

## TEQS IN BRIEF

1. “Tradable Energy Quotas” (TEQs) is a system to enable nations to reduce their emissions of greenhouse gases along with their use of oil, gas and coal, and to ensure fair access to energy for all.
2. There are two reasons why energy-rationing may be needed:
  1. *Climate change*: to reduce the greenhouse gases released into the air when oil, gas and coal are used.
  2. *Energy supply*: to maintain a fair distribution of oil, gas and electric power during shortages.
3. TEQs (pronounced “tex”) are measured in units.
4. Every adult is given an equal free Entitlement of TEQs units. Industry and Government bid for their units at a weekly Tender.
5. At the start of the scheme, a full year’s supply of units is placed on the market. Then, every week, the number of units in the market is topped up with a week’s supply.
6. If you use less than your Entitlement of units, you can sell your surplus. If you need more, you can buy them.
7. All fuels (and electricity) carry a “rating” in units; one unit represents one kilogram of carbon dioxide, or the equivalent in other greenhouse gases, released when the fuel is used.
8. When you buy energy, such as petrol for your car or electricity for your household, units corresponding to the amount of energy you have bought are deducted from your TEQs account, in addition to your money payment. TEQs transactions are automatic, using credit-card or (more usually) direct-debit technology.
9. The number of units available on the market is set out in the TEQs Budget, which looks 20 years ahead. The size of the Budget goes down year-by-year – step-by-step, like a staircase.
10. The Budget is set by the Energy Policy Committee, which is independent of the Government.
11. The Government is itself bound by the scheme; its role is to find ways of living within it, and to help the rest of us to do so.
12. TEQs are a national scheme, enabling nations to keep their promises, guaranteeing their carbon reduction commitments within whatever international framework applies at the time.

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## RESEARCH CENTRES

Carbon trading schemes which include individuals exist in several variants. Their names vary too: Domestic Tradable Quotas, Personal Carbon Allowances, Personal Carbon Trading and Carbon Quotas. The following centres in the U.K. have programmes to research or promote systems of this kind: Department for Environment Food and Rural Affairs; Institute for Public Policy Research; The Lean Economy Connection; Oxford Environmental Change Institute; The Royal Society of Arts; The Sustainable Development Commission; and Tyndall Centre for Climate Change Research. Others wishing to be listed here should supply the publishers of this booklet with a brief outline of their work.

*For further information on TEQs, please visit: <[www.teqs.net](http://www.teqs.net)>*

# ENERGY AND THE COMMON PURPOSE

Descending the  
Energy Staircase with  
Tradable Energy Quotas  
(TEQs)

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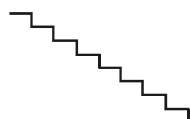
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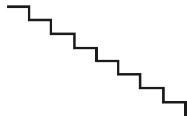
BUDGET. The TEQs budget sets the quantity of units to be issued each year for twenty years.
CARBON EMISSIONS. The greenhouse gases (mainly carbon dioxide) released when fuels are burned to release energy.
CARBON UNIT. The unit of account when TEQs are used to control carbon emissions: one kilogram of the carbon dioxide released when a fuel is burned. Other greenhouse gases are measured in units whose global warming potential (GWP) is equivalent. For instance, one carbon unit of a gas whose GWP is 30 times greater than that of carbon dioxide is one thirtieth of a kilogram of that gas.
COMMON PURPOSE (aka Collective Motivation). Shared effort to reach a shared goal, where collective aims are advanced by the individual purpose, and individual aims are advanced by the collective purpose.
ENERGY POLICY COMMITTEE (aka Carbon Policy Committee). The independent committee that sets the Budget and revises it as necessary.
ENTITLEMENT. The units allocated as an equal per capita grant to all adults.
GOVERNMENT. The authority responsible for providing the practical help needed to achieve the energy descent defined by the Budget.
ISSUE. The distribution of units via the Entitlement and Tender. One year's supply is issued at the start, and is topped up each week.
LEAN ENERGY. The three part programme which implements the energy descent defined by the TEQs Budget: (1) energy conservation and efficiency; (2) structural change – building the potential for the local supply of energy, goods and services; and (3) renewable energy systems designed to match local conditions; all linked by local grids.
PLANET. The place that is cared-for by national TEQs schemes within an international framework such as Contraction and Convergence.
RATING. The quantity of carbon dioxide (or equivalent in other greenhouse gases) released when a given quantity of fuel is burned, expressed in units. For instance, one kilogram of carbon dioxide is released by about 2½ litres of diesel oil, which therefore carries a rating of 1 unit.
REGISTRAR (aka QuotaCo). The database (and its management) which keeps track of the unit accounts of all energy-users.
TENDER. The auction which releases units to business, Government and all other energy users.
UNITS. The points which are surrendered whenever anyone buys energy. Depending on the application of the TEQs system, these might be carbon units, petrol units, gas units, etc. Each of these is a type of TEQs unit.

## 1. INTRODUCTION

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We need to develop a common purpose in response to two problems. There is the climate problem: oil, gas and coal produce the greenhouse gases that are raising the temperature. And there is the supply problem: reserves in the ground are being used-up rapidly; in the coming years, there will be deepening scarcities. We therefore need to manage an energy-descent, cooperating in solutions and alternatives as we go, maintaining a fair distribution of the energy on which we all depend, and starting as soon as we can.

This little book is about that energy descent. TEQs (Tradable Energy Quotas) are a system which achieves a phased, planned reduction in carbon emissions and in the use of the oil, gas and coal which produce them, while at the same time ensuring equal and fair access to energy. It includes everyone – individuals, industry and the Government – and it enables users to sell the TEQs units they do not use. It brings everyone together in a single scheme. It supplies the incentive to take the long-term action needed now to achieve a transformation in the way we will be using fuel in the future. It is fair. It is simple and practical. It gets its results by uniting us all in the common purpose.



## 2. TEQs AND YOU

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TEQs are a very simple idea: an electronic rationing system with most transactions automated. They are designed for minimum hassle in our daily lives and maximum impact on our use of energy.

What, then, would it be like to live at a time when our energy use is shaped by TEQs? Imagine TEQs are up and running. What do they mean for you? How do they affect your day...?

### **You, an individual**

Every adult has an equal and free Entitlement of TEQs units. When the scheme opens, your Entitlement for one year is placed in your TEQs account; then, each week, your account is automatically topped up with another week's supply. You can check how many units you have through the Internet, or by telephone, or by texting your account from your mobile, or via an ATM cash dispenser.

When you buy fuel – petrol for your car, or electricity, gas, oil or coal for your home – you pay for it in the normal way (in money), but you also surrender TEQs units to cover your purchase, and this is done in whatever way is most convenient:

- The cashier could swipe your TEQs card through the reader, to deduct TEQs units from your account.
- If your TEQs account details are on your credit- or debit-card, the cashier will deduct units from your TEQs account at the same time as taking payment for the cost of the petrol from your card account in the usual way.
- If your household fuel bills are paid by direct debit, the TEQs units you have used can be paid by direct debit, too.

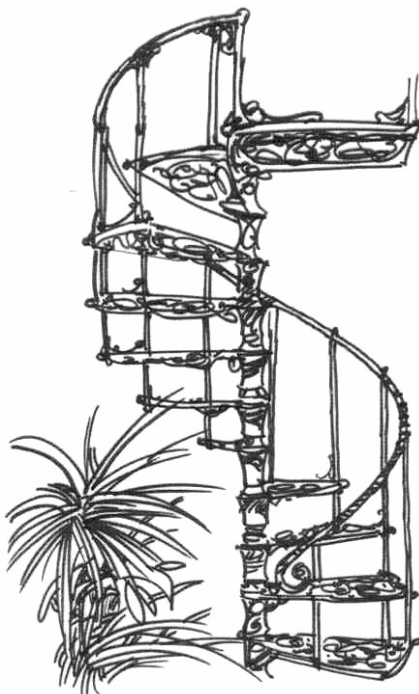
Now, imagine that you are economical in your use of fuel. Your car may be a small one, or perhaps you don't have a car at all. Your house may be well insulated, and you may be economical with heating, even on cold days. You get the benefit of all this, not only by saving money on fuel, but also by spending less than your Entitlement of TEQs. That means you can sell them, and the money will be automatically paid into your bank account.

Or, if you are less economical, and want more units, you can buy them.

So, there is very little to it – for now. You are scarcely aware of the extra transactions that are going on when you buy fuel, since most of them are done by credit- or debit-card, and by direct debit. You will be reminded that the *whole national economy* has to live within the limits set by the TEQs Budget but, so long as that Budget is large – not much less than the total quantity of energy we use today – it will not make much difference. It is when the Budget has been reduced to the much lower level that will apply in ten years time, or the even lower level of twenty years ahead, that all our lives will be different. Every energy-using thing we do will be different – the way we heat and light our homes, the extent to which we rely on transport, our use of new energy technologies, our choices about how and where to live.

That is, we will have to plan ahead. Our minds will be turned towards the certainty that in the future we will have to get by with half the energy we use now ... and then with a quarter ... and then with even less. Every individual and every family that wants to avoid being caught out when the time comes – having to pay high prices for the TEQs units made available by the reduced TEQs Budget of ten or twenty years' time – will need to start taking action now.

There will be help. The conversion of our way of life to the low-energy future will be the priority for consumers, Government and industry. Learning to live with TEQs will be trivial – barely noticeable. Learning to live in the low-energy economy that they will deliver will be as big a task as can be imagined. This is the focused response to the big, and intimately linked, challenges – climate change and fuel depletion – that are now almost upon us. They call on each of us to be (at least) a bit of an



energy expert, a little bit of a visionary.

### **You, a small trader**

For many of us, there is no sharp distinction between the way we live as individuals and the way we earn our living. Though your office or workshop may be at home, you may go out for the work itself – to meet clients and customers; you may grow your own vegetables at home but also work part-time as a gardener in the neighbourhood. Partly-at-home workers like you are likely to need a car or van for your work but use it also for the day-to-day needs of the family.

If your life includes this mixing of work-life and private-life, then it is likely that you will use your personal Entitlement of TEQs units for your basic energy needs – that is, you will use them first; then, if you need more, you will top them up, and the cost of doing so will be counted as a business expense, in the same way as your petrol and other energy needs. But, of course, your “personal units” and your “business units” are identical: you buy them for your business use in the same way as you may buy extra for your personal needs, and they go into the same account.

And, as a small trader, you will need to think about how your business must change in order to carry on when energy is scarce, and when the price of TEQs units is likely to be high. Or, you may begin to think about transforming your business drastically. In the future, there will be increased demand for new energy and insulation systems, for local food (free from the costs of long-distance transport), for midwives who can deal with home births (saving long car-journeys to hospital)... Some small businesses will suffer in the face of energy-scarcities; others will prosper. But TEQs can help: they concentrate the mind; they make planning ahead a necessary business skill; they make it second nature.

### **You, a company or institution**

The TEQs-trading done by a company is, of course, distinctly separate from that of its employees. Companies will have to buy all the TEQs they need on the market, and they will generally do so in the easiest possible way – that is, by giving instructions to their bank. Each week, the bank will take part in the Tender (the primary market for TEQs), where it will buy enough TEQs units to meet the needs of all its customers; it will then distribute them, recovering the cost of the units from customers' bank

accounts by direct debit.

So here, too, administrative trouble and distraction is kept to a minimum. Companies will buy and sell energy in the same way as before, except that now they will be paying in TEQs units as well as money. And well-managed companies will also want to monitor their stock of TEQs units, and their use of them, quite carefully. They will want to keep a big-enough reserve to ensure that they can pay for their energy needs week-by-week, but they will not want to build up a large stock which would tie up cash.

And, as in the case of households and small traders, they will have a powerful motive to plan ahead. The descent from the high-energy economy of now to the Lean Energy economy of the future will transform large businesses just as much as it will transform the lives of people, and the minds of companies will be concentrated on the question of how to use the opportunities and cope with the threats that the low-energy future will bring.

### **You, a bank**

Here is a market in which you can provide a new service for your clients by buying and selling TEQs on their instructions. The accounts of TEQs users are not kept by the banks themselves; instead, they are kept by the TEQs Registrar (QuotaCo). And yet, QuotaCo does not handle money; its job is entirely to sustain the Register of accounts. Therefore, when someone wants to buy or sell TEQs units from his or her account, he or she has to find a market-maker – usually, a bank – who can carry out the trade, instructing QuotaCo to switch the traded units between accounts, paying the person who sells his or her units, and being reimbursed by the buyer.

And banks are central, too, in the primary market, into which they distribute the units issued by the Tender.

Is there money to be made from all this? Yes, but the competition will be sharp and transparent. As a market-maker you will always ask a higher price for the units you offer for sale than you will bid for the units you want to buy – that is, there will be a “spread” between the two prices – but if the spread gets too wide, you will quickly be in trouble: no one will want to buy units from you at the high price you are asking for, nor sell to

you at the low price you are bidding. Adjustments back towards the competitive norm will take place thousands of times a day, ensuring that the market, and your participation in it, is efficient.

This will be an essential, fast-moving service. It is your participation in it as market-makers that brings it to life.

### **You, a child**

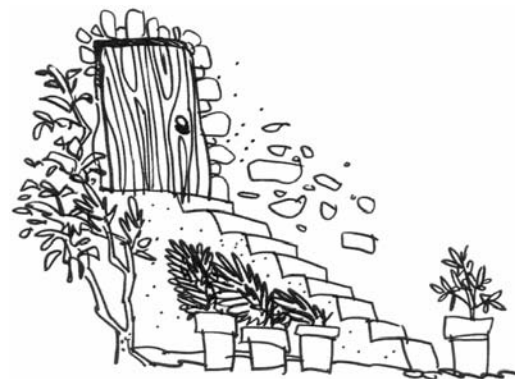
If you are a baby, burning up as much oil, gas or coal as your mother and father, well, I am sorry to say, you are being a little wasteful. You don't have to buy petrol for your car, you live in a house which is already kept warm for the other members of your family, and you spend a lot of your time asleep. You are included in the scheme, but in another way: if your family really has to use more energy to meet your needs, and is having trouble in doing so, then the child allowance which the family receives on your behalf could be increased accordingly. But don't worry – your time will come. When you are old enough to drive a car, you will qualify for a TEQs Entitlement of your own. You might then decide that the smart thing to do is to do without a car, save money on petrol, sell your surplus TEQs units and use the money for something else: to help a smart kid like you through university, perhaps.

### **You, if you really don't want to know**

No computer? No mobile phone? No bank? No interest? No address? No problem – at least as far as TEQs are concerned. A TEQs account will be set up for you automatically, and you will be able to cash in your TEQs units from time to time, with arrangements for access – such as visiting

your local Post Office – working in the same way as those which already exist for social security payments.

Or, indeed, you may be fully equipped with computer, bank account, car and flashy life-style – and *still* not want to know. Fine. You can ask your bank to sell all your TEQs units as soon as it

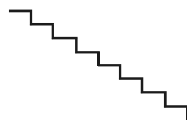


receives them. The cost of the units you need when you buy petrol and fuel will be added to your bill, and in this way you can live in splendid isolation from the whole scheme. But there is really no point in doing this. For a start, you will be paying a little bit more for the units when you buy them back than you received for them when you sold them, but there is a more important reason than that for not opting out: the big reason is that that you will be in for a shock when TEQs units get scarce in the future. It would save you a lot of trouble if you started thinking about the scheme, its purpose – and its future – now.

### **You, the Government**

You, too, are bound by the scheme. You have to surrender TEQs units every time you buy energy. You have to pay for your energy in units with the normality and certainty that applies to energy bills now. You will bid for TEQs units at the weekly Tender, along with the banks. And you have the moral authority that comes from having to live within the scheme: as the Government, you will be taking your own medicine.

It is from that position as a participant that you will be able to provide leadership for the energy descent, guiding, helping, training, encouraging, sorting out difficulties, thinking ahead, making sense of it all, learning from your own experience as well as that of everyone else. It will be a test of your intelligence and leadership. And in one way it will make life easier for you: when international negotiations commit you to reducing energy demand and carbon emissions, you will be able to do something about it. With TEQs in place, you can agree to ambitious international targets – and you can achieve them.



## 3. TEQs EXPLAINED

There are two ways of reducing the demand for fossil fuels. Taxation of fuels is the most obvious and widely canvassed one, but there are problems with it. It is hard to set a rate of tax which changes the behaviour of higher-income groups without causing unacceptable hardship for people on a lower income. Taxes are poorly defended against politics. And, as the price of oil and gas rises, taxation only raises it higher still, making a bad situation worse.

The other solution is rationing – guaranteeing a fair distribution of fossil fuels along with the reduction in overall usage – but achieving this all in a way which is very different from the coupons-and-scissors methods of the past. With the benefit of modern information systems...

... the rations can be distributed among consumers electronically;

... they can be traded; and

... a Budget can be set which maps out a path of reduction in fossil fuel consumption (and in the emissions it represents) well into the future.

Various tradable rationing schemes have been devised. Some, designed to reduce emissions of carbon dioxide and other pollutants by large companies, are already being applied in practice. Several schemes designed to include consumers in the rationing process have also been suggested.<sup>1</sup> The design of one such scheme, TEQs, has been worked out in detail.<sup>2</sup>

TEQs are intended for use within a national economy, alongside an international system for reducing carbon emissions from the planet as a whole. A well-known approach to international trading, called "Contraction and Convergence", would require nations to converge towards a point at which each nation's right to pollute would be in proportion to the size of its population.<sup>3</sup> Another model – the Depletion Protocol – would smooth the rate of decline in the consumption of oil as supplies become depleted, sustaining fair access to the remaining reserves.<sup>4</sup>

TEQs make it possible for ambitious international targets to be carried out domestically – that is, within nations – by giving nations control of

the rate at which the consumption of fossil fuels (oil, gas and coal) is reduced, while sharing out the available supply fairly, and maintaining flexibility in prices. To keep the story simple, it is assumed for the moment that the main intention of the scheme is to reduce emissions of carbon dioxide (carbon emissions), but they are equally suited as a way of rationing the use of particular scarce fuels such as oil or gas (see “Rationing and TEQs”, p 25).

### How TEQs work

The starting-point is the TEQs Budget which sets out the volume of carbon emissions that will be permitted each year in the next 20 years. The Budget, which determines the Issue – the number of TEQs units that will be issued in each year for the next 20 years – rolls forward week-by-week. Part of the Issue is an unconditional Entitlement to all adults; the remainder is sold by Tender, a form of auction modelled on the issue of Treasury Bills: units are distributed via banks and other outlets, to all other energy-users – to industry and services of all kinds, and to the Government itself. The units can be bought and sold, so that users who cannot stay within their Entitlement can top it up, and users who keep their fuel consumption low can sell their surplus.

TEQs are a hands-free scheme, with virtually all transactions being done electronically, using the technologies and systems already in place for direct-debit payments and credit-cards. The scheme has been designed to function smoothly, not only for people who actively participate in it, but also for those (probably the great majority) who are happy for it all to be done automatically through their credit-cards or by direct debit, or who are too infirm to take an active part in it – as well as for overseas visitors who do not have a TEQs account.

#### *The market for units*

Now, let us stay with the presumed primary use of TEQs – that is, as a means of reducing emissions of the greenhouse gases that are changing the climate. In this case, the TEQs unit is defined specifically as a “carbon unit” – that is, one kilogram of carbon dioxide, representing the carbon emissions produced by the combustion of the fuel itself, plus the combustion of the other fuels that were used in extraction, refining, generation and transport. All fuels carry carbon ratings. Nitrous oxide, methane and other global warming gases are rated in “CO<sub>2</sub>-equivalents” –

the number of kilograms of carbon dioxide that would produce the same amount of global warming as one kilogram of the gas being rated. Approximate guidelines for illustration of the carbon ratings of the main forms of energy in use are shown in the box:

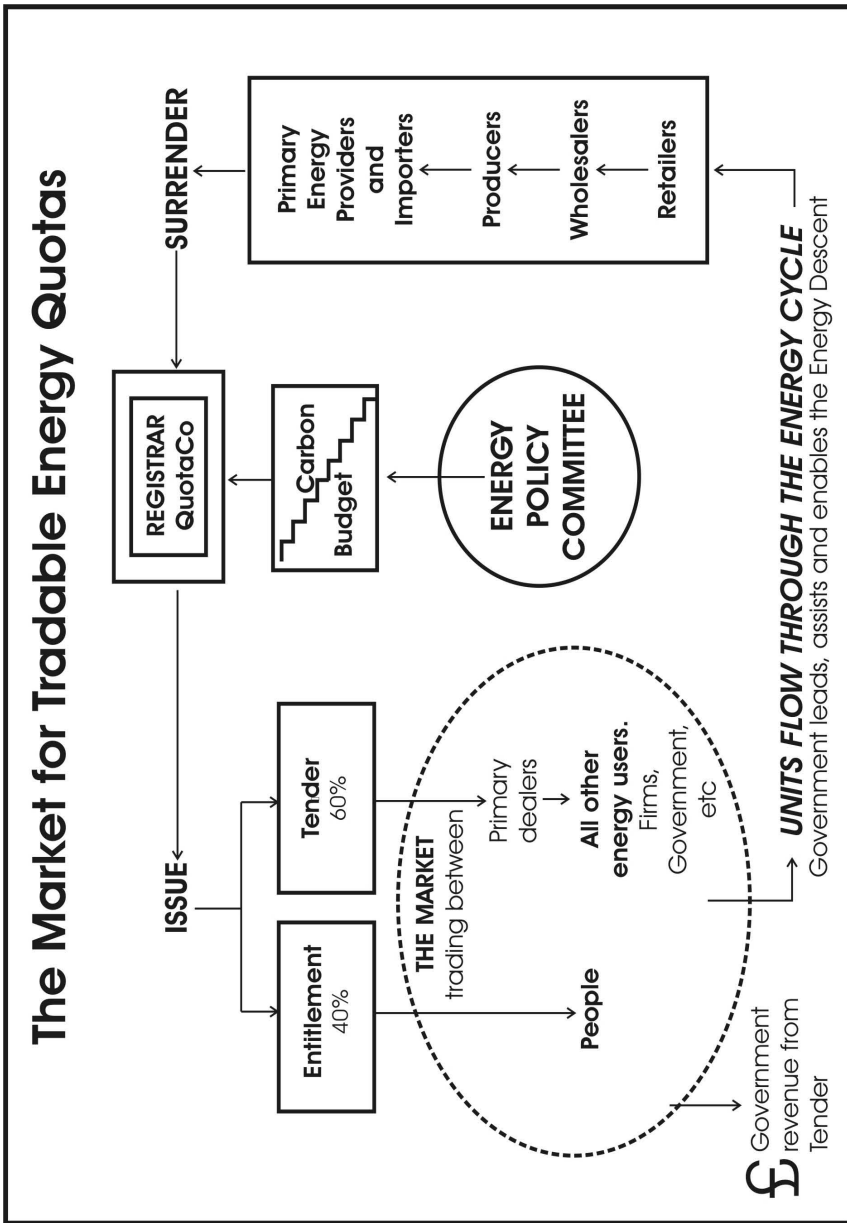
<b>Translating Emissions into Fuels<sup>5</sup></b>	
Estimates of the global warming potential (GWP) of gases released by the production and combustion of fuels. 1 kg carbon dioxide = 1 carbon unit. The GWP of methane and nitrous oxide is measured as carbon dioxide equivalents.	
<b>Fuel</b>	<b>Carbon units</b>
Natural gas	0.2 per kWh
Petrol	2.3 per litre
Diesel	2.4 per litre
Coal	2.9 per kg
Grid electricity (night)	0.6 per kWh
Grid electricity (day)	0.7 per kWh

The market for units works as a sequence. At the start, there is the Registrar (called QuotaCo); this is a computer database which holds individual carbon accounts for all participants in the scheme, like the accounts that are held for credit-cards and collective investments.

The diagram shows how carbon units are placed on the market. The Entitlement for all adults, comprising households' direct consumption of fuel and electricity, accounts for about 40% of all emissions in the UK. TEQs units representing this share of all carbon emissions are issued to adults on an equal per capita basis. (Children's energy usage is provided for by the flexible system of child allowances.) The remaining share (60%) is issued through the Tender to all other users – companies, small businesses, public bodies and the voluntary sector; it is then distributed by the banks to organisations using direct credit (for the units) and direct debit (for the payments). All TEQs units are identical, and are traded in the secondary market, to which all participants in the scheme have access.

When energy-users make purchases of fuel or energy, they surrender units to the energy retailer, accessing their quota account by (for instance) using their TEQs card or direct debit. The retailer then surrenders TEQs units when buying energy from the wholesaler. Finally, the primary provider surrenders units back to the Registrar when it pumps, mines or imports fuel. This closes the loop.





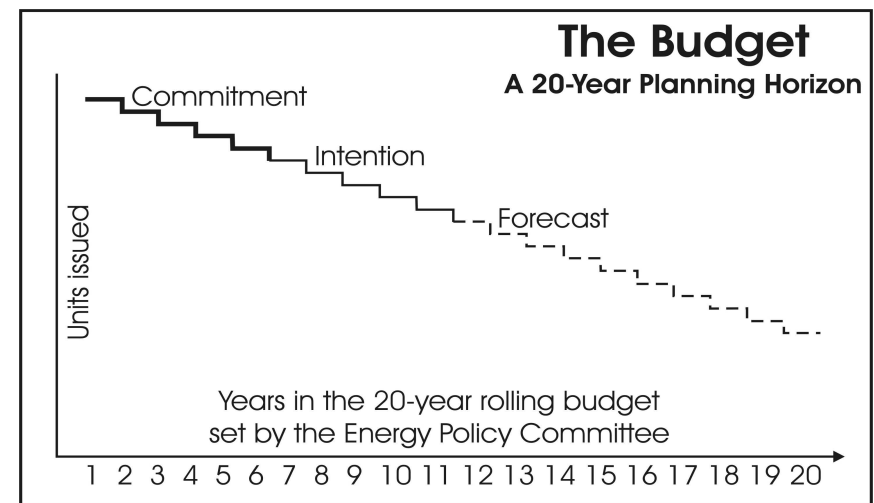
Some purchasers will not have any TEQs units to offer at point of sale – for example, foreign visitors, or people who have forgotten their card or cashed-in all their quota. All these must buy units when they purchase fuels, in order to surrender them; this will be done in a single transaction, with the cost of units being added to the cost of the fuel.<sup>6</sup>

The Government receives revenue from the Tender, and a trading margin is earned by the market-makers who quote bid and offer prices. TEQs units are bought and sold on the “secondary” market. Purchases and sales of units are made on-line through home computers, through automatic teller machines (ATMs), over the counter of banks and post offices and energy retailers, and/or by direct debit with energy suppliers.

### The TEQs Budget

The 20-year TEQs Budget is defined over three periods.

- Period 1 is a 5-year binding Commitment, which cannot be revised except by *force majeure*.
- Period 2, the 5-year Intention, is inflexible; the presumption is "no change", but it can be revised for stated reasons at an annual review.
- Period 3 is a 10-year Forecast, which is a “robust guideline”. It is a rolling Budget: as Year 1 passes, a new Year 20 is added.

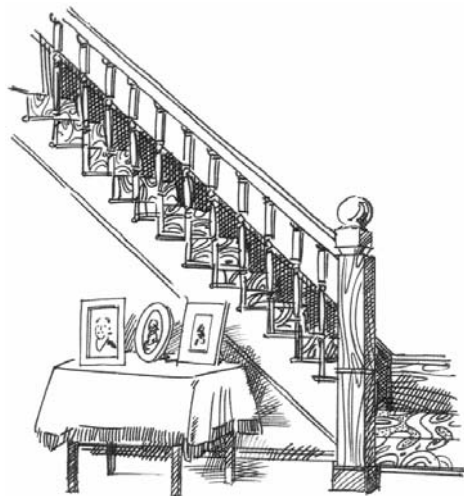


The Budget is at the heart of the scheme. It guarantees the intended reduction in carbon emissions from the use of energy, and it provides notice of the reductions that are to come. Deep cuts in carbon emissions take time; people will need to take action *now* in the light of their knowledge of the quantity of carbon units that will be available in the future. The Budget provides the long-term signal needed for this. There is an automatic reward in the form of lower unit prices if the economy adjusts smoothly and efficiently to the ever-decreasing quantity allowed by the TEQs Budget.

The TEQs Budget is set by the Energy Policy Committee, an independent body like the UK's Monetary Policy Committee. This will relieve the Government from having to defend the Budget, providing protection from the political process, and (this is critical) allowing Government to concentrate on helping the economy to achieve the targets that the independent body had set. There is a separation of function: the Committee sets the ambitious targets contained in the Budget; the Government's role is to enable the political economy to find ways of meeting those commitments.<sup>7</sup>

### Carbon reduction as a common purpose

Withdrawal from dependency on fossil fuels will be an extremely ambitious and difficult programme. It will be achieved only if it is done as a joint, cooperative task – that is, if there is common purpose. It will be in the individual's interests not only to reduce his or her own carbon-dependency but also to cooperate with others, to encourage and collaborate with them to do the same. Everyone is given a stake in the system. There will be a sense that one's own efforts at conserving energy will not be wasted by the energy profligacy of others, and that the system is founded on justice.

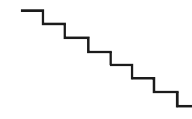


TEQs provide the basis for this common purpose in two connected ways. First, the fixed quantity makes it obvious that high consumption by one person leaves less for everyone else. Your carbon consumption – that is, the extent to which you depend on fossil fuels – becomes my business: I have an incentive to influence your behaviour to our mutual advantage: lower demand means lower prices.

That is, it is in the collective interest that the price of carbon units should be low. A high price would increase the cost of industry's purchases of energy, raising prices for goods and services across the economy as a whole. However, the price of units is ultimately under the control of the people who use them, since the faster they are able to reduce their demand for units, the lower the price. If all energy-users in the economy believe that, by reducing the demand for carbon units, they can have an effect in keeping prices low, then there is an incentive to cooperate to make it happen.

Secondly, the big structural changes – including a substantial localisation of the energy system – that will be needed to achieve deep reductions in dependency on fossil fuels will not by any means be simply a function of individual effort. This is not a negative programme in which individuals are persuaded to reduce energy use (by the use of sanctions such as taxes), but a positive and collective – even exhilarating – incentive to restructure and rebuild the political economy on different principles.

It is a programme in which individual choices are made in a social and economic culture that is intelligently and effectively going somewhere: there is a shared adventure here; it is something that we can achieve only because of, and thanks to, the commitment of so many other people to the same end. Individual choices within the common purpose are profoundly different from choices which the individual makes in isolation. The individual is empowered by other people. It is hard from the standpoint of our current world of individual consumer choices and an austere competitive ethic to realise how powerful that common purpose can be.<sup>8</sup>



## 4. KEY PRINCIPLES

### The Common Purpose

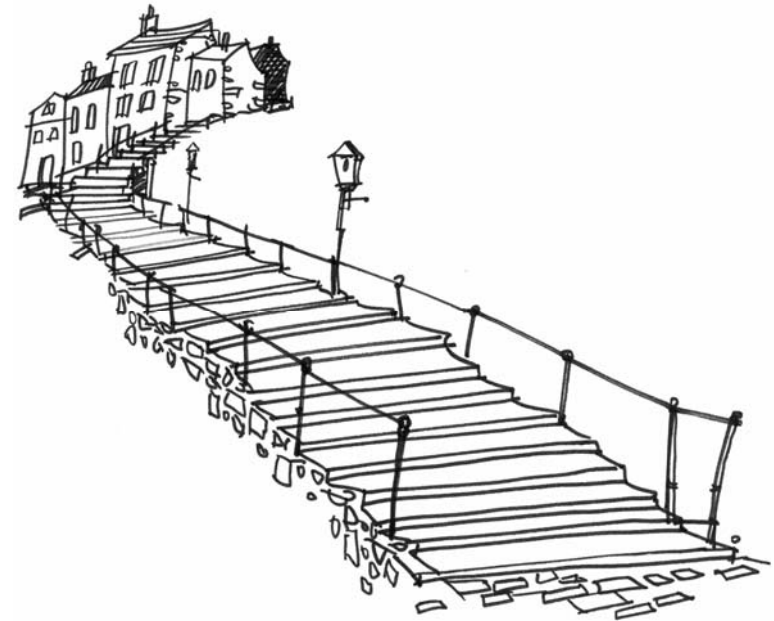
TEQs create a shared incentive to reduce – and to go on reducing – our dependence on oil, gas and coal. Within a TEQs scheme, it is in the interest of everyone to reduce their own demand for TEQs units and to cooperate with others to reduce their demand too: the lower the demand for units, the lower the price – and the lower their expected price in the future. The supply of units is inflexible, so that if demand increases, all that happens is that their price rises. That means that the price I have to pay for units is affected by your demand. And that in turn means that your consumption is my business: if you are a rich person and can afford to buy lots of additional units, you will be contributing towards a rise in the price of units for everyone, so that I, along with everyone else, will have an incentive to encourage, persuade and enable you to reduce your demand for units.

This is one of the ways in which there is common purpose. Here is another: the three elements of Lean Energy – conservation, structural change and the use of renewables (see pages 24-25) – are not things which individuals will be doing in isolation. TEQs will set up a situation in which everyone has more or less the same motivation to move toward the same goal at the same time. Possibilities will open up that have not been available before. Localities will be making their own arrangements to establish and sustain decentralised generation, storage and conservation systems, linked up in local grids. A strong social, economic and practical current will be flowing towards joined-up low-energy, low-carbon solutions, and in many senses it will be easier to go along with this current than to try to resist it.

This means that, at the practical level which really matters, TEQs will be not only stimulating individual incentives to achieve the energy descent, but developing a second “common property”: *common capability*. There are some tasks – notably the task of achieving the energy descent – which cannot be done by individual initiative alone; there has to be a collective and coordinated movement. Individuals become participants in a collective programme, discovering and developing a collective competence. It is a competence which will enable the rethinking of the

structure of the local economy, the location of local producers, and the systems within which they work. New possibilities open up; deep reductions in energy use become available when the locality explores and develops its common capability. And if solutions are developed for energy, solutions for other problems will follow – for energy is the enabling resource for every other aspect of our lives.

These two common properties called-on by TEQs are crucial and powerful, and provide much of its leverage. That leverage is a necessary feature of any progress in achieving the energy descent – the massively ambitious programme of phasing-down the use of the fossil fuels on which the planet’s industrial and economic existence has so far depended.



### A Hands-Free Scheme

The majority of transactions in units will be automatic, using established credit-card and direct-debit technology so that, for most people, the scheme itself will require no extra time and effort at all. This point is critically important: some of the discussion of carbon rationing has paid a lot of attention to the problems of training people in their use. This not only runs the risk of underrating the public intelligence, but also

overrates the complexity of the scheme from the user's point of view. Since almost all transactions are automated, the user barely needs to be aware of it. Even the sale of surplus units at the end of each month, or the purchase of units to sustain a desired opening balance, can be done by standing-order with the bank. The scheme itself leaves strategic thinking at the margins. All the thought, learning and strategy needed is directed towards what matters – actually achieving the reductions in carbon-dependency and energy use that the Budget requires.

Most people will take the option of leaving the whole of their TEQs dealings to automatic transactions. Others will approach it in other ways. For example:

1. People in institutions such as long-term care homes and prisons will usually surrender their TEQs units to the management for the length of their stay (as in the case of the ration books of World War II). For short stays – for hotel guests, for instance – the institution must purchase the units it needs in the market.
2. Foreign visitors will buy units on the market at the same time as they surrender them for each purchase of energy. This, too, will be automated in a single transaction with (e.g.) a credit-card.

### **Freedom from Command and Control**

There are two ways of setting up a system that depends on people taking effective and coordinated action. One way is to issue people with a large number of instructions and regulations, to stand over them to make sure they carry them out, and then to correct the problems that arise when they haven't done so properly. The trouble about this method is that it builds failure into the system; people cooperate because they must, but for no other reason; their hearts are not in it; they do not apply their minds to the invention of better ways of doing it, so that the system fails to make use of the immense resource of ingenuity and creativity which would otherwise be available to it free. And it is expensive, because it needs a lot of non-productive officials to write the rules, to enforce them, and to pick up the pieces when the system fails.<sup>9</sup>

A better way of doing it is to set up the system so that everyone in it has the incentive to make it work: they actually want it to do so; they apply their creative judgment; they monitor their own performance; they create

a momentum and a flow. Success is built-in.

It is the second of these alternatives which has been studied and adopted in the management style known as “Lean Thinking”. This, in its essentials, was invented in Japan following World War II by the Toyota executive Taiichi Ohno and, in its spreading applications across industry and the services all over the world, its results are spectacular, with productivity and reductions in waste improving by factors of 10-fold or more. The explanation is that Lean Thinking designs the system in such a way that it does not depend on “command and control”; on the contrary, it gives everyone in the system the *incentive* to make it work. The system is “taut”, in that it is immediately obvious what needs to be done; mistakes are revealed as soon as they are made; people respond to the system, rather than to a bureaucratic management standing outside it. There is a convergence between the interests of the system and the motivations of the people that participate in it. There is “pull”; that is, actions are accurately pulled along by the system rather than roughly pushed along by authorities responding to the old rules of command and control.

This is the principle on which TEQs are based. Everyone participating in the scheme knows that by certain times ahead – 10, 20 years – they will *have* to be living and working within a defined, and much reduced, limit on their consumption of fossil fuels. They will invent their own solutions; they will take advice; they will refer to guidelines and standards; they will respond to the needs of their neighbours; they will join together in local schemes which can do much more to improve energy-efficiency than any household can manage on its own. But they will not need regulations to tell them what to do.

That does not mean that there will be no regulations; no doubt some will still be needed, but they will be peripheral to the system, and not the motor which drives it along. For instance, it would be unnecessary under a TEQs regime to introduce costly schemes such as road pricing. That is, TEQs are a system of Lean Thinking, which sets things up in such a way that participants who have to live within the Budget will have good, passionate reasons to achieve far more than they could ever have imagined possible. Command and control is obsolete. The results of a model which relies on, and provides the incentive for, the creative intelligence of the people can be spectacular.

## **The Tender**

The Tender is the route by which all energy-users other than citizens obtain their TEQs units. It is a weekly auction, on the model of the Tender for Treasury Bills and other Government debt. The revenue generated by the Tender is hypothecated to – reinvested in – helping us all to accomplish the energy descent defined by the Budget (see Government's Role in TEQs, page 20).

The Tender is crucial. It sets the price from which dealing in the market starts, and gives households the benefit of being able to trade in a large and efficient market. It also ensures that there is one price for units; if there were more than one price – e.g. a higher price for business in a split market, there would be brokering between the two markets, opening up the prospect of illegal trade and of the scheme rapidly breaking down. An individuals-only scheme would in effect exclude consumers from taking into account the energy embodied in their purchases of goods and services (that is, the energy used in their production), and it would provide no workable system for fair rationing and distribution at a time of energy shortages, nor for sustaining a genuine (as distinct from estimated) rating system. There would also be contested boundaries between individuals and businesses: a midwife whose car is for home visits and for personal use...? A writer who works at home...? Accountants, lawyers, regulators and the police would find plenty of work during the brief life of a split TEQs scheme. The principle of a single market for all users and for all purposes is critical to the TEQs system, and it is the Tender that makes it possible.

## **Energy Policy Committee**

At the heart of the TEQs scheme is the Energy Policy Committee (aka Carbon Policy Committee), which is designed and managed on the model of the UK's Monetary Policy Committee (MPC). It sets the TEQs Budget, linking it to wider EU and global obligations with respect to climate change and fuel depletion, and monitors the progress of the scheme, month by month. The Committee is independent of Government, but subject to guidelines laid down in its terms of reference, as in the case of the MPC.

## **Government's Role in TEQs**

The independence of the Energy Policy Committee means that the Government can concentrate its efforts on the major task of helping and enabling the nation as a whole to live within the TEQs Budget with the least possible damage to the economy, living standards, and well-being.

This enabling and encouraging role is a rich one, requiring Government to take the lead in focusing national effort, providing training programmes, and helping to develop the technologies and changes in land use which will be needed. There are clear advantages in the TEQs budget being kept separate from the political process and decided on its own terms. The Government will not be encumbered with having to defend the TEQs Budget, since that will be outside its remit; instead, it is actively and intelligently on the side of the people who have to meet the challenge that the Energy Policy Committee has set.

## **Market Behaviour: Prices and Quantities**

The market is based on the rolling Budget. On the opening day, a year's-worth of TEQs units is issued. After that, they are topped up on a weekly basis so that, on the first day of the second week, a further one-week's supply is placed on the market. In other words, between 51 and 52 weeks' supply of carbon units will be on the market at all times.

The market for TEQs is essentially the same as the market for all other commodities. Prices will be published in the papers every day, giving either formal bid and offer prices, or (for the more distant periods) estimated prices, for every month for the next twenty years. These prices will have a stabilising effect. That is, if the demand for TEQs units should rise, then their price will rise; this will tend to encourage people to reduce their demand, and to offer more units for sale – and that in turn will tend to reduce the price of units.

Prices will be mainly governed by the rate of decline in the TEQs Budget, along with the market's estimations of how well the economy will be able to accommodate itself to these reductions without disruption. But they will be influenced by many factors, of which the following will be among the most important:

1. Changes in the TEQs Budget. The Forecast Period (Years 11-20) will be subject to regular revision as necessary. The Intention Period (Years

6-10) will be reviewed and confirmed annually. The Commitment Period (Years 1-5) is subject only to enforced changes, due to short term *force majeure*. That *force majeure* could, however, be a quite frequent occurrence, owing to interruptions in the supply of oil and gas.

2. Changes in the price or availability of fuel, especially oil and gas. High prices of oil and gas could have the effect of reducing the demand for – and the price of – units, and in this sense, TEQs would tend to have an overall stabilising effect on fuel prices. Reductions in the availability of oil may lead to corresponding revisions in the Budget, ensuring that there is a fair basic Entitlement of fuel, rather than an uncontrolled auction for access to limited supplies. This would have the effect of helping to stabilise the price of fuel. (See Rationing and TEQs, p 25).

3. Changes in the extent to which the economy is able to cope with reductions in the TEQs Budget. If the economy copes poorly, the price of units will rise.

4. Dynamic changes in the market itself. The price of units will be liable to some fluctuations, due to the day-to-day processes of buying and selling. These fluctuations will be slight in the early years, when the price of carbon units is low, but as the market matures, and the TEQs Budget reaches low levels, the demand for units will become increasingly taut, so that the sensitivity of prices can be expected to increase to some extent. However, there is no reason to think that, at any stage, this would be a volatile market.

### The Rating System

TEQs units can be defined in whatever way is needed most at the time, but the presumption is that TEQs should be set up as a policy response to climate change. In this case, TEQs units will be defined on the basis of each fuel's global warming potential (GWP), that is, its impact on the climate. In this context, the key measure is the climate-impact of 1 kilogram of carbon dioxide released at ground level; this is defined as one carbon unit (although, like currencies, it can be traded in fractions of a unit). The "carbon rating" of all other fuels is evaluated in terms of this basic measure. For instance, the GWP of nitrous oxide is about 310 times as great as the GWP of carbon dioxide; if the combustion of a litre of fuel were to be estimated (on average) to release 1 kilogram of carbon dioxide plus 0.01 kilograms of nitrous oxide, the carbon rating of that fuel would

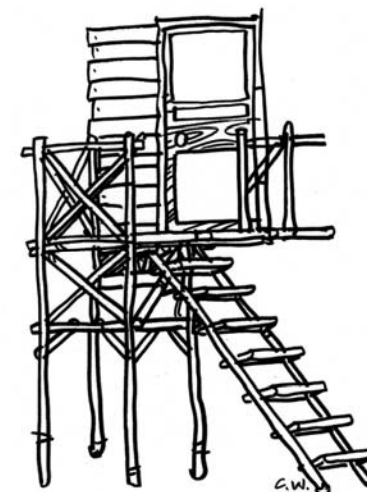
be  $1 + 310/100 = 1 + 3.1 = 4.1$ .

And yet, it is not as simple as that, because the carbon rating of a fuel which you buy (for instance) at a petrol station will undoubtedly be lower than the carbon emissions associated with its whole life-cycle, from the moment it was pumped out of the ground to the moment it gets pumped into your car. Refining, for example, is an energy-intensive process, and if the carbon from these processes were simply omitted, the rating of the final fuel would be very misleading. The final rating for a fuel is therefore not based simply on the carbon released when it is used, or when (in the case of electricity) it is generated: it is based on the energy embodied in it by all the energy-using processes that were required to bring it to the condition and to the place where the consumer buys it. In other words, TEQs are similar to the "value added" principle that underlies Value Added Tax: every producer in the chain adds value, and the final user pays the whole cost, including the tax. TEQs, in this sense, are a "carbon added" system: every producer in the cycle of fuel production uses energy, releasing carbon and adding to the fuel's carbon rating which determines the number of units (of carbon released) in the whole cycle, payable by the final user.

This puts the final energy-users – households, companies and institutions – in control of their energy-decisions, because they know what the actual carbon rating of a unit of fuel is. Without it, a fuel which might seem to be quite energy efficient, with a low carbon-rating, may actually turn out to be the cause of a high level of carbon emissions, by the time all the operations needed to produce and deliver the energy have been taken into account. It also confers direct competitive information: if two fuels with identical carbon emissions on combustion have been produced by processes of sharply-differing energy efficiencies, that difference will show up clearly in their different carbon ratings.<sup>10</sup>

Here, then, are some illustrations of the rating system applied to particular fuels:

1. The fossil fuels (oil, gas and coal): the



rating system takes account of all the energy used, from primary extraction to consumer.

2. When fossil fuels are extracted or imported for feedstocks (plastics and chemicals), the manufacturer surrenders units on buying the primary fuel, but does not pass the demand for units on to customers; instead, the units are purchased through the Tender or on the market and the cost is passed on to consumers in the price of the product.

3. Nuclear energy. Although nuclear fission is not itself a source of greenhouse gases, all the other operations of the nuclear energy industry do involve substantial emissions. As the industry is forced to turn to poorer ores, the total energy balance of nuclear power will decline and emissions will rise further. In addition, more energy will in due course be required to decommission its reactors and to dispose of its waste.<sup>11</sup>

The nuclear industry will need carbon units to surrender to the providers of the fossil fuels it uses, and it will then recover those units from users of the electricity it generates. The final unit-price of nuclear-generated electricity will embody units covering the whole of the energy used at all stages of its production. Nuclear energy has the curious anomaly that most of its waste-disposal costs are not actually incurred until many years after the energy was produced. The industry will therefore be required to prepare an audited budget setting out how much energy will be needed for waste disposal, and those costs will be included in the rating of the energy produced now.

4. Large-scale renewables. Even renewable energy depends on fossil fuels for the manufacture of equipment; biofuels, for instance, need energy, part of which is likely to be from fossil fuels, for processes such as cultivation, transport, refining and distillation. It is essential that these carbon emissions should be made explicit in the carbon ratings associated with the production of renewable energy systems, and this means that renewables, too, will be rated in carbon units. Farm-produced fuels (the biofuels) generally have a poor energy balance; that is, the energy used for cultivation, processing and distillation can be as much as, or even more than, the energy that is eventually extracted. The carbon-added system will make that evident.

5. Very small-scale producers of renewable energy will not require consumers to pay separately for the carbon units associated with the fuel

they provide (e.g. from the manufacture of the equipment, or the fuel needed to harvest biomass). This exemption will apply to all local and domestic producers: e.g. wood cutters, and operators of small local installations such as wind-turbines or the turbines installed in old water-mills. But note that these providers will still have to surrender TEQs units in order to buy the fuels and electrical energy they need in the process of supplying the renewables.

### **Practical Solutions: Lean Energy**

The three key elements of Lean Energy must all be taken forward towards the limit of what is possible. They are:

1. *Conservation*, ranging from advanced technologies to the application of simple changes in everyday practices affecting the use of energy. For example, houses can be designed to conserve energy so well that they are substantially – or entirely – free of any dependence on energy from oil, gas and coal. Cars can be designed to be much more fuel-efficient. Industrial processes have proved their potential for advances in energy efficiency, and incentives for this will become stronger still. Organic agriculture, with greater emphasis on small scale production, crop rotations, closed systems, more use of labour and freedom from fertilisers and chemicals derived from gas and oil, makes better use of energy than industrial agricultural systems.

2. *Structural change*. The political economy of the future will require radical reorganisation in its use of space and distance; it will develop the “proximity principle”, which requires goods and services to be produced close to where they are needed; it will move towards localisation. Examples: local food production; local generation and distribution of energy; localities enriched economically, socially and culturally to the point where they can provide most of their needs from local resources. The transport-dependent systems of today will become obsolete, as our society evolves and reorganises itself for a more rational use of land.

3. *Renewable energy systems*. Solar power, wind power, water power, and the other renewable sources can make an adequate contribution to energy supplies if, and only if, they are applied in an energy system in which high standards of conservation and structural change have already been either achieved or planned, so that the renewables systems can be designed for properly-defined purposes, on specific sites.

All these three practical ways of achieving the needed energy descent – the Lean Energy strategy – will require at least twenty years’ intensive effort as the primary, overriding objective and common purpose of the Government, industry and citizens. TEQs provide the framework that will be required if that is to be achieved: that recovery from massive energy-dependency is already at the very limits of what is possible. Its difficulty and urgency tend to be underestimated.

### **Rationing and TEQs**

So far, TEQs have been discussed mainly in the context of climate change. However, although climate change is itself a supremely urgent issue, it is becoming increasingly apparent that an equally imminent shock is in fact the very high fuel prices and supply interruptions that can be expected in the near future. The policy instrument required in response to fuel shortages is not taxation: that would only increase the price of already-expensive fuel, doing nothing to ensure fair distribution of a scarce resource. Instead, it will be necessary to set up some form of rationing system to ensure fair access to fuel among the population as a whole. The existence of the two problems – climate change and oil/gas depletion – is not a conceptual problem for TEQs; on the contrary, they are complementary; they are two sides of the same story, and TEQs are designed to tackle either – or both at the same time.

The standard procedure for rationing consists of ration books, containing coupons, which are detached by tearing them off or cutting them out with scissors. This is 1940s technology, and there is at present the alarming prospect that it will be the technology that will be dusted-down and used again if or when a rationing scheme is suddenly, and urgently, needed.

But, of course, it has disadvantages. It is messy and troublesome to use. It is easy to forge. It does not transparently include companies and Government under the same scheme. It does not provide easy access into a rationing scheme suited to the many people, such as self-employed traders, who are on the borderline between being private and commercial energy-consumers. It does not permit significant trading of rations apart from very informal and local arrangements between friends. It is expensive to administer. It is inflexible. And paper coupons are clearly a gross anachronism in the age of electronics.

Electronic rationing must inevitably consist of TEQs in some form. There is no other way of doing it. The use of TEQs in the context of fuel shortages would be the same as their use for carbon reduction, except in one respect, namely, that in the case of fuel shortages, the flexibility and potential of the TEQs rating system will prove itself.

Suppose that the supply of oil were cut, owing to forces outside anyone’s control, by a substantial amount. The policy response would be in two parts. First, it would define units in terms of a quantity – e.g. 1 oil unit = 1 litre of petrol, or ~1 litre of fuel oil. Secondly, the total Oil Budget would be set at a level corresponding to the available quantity and expectations of how much will be available in the future. The existence of more than one kind of unit is a complication, but segmentation is intrinsic to any rationing system, which has to be defined specifically in terms of individual goods. The alternative – if TEQs units were used indiscriminately for all fuels, including the scarce fuel (oil) – would have the effect of starting a rush to use units to buy oil, with some users getting all they need and others ending up with none – just what rationing schemes are designed to avoid.

In fact, the complication of product-specific units is not all that serious. A TEQs scheme should be set up in the first place so that this is possible. Since all rationing schemes have to be product-specific, the use of an electronic scheme represents a net gain relative to the alternatives. It could be quickly implemented; it would be flexible; and it would have the advantages of the automated, hands-free quality of TEQs: consumers could (and many undoubtedly would) participate in the scheme without actually having to do anything at all – least of all cut out coupons with scissors.

“Rationing” has bad associations, but it does not deserve them. It is the natural and only way of making sure that everyone gets a fair share of a resource which is in short supply. If – at a time of shortages – rationing did *not* exist, people would be pleading for it. And, in fact, it is equally relevant, whether the aim is to reduce carbon emissions or to cope with oil shortages. If the energy usages that produce carbon emissions were really to be reduced by taxation, then it would be those with least income who would be reducing their energy consumption most. The equitable, effective, efficient and – once it is understood – welcome way of doing it is by a system of rationing.



## **Time and Taxes**

One of the critical features of the TEQs Budget is that it is defined over the long term, looking twenty years ahead. Over that period, there is no doubt that economic conditions, fuel prices, and many other factors will change profoundly, leading to corresponding changes in the price of units. However, there is no reason why these changes should necessarily imply any changes in the TEQs Budget itself: in response to the realities of climate and fuel availability, it can either change or – ideally – remain unchanged while prices adjust around it. It is the flexibility of prices that makes the consistent Budget possible.

It is essential that the TEQs Budget should, as far as possible, be consistent and stable. This is because the profound structural, economic and technical transformation needed for the descent to the low-carbon economy will not be available quickly. Small improvements in energy-saving technology can be achieved quickly: profound changes will require notice; the major changes will take at least twenty years to achieve.

Here, then, is one of the major weaknesses of taxation. No taxation regime can be set for twenty years ahead; it has to be constantly changed, so it does not give a signal for the long term. No long-term signal means no incentive for foresight. TEQs provide the needed signal; they make deep, phased reductions in fossil-fuel use a practical, serious possibility.

## **International Trade: TEQs and Competitiveness**

What would happen if one nation, or a few nations, implemented a TEQs scheme and the majority did not? Well, first of all, it would mean that the defaulting nations would need to achieve their energy descent in other ways. If they failed to do this, then they would be throwing their weight into wrecking the prospects of a successful response either to climate change or to the depletion of oil and gas – and the consequences of that would outweigh any short term benefits won by a competitive advantage in international trade.

Secondly it would mean that the defaulting countries would be failing to develop the low-energy technologies which will be an absolute requirement for successful competition in the international market. It is already becoming harder to sell technologies which do not achieve high standards of energy efficiency, and an economy which had protected its

energy-inefficient industries by not participating in a TEQs scheme or equivalent would be at a disadvantage.

Thirdly, defaulting countries would be making no provision to share out access to oil and gas equitably among firms and households in their populations, despite increasing scarcity and high prices. A nation that does not ration fuel when the time comes will be subject to such a level of social unrest that the question of whether it is a competitive international trader or not will scarcely matter.

## **The Three E's**

### *1. Effectiveness*

TEQs are effective. The Budget is a virtual guarantee that targets for reduced carbon emissions will actually be met. They give a long term signal for action now to reduce carbon emissions in the future. Some simple measures can be taken to reduce carbon emissions and energy use almost immediately (such as switching off the lights or driving a smaller car), but we have to face up to the really decisive reforms that are needed: deep improvements in energy-efficiency and conservation; structural changes in the use of land, transport, food production and in the use and disposal of goods; and a new generation of renewables designed for the specific needs of specific places. To achieve this advance towards Lean Energy will take years of sustained planning and development. The TEQs Budget defines the scale of the energy descent that is needed, and provides the advance notice that will be needed to achieve it.

### *2. Equity*

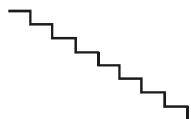
TEQs are equitable, in that they supply an equal per capita Entitlement to carbon units. And there is no Government body manipulating the prices and taxes; it is citizens' own scheme.

### *3. Efficiency*

TEQs are efficient because they respond accurately to demand and other changes in the economy: there is no need for the Government constantly to make adjustments to prices as an input to the system. The price of units is not an input into the scheme, but a symptom of how well the economy is coping; it is the quantity of energy or carbon emissions that is defined; prices adjust flexibly around that quantity as the economy

searches for the most efficient ways available to it.

TEQs are also efficient in their appeal to the common purpose – setting up a system in which the energy descent becomes a shared aim. They are defined in terms of the actual use of energy, not price; people's minds will be focused directly on saving energy, rather than on the more general and indirect question of how to allocate their household Budgets. It can be expected that, faced with this sharply-defined incentive to reduce fossil fuel consumption, consumers will devise ways of doing so as efficiently as they can.



## 5. POTENTIAL OBJECTIONS

### **Are TEQs really as effective as claimed?**

Suppose that households and industry just gave up and made no effort to reduce their demand for fossil fuels: the prices of TEQs units would rise rapidly; hardship stories and the political fall-out would be so awful that the Government's nerve could crack and the scheme itself could be abandoned. And yet, any instrument is vulnerable to a failure of will. TEQs stand the best chance of placing the responsibility where it belongs: in the hearts of citizens. Energy-descent programmes in which the decision-making takes place in the bureaucratic uplands, and in which citizens are told what to do, or which twist citizens' arms by imposing taxes, are less likely to inspire willing and inventive cooperation.

People sometimes suppose that the TEQs scheme does not extend to air transport. In fact, it does cover the airlines, and it makes them bear the cost of the TEQs units in the usual way, rather than letting them off the hook by allowing them to claim back from their customers the units they have had to surrender in order to buy the fuel. Either way, the end-consumer ends up paying for the units, because the airlines have no other source of income apart from their customers. In fact, the competitive pressure on them is particularly intense if the cost of units has to be incorporated into the price of tickets, rather than simply added on in the form of units, tempting the airlines to shrug them off as just another tax.

But there are three important principles here. First, there is embodied energy in every product and service we buy, and all uses of energy are covered by TEQs. Therefore no consumer purchases at all are excluded from the TEQs scheme. Secondly, TEQs are a guarantee that the limits to carbon emissions, or to energy-dependency, specified by the Budget, will actually be achieved. There is no need for any further complication or regulation: the scheme will certainly deliver, and it is up to us all to work out how to adapt to it. The less intervention there is – the less interference by regulation and change – the more will it be trusted, and the better will it work. Thirdly, the central policy problem relating to airlines at present is that they are not subject to any fuel taxation or regulation on carbon emissions at all – but this is changing. When the airlines' exemption has been ended, as it soon will be, it will be possible to

bring them within the reach of national TEQs schemes, requiring them to surrender units for their energy purposes, like every other company.<sup>12</sup>

### **Are TEQs really as equitable as claimed?**

No instrument can claim to be entirely equitable. For example, people who live in remote areas may (relative to city-dwellers) have the disadvantage of having further to travel to work, and people with low incomes would have the disadvantage of being less able to buy top-up carbon units on the market than those on high incomes. And yet, there are compensations: people in rural areas would be much better placed to provide themselves with energy. There may be equity anomalies in the scheme, but not insoluble ones. And there is positive change at work here: present conditions are the point from which improvements and adaptations start.

Children do not receive the adult Entitlement, but they are included in the TEQs scheme through child-allowance schemes, adapted to provide the flexibility needed to produce fair solutions for the particular circumstances of families and children. This is to avoid the problems of equity and efficiency that would arise if every new-born infant automatically qualified for a full adult TEQs Entitlement. Babies can need a lot of energy – e.g. for heating – but infant-care methods which required the same amount of energy as the average car-driving householder would be startlingly inefficient.

It should be noted that the equal per-capita Entitlement for adults is itself rather inflexible. People who need more energy (because for instance, they have to drive a long way to work) have the same Entitlement as people who work at home. It seems unjust, but the point is that the inflexible equal Entitlement is itself doing a vital job; it provides a powerful incentive for every energy user to make the changes needed to live as energy-efficiently as possible. If people were to be compensated for the energy-inefficient aspects of their lives, that would defeat the purpose. The equal per-capita Entitlement focuses the mind on the need to cope with the situation as it is; it reveals the realities. In this sense, TEQs are a mimic and forerunner of climate change itself, which will not discriminate on the basis of need. If we are to seek equity, the first essential is to be individually and collectively effective in mitigating climate change and in coping with the energy deficit. These two massive

events give equity a new meaning – or rather a new application: it means equal effectiveness in being prepared.

Could people go into debt on the TEQs account? No. No overdrafts are allowed; if you overspend on your unit account, the energy retailer simply buys (at your cost) the units needed to cover your energy purchases and surrenders them for you.

### **Are TEQs really as efficient as claimed?**

If TEQs caused energy-costs to be volatile, that would be inefficient, but there is reason to expect that, under a TEQs regime, they would be *less* volatile: high fuel prices would reduce the demand for units, tending to reduce their price (and vice-versa), so that – for the total (fuel + units) cost of energy – there is a stabilising effect.<sup>13</sup>

What about fraud? There is no reason to believe that there would be any more fraud in the market for TEQs than in markets for any other asset. Credit card fraud does not destroy the credit card system. Moreover, the TEQs market is essentially self-regulating: the energy company that sells you the fuel has to claim back from you the units it surrendered when it bought the fuel in the first place: units are pulled round the energy cycle, and it is in the interests of every participant to be sure that the chain remains unbroken.

But would it not take a lot of development? Well, here is one thing to remember about the scheme: it invents nothing; all the systems and technologies needed already exist in other applications. A scheme which monitored everyone's *carbon emissions* would indeed be complex; the technologies don't exist, and setting-it up could take at least fifteen years.<sup>14</sup> But a TEQs scheme, based simply on surrendering electronic units when purchasing *fuels* would be lean and efficient. Fifteen months? When a thing really needs to be done quickly, it can be.

### **Wouldn't taxation be simpler and more effective?**

The unsuitability of taxation for the task of reducing carbon emissions needs to be frankly recognised. Here are some reasons. If taxation were high enough to influence the behaviour of the better-off, it would price the poor out of the market, placing it at the centre of political indignation, and consuming the attention and effort that now needs to be focused without hesitation or deviation on the energy descent.

The focus of the scheme must be clearly and steadily on the long-term programme, sustained over many years, of reducing energy-dependence. There needs to be a framework to guide this, but this is not a job which taxation can do: it is impossible for tax to give a long-term steady signal: if it remains constant, it will be inappropriate at certain periods of the economic cycle; if it fluctuates, it does not provide the steady signal.

Taxation would take money from people just at the time they need it most: to achieve the needed reductions, they will need to spend substantially on a whole range of structural changes and technologies, and it is essential that they should have as much discretionary income as possible to enable them to do this. There needs to be an incentive to plan ahead and, perhaps above all, there needs to be a reliable Entitlement/rationing system in place, so that when energy depletion hits in the form of failures in the supply of oil and/or gas, everyone is guaranteed a fair and equal ration.

And taxation is based on the assumptions that the authorities know what people need to do, and that they won't do it unless pushed – in effect fined for not getting on with it. The energy descent, by contrast, requires a clearly-defined framework whose difficulties can only be solved by the application of local ingenuity and brilliance. Only detailed ingenuity can work out what really needs to be done, using particular local opportunities and coordinating action among local people to make it happen. Tax throws away the main asset available to the energy descent: local brilliance. TEQs, by contrast, depend on “pull”; they stimulate people's creative intelligence; they make brilliance feel wanted.

That is, taxation should concentrate on what it is good at – raising money. For a full comparison between TEQs and tax as a means of achieving the energy descent, see the table on pages 34-35.

### Wouldn't TEQs work better alongside existing large-company carbon trading schemes?

No. This would involve double-counting – that is, some companies would have to surrender carbon units twice over. The only way to avoid this would be to exempt companies subject to schemes like the EU ETS from surrendering TEQs units when they buy energy, but this is not feasible, since large companies would still have to surrender units when they bought fossil fuels; their energy-suppliers would require them to do so in

A COMPARISON OF TEQs AND TAX	
TRADABLE ENERGY QUOTAS	TAX/CREDIT SCHEMES
1. <i>A Guarantee.</i> TEQs are a guarantee that the reduction set by the TEQs Budget will actually be achieved.	<i>No Guarantee.</i> If taxation is high enough to be effective, it will not be accepted politically; if low enough to be accepted, it will be ineffective.
2. <i>Time to plan ahead.</i> The TEQs Budget gives a clear long-term signal of the scale of the reduction over 20 years. The Budget is constant; prices adjust round it.	<i>No time to plan ahead.</i> Taxation levels cannot be set for many years in advance. The essential property of foresight is lost from the scheme.
3. <i>Equity.</i> Units are distributed to all adults on an equal per capita basis. This mimics the effects of energy depletion and climate change, and reveals energy uses which most urgently need attention.	<i>Inequity.</i> If taxes are set high enough to influence the rich, they will be intolerable for the poor. But a complex system of exemptions would distort the signal, suggesting that wealth and special cases are exempt from the problem.
4. <i>Leaves money with the consumer.</i> The high cost of achieving the transition and the possibility of an economic downturn makes it necessary to leave as much money as possible with the consumer.	<i>Takes money from the consumer.</i> Households have to pay for poor energy performance, reducing the money they have left to invest in improvements.
5. <i>Both for energy scarcity and the climate.</i> TEQs are a single scheme designed as a response both to climate change and energy scarcity – two aspects of the same problem	<i>No relevance to energy scarcity.</i> Taxation has nothing to contribute as a response to shortages in the supply of fuel; its use would simply make high energy prices higher still.
6. <i>An assured ration.</i> TEQs guarantee that every person can obtain his or her entitlement or ration of energy. When energy depletion takes effect, it will be essential to have some form of electronic rationing in place.	<i>No assured ration.</i> Taxation leaves individuals exposed to the risk of being unable to obtain any energy at all when oil and gas get scarce.

A COMPARISON OF TEQS AND TAX	
TRADABLE ENERGY QUOTAS	TAX/CREDIT SCHEMES
7. <i>Specified in terms of energy.</i> The problem is an energy problem, and it will call for imaginative energy solutions. It needs therefore to be specified in terms of energy.	<i>Specified in terms of money.</i> The tax is one more charge on the household budget – a punishment for failure – not a positive incentive to think about energy.
8. <i>A hands-free scheme.</i> TEQs are self-monitoring, with most transactions being by card and direct debit; the focus is on finding ways of achieving the energy descent, not on the energy-descent itself.	<i>A hands-on scheme.</i> Users have to cope with the system of charges and credits; the scheme attracts time and attention which should go into inventing energy solutions.
9. <i>Government is there to help.</i> The Government does not set the TEQs Budget. Instead, its role is to enable everyone (itself included – it is bound by its own scheme) to achieve the energy descent.	<i>Government is there to punish.</i> It sets the tax for people who do not reach its imposed standard. It stands to benefit financially from failure to reach that standard.
10. <i>Competitive advantage.</i> First-movers have the benefit of lower energy costs, energy-saving technologies and services, and provision for fair distribution of energy at a time of scarcity.	<i>Competitive disadvantage.</i> Taxes which are high enough to get results are high enough to raise the costs of production.
11. <i>Pull.</i> TEQs are based on Lean Thinking, which gives people the responsibility for engaging their own and the community’s intelligence in response to particular local detail and opportunity.	<i>Push.</i> Taxation intervenes with broadly-based instructions with no regard to local problems and opportunities, showing that people needn’t take the trouble to think because the Ministry knows best.
12. <i>The Common Purpose.</i> TEQs achieve a convergence between individual aims and the collective purpose: <i>you</i> are motivated to do what is in the interests of <i>everyone else</i> (and vice-versa).	<i>No Common Purpose.</i> Taxation is directed at individual motivation: the individual does not care what other people have to pay. And if you can afford the tax, why bother to get together with others to reduce it?

order to recover the units which they themselves had surrendered. It would be incoherent – and impossible in practice – to sustain two concurrent carbon budgets, covering different, but overlapping, areas. Even if it were possible, it would set up a market in which there were two prices for the same good – an anomaly which black-market arbitrage would quickly destroy.

There is no inconsistency between TEQs (an *intranational* trading scheme) and international trading. But that international trading will be between nations, not between users within different nations. Nations can define their national Budgets in accordance with an allocation arrived at by any combination of negotiation and trading that may be required, including international offset arrangements if that were appropriate. But there is then no trading of TEQs units across national boundaries.<sup>10</sup>

### What happens if the unit price falls?

It is a common misunderstanding that a low unit price would make the scheme ineffective. The TEQs model is defined in terms of quantity (of units), not in terms of price. So long as the Budget stays in place, it does not matter how far prices fall, since what we need is a fall in the quantity of carbon released (or fossil fuels consumed), and that is guaranteed by the Budget. Indeed, it is an important secondary aim of the scheme to do everything possible to keep the price of units *low* – because low prices would mean that the economy is proving that it can adapt to the Budget without acute pain and inefficiencies; it is especially significant for the poor, and for everyone’s ability to invest in the energy-saving solutions they need, that unit prices should be low. We are used to thinking in terms of prices, not quantities. The climate and the oil peak are quantity-problems: TEQs are a quantity-response to match.

### What about the effect of a TEQs scheme on economic growth?

It is sometimes claimed, with regret, that effective action on climate change will have a cost in terms of a reduction in the rate of economic growth.<sup>15</sup> This merits reflection:

(a) An effective programme would include major improvements in conservation, with corresponding savings in the cost of energy. It would also bring a reduction in intermediate goods – the “regrettable necessities” which we have to put up with, but from which we do not

actually get any joy. Examples: long-distance travel and transport, notably of food, congestion, poor waste-management, the costs of treatment for the ill-health arising from air pollution. If these were substantially diminished by the energy descent, then we would have more money to spend on the consumer goods that we actually want, so that in real terms any fall in national income would be mitigated; it could even rise.

(b) But let us suppose that economic growth did in fact technically fall as a result of the programme. It would be a mistake to assume that this mattered, because the fall in growth would be due to the fact that labour and capital, which would otherwise be directed into growth, is in fact redirected into implementing climate solutions. No problem: the main reason why we need economic growth is to maintain full employment, providing jobs for people who, in the absence of growth, would otherwise lose their jobs with every labour-saving technical advance. If the climate action maintained near-full employment – and it would certainly be a job-provider – the critical task of sustaining a stable economy would be achieved.

(c) This goes a little bit deeper. The reason we are facing problems of climate change and the oil peak in the first place is because the market economy has enjoyed two centuries of economic growth. But a system that depends on continual growth contains an inherent contradiction which will lead in due course to its collapse. Sooner or later growth must stop. The climate will not be stabilised and the planet will not be saved until growth stops – although indeed we may have overshot by now. Growth is the central dilemma – we are damned if we do, and damned if we don't – and it has to be solved, starting now.

If the action delivered by TEQs did bring an interruption in growth, this should be regarded as evidence that we are not just beginning to solve the symptoms of carbon emissions and energy deficits, but actually facing up to the essential contradiction in the political economy of the modern world.

### **Why not make a good scheme like this international?**

International commitments can no doubt be sustained by forms of trading, but that takes place in a different market from the market for TEQs. The international scale is covered by complementary schemes

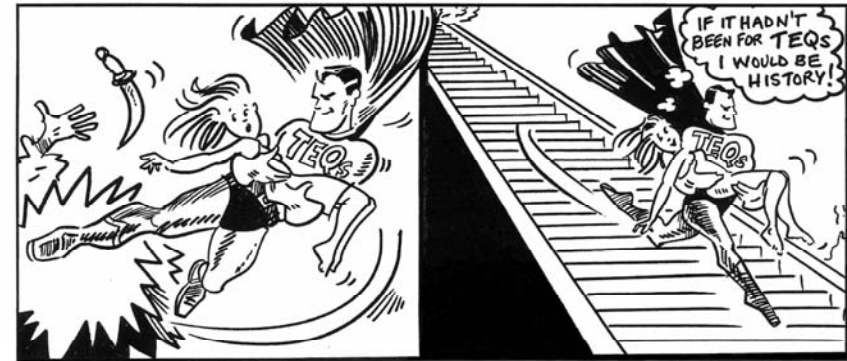
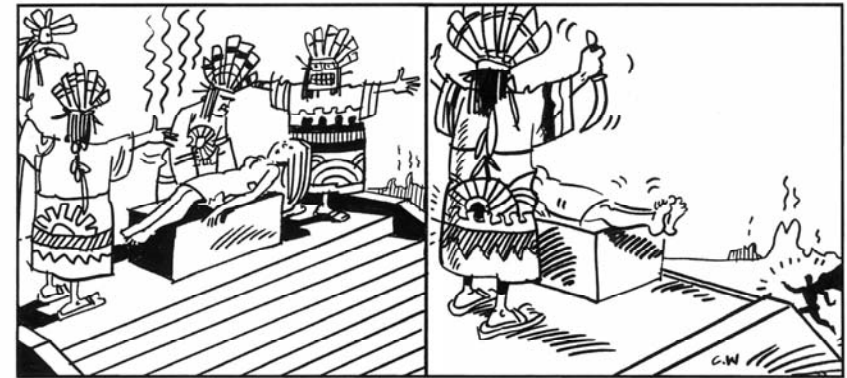
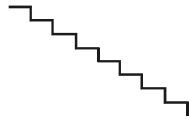
such as Contraction and Convergence or the Oil Depletion Protocol.

TEQs are designed to work on a national scale *within* an international scheme of this kind: they are not themselves suited as an international/global framework. They depend on collective motivation on a scale in which individual effort is seen as being significant: there is a sense of “we”. That shared belonging may look attractive also from the point of view of the fate of the whole planet, but a scheme intended to align individual motivation with collective aims only works on a scale small enough for the individual to see his or her actions as significant. There has to be good reason to believe that everyone with access to the system is cooperating: no theft, no wreckers – or, at least, not enough for people to lose confidence in it. It does not work on a scale so large that the individual loses the sense of belonging, or the belief that his or her personal contribution makes a difference.<sup>16</sup>

A planet-wide TEQs scheme would, moreover, be unstable, since it would be vulnerable to breakdown anywhere in the world; and it would either lose the essential element of a single Budget, or else it would attempt to set a single one-size-fits-all Budget, which would be unfair and unsuited to the wide diversity of conditions between individual states.<sup>10</sup>

International schemes must have the flexibility to allow different nations to consume different quantities of energy. There are many reasons for this: the degree of their current dependency on oil varies; as do the extent of their willingness to commit to reductions on fossil fuel dependency, and the extent to which they have access to indigenous supplies of oil and gas. Moreover, at a time of global energy scarcity, Governments will vary in their ability to make fuel purchases at a high cost in the international market, and then distribute them at lower cost through rationing schemes in their domestic economies. For reasons such as these, the carbon budgets of nations will vary very substantially – at least until the “convergence” part of Contraction and Convergence comes into effect in terms of the actual usage of fossil fuels. If a TEQs scheme were designed as an international programme, consumers in different nations would be constrained by carbon budgets which had no relation to their current needs and dependency, and the scheme would become swamped with massive flows of money between energy consumers in different nations.

Climate change and the oil peak are global problems, and in that sense they need a global solution. But it needs to be a systems-literate, modular global solution. It is helpful here to bear in mind the “Systems-Scale Rule”: *large-scale problems do not require large-scale solutions; they require small-scale solutions within a large-scale framework*. TEQs, here the smaller-scale system within a larger (global) framework, is itself the larger (national) framework for smaller-scale (local) energy descent plans. And these national TEQs schemes do not have to come into being all at once. A first mover is needed, a pioneering nation that thereby not only becomes the role model for the rest of the world, but also gets ahead with the technology and with the rationing system that will be needed when the oil outages start. There are advantages for the nation that moves first.



## 6. SUMMARY

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The establishment of national TEQs systems would be a step of historic significance.

### 1. *The common purpose.*

TEQs provide a common framework for action: there is a common Budget, so every decision you make affects the price of units for everyone else. At the same time, the shared aim to achieve the energy descent becomes so strong that it is easier to go along with it than to resist it. Every good decision makes it easier for others to make good decisions: collective aims are advanced by the individual purpose, and individual aims are advanced by the collective purpose. This is the first essential condition for success.

### 2. *A generic scheme.*

Electronic rationing has to take – more or less – the form of TEQs. The alternative is to dust-down and reuse the obsolete system of ration books and scissors.

### 3. *Double competence.*

The intensity of the emerging problem of declining reserves of oil and gas could commit us to deeper reduction targets than any foreseeable policy-response to climate change. However, TEQs are equally suited as a response to fuel depletion or climate change, or indeed both, and the model can and should be developed with both these purposes in view.

### 4. *A guarantee.*

The TEQs Budget sets clearly-defined limits to carbon emissions (or to the quantity of particular fossil fuels). Those limits are set for a long time ahead, allowing consumers and industry alike to make realistic plans to participate in the energy descent. The Budget is robust and constant, needing little or no revision or intervention, however much the economy may fluctuate through crises of, say, depression or inflation. Fuels are obtainable only by the surrender of units. All this amounts to a guarantee that the limits set by the Budget will actually be met.

### 5. *Separated powers.*

TEQs separate the task of setting the TEQs Budget from the quite different task of enabling all participants to live within it. The Government's role is that of the enabler; everything it does is focused on helping us all to live within the energy limits which the Energy Policy Committee has set. This *positive* leadership is central to the scheme.

### 6. *Freedom from Command and Control.*

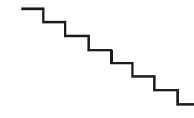
TEQs are designed within the principles of Lean Thinking. They make regulation and the other apparatus of the state substantially redundant. They set a long-term Budget within which all participants will have to contain their consumption of fossil fuels. It is then up to the participants themselves to decide what measures to take in order to achieve those results. Creative judgment and success is built into the system.

### 7. *The international dimension.*

By showing that it is possible to achieve a deep, orderly energy descent, TEQs will enable nations to commit themselves to deep reductions. The pioneering nation which first adopts TEQs not only becomes the role model for the rest of the world, but also jumps ahead in the technology and expertise that will be needed when the oil outages start, and when the energy reductions demanded by climate change begin to bite.

### 8. *Simplicity.*

The TEQs model is simple. The more you understand it, the simpler it becomes. And yet, some people have found it complicated. The thing is, if you don't know about the core principles of the rating system, the Budget, the Energy Policy Committee, the Tender etc, well, yes, it's not just complicated: it's incomprehensible. If you think it is complicated, start again with the Brief Guide at the beginning of this booklet. Soon you will realise that, from the point of view of the consumer, it is as simple as walking downstairs. Then we can concentrate on the complicated bit – achieving the deep practical reforms affecting every aspect of our lives. That provides all the complication we need. Seeing the simple and straightforward as simple and straightforward is good for the planet.





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