Subsidies and Emissions of Greenhouse Gases from Fossil Fuels

by

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A report to

Comhar the National Sustainable Development Partnership

On Behalf of

Feasta, the Foundation for the Economics of Sustainability

and

Friends of the Irish Environment

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1. Terms of Reference

Comhar's recommendations in relation to the Review of the National Climate Change Strategy included the following passage:

> "There is a lack of clarity as to where in the NCCS process on the issue of subsidies or effective subsidies / state aids which incentivise GHG emissions is to be dealt with.
>
> "Aside from the introduction of appropriate taxation and other economic measures, Comhar believes it is very important that existing subsidies, state aids and tax exemptions which incentivise emissions are identified and either phased out or reformulated to remove the undesirable incentives part of the policy."

The purpose of this research is

- to identify such subsidies, state aids and tax exemptions and, as far as possible, to ascertain their value or extent.
- to make recommendations in relation to reformulating/removing/altering these subsidies. state aids and tax exemptions so that the incentive to emit greenhouse gases is reduced.

2. Introduction

This report, which should be regarded as a scoping study for more detailed work, limits its coverage to identifying state policies, aids and subsidies which encourage greenhouse gas emissions from fossil fuel use. It ignores greenhouse emissions from causes such as the use of particular chemicals or changes in land use.

It regards any increase in energy use as undesirable because almost all the energy used in Ireland comes from sources which involve the release of greenhouse gases and because the demand for power has been growing more rapidly than the supply from renewable (ie non-greenhouse emitting) sources. In such circumstances, all subsidies and policies which encourage energy use make higher levels of greenhouse emissions inevitable.

2.1 Types of subsidies

There are three types of subsidy which the state can give to activities which involve energy use.

1. **Direct subsidies**: The state can give a direct financial subsidy either by paying money or by exempting an activity from some or all of the charges paid by most other activities. Charging a lower rate of VAT on certain fuels is an example of a direct subsidy.

2. **Indirect subsidies**: The state can permit the activity to extract a subsidy from the environment or from the wider community by allowing those carrying it out to impose costs and not pay for doing so. For example, the particles emitted by diesel engines damage the lungs of those who inhale them and, if the operators are allowed to get away without paying compensation, they have, in effect, received a subsidy from those members of the general public who breathed in the fumes.

3. **Passive subsidies:** The state can impose taxes on low-emissions activities, thus effectively subsidising higher emissions activities by making them relatively cheaper. Placing taxes on human labour encourages its replacement by the use of fossil energy, for example.

Since, as we have just seen, not all subsidies involve the direct payment of money by the state, we define a subsidy as any state action, inaction or concession which makes energy use cheaper in relative if not absolute terms. In addition we also identify those government policies that make greater energy use necessary or desirable. There are are two types of these:

1. **Policies of commission** which encourage energy-using activities by sanctioning changes which make it necessary. For example, by allowing the construction of out-of-town shopping centres or the termination of bus services, the state makes it necessary for people to use more energy by travelling by car.

2. **Policies of omission**. These involve the state failing to act. For example, it would have been possible for the government to have required much more energy-efficient building standards without it adding to the cost of a house. (This is because the house would still have been sold by the developer for whatever price the market would bear and this price would not have changed. If energy-efficient houses did cost more to build, developers would be forced to offer landowners less for their sites. In other words, the windfall gains of landowners would be reduced if higher energy standards were required).

In the policy area, an internal Department of Finance paper (2002) shows that policies of omission have put up business costs and made the country less competitive internationally. Discussing the failure to the government to devise and implement policies for the energy- and transport-efficient location of housing, the paper says that

> “the cost of the failure of urban governance… may now exceed 3.5% of GDP” It adds that to have prevented economic growth by this amount could have added 63,000 to the unemployment figure.”

2.2 Reasons for Subsidies

Ireland has been subsidising energy use, and thus greenhouse gas emissions, for two main reasons.

1. The wish to enhance the country’s international competitiveness by keeping business costs down. Since energy is used in every aspect of modern life, higher energy prices would increase not only the direct cost of the energy used by companies but most other costs as well.

2. The wish to accelerate or at least maintain the rate of economic growth. Since the start of the Industrial Revolution, most growth has been generated by the use of technologies which have allowed the progressive use of non-human and non-animal forms of energy. Irish energy use increased markedly during the recent growth spurt.

The removal of direct and indirect subsidies would raise business costs and tend to make the country less competitive. The action would, however, reduce the impact of passive subsidies such as the taxes on labour. In other words, when firms have to make choices between using more or less labour and more or less fossil energy it would tend to make the playing field more even,

3. Impact of Subsidies on Emissions

Some direct subsidies for energy use increase greenhouse gas emissions in Ireland but have little or no effect on world energy use and thus emissions on a global level. They are therefore only of concern in relation to this country's compliance with its Kyoto obligations.

3.1 Industrial Electricity Tariffs

Consider the arrangement under which Aughinish Alumina (in common with other large consumers) is able to purchase electricity from the ESB at significalntly less than the tariff which would apply to smaller businesses. Both parties deny that a subsidy is involved here. Aughinish Alumina in fact claims that it could generate power itself for a lower cost than it pays the ESB and it will open a CHP plant to do so in 2005. However, if a subsidy is in fact being given and other power users are paying more so that Aughinish can pay less, and if thie plant would close or

scale down production without this subsidy, more electricity is being used in Ireland, and therefore more greenhouse gases (ghgs) are being released, than would be the case if Aughinish was not getting its discounted price.

If Aughinish ended or reduced production because it could not get cheap power, Irish ghg emissions would obviously fall, easing Ireland's problem of complying with its Kyoto target. But what would happen worldwide? The fall in alumina production in Ireland would probably have little effect on global aluminium prices and thus on aluminium production. Overseas plants would simply pick up the slack and their ghg emissions would rise accordingly. The net effect of any Irish subsidy on global ghg emissions might be nil. So, if any subsidy is being given to Aughinish, it can be regarded as primarily for employment creation. But it is one which, if it existed, would have important implications for a country trying to meet its Kyoto target.

3.2 Oil and Gas Exploration

Similar arguments apply to the terms given for oil and gas exploration and production in Irish waters which have been among the most attractive in the world since they were introduced in 1992. Companies are given licences to extract oil and gas for nothing, they are not expected to pay any royalties on the quantities they deliver and there is no requirement that the State be given a block of shares in the venture or a share of the profits. Indeed, there are no requirements for any Irish participation at all. Irish crews do not have to be employed on the rigs, which do not have to be supplied and serviced from Irish ports, and the oil and gas does not have to be brought ashore in Ireland. Very little Irish tax is likely to be paid by companies acquiring licences since 100% of their exploration, development and operating expenses can be set against their profits and unused tax allowances for unsuccessful exploration expenditure can be carried forward for up to 25 years. The costs of abandoning fields and dismantling of pipelines can be set against tax in the same way. Once these allowances have been used up, companies simply pay corporation tax on their profits at the standard rate, 12.5%, one of the lowest in the world, tax havens apart.

The intended effect of these ultra-favourable terms is to make it more likely that firms will prospect for gas and oil in Irish waters rather than in parts of the world with more stringent conditions. It seems most unlikely that the terms will bring world oil and gas prices down and thus encourage greater consumption. Even gas coming ashore from the Corrib field will not be sold any more cheaply than that being brought into Ireland through the two undersea pipelines from the UK. The terms are therefore a subsidy to the oil companies' shareholders because they allow better dividends to be paid, rather than for energy use.

3.3 Aircraft Leasing

Similar remarks can be made about the subsidies given to encourage the establishment of aircraft leasing businesses in Ireland, either within the International Financial Services Centre in Dublin or at Shannon. In both locations, leasing companies are able to set 100% of the cost of the aircraft they buy against the tax they would pay that year on their profits, levied at the 12.5% rate. Alternatively, they can decide in which later years to take the tax allowance. An additional benefit is that no VAT is payable on aircraft lease deals. These concessions might be thought to encourage energy use by making it cheaper for airlines to lease their aircraft, thus enabling them to offer cheaper fares and operate more flights. However, as aircraft leasing is a worldwide business, the terms offered at Shannon would only affect the amount of flying done in the world if their existence had the effect of lowering the world price for aircraft leases. It is not clear whether this is the case. Without further study, the only safe course is to regard the terms as a means not only of employment creation but also of tapping tax revenues that would otherwise have gone to other governments. A firm of Dublin solicitors, William Fry, advises its foreign clients not to use the capital allowances on their aircraft in Ireland but in their home countries instead as this could save them more tax overall since the Irish rate of corporation tax is so low. In other words, they should arrange their affairs so that they make as much of their profits as possible in Ireland rather than at home, and pay the tax to the Irish authorities.

3.4 Fertiliser Production

Until relatively recently, the production of fertiliser in Ireland was encouraged by supplying the factory, (NET, later Irish Fertiliser Industries) with gas from the Kinsale field at below market rates. When this gas field was exhausted, the company had to buy its main raw material from supplies being piped under the Irish Sea from Britain. This gas proved too expensive to enable the factory to survive in competition with producers with access to gas at lower cost and it closed last year. But was the cheap gas a subsidy for energy use? We think not because if the factory has never been built, Irish farmers would have purchased foreign fertilisers instead in much the same quantities and at much the same price, consequently requiring the use of much the same amount of fossil energy. The cheap gas was, therefore, basically a subsidy for the 620 jobs created by the production and distribution of the fertiliser.

4. The Balance Between Sustainable And Unsustainable Sources Of Energy In Ireland

Very little sustainably-sourced energy is used in Ireland at present as Figure 1 shows.

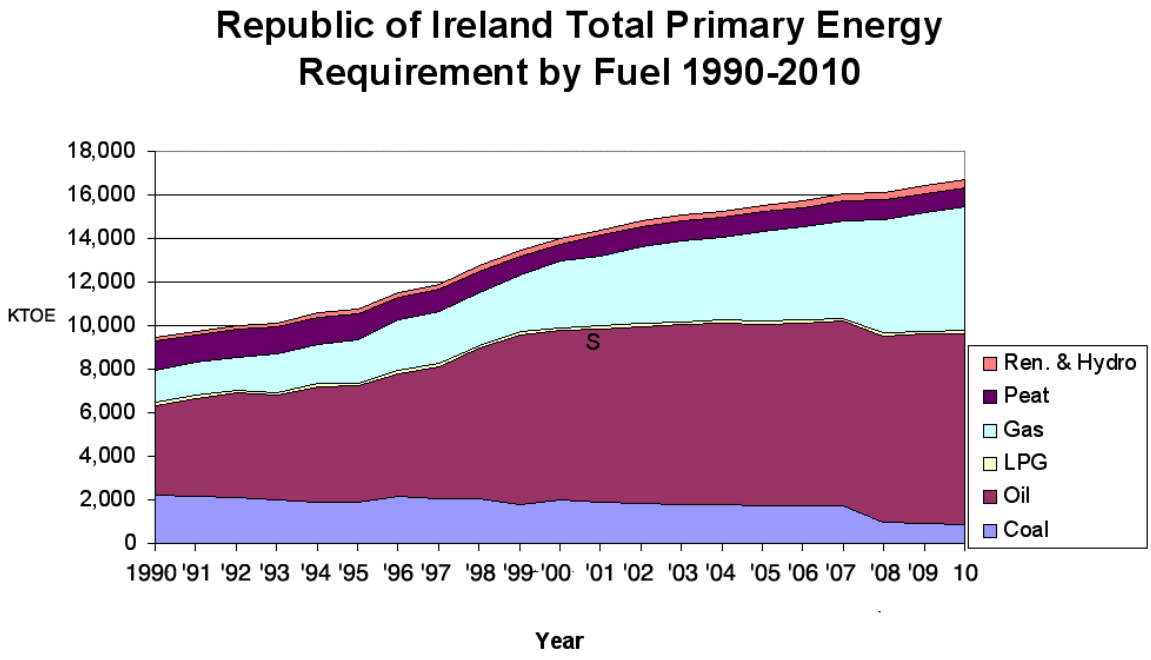

Figure 1. Energy demand increased rapidly over the period 1990 to 2000 and is projected to continue to increaseup to 2010. Most of Ireland's energy comes from oil and natural gas. Source: ESRI, 2001

Sustainable sources contributed only 1.8% of all energy used in 2002, 250,000 tonnes of oil equivalent (TOE) out of a total primary energy requirement (TPER) of 13,591,000 TOE. This was equivalent to 10.5 PetaJoules out of 569 PJ. Figure 2 shows what the sustainable sources were:

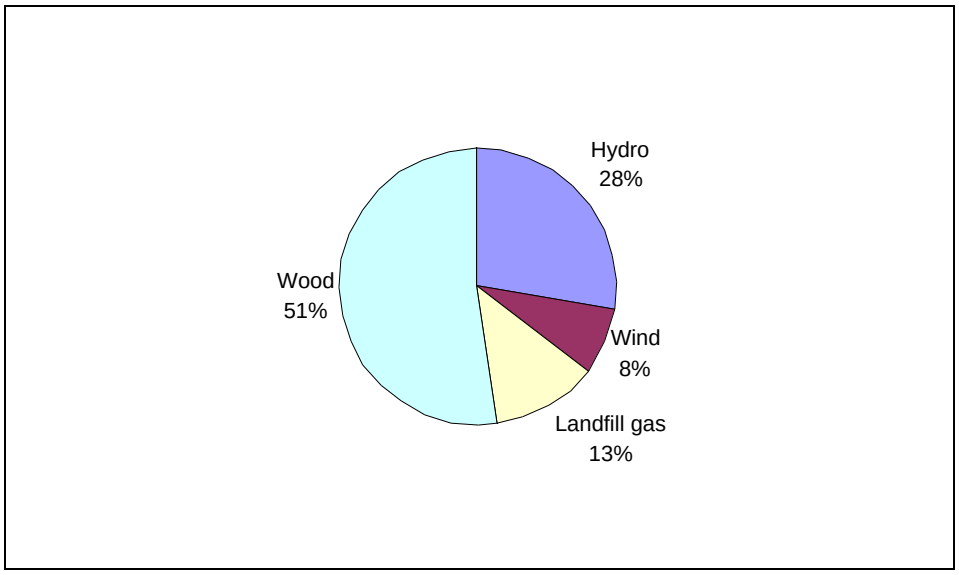

Figure 2: Breakdown of Renewable Energy in Ireland 2002. Sources: ESRI, 2001; Jacob, 2001

The uses to which this energy was put are shown in Figure 3. The transformation sector is primarily the generation of electricity - only about one third of the energy input to electricity generation is delivered to consumers in the form of electricity. Energy is lost as waste heat in power generation and from electricity transmission and distribution lines. There are also losses in the heat and transport sectors too due to the inefficiencies involved in converting heating fuel to thermal energy or transport fuels to vehicular motion.

Sustainable energy sources are only able to offer an alternative to fossil fuels in the generation of electricity and the production of heat. Consequently, direct or indirect subsidies to the use of energy in the transportation system should be withdrawn since, as we discussed, they will inevitably subsidise the use of unsustainable forms of energy until renewable energy sources – such as hydrogen produced using electricity from wind turbines – are readily available.

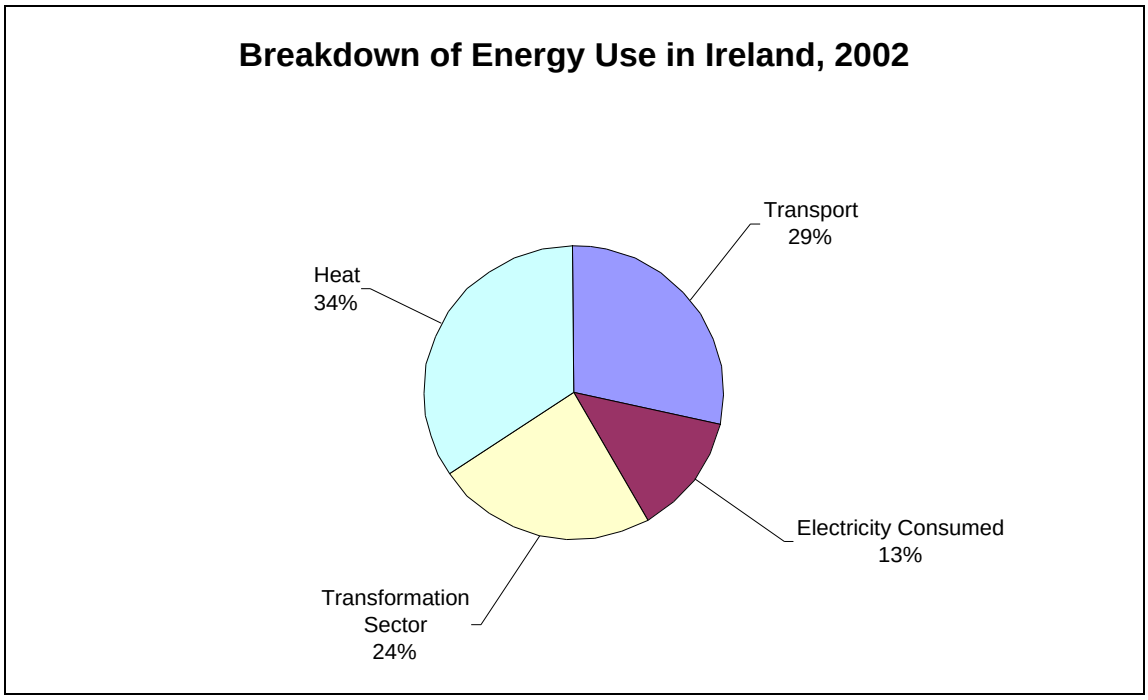

Figure 3. Breakdown of Energy Use in Ireland Calculated from data in ESRI, 2001.

5. Energy Subsidies in General

Energy consumption in Ireland gets two subsidies, one direct, the other indirect. The direct one arises because purchasers of fossil fuels pay less tax than would be the case if they were buying most other products. The usual rate of VAT is 21% but electricity and most fuels (the exceptions are diesel oil for road use and petrol) are charged at the reduced rate of 13.5%. The difference between the two tax rates constitutes a subsidy for fossil fuel use. We have not been able to estimate the amount of revenue lost as a result of this concession as to do so, since businesses can reclaim the VAT they pay on their inputs, we would need to know the proportion of the affected fuels consumed by non-VAT-registered users.

The indirect subsidy for fossil energy use is much more important. It arises because users are not required to pay the full cost of the damage done by fossil fuels they burn. Apart from taxes such as VAT and the duties on motor fuels, the price they pay is based on the cost of extracting the fuel from the ground, processing it and getting it to market. The uncovered – and therefore subsidised costs - are:

a. The damage likely to be done as a result of changes in the global climate as a result of the release of greenhouse gases when fossil fuel is burned.
b. The effects of the emissions caused by the use of the energy on human health.

c. The effects of the emissions caused by the use of the energy on the environment and on the fabric of buildings etc.
d. The costs of occupational diseases and accidents related to the energy use

Removing this subsidy would entail charging the emitters the full cost of these damages *and then using the money to compensate the victims, both in this generation and subsequent ones*. Just collecting the cost of the damage as a tax and then using it for general public purposes, while a step forward because it would increase the price of fossil energy and thus tend to curtail its use, would be merely taking the subsidy away from energy users and giving it to whatever groups benefitted from the reductions in other taxes and/or the increases in public spending that the change in the tax base brought about. *The society as a whole would still be drawing a fossil energy subsidy, although probably a smaller one, and in a different way.*

Estimates of the extent of this subsidy in the production of electricity in the EU can be found in the ExternE study (European Commission ExternE Programme, 2001) which was the first research project "to put plausible financial figures against damage resulting from different forms of electricity production for the entire EU". It defines the subsidy paid by society as a whole as the total cost of the quantifiable damage done to health and the environment which was actually incurred by generating electricity but not built into the cost of the electricity to the consumer. For example, it includes estimates of the effects of air pollution on human health, crop yields and buildings, as well as occupational disease and accidents. It also estimates the damage done to the world’s climate but we have excluded that element from the figures given in the table below as we will discuss the problems with pricing this type of damage later. As a rule of thumb, however, the ExternE study showed climate damzge to be roughly equal to the total of the other types of damage done, which was largely to public health. The figures in Table 1.1 are averages - there was wide variation in the range of damage costs from country to country and from powerstation to powerstation, depending on, for example, whether flue gases were scrubbed or not before being released.

Source	Extra cost from environmental damage (except global warming) € cents/kWh
Coal	5.7 (Moneypoint 4.1)
Gas	1.6
Oil	2.0
Peat	3.2 (Irish data)
Biomass	1.6
PV solar	0.6
Hydro	0.4
Nuclear	0.4
Wind	0.1

Table 1 Extra cost resulting from environmental damage, € cents/kWh Global warming excluded Source: European Commission ExternE Programme, 2001

Since the ex-powerstation cost of electricity generated in the EU averages about 4 cents/kWh because of the subsidy, if the subsidy was withdrawn, the price of electricity from coal would jump by from 4 cents to 9.7 cents, a 142% rise, while that from gas would increase by 40%. The total amount of the subsidy in the EU was put at between €65,000 million and €90,000 million a year, almost all from fossil fuels use as the table below shows:

Electricity Source	Subsidy €million/year
Fossil fuels	63,342 – 88,539
Nuclear energy	734 – 1,355
Renewables	562 – 564
Total	**64,638 – 90,458**

Table 2 Total subsidy to electricity production in the EU (M€/year) in the early 1990s, excluding climate change Note: Figures do not include the former GDR, Austria and Luxembourg. Figures for nuclear do not include Finland. Figures for renewables do not include Belgium, Germany, Italy and The Netherlands. Reliable values for nuclear accidents, high level nuclear waste impacts, nuclear proliferation and impacts of terrorism have not been developed. These omissions might well be significant.

An earlier European study (Krewitt et al, 1999) which also estimated the impact on human health, building materials and crop production, but not global warming came up with a very similar figure. It put the 1990 figure as US$ 70,000 million, about 1% of the EU's GDP.

If we apply the figures in Table 1.1 to Ireland, the current subsidy for the use of fossil fuels in electricity generation works out as follows: 22,285,000,000 kWh of electricity was produced in 2000 with the following mix of fuels:

Electricity Fuel Mix, 2000.	
Source	%
Gas	35.4
Coal	29.1
Oil	22.3
Peat	11.1
Hydro	1
Wind	1

Table 3 Electricity Fuel Mix for Ireland, 2000

This means that gas was the source of 7.9 billion kWh, coal, 6.5 billion, oil, 5 billion and peat, 2.5 billion. The subsidy was therefore as follows:

Source	**KWh by cost**	**€ million**
Gas	7.9 x 1.6 =	126
Coal	6.5 x 4.1 =	266
Oil	5.0 x 2.0 =	100
Peat	2.5 x 3.2 =	80
Total million euros.		**572**

Table 4 Environmental damage, (global warming excluded) for electricity generated in Ireland, 2000

Although fossil fuels are put to other uses besides the generation of electricity we have been unable to find estimates of the damages these uses do. While coal burned in a domestic grate or oil burned in a diesel engine must have much more serious effects on human health (the main element in the damages we have just identified) than coal burned under highly-controlled conditions at Moneypoint or oil burned at Tarbert, any multiplier we introduce would be only a guess. We have therefore decided to price these damages as if they had been done in the course of electricity generation and allow the reader to judge whether the figure we present should be multiplied by a factor of two, three or more.

In 2001, the equivalent of 14.8 million tonnes of oil was consumed in Ireland, of which electricity production took roughly a third. It took three-quarters of the coal and peat, a seventh of the oil and two-thirds of the gas. Thus the minimum damage done by the non-electricity-generating uses of fossil fuels was as in Table 5.

Fossil fuel damage (non-electricity)	€million/annum
Coal	88.7
Peat	26.7
Oil	600
Gas	63
Total	**778.4**

Table 5. Estimates of damage by non-electricity uses of fossil fuels in Ireland

Thus the total amount of damage done by fossil fuel use in Ireland, largely to human health, cannot be less than €1,350 million at 1995 prices, climate effects excluded, and could easily be 50% above that. This is a massive subsidy, equivalent to 1.4 - 2% of 2002 gross domestic product at 1995 prices (€94,259 million) or to 27-40% of the amount the state spends on health.

5.1 Estimating the Climate Subsidy

Humanity is burning fossil fuels at a faster rate than natural systems can render harmless the gases their combustion creates. As a result, a stock of these gases is building up in the atmosphere and as it grows, so does the rate at which the Earth retains energy from the sun because of the greenhouse effect the gases create. The higher energy levels at which the world's weather systems operate produce more storms, stronger winds, higher waves and changed weather patterns. One of the world's leading re-insurance companies, Munich Re, estimates that the cost of the damage around the world is rising at 10-12% a year. It should be noted that this figure only covers insured properties. It might be that the rate of damage is increasing even more rapidly because a lot of the increased storm damage occurs in the tropics where many properties are uninsured.

While this stock of gases remains in the atmosphere, it will continue to cause damage every year until emissions fall below the rate at which they are absorbed by natural sinks and the gas we caused to be released when we burned fossil fuel finally gets taken out of the system. This process might take several hundred years – or even more, if large quantities of coal continue to be burned around the world. So the total damage done by the fossil fuel we burn is the total of all the damage it will cause until it is reabsorbed.

Unfortunately, the ExternE study did not calculate the total exactly that way. Instead of simply adding up the cost of the damage expected to occur every year for at least the next two centuries, it discounted all the damage that is expected

to occur in the future. For example, a million euros worth of damage that is expected to occur in fifty years' time was not treated as being equal to a million euros worth of damage this year. Instead it was set at either 200,000 euros or 600,000 euros depending on whether a 1% or 3% discount rate was selected. The study could not choose between these rates. It comments: "for intergenerational damages … a discount rate equal to the per capita growth rate is appropriate" and thought that a 1% rate was rather more likely than a 3% rate but this was where it left the matter: "The choice between 3% and 1% on grounds of soft-sustainability is not so clear."

But will the average per capita income of people throughout the world economy grow at all during the next century or two? We cannot be sure that it will in view of the fact that oil and gas production will begin to decline within the next 25 years because of resource depletion and the availability of fossil energy has been the source of most economic growth during the past century. If per capita income fell by 1% a year, the impact that the losses caused by global warming would have on people's lives in future would be greater, not less. Accordingly, we suggest that the value calculated by the ExternE study using the 1% discount rate (a rate which makes any damage taking place 230 years in the future totally negligible) and which assumes a high climate sensitivity to the release of the gas be accepted as the minimum subsidy being taken. This puts the damage at €320 per tonne of carbon released in 1995 prices, which converts to €87 per tonne of CO_2 released.

Irish emissions of carbon dioxide are of the order of 40 million tonnes a year. This means that the subsidy being taken from the future by the use of fossil fuels could be of the order of €3,500 million each year, roughly 4% of the value of Irish GDP in 2002 at 1995 prices. It is also roughly 2.5 times the level of other forms of damage being done.

The only way that these subsidies can be removed is to impose taxes of equivalent value and then use the revenue either to compensate those suffering the damage or to minimise the harm being done. As we will discuss later, the only significant taxes on energy in Ireland at present are the excise duties on motor fuels but these can be considered a payment for the use of the road system and not an energy tax at all. The VAT charged on motor fuels and home heating oil is just the same as the tax charged on most consumer products. It is not a special energy tax.

Thus, to remove the subsidy, at least an extra €5,000 million at 1995 prices (add 60% to convert to the 2002 level) or should be raised in taxes on energy and of this €1,350 million (€2,160 million in 2002 money) should be either be put into the health budget on top of the current spending, or paid out in compensation to those with, say, respiratory complaints, or used to minimise future emissions. The remainder, at least €3,500 million at 1995 prices each year, should be spent on projects which will benefit future generations and thus compensate for the

damage we are doing to them. As this figure is roughly a fifth of the sum invested by the country in 2002 at 1995 prices (€17,801 million) each year, it means that roughly a fifth of all investment projects should have as their primary goal the wellbeing of future generations rather than the creation of incomes and profits for people living now. Suitable projects for this future-first investment fund could include Ireland making a rapid switch to complete reliance on non-fossil fuels.

5.2 Recommendations

The government should announce that it intends to drastically reduce taxes on labour over the next 15 years and raise the revenue lost from carbon taxes instead.

In addition to carbon taxes designed to raise revenue, the state should collect a special ‘climate compensation’ tax to be invested in projects both in Ireland and in developing countries which are intended to compensate future generations for the losses they will suffer as a result of current Irish energy use.

Particular Direct Subsidies

6. Road transport

As we have seen, taxes on fuels should compensate the public (including future generations) for the damage their use causes if a subsidy is not to be given. This means that the tax on petrol and road diesel should cover the damage that the vehicles burning them will do to the road surface in addition to the damage their emissions do to public health and the global climate. The taxes should also cover the cost of servicing the capital used to build the road network in the first place.to the extent that the cost was met from general taxation. The state should use the revenue from this to fund its general activities. If these charges are not set at a sufficiently high rate, activities that use a lot of transport (and hence energy) will be favoured at the expense of those using less.

All road vehicles pay both a licence fee and excise duty on the fuel they use. A vehicle registration tax is also paid on cars and at a nominal rate, a mere 50 cents per vehicle, on heavy goods vehicles. If we ignore for the moment the damage that vehicle emissions do to public health and to the world’s climate, are these three taxes adequate to cover the cost of providing and maintaining the road network?

The Oscar Faber Report (1999) on transport and the environment conducted for the Technical Assistance Programme of the Operational Programme for Transport 1994-99 compared the tax revenue (excluding VAT) from road

transport compared with the road infrastructure costs, accident costs, and environmental costs imposed by the sector. It concluded that even if a high value was placed on environmental emissions, the road sector paid more in taxes than all of the costs it imposed (see Table). Cars in particular were shown to pay between 50 and 75 per cent more than the costs they imposed.

Category of Road Vehicle	Ratio of Tax Payments to Costs Imposed	
	High Cost Estimate	Low Cost Estimate
All Road Vehicles	1.02	1.16
Cars	1.51	1.75

Table 6 Ratio of Tax Paid by Road Transport to Cost Imposed, 1996

The Society of the Irish Motor Industry argues that since revenue from VRT and road fuels has doubled since 1996, a similar calculation today would show an even greater excess of taxes over costs imposed, despite the increased expenditure on road infrastructure since that time. This seems correct in relation to infrastructural costs. Expenditure in 2002 on national roads by the National Roads Authority came to **€**1,138,000,000 while spending on non-national roads was **€**435,457,000, making a total road spending of **€**1,573 million, roughly twice the figure collected in tax as shown below. VAT is excluded from the total because it is charged on most economic activities and is not a specific motor tax.

Taxes on Vehicles 2000 (vat excluded)	€m
VRT - Cars	777.1
VRT - Other Vehicles	15.5
Fuel Excise Duty	1514.5
Benefit In Kind	78.2
Road Tax	581.0
Total	**2966.3**

Table 7 Taxes on Vehicles 2002, VAT excluded

In our opinion, however, both the health costs and, because of climate change, the environmental costs of road use are much higher than those adopted by Faber, and so the excess tax paid is insufficient to avoid a subsidy being given. What is certain, however, is that, as the Oscar Faber report suggested, the transport of goods by road is being subsidised by other road users. The damage done to a road's surface and structure is proportional to the fourth power of the axle load. As a result, the UK Highways Agency estimates (*Design Manual for*

Roads and Bridges, 1994) that a 40 tonne, 5 axle lorry causes over 10,000 times more damage to road surfaces than an average car, Moreover, as the cost of building roads is greatly increased by the fact that trucks will use them, HGV owners should contribute for that as well.

Lack of data prevents us estimating the amount of the subsidy being given for road transport. The damage done by trucks varies widely between types. For example, a 31-32 tonne rigid (ie, not articulated) truck does 50% more damage over the course of a year than a 26-31 tonne one. Anyone attempting calculate an accurate figure for the damage done in the course of a year would therefore need to know the exact composition of the Irish truck fleet, how many miles each type of vehicle travelled and the weight carried on each journey.

The reason road hauliers are given this subsidy is clearly to increase Ireland's international competitiveness as a manufacturing location. However, it may not be possible for these preferential charges to apply for much longer. By 2005. the European Commission hopes to have a single EU-wide charging system in operation covering all vehicles over 3.5 tonnes or carrying 10 or more passengers although the rate of charge could and would vary from state to state. Eventually, each vehicle is likely to be tracked using satellites and charged according to its axle loading and the distance it travels. Higher charges are being considered for sensitive areas, such as the Alps. Governments will also be able to charge according to a vehicle's emission level, the time of day and the degree of congestion. Switzerland already has a system which charges trucks according to their axle loading and distance travelled and Germany is currently introducing one. (See appendix) Higher road freight costs will reduce the amount of road transport and shift some goods to less energy-intensive modes, such as rail and sea. They would therefore help cut greenhouse emissions.

6.1 Recommendation

Since the EU is pushing for the introduction of road pricing anyway, the Irish government should install the necessary equipment now and begin charging road hauliers the full cost of their activities.

7. Direct subsidies to air transport

Aviation is the most carbon-intensive means of travel. As take-off and landing use the most fuel, shorter trips have higher emission rates per kilometre.

Mode	**kg CO_2 / passenger km**
Aviation	0.46
Car	0.13

Train (diesel)	0.07

Table 8 Estimated CO_2 emission rates for different forms of travel

Despite this, aviation enjoys a highly favoured position in public policy in Ireland and many other industrialised countries. We have identified four significant areas of favourable treatment by subsidies, grants or tax exemptions:

- direct subsidies to internal aviation,
- subsidies to the capital costs of regional airports (most of whose custom is the subsidised internal aviation)
- aviation fuel untaxed

7.1 Direct Subsidies to internal aviation

Direct subsidies in the form of Public Service Obligations (PSO) are granted to internal aviation on six routes all radiating from Dublin. (Derry, Carrickfinn (Donegal), Sligo, Knock, Galway, Farranfore(Kerry)).

From 1995 to 2000, there were four routes. In 2001 two further routes were added. Over this period Aer Lingus withdrew from a number of routes which were reallocated with increased subsidy levels. In early 2003 the Sligo and Donegal Routes which had been operated by Euroceltic were reallocated to Aer Arann under temporary contracts following Euroceltic's collapse.

The total exchequer subsidy in 1995 was just over €1 million. The predicted subsidy in 2003 is just under €20 million.

Subsidies									
Route	1995	1996	1997	1998	1999	2000	2001	2002	2003f
	€'000	€'000	€'000	€'000	€'000	€'000	€'000	€'000	€'000
Kerry	698	698	698	956	956	956	3,441	4,479	4,497
Galway	444	444	444	1,364	1,364	1,364	3,999	4,600	5,105
Sligo	-	-	603	874	874	874	2,725	2,681	} 4,800
Donegal	-	175	454	911	1,011	960	1,802	2,083	}
Knock	-	-	-	-	-	-	1,960	2,388	3,191
Derry	-	-	-	-	-	-	2,306	2,306	2,306
Total	**1,143**	**1,318**	**2,200**	**4,105**	**4,204**	**4,153**	**16,233**	**18,537**	**19,898**

Table 9 Annual PSO subsidies €'000. The 2003 allocations for Sligo and Donegal are not disaggregated. Source: Department of Transport

Passenger Numbers	1995 '000	1996 '000	1997 '000	1998 '000	1999 '000	2000 '000	2001 '000	2002 '000	2003f '000
Kerry (3)	42	57	58	60	70	79	78	82	82
Galway (3)	51	54	55	66	74	72	86	97	96
Sligo (1)	-	-	20	22	21	24	23	26	NS
Donegal (2)	-	2	9	10	11	12	15	19	NS
Knock (3)	-	-	-	-	-	-	8	11	11
Derry	-	-	-	-	-	-	20	24	26
Total	**93**	**113**	**142**	**158**	**176**	**187**	**230**	**259**	

Table 10 Annual passenger numbers on PSO routes (1000 passenger units). NS = "not specified" As these routes are being run on temporary contracts there are no estimates. Source: Department of Transport

Per capita subsidy (e/w)	1995 €	1996 €	1997 €	1998 €	1999 €	2000 €	2001 €	2002 €	2003f €
Kerry	17	12	12	16	14	12	44	55	55
Galway	9	8	8	21	18	19	47	47	53
Sligo			30	40	42	36	118	103	
Donegal		88	50	91	92	80	120	110	
Knock							245	217	290
Derry							115	96	89

Table 11 Subsidy per passenger each way

Increase over 1995 levels	1995	1996	1997	1998	1999	2000	2001	2002	2003f
Total expenditure €'000	1,143	1,318	2,200	4,105	4,204	4,153	16,233	18,537	19,898
% increase	**0**	**15**	**92**	**259**	**268**	**263**	**1,320**	**1,522**	**1,641**
Total passenger numbers '000	93	113	142	158	176	187	230	259	
% increase	**0**	**22**	**53**	**70**	**89**	**101**	**147**	**178**	

Table 12 Increases in subsidy and passenger levels

Current levels of subsidy have increased dramatically. The PSO requires that at least 40% of passengers travel on a maximum return fare of €110 and another 40% at a maximum fare of €123 (exclusive of airport charges). This means that a passenger buying a €110 return ticket benefits from a subsidy which ranges from €106 in the case of travel to/from Galway to €580 in the case of Knock.

Significantly, four of these routes are in direct competition with rail links to Dublin (Sligo, Knock, Galway, Kerry). The other two (Derry and Donegal) are in competition with express bus services. Deutsche Bahn has started a legal challenge for unfair competition against the German government's subsidies to internal aviation.

We have estimated potential CO_2 emissions reductions on the basis of transfer to car for Derry and Donegal and to rail for the other modes.

Total exchequer savings available:	c. €20 million/annum
Total CO_2 emissions reduction available	0.024 Mt CO_2/annum

Table 13 Potential savings, financial and GHG emissions. Calculations based on emission rates above.

7.2 Subsidies to the capital costs of regional airports

Despite the fact that most of the custom of the regional airports is the subsidised internal aviation referred to above, there are substantial grants to regional airports under the National Development Plan. The total to be spent under the plan was €11.9 million of which €2.4 million remains to be spent in the years 2004-2006

Total exchequer savings available:	**€2.4 million over 2004-2006**

Table 14 Potential financial savings

7.3 Fuel subsidies for air transport

Air travel and air freight is given a significant subsidy because no tax at all is paid on aircraft fuel. Professor P.E. Hart (2003) of the University of Reading calculates that if airlines had to pay the same tax on their fuel as paid by British motorists, the cost of air tickets would go up by around 40%. This, he points out, would lead to a fall of 40% in the number of people flying, if the minus-1 figure for the price elasticity of the demand for air transport used by the British Department of Transport is correct.

Ships – including the passenger ferries competing with the airlines - also pay no tax on their fuel and it has been argued that if Ireland began taxing bunker oil, vessels would refuel elsewhere. The same argument does not apply to aircraft, however, because of the operating cost penalty of carrying more fuel. Except on very short flights, aircraft usually refuel at every airport. Thus if Ireland started taxing aviation spirit and Britain did not, the return trip fare between the two countries could be expected to rise by 20%. Irish ghg emissions would fall and pressure for airport extensions diminish.

We recommend that the same rate of excise duty currently being applied to motor fuels be charged on aviation spirit.

8. Direct subsidies for peat-fired electricity generation

The use of peat for electricity generation is economically unviable in Ireland. In addition, it is by far the most carbon-intensive form of electricity generation.

Estimated Price and CO_2 emissions per kWh are as follows.

Source	cents /kWh	kg CO_2 /kWh
Peat	*	1.15-1.6
Coal	2.5-4.5	1
Gas	3.2-4.3	0.5
Wind	4.5-5.5	None/negligible

Table 15 Market price and CO_2 emissions for various electricity fuel sources *Due to the fact that peat-fired electricity is not traded on a market, we have been unable to obtain this figure.

In addition, peat extraction causes further CO_2 emissions from the drained but unextracted parts of the peatland, and removes the living peatland which is an active carbon sink. Other negative environmental impacts include increased risk of flooding downstream in the catchment and loss of habitats of biodiversity and conservation value.

Despite peat's highly unfavourable profile as a fuel, one new peat-fired power plant was built at Edenderry during the 1990s and two further plants are under construction at Lanesboro and Shannonbridge. The previous generation of peatfired power plants had been in operation well past their projected life-span.

These power plants exist because of an ongoing policy of government subsidy and cross-subsidy. The purpose of the policy has been to prevent market forces operating to shut the uncompetitive peat-fired electricity out of the market. The burden is now being borne by a levy on all electricity consumption.

In 1995, the European Commission approved £21 million in ERDF funding to the Edenderry Power plant.

In 2001 the European Commission approved a Public Service Obligation for whereby the Commission for Electricity Regulation is obliged to surcharge all electricity users to subsidise peat-fired electricity. The cost over the period 2001 to 2019 was intially estimated at €568 million. However, this now appears to be significantly underestimated. For 2003, the annual total is €39 million and the total for 2004 is €58 million

Year	Peat-related PSO levy
2003	€39 million
2004	€58 million

Table 16 Peat-related PSO levies for 2003 and 2004

The PSO cross-subsidy for peat is 4 times that for wind.

This subsidy is very substantial and has received widespread criticism from economists and environmentalists. The ESRI has consistently been criticising this policy since at least 1997. (Honohan, 1997). Environmental campaigners have opposed it at national and EU level. The OECD in its 2003 Country Report on Ireland, is highly critical:

"Ireland has adopted a promising policy approach, including the extensive use of economic instruments, in many areas of environmental protection. But weak resolve of policymakers in fighting special interests and insufficient advocacy activities have raised the costs of compliance born by the rest of the economy. Notable examples include continued use of peat in power generation, non-charging of water use by households, and the absence of taxation of excessive fertiliser application.

…

"On the other hand, there is a lack of integration between environmental and social objectives. The recent update on the sustainable development strategy makes an attempt to put more emphasis on social goals (DELG, 2002). Objectives of social policy are listed side-by-side with environmental goals but can hardly be regarded as integrated in a comprehensive strategy. The concomitant decision to increase the use of massively subsidised and environmentally harmful peat is particularly telling in this regard.

…

"A comprehensive CBA was undertaken in the context of the preparation of the Climate Change Strategy (ERM, 1998) and proved useful though its conclusions were ignored as far as peat was concerned.

…

"Continued use of peat deprives Ireland of a negative cost option for lowering emissions and hence raises compliance costs in the rest of the economy."

Resultant CO_2 emission levels from the three new power plants are as follows.

Power plant	**GHG emissions (Mt CO_2 /year)**
Edenderry	1.0
Lanesborough	0.8
Shannonbridge	1.3
Total	**3.1**

Table 17 Greenhouse gas emissions from new peat plants

Total saving available for electricity consumers:	€58 million per annum
Total CO_2 emissions reduction possible	
If substituted by wind generation or efficiency:	3.1 Mt /annum
If substituted by gas-fired electricity:	1.8 Mt /annum

Table 18 Potential savings, financial and GHG emissions

There are also some subsidies we have not included in the above estimate. In addition to the ongoing cross-subsidies, there have been substantial historical subsidies to Bord na Móna. We have not been able to obtain a value for lands transferred to the Board. However, the International Energy Agency reported in 1999 that

“Since 1996, the Government has injected I£108 million into Bord na Móna to repay unsustainable debts (estimated at I£110 million in 1996). These debts arose from energy investments undertaken to increase the production of indigenous fuels following the oil crises of the 1970s and 1980s.”

Were these land transfers, the governmental cash injection and the 1995 £21million ERDF grant to be treated as debts owed to the Exchequer, the effective subsidy to peat extraction would be even higher.

Since roughly 75% of the peat harvested in Ireland is used in electricity generation, very much less peat would be harvested in the absence of these cross-subsidies. They should not, however, be seen as subsidies which encourage greater energy use as the amount of electricity being used in Ireland would be just the same without them. They are, as in some other cases we have discussed, essentially subsidies for employment creation and, probably as an afterthought, reducing Ireland's heavy dependence on imported fuel. Nevertheless, the cost in terms of extra ghg emissions is very high and it would be better to spend the subsidy in other ways to achieve the same employment creation and fuel source results.

8.1 Carbon tax and peat

The current PSO is designed to make peat-fired electricity competitive in the current fiscal environment. As peat is the most carbon-intensive fuel, the introduction of carbon tax will increase the relative inefficiency of peat-generated electricity even further. Peat will once again be uneconomic under the current PSO levels. The Department of Communications, Marine and Natural Resources has indicated to us that it does not know whether the PSO will be reformulated to take account of carbon taxation of if in some other way the cross-subsidy to peat will be maintained at a level which ensures the continued operation of peat-fired stations.

8.2 Appropriate responses to the current situation.

The cross-subsidy to peat must stop. Simply removing the PSO subsidy would of itself be a significant positive step, with advantages for electricity consumers and the economy of reducing electricity costs.

However given the difficulties in meeting Kyoto targets we would not put a high priority on reducing electricity unit costs compared to reducing emissions. There are three options which would in our view be superior and be in keeping with climate change policy and the EU electricity policy framework.

- The PSO funding could be reallocated to windpower, leading to a substantial boost to wind-generated electricity.
- Given the existing capital investment in the peat-fired power plants, another appropriate response could be to change the fuel used in those plants to biomass fuels (coppiced willow or poplar, forestry thinnings, straw). The EPA has required that the plants be capable of using biomass as fuel as part of their IPC licences. This option has the advantage of maintaining the local economic value of the power plants. However, to our knowledge there has been no feasibility study on this option by either the ESB or Bord na Móna.
- The funding could be invested in electricity efficiency and demand-management measures. In addition to reducing emissions, this would in all likelihood lead to further financial savings.

9. Subsidy to public transport

There is general agreement that the subsidy to public transport is one which, by diverting traffic from private vehicles, reduces greenhouse gas emissions. Nevertheless, it appears that the way in which this subsidy operates is preventing the spread to Ireland of cleaner and more efficient bus technology.

Scott and Feeney (1998) of the ESRI report that

> The fiscal treatment of scheduled public road transport is somewhat perverse. Owing to its being exempt VAT, new technology in the form of new buses, for example, is subject to full non-deductible VAT at 21 per cent. Meanwhile there is a large rebate on diesel. Rebates and subsidies tend to encourage extra use. It is not fuel use that should be encouraged and furthermore diesel may not be the fuel one wants to encourage. For licensed scheduled road passenger transport, the rate of excise on LPG is over three times the rate on diesel. The argument that the technology and infrastructure for LPG are not sufficiently advanced is possibly well-founded, but such fiscal treatment will help to prolong just that. Long-term effects of the fiscal setup are stronger than the short-term effects.

Since then Dublin Bus has carried out trials of cleaner buses. The Department of Transport (2003) reported as follows:

> In 2001 [Dublin Bus] completed a 6-month trial of an LPG-fuelled bus. While the trial proved the bus reliable the essential issues in relation to the introduction of such buses into the fleet relate to costs. The actual cost of an individual bus is some 20% greater than the standard diesel bus. Fuel costs are considerably higher, fuel efficiency is poorer – about 1.5 times greater fuel consumption, and considerable changeover costs with large safety considerations. LPG is considerably cleaner from a local air quality perspective, but is marginally poorer in relation to CO2 emissions than diesel (greenhouse gas) due in the main to the poorer efficiency.
>
> The calculation of 1.5 time greater fuel consumption must be based on the economic cost (under the current fiscal framework) rather than the energy consumption or CO_2 emissions. Estimates for CO_2 emissions from LPG are in the same range as from dieselInterestingly there are gas-powered buses in operation in Dublin, but only as tourbuses rather than standard public service vehicles.

While we have not come across any quantified estimates, the current subsidy structure has the following actual or potential undesirable effects:

- Reducing the incentive for or discouraging established cleaner technologies such as LPG.
- Discouraging new cleaner and more carbon-efficient technologies such as fuel cell buses
- Reducing the incentive to management or operational changes which would reduce emissions.

The subsidy to public transport should be reformulated to base on the characteristics of public transport which are most desirable. Scott *et al.* recommended:

> "The main point is that subsidies should be targeted on some desirable objectives, such as passenger kilometres, so that the company is rewarded according as these are achieved."

10 Fertilisers

Fertilisers, a very energy-intensive product, are zero-rated for VAT when sold in quantities of over 10kg. Since every farmer would be buying them in above 10kg qunatities, this means that the agricultural sector is essentially getting its fertiliser VAT-free. We do not regard this as a subsidy for energy use, however, since it would make little difference even if the full rate of VAT was charged. This is because those farmers who are VAT registered would be able to reclaim their payments and those who are not would be compensated for the VAT they were charged on their purchases by an increase in the flat-rate addition to the prices at which they sold their produce and services to VAT-registered persons. This flat-rate addition is currently 4.3%

11 Agricultural Diesel

A much more important subsidy is the lower rate of excise duty paid on the diesel fuel used on farms. This is currently levied at E47.36 per thousand litres whereas other diesel users pay E326.73 per 1000 litres. However, as the excise duty charged on motor fuels is essentially a charge for the use of the public roads, we see no reason to suggest that this rate be changed. However, farm fuels should not be exempted from carbon taxes and and taxes or duties designed to curb global warming or to compensate for its effects.

12 Indirect subsidies

We have already discussed the major indirect subsidies being given to fossil fuel use in Ireland – the damage being done to public health and the cumulative damage being done to the global climate which will result in damage to property and loss of life for many generations. The extent of these subsidies is far, far greater than any direct subsidies being given and we will recommend an approach to reducing them in our conclusions.

13 Passive subsidies

The main passive subsidy being given in Ireland today which increases energy use stems from the fact that the tax system is largely based on labour taxes rather than taxes on energy and materials use or taxes on land and property. Even VAT is fundamentally a tax on labour.

Labour taxes increase the cost of labour to the employer and encourage the use of machinery and other types of capital equipment instead. This has the effect of increasing fossil energy use not just because, say, an electric motor performs a task previously done by human muscle – this is a minor effect - but also because mechanisation greatly increases the scale on which an enterprise has to be carried on in order to be competitive. The more labour-saving (and hence specialised) a firm's capital equipment becomes, the bigger the market it needs to absorb its output and thus the more transport services it requires.

In our conclusions we therefore recommend a rebalancing of the tax system in favour of labour and against energy use.

14 Policies of Commission

Current capital expenditure has long-term impacts on future energy demand. In Ireland at the moment, energy demand is rarely or never a criterion in decision making in relation to capital expenditure. Transport is probably a prime example, with substantial capital expenditure being put into road infrastructure. This inevitably leads to high energy demand over the lifetime of the infrastructure. In addition, the selection of appropriate sewage treatment infrastructure or other plant rarely is determined by the comparative energy demand of the various options available.

In addition the impact of state-funded capital expenditure on private capital expenditure decisions must be taken into account. Transport is again a prime example. State investment in road infrastructure encourages private capital investment in road-based transport solutions such as road-based distribution networks, location of employment in areas poorly accessible by public transport. Similarly, decisions about the electricity grid determine whether developments will incorporate photovoltaic cells, CHP plants of small renewables schemes.

Unfortunately Irish public policy does not consider these impacts and the unprecedented capital expenditure taking place at the moment is locking us in to a high level of energy demand for decades to come. Given the envisaged increase in fossil fuel prices and the need for greenhouse gas abatement, this is storing up problems for the future.

The failure to consider long-term energy demand leads to effective subsidy through capital expenditure. Due to the uncertainties involved, we have not attempted to quantify such subsidies, but we do emphasise the importance of considering them.

15 Policies of Omission – Spatial Planning

Perhaps the most important subsidy of omission which has encouraged energy use in recent years has been the near total failure of government to develop and implement a spatial strategy designed to mimimise the need for transport of all sorts, and particularly road use. This is true throughout the country. Around the capital, as the land banks close to Dublin were used up, housing development was allowed to leap-frog over established dormitory areas (ie, Leixlip-Maynooth, Bray-Greystones) with the result that the outer Leinster counties (Louth, Westmeath, Offaly, Laois, Carlow and Wexford) are now becoming integrated into the Dublin commuter belt which now extends for up to 100km from the city centre. Other cities have seen the same thing – Galway, for example, has exploded out to Oranmore, where large private housing estates have been built several miles from most of their owners' work and with no effective bus services. And, thoughout rural Ireland, tens of thousands of houses have been built well away from jobs, shops, services and public transportation. Between 1991 and 1996, the number of people travelling over 15 miles to work increased by 52%.

International experience has shown that building houses in dense clusters close to public transport routes, shops, services and employment reduces car use very significantly in both higher- and lower-income regions. (Newman et al, 1997, Kenworthy and Laube 1999).

Mixed land use is an important variable and so is whether distances are such that people can walk or cycle rather than drive. Data from the Australian National Personal Transportation Survey showed that residents of urban areas make 25% fewer motorcar journeys than the national average. Cambridge Systematics (1992) showed that households in a high-density, transit-oriented suburb made less car trips than those in a conventional low-density area. Similarly, Holtzclaw (1994) found that average vehicle ownership, vehicle travel and vehicle expenditure per household declined with increasing residential densities and proximity to public transport (holding household size and income constant). A reduction from 20 to 5 dwellings per 1 acre increased average vehicle travel by around 40%.

In a study of 32 cities, Newman and Kenworthy showed that there was a definite inverse relationship between the real price of petrol and the amount of energy used in the transport sector. In other words, putting up the price of petrol signals to people that they ought to live closer to their work.

Deciding the optimum locations for housing, shops and industries cannot (or, at least, should not) be done by government alone. It is important to signal to people what is likely to happen to energy and thus transport costs in the future so that they can take informed decisions about where to live or where to locate their businesses now. Even if taxes to reduce greenhouse emissions are not introduced, the depletiion of oil and gas reserves will push up prices sharply. A public awareness campaign needs to be mounted now.

16 Conclusions and Recommendations

1. The VAT rate on all fuels, including electricity, should be increased to the standard rate. This will cause hardship to the least well-off so social welfare payments should be raised simultaneously to compensate. The lower rate of duty charged on farmers' fuel should be withdrawn and, if necessary, the direct payments to farmers increased to compensate.
2. Since the EU is pushing for the introduction of road pricing anyway, the Irish government should install the necessary equipment now and begin charging road hauliers the full cost of their activities.
3. The subsidy being given to the generation of electricity from peat must stop. Simply removing the PSO subsidy would of itself be a significant positive step, with advantages for electricity consumers and the economy of reducing electricity costs. However given the difficulties in meeting Kyoto targets we would not put a high priority on reducing electricity unit costs compared to reducing emissions. There are three options which would in our view be superior and be in keeping with climate change policy and the EU electricity policy framework.
    - The PSO funding could be reallocated to windpower, leading to a substantial boost to wind-generated electricity.
    - Given the existing capital investment in the peat-fired power plants, another appropriate response could be to change the fuel used in those plants to biomass fuels (coppiced willow or poplar, forestry thinnings, straw). The EPA has required that the plants be capable of using biomass as fuel as part of their IPC licences. This option has the advantage of maintaining the local economic value of the power plants. However, to our knowledge there has been no feasibility study on this option by either the ESB or Bord na Móna.
    - The funding could be invested in electricity efficiency and demand-management measures. In addition to reducing emissions, this would in all likelihood lead to further financial savings.
4. We recommend that the same rate of excise duty currently being applied to motor fuels be charged on aviation spirit.
5. Building regulations should be tightened to ensure that the energy efficiency of all new buildings is up to the highest standards.

6. The government should announce that it intends to drastically reduce taxes on labour over the next 15 years and raise the revenue lost from carbon taxes instead.
7. In addition to carbon taxes designed to raise revenue, the state should collect a special 'climate compensation' tax to be invested in projects both in Ireland and in developing countries which are intended to compensate future generations for the losses they will suffer as a result of current Irish energy use.
8. Deciding the optimum locations for housing, shops and industries cannot (or, at least, should not) be done by government alone. It is important to signal to people what is likely to happen to energy and thus transport costs in the future so that they can take informed decisions about where to live or where to locate their businesses now. Even if taxes to reduce greenhouse emissions are not introduced, the depletiion of oil and gas reserves will push up prices sharply. A public awareness campaign needs to be mounted now.

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Appendix 1: Road Transport Charging in Europe

Adapted from*: Lorry road user charging*, Freight Transport Association (UK), 4 December 2002. Published on FTA Online

http://www.fta.co.uk/information/otherissues/freighttaxation/021204lorrycharging.htm

Switzerland

Switzerland introduced a distance based lorry road user charge on 1 January 2001. The charge level depends on the distance travelled, the maximum permitted weight of the vehicle according to the vehicle documents and the emission standards.

Technology:	microwave and gps (at strategic level)
Swiss lorries:	fitted with an on board unit (obu) which uses microwave technology to switch on/off at the Swiss border. Lorry user to transfer activity data from obu to Swiss customs every month via electronic chip card
Foreign lorries:	obu (with deposit to Swiss authorities to guarantee payment) or self declaration
Payment terms:	60 days
Vehicles covered:	all lorries over 3.5t gvw
Roads covered:	all roads in Switzerland
Charge per km:	28 euro cents per km (based on a 34t gtw Euro II vehicle)

Germany

Germany announced its intention to leave the current eurovignette scheme on 31 December 2002 and to introduce distance based charges in January 2003. However, unresolved disputes over the tendering exercise for the technology have delayed the start. The charge will vary with vehicle emission euro standard.

Technology:	gps and microwave (to read numberplates)
German lorries:	obu
Foreign lorries:	obu or alternative paper-based system involving pre-booking and pre-paying for journeys made of the motorway
Vehicles covered:	all lorries over 12t gvw
Roads covered:	all German motorways
Charge per km:	12-17 euro cents per km

France, Italy, Austria and Spain

These countries have introduced, or are in the process of introducing, microwave based payment mechanisms at toll booths. This provides operators with a drive-through tolling option. However, using microwave technology alone for electronic charging is not cost efficient. The evidence from the microwave/paper based system in France (Telepeagé) suggests it currently costs four to five times more than the anticipated cost of the proposed German system.

Netherlands

The Netherlands announced in 2001 its intention to set up a distance based charge for all vehicles on all roads. The project, which was to be introduced gradually from 2004 and completed in 2006, was shelved following a change in Government in June 2002.

United Kingdom

The UK will introduce distance-based charging in 2006 but has yet to decide on the technology.

Appendix 2: Valuing the Damage done by Carbon Dioxide Emissions

Estimates of the cost of the damage likely to be done by each tonne of carbon dioxide released into the atmosphere vary widely in the literature. In a recent survey[1], Richard Tol, who was largely responsible for the methodology adopted by the ExternE study, counted 88 estimates in 22 published studies ranging from $5 per tonne of carbon to over $1,000. This wide variation was due to both scientific uncertainty and to the difficulty of placing a value on the damage likely to be done. In the scientific area, the studies differed in the way they :

- measured present emissions and predicted future ones
- converted emission levels into concentrations of carbon in the atmosphere
- thought an increase in the concentration of carbon dioxide in the atmosphere would affect the climate
- estimated the extent that a change in the climate would be damaging, and
- placed different estimates on the extent of the 'socially contingent effects' of climate change such as migration, hunger, disease, conflicts including wars.

In the valuation area, the studies differed because they

- took different monetary values for the damage they thought might be done, such as the price they put on each life lost
- took different discount rates to calculate the presernt value of damage likely to be done in the future, and
- put a different probability on the chances a catastrophic climatic 'flip' taking place.

As with most cost estimates, the more closely one looks at the possible consequences of the build-up of CO2 in the atmosphere, the higher the total of the potential costs seems to climb. Certainly, the $320 figure used in this report is, unfortunately, well within the bounds of possibility.

Appendix 3: Indirect Taxes other than VAT on motor fuels in EU countries (June, 2003)

Ireland has amongst the lowest rates of tax and duty on both petrol and diesel fuel. In most countries, diesel fuel, which does more damage to human health because of the particulates produced on combustion, is taxed at a lower rate than petrol. This constitutes a subsidy to road freight transport.

Unleaded petrol (euro-cents per litre)

Germany	**65.4**
UK	**64.6**
Netherlands	**63.5**
Finland	**59.7**
France	**58.9**
Denmark	**54.8**
Italy	**54.1**
Sweden	**51.6**
Portugal	**50.7**
Belgium	**50.7**
Austria	**41.4**
Ireland	**40.1**
Spain	**39.5**
Luxembourg	**37.2**
Greece	**29.6**

Road diesel oil (euro-cents per litre)

UK	**64.6**
Germany	**47.0**
Italy	**40.3**
France	**39.2**
Denmark	**37.0**
Netherlands	**35.7**
Sweden	**34.9**
Finland	**34.6**
Ireland	**32.7**
Portugal	**30.9**
Belgium	**30.5**
Spain	**29.4**
Austria	**29.0**
Luxembourg	**25.3**
Greece	**24.5**

Source: European Commission, http://europa.eu.int/comm/energy/en/oil/str_taxes03/06-2003.pdf

[1] *The Marginal Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties*, Working Paper FNU-19, University of Hamburg.