express permission of the "person making the discharge in question"; and such disclosure without permission, makes the offender—who is likely to be not a corporation but an individual—liable on summary conviction, not only to a fine of £100 but also to a prison sentence of three months.

Walt Patterson, *The Ecologist*,  
Vol. 3, No. March 1973.  
Ref: 000,325.

## FOOD AGRICULTURE, FISHERIES

### Peruvian Anchovies

The Humbolt Current in the ocean trench beside South America brings subantarctic water to the surface, where light reaches. Its richness springs from a constantly renewed supply of chemical

## TOWARDS SURVIVAL

nutrients, principally phosphates and nitrates. When the debris of dead marine plants and animals sink below the reach of light they are outside the range of photosynthesis. The upwelling Humbolt Current brings these nutrients to levels reached by light, where photosynthesis can occur. The sea plants are the base of an oceanic food chain. The anchovy is a species which has succeeded in capturing an exceedingly high proportion of the total energy available in the ecosystem. The bulk of the species has reached 15 to 20 million metric tons. Although one month after the time the anchovy larvae are hatched, more than 99 per cent of them have perished—a process that begins with billions of spawning fish, each casting 10,000 to 20,000 eggs, produces enormous quantities of larvae.

In the past few years the anchovy fishery has made Peru the world's leading fishmeal producing nation. Peru was harvesting at a rate of 10 million metric tons a year. The fishmeal made from the Peruvian catch is sold around the world to enrich feeds for farm animals and poultry. Fish oil goes into margarine, paint, lipstick and a score of other products.

Towards the end of April 1972, fishing suddenly faltered. By the end of June catches had dwindled to almost nothing, and at the close of 1972 season only 4.5 million tons of anchovies had been harvested. The catch this year threatens to be even poorer. Indeed, there is some reason to fear that the world's greatest stock of fish may have been irreversibly damaged.

C. P. Idyll, *Scientific American*,  
June '73, 228, 22.  
See also *Information for Survival*,  
No. 3, page 4.

### Fishery Resources

The living resources of the sea are limited, and do not hold the key to adequate nutrition of a growing human population. The "conventional" resources can yield more—perhaps twice as much as at present "Unconventional" resources—animals lower in the good pyramid—could be utilized when technical problems of harvesting and processing them economically have been solved. Meanwhile the growth rate of the world's fisheries—which for some years was faster than population growth—is slowing down, and twice in recent years has actually been lower than in the previous year. Existing fisheries are threatened in the short term by overfishing and in the longer term by pollution and by society's thirst for energy. Statistics showing the rapid growth of fisheries in the past obscure the continuous decline of "quality" as might be seen from the proportion of the catch which is for direct human consumption, rather than for reduction to fish oils and meals.

## TOWARDS SURVIVAL

The coastal zones where mariculture is feasible are just those areas most affected by urban and industrial development; and the two type of "development" may not be compatible.

Dr. S. J. Holt, UN Adviser to the International Ocean Institute at Symposium on *The Man/Food Equation*, September 1973.  
Ref: 000,534.

### Ceylon (Sri Lanka)

According to the UN statistical Yearbook, the population of Ceylon rose from 10.6 million in 1963 to 12.5 million in 1970. The density (people per square kilometre) is about a third greater than India.

In Ceylon there was drought in both 1971 and 1972. The rice crop this year is expected to be down by a quarter (270,000 tons instead of 350,000 tons). Normally Ceylon obtains a quarter of a million tons of rice from China, but China's production is expected to decline by 4 per cent this year due to failure of the rains.

Marketing problems arise out of competition between the state sponsored Paddy Marketing Board (paddy = unmilled rice) and private traders.

These problems apart, the Government is mobilising the people to grow more subsidiary foods to supplement the rice ration—which may be reduced if supplies fail. Farmers are cultivating vacant land with subsidiary food crops such as cassava, maize, millet, pulses, sweet potatoes, yams, soybeans, vegetables and fruit.

Impartial foreign observers are agreed that Ceylon's food production drive is a much bigger success than India's. They believe that if the present tempo and enthusiasm are maintained, the harsh effects of the famine which threatens this island will be mitigated.

*The Financial Times* 29.9.73, p. 29.  
Ref: 000,533.

### The World

World agricultural and food production fell by 2 per cent in 1972 compared with 3 and 4 per cent gains in 1971.

With a world population growth of 2 per cent, food and agricultural production per person dropped by 3 per cent.

Fishery production also fell by about 1 per cent.

Forest "production" (including forest depletion) increased by some 2 per cent. *The State of Food and Agriculture* 1973. FAO Rome.  
Ref: 000,513.

### World Cereals

In August the International Wheat Council was predicting a world deficit of 9 million tons of wheat—supplies of 57 million tons against needs of 66 million tons.

The Director General of the FAO, under article VI section 6 of the FAO constitution convened an urgent consultation of wheat exporting member countries. It met in Rome on September 20. Senior representatives of Argentina, Australia, Canada, France and the US attended, with others.

Whilst this was happening the International Wheat Council revised its predictions. It now set "potential wheat export availabilities" between 59 and 62 million tons, whilst placing "import requirements" at between 62 and 65 million tons.

Mr. Richard Bell, leader of the US delegation—asked to identify the countries where predictions of their wheat stocks had risen—replied "all of them with the exception of Argentina where the situation is murky".

The US Agriculture Secretary, Earl Butz estimated that world grain exports would just about equal import demands this year at prevailing prices.

Authoritative Conference sources stressed that, even if supply did meet demand, the developing countries were likely to face serious problems in paying for their wheat imports as prices had trebled in the year.

*The Financial Times* 20.9.73, p. 29, 21.9.73, p. 31.  
FAO Press Release 73/75 CO/16.

## URBANISATION

### Housing a generation

The Director of the UN Centre for Housing, Building & Planning, Mr. R. J. Crooks, records a global 'urban' population of 1,312 million at the present time. He has, apparently, done his sums. He is reported as saying that the world will need 2,000 cities each with a population of one million and another 1,200 homes by the end of the century; that is, in the next 27 years. He estimates that the 'urban' population will rise to 3,300 million by that time. He thus envisages at least a doubling of houses. This takes no account of maintenance and replacement.

Judy Hillman, *The Guardian* 5.6.73.  
Ref: 000,488.

### Limits to Growth

Planning, as in Great Britain, does not apply in the US where both state and city are left a local initiative. Communities seek their own solutions. While both population and affluence increase,

people in a favourable locality are seeking to limit their population and to 'close their gates'. Yet in the US, from now until 1985 over 27,000 new households will be established each week.

"At the polls last November, Boca Raton (Florida) voted a 'population cap'. This limits to 40,000 the number of dwelling units than can ever be built there. With an average of 2.5 people per unit, this would mean an ultimate ceiling of 100,000. After that total is reached, the city could deny any more housing construction permits".

The measure is criticised as exclusive. *The Christian Science Monitor* 25.V.73. Ref: 000,498.

### Second Homes

A survey from Wye College, London University, estimates the number of second homes in Great Britain, including caravans, between 300,000 and 350,000, increasing by 25,000 a year. By the end of the century there might be as many as a million.

Dartington Amenity Research Trust. CCP 65, 50p. Ref: 000,489.

### Botany Bay

Sydney rambles over 670 square miles and squeezes 2.7 million people into 368 separate suburbs. One fifth of the entire nation's population now lives within a 25-mile radius of Botany Bay. Oil spills, mining, erosion, and noise have led to the near destruction of the beaches. Two years ago a paper manufacturer was fined \$200 for discharging 3,700 gallons of effluent per minute into the Bay.

Near Sydney International Airport 15,000 cubic yards of refuse are in danger of breaking loose from a tip on the foreshore.

Six miles south of Sydney, the skies are darkened with industrial smoke, the horizon broken by armies of electrical transmission towers, the bay's basin reportedly covered with a foot of discharged pulp, the shore sand eroded so extensively that Kurnell Peninsula is in danger of becoming an island.

David Lamb. *The Guardian* p.11 4.8.73. Ref: 000,523.

## INDUSTRY

### Chemicals

For more than a decade chemical production has been advancing at an annual average rate of 9 per cent. On a per capita basis, chemical production has been moving up at about a 7 per cent average annual rate. This means that it has doubled in the past ten years. Most chemical production is centred in

four major economic areas. North America (US & Canada) accounts for almost 33 per cent of the world total, the USSR and Eastern Europe for a little over 20 per cent, Japan for about 8 per cent and the now nine-membered EEC for 24 per cent. Chemical sales are equivalent to 5 per cent of the gross world product.

The world's 50 largest basic chemical companies comprise 22 US; 11 Japanese; 5 West German; 4 UK; 2 each for Netherlands and France; 1 each for Belgium, Canada, Italy and Norway. ICI is the largest. Others among the first ten are Du Pont, Union Carbide and Monsanto (US); Hoechst, BASF and Bayer (West German); Montedison (Italy); Akzo (Netherlands); and Rhone-Poulenc (France). Many major oil companies make enough chemicals to be placed high on the list but are not included.

*Chemical & Engineering News* 16.4.73. Ref: 000,524.

### Chemicals & Oil

The Chemical industry's use of oil and gas probably represents less than 3 per cent of worldwide hydrocarbon consumption. Chemical makers have to compete for their hydrocarbon feedstocks with fuel users.

The Middle East holds 57 per cent of the world's crude oil reserves. At the rate they are being used today these reserves along would theoretically last more than 60 years. The USSR has about 12 per cent of world reserves and at today's rate of production they would last almost seventy years. Canada and the US share less than 9 per cent of total world reserves; at the rate they are operating today their reserves will be used up in 12 years.

Ref: 000,525.

### Fertiliser Shortage

Senator Hubert Humphrey forecasts a million-ton shortage of nitrogen and phosphate fertilisers.

In addition to world demand the shortage is caused by inadequate US production, the fuel shortage and delivery bottlenecks on the railways. Fertilisers are not the only petroleum by-product being hit by the energy crisis. The American plastics industry has reported serious and growing shortages of raw materials and predicted reduced output over the coming two years.

Peter Jenkins. *The Guardian* p.2. 12.9.73. Ref: 000,539.

### Economics of Recycling

There is no such thing in commerce as absolute worth; the value of a commodity only has meaning in terms of the tariff and tax structures which surround it.

Dr. I. B. P. Williamsom, speaking at a symposium on resources and recycling, recognised that many raw materials were becoming uncomfortably scarce whilst in their used form they were becoming uncomfortably plentiful. In many industries recycling, either of post consumer waste or of industrial waste, does not exist or is at best a fringe activity.

Technological improvements leading to reductions in recycling costs would not come quickly. Rising labour costs and new technologies could actually work against recycling.

There are factors, however, which could override all economic arguments. Recycling might become very much more attractive if political instabilities threatened the security of supply of important materials.

*The Guardian* p.7. 23.8.73. Ref: 000,526.

### The Cost of Waste

The total value of the raw materials thrown away annually in this country is estimated at £600 millions. It costs £22 million to dispose of this waste.

Shadow Minister of Environment. *The Guardian*, 11.9.73.

Ref: 000,538.

## METALS

### Lead in Petrol

"Organic lead" is an unusual and specially toxic combination of lead and hydrocarbon groups used almost exclusively as a petrol additive. Other conventional forms of lead ("inorganic lead") cannot be used because they will not dissolve in petrol. On combustion in the car engine, about 90 per cent of the organic lead in the petrol is converted into "inorganic lead" and most of this is puffed out from the exhaust to reinforce the numerous other sources (industrial emissions, paint, plumbing, food, food cans, etc.). Probably less than 1,000 tons of organic lead is emitted as such—although this is bad enough for a type of material seriously considered for use as a chemical warfare agent in World War Two.

High-octane petrol, not lead, is necessary for many cars to run without "pinking". Addition of lead is a sloppy but conventional way of raising the octane number of poor quality fuel and as such is a hallowed tradition for refinery managers. But there are many relatively innocuous techniques for preventing "knocking" without the use of lead, e.g. addition of alcohols or steam injection, and if the hydrocarbon feedstock is properly refined or "reformed" it is possible to produce high octane petrol without any additives whatever, and at an increased cost unlikely to exceed 1p a gal.

Prof. D. Bryce Smith. Letter to *The Guardian* 3.9.73. Ref: 000,527.

### Let the Carrier Beware!

A West German freighter loaded with 1,000 drums of deadly chrome acid poison sank in rough Baltic seas. Action taken: The skipper was charged with "deficient seamanship".

*East Anglian Daily Times* 1.10.73. Ref: 000,538.

### Mercury Poisoning in Iraq

Seed grain, treated with methyl mercury as a fungicide and intended for spring sowing, was distributed to rural areas throughout Iraq in the winter of 1971-2 after a year of poor harvests. By February 1972 mercury poisoning cases were entering hospitals at the rate of hundreds a week. Five hundred people died and more than 6,000 have been injured, many irreversibly. The cause was the diversion of seed grain into breadmaking and from the outset the Iraqi Government drew a veil over the progress of the 'incident'. It is known that when rural populations realised that the epidemic of insanity and death was caused by contaminated grain, the Iraqi Government ordered that anyone disposing of diverted grain in rivers or streams was to be summarily shot. The danger was that mercury, already affecting the rural population over a wide area, might enter the water system, coming back to the human population through a great variety of food chains.

Anthony Tucker. *The Guardian* p.24. 6.9.73.

Ref: 000,529.

### Mercury in Waterways

We now know something about how methyl mercurials enter our waterways and a little about their general behaviour once there. No demonstrably workable method for removing them has yet been proposed. The very fact that mercury adsorbed on sediments will produce toxic methyl mercurials for many years is likely to pose an increasing threat. It appears at the moment that whatever decontamination method is adopted—mechanical such as dredging; chemical such as ion exchange; or biological—it is likely to be far more expensive than simply preventing mercury from entering our waterways now.

Dr. Ronald J. Cross. *Chemistry & Industry*. 4.8.73. Ref: 000,530.

The combination of various factors comprising technological growth has resulted in a progressive increase in mercury in the sediments of Lake Windermere.

Aston, S. R., Bruty, D., Chester, R., Padgham, R. C. *Nature* Vol. 241. 16.2.73. Ref: 000,317.

## Highland Front

Roy Bridger



### Aftermath of the Juggernaut Act

Following the first of President Nixon's policy statements interpreting the global energy crisis as an American energy crisis, *The Scotsman* published an article "Why the Highlands must come to terms with oil" by the chairman of the Highlands and Islands Development Board, Sir Andrew Gilchrist. The gist of it was: "If America wants more oil, America will get it . . . domestic pressures could build up for us to get what we need by crash-programme extraction . . . instead of fighting in a dozen last ditches, we should meet our enemy on the way". As to environmental considerations, particularly on the west coast: "There is a tendency in certain environmental circles to assume that there is something inherently shameful and destructive in siting any development projects whatever on the west coast". And so on. And why not—had they not been given a mandate by Parliament to keep on developing regardless? "We are instructed in our charter not merely to carry out economic and social development, but to preserve the beauty of the scenery of the Highlands and Islands". To reverse that back to what the Act was getting at: not merely to preserve a few mountains reasonably intact, but to industrialise to the limit.

Thus was an earnest confluence of good intentions diverted to a virtually opposite direction. The original sequence of ideas reaching Westminster was roughly: Glencoe and the exhausting feuds of the clans—Culloden and the end of resistance to the London megamachine—the Highland Clearances—the need to make amends for it all, especially in regard to the existing crofting population. That took us to the peak eloquence of the Taylor Report on Crofting Conditions, 1954: "We have thought it right to record our unanimous conviction, founded on personal knowledge and on the evidence we have received, that in the national interest the maintenance of these communities is desirable, because they embody a free and independent way of life which in a civilization predominantly urban and industrial in character is worth preserving for its own intrinsic quality".

Whether in this world, I commented at the time, anything ever does get preserved for its intrinsic qualities, or whether it survives simply through its inherent strength to survive was a moot point. Forebodings of the muddle-headed shape of things to come. The machinery of legislation ground on, eventually turning out the Crofters Acts of 1955 and 1961. Had they been based on a Note of Dissent by a member of the Commission of Enquiry, Mrs. Margaret Macpherson, rather than on the premises objected to, subsequent

history might have been very different. "I do not believe that public control with private ownership will work". Not under the Highlands absentee landlords set-up, at any rate. She recommended that all crofting land should be taken over by the Secretary of State for Scotland, which in practice means the Department of Agriculture. The Department already has the largest number of crofting tenants—including Mrs. Macpherson. It has all the expertise, manages its estates admirably, and is approachable and reliable in its everyday exchanges, in sharp contrast to the bureaucratic and inert Crofters Commission which Parliament in its crushing out-of-touchness set up instead.

Moreover, much more than the crofting way of life was at issue. Ecological enlightenment is calling for a new and more comprehensive land-use policy, based on a homestead economy and integrating nature conservation (first), mixed forestry (second and almost synonymous) and agriculture. But the uncomprehending machinery laboured on, this time producing the Juggernaut Act—the arrogantly styled Highlands and Islands Development (Scotland) Act, 1965, complete with that midget injunction on the "desirability of preserving the beauty of the scenery". "Is there an ecologist in the House?" they might have vainly called. As applied to deforested mountain slopes and waterlogged moors run down to last-resource bog myrtle, "beauty" is a very foolish word. What multi-species nature wants to know is: "Are all of us present?" The nebulous concept of "the Highlands" coming to terms with "oil" could hardly be further removed from the precision management of an optimum-turnover estate, nor could giving money its head as most-favoured entity be less likely to avoid environmental bankruptcy.

*Editor: HIGHLAND FRONT will be a regular feature in Towards Survival. I should be most interested to hear from readers in Ireland and Wales who would like to contribute a regular environmental item of about 250 to 350 words.*

## Poetry

### CODE COMFORT

Behind plastic partitions  
Refugees from humanity  
Control the central office, spewing  
Information to the processing  
Plants at the perimeter.

Only the code is venerated.  
For an uncoded communication  
Deaf ears flap like leaves  
Heralding refreshing rain,  
Absorbed in times' own space.

The impatient hand of power  
Throws its own death dice  
Destroying with its touch  
Fragile heads of freedom  
Emerging into light.

Margaret Wiskow

### 48 WORDS IN FEBRUARY 1973

A cloud hangs over  
the people  
the land  
the innocent animals  
and plants  
It doesn't matter whether the  
cloud is  
of radio-fall out, or of smoke,  
or of artificially-seeded water  
droplets,

in any case it means—  
Man's in his heaven  
and all's wrong with the world.

Dave Crosher

## Correspondence

### Herman Kahn's Scenario

In your October editorial you deal at some length with Herman Kahn's *Frankenstein's nightmares*. You say that some readers may like to be refreshed on Kahn's basic argument and you then repeat the synopsis from the *Radio Times*. But to me that synopsis contained a statement but no argument. I saw the TV programme and was staggered when he completed his opening statement. It was the most unconvincing address I have heard for a long time. All the time he was speaking I was waiting for his argument but it never came. He made wild claims for technology but never, in his initial statement, attempted to justify such claims. There were one or two vague hints of argument in his replies to questions but the impression left on me was that he had not the remotest idea how to put over his case, if indeed he had one. I doubt whether the studio audience or viewers were convinced.

His "case", if such it can be described, appeared to be restricted to energy and food. Apart from solar technology and protein production, what about resources of copper, lead, nickel, mercury, iron, silver and the rest? Where are the vast supplies of these minerals to come from? He did not tell us. Perhaps his new technology has dispensed with them.

I read *Blueprint for Survival* and *The Limits to Growth* several times and was convinced by the arguments and the clarity of their expression. Herman Khan evidently considers himself so far above us that he thinks we should take him on trust. I hope the Governments of the United States, France and Japan are not accepting him at his own valuation. They must be clutching at straws, presumably to avoid the uncomfortable decisions they are now facing and which they must take in the next decade or so, if survival is to be possible.

W. CECIL ORR,  
18 Sycamore Road,  
Chalfont St. Giles.  
Branch Sec., Conservation Society.

### Control in the sustainable society

While I agree with Frank Jackson (August Correspondence) in lamenting the loss of woodlands and with him find the life-style of urban man unattractive and destructive, I find his attitude to people equally unattractive and destructive. Anybody who can write, "for no matter how tyrannical the few, government by the mob, however defined, is even more to be feared", demonstrates a bucolic ruralist arrogance that ignores the needs of the vast majority of the population. It would of course be nice if the cities suddenly disappeared off the face of the globe; it might even be a legitimate policy for survivalists to set about systematic bombing with a view to reducing the urban population; but I think both of these possibilities are a bit unrealistic. So visions of rural utopias "and no more mobs" get us nowhere. The masses will always be here, and the real problem is how to engender in them an objective awareness of the situation so that a sustainable society can exist not through a totalitarianism, however disguised, but through the consciousness of the people.

Any viable survivalism must accept the primacy of human needs, always recognising that those needs exist in an ecological context. From this point of view the *Programme for Survival (Towards Survival Number 14)* is weak. The vision it calls for is, it admits, a conventional one, and the policies it calls for imply not more than centralised social engineering. Such policies are bound to fail, for a sustainable economy will not be established unless the masses find in it sustainable satisfaction. In a capitalist system satisfaction is defined in purely material terms and so growth is an integral part of capitalism in order that an ever-increasing supply of goods may keep the worker happy enough to go on keeping the ruling class in Rolls Royces. and the emphasis on material satisfaction are of course ultimately destructive of society and of the environment, and this is one of the basic contradictions in capitalism: the dynamic essential for its survival is also the dynamic of its destruction. A policy of conservation might prevent the destruction of the environment, but what should be done about the mystifying assertion that material goods are

the path to personal slation, an assertion that is socially destructive.

Conservationists have long been talking about the importance of the "quality of life", but have they realised the full implication of this? People cannot overcome alienation and achieve self-realisation through a process of conversion or by social engineering. It can come about only through practical involvement in meaningful activities, which means the activities which are basic to the person's life. In other words, people must be in control of the decisions which affect their daily life, rather than simply being recipients of orders from above. This is not a demand for 'participation', which is a public relations gimmick, but a demand for control.

The result must be socialism. Here I see hands being thrown high with horror: such people should analyse carefully the motivation of their fear of socialism. A conventional reaction is to say: "But look at the Soviet Union! Who wants to be like that?" To which one could retort: "But look at China!" though that would not be the point. A revolution is not made by copying other people's experiments, but by people going through the process of liberation and re-creating their own world. With such a perspective, planting tree seeds might be a nice gesture, but it advances the epoch of sustainability not one jot.

PHILIP BOWLER,  
194 Glenfield Road,  
Leicester LE3 6DG.

### Time for sport

T. F. Scott-Hetherington ("Sports and Games in a Survival Society", *Towards Survival Number 14*) is very optimistic. Will there be time for any games after we have maintained our machinery, collected our windpower and rainwater, organically grown our food, collected the free-range eggs, milked the goat, recycled our waste, re-made our clothes from old, bicycled to work, etc., etc.? Perhaps he hopes for servants!

ULLA TALBOT,  
Hill House,  
London Road,  
Chalford,  
Glos.

## Reviews

### Books

*York 2000: People in Protest* (York 2000, £1.50; obtainable from Thomas C. Godfrey Ltd., 21 Stonegate, York.)

This is the autobiography of York 2000, a group of ordinary people who displayed extraordinary energy and imagination in fighting the City Council's proposals for an inner ring road in York. From the earliest days of rising concern, to the formation of York 2000 in September 1972, and from then to the present time every detail is recorded: the early meetings, recruiting, fund-raising, constructing a case and choosing expert counsel, the gruelling experience of a public enquiry, and so on. As Appendices there are fascinating minutiae of the daily events of an eighteen month period, and "A week in the Shop" (their headquarters and recruiting centre). The book is replete with illustrations, publicity material, documents and newspaper cuttings of the events. This is an intensely interesting story. Even though the decision of the Environment Secretary may yet go against them—but this hardly seems credible—this is already a success story. It deserves to be read all over the country by all who are fighting ill-considered proposals.

K.H.

*The Politics of Environment* (The Labour Party, 30p; Smith Square, London SW1).

*The Politics of Environment* has been produced by a working party of six under the chairmanship of Lena Jeger, MP, and gives a brief run-through of all the diverse and well known environmental problems. It is in the form of a brochure with some good illustrations, including one very moving picture of a seagull overcome by fuel oil. The authors describe it as the "greenest of Green Papers"; that is, as the most preliminary of preliminary surveys of the facts and problems on which the Labour Party has to develop a policy. As Ron Hayward said in his Foreword, the

## TOWARDS SURVIVAL

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## TOWARDS SURVIVAL

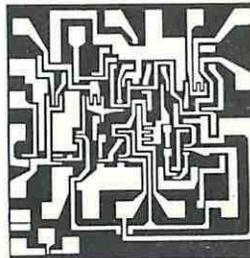
"environment has yet to become a major political issue". But before this can happen the total relationship of man to his environment must be grasped, considering the basic problems of increasing scarcity as well as the defilement of the surroundings in which we have to live. The present booklet considers only the symptoms of the increasing disequilibrium between man and the rest of nature, not the disequilibrium itself, and thus its diverse proposals like recycling or time graded motor taxes are just separate pills for separate symptoms. The disease lies deeper.

M.L.S.

*Methane: Fuel of the Future*, by C. Bell, S. Boulter, D. Dunlop and P. Keiller (Andrew Singer, 75p plus 10p postage) paperback/£2.00 hardback; Bottisham Park Mill, Swaffham Road, Bottisham, Cambs, CB5 9ED.)

Andrew Singer, who personally designs, prints and distributes his books, has published a valuable assessment. Methane gas is the simplest organic molecule, merely being a carbon atom bound to four hydrogen atoms. But how interesting, ubiquitous and useful it turns out to be in these pages! Not only are its conventional methods of production described with great clarity but fascinating insights are given of its future potential as an energy source particularly from algae-methane systems and in Total Energy concepts. Energy, unlike matter, cannot be recycled without losses, yet there are obviously great savings to be made nationally and domestically if these suggestions were taken further. A well qualified panel of authors have written a book of great interest for the environmentally aware layman. The specialist too will be well satisfied with its thorough listing of the literature in the Appendix. It is to be recommended and perhaps readers could persuade their libraries to stock the hard-cover version too.

J. M. O'N.



### UNDERSTANDING TECHNOLOGY

Charles Susskind, Professor in the  
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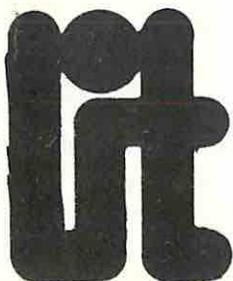
—London W1X 8LL—

## Film

"... I tried cotton wool, but it made my ears go funny" (16 mm colour, 24 mins.)

This documentary film, directed by John Morris, starts innocently enough with shots of the conflict of traffic and people and short interviews with some protagonists of motorways as the solution to such conflicts. Then a sudden change of direction shows what happens when motorways are built, as seen, heard and felt by people living near them. Ordinary people talk about the destruction of communities, the effect on old people, the noise, the devaluation of their homes, the bad faith of the authorities, and ultimately the futility of it all. The film avoids the sophisticated argument of economic expertise, believing that while the subjective effect of motorways as it is seen to be in the film, these arguments are putting the card before the horse. Coverage of a recent protest rally shows that the battle continues, and the film is left open-ended with commentary by Keith Hudson briefly putting the conservationist point of view, that fresh thinking on transport and our way of life as a whole is required. "I tried cotton wool..." will be of particular value to groups trying to drum up support or money to fight motorway proposals. People are none too fond of motorways, but still tend to use them rather than standing near one to see what it's like. This film does that for you. You can contact John Morris direct (021-705 6166) or Concord Films, Nacton, near Ipswich, for details of hire or purchase of copies.

K.J.A.



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## Announcements

Announcements are free to subscribers at the editor's discretion.

**TOWARDS SURVIVAL** Back copies are available. Numbers 7 to 13, 11p each; Number 14 onwards, 15p each, all including postage. Subtract 1p each for plural orders. "A Programme for Survival" and introduction by Margaret Laws Smith, 2,000 word single sheet: 1 for 5p, 10 for 10p, 50 for 25p, inc. postage.

"THE ENERGY CRISIS—GROWTH, STABILITY OR COLLAPSE". Public address by the President-Elect of the Conservation Society, Lord Avebury, London School of Economics, Houghton Street, London, WC2. Friday 16 November at 7.45 p.m. Tickets 30p plus s.a.c. from Conservation Society, 34 Bridge Street, Walton-on-Thames, or at the door.

**ENERGY SOURCES FOR SCOTTISH TRANSPORT.** 24 page booklet by Francis Wayne and published by Transport 2000. Besides Scottish affairs it contains a good analysis of general energy matters. Single copies available free from Rev. Donald Ross, 59 Elm-bank Street, Glasgow G2 4PY. Bulk supplies from the printer: Aberdeen Peoples Press, 10 Rubislaw Den South (basement), Aberdeen at £5.50 per hundred, £20.00 per five hundred, and inc. post and packing.

**SOCIALIST ENVIRONMENT ASSOCIATION.** Are you worried that the message isn't getting across to the labour movement? If you think that such an organisation is needed write to Steve Cohen, 120 Buckingham Street, Newcastle-upon-Tyne, NE4 5QR.

"STRATEGY FOR ENERGY". A one-day symposium to be held in The Station Hotel, Stirling, on Sunday 25 November 1973. The syllabus includes the political, economic and environmental aspects of the worsening energy situation, together with a consideration of possible renewable resources. Further details from Peter Dickson, 11 Hamilton Crescent, Bearsden, Glasgow G61 3JP.

**ENVIRONMENTAL STUDIES.** Summer Term 1974. One-term course for serving teachers of the 8 to 13 age range in Environmental Studies. The course will consider environmental problems and the contribution that education can make to their solution. The main emphasis will be on teaching method. Further details from John Burton, Alsager College of Education, Alsager, Cheshire.

**THE WORLD FUTURES SOCIETY.** London Group, welcomes contact with you. We hold discussion meetings in the London area and look forward to your ongoing viewpoint. Secretary: David Berry, 45 Bromley Common, Bromley, Kent. Tel: 460 2355.

**EDUCATIONAL FACT SHEETS.** "Our Environment—Our choice" (5p per set of 7 sheets, or 75p for 25 complete sets.) Also the revised version of *Guide to Resources in Environmental Education* is available from Peter Berry at 10p, 246 London Road, Earley, Reading RG6 1AJ.

**ENVIRONMENTAL PROJECTS.** A series of seven project outlines for teachers in local schools. They comprise: A Project based on the Classroom, A local Industry, Food and Farming, Communities in their Environment, Transport, Man as Consumer, What Can I Do? A Guide to Environmental Action. Price: 50p per set or 10p per project. They all contain bibliographies, films, lists of addresses, lines of study and suggested activities. Mostly for secondary but could be adapted for younger schoolchildren. From Mrs. Imogen Bright, 74 Lincoln Park, Amersham, Bucks.

**COUNTDOWN** Irish linen tea-towel with the Happy Families message, in crisp blue and white, selling at 50p (p & p inc.). To be had from Mrs. Cynthia Walton, 58 Oxford Road, Moseley, Birmingham 13. A 'must' for any zero-growther's kitchen. Other colourways in the pipeline.

## ANNOUNCEMENTS contd.—

**CONSERVATION BOOKS.** For a speedy, reliable and comprehensive book service in the environmental field write to John Treble, Conservation Books, 28 Bearwood Road, Wokingham RG11 4TD.

**FRIENDS OF THE EARTH.** For details write to Operations Manager, Colin Blythe, 9 Poland Street, London, W1V 3DG.

**PEOPLE.** The first explicit environmental political party in the country. Send for details to: Lesley Whittaker, 69 Hertford Street, Coventry.

**THE ALTERNATIVE SOCIETY** organises summer and week-end schools. Further particulars from Stan Windass, Chairman, 9 Morton Avenue, Kidlington, Oxford (Kidlington 3413).

**ANDREW SINGER,** book publisher, is keen to receive good manuscripts on subjects of self sufficiency and alternative technologies. His address is The Mill Cottage, Swaffham Road, Bottisham, Cambs.

**POPULATION STABILIZATION.** For details write to Colin Hines, 6 St. Mark's Place, London W11 1NS.

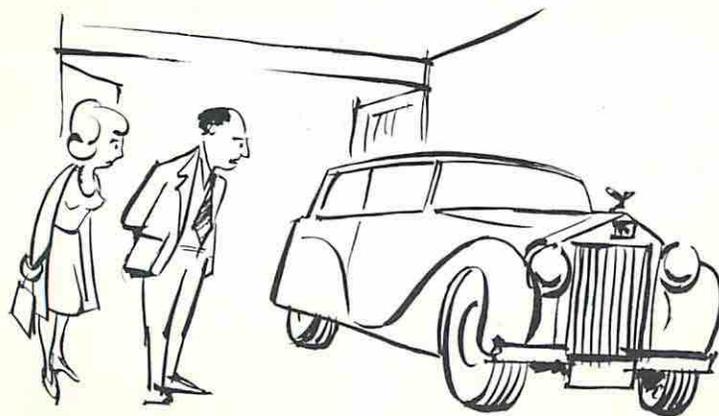
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*Photography by Grahame Leman*

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We have been splendidly supported by our readers and also by contributors in our pages. Among the writers whose articles have appeared in the past eighteen months we can cite:

Robert Reed, Francis Arnold, Margaret Laws Smith, John Davoll, Gerald Foley, Christopher Tugendhat MP, Francis Croker, Herbert J. West, J. Ashley-Cooper, Andrew MacKillop, Roy Bridger, T. F. Scott Hetherington, Mark Burton, Sir Richard Acland, Victor Anderson, Alvin Weinberg, Roger Franklin, Colin Stoneman, Professor M. W. Thring, Brian Aldiss, Grahame Leman, Jean Giono, R. V. Latham, Ulla Talbot, Robert A. de J. Hart, Alan Ireland, Kenneth Barlow, J. W. Lucas, John Standish, H. V. Hodson, B. J. F. Hudson, Ivan Illich, Philip Brachi, Sir Sydney Greenè, John A. Loraine, Tony Mills, B. W. Loveless, Val Stevens, Oswald Barraclough, Barbera Priddy.

The cause of survival is no nine-day wonder—nor is it any ordinary pressure group. We are at the beginning of a powerful and responsible movement for change.

The finances of *Towards Survival* are shaky—very shaky indeed—and will be for some time until we have established a viable circulation. We shall do this, *particularly with your support*. You can send for a sample copy by completing the form below and posting it to us with 20p stamps, P.O. or cheque.



To: *Towards Survival*, 79 Sutton Ave., Eastern Green, Coventry, CV5 7ER.

Please send me the current issue of *Towards Survival*. I enclose 20p.

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# TOWARDS SURVIVAL

and Information for Survival Digest

A Monthly Journal of Survival Policies  
Economics Population Environment Food  
Sustainable Technologies Politics Resources

Editor: Keith Hudson Economics Editor: Margaret Laws Smith  
Poetry Editor: Eric Millward Digest Editor: Dr. Kenneth E. Barlow  
Consulting Editor on Population: Dr. John A. Loraine

We should like to introduce you to a new journal called *Towards Survival*.

The heading above will give you an idea of our brief. We are deeply involved in environmental matters with an emphasis on the political and economic aspects of the sustainable state.

Within the environmental movement in this country two schools of thought can already be distinguished—the “tidy-uppers” and the “stable-staters”. We belong unequivocally to the latter. Without a wise control of population, economic activity, resource and land usage in the coming years we shall not have the opportunity to “tidy up” the environment around us.

In the early issues of *Towards Survival* (July, August, etc., 1972) we were principally concerned with resources—particularly oil. Long before there was the barest mention in the press of any energy crisis we were analysing the world demands on finite reserves, essentially those in the Middle East. We envisaged a crisis in the early 1980s. We were wrong in our time scale because it is here already.

But our Jeremiah period is now over. We have no need to persuade intelligent people any longer about the dangers facing us. The journal is now principally concerned with opposing some of the

grandiose ideas now being pushed by macro-growthers—more motorways (despite an insufficiency of fuel in the coming years), nuclear power stations by the score (when incredibly dangerous problems of radioactive storage are not being squarely faced), Maplin, Concorde, Morecambe Bay Barrages, the Chunnel and so forth.

It would be unreasonable if *Towards Survival* contained nothing but criticism and made no attempt to supply the answers. We are therefore also deeply concerned in encouraging discussion about what is entailed in planning a sustainable society. Also we and a great number of our readers are active to that end. We believe that we have a great responsibility in leaving a workable planet and an all-species nature to our children and their children.



# Important!

Dear Reader,

As you have seen, *Towards Survival* is now in a new format. There have been several reasons for this change but the most pressing one has been the enormous amount of time that has had to be spent on typing, printing, collating the pages, etc. This has meant, among other things, that there has been much less time available for the editorial work that needs to be put in.

Having the printing done outside means:

- \* the journal should improve considerably both in appearance and in the quality and scope of its contents
- \* the economics of publishing *Towards Survival* will be totally (and dauntingly) different

On this second point each reader could help a great deal by assisting us to establish a viable circulation for our new costs mix. Ideally, if each one of you could introduce a new reader a month we should, at the end of six months, be on an even keel financially. Unless this is achieved we shall have to go back to our old format.

I am also going to ask a concession from those who have contributed to our platemaker fund (£133). I should like to put this money towards the extra substantial amount needed (probably at least £600) during the next six months. If any do object then I will willingly return donations. Of course, the quicker the extra readership come in the quicker we shall reach break-even point and the less we shall have to go into the red.

*Towards Survival* has established a reputable niche for itself in the environmental movement in this country. We believe that the discussion in our pages, particularly on the economic and political aspects of the deepening environmental crisis, is valuable and constructive. After a slide earlier this year (the environmental "backlash"?) when we lost about 200 readers, we have regained this number and are now growing steadily by word of mouth.

Can you help? A couple of subscription forms are overleaf.

Yours sincerely,

KEITH HUDSON,  
*Editor.*

15th November, 1973

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