Eliminating the Need for Economic Growth

A submission to the Stern Review on the Economics of Climate Change

"The blunt truth about the politics of climate change is that no country will want to sacrifice its economy in order to meet this challenge"
– Tony Blair, 1st November, 2005.

"The blunt truth about the politics of climate change is that countries are not doing enough to adapt their economies so that they reduce their greenhouse gas emissions." - Lord May, President of the Royal Society, 9th November 2005

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Summary: *This paper is about adapting the economic system so that it can respond to the challenge of climate change. It argues that the highest priority has to be given to eliminating the need for rich countries to continue to grow economically if they are to prevent their economies collapsing. The paper argues that their need for growth arises because they issue their money as a debt. If this was changed in the way suggested, they would be able to cut their emissions sharply with immediate effect.*

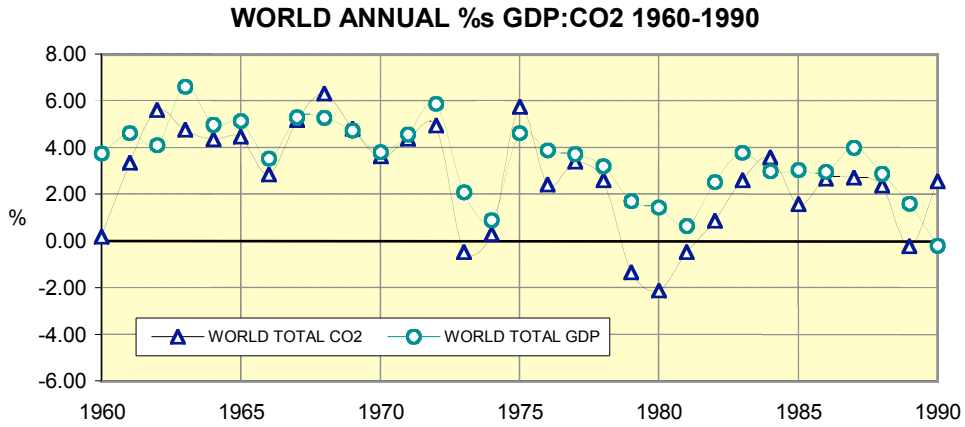
The paper also discusses other monetary changes needed to give governments the economic freedom to respond the climate crisis and suggests the introduction of a system of tradable personal emissions allocations to protect the poor from the worst effects of the higher energy prices that will result from effective restrictions on greenhouse emissions.

Feasta is an international network of people who have set themselves the task of identifying the characteristics that a society would have to possess to be truly sustainable. By this, we mean that the society is capable of continuing as it currently functions for several hundred years without being forced to change because it is exhausting social and environmental resources on which it depends. Once we have identified these characteristics, we can see what needs to be changed in our current societies and economic systems.

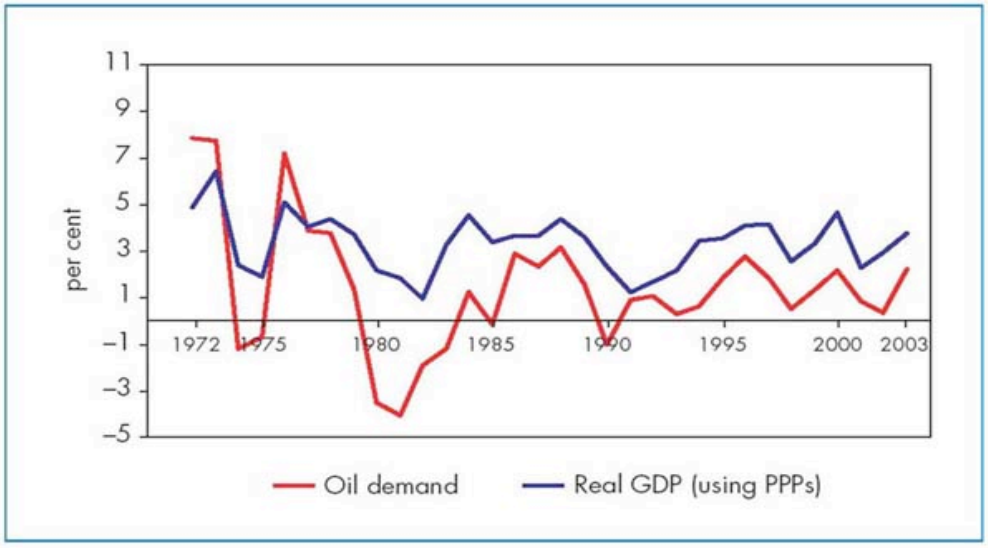
One of the features of a truly sustainable society we have identified is that its economy would not need to grow continuously to avoid collapse. The current economic system, on the other hand, would collapse if it did not grow. Feasta has therefore devoted a lot of thought to attempting to explain why this is the case, and whether it is possible for the system to be changed so that it becomes unimportant whether growth takes place or not. This submission summarises Feasta's findings on why economic growth is necessary to avoid economic collapse and what needs to be done to change that.

1. Why economic growth is required

National income growth is currently the world's most widely considered economic indicator. It is the percentage by which the amount of trading in the monetarised part of a national economy has risen, usually in the course of a year. Put another way, it is the percentage increase in the total of all the money incomes generated in the economy. Its significance is much wider than that, however. Because it measures the additional income, the growth rate is an excellent guide to the extra profits that arose in an economy and hence the attractiveness of that economy to investors.



Graph 1: The rate of increase in the world's output has moved very closely in step with its emissions from fossil fuel use.



Graph 2: There has also been a very close relationship between the rate of growth of world output and the rate of growth of its consumption of oil.

The relationship between economic growth and energy use is very, very close, as is shown by these two graphs. Graph 1 shows the link between world economic growth and carbon dioxide emissions, Graph 2 that between world growth and world oil use. The inescapable conclusion to be drawn from these graphs is that it is going to be impossible for economies to grow if emissions are reduced at the sort of rate required if the carbon dioxide concentration in the atmosphere is to stabilise at 400 parts per million, the level thought to correspond with the temperature target set by the EU, a 2 degree Celsius rise. The level is 379 ppm today and, at the current rate of emissions, 400 ppm will be reached in 10-15 years. Accordingly, if the 400ppm level is not to be breached, drastic cuts in the rates of fossil fuel use are required immediately. These cuts will have to be so rapid – perhaps over 3% a year – that technological advances and the

greatly increased use of energy from non-carbon sources are most unlikely to be enough to ward off economic contraction, let alone enable growth to continue at anything better than a snail's pace.

Enabling the world economy to cope with not just zero growth but actual contraction requires changes in the way that national currencies like the pound and multinational currencies like the euro are put into circulation. There are two reasons for this. One is the fact that our present money is created as a debt and debts have to be repaid with interest and the second is that, if a significant number of people in an economy are employed making growth happen, they and others will become unemployed if it stops.

A. The debt-based nature of money

Most of the money supply in OECD countries – all but about 3%, the value of the coins and notes - is issued as debt. In these countries, the total of all the bank accounts in credit is balanced exactly by all the accounts on which money is owed. This makes the economies basically unstable because if insufficient new loans are taken out in any year to cover the principal and the net interest[1] being paid into the banks on the previous years' loans, the money supply will contract. A smaller money supply makes it impossible to carry on the same level of business as in the previous year. People lose their jobs and surplus capacity appears, further inhibiting borrowing and investment. A downward spiral could develop with one set of job losses leading to others.

So, if the economies of these countries are not to become depressed, the amount borrowed in any year has to be at least equal to the amount being paid to reduce old loans plus the banks' retained earnings. And, assuming that the banks are not distributing all their profits, this means that the amount borrowed has to grow year by year. But since a steadily increasing amount of borrowing cannot be supported by a stationary or declining economy, this means that the economy has to grow too to prevent the level of indebtedness rising continually in relation to national income. This is a small effect compared with the second reason why growth is required.

B. The relationship between employment and growth

If there is no growth in any year, the investments made the previous year have produced no return. Because firms will almost certainly have taken on debts on which interest has to be paid to finance their investments, this hits company profits. The lower profits and the unused capacity created by last year's investment discourages further investment *at least in those sectors in which the increased capacity has not been taken up.*

Any reduction in investment has serious results quite apart from reducing borrowing and hence the money supply. In normal years in industrialised economies, somewhere between 18% (US and Sweden) and 28% (Poland and Portugal) of GNP is invested in projects that, it is hoped, will enable the economy to grow the following year. A similar proportion of the labour force is employed on these projects. Consequently, if the expected growth fails to materialise and all further investments are cancelled, a fifth or

[1] By net interest, we mean the portion of interest paid over which is retained by the lending institutions as their profit and used to build up their capital reserves

more of a country's workers will find themselves without paid work. These newly-unemployed people will be forced to cut their spending sharply, which in turn will cost other workers their jobs. The economy will enter a downward spiral, with each round of job losses leading to more.

In the present system, the only way to ensure that an adequate level of borrowing takes place to maintain the money supply and that an adequate amount of investment takes place to maintain high employment is therefore to ensure that growth occurs year after year. Studies have shown that a minimum of around 3% growth is required in Britain to prevent unemployment increasing.

The prospect of the rate of investment falling and creating widespread unemployment terrifies governments so much that they have to work very closely with their business sectors to ensure that their economies continue to grow almost regardless of any social or environmental damage the growth process may be causing. In other words, the need for growth to maintain short-term economic sustainability gets in the way of attending to more fundamental types of sustainability such as halting climate change.

Indeed, it presents a massive barrier since roughly half of all the fossil energy used in OECD countries is required for the growth process. Consequently, if we could find a way to enable the OECD economies to survive without growth, very deep and rapid cuts in world fossil energy use would be possible and hence in the level of emissions.

2. Preventing an economic collapse

How then can governments change their economies so that they can not only manage without growth but also cope with the economic contraction that reducing fossil fuel use is almost certain to bring about? We have seen that no growth means that private sector investment slows or stops. Governments could neutralise such a decline by increasing their own spending by the same amount. They could even target this extra spending on projects that reduced greenhouse emissions. In the current system, however, the extra spending would generally involve running a budget deficit that would be financed by borrowing. This would top up the money supply but if it did not enable growth to resume fairly quickly by enough creating shortages of capacity which forced companies to start investing again, the resulting debt could build up to such an unmanageable level that the banks would refuse to lend the government any more except on unfavourable terms.

This is exactly what happened in Japan during the 1990s – government spending on building unnecessary roads, airports and bridges kept unemployment low for almost a decade but failed to re-ignite the growth process. Eventually, when the debt burden reached 130% of national income, the government realised that it would have to stop borrowing. It allowed unemployment to rise but the debt was already too high in the eyes of the three US credit rating agencies and in December 2001, they lowered their rating on government bonds. This led Heizo Takenaka, the economics minister, to warn the country on television that a further downgrading of the debt would be catastrophic as it would lead to higher interest rates thus making a recovery even more difficult to bring about.

So the only non-time-limited solution would be for the government to fill the gap left by the decline in private investment by spending into circulation money it had created itself rather than borrowed. This would enable it to continue to pick up any economic slack by investing in projects that reduced fossil energy demand until either the private sector had begun to invest again or it had developed a no-fossil-fuel economy that was completely sustainable.

If the point was reached at which there were no further projects into which new money could be poured to produce a worthwhile return in terms of either sustainability or quality of life, the government's investments should stop and it should divert the money to the least-well-off segment of the population so that they could spend it instead. When this happened, everything being produced by the economy apart from that required to maintain the capital stock would be going to meet people's needs rather than to generate growth or enhance sustainability. There would be no net investment or net savings in such an economy.

If fossil fuel emissions are severely restricted to combat climate change, the extreme case in which private sector investment never resumes on a substantial scale will never come about because the increasingly high energy prices will in themselves create a wide range of opportunities for businesses to invest and make profits. Research[2] in America indicates that for every $10 a barrel rise, the US growth rate falls by 0.4% for about four months. After that, the economy recovers rapidly so that after 18 months the higher energy prices actually boost the growth rate by 0.1%, an effect which lasts for another year and a half. This is because while in the short run, consumer spending falls because of the increased cost of vehicle fuel and heating oil, in the longer run, firms invest in the new opportunities open to them, such as supplying equipment for renewable energy projects and insulating people's homes.

Higher energy prices therefore tend to shift spending away from consumption to the production of goods for export (in order to pay the higher cost of energy imports) and to pay for capital investment in energy-saving and energy-producing technologies. They may not depress the overall level of economic activity in the log run and they could even, perversely, increase energy demand, because the investment goods purchased are likely to have a higher embodied energy content than the goods and services which the consumer is no longer buying.

There would therefore be continued private investment even in circumstances in which the overall economy was shrinking because of the new profit opportunities created by the higher energy prices. The level of this investment might not be adequate, however, to keep an economic system in which money was created on the basis of debt running satisfactorily and the only safe, controllable course would be for governments to issue non-debt based monies themselves whenever demand was slack. They would gradually replace the debt-based money issued by the banking system with a stock of money which they had spent into circulation themselves and which remained there until they taxed it out again. The result would be an economy that was exceptionally controllable and stable – trying to control inflation by reducing the money supply through interest

[2] Ben S. Bernake et al, "Oil shocks and Aggregate Macroeconomic Behavior: the Role of Monetary Policy, a reply" *Journal of Money, Credit and Banking*, Vol. 36, No. 2, 2004.

rate rises is a very crude approach, since higher interest rates are themselves inflationary as they increase business costs.

3. Should economic growth be sacrificed to preserve the climate?

Two points should be made. One is that there is certainly no need for growth to continue in the OECD bloc. Its people are the most lavishly resourced in the history of the world and there is no evidence that further economic growth would make them any happier. The second is that the depletion of the world's oil and gas reserves means that the option of continuing to generate economic growth by moving to higher and higher levels of energy intensity is about to be closed off, although opinions differ over exactly when this will happen. Some think that the peak in global oil production is about to be reached, while others think that, given enough investment, it will not be reached for 25-30 years.

Whichever is the case, economic growth should be halted now because the changes that the OECD countries are making to achieve it make them less able to adapt to a low-fossil-fuel-use world. This is because, at present, they are generating their growth primarily by technologies that substitute fossil energy for that from the sun and human and animal sources. This confers a massive competitive advantage upon them and other industrialised countries since one litre of petrol can do as much work (in the sense of lifting a load a certain distance) as a man can do in a hundred hours.

They are applying fossil energy in two ways to achieve this growth. One is as capital, the energy embodied in buildings, infrastructure and equipment. The other is as income, the amount of energy needed to operate and maintain the capital stock. Consequently, as they grow economically, they become increasingly dependent on energy use. Even if they can avoid collapse if no growth happens, they need a lot of energy to maintain their current methods of production and distribution and hence their income levels. This will be an enormous burden in future since all types of energy are likely to become considerably more expensive in relation to labour whether or not an effective climate treaty comes into force because of the rapid depletion of supplies of oil and gas.

Indeed, such countries might well find that the investments they made in increasingly energy-intensive technologies during their rush-for-growth years were a mistake and that they will be out-competed by countries which have not "advanced" so far and have retained more labour-intensive methods of production and distribution. If this is a serious possibility, the conclusion as to be drawn that overall economic growth within the OECD and in the energy-intensive sectors of poorer countries needs to stop immediately in those countries' own interests. Such growth takes them further and further up a *cul de sac* down which they will have to return, only to find when they do that the energy they require to re-equip themselves to operate at a lower level of energy use is very much more expensive.

4. The Need for Inflation

We have already argued that restrictions on the use of fossil energy, whether as a result of resource depletion or measures against climate change, are likely to bring about big increases in the price of all forms of energy in relation to the price of labour. As a result, since goods and services all require different proportions of energy and labour form their delivery, all price relationships in the economy will need to change. The best way of enabling this to happen is to allow an inflation which needs to proceed for several years as, initially, firms will put prices up by the amount of their direct fuels costs and they will require further increases when the higher cost of the fuel used in the products they purchase works its way through to them and needs to be passed on. Resisting such an inflation would essentially be an attempt to maintain the purchasing power of money in terms of the amount of energy it buys. This is obviously an inappropriate response if energy is getting scarcer and/or requires more resources to produce.

Higher energy prices are a good thing provided that (i) they don't rise so rapidly that they dislocate the global system and (ii) the poor are protected. They are certainly necessary to bring about important changes in the way we use energy and in the types of energy we use. They shift the balance away from energy- and capital-intensive forms of production towards more labour-intensive ones. They do this by making machinery more expensive to build and to operate, and by greatly increasing the cost of transport and distribution.

To be more concrete, companies that use automated, specialised equipment to make very large quantities of one thing in one place and then need to ship it to markets around the world will tend to lose out to smaller firms which use rather more labour with a higher level of skill and less specialised equipment to make a wide range of things for their local markets. Higher prices also shift the balance away from the centralised supply of energy drawn from fossil sources to local systems supplying energy from local sources. Local energy sources become important again and, just as in the past, instead of energy being taken to wherever in the world is currently a cheap place to manufacture, economic activity will move to wherever there is a reliable supply of competitively-priced energy available for its operations. This has the potential to bring about a shift in political and economic power.

5. The need for emissions rationing

As fossil energy prices rise further over the coming years, the world's poor, and especially the landless among them, will be seriously hurt. Food will become increasingly scarce and expensive because of the large amount of energy required by industrialised agriculture and also because huge areas of land are likely to be taken out of food production to produce energy crops. The situation will almost certainly arise in which the rich – in whatever country they live – will be running their cars using fuels produced by starving the poor. Everything the poor buy will go up in price and there is no guarantee that their incomes will increase in step with the prices they will be asked to pay. Moreover, market prices will deny them the energy they need to make themselves more productive in their local economies.

In times of acute scarcity, even governments with impeccable right-wing credentials do not leave the distribution of vital commodities to the free market. Instead, they regulate the market by introducing rationing. In an unregulated market, the rich will have plenty of energy and use it, one way or another, to maintain their wealth and political power. Consequently, if the poor are to be protected, energy rationing is needed now, before attitudes harden as the scarcity grows more acute.

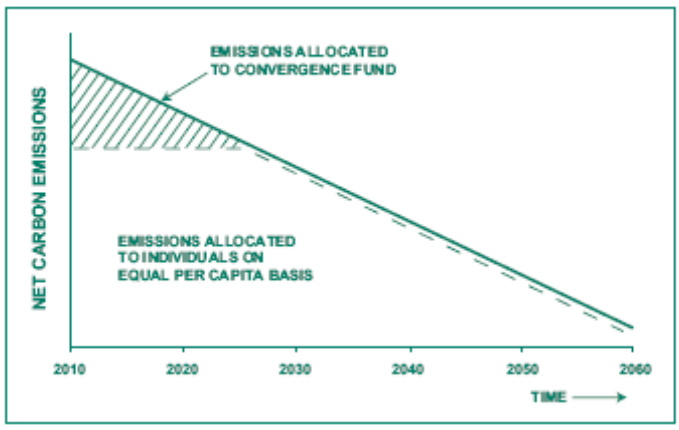
Almost certainly, this rationing will be introduced by countries acting individually. However, because much greater benefits would flow to the poor if most nations acted together, once the

pioneers have their own systems running they are likely to invite other nations to join them in setting up a fossil fuel buyers' organisation – let's call it a Carbon Club - which would negotiate with the oil and gas producing countries for supplies. The club and the producers would agree a fixed price for whatever amounts of oil and gas could be produced each year and the buyers' club would set up a system to share out the amount of the two fuels purchased among the participating countries. Similar negotiations would be carried out with the coal-producing nations because, even though coal is abundant, its price tends to rise along with that of oil. Moreover, it would be disastrous for the world's climate if the world economy used coal to replace its shrinking supply of oil and gas. Greenhouse gas emissions per unit of delivered energy from coal are very much greater than from the other two fuels.

The Carbon Club would distribute the oil, coal and gas it had agreed to buy from the producers on the basis that everyone has an equal claim to be able to use the atmosphere as a dump for his or her greenhouse gas emissions. It would calculate the total amount of greenhouse gases that could be released into the atmosphere while avoiding catastrophic climate change. This would place an overall limit on the total carbon content of the fossil fuels that could be burned before the world had reduced its emissions to the point at which they were no longer accumulating in the atmosphere and humanity had consequently ceased to cause the planet to warm.

The annual percentage rate at which global fossil fuel consumption needed to be reduced from its present level would then be calculated. This would set targets for the maximum level of carbon emissions from fossil fuel use for every year. The rate at which these emissions would fall is indicated by the solid line in Graph 3.

How fossil fuel emissions could be shared



Graph 3: Under the plan proposed by Feasta, the world's carbon dioxide emissions would be cut back annually as represented by the sloping line. Each year, the entire emissions allocation would be shared equally among the world population except that during the first, say, twenty years, some of the allocation (represented by the hatched area) would be issued by governments to sell to raise funds to make their countries less exposed to the effects of climate change and less dependent on the use of fossil fuels.

If the world was an equal place, all the annual amount for any year would be shared amongst the human population on an equal per capita basis. Every quarter or every year each person in the world would get an individual ration coupon entitling him or her to burn whatever amount

of fossil fuel would result in releasing their portion of the allowable weight of greenhouse gas allocated for that year. They would not, of course, be entitled to the fuel itself but their ration coupons would be tradable and they would sell them through a bank or post office just as if they were foreign currency for whatever was the price at the time of sale. The price would be higher if the world economy was booming and energy demand was high than if it was depressed. Companies importing fossil fuels would then buy the number of permits required to cover the emissions from the fuel from the banks and pay the permits over to Customs when the fuel came ashore. Energy distributors buying from domestic fossil energy producers would pay the permits over to the companies operating the wells or the mines and inspectors would call frequently to collect the permits and check that the number which had been paid over corresponded with the amount of fuel sold. It would be relatively easy to operate such a system.

The world, however, is not an equal place and this system of allocation, while equitable, would not be very fair as people living in some parts of the world have challenges to overcome before they could live as comfortably on their emissions allocation as people elsewhere. Feasta therefore proposes that for the first, say, twenty years after the introduction of a global rationing system, everyone should get the same allocation each year but at the rate appropriate for year 20. This is represented by the dotted horizontal line on Graph 3. The shaded area above the dotted line is the difference between the total amount of emissions permits available for any particular year and the amount distributed to individuals. These remaining permits would go into a "convergence fund" to be allocated to national governments by the club according to an internationally-agreed, transparent set of criteria.

The national governments would sell their permits to raise funds for projects which enabled their countries to make the transition to lower fossil energy use. For example, countries might be allocated permits because they needed to improve the energy efficiency of their buildings and transport systems, or to take precautions against the increasing storms, drought or rising sea levels brought about by climate change. Or they might qualify for them because they had a greater need than other countries to enable their industries to adopt new, low-energy technologies. Obviously, the size of the convergence fund would fall each year until it ceased altogether in year 20. Thereafter, each individual's emissions allocation would fall annually, so that the total number of permits issued globally kept to the downward dotted line and the target concentration target was met.

6. The need for a true global currency

A global system on the lines set out above could only be introduced, and, having been introduced, work, if it was in the short-term interests of all the participants as well as their longer term ones. The interests of both energy consumers and energy producers are that the price of fossil energy does not fluctuate so wildly that it causes the global economy to collapse but either remains stable or rises at a predictable and moderate rate. This would be achieved by another currency which we have not discussed yet – a world currency, the ebcu (**e**missions-**b**acked **c**urrency **u**nit) which would be used to adjust the level of global economic activity so that energy prices were stable in terms of the international currency but could vary in national currency terms.

The new currency would be issued by the club and given to member governments according to the size of their populations, thus enabling some of the heavily-indebted ones to pay off all their international loans. Ebcus would replace the dollar, the pound, the euro and the other reserve

currencies for all international trade transactions between club members, including trade in the emissions permits issued by the club.

Their use would remove one of the great distortions in the world economy at present - the ability of the US, and to a much smaller extent, Britain, to pay for their imports in money that both countries have created themselves and then borrow that money back, paying interest on the loan in yet more self-created money. This ability has enabled the US to run a deficit on its balance of payments current account for over twenty years. It is the reason that it is a superpower. America is currently importing $800 billion worth of goods each year, a third of its imports, without having to pay anything for them that took real resources to create. The debts it has run up over the 20 years - $2,484 billion at the end of 2004, equivalent to half the world's savings - may never be paid off. Replacing the dollar with the ebcu would remove this massive US advantage, one which the eurozone is trying very hard to acquire.

Before the ebcu was issued, the club would announce that, if ever the price of emissions permits rose above a certain price, it would offer more permits for sale but remove the ebcus used to pay for them from circulation permanently. As the volume of world trade that it is possible to carry on is determined by the amount of international currency available to finance it, the loss of these ebcu would restrict international business. This, in turn, would reduce global energy use and hence the price being paid for emissions permits.

On the other hand, if the price of emissions permits was tending to fall, the club could either issue fewer permits the following year or it could buy permits on the market itself, thus putting more ebcus into circulation and increasing world energy demand.

It would therefore be a very simple matter to keep the ebcu price of emissions permits at a constant level. This would give stability to the entire world economy. Indeed, as the ebcu price that the fossil energy producers would receive would be fixed too, everyone would always know exactly how many ebcu they were going to have to pay for their energy.

What they wouldn't know is what the price of ebcu would be in terms of their national currencies. These would have a floating exchange rate with the ebcu, one determined by supply and demand. Countries which converted quickly to renewable sources of energy and consequently did not need to buy so many emissions permits, or gave themselves extra to sell, would do well. Their currencies would be strong and they would find that imports were cheap. Other countries would find that it was costing them more and more in national currency terms to buy their imported energy, which would give them a very real incentive to switch to renewable sources of energy too.

Without monetary reform at both national and global levels, the pressures to continue to use more fossil energy – which, given the oil and gas peak can only mean coal - each year to ensure that one's national economy does not collapse will be immense, and probably irresistible. As a result, it would be almost impossible to introduce an effective global fossil fuel rationing and climate emissions-control agreement and, if one was introduced, it would be much more likely to break down.

Would governments agree to the introduction of an energy rationing system along the lines described? There is some chance that they would because the alternative is to do nothing about climate change and to run the risk that too rapid an increase in energy prices will cause the world economy to collapse into a severe depression which persists for many years.

Coal mining companies would probably only participate in the scheme if they were compelled to do so by their governments despite the fact that they would receive a guaranteed, fair price for a fixed amount of coal.

Global Rank Ordering of the Ten Leading Countries' Coal Reserves and Production, 1998

	RESERVES		PRODUCTION		
Country	Share of Global Reserves	Share of Country Cumulative reserve		Share of Global Production	Share of Cumulative Production
U.S.A.	25.1	25.1	U.S.A.	26.7	26.7
Russia	15.9	41.0	China	23.3	50.0
China	11.6	52.6	Australia	7.3	57.3
Australia	9.2	61.8	India	7.2	645
India	7.6	69.4	South Africa	5.5	70.0
Germany	6.8	76,2	Russia	5.4	75.4
South Africa	5.6	81,8	Poland	3.2	78.6
Kazakhstan	3.5	85.3	Germany	2.6	81.2
Ukraine	3.5	89.9	Indonesia	2.2	93.4
Poland	1.4	90.2	Ukraine	2.0	85.4
Next 10 Countries	6.9	97.1	Next 10 Countries	9.7	95.1

The table shows that world coal production is concentrated in very few countries and that China and the US account for over half. The attitude of both governments would therefore be crucial. China could be expected to join the Carbon Club because its people, especially those in rural areas, would gain enormously from selling their allocation of emissions permits and their prosperity would create buoyant markets for its manufacturers.. The same would apply to South Africa, India and Indonesia. But what about the US and the other wealthy countries? Yes, their fossil energy supplies would cost them more, but that is inevitable as a result of energy scarcity anyway and the club arrangement would at least ensure they had a stable business environment and good export markets for their advanced manufactured products. Equally importantly, their unemployment could be kept low.

There is no need for the Carbon Club to be set up before countries can take action and Feasta is proposing that the EU-25 should divide up the emissions it is permitted to make in any year under its Kyoto commitment and issue permits to its people individually. This would replace the current Emissions Trading System which amounts to little more than a subsidy to large-scale fossil energy users. However, any government could start issuing emissions ration coupons regularly to its population, the total ration any year adding up to just less than the country's expected CO2 emissions for the year. In each subsequent year, the total emissions ration could be cut by, say, 2%. The competition among businesses for the limited number of permits would give them an increasing value.

Even if a country acted alone, this approach would bring it three benefits.

- It would force the country's industry and the public to be more energy efficient. This would stand the country in good stead as the world price of fossil fuels rose over the

years. Moreover, the techniques industry developed might find a market overseas, in the way that the encouragement given by the Danish government to its windpower industry has paid off many times in export sales.

- The cost of buying the coupons needed to purchase fossil energy would rise year by year as the size of the total national ration fell. The income from selling coupons would, in effect, provide everyone with a citizen's income which would be of most benefit to the poorest people.

- As the price of fossil energy rose because of the increasing cost of buying the coupons to purchase it, it would become financially attractive to develop renewable sources of energy. As many of these could only be developed at a local level, the benefits would be shared out across the country.

What is likely to happen if these ideas are not adopted?

The biggest immediate danger presented by the current uncontrolled oil market is that energy prices will rise so rapidly that they will provoke an inflation that the central banks cannot ignore and that the higher interest rates the banks impose will plunge the world economy into a depression. Once the depression has brought investment to a halt and demand has dropped because many of the people who would have been working on investment projects have lost their jobs, it will be very difficult to get the world economy working at full capacity again. Such a depression might therefore persist for 10-20 years. Most banks would be in deep trouble and the global financial system might collapse. Living standards would fall everywhere and there would be increased starvation and misery.

Even if this scenario is avoided and the world economy continues to expand, the prospects are equally gloomy. The price of fossil energy can be expected to rise as the reserves of gas and oil are depleted and hundreds of millions of people could find themselves too poor to buy the energy on which they depend for cooking, lighting and heating. Landless people could also suffer as food became increasingly expensive.

Conclusions

Conclusion 1: *In order for governments to be able to be largely unconcerned whether economic growth takes place or not, they need to be able to create money and spend it into circulation. More generally, the money supply should cease to be dependent on people or firms going into debt. Money creation should be gradually taken out of the hands of the commercial banks. Instead, all money should be spent into use by national or local governments. This approach is suggested in a recent book,* Creating New Money*, by James Robertson and Professor Joseph Huber.*

Conclusion 2: *Economic growth should cease to be the primary national objective because it is making the countries generating it less able to survive in a low carbon emissions world. Instead, absolute priority should be given to assuring a high quality of life at a low or zero rate of fossil energy use. A high level of investment in bringing about this transition could produce economic growth but this would be a happy accident, not the aim of the policy.*

Conclusion 3: *Energy prices are likely to rise substantially in real terms as a result of restrictions on fossil energy use. The higher prices will widen the gap between rich and poor and cause great hardship. A system of rationing the use of fossil energy based on equal per capita entitlements to the use of the world's emissions sinks should be put into place. These tradable personal emissions allocations would provide both a mechanism for limiting global emissions and a net income for those who use very little fossil fuel.*

Conclusion 4: *A new global currency should be issued to replace the national currencies now used for world trade. This currency would take its value from the personal emissions allocations and would have the effect of ensuring that the amount of world trade being carried on at any time was compatible with the emissions reduction path required to reach the atmospheric concentration target.*