

Factor 10:

**Fiscal Reform,
Resource Productivity,
And Employment**

Yannis Paleocrassas

II. Factor 10: Fiscal Reform, Resource Productivity And Employment

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Executive Summary

Classical economists considered land and other basic resources as one of the three basic factors of production, but within this category *some resources were more equal than others*. Land, minerals and other *scarce* resources were priced and entered into the market mechanism, while air, water or grass were considered free and ignored. Costs associated with their use or abuse were termed *externalities* and charged to the general taxpayer of today or to future generations. Thus the polluter and the environmental destruction that he causes is subsidised by our socio-economic System to the tune of 14% of Gross Domestic Product (GDP).

The tax system, which could rectify such price distortions, ignores them and instead concentrates on taxing human effort. In the European Union 84% of tax revenues, equivalent to 34% of GDP come from taxation of labour and other personal income. This situation has very important implications for relative prices and produces unsustainable consumption, production and investment patterns. It encourages the over-use of natural resources and is largely responsible for high and persistent unemployment. Moreover, such impacts are perpetuated through technological development, which receives the wrong market signals.

The large scale destruction of natural resources, which is typical of the “throughput economy“ is reinforced by such financial and accounting mechanisms as the formula of *present value* or *accelerated depreciation of equipment*, which lead to built-in obsolescence.

As taxes account for 41% of European GDP they represent a formidable tool in bringing about a more sustainable socio-economic system. A shift of taxes from human effort to resource use could produce almost immediate results. A minimum critical mass of taxes equivalent to 15% of GDP should be shifted. Social insurance contributions, VAT and personal income tax are recommended for drastic tax reduction, while a comprehensive range of existing and new Resource Extraction Taxes (RET) should be raised correspondingly. The change should be neutral, as regards the overall tax burden, but would have some beneficial fiscal repercussions because resource taxes admit very little tax evasion and present very low collection costs.

Important examples of the proposed resource extraction taxes (RET) are a *packaging tax*, a *commuter tax* and drastically revised *land and building rates* to reflect land use and urban planning policies. Their obvious impact would be to reduce packaging, material use and waste; to bring closer home and workplace; and to arrest urban sprawl as well as very high density development.

Other economic and financial instruments such as tradable pollution permits, returnable containers, environmental impact or risk assessments, revised depreciation and present value formulas, voluntary agreements, eco-audit and eco-label schemes, pollution reporting

schemes may all contribute to the above change, each in the area where it is more efficient and expedient. But regulation and legislation should not be forgotten in the areas where taxation and the other economic and financial instruments are not operative.

The various instruments are effective in different ways. Some have more immediate impact than others and some are more efficient than others. On the receiving end, the various parts of the socio-economic System have a different rate of response. The economy, because of the market mechanism, responds quite quickly to structural changes, such as the ones envisaged above. Technology responds over a longer term, due to the necessary gestation period. Finally, the system of human settlements is the one to respond with most delay, because it is the one least integrated with the market and mainly because its operators, as well as those of other sub-systems fail to perceive the inter-connection.

There is no doubt that fiscal reform in its broadest sense is a powerful tool in the attainment of Factor 10. Because it makes the connection among the various sub-systems via the market mechanism, which has proved to be the most efficient resource allocator. It connects consumption, production and investment patterns with technology. It integrates the Operation and planning of human settlements with the economy, society and technology. It is the catalyst in restoring the cohesion of the entire system, in re-integrating into it environmental and other social values, in preventing its fragmentation and obsolescence.

1 External resource costs

In the Introduction resource productivity has been defined as the *material input* MI per *unit of service* 5. Therefore resource productivity = S/MI. Service as defined in this context, is not equivalent to the service sector and its output in economic terms. It is a much broader notion applying to the *service obtained* from the use of various goods and facilities. In terms of classical economics, therefore, it applies to the use of the product of all three sectors of production, i.e. primary (agriculture, forestry, fisheries, mining), secondary (manufacturing, energy and construction) and tertiary (services). Consequently, *Service* in the above equation comes closer to the economic terms of *final consumption* or *consumer utility* including such dimensions as environmental or social utility.

Material input on the other hand represents the sum total of natural resources used to produce one unit of *service*. As mentioned earlier, this sum is called a *rucksack*. The rucksack of a ton of steel for example is the sum of the soil that was excavated to reveal the iron ore, the iron ore itself, the material and energy that went into the transport of it, the material and energy used in the blast furnace, etc. We should point out that there is no basic difference between positive use of a resource, such as using a mineral as raw material, or abuse in the form of pollution. In using a ton of mineral you reduce by that increment the total stock of that mineral available for other people and for future generations.

However, not all resources are the same from the point of view of the impact of their use on the environment. In the case of non-renewable or finite resources, such as minerals, the diminution of natural wealth is permanent and irreversible. If it proceeds to the point of depletion or extinction only substitutes can be used in its place.

In the case of resources capable of *reproduction* the damage is not so permanent. If the resource is used at a scale that does not exceed its *reproduction* or *regeneration rate*, we may have a more sustainable Situation, provided that its production, and transportation use are organised in sustainable ways. Erosion, for instance would have to be kept to extreme low values. This applies for example to forestry, fisheries or animal breeding.

The case of *pollution* or abuse of natural resources is very similar. Because all natural carriers such as air, sea, rivers, lakes, groundwater, soil have a certain carrying or self-cleaning capacity for pollutants. Provided the amount of pollutants is kept below this capacity we may not have pollution, or if you like we may have a „sustainable pollution“. Indeed such sustainable pollution or attrition is a basic feature of all eco-systems which are generally dynamic and not static. Nevertheless, synthetic products of technical origin may place a more severe burden on natural self-cleaning.

Finally, we have the cases of use or abuse of *human* or *human-made* resources, which also present certain similarities. Beyond certain limits over-use or abuse may lead to loss of health and life, to loss of social and cultural values, to loss of social cohesion and disintegration, to destruction of the urban or other man-made environment. But in all these cases you may also keep within a certain scale of tolerable or indeed advisable use, so that you may have a sustainable demographic, social, cultural and urban evolution.

Bearing these basic differences in mind, we may proceed further and consider the relationship of these material inputs to the process of economic activity and the functioning of the market. In classical economic theory land and other material resources used as raw materials were considered as one of the three factors of production, the other two being labour and capital. However, always according to the classical economists, not all resources were genuine factors of production. Land, minerals, or other scarce resources were considered *economic goods* and entered into the market through the price mechanism. Other, such as air or natural bodies of water, or grass were considered *free*, having no price and falling outside the domain of the market.

It is obvious that such a perception of economic activity represents a gross oversimplification. Very quickly economists were forced to recognise that labour is not a homogeneous factor of production. Entrepreneurs for example, or scientists, or engineers do not contribute to production in the same way as an unskilled worker. Labour was therefore qualified and split into different groups. More pertinently to our subject, some natural resources such as water supplied through the municipal system, has a *certain price* (the one we pay to the municipality) and is not completely free. But what is the difference between tap water and spring or river water? Grass has generally no price, but in an animal breeding area it certainly has and is reflected in the price difference between plain and pasture land. Today, in most urban areas, even clean air is not free. We are approaching the point where through the greenhouse gases there will be little clean air at all. Pollution has to be controlled at a cost and therefore clean air has its price. The classical economic division of goods into „free“ and „economic“ has collapsed under the weight of contemporary reality.

Nevertheless, these phoney divisions and unfounded theories have taken their toll. A lot of natural resources were used in the process of production and development with their users paying only part of their value or nothing at all. Water was drawn by industry from the sea,

lakes or rivers used in the production process and discharged in varying degrees of pollution, with 110 payment at all. Clean air was sucked into millions of furnaces burned and discharged as carbon dioxide, with no payment at all. Forests were cut, with timber merchants paying prices that covered only the cost of felling and turning the tree trunks into usable timber, not the cost of replacing the trees. Modern man almost automatically applies depreciation allowances for anything man-made on the basis of replacement cost, but systematically ignores it when it comes to natural capital.

Economists somehow perceived the irregularity and had to fix it. In their neat world of economic abstraction everything has to be pigeonholed. The costs of use or abuse of nature were quickly labeled *externalities* and rapidly pushed out of sight, into this pigeonhole. The theory was that there were no markets for these externalities or that under certain circumstances there were *imperfect* markets. The truth is that there is no clear-cut intrinsic division between external and internal costs. In a large number of areas of human activity, such as education, or public transport, or municipal services, markets are literally created or extensively formulated by State intervention. The State is the ultimate arbiter of what increment of the total costs involved is paid for by the user - and therefore internalised - and what remains external and is paid for by the general taxpayer of today, or is transferred to future generations. The devices that are used in this „arbitration“ are extremely varied and versatile. Regulation by administrative order or legislative decree, licensing, indirect taxes or charges, voluntary agreements are few of this impressive array.

What is certain is that we are not talking about a marginal intervention. In the European Union tax revenues represent 41 percent of the gross domestic product ¹. Even in our world of triumphant free market economy, there is hardly a single area of economic activity which is not licensed or regulated. Labour is „protected“, investors are „protected“, consumers are „protected“, even competition is „protected“. In my view quite rightly too. But then we cannot turn round and talk about *externalities* as if they are God-given, the inevitable consequence of the market economy. The market mechanism is a mechanism not a divine being or even less an ideology. Prices are the language that this mechanism speaks in the same way that Computers speak *cobol or java*. But the extent to which externalities become internalised and more generally the extent to which prices reflect true costs is the result of what we feed into the mechanism as input. Taxation and regulation is the work of governments and parliament, not of the market mechanism. And it is these that largely determine the inputs of prices and consequently the results it produces.

The present Situation in this matter is that most environmental costs associated with material inputs are considered *externalities* that are not covered by the users of the service ultimately produced through such material inputs, but by the general taxpayer. In fact even the general taxpayer covers only part of these external environmental costs: the part, which is covered by the socio-economic System through the repair of environmental damage now. The balance is relegated to future generations.

Let us take a basic source of energy - coal. From an environmental point of view it is the worst source of energy, because it has the lowest thermal efficiency. It produces not only the greatest amount of CO₂ but also of SO₂ and a number of other noxious emissions, notably fly

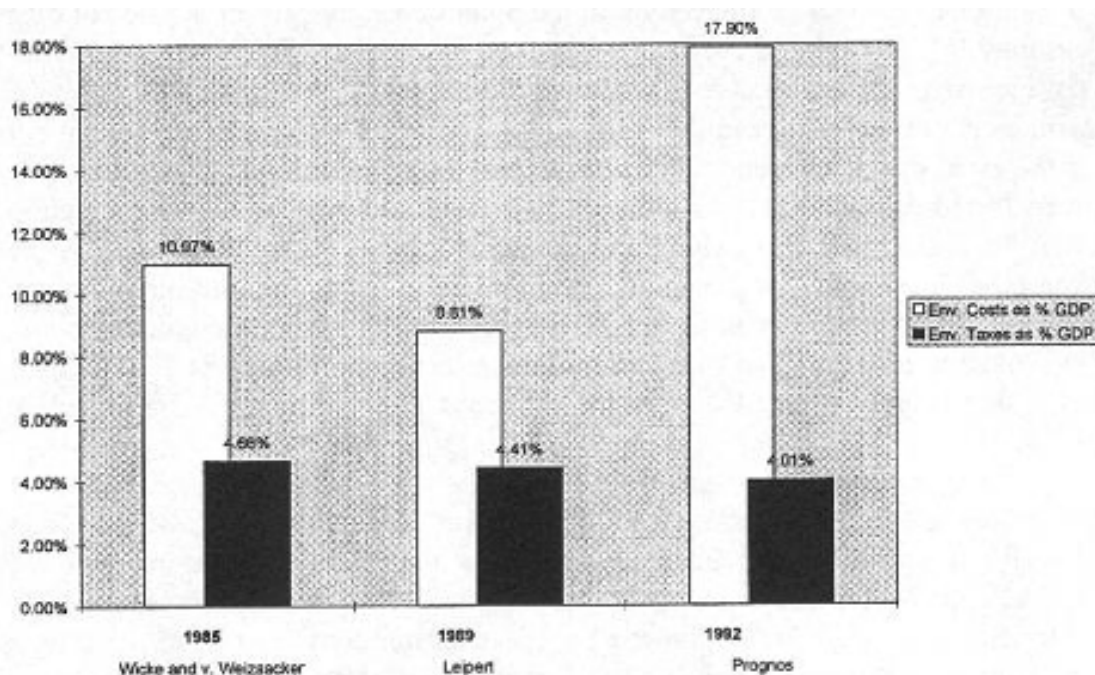
1 See Table 4

ash. It is established that it seriously affects the health of not only miners but of the population living near the mining areas or the power stations. Its external costs have not been calculated to the full, but they must be exorbitant. An indication is to be found in a 1992 study by the research institute Prognos, which calculated the external costs of total energy production in Germany at DM 500 billion equivalent to 18% of gross domestic product (GDP)². Perhaps half of it is associated with coal. And yet 110 attempt is being made to recoup them from either the mining companies or the power generators. On the contrary, in many European countries, particularly Germany, coal extraction is subsidized.

Let us turn next to the motorcar. In a fairly recent study of the Centre for Social and Economic Research on the Global Environment (CSERGE) of University College, London³, it has been estimated that in the United Kingdom only 31-36% of the external costs of road transport are covered by taxes specific to the road user. The rest are covered by the current or future taxpayer.

Unfortunately, there are no comprehensive estimates of environmental costs at the international or even the European level. The author of this Chapter has put together such data for Germany and compared them to the level of environmental taxes, so as to give a picture of the extent to which the polluter is subsidised by the general taxpayer, in Figure 7.

Figure7
Subsidising environmental Destruction,
the case of Germany



Source: External costs derived from data in von Weizsäcker '5 book quoted above. Environmental taxes derived from author 's own research based on OECD, Revenue Statistics, Paris 1996.

2 Weizsäcker, E. U. v., 1994: Earth Politics, Zed Books, London., p. 119.

3 Maddison, D./Pearce, D. et al., 1996: The True Costs of Road Transport, London, Earthscan, Publications, Box 8.2, p.141.

What is the magnitude of total external environmental costs? On the basis of material collated from various studies it would not be unreasonable to place them, in the context of the European Union, at about 20% of GDP. In a study to be published by the author of this Chapter later on this year, an analysis of European tax revenues indicates that environmental taxes, even on the basis of a very liberal definition, hardly cover 6% of GDP. The difference of 14% of GDP. represents a huge subsidy to the polluter.

2 The importance of relative prices in resource allocation

The first step in the establishment of consumer patterns is the basic choice or preference of the consumer for this or the other good. This is embodied in the consumer's demand preference, which is determined on the basis of the perceived quality or utility of each good in relation to its price. Utility is the subjective and price is the objective element in the choice. Price is the yardstick by which we choose among what seem equally useful goods to us. The main function of the price system in relation to consumer patterns is to determine final demand and eventually consumption on the basis of the relative prices of the various goods and services.

Given consumers' demand preferences for a range of goods, the price mechanism assists the consumer in determining his final consumption basket through an evaluation of relative prices. If, for example, the price of beef is £ 8 per kilo and the price of chicken is £ 6 per kilo, a given consumer may buy 1 kilo of each, obviously because he considers the utility or „service“ of beef higher than that of chicken up to the point of 1 kilo. But if the price of beef falls to £ 6, he may buy 1.5 kilo of beef and 800 grams of chicken. The absolute price of chicken has not increased, but its relative price has and therefore he buys less. Naturally, the price mechanism works the same way in the determination of investment patterns. The proper functioning of the price mechanism and indeed of the entire market depends on the accuracy of relative prices. If part of cost or profit is omitted from any price, the consumer is driven to use more of that particular good or service up to the point that his utility for it remains the same. If, on the other hand something is added in the form of a tax or some other charge, consumption shifts. This is material that the reader may find in any basic economic textbook. The reason for repeating it here is that contemporary man has been brainwashed for so long by consumerism, that it is necessary to re-state the obvious in order to drive the argument home.

Correct relative prices are the cornerstone of the free market economy. That is why such an effort has and is still being put into the eradication of tariffs and subsidies on an international basis through GAIT (U.N. General Agreement on Trade and Tariffs) and its successor the World Trade Organisation (W.T.O). Within the European Community, thanks to the Single Market, we do not have to battle with tariffs but an equally large effort is exerted towards the removal of subsidies and other protectionist measures, as well as towards the harmonisation of indirect taxation. Nobody questions the wisdom of this line of thinking. It is taken for granted. Except in connection with the environment and the natural resources we extract or use from it. Here, as already analysed, the system permits or even encourages the subsidisation of the extractor or the polluter, on a very large scale indeed.

The consumption effect of subsidising the over-use of material resources on such a scale, is enormous. If the full environmental costs were charged to the motorcar owner, or the air companies it is obvious that rail and sea transport would receive an enormous boost.

The modal split among the various forms of transport would change almost overnight⁴. In agriculture, modern biotechnology has produced a full range of bioproducts that are perfect substitutes of pesticides, but their current market price exceeds that of chemical pesticides by about 50%. If the soil and water contamination costs were charged to the latter, the bioproducts would become considerably cheaper and replace chemicals on the market, with enormous benefit to the quality of soil and groundwater as well as to biodiversity.

It is extremely difficult to try to measure the enormous shift that would occur in consumption and investment patterns, if the full resource costs (including external environmental costs) were calculated and charged to prices, through the use of resource taxes or other appropriate means. The difficulty is twofold: on one hand, it is difficult to calculate precisely many environmental costs, on the other, it is even more difficult to assume an imaginary eco-tax structure or the behaviour of a tradable permit market. The effort carried out so far by the Factor 10 Club, in calculating material rucksacks of various goods and the resulting MIPS, addresses the first difficulty. The effort beginning with the present report on Factor 10 and Fiscal Reform addresses the second.

However, even at this stage, it is not difficult to guess the areas in which we would see drastic changes, if true material costs were calculated and integrated into the price mechanism. Consumption of fossil fuels and their by-products, many chemicals including, fertilisers and pesticides, a lot of timber, many minerals, motor cars and other machines incorporating internal combustion engines, would register a sharp decline. On the other hand, renewable energy applications, timber coming from “sustainable“ forestry and its by-products, notably sustainable paper, re-cycled products, ships, barges and trains, insulating construction materials, dematerialised products, most of biotechnology products, would register an impressive rise in demand.

So far we have limited the analysis to the direct impact of correct relative prices on consumption and investment patterns. But there is an equally, if not more, important impact on long term developments. We shall concentrate on two of these which are of crucial importance: technological development and the evolution of human settlements.

Technological development in the past was dominated by government, which funded it almost exclusively. This was done, either directly through government programmes implemented in government-owned research establishments, or indirectly through government funding of similar programmes in higher education institutions and industry. Today the situation has changed radically. Government research institutions have been privatised and the funding of these or higher education research has been largely taken over by industry. Only the European Union still implements a large research programme, using mostly universities and their research institutes, as well as private consultants for its execution. But even these Research

4 In David Pearce and others, Op. cit. *an* estimate of external costs of transport in the Netherlands shows that both rail and inland water transport present 1/40th of the external costs of road transport, p. 214, Box 11.6.

Framework Programmes, as they are called, are to large extent target oriented towards development goals. Overall, technology is oriented towards market goals.

The market forces in the area of technology, work through the signals emitted by the relative prices of the factors of production. Technological advance is stimulated by the need for ever-higher efficiency which is directly translated into cost cutting, both in production and distribution. Of course, the reference is to costs incorporated in the price mechanism not external environmental costs, which hang somewhere in the air. It is worth investigating the meaning of this by reference to an example which is typical.

The basic assumptions of this example are the following:

- It refers to a medium sized, labour-intensive, food industry.
- External road transport costs are borne by the State.
- there are no sales or production taxes on raw materials.
- there is a 50% tax burden on labour (social insurance contributions and VAT)
- There is the usual small incidence of VAT on energy, transport and distribution.
- There are the usual special taxes on transport.

The cost and price structure of this typical industrial firm is shown in Table 3. For the purpose of simplification costs are limited to five categories only: materials, labour, energy, transport and distribution. Faced with the cost structure that emerges after indirect taxes have been added, the manager of the firm will be pre-occupied first with the higher cost item, which is labour, and how to reduce it and then, as a second priority with materials and transport.

Table 3
Typical cost structure of a firm

Cost Category	Private Costs (internal)	Present In- direct Taxes	Present Costs (after taxes)	Envir. Costs (external)	Real Costs
(1)	(2)	(3)	(4)	(5)	(6)
				<i>in cost units</i>	
Materials	35	0	35	15	50
Labour	30	15	45	0	30
Energy	5	1	6	2	7
Transport	20	10	30	30	50
Distribution	10	5	15	5	15
Total	100	31	131	52	152
				<i>in percentages</i>	
Materials	35	0	27	29	33
Labour	30	49	34	0	20
Energy	5	3	5	4	5
Transport	20	32	23	58	33
Distribution	10	16	11	10	10
Total	100	100	100	100	100

If, however, taxes reflected the real resource costs (Column 5) and were used to integrate them in the price mechanism, the picture would be totally different. The main difference in the tax structure between Columns 3 and 5 is, **first** the introduction of resource taxes on material inputs plus the substitution of resource taxes in energy, transport and distribution, to cover environmental costs and **secondly**, the abolition of labour taxes which have no environmental justification. Faced with the new cost structure, the manager would be pre-occupied overwhelmingly with the reduction of his transport and materials costs and would not be concerned with labour costs, which would represent only 20 percent of the total. What is more, knowing that environmental costs are higher in road than in rail and water transport he might even resort to some shifts in the mode of transport he is using.

Thus the real costs given in Col. 6 are higher than present costs only in the very short-run. Very quickly management strives for greater resource efficiency and achieves a reduction in transport, material and energy costs. At the same time the shifts towards more sustainable transport would reduce his external transport costs. The final result, as estimated by the author in a separate study is a reduction in real costs, below the level of present costs.

Since it is the managers of this world that send the signals of the market to technology, we can now understand why all modern technology is characterised by a labour-saving mania. It has become a syndrome. The pressure for more efficiency, for more competitiveness, translates directly in our modern lingo into the famous „shedding of jobs“. **No more and no less**. Faced with such overwhelming economic realities it is futile to search for solutions in the reformation of managers and in the change of mentalities, or to try to redirect technology by government edict or funding towards de-materialisation and more generally towards the

environment. By the time these long-term efforts at changing „economic culture“ come to fruition - if they will ever do - natural resources will be totally depleted and the ecosphere will no longer provide services which sustain human life on earth. Having driven, through a perverse tax system, the powerful economic forces in the wrong direction, we would be fools to try to do battle with them counter-deploying mentality change campaigns. It is far simpler to recognise our mistake and reshape the tax system, so as to give the right signals to the market.

The success of such a move can be judged by reference to what is already happening in the world of environmental industries. Under the pressure of environmental legislation and regulation, firms sought the help of technology in order to comply with this pressure. With the market still sending the wrong price signals technology responded with a limited range of products. Even this restricted application of environmental technology to the production process, as we have already seen, brought some double dividends in the form of considerable savings in materials, energy, water and waste. However, because of the above-described distortion in cost structure, this application meant an increase in production costs in the short run. It is only natural that a lot of managers who are not far-sighted will be scared away from any effort. Why pose extra hurdles because of fossilised misconceptions in economic theory and practice? This is the real question.

3 Fiscal reform as a tool of de-materialization

The little example of the industrial firm that was given in the previous section, illustrated how the present tax structure pushes technology inexorably into what we described as labour saving mania. The same example showed that the tax structure does not create any incentives for greater resource productivity or for lower pollution. It is high time we took a closer look at our tax system and its implications on production, consumption and investment patterns.

As a first step let US examine the distribution of tax revenues by main source (Table 4).

Table 4**Tax structure in the European Union**
(Revenue basis)

	1970	1980	1990	1994
<i>As percentage of G.D.P.</i>				
1. Taxes on human Effort	25.2	31.6	33.9	34.3
<i>of which on labour</i>	<i>14.0</i>	<i>18.2</i>	<i>19.0</i>	<i>20.1</i>
2. Capital Taxes	0.5	0.4	0.6	0.5
3. Environmental taxes	7.1	5.4	5.4	5.9
TOTAL	32.8	37.4	39.9	40.7
<i>As percentage of tax revenue</i>				
1. Taxes on human Effort	76.7	84.4	84.9	84.3
<i>of which on labour</i>	<i>42.8</i>	<i>48.7</i>	<i>47.7</i>	<i>49.5</i>
2. Capital Taxes	1.6	1.1	1.4	1.2
3. Environmental taxes	21.6	14.4	13.7	14.5
TOTAL	100.0	100.0	100.0	100.0

Source: Author's research based on OECD Tax Revenue Statistics. For definitions see Appendix 1

Taxes on human effort consist of social insurance contributions (both sides), of salary and other work force taxes, of VAT and of income and profit taxes. Of those, taxes on labour comprise social insurance and work force taxes, as well as 85% of VAT. The assumption here is that 85% of VAT falls on labour and 15% on profits. Capital taxes consist mainly of capital gains tax and other taxes on movable property. Finally, environmental taxes consist of 5 categories: Taxes on land and buildings, taxes on natural! resources (mainly fuel), taxes on vehicles and other transport, energy taxes, pollution taxes and „health taxes“ (alcohol, tobacco etc). Taxes on land and buildings have been included in environmental taxes because the first is levied on a natural resource and the second on man-made environment. However, it is clear that the present motivation behind all categories that come under the heading „environmental taxes“ is far from the protection of the environment and is simply pecuniary. The only exceptions are pollution and energy taxes-but these in 1994 represented only 3% of „environmental taxes“.

The reason why I bothered with the group of „environmental taxes“ at all is that I believe they can be turned into real environmental taxes if their structure is changed, within a broader fiscal reform which will reflect a genuine de-materialisation policy.

Following these definitions and clarifications we may take a look at the figures themselves. What is the story they tell us?

It is really a very sad and at the same time schizophrenic story. In a region such as Europe, where unemployment and the environment are the first concerns of the population, the tax

system severely penalises human effort, from which it draws 85% of total tax revenue, while by default it subsidises the pillage and squandering of natural resources. As we saw earlier there is a gap of 14% of GDP. between the estimated level of external resource and pollution costs and the level of „environmental taxes“ that should at least cover them. The implications of this tragic mistake on our socio-economic System and its chances for survival are enormous. Here are the main reasons for it:

- Taxation really shapes the system. We are not talking about a mere influence or a limited impact, but an economic bulldozer with a horsepower equivalent to 41% of the entire gross domestic product of the European Union.
- For the time being, all this power delivers a sledge hammer blow to employment (with the force of 34% of GDP.). The blow hits primarily labour, but even the part of it that hits profits or other professional income is also a blow to employment. It discourages entrepreneurs and professionals from creating jobs.
- It encourages the over-use of resources by making them cheaper than they really are. This is done in two ways: On one hand, it makes them absolutely cheaper by not charging the full costs to the use of resources (a subsidy equivalent to 14% of GDP.) and, on the other, it makes them relatively even cheaper by over-taxing labour, which should not be taxed at all in a sustainable system. The combined effect is more than 1 quarter of European GDP. **How can either employment or the environment survive under such circumstances?**
- The signals that this Situation sends to technology compound the effect and ensure that this twin catastrophe is perpetuated in the future. Technological development is pushed exclusively towards the direction of labour-saving and receives no impulse from the tax system towards developing resource-saving technologies.
- Persistent unemployment further undermines the social security systems, whose deficits have to be financed by resort to even higher taxation, making employment even more prohibitive. Add to this the inflexibility's of the labour market introduced by „protective“ legislation and the vicious circle closes. The social implications of this vicious circle are enormous.
- The specific mechanism of the VAT imposes on the economy a *throughput compulsion*. VAT on material inputs is deductible from VAT on sales, whereas labour taxes are not. The more your material throughput the less you are taxed and the more profit you make.
- By comparison to the above powerful impacts, the little encouragement that the tax system offers in the form of the tiny energy or pollution taxes, or the tax rebates for environmental investment in industry, or for the use of solar energy in housing, are not of any real consequence.

If we leave for the time being the tax System aside and we move to other parts of the broader fiscal system, such as public utility rates, we observe the same bias. The structure of such rates is regressive in the sense that the more you consume or the more waste you produce, the less you are charged. Again the mentality of mass production and mass consumption is all pervading.

In the para-fiscal areas of company law, accounting and financing one observes powerful mechanisms and established techniques that inexorably push towards ever-higher material use and a near zero resource productivity.

Depreciation rates become higher everyday. Most investment incentive schemes contain even more accelerated depreciation. What does that mean? That valuable and heavy pieces of machinery can be written off in 8, 6 or even 5 years, whereas their technical life can be as long as 15 years and more. Material input per unit of Service on **that score alone** is two to three times what it should normally be.

In the world of banking, insurance, project evaluation, discounting to present value represents universal, unassailable, financial orthodoxy. It is the accepted Financial Religion in the World Bank, the I.M.F., the European Commission, the European Investment Bank, applied to the millions of projects that they finance throughout the world and that shape the future for many decades to come. But that means that humanity over-values the short term and discounts the future. The prices of petroleum, natural gas, other minerals that will start rising considerably in a few decades, as these resources are being depleted, are of no consequence. Most project evaluations do not go beyond ten years, since values beyond that period discount to fractions under $\frac{1}{2}$ at present value. The higher the interest rate you apply to the discount formula the more you are praised by the banks as „**prudent**“ and the lower the present value of future flows. An investment project that embodies material saving technology, producing increasing resource productivity over the next 15-20 years, stands no chance in comparison with a standard throughput-oriented labour saving project, with low and stable resource productivity. The beneficial results of the former are literally discounted away.

However, all these extremely forceful impacts of contemporary fiscal reality should not be examined in isolation. They should be seen in the light of a holistic approach that takes in the entire System. This holistic vision is really frightening. Because the various impacts reinforce rather than cancel each other out. They produce an economic world, in which businessmen, scientists, technologists, financiers, politicians, worship two **deities: material throughput and obsolescence**. This is no wonder. If you combine the effects of subsidised resource prices, prohibitive taxation of employment, the rigidities of the labour market, the regressive rates of public utilities, of subsidised waste disposal, of the depreciation and project evaluation regime, you would be a fool not to worship the two deities.

You would be a fool not to substitute machines (read material) and energy for labour in production. You would be a fool not to over-use road transport in distribution. You would be a fool not to build-in early obsolescence in product design, especially if the local municipality disposes the refrigerator or the car or any other product at the end of its short life, almost cost free. You would be a fool to present any long-term yielding project for financing. In general you would be a fool to consider the future, especially that of future generations. Finally, even if by some intuitive sanity you did not consider yourself a fool, the media, which act under all these powerful impulses, would brainwash you into **believing that you are a fool**.

Having established that without drastic reform of the broader fiscal and financial system dematerialisation and the environment in general stand no chance, let us see what reforms can achieve a turnaround of the present deplorable situation. We shall concentrate in three main areas: The tax system, the tradable permits system, other economic and financial instruments

and finally voluntary and demonstration instruments. This is done in the belief that what we need is not a single and drastic change in one area only, but a broad range of reforms and new instruments. The circumstances of integrating environmental costs differ in various areas and call for different methods and instruments.

3.1 Reform of taxes and charges

The perversity of the present tax structure has been analysed in the preceding paragraphs. Accepting that our tax System is in need of drastic restructuring, what would be the basic directions of reform? The author, drawing on his research of European tax matters but also on his experience as Minister of Finance would propose the following basic changes:

- a) A shift in the source of tax revenue of the order of 15 percentage points of GDP. from labour taxes (including VAT) and income taxes to resource taxes. This represents a minimum critical mass.
- b) A reconsideration of capital taxes on bonds, equities and similar financial instruments, as well as foreign exchange transactions. The present tax discrimination against deposit money has no economic justification. On the contrary, a substantial capital gains tax would take at least some volatility out of the stock and money markets.
- c) A drastic revision of the currently applied „environmental taxes“ so that they fit indeed the purposes of a comprehensive environmental policy.

Such basic moves would produce the following changes in tax revenue structure compared to that of Table 3.

Table 5
Proposed shifts in the source of tax revenue

Category of tax	existing	proposed
<i>percent of GDP</i>		
Taxes on human effort (of which on labour)*	34.3 (20.1)	20 (10)
Taxes on capital**	0.5	(at least) 1
Environmental taxes	5.9	20
Total	40.7	41
<i>percent of total taxes</i>		
Taxes on human effort (of which on labour)*	84.3 (49.5)	49 (24)
Taxes on capital**	1.2	2
Environmental taxes	14.5	49
Total	100.0	100

* including 85% of VAT

** excluding real estate which is included in environmental taxes

This proposal is not as arbitrary as it appears at first glance. It should not be forgotten that the main purpose it serves is the internalisation of environmental costs. As already mentioned, despite the wealth of material existing in various individual studies, at this stage there is no authoritative computation of this magnitude on a European Union scale. We have accepted, however, on the basis of existing research that we are talking about a magnitude of the order of 20% of GDP. But the reader should not construe the proposed level of environmental taxes at 20% of GDP. as representing a 100 percent internalisation of environmental costs. It would be both presumptuous and unrealistic to imagine that the aim of the tax system would change overnight to focus exclusively on the internalisation of environmental costs.

On one hand, a good part of revenues from resource taxes would be accounted for as general taxation. On the other, a considerable amount of environmental costs would be internalised through other methods. In any case, at the first stage of an effort to internalise external environmental costs it would be both impossible and imprudent to aim for full cover. The figure of 20% is the net result. It could well consist of, let us say, 5% as contribution of the group of resource taxes to general taxation and 15% covering internalisation of external environmental costs.

We can now expand on the above proposal in more specific terms as to the spectrum of proposed new resource taxes, including the conversion of existing taxes into more environmentally purposeful instruments. The following range of possible ecological taxes is proposed, under four headings:

On depletable natural resources

1. petroleum products
2. coal
3. natural gas
4. other scarce mineral resources (that have no substitutes)
5. timber (heavier rate on non-sustainable forest timber)
6. water (including water for irrigation or any other use)
7. energy, other than from renewable sources.
8. hunting and fishing (and generally loss of genetic capital)

On pollution and waste

9. vehicle circulation (restructured to reflect harmful emissions)
10. similar taxes to cover the use of other means of transport
11. air, water and soil pollution (excluding transport emissions)
12. garbage collection
13. sewerage
14. toxic waste
15. nuclear waste

On purchase of unsustainable products

16. pesticides and biocides
17. fertilisers
18. other environmentally dangerous chemicals
19. non-sustainable paper
20. other strongly non-recyclable and non-biodegradable products

21. vehicles, locomotives, ships and aircraft (geared to their emissions)
22. diesel engines, turbines and other emission producing equipment

On space use

23. property and buildings (restructured to reflect physical planning policies)
24. disturbance of habitats
25. landscape deformation (cuttings, fillings, excavation (excluding tunnelling) tree cutting)
26. landfills (for waste)
27. commuter tax (varied according to the mode used)

The above indicative list-which is by no means exhaustive-requires a number of explanations, on the philosophy behind it, the difficulties in imposition and assessment and the economic or social desirability of such taxes.

First, resource taxes by concept and definition do not fall into the conventional divisions of *direct or indirect, custom duties or excises, taxes or charges*. In a way they are all excises (non deductible) levied at source, on the purchase and/or use or abuse of certain commodities, natural elements and equipment. In reality we should not talk about a lot of resource taxes but about a **new Resource Extraction Tax (R.E.T.)** with four or five tax rates corresponding to the rucksack of each group of goods or Services.

Second, the philosophy behind this Resource Extraction Tax is obvious. It internalises environmental costs in order to dematerialise production and therefore protect natural resources from depletion, protect the environment from pollution (either direct or indirect) and the landscape and habitats from undue human intervention. The proposed resource taxes will lead to a direct reduction in the size of the rucksack of most goods and services, in the same way that the VAT and the social insurance contributions led to a constant reduction in the labour input of production.

Third, to the extent that such taxation is commensurate with externalities, it establishes correct relative prices and therefore sustainable production, consumption and investment patterns. This in turn stimulates production and technology to search for greater resource productivity, for substitutes with lower material input, as well as towards the development of green (lean) technology and innovation. At the same time it points urban and infrastructure development in the right direction.

Fourth, there is a kind of double taxation of pollution, in the sense that category (b) falls on pollution and category (c) on the purchase of the capital equipment that produces it. This is because sustainable investment decisions, including the purchase of durable consumer goods, are of cardinal importance in establishing sustainable production and consumption patterns. Similarly there is a triple taxation of energy: its non-sustainable sources, its production itself, as well as its emissions and waste. The former and the latter because they fall under the respective categories. Energy production itself, because there is certainly an over-use of energy in general and because producers are more sensitive to taxation than the general consumer.

Fifth, tax rates should vary in accordance with the rucksack but there should be a rebate or a surcharge to take account of regional variations. The environmental cost of the commuter trip

is not the same in London and in the Scottish Highlands, in Paris and in the Alps. Pollution may be relative to the absorption capacity of the carrying medium. Tax rates on depletable resources should also increase as we approach the point of depletion. It is this flexibility of resource taxes that makes them also useful instruments of regional development, technological advance, industrial policy and physical planning.

Sixth, resource taxes-as every other tax-can be both positive and negative, i.e. in the form of subsidies. In this sense the indicative list of proposed taxes may well double. You may have for example a subsidy on sustainable timber side-by-side with a tax on unsustainable. However, in the author's opinion subsidies should be used very sparingly and over a limited transitional period to accelerate or introduce a socially desirable change. Experience has taught us that subsidies are open to arbitrariness and exploitation even more so than taxes.

The practical application and phasing in of such an ambitious spectrum of resource taxes is of course open to debate, best carried out at the national and European level, with the participation of local authorities who would play a more important role in such a tax system. An important aspect of this debate is the compensating decreases in conventional taxes, which would match the introduction of resource taxes, as the overall tax burden should remain the same if not decrease. Labour taxes, including notably VAT are an obvious choice, but I think there is ample ground for a drastic reduction of income tax, if not a total abolition of it, below a certain level of income. Let me take these two points a little further.

Why resource taxes may lead to a reduction in the overall tax burden? The answer is twofold:

First because resource taxes have a much lower administration and collection cost than some of the present taxes, e.g. income tax or VAT. My experience indicates that about 10 percent of personal income tax proceeds go to cover the cost of its administration. The immense paperwork and the cost of its design, printing and postage. The cost of the thousands of income tax officials who handle the annual Olympics of income tax returns. The equal if not higher cost of the officials who control it. The time and cost the taxpayers and their advisors or agents spend on it. The collection points of income tax number millions. The collection points of resource taxes do not exceed few hundred thousand. They may indeed be much less.

Second, because resource taxes are much more difficult to evade. They are levied on physical, concrete units such as litres of petrol, or kilowatt hours of electricity, or motorcars that cannot evaporate. In most cases they are electronically recorded at few central databases, or at worst in the cash registers of few hundred thousand retail outlets.

Now let us come to the taxes that should be replaced or drastically cut. The argument against income tax has been developed extensively. It kills human ambition and initiative and it is self-defeating through its excessive collection cost. Let me add that in practice it is socially unjust too, because it mostly hits wage earners and salaried people who cannot evade it. The self-employed, the entrepreneurs and the rich have ways and means of even lawfully avoiding it. The negative influence of VAT on employment has already been explained. But in addition the VAT is the worst possible tax for de-materialisation. As we proved earlier, it strongly promotes a throughput economy and mitigates any effort to increase resource productivity. Both income tax and VAT are considered sacrosanct in the fiscal world. But from whose point

of view? the taxpayers; the future of humanity; or the tax collectors? Can we allow so many to suffer for so long, for the short-term interests of so few?

As far as resource taxes are concerned there are two standard objections to any debate on their introduction:

- a) They are detrimental to competitiveness
- b) They are socially unjust, as they are not progressive and hurt the consumer irrespective of his level of wealth.

The first is an extremely short-sighted argument. Any indirect tax increases costs, since it is bound to increase the price of the commodity that is taxed. But this applies only to the next day. Because, on the day after, the process of adjustment begins leading to efficiency increases in the use of material resources, to the search for substitutes, in general to a chain reaction in production, consumption and investment patterns, so as to avoid the tax burden. Most environmental taxes lead in the medium if not the short-run to increased efficiency. Taxes on packaging, for example, lead to spectacular reduction in packaging material and costs. A car commuter tax leads to a shift towards public transport and in the longer term to more sustainable choices of residential location in relation to the workplace. The author has calculated in a study under publication that the commuter trip absorbs 8 percent of the European Union GDP. If it was reduced by one quarter the competitiveness of the European economy would increase by 2 percent. We would need to shed about 4,000,000 jobs to achieve the same increase.

The second is an extremely populist if not hypocritical argument for three reasons.

First, most resource taxes can be made to be progressive. In fact what we have recommended by way of tax reform already contains such an element. For example, car circulation taxes geared to CO₂ and other emissions are surely going to hit big car owners less than small car owners; and they are not going to hit those that have no car at all (mostly poor pensioners and unskilled workers). Energy, water, sewerage rates, must be made progressive with increased consumption and even contain an income redistribution element, beyond covering external environmental costs, if the lawmaker wishes it.

Second, the proposal is to use the revenue from resource taxes to reduce labour and low income taxation. The redistribution which will be achieved through this shift will be far greater than any redistribution attained through a progressive income tax.

And third, as we have already observed, resource taxes do not leave the usual loopholes for “legal“ tax evasion, that the present System allows to the rich that can afford expensive tax advice.

However, there is an element of truth in the argument. Resource taxes can be made progressive, but cannot exclude the poor altogether. People below a certain income, or pensioners can be excluded from income tax. But the same categories cannot be excluded from an eco-tax on the small car they may own. To cover such cases in the proposed new tax structure, some living allowance should be instituted to cover the lowest incomes for their increased eco-taxation.

It is time to close this section by some practical examples which will show how some of the proposed resource taxes may work in practice. We need not go into the energy/carbon tax, because this has been studied and analysed extensively. It is enough to quote Japan's experience of a 15 percent increase in energy efficiency, in the period that followed the two energy crises. We shall instead search less well-known areas for examples.

Tax on plastic packaging and non-sustainable paper will force manufacturers to reduce packaging altogether, as well as substitute recycled paper⁵ in the reduced packaging. Both will reduce waste and costs in purely economic terms. Consumers will re-use their plastic bags or even better use permanent shopping bags, as in the past. If you add up these savings through the several cycles from production to waste disposal, you will see an important increase in overall economic as well as resource efficiency.

The commuter tax, on the other hand would be withheld by the employer (together with other tax and insurance withholdings) depending on the employee's place of residence and means of transport used. It should be progressive with the distance and there will be lower rates for public transport users. A rough guesstimate is that it will double the cost of commuting to the private car user and treble it for the motorcycle user, but will only increase it by 10 percent for the bus user and under 5 percent for the train user. It may well provide a strong incentive for a move closer to work, ideally within walking distance. But it will provide an equally strong incentive for a shift from car to public transport and especially train or vessel (wherever the latter is available).

Finally, rates on urban band and buildings if varied in accordance with the environmental impact of space use and with physical planning policies may:

- a) provide a strong pull between residence and employment.
- b) discourage the development of shopping centres and other high density uses in the country.
- c) encourage urban redevelopment.
- d) produce densities that minimise pollution, resource and energy use.
- e) discourage indiscriminate road building.

Some readers may be impressed with the scale of change and become apprehensive of the cost of transition. I would like to reassure them that it will be minimal compared to the upheaval of introducing VAT First, because most of the proposed resource taxes are already in place for revenue collection. Of the 27 categories mentioned on page 125, eleven are already in use in most European countries. Therefore the question is about their modification not introduction. Secondly, because the new ones can be introduced over some time and after adequate preparation.

It should be emphasised that the above list is indicative of what the author considers the most important resource taxes. There are others that have been omitted whereas some contained in the list may not be appropriate for certain States. The mix of resource taxes to be introduced, their phasing, the exact definition of the tax base, the tax rates and exemptions, are all the

5 Provided recycled paper has a smaller material rucksack than plastic. Otherwise recycled paper should also be subject to an eco-tax.

prerogative of Government and Legislatures. It is expected that within the European context there will be a great variety from State to State and indeed, as mentioned earlier, from region to region. In my opinion one thing is certain: that sooner or later resource taxes will be adopted on an increasing scale and will augur a period of fast integration of the environment in our obsolete socio-economic System.

Indeed, if combined with a reduction of the excessive taxation on labour and human effort, they may prove the catalyst for a new period of sustainable growth characterised by unprecedented restructuring in industry, services, technology and education, as well as in the pattern and life of our urban regions. As this coincides with the ushering in of the information era, the effect will be multiplied. It is most probable that instead of the present malaise of persistent unemployment, the chain of explosive social problems that it creates, the wholesale destruction of the earth's resources, the environmental holocaust of climate change, we may look forward to a fresh page in global history. A different type of development, less intensive in rates of growth but more job-creative. A less threatened environment and a better health, especially for our children. Finally, a life more rich in spiritual and cultural values as people will be cured of their cult of consumerism and the stress it entails for humanity and the environment.

3.2 Tradable pollution permits

It has long been recognised that resource taxes are not and cannot be the only means to achieve the de-materialisation of our socio-economic system and protect the environment from further degradation. Resource taxes introduce the environmental dimension into the market system, **by intervening in prices and correcting them for environmental costs.** They are based on the assumption that the omission of environmental costs is an imperfection of the existing market, which ignores externalities. But they do **not create a special market in which the quality of the environment can be traded.** This latter option presents a number of theoretical and practical advantages.

Indeed, from the point of view of economic theory the environment can be treated as common property to which citizens have property rights. Rights that can be traded and therefore create a market. For example, the citizens of California have property rights on a clean, healthy atmosphere. What is a clean atmosphere can be defined by the State in terms of the maximum amount of various noxious gases that can be released into it, without harm. In a theoretical model such rights could be recognised by the State in the form of individual permits allowing a fraction of such releases per gas and citizen, within a defined region. Citizens could then trade these permits, which would presumably go to the highest bidder. Bidders being industries, administrators of office and commercial buildings, all the way down to the individual house owner who would need it for his heating or air-conditioning system. But citizens who wish the air to be cleaner than the State standard are also potential bidders. Presumably, heavy energy-users in industry would bid higher, push

In practice the system does not always work according to the model. In most real cases the State does not attempt to define and apportion environmental property rights to all citizens. Instead it sells pollution permits to the substantial polluters only, set at levels below current pollution in proportion to their observed emissions over the past. Permit holders then trade

fractions of the permit among themselves. Those that manage to reduce their emissions make a handsome profit, while the others push prices up creating an incentive to address themselves the problem of reducing emissions. Following the Kyoto Conference on Climate Change and the undertaking of industrial nations to reduce their emissions of CO₂, UNCTAD has proposed an international system of tradable permits for such emissions, the theory being that developing nations could sell some of their more generous permits to the industrialised world, while industrialised nations effecting CO₂ reduction projects in the developing world would get credit in permits.

The great advantage of the tradable permit system, in comparison with resource taxes is that it avoids the relatively arbitrary definition of a tax rate which may overshoot or underestimate external environmental costs. But even with a tradable permit system you have a number of definitions/decisions that are not devoid of arbitrariness.

- a) What are permissible levels of pollution and over what area?
 - b) How are pollution rights distributed to the individual citizen/owner of the environment?
 - c) How are they apportioned among existing and future industry, if this is part of the scheme?
 - d) What value should be attached to them on the occasion of first sale to industry?
 - e) What happens when technological development induced by the scheme leads to an overall reduction of pollution in the region?
- O Are permits then reduced in size, or is the market allowed to collapse. We cannot always rely on growth and technology to balance each other precisely.

Furthermore, the System calls for certain conditions for its successful operation. It presumes a relatively large number of similarly polluting firms in any given area, so that a market may emerge. It also presupposes the existence of a sophisticated monitoring and measuring mechanism, both within each industry and at the disposal of the permit authority. If, as is often the case in practice, the initial amount is fixed as a fraction of the current emission of each firm, the system penalises the environmentally conscious firms that contained their emissions before the scheme was introduced and vice-versa. In general, the tradable permit is an instrument which presupposes a developed and sophisticated industry and administration and has a high monitoring and enforcement cost, otherwise the cheating potentialities that it offers may well neutralise it.

But there are two even more serious difficulties for a universal application of the system of tradable permits.

First, it cannot be applied to a large area of environmental costs and in particular resource costs. For example how do you define and apportion property rights of future generations to a depletable resource, e.g. gold. Or how do you apportion the property rights to tropical forests among the indigenous, the national and world population?

Secondly, how do you start and administer a tradable permits System applying to all resources and all kinds of pollution? The States and the United Nations would have to define on a world-wide basis variable per capita levels of sustainable consumption or tolerable pollution for each resource, each pollutant and each region. Following which they would have the even

more difficult task of negotiating the apportionment of property rights among local, regional, national and world population.

The conclusion that can be drawn is that the tradable permit System is practical and preferable for the internalisation of environmental costs in the area of pollution, but not so suitable in the area of resources. Because there you would have to establish on a world basis a parallel environmental market functioning side by side with the current economic market, a task of immense difficulty and complexity. The author of this Chapter believes that for the purpose of de-materialisation resource taxes are more practicable and produce speedier results, than tradable permits.

3.3 Other economic and financial instruments

Apart from the basic systems of eco-taxation and tradable permits, there is a barge number of other economic and financial instruments, which act through the market, in order to achieve de-materialisation or environmental protection. The difference is that these instruments do not claim any universal application. They apply to specific and rather limited areas. However their impact in these areas is most profound and in most cases they cannot be supplanted by resource taxes or tradable permits.

Deposit refunds are of course the other side of the returnable bottle. Although they have been used as an incentive in collecting tins and other material for recycling, their primary function is inseparable from the returnable bottle. As an economic instrument it is simple and very commendable without any shortcomings. If there are any, these are associated with the returnable bottle not the refund for it. The returnable bottle is both attacked and defended with religious fanaticism. The author would not like to take sides in this contemporary religious war, especially in the short confines of a general study. Suffice it to say that the returnable bottle may become environmentally unfriendly, beyond a certain average distance, as the transport and energy costs may outweigh the saving in waste. It is also harmful! to health beyond a certain number of return trips. Finally, it is historically established that it was conceived as a competitive commercial weapon and it remains so, as it establishes an important advantage for local as opposed to out-of-region manufacturers.

Environmental Risk Assessment is a relatively recent financial instrument introduced neither by Government nor by industry, but by insurers and financiers who are extremely worried by the mounting risk of a project being delayed or even shelved for environmental reasons, or of the even more permanent risk of an environmental accident during the economic life of the investment. Both can sometimes occasion a real financial catastrophe. Both insurers and bankers are often called upon to foot the bill for such delays and accidents. Under the impact of such phenomena both categories of financial firms now require an environmental risk assessment, before they would insure or finance. The production of such assessments together with the environmental impact assessments for investment projects, is one of the fastest growth industries.

An Environmental Impact Assessment (E.I.A.) is not strictly speaking an economic instrument. It is a complex, integrated analysis of the impact of any investment on the environment. It is a unique instrument integrating pollution, biodiversity, planning and

resource use issues. Within the European Union it is mandatory before the authorisation of any substantial investment project and it is one that in practice has stopped many projects that would result in serious damage to the environment. On other occasions the E.I.A. prescribed modifications that resulted in extensive internalisation of environmental costs and a successful implementation of an environmentally integrated project.

Its usefulness is also great in making a valid choice among a number of alternative or competing planned project. A sound E.I.A. as a pre-requisite in the pre-investment evaluation ensures that an environmentally sustainable rather than a non-sustainable project is approved.

The great problem with E.I.A.s is that there is no approved framework or regulation, as regards their content and methodology. Consequently, in practice there is great variance in their fullness and coverage which may often result in the approval of unsustainable projects, unless challenged.

Table 6 gives a picture of the frequency in the use of the various economic instruments, taken from a special O.E.C.D. Study carried out in the early 90's.

Before we pass on to Voluntary and Demonstration Instruments we should also deal with **depreciation and discounting to present value**. Strictly speaking these are not economic and financial instruments but two very important techniques or financial conventions, enshrined in company law and financial practice. Their present importance and impact on the economic and financial world have been analysed in the introductory. From an environmental point of view they produce the worst distortion in market prices and in investment decisions. They encourage a throughput production and discount the future. In other words, they do exactly the opposite of what the Factor 10 movement and indeed any environmental movement IS striving to achieve. As part of a comprehensive fiscal reform they should be drastically changed.

Let us start with **depreciation**. On one hand conventional depreciation rates in accounting should reflect the technological life of a piece of machinery, of a building or a computer. The guiding principle here should be that a fixed asset should not be replaced before it is technologically obsolete, after all adaptation possibilities have been exhausted. A computer for example, is superseded almost every couple of years by something new on the market. This does not mean that its technological life has come to an end. It can be adapted by an expansion in memory, by the addition of various modems, etc. On purpose 1 picked an asset with the fastest rate of innovation. The same arguments apply with more force to machinery and even more so to buildings. The present System of accelerated tax-free depreciation encourages firms and individuals to scrap assets as a whole, rather than try and adapt them or repair them. Combined with the taxation of labour that pushes the cost of servicing to the sky, it means that business is pushed to scrap rather than repair, maintain or modernise.

Depreciation allowances should therefore be curtailed. The law should prescribe reasonable maxima based on the principles of the previous paragraph. Accelerated depreciation should not be tax free. At the same time, an additional increment of depreciation should be added to the costs of enterprises that extract minerals or other finite materials or even deal in resources capable of regeneration (forestry, fishery). This element of depreciation would go into special reserves to be used exclusively in exploration and research for new deposits and substitutes or

in regeneration, as the case may be. A corresponding resource tax would ensure that this depreciation cost is reflected in prices.

Discounting to present value should be relegated where it belongs: to the world of financial investment, banking operations and the stockmarkets, i.e. where interest genuinely belongs. It should be excluded from the project evaluation manuals of the World Bank, the European Commission, the European Investment Bank and other financial institutions dealing in project evaluation and financing. On the contrary, these evaluations should incorporate the special *resource depreciation* outlined in the previous paragraph. There is no valid reason to discount the future and inflate the present, when comparing alternative projects. Especially when, as it seems, the world has passed into an era of relative price stability.

Table 6
Economic Instruments per Country on 1.1.1992

	Charges on emissions (of which user charges)	Charges on products (of which tax differentiation)	Deposit Refunds	Tradable permits	Enforcement incentives
Denmark	3 (2)	10 (2)	2		
Germany	5 (2)	3 (3)	2	1	
Netherlands	5 (2)	4 (2)	2		
Belgium	7 (2)	2 (2)	1		
Portugal	4 (1)	3 (1)			
Italy	3 (2)	2 (0)			
Ireland	2 (2)	1 (1)			
Greece		2 (1)	1		
Spain	3 (2)				
U.K.	1 (1)	1 (1)			
Sweden	3 (2)	11 (2)	4		2
Finland	3 (2)	10 (2)	2		
Austria	3 (1)	4 (2)	3		
Norway	4 (2)	8 (2)	3		
USA	5 (2)	6 (1)	4	4	2
Japan	3 (1)	1 (1)			
Switzerland	3 (2)	2 (2)	1		
Australia	5 (2)	1 (0)	3	1	2
Canada	3 (2)	7 (3)	1	2	1

Source: OECD Integrating Environment and Economics: The Role of Economic Instruments
1993

3.4 Voluntary and demonstration instruments

There is a great variety of such instruments which are based primarily on voluntary action by the participants. They constitute an indirect way of internalising environmental costs, not acting through a direct integration in prices. Nevertheless their aim and hopefully their result is equivalent. They increase resource productivity and prevent environmental damage. The main categories are:

- i. eco-labelling schemes
- ii. Eco-auditing schemes
- iii. other voluntary agreements
- iv. iv. pollution reporting schemes

Although all these schemes are voluntary, they operate within an official or unofficial framework created or acknowledged by the government. Eco-labels for example, cannot be awarded by all and sundry. There have to be strict criteria and an approval procedure to ensure that the particular product, to be eco-labeled, conforms to the criteria. Even voluntary agreements are formally approved or tacitly endorsed by government.

Eco-labelling schemes started as industry initiatives with government support and approval in countries with a relatively high degree of environmental awareness. After considerable research a set of criteria are established for rebated goods or categories of goods and an industry or government award panel is established to award the label to each particular batch of goods, based on the fulfilment of the pre-established criteria. The same panel usually oversees the Operation of the entire scheme and serves as an appeal tribunal.

In Europe, several countries among which Germany is the most important have operated their own national eco-labelling schemes for a long time. Gradually, as more and more countries entered the game or as some used other nation's schemes for goods exported to those nations, considerable confusion was created. Finally, the European Community adopted its own European Eco-label Regulation in 1992, but the first batches of goods were not approved before the summer of 1993. The main difficulty encountered was the adoption of the various sets of criteria, due to wide divergences in national philosophies and practices in this field.

It is worth noting that many aspects of the good under approval are examined, including savings in environmental resources at the production stage, its environmental impact during distribution and consumption or use, including its waste-producing propensity. In the case of durable goods, their impact on the environment after the end of their useful life is also reviewed. Among other examinations, a complete life-cycle analysis has to be carried out before a European eco-label is awarded to a particular category of goods.

Eco-labels as already pointed out have important trade ramifications as they constitute a very strong parameter in market entry. One of the stronger motives behind the launch of the European scheme, was to remove the possible threats to the single market that the various national schemes posed. Now the question is hotly debated at the international level, as developing nations in particular claim that eco-label schemes are used as one more form of protectionism and as trade barriers to their exports. Eco-labels for timber produced in „sustainable managed forests“ are a particularly hot item of dispute.

Eco-audit schemes have a very similar history to eco-labelling, in the sense that they started also as voluntary exercises promoted through mutual co-operation between government and industry. They correspond strongly to the pattern of financial auditing, with professionally or state recognised environmental auditors auditing the environmental performance of each firm that participates in the scheme and issuing an environmental certificate, with or without notation. The European eco-audit scheme came into force with the adoption in 1993 of the Eco-Management and Audit Scheme (EMAS) Regulation which follows the above described framework. Its international counterpart is the series of environmental certification Systems operated by the International Standards Organisation. The most recent is ISO 14000, which has gained wide international acceptance, including major European firms. The two are not exactly comparable as EMAS is a somewhat broader auditing scheme, with a body of special auditors and a logo awarding mechanism.

Other voluntary schemes are by definition so varied that they defy any classification. They are becoming popular in the U.K. and other European countries, where industry, rather than being faced with burdensome legislation and/or administrative action, hastens to negotiate voluntary agreements that actually cover the same ground. It should be appreciated that from the industry point of view they present several *advantages: first*, they are negotiated; *secondly*, they are more flexible and usually do not involve penalties; *thirdly*, they can be easily revised or adapted. From a Government point of view, they also present the same advantages plus the additional important advantage that they avoid the burden and delay of the legislative agenda and do not entail any serious political cost. They are usually entered into by industry and government, under the threat of impending legislation, but this does not appear to detract from their popularity.

Finally, **pollution reporting schemes** are used with considerable success in America, where the Environmental Protection Agency publishes quarterly data on the pollution produced by individual firms in various parts of the Country. Irrespective of the statutory environmental quality standards and their enforcement, the mere fact of publication has an important demonstration effect. Larger firms in particular, which are very jealous of their public image, would go to great lengths and expense, to avoid being at the top or near the top of the list. E.P.A. has found these Quarterly Inventories extremely efficient deterrents of pollution. An added advantage is that, contrary to legislated standards, they have no ceiling effect and they induce a continuous improvement in the environmental performance of industry, far beyond the statutory limits.

4 Regulation as an equivalent effect

There is no doubt that most of environmental regulation and legislation, if it does not directly prescribe a tax, charge or fine, it has an indirect equivalent effect.

Let us take the legislation prescribing maximum emission standards for nitrous oxide, lead etc. for cars. Compliance with them requires a different engine, different fuel and a catalytic converter. At the time of their introduction and before technology had the time to adapt to the new requirements, they had the effect of increasing the price of a car and of the petrol it used. They were equivalent to the imposition of a special purchase tax and a special fuel tax. They also had the equivalent effect of stimulating technology to produce innovations that would

mitigate the effects of the tax. But there the equivalence stops. Because the tax leaves to the consumer the Option of carrying on with the use of an old car, or the old type fuel, provided he is prepared to pay the extra cost. Legislation does not allow such option. On the other hand, the tax provides a continuous stimulus for technological development, as any improvement has a continuing effect in lowering the tax burden. Legislation provides a stimulus up to the prescribed emission standard and no more.

There is also a basic difference in the philosophy between regulation and economic and financial instruments. Historically, regulation was introduced in order to check the environmental degradation produced by intensive economic growth and protect humanity from its ill effects. But this was in the context of confrontation, not integration. That is why the majority of provisions are penal not civil. Damage to the environment is considered to impinge on the human right to a healthy environment, not on basic economic rights, and is punished accordingly.

However, in the section devoted to tradable permits, the view was developed that the environment can be considered the joint property of citizens and that its pollution entitles them to damages, in the same way that infringement of private property can be brought to Court for compensation. The logical repercussion of accepting this view, is the adoption of a System of *Civil liability for the reparation of environmental damage*. The concomitant of such a move is that the legal system operates then as a mechanism for the integration of the environmental dimension into the market mechanism. Inherent in such a set-up is the definition of the „environmental property rights“ in the form of an acceptable level of pollution, beyond which damages arise.

Much as at first glance this appears an attractive idea, its practical implementation is beset with a series of legal, technical, economic and practical difficulties. Some of these were encountered in the analysis of the tradable permits system, but it is worth recapitulating them.

- a) Who and how defines permissible levels of pollution and over what area?
- b) How are they apportioned among existing and future industry, present and future generations?
- c) What value should be attached to them?
- d) How are pollution rights distributed to the individual citizen/owner of the environment?
- e) What damages can Courts award to citizens/owners who sue industry that pollutes beyond its permit? Should part of the damages go to the State as a custodian of the environment?
- f) What happens with historic or joint pollution? how is it apportioned to individual polluters?
- g) Is the government entitled to sue for damages as well as the citizen/owner?
- h) Should liability for damaging the environment be objective or should the plaintiff prove the offenders' guilt?
- i) How can you evaluate objective liability and define the respective penalties?

Obviously there are no easy answers to these hard questions. Perhaps This is the main reason that civil liability for environmental damage has not been introduced except in the USA with questionable success and otherwise in limited scope by the relative Council of Europe

Convention.⁶ The author of this Chapter as European Environment Commissioner started the process of introducing a civil liability regime in European legislation by publishing a Green Paper on the subject in 1993.⁷ The Commission is now preparing a White Paper containing proposals, on the basis of strict liability.

At this stage it would perhaps be interesting to speculate, to what extent can a civil liability system be replaced by a comprehensive range of resource taxes. Theoretically they are interchangeable, provided one could cover all cases of pollution with a corresponding eco-tax and provided one applied the appropriate tax rate to limit pollution to permissible levels. But such an *equivalent tax structure*, apart from the very difficult provisos set above, begs some important question. How can one find a structure that individualises the tax? would it not be against the basic constitutional principle of tax equity? Secondly, it is impossible to treat pollution by accident even through the most perfect tax system. So the answer to the speculation should at least in part be negative: No you cannot substitute a tax System for a civil liability system, in all circumstances.

There is a final question to be asked in this section of the Study. In the light of all that has been stated above on an extensive fiscal reform and rebated Systems, what happens to good old environmental legislation? The answer is that quite a lot stays and flourishes, even in the future. For, you cannot stop treating environmental damage that endangers human health as a criminal offence. You can make it a civil offence too, giving rise to compensation to the damaged party, but it must always remain basically a criminal offence. In fact there is a good case for extending the criminality to some offences against animals and nature. On the other hand, quite a lot of existing environmental legislation can be superseded by the progressive introduction of economic and financial instruments and the adoption of a civil liability system for the reparation of environmental damage. The character of the remaining legislation should conform, as far as possible, to the new accent on integration rather than the traditional confrontation.

5 The impact of fiscal reform on resource use efficiency

The impact of fiscal reform and of other measures of equivalent effect on the environment has already been outlined in the previous few sections of this Chapter. Now we must proceed to a more systematic analysis of it. As already remarked, taxation, other economic and financial instruments, voluntary agreements and schemes, legislation, all shape our socio-economic System and mark its future for decades if not centuries. However, their impact is far from uniform or smooth over time. There are **two basic time horizons**: *Short-term and long-term*. But even within those there are great variations, among the various instruments, as to the degree and timing of their impact.

6 Council of Europe, 1993: Convention on Civil Liability for damage resulting from activities dangerous to the environment, Lugano. Published in Strasbourg.

7 European Commission, 1993: Green Paper on remedying environmental damage COM(93)47, Bulletin EC.

Short-term is defined mainly in relation to the possibility of changes in technology or environmental and institutional factors. Short-term comprises all these changes that can take place, with given technology, urban structure and institutional set up. **Long-term** starts when further changes require structural change in these three elements. Let us consider the crucial area of private cars for example. Part of the impact of a rise in petrol tax takes place in the short-term, by a fall in demand for petrol and possibly cars. But its full impact through the technological development of more fuel-efficient engines, of introduction of bio-fuels, faster scrapping of old cars, development of better public transport, changes in urban patterns, takes place in the long-term. That is why the price elasticity for fuel is very low in the short-run but increases considerably as time goes by. Let us examine the time and intensity dimension of such impacts, by category of intervention.

The impact of **resource taxes** varies enormously both with the type of tax and over time. Generally the impact of consumption resource taxes is more restricted, especially in the short-term, than that of purchase or investment resource taxes. The average European will not change behaviour over-night with a rise in petrol duty, or the introduction of a tax on plastic bags. He can afford it because it is a fraction of his monthly budget. But he will be affected more by a rise in the purchase price of cars, especially if this is the result of an eco-tax on CO₂ emissions which allows him the alternative of purchasing a low emissions car. What is more, the purchase tax on polluting cars will have a great impact on manufacturers, for whom the CO₂ efficiency of the car will become a point of market entry. They will run like mad to develop such efficient cars and they will market them very aggressively. Thus the impact of the tax will multiply in the longer-term.

In a similar way the effect of the tax on plastic bags will be felt, through its impact on supermarket chains. For them this is a substantial item in their budget. In no time they will explore the switch to paper bags, or they will introduce incentives for the re-use of bags and search for alternatives. Generally, producers have higher price-elasticity's than consumers because they are more cost conscious, they are in competition with each other, they have easy access to technology and they can resort to substitutes. Production patterns change easier than consumption patterns.

Another feature of the impact of resource taxes is that they have a continuous influence and therefore provide a continuous stimulus to technology. The search for a more fuel efficient engine under the impact of a combined fuel and purchase tax goes on until all technological margins have been exhausted. They also have a more universal influence because they act through not against or in parallel with the market system. Let us go back to the same example of cars. As the internalisation of the external environmental costs of the private car is driven home, through a combination of petrol, purchase and road use taxes, not only producers and consumers turn to more fuel-efficient and road-use efficient cars, but they search for alternatives. The alternatives vary from car pooling to greater use of public transport to shifts of residence in relation to work. The shift may be made by the employee moving home, or the employer moving factory or office, or both.

The same feature, however, of a very market-pervasive impact means that great care should be taken in planning resource taxes so as to avoid mutually cancelling influences. The impact of the above mentioned triad of resource taxes on car use, for example, could be very well reduced by a tax deduction on commuting, or a property tax which would be very low in the

suburbs in relation to central urban areas. The design of an eco-tax System should among other things pay great attention to the synergy of the various taxes. Not an easy task to achieve.

Tradable permits almost by definition have a long-term impact. First because the institution of a tradable permit System has a long design and gestation period. Even if the aim is to control a single pollutant, such as sulphur dioxide (SO₂), the following actions are required before the System can even start functioning:

- definition of the area and the population participating in the scheme,
- definition of limit values for what constitutes pollution,
- definition of property rights per citizen and per industry (if the System is dual),
- design and setting up of a monitoring System,
- institution of the State supervising agency,
- definition of penalties and of who imposes them (Agency or Courts?),
- adoption of empowering legislation,
- distribution of permits.

Following that, the „market“ may start functioning but it has to gain depth and experience which also takes some time. Altogether we are talking about an Operation that well exceeds a 5-year span.

Tradable permits lack the market pervasiveness of resource taxes, in view of the fact that the special market in which they operate is not automatically connected via prices with the economy in general. Also, contrary to resource taxes, which by definition operate on a national scale, tradable permits may and usually do operate locally or regionally only applying to a single type of pollution. A comprehensive system of tradable permits covering all resources and all types of pollution may of course be organised on a national or even international basis, but with greater difficulty as we have seen in the respective analysis of the previous section.

Other economic and financial instruments are naturally of a more limited impact. None of them is of universal application, even in theory. However, their impact is usually very great because they are tailor-made to the specific circumstances of the need they serve. In terms of timing, most of them are effective in the medium to long-term, but one cannot generalise in view of the variety of these instruments. The same applies to voluntary or demonstration instruments. However, the techniques of depreciation and discounting which we analysed under this heading are an exception. They both have an immediate and universal impact.

Finally, **regulation and legislation** is comparable to resource taxes in universality of application and market pervasiveness. Indeed, as we have seen in the previous section one may speak of it as of equivalent effect. If designed with the aim of de-materialization and of internalisation of environmental costs, it may cover almost all the ground that a comprehensive system of resource taxes does. What it lacks is the automatic relation with the market and the feature of a continuous incentive that the tax system possesses. Regulation acts with floors and ceilings and only as far as empowering legislation goes.

In terms of the timing of its impact, it usually has an immediate effect. That is immediate from the date of application. Because conventionally laws come into force at a certain date defined in the law or the regulation. And equally conventionally .especially in environmental matters . this date is few years from the date of adoption of the law or measure. They also have an expiration date or an anticipated revision date (written or unwritten). Whereas, therefore, legislation and regulation could technically be of immediate and continuing effect and impact, in practice they are given a sort of delay fuse and an anticipated time horizon. This removes some of the force of their impact.

Now that we have analysed the type of impact that each category of instrument has in terms of universality of application, market pervasiveness and timing we may try to fathom this impact in each key factor. The economy (mainly through consumption, production and investment patterns), technology and finally human settlements, determine between themselves the amount of material inputs, the efficiency with which they are used, the waste produced and the efficiency of its reuse or disposal. All categories of instruments have an influence in all three key factors. The difference lies mainly in the speed with which each key factor reacts.

Generally the economy reacts faster than the other two. That is if the impact is directly on the market and does not call for structural or institutional changes. If for example a resource tax is introduced on pesticides used in farming, but farmers have organised their supplies through co-operatives, while a State Agency licences the supply of bio-products for pest control, the impact may take few years. Similarly, a stiff energy tax may provide a stimulus for a shift to the use of labour. But if the labour market is very rigid on hire and fire regulations, the energy tax will have no employment effect until the labour market has been liberalised. This may well take a decade.

Technology receives the signals quickly but needs time to research and develop new technologies, or adapt existing technologies to the new needs. And then we have the stage of innovation, i.e. of application of the new technology to industry or services. The cycle from stimulus to innovation may well take 5 years. It may take more if research and development programmes are government controlled and funded because then the signals do not receive immediate response. An even more frequent phenomenon in the area of technology is conflicting signals. A signal for pollution reduction or de-materialisation may be emitted by new legislation, but the market may send an opposite signal. The outcome depends on the relative strength of the opposite signals. American technology receives a feeble signal for lean car motors from legislation, but a strong market signal for „gas guzzlers“ in the form of cheap fuel prices. The result is that some effort is made towards more fuel efficient motors, but the power of engines and the size of cars still remains very high compared to the European or Japanese counterparts.

The System of human settlements is the slowest to respond for a number of reasons. First, housing and other urban or rural infrastructure have a long life. Much longer than any piece of machinery. Some roads, sewers and canals date back to the Middle Ages. Second, physical planning is in the hands of institutions and persons that fail to perceive human settlements as the most important part of the socio-economic System. They take the physical dimension or configuration of population, industry, transport networks as given and then they try to plan and regulate as best as they can, with an eye mainly focused on aesthetics and some amenities (green spaces, schools, shopping). Third, there is a great fragmentation of tasks and

responsibilities. Different departments of the central, regional and local government are responsible for physical planning, forestry, transport infrastructure, transport operation, water mid sewerage, power, telecommunications, education, social services, industry. Business, the professions, the Churches and finally the people take a good part in shaping the structure and life of our urban and rural communities and add to the confusion.

Urban regions in particular have grown so big, so complex and so fragmented, that we fail to see them as a system. And yet they are the most important part of the system. Accounting for more than 4/5ths of European population, production, pollution and waste. That is where the crux of the problem lies. That is where the greatest friction and Waste of resources occurs. And yet most people, even those concerned with the de-materialisation of our society and the salvation of our environment, fail to recognize this crucial reality. They are concerned with mining, industry, services, technology, global warning as constituents of economic activity, but **never with the urban system** as the most gigantic, integrated economic unit. After all this, it should not come as a surprise that the urban System is the most insensitive of all to fiscal reform. Because, apart from the reasons outlined in the previous paragraph, fiscal design itself has also failed to see it as a system. The impact of fiscal reform and of equivalent measures on the urban system may take ages, because of the total lack of understanding and the immense inertia associated with it. Precisely because of this, fiscal reform and even more so planning reform should start with it.

6 Fiscal reform and the attainment of Factor 10

It is obvious from the preceding analysis that in order to achieve such a revolutionary change as the de-materialisation of our society we need a comprehensive fiscal reform in the broadest sense, i.e. comprising not only resource taxes and charges, but other instruments of parallel or equivalent effect. We have enumerated them as tradable permits, other economic and financial instruments, voluntary and demonstration instruments, as well as the good old legislation and regulation. Although taxes, tradable permits and regulation may claim a greater universality of application, none of them can achieve the task alone.

We need a multi-pronged attack using all available means. The day of cavalry charges or pitched infantry battles, however heroic, is long past. Now is the age of combined Operations. De-materialisation calls for a gigantic combined operation using all available means, each in accordance with its potentialities and its type of impact. A dogmatic attachment to one or the other is wrong, especially in view of the urgency of the task. They all have to be used but great care should be taken in how we combine them. At present, the dis-jointed application of some eco-taxation, few tradable permits and other economic and financial instruments, side by side with the still dominant legislative method, produce a lot of friction and relatively poor results, especially on an international scale. The signals provided by such action to the economy, technology, education and physical planning, which are all key factors in achieving resource use efficiency are confused and most of the time conflicting. What we need is a well devised strategy using fiscal reform and all other equivalent means in a complementary and synergistic way.

Furthermore, our strategy should devote equal attention to the area of application. Fiscal reform should not be seen in the context of the economy only. It should take in technology,

education, social phenomena and culture and especially the urban system, which is the apex and at the same time the sink of all these activities. We are talking about a total system and not loosely related independent entities. The system is coming apart through fragmentation and is dragging the earth to an end, together with it. A fragmentation that produces immense friction and waste. A great waste of material resources, as our culture has turned increasingly material and less spiritual. The effort towards de-materialisation should address the total System **not its constituent parts**. Fiscal reform is an extremely useful tool in this effort. Not only because it packs a lot of power - **more than 2/5ths of our gross domestic product** -, but because it has an almost universal application, considerable flexibility and pervades the market. The market mechanism by its survival and universal acceptance has proven its worth as a mechanism of allocating resources, **provided we feed it the right inputs in a Language that it understands, i.e. prices**. The fiscal system, always in its broadest sense, corrects or distorts prices. If we set it right it may do the former rather than the latter. We may then have the market with its proven force and efficiency **with us not against us**. The market sends the strongest signals to all three key factors. The economy, technology the urban system. Today legislation, the fiscal system, education send them conflicting signals. If we could co-ordinate and convert them into synergistic signals we could hope to achieve such an ambitious target as de-materialisation. Fiscal reform is a catalyst in achieving this synergy, because it speaks the same language as the market.

There is no doubt that Factor 10 is an ambitious target. We that propose it are the first to recognise it. It is ambitious because of its relatively short time span. One generation, 40-50 years, is not a long time. But it is achievable.

First, because technology has proved time and again that it can accomplish wonders. Developing technologies that increase resource use efficiency 10 times within a generation is not a dream. It is a future reality within grasp as other parts of this book have proven.

Second, because there is a great waste and friction in the present functioning of our socio-economic System. Food, raw materials, water, energy are all wasted to an unbelievable degree. They are substituted for labour in a society that recognises unemployment and the environment as its primary problems. Even with given technology we could have substantial progress in de-materialisation, through a restriction of such waste.

Third, modern agricultural, industrial and service production is sufficiently flexible to be able to use substitutes for a large range of raw and secondary materials. We could easily switch from depletable to renewable resources, from polluting to clean methods, not only in energy, but in practically every material. This is possible even with given technologies, but it is immensely enhanced by new technology.

The main reason that these three movements do not take place quickly enough, is the fragmentation and the conflicting signals of the present system. A comprehensive fiscal reform of the type outlined in this Chapter may go a long way towards turning these conflicting signals into synergy. It uses in this effort the most efficient, proven mechanism: the market. The very mechanism that was used to establish the religion of consumerism. It would be a pity not to use it to correct this huge human mistake. Fiscal reform as a catalyst holds the key to the speedy and successful completion of his ambitious enterprise.