

ENVIRONMENTAL ACCOUNTS:  
SERIES + ECO-TAXES

TIME

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# **Environmental accounts:**

## **time series + eco-taxes**

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### ***Preface***

This study was commissioned by the European Commission in cooperation with Eurostat with the objective of improving and extending the scope of the environmental accounts for Ireland. It follows two previous studies, *Pilot Environmental Accounts* published by the Central Statistics Office and the *Satellite Environmental Accounts for Ireland 1996*, unpublished report to Eurostat (2000). As indicated in the title, this study presents time series, which in some cases are of considerable length, and provides information on what could loosely be called eco-taxes. Additionally, where feasible the study relates environmental information to the underlying economic magnitudes and movements, and broadens the information considerably.

The report consists of three self-contained sections. The sections cover (1) emissions to air, (2) discharges to water and (3) disposals of solid waste and these three types of releases to the environment are disaggregated according to NACE Rev 1 by five major economic sectors:

- Agriculture/forestry/fishing
- Energy transformation
- Industry
- Transport
- Services
- Households

though in some areas the breakdown is unavoidably less detailed and it is more detailed in others.

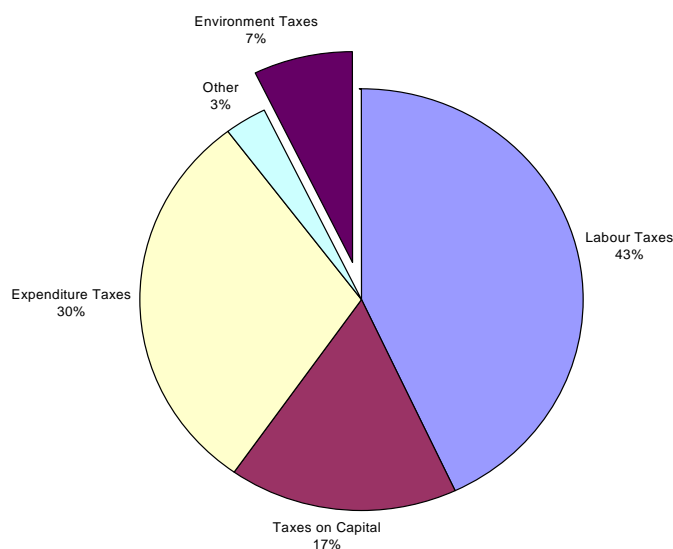
Section 1 on emissions to air concentrates on greenhouse gases and on improving the underlying information on energy use. Behavioural analyses have been hampered in the past by inadequate time-series of energy-related prices and taxes so that a large effort was devoted here to presenting coherent time-series of these items.

Section 2 reformats the information on loss of BOD, N and P to water that is given in the EPA's database to relate the data to economic activity. In order to investigate prices and charges for discharges to water, three other sources are investigated, namely, the National Accounts, the Census of Industrial Production and the Local Authorities themselves. The National Accounts yields the most useful time-series, though the Census of Industrial Production has considerable potential. There are in fact no eco-taxes, strictly defined, relating to water services in Ireland, but the charges per unit of water supplied and waste water serviced were investigated in some depth as these can have ecological implications.

Section 3 on solid waste extends the level of detail on waste streams based on the two National Waste Database Reports for 1995 and 1998, produced by the EPA. There are no time series apart from the data for these two years. This information is supplemented by data on upto-date charges presented in some detail for each local authority. Collection of information on charges is not on an official footing and this is a serious shortcoming.

As described by Eurostat (2000) investigations of environmental taxes (or eco-taxes) are frequently expanded to cover environmental fees, with Denmark, Greece, Italy, Portugal and Spain describing aspects of financing environmental expenditures in their reports. A similar approach is applied in parts of this report. In fact there is a distinction between taxes as defined in the national accounts and other payments to general government, such as fees. Taxes are compulsory unrequited payments while fees are paid for a purchase for supply or services. The taxes presented in Section 1 on energy are indeed taxes, though only loosely based on air emissions. The charges presented in Sections 2 and 3 are fees for water and waste services. The subsidies identified in the provision of water services, which could be described as benefits in kind, are also loosely termed here as 'negative eco-taxes', in so far as they can have ecological effects and represent a deviation from the recovery of costs. If one were to go to the extreme and label all taxes on energy and vehicles as well as all fees for environmental services as 'environmental taxes' then the share of total revenue that accrues from environmental taxes is as shown in the pie chart below. Pushing the definitions to their limits, environmental taxes are shown to contribute seven per cent of revenue.

### Government Revenue Shares in 1998, %



It is seen from this report that information on quantities is improving in many areas, particularly in respect of quantities of pollutants released to the environment. The allocation of official responsibility to the EPA to gather this information is bearing fruit in rich data sets. Unfortunately the call made in the *Pilot Environmental Accounts (CSO 1999)* for subsequent coordination between the agencies involved has remained unheeded. Reclassification of environmental data according to NACE in order to make it compatible with economic data, for example, and to 'mainstream' the environment into economic policy analysis has yet to be made an official and routine task. As for price data, improvements have not been forthcoming and, given recent suggestions from the European Environment Agency and OECD that the potential for eco-taxes and economic instruments be investigated, the data deficiencies on this front are all the more pressing.

### **REFERENCE**

Eurostat, 2000. *Statistics on Environmental Taxes and other Economic Instruments for Environmental protection in EU Member States. A collection of studies in 13 EU Member States and the Czech Republic.*

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# 1. Emissions to Air

## *1.1 Introduction*

The purpose of this section is to describe and present information relating to Emissions to Air. This task has entailed assembling a database from a wide range of different sources, which helps to illustrate the interaction between economic growth and emissions to air (in particular emissions of greenhouse gases). Energy use is responsible for some two-thirds of Irish emissions of greenhouse gases (with agriculture being responsible for most of the rest of the emissions). In trying to describe the interaction of the economy, energy use and emissions, there have been persistent problems in obtaining the necessary data on the energy sector. Many analyses require long runs of time-series data. The data should span the major oil price shocks of the last 30 years if we are to fully understand the factors driving energy use and emissions to air. As a result, in this report we pay particular attention to energy data as a vital ingredient in developing our understanding of the factors driving greenhouse gas emissions. These data also play an important role in modelling the interaction of economic growth with a range of other environmental problems such as acid rain, traffic, congestion, and noise.

The problems that have beset modellers interested in energy data have been:

- The failure by many relevant bodies to appreciate the importance of collecting price data;
- The need for consistent time-series over three decades.

As a result, in this section of the report, as well as collecting data on greenhouse gas emissions, considerable attention is devoted to producing a well-documented database of energy data. Given the volatility of energy prices since the first oil price shock in 1973, it is desirable to have series that predate this. As a result, much of our data goes back to the 1960s. The advantage of this is that in modelling work it allows one to observe the responsiveness of different sectors to price movements over a period in which there were significant changes in prices.

In order to assemble the database it has been necessary to utilise a wide range of different sources, each of which is outlined below. Considerable effort has gone into the use of linking techniques in order to build consistent price series for as long a period as the data permitted. It is really only in the past decade that a consistent approach to data collection has been adopted by the relevant government department<sup>1</sup>. Indeed, the problem of global warming only captured the interest of governments during the 1990's, and hence the collection of relevant data on emissions to air is a recent phenomenon.

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<sup>1</sup> The department now regularly produce energy balance sheets on a consistent basis and have made them available back to 1980 (see Myers, 1994).

However, the Environmental Protection Agency (EPA) is currently devoting significant attention to this issue.

The results presented here are available as a series of different spreadsheets. Before looking at these, the next section describes the different data sources. Having considered each of the series in section 1.3, sections 1.4 to 1.7 illustrate the important trends that have emerged over time and the implications for emissions to air. The final section contains the conclusions of this report.

## ***1.2 Data Sources***

The Energy Balance Sheets constitute the primary method of classifying energy data. For each year they provide a breakdown of energy into the major fuels (coal, peat, oil, gas, electricity, and renewables) and build up a supply side and a demand side for each. The total primary energy supply of a fuel (TPES) – the supply-side aggregate – is equal to indigenous production plus imports minus exports (adjusting for stock changes and international marine bunkers). Total final consumption (TFC) – the demand-side aggregate – is equal to the sum of the consumption of each fuel by the principal sectors – industry, transport, commercial, residential and agriculture. The difference between TPES and TFC is taken up by the transformation of the raw supply of certain fuels into more useful alternatives for final consumption. Electricity generation from fossil fuels is the most obvious example, but also included here is the manufacture of peat briquettes and oil refining. The units used are Tonnes of Oil Equivalent (TOE) which is a measure of chemical energy equal to roughly 41.86 Gigajoules.

The Energy Balance Sheets were provided by the Department of Public Enterprise (DoPE) from 1980 onwards. Data for the period 1960 – 1979 were obtained from the International Energy Agency (IEA), who collects energy balances for OECD countries annually. In its publication *Energy Statistics of OECD Countries 1960-1979*, the IEA also provide a more thorough breakdown of oil balances into petrol, diesel and fuel oil, which is incorporated in the spreadsheets. On the whole, the data should be reasonably accurate, but a few points are worth mentioning. The inception of the single market in 1992 meant a complete relaxation of import restrictions and has in all likelihood facilitated the smuggling of significant amounts of coal to get around the smoky coal ban. It is probable, therefore, that the reported figures represent an underestimate of final consumption throughout the 1990's. Also, some of the private harvesting and sale of turf by farmers may be passing unnoticed. However even if the totals are reasonably good there is no guarantee that their apportionment to the various sectors is as accurate. For oil in particular, it is left up to the major suppliers to determine who the final consumers of their products are, and they may not be getting it right.

Different fuels are traded at different prices in different sectors, so ideally one would like to be able to assign a price to each component of the energy balance sheet. The International Energy Agency (IEA) publications also provided much of the data on prices, as published in their periodical *Energy Prices and Taxes*. Further price data were obtained from Eurostat.



There was some discontinuity between certain years, which necessitated the use of a linking process in order to obtain a consistent series. The linking process is explained in the appendix. The Irish Energy Centre provided further data on prices from 1981 onwards. They publish prices for various fuels for both industrial and domestic users each quarter and it was possible to obtain at least one observation per year, although the periodicity was unreliable.

There are also other issues with the price data that are worth noting. For many fuels, large customers have bargaining power and can usually negotiate their own price with the supplier. This is especially true in gas but also applies to oil. The problems with smuggling and underreporting described above also cause difficulties in trying to identify prices, especially where there is VAT and excise evasion (Energy Centre prices are inclusive of VAT at the prevailing rate).

The Central Statistics Office (CSO) publishes some useful series. The CSO National Accounts series provides information on household consumption, and includes figures for personal sector consumption of different fuels and energy. The CSO Trade Statistics give imports and exports of energy. The CSO Census of Industrial Production contains manufacturing sector expenditure on energy. The monthly consumer price index includes relevant price series, such as the price of fuel and light, energy products and motor fuel, while the monthly wholesale price index includes price series for petroleum fuels, electricity and energy products bought by industry.

Another source of data is Bord na Móna (the Irish Peat Company) Annual Reports, which contain figures for peat production and sales in both value and volume terms. Other price data were obtained from Eurostat's New Cronos Internet facility, while the Revenue Commissioner's Statistical Reports provided tax and excise figures. Finally, the EPA provided data on emissions of greenhouse gases.

### ***1.3 Series Available***

The results of this data assembly are available as a series of spreadsheets. To facilitate the locating of particular data, a brief summary of where to find the principal series is given. Following this, a description of each of the available spreadsheets is provided. Given the large quantity of data presented, each variable is given a mnemonic as well as a label. The abbreviation EN represents energy, and when preceded by P corresponds to the price. A number between one and nine follows EN, representing each of the different types of energy (e.g. 4 = oil). The rest of the mnemonic consists of letters signifying the use of each type fuel (e.g. TD = total primary energy use), while the unit of measurement and source can also be included with the use of underscores. So for example, the primary energy demand for oil in TOE's is given by EN4TD\_T. A full explanation of each of the symbols used in the mnemonics is given in the Appendix.

The vast majority of the data regarding energy quantities are contained in "ENERGYJH.XLS", and also in the spreadsheet called Table 11.WK1. The spreadsheet names are derived from the filenames

used in the ESRI's databank for the Irish macroeconomic model. Energy prices are best observed from spreadsheet Table 37.WK1, which gathers together the price data from all sources. Imports of energy can be found in Table 29.WK1, where they are broken down by SITC classification. Energy Taxes are best observed in the spreadsheet "ENERGYTAXES.XLS".

Turning to a more thorough description of the series available, much of the data are contained in ENERGYJH.XLS. This spreadsheet contains forty-eight separate worksheets. Forty of these are labelled y60, y61... y99, which are the energy balance sheets for each individual year, and are self-explanatory. The worksheet entitled "energy use" summarises these balance sheets. For each of the main energy types (coal, peat, oil, gas, electricity, and renewables) it gives the breakdown of the total at Factor Cost and Total Primary Energy Supply for each year. It also lists the conversion factors for each fuel type. The sheet entitled "oil 1000mt" gives a more detailed breakdown of oil balances and is included in "energy use", having been converted to TOE's. The prices obtained from the Irish Energy Centre are given in the sheet "Energy Centre Prices", and includes price series for coal, gas, petrol, electricity and turf, all inclusive of VAT at the prevailing rates. The sheet entitled "New Prices" contains prices from Eurostat for natural gas for industry and households, heating oil, and pump prices of petrol and diesel. The rest of the worksheets contain data from the IEA. Energy prices from 1968 to 1978 are given in the sheet "Prices £", and prices from 1979 to 1999 can be found in "Prices linked". The full thirty-two year series of prices is given in Table37.WK1 (see below). The sheet "Prices and Taxes" is used to generate "Prices linked", while the final worksheet, "Price Indices", gives some miscellaneous energy prices in index form.

Although there are some data on taxation rates contained in the "Prices and Taxes" worksheet of "ENERGYJH.XLS", the most important data on energy taxation is contained in the spreadsheet "ENERGYTAXES.XLS". This spreadsheet contains revenue data, rates of excise taxes on vehicles and on the different fuels. Most of the series run from 1960, with some beginning before this.

The rest of the database is presented in thirteen separate spreadsheets called TableXX.WK1. The spreadsheets are taken from an ESRI database, which is updated annually and used in the preparation of the ESRI Medium Term Review. The tables presented here are those directly relevant to this particular study, forming only a small subset of the overall database. For this reason, the numbering of the tables is not sequential being drawn from the wider databank. A brief explanation of each spreadsheet follows:

Table 6. This spreadsheet gives personal sector consumption data from the CSO as contained in the National Accounts. Total personal consumption is disaggregated into its constituent parts and presented in both current and constant prices. There are separate series for consumption of domestic heating oil, electricity, energy, kerosene, LPG, petrol, and a joint series for kerosene and heating oil. All series run to 1999 and some date back to 1953, although most date from later.

Table 11. This is the Energy Balance Sheet data. It is the same summary information as is contained in the “energy use” worksheet of “ENERGYJH.XLS”. From 1980 onwards the figures are from the Department of Public Enterprise, while the pre-1980 figures are given on a consistent basis by the IEA. The series run from 1960 to 1999.

Table 12. This is energy consumption data, with detailed breakdowns of TFC and TPES for certain sectors. The series cover the period 1960 – 1999.

Table 28. This spreadsheet consists of data from the Revenue Commissioner’s Statistical Report, and details consumption of LPG (both auto and non-auto), diesel, fuel oil and petrol. Most series run from 1960 to 1999, with one petrol series beginning in 1953.

Table 29. This contains data on Imports from the CSO Trade Statistics. Imports are given in current and constant prices, broken down by SITC code and distributed according to main use. Some of the series go back as far as 1938 while most begin in 1960. The relevant SITC sector is sector 3, which refers to Mineral fuels, lubricants and related materials. The next two digits in the code refer to the division; 32 refers to coal, coke and briquettes, 33 to petroleum, petroleum products and related materials, 34 to natural and manufactured gas, while 35 refers to electric current.

Table 35. This spreadsheet gives the price deflators to convert consumption values (including taxes) to constant prices from Table 6. Again, the relevant series are the price deflators for consumption of domestic heating oil, electricity, energy, kerosene, LPG, petrol, and the joint series for kerosene and heating oil, with most going back to 1960.

Table 37. This spreadsheet contains energy price data. It contains around 80 price series, each with mnemonic and description, as in “ENERGYJH.XLS”. Some of the series are linked to give complete series dating back as far as 1953, using the linking process described in the Appendix. These linked series are formed using other series that span only certain time periods. This spreadsheet includes all of the price data from “ENERGYJH.XLS” and from all other sources.

Table 42. This spreadsheet gives the price deflators for imports. Again, the deflator relates to SITC 3, but the spreadsheet also contains deflators for goods and services both separately and together, as well as for other SITC sections.

Table 45. This spreadsheet contains the price deflators for energy inputs into the different sectors of industry from 1970 to 1999, as well as a series for the price of imported energy in Ireland from 1958.

Table 49. This gives the value of energy inputs into industry from 1991 to 1998, taken from the CSO Census of Industrial Production. Industry is broken down by NACE code. The spreadsheet includes series for the value of energy inputs into mining, manufacturing, food processing and the production

and distribution of electricity, gas and water. The manufacturing sector itself is also broken down into significant detail.

Table 51. This spreadsheet details indigenous energy production and consumption. There is a series for total domestic energy production, as well as series for production of peat and turf, hydroelectricity, and natural gas used in the transformation sector, each from 1960 to 1999. The other series give energy consumption by different sectors of industry, and have a shorter time-span.

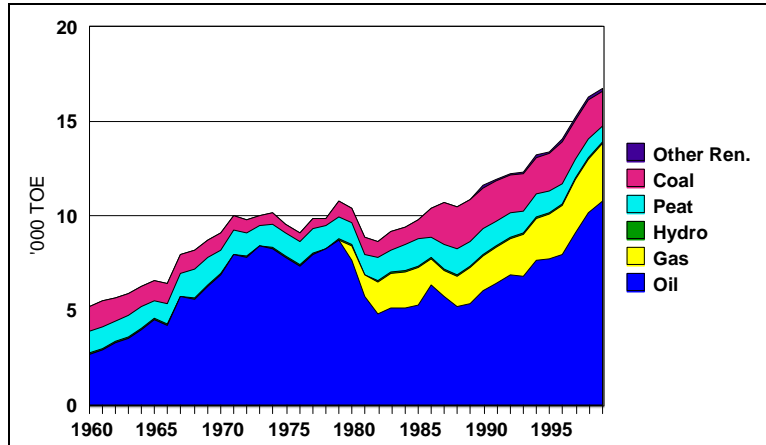
Table 71. This spreadsheet contains the environmental data on emissions to air collected by the EPA. They split Greenhouse Gas emissions into carbon dioxide, methane and nitrous oxide. They then disaggregate further to trace the source of the emissions back to particular sectors. The data runs from 1990 to 1998.

Table 80. This details expenditure on energy by the manufacturing sector, based on the old Census of Industrial Production ISIC classification. The manufacturing sector is disaggregated in great detail, and the spreadsheet includes series for expenditure on energy in the production of electricity, gas, water and turf, as well as in the coal and oil sectors. The data run from 1973 to 1978.

#### ***1.4 Trends in Energy Demand***

We first set out the trends in energy demand. As trends of this length have not been shown before, they are set out in some detail. Given a database of this magnitude, it is possible to analyse many aspects of energy demand, supply, consumption and pricing over time. This is especially interesting given the volatility of energy prices, with major price shocks in 1973/4 1979 and 1986. Most of the price series run from 1968, while consistent balance sheet data are available from 1960 onwards, thus permitting modelling of behaviour before, during, and after these shocks. Using a series of graphs, certain relationships are considered below. Obviously, this is just the tip of the iceberg, as there is considerable scope for further exploiting the data.

**Figure 1.1: Total Primary Energy Supply**



We first consider the supply side of the Energy Balance sheets. Recall that Total Primary Energy Supply (TPES) equals domestic production plus imports minus exports with an adjustment for stock changes and international marine bunkers. Figure 1.1 indicates that over the last forty years, the total primary energy requirement for Ireland has more than trebled, with TPES exceeding sixteen million tonnes of oil equivalent in 1999. The graph illustrates a general upward trend, which is to be expected as an economy expands and modernises over time. Innovations since the 1960's have tended to be energy consuming, such as household appliances and computers in the workplace. Population increases have also driven the upward trend in TPES, as well as the extension of the electricity and gas networks. Oil forms the largest share of TPES (see also Figure 1.2 below), and so it comes as little surprise that the oil price shocks of the 1970's resulted in slight decreases in the energy requirement. Natural gas came online in 1979 and fulfilled some of the energy requirement since then. Once oil prices began to fall again during the mid-1980's TPES increased with economic growth. The rate of increase accelerated throughout the 1990's as Ireland entered its period of unusual economic growth. Massive levels of job creation have led to substantial net immigration and a dramatic increase in the number of households. The booming economy has required more energy in order to satisfy the ever-increasing number of households and businesses.

**Figure 1.2: Total Primary Energy Supply by Source (per cent)**

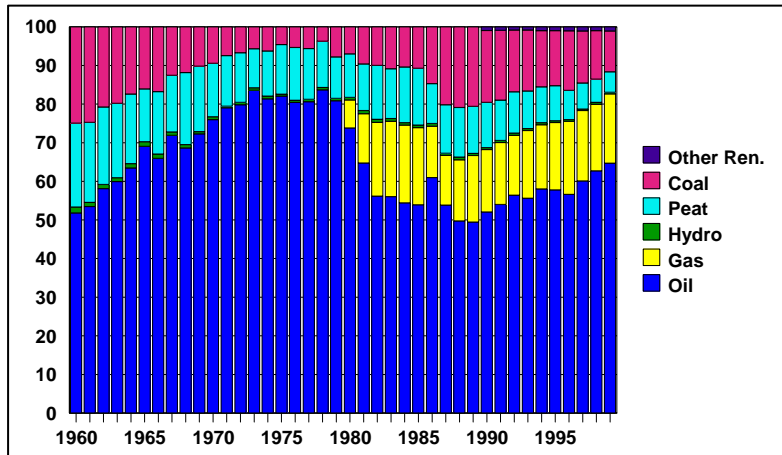


Figure 1.2 gives a breakdown of Total Primary Energy Supply into its constituent parts. The importance of oil to the Irish economy is highlighted. The proportion of TPES made up by oil began the 1960's at some fifty per cent, and rose thereafter. By the time of the first oil crisis in 1973 oil constituted over eighty per cent of TPES. It wasn't until the second oil price shock in 1979 that oil's share of TPES began to decline. This decline was primarily due to the introduction of Natural Gas to the Irish economy, and gas quickly gained importance as the new domestic source of supply came on stream. By 1985 oil's share in TPES was back down to its 1960 level, as coal and gas increased in importance and peat maintained its share. Nevertheless, oil still constituted over fifty per cent of Ireland's TPES throughout the entire period. When the price of oil began to fall again in the late-80's and the economy began to grow again, oil's share rose accordingly. In the period since then both gas and oil have grown in importance, while peat has become significantly less important. Coal still makes up over ten per cent of TPES, but this continues to fall gradually.

**Figure 1.3: Dependency on Imports**

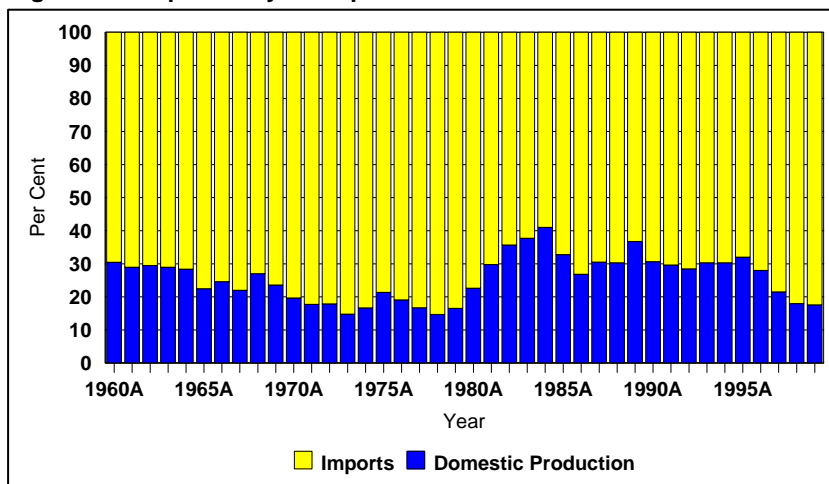
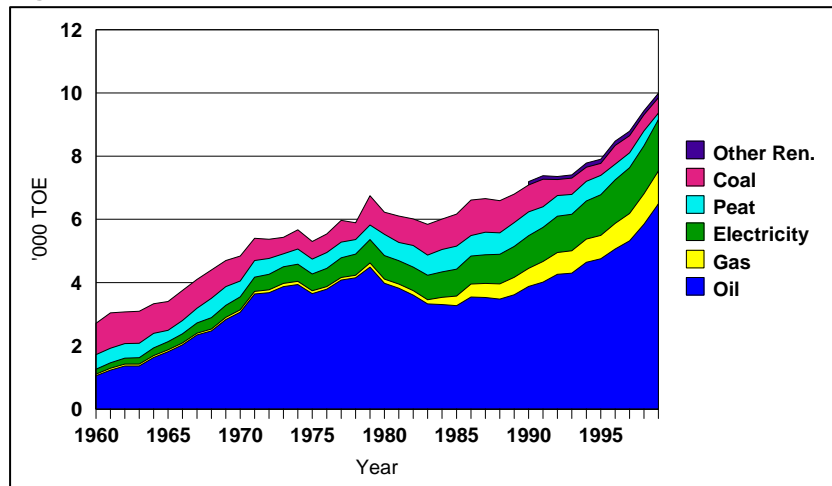


Figure 1.3 illustrates Ireland's dependence on energy imports. Domestic production accounted for about thirty per cent of energy requirements throughout the 1960's, mainly due to indigenous peat production. Increasing dependence on imported oil drove this proportion down to below twenty per cent by the time of the first oil price shock. The introduction of domestically produced natural gas in

1979 reduced imports share of energy requirements to below sixty per cent by 1985. However, since the mid-1980's imports of oil rose again and domestic production accounted for about thirty per cent of energy requirements over the decade to the mid-1990's. Since then imports have significantly increased their share of energy requirements. This is because the increasing primary energy demand seen in Figure 1 is faced with a relatively fixed level of domestic production; the remainder of the energy requirement must be satisfied with imports. By 1999, domestic production accounted for less than 20 per cent of the total energy requirement, and this proportion is set to fall further as natural gas reserves are exhausted and peat production continues to decline.

**Figure 1.4: Total Final Consumption**



The demand side of the Energy Balance sheets is graphed in Figure 4. Recall that Total Final Consumption (TFC) is equal to the sum of the consumption of each fuel by the principal sectors – industry, transport, commercial, residential and agriculture. TFC shares a similar trend to TPES, however the magnitudes are much smaller. This is a result of substantial energy losses when converting energy from one form to another. Electricity generation is the biggest culprit, with an efficiency of conversion of about thirty-five per cent. Consequently, magnitudes in the supply side of the energy balance sheets are significantly greater than those in the demand side of the balance sheets. In 1999 this gap was of the order of over six million TOE's.

**Figure 1.5: Total Final Consumption by Source**

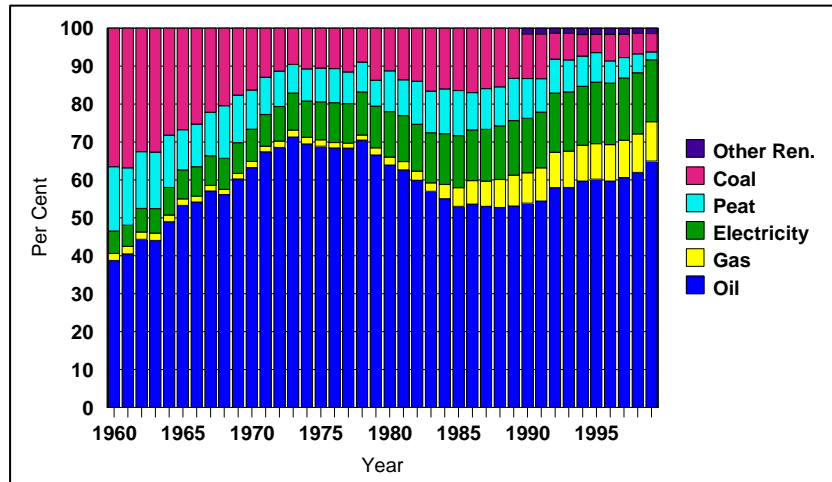


Figure 1.5 illustrates the breakdown of TFC into its constituent parts. The trends between TFC and TPES are very similar, with the dependence on oil increasing until the oil price shocks, and declining rapidly until prices fell in the mid-1980's. Final consumption of peat has fallen to negligible levels, especially in the last five years. Gas has increased its proportion of TFC consistently since domestic natural gas production began in 1979. The graph also indicates the growing importance of electricity in final consumption. It is interesting to observe the decline of coal as a fuel in final consumption over the forty-year time horizon. At the beginning of the 1960's coal accounted for almost forty per cent of final consumption. Its proportion declined at a rate practically identical to that of the rise in oil until the oil price shocks. It remained around the ten per cent mark for much of the 1970's, and even increased its share in the early 1980's as people substituted away from oil into coal, while the price of oil rose to very high levels. Peat also increased its share during this time, as did electricity. Since then, however, coal's share in final consumption has fallen significantly, and in 1999 it constituted less than five per cent of final consumption.

**Figure 1.6: Ratio of Energy to GNP**

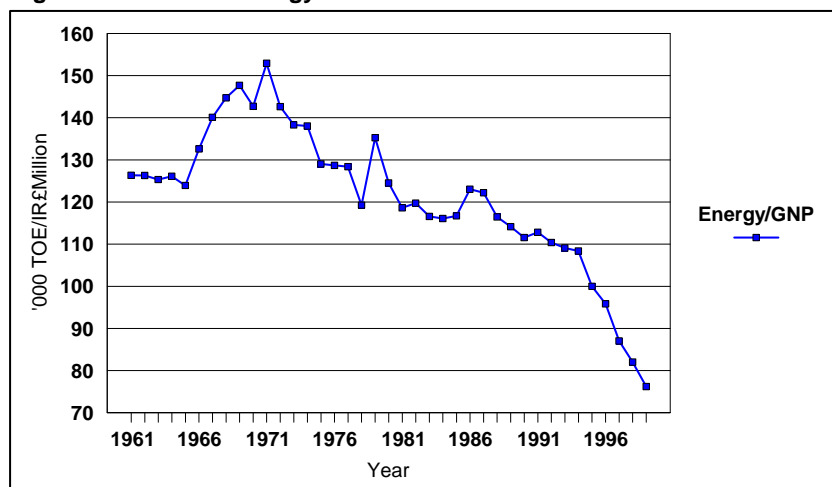
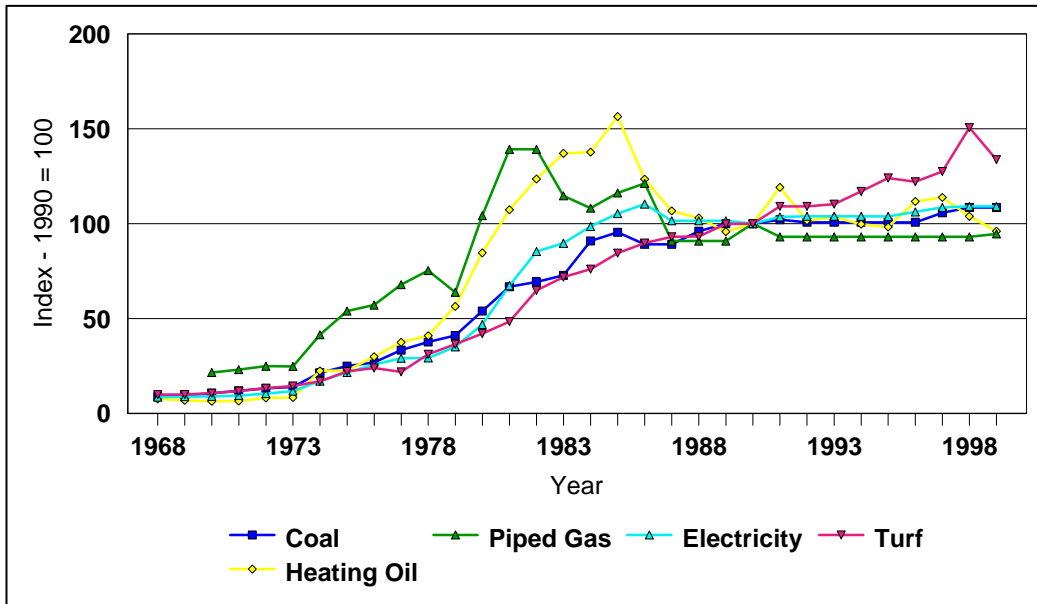


Figure 1.6 plots the ratio of total primary energy use to gross national product over the forty-year time horizon. The ratio is indexed to equal one hundred in 1995. In the period to the early 1970's, industry in Ireland became more energy intensive, causing the ratio to increase to its peak in 1971. The ratio



then began its downward trend, with the exception of some temporary blips during the 1970's and 1980's, as the economy became progressively less energy intensive. Although total primary energy demand has continued to grow throughout the 1990's (see Figure 1.1), it has not come close to matching the phenomenal rate of growth of GNP. As a result, the rate of decline in the energy to GNP ratio has accelerated, especially in the high-growth period from 1995 onwards.

**Figure 1.7: Energy Prices for Households**



Now, we consider energy prices. It should be noted that none of the prices are adjusted for overall inflation. Figure 1.7 plots the price of energy for households over time, with 1990 prices set to 100. Gas and oil are the most volatile, which is to be expected. Each price series demonstrates a gentle upward trend until the oil price shocks. Prices of all fuels then rise sharply, before levelling off in the late 1980's. Also in the mid-1980s the prices of oil and gas fall sharply to bring them back in line with the other fuels. In the period since then, the price of most of the fuels has remained relatively stable, with the exception of peat, which has seen its price jump in the last few years. The rise in the price of natural gas for households shows the smallest increase over the 1990s.

Figure 1.8: Energy Prices for Industry

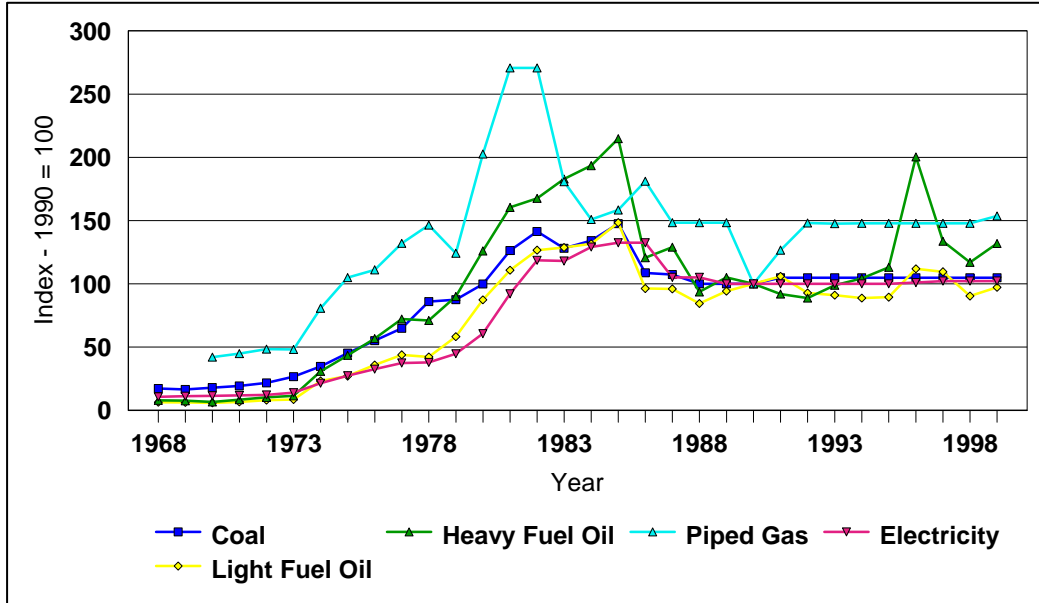


Figure 1.8 illustrates the price of energy for industry over time. The main similarity with the price for households is the fact that prices remain relatively stable after 1990, with the exception of natural gas and heavy fuel oil. The gas series is very volatile in the period before the introduction of natural gas around 1980.

Figure 1.9: Energy Consumption by Sector

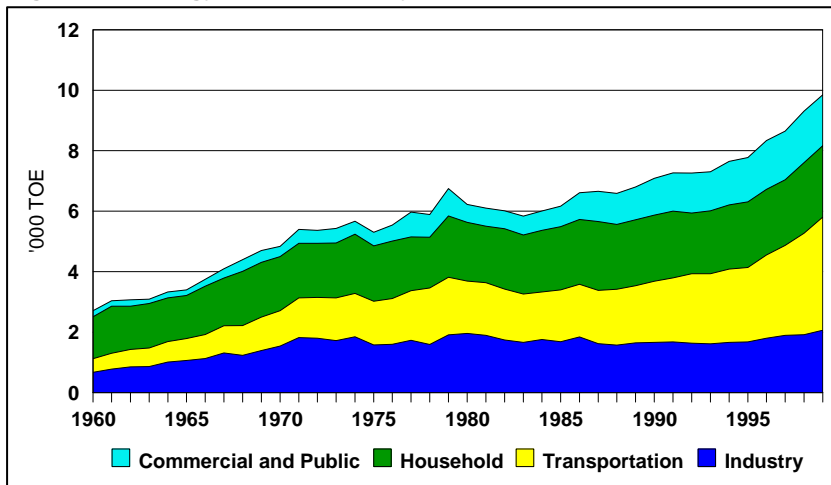


Figure 1.9 considers energy consumption by the different sectors. The commercial and public sector has increased its share significantly, especially since 1980. The commercial and public sector accounted for almost twenty per cent of energy consumption throughout the 1990's, compared with less than five per cent during the 1960's. The rising share of the commercial and public sector has resulted in significant reductions in the shares of both households and industry. It is not that these sectors are consuming less energy, but there has been such an expansion in the commercial and public sector that their relative shares have declined. The transportation sector has also seen a significant increase in its share since 1980, and it now has the largest share of total final consumption.

**Figure 1.10: Energy Input Price Ratio**

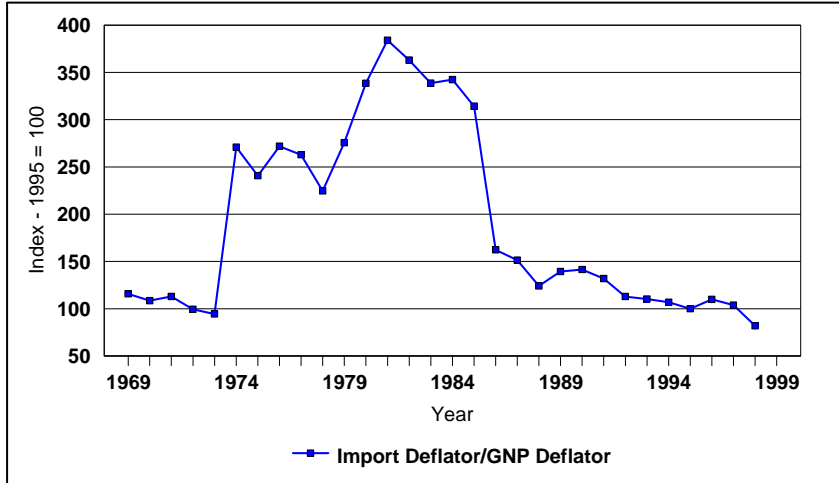


Figure 1.10 plots the ratio of the price of energy imports to the price of GNP. It is indexed to equal 100 in 1995. The price of GNP was rising marginally faster than the price of energy imports until the first oil price shock in 1973. Figures 1.2 and Figure 1.5 both illustrate Ireland’s dependence on oil as a fuel and, with no indigenous production of oil, it is unsurprising to see the ratio jump in 1973 as the price of imported oil spiralled. The ratio then fluctuated at a high level until the second oil price shock in 1979, after which it continued to climb, reaching a maximum of over 380 in 1981. As oil prices fell in the mid-1980’s, the ratio fell accordingly. Between 1985 and 1986 the ratio halved, and the downward trend continued until it reached its index mark of 100 in 1995.

**Figure 11: Domestic Energy Price Ratios**

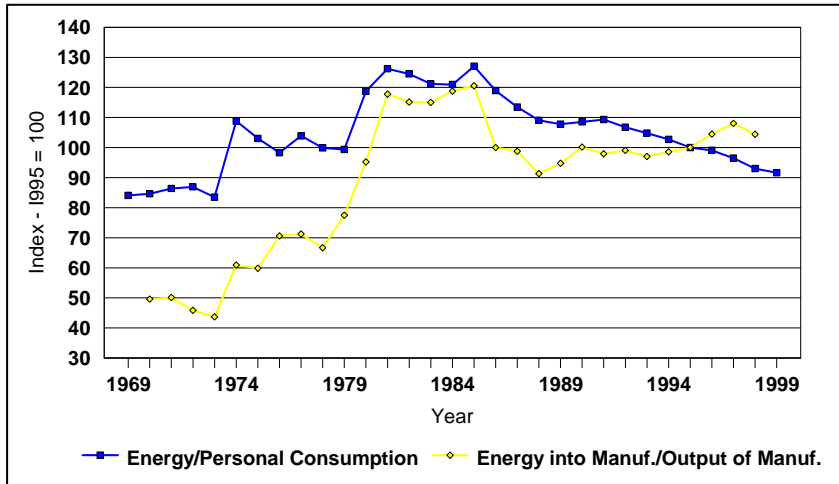


Figure 1.11 illustrates the domestic energy price ratios. The first series plots the ratio of the price of energy for consumers (excluding petrol) relative to the price deflator for personal consumption. The second series plots the ratio of the price of energy inputs for manufacturing to the price of manufacturing output. It is worth noting that although the series in both this graph and the previous one are indexed to equal one hundred in 1995, the scales are significantly different. The previous graph considered the imports of energy, primarily oil, and in the 1970s the index rose to almost four times its 1990 level. This graph considers energy consumption by the household and manufacturing sectors, and the indices never deviate more than sixty points from the 1995 base of one hundred. This is because

these indices include domestic taxes on oil, and also because of the fact that oil is not the only fuel used in Ireland: as we have seen previously, both electricity and gas have increased their shares of TFC over the previous two decades. Whereas the previous graph was strongly influenced by the price of oil, domestic consumers and industry are not as exposed, and have the ability to substitute away from oil. The previous graph considered energy imports, while this graph is concerned with the price paid by final consumers. The domestic costs of transforming primary energy into useful energy, which are less volatile, also help to explain the observed difference between them.

In 1969, the index of the energy price ratio for manufacturing lay below that for personal consumption. The two price indices converged during the early 1980's, as the price deflator for energy use in manufacturing rose significantly faster than the price of manufacturing output. Both energy price ratios shared a similar downward trend throughout the late 1980's as the price of energy for both households and industry declined with the price of oil. Both are indexed to equal 100 in 1995, but the household energy price ratio is on a downward trend, while the ratio for the price of energy in the manufacturing sector has tended to rise. The reason for this is that the personal consumption deflator has risen markedly throughout the 1990's as the economy has grown so strongly, while manufacturing output prices have changed relatively little. When coupled with small changes in the price of domestic energy, the result is a fall in the ratio of the price of domestic energy to the price of personal consumption.

### 1.5 Emissions to Air

We now present the data on emissions of greenhouse gases, availing of the Environmental Protection Agency's data, collected in the process of reporting to the CORINAIR programme. It should be noted that the emissions figures include emissions from processes, such as the manufacturing of cement, but exclude sequestration by forests and emissions by soil. However, the EPA has collected data on sequestration, and it is presented in Table 71 (listed in the appendix).

**Figure 1.12: Greenhouse Gas Emissions**

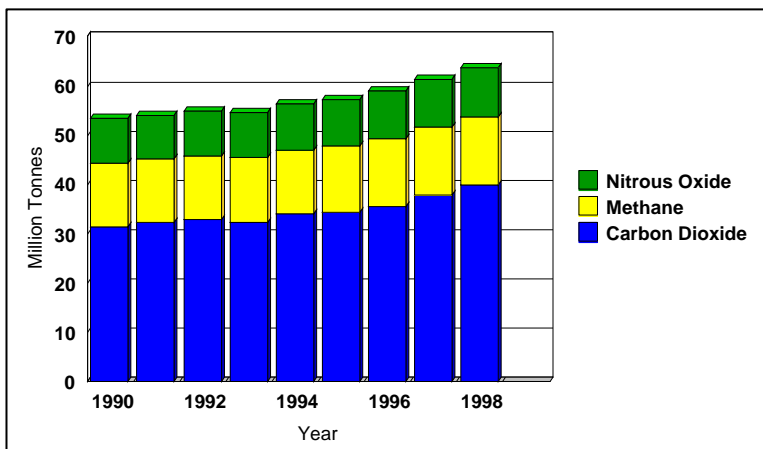


Figure 1.12 plots the level of greenhouse gas emissions in million tonnes ('000 Gigagrams). These data from the EPA cover the 1990s. Given the amount of other data collected on energy, it would be

possible to model emissions from energy use back to the 1960's, but this would require significant additional work outside the scope of this study. From the graph, it is obvious that the overall level of greenhouse gas emissions has increased significantly since 1990. Throughout the early 1990's the rate of increase was quite slow, and emissions even fell in 1993. Since then, however, the rate of increase has accelerated, especially since 1996. Greenhouse gas emissions take the form of Carbon Dioxide, Methane and Nitrous Oxide, and emissions of each of these have increased at a similar rate. Carbon dioxide emissions constitute around two thirds of total emissions throughout the nine-year period.

**Figure 1.13: Greenhouse Gas Emissions relative to Real GNP (1995 prices)**

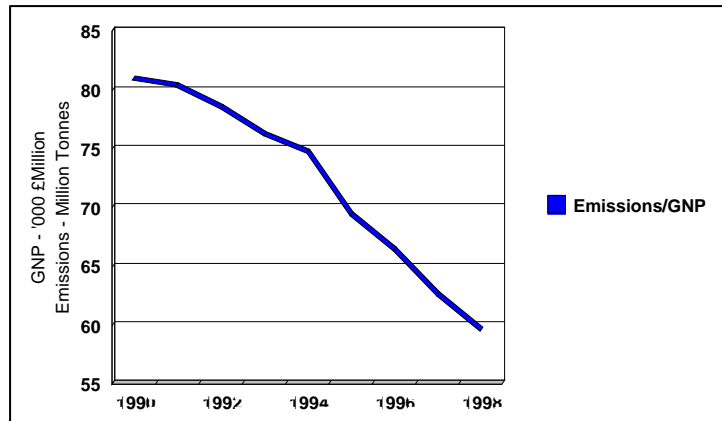


Figure 1.13 plots the overall level of greenhouse gas emissions relative to the level of real GNP at 1995 prices. This indicates that greenhouse gas emissions are rising much more slowly than the level of overall economic activity.

**Figure 1.14: Carbon Dioxide Emissions per unit of Final Energy Consumption**

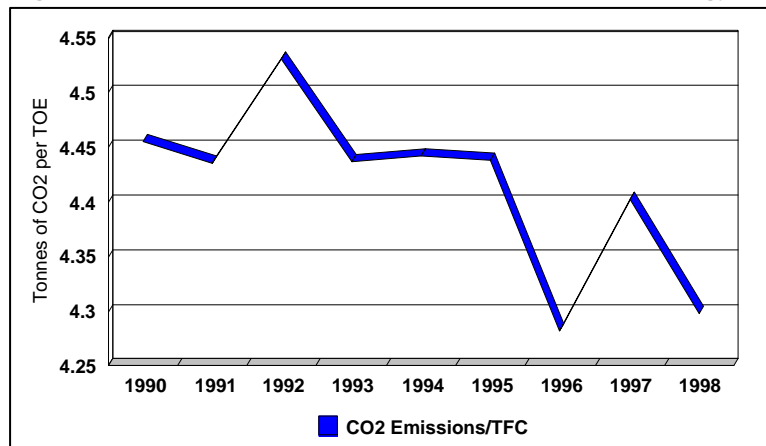


Figure 14 illustrates the ratio of carbon dioxide emissions to total final consumption of energy. The ratio varies, but is generally declining.

**Figure 1.15: Greenhouse Gas Emissions by Sector**

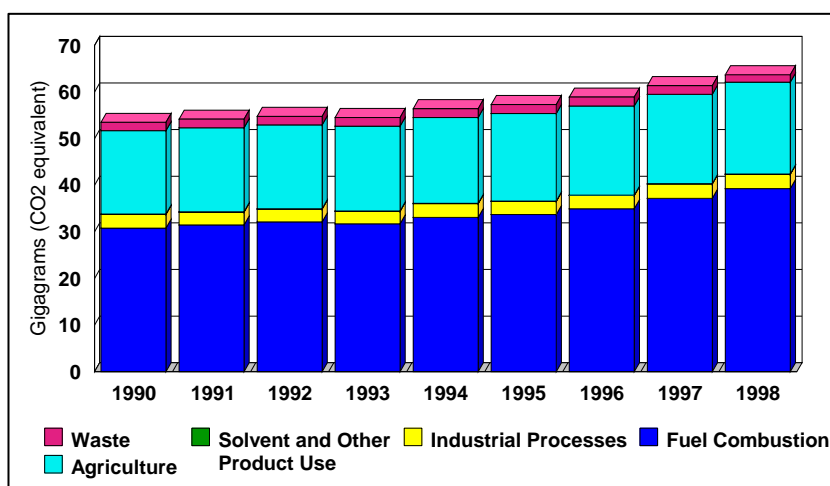


Figure 1.15 illustrates the breakdown of total emissions by sector of origin, using the EPA's classification. It is clear from the graph that the majority of emissions come from the fuel combustion sector. This includes both the transport and energy transformation sectors, accounting for over half of total emissions over the entire nine-year period. The other main polluting sector is agriculture, which has seen a ten per cent increase in its emissions since 1990. The other sectors have retained their minor shares of total emissions. Note that the 1998 Census of Industrial Production will contain energy data in reasonable detail, but is not yet available. Hence, for that year, it will be possible to reclassify and disaggregate the emissions data into sectors in more detail.

### **1.6 Taxes**

There are very few ecotaxes in Ireland. The single most important type of ecotax is the excise tax on oil. However, it should be noted that these taxes are not primarily levied for environmental reasons. They also serve to internalise the costs of road maintenance, congestion, accidents and other costs arising from the increased consumption of oil.

**Figure 1.16: Tax Revenue per TOE of Oil**

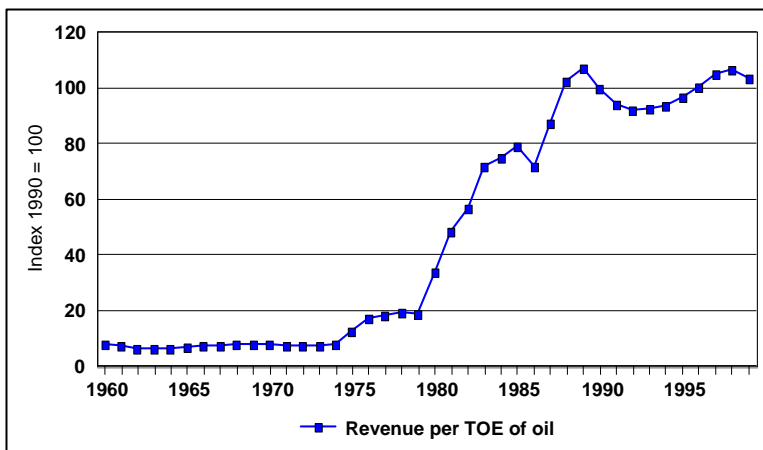


Figure 1.16 plots the ratio of the nominal revenue from taxation of oil (excise taxes only) to primary energy demand for oil from 1960 to 1999. It is indexed to equal 100 in 1995. The index remains at around ten per cent of its 1990 base until the mid-1970's, when there is a jump to about twenty per cent of its base. The index rose rapidly throughout the 1980's, reaching a peak of over 107 in 1989. Since then it has fluctuated around its 1990 base. The graph illustrates the fact that taxation of oil per TOE of primary demand rose dramatically throughout the 1980's. This is unsurprising, as it was a period of increased taxation in the economy as a whole, when both direct and indirect tax rates were increased as the country attempted to redress it's fiscal imbalance. As taxation levels have shown only a slight increase throughout the 1990's, there has been little deviation around the 1990 base.

**Figure 1.17: Revenue from Excise Duty on Oil relative to GNP**

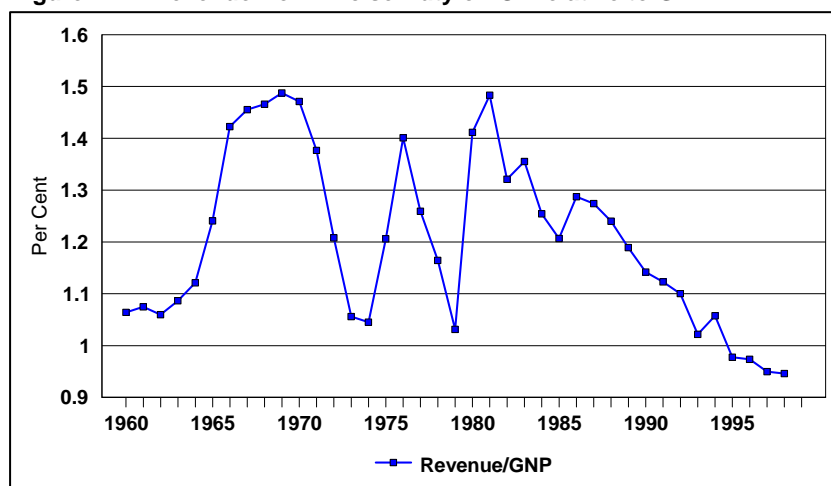


Figure 1.17 plots the ratio of revenue from excise duty on oil to GNP, all at current market prices. From the graph, it is obvious that the ratio has been very volatile, especially throughout the 1970's and 1980's. Revenue from oil represented about one per cent of GNP in 1960 and this had risen to approximately 1.5 per cent by 1970. The ratio fell dramatically around the time of the two oil price shocks, with a temporary recovery in between. This reflects underindexation at a time of rapid

inflation. Since the first half of the 1980s revenue from energy taxes has shown a downward trend and, by 1998, revenue from oil came in at less than one per cent of GNP at market prices.

**Figure 1.18: Revenue Raised per Gigagram of Emissions of Greenhouse Gases**

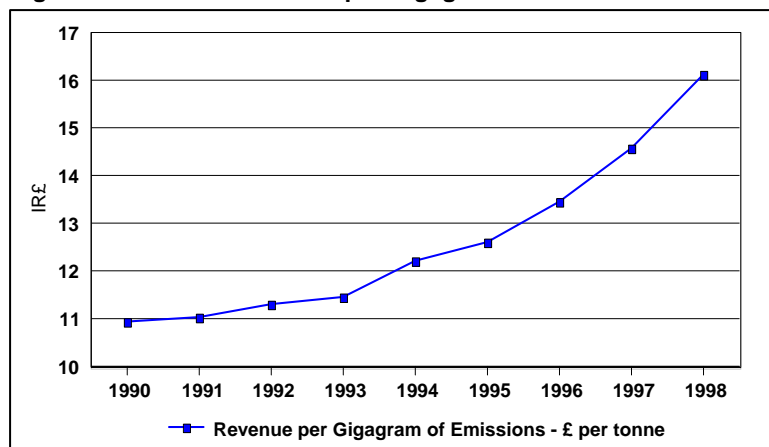


Figure 1.18 illustrates the nominal revenue from excise duties on oil per gigagram of Greenhouse Gas emissions. With the exception of a slowdown in 1993, revenue per unit of greenhouse gases has been rising for the last nine years. Revenue has increased at a faster rate than emissions, resulting in the ratio increasing over time. These rates of £11 to £16 per tonne of greenhouse gas emitted can be contrasted with the estimates of marginal damage costs in the international literature. These costs cluster in a range from £4 to £15 approximately, and do not include infrastructure use or other implications.

## 1.7 Conclusions

This report has assembled a consistent series for energy balances as well as energy prices. The data for energy balances run from 1960, while price data are available from the late 1960's. Data on taxes have been presented on various bases. Emissions data are only available on a consistent basis from 1990 onwards, but one avenue of future work could be to use the data from elsewhere in the databank to generate a series for emissions dating back to the 1960's, and to reclassify emissions according to broad NACE categories. Another future task is to assemble consistent data on other emissions to air, such as sulphur dioxide, nitrogen dioxides and Ammonia, which are collected by the Environmental Protection Agency.

The data still show significant shortcomings, especially in obtaining consistent price series for reasonable periods of time. The Census of Industrial Production, which in the 1970s allowed a breakdown by expenditure on different types of energy for each industrial sector, has not been available for much of the 1980s. Data for 1990 were used in the *Pilot Environmental Accounts* and similar data will be available on a once off basis for 1998. The responsibility for ensuring consistent standards in data collection and for ensuring consistency over time in data availability should, ideally, rest with the CSO. However, to date, they have not had the resources to take on such a role.



## ***Appendix 1.***

### ***A.1. - Key to Mnemonics:***

A = Agriculture  
C = Domestic Consumption  
E = Electricity Production  
FC = Final Consumption  
G = Gas Production  
I = Industry  
M = Imports  
QD = Domestic Production  
R = Refineries use of Crude Oil  
S = Services – Commercial  
ST = Transport  
TD = Total Primary Energy Use  
X = Exports

1 = Coal  
3 = Crude Oil  
4 = Oil  
41 = Petrol  
42 = Diesel  
43 = Fuel Oil  
44 = Refinery Gas + Kerosene + LPG + Naphta  
45 = Light Oil for Heating  
6 = Gas  
7 = Electricity  
8 = Turf  
9 = Renewables – excluding Hydro

### ***A.2. Explanation of process used to link data series***

#### **1. PEN41\_L**

This represents the price of a litre of petrol. Eurostat provide us with the (at the pump) price for a litre of premium unleaded petrol from 1985 to 1999 in PEN41U\_L\_EU. This is then linked with a similar series from the IEA spanning 1978 to 1999, PEN41U\_L\_IEA. We also incorporate a series from the CSO called PCPET, which is a price deflator for final consumption of petrol from 1953 to 1999. Finally, the Revenue Commissioners Statistical reports contain a series for the price of a litre of petrol going back to 1953. We link all these series to form PEN41\_L, which runs from 1953 to 1999.

#### **2. PEN42\_L**

This represents the price of a litre of diesel. Similarly to above, the Eurostat (at the pump) price, PEN42\_L\_EU, is linked with the corresponding IEA series, PEN42\_L\_IEA, to give a linked series from 1978 to 1999. This is then linked to a series from the CSO's Wholesale Price Index, WPAM403, which gives the price of a litre of diesel for industry from 1975. Together these yield the full series PEN42\_L, running from 1975 to 1999.

#### **3. PEN43I\_L**

This represents the price of a litre of light fuel oil for industry. The IEA series PEN43LI\_L\_IEA gives prices from 1978 to 1999. This is linked with a series from the CSO's Wholesale Price Index, WPAM 404, which gives the price of gas oil other than diesel from 1975. This series is necessary to provide a link to another IEA series, PEN45I\_IEAOLD, which gives the price from 1968 to 1978. The resulting series, PEN43I\_L, is a consistent series for the price of light fuel oil for industry running from 1968 to 1999.

#### **4. PEN43C\_L**

This represents the price of a litre of light fuel oil for households. Eurostat provided a series for the price of heating gas for households, PEN43LC\_L\_EU, running from 1985 to 1999. This was linked

with a similar series from the IEA, PEN43LC\_L\_IEA, which runs from 1979 to 1999. Another IEA series, PEN45C\_IEAOLD, gives the price between 1968 and 1978. It was necessary to use the above price for industry, PEN43I\_L, to provide an overlapping year with which to link. Thus, the series PEN43C\_L gives the price of light fuel oil for households from 1969 to 1999.

#### 5. PEN44I\_M

This gives the price per metric tonne of heavy fuel oil for industry. The IEA series PEN44I\_M\_IEA gives the price from 1979 to 1999. Another IEA series, PEN44I\_IEAOLD, gives the price from 1968 to 1978. In order to link the two series, the CSO's Wholesale Price index WPAM405 is used. This gives an index of the price of fuel oil from 1975 onwards. Using this series it is possible to create PEN44I\_M, the price of heavy fuel oil for industry from 1968 to 1999.

#### 6. PEN44E\_M

This gives the price of per metric tonne of heavy fuel oil for the energy sector. It links the industry price from the previous series, PEN44I\_M\_IEA, with a series for the price of fuel oil that is indexed to the CSO's Wholesale Price Index, PEN43, which goes back to 1975. This is then linked to the IEA series, PEN44E\_IEAOLD, which runs from 1968 to 1978. The resulting series is PEN44E\_M, running from 1968 to 1999.

#### 7. PEN1C\_M

This is the price per tonne of coal for households. The IEA provide a series for the domestic price of coal from 1978 to 1994, PEN1C\_IEA. This is then linked with a series from the CSO's Consumer Price Index for the household price of coal, PEN1C\_OLD, which runs from 1953 to 1981. The Irish Energy Centre provide a similar series from 1981 to 1999, and thus linking all these series yields PEN1C\_M, which runs from 1953 to 1999.

#### 8. PEN1I\_M

This represents the price per tonne of coal for industry. The Irish Energy Centre provided figures for the price of coal for industry from 1993 to 1999. Due to the absence of data on the industry price of coal, this is then linked to the price of coal for households from above, PEN1C\_M, to give a series for the industry price of coal running from 1953 to 1999.

#### 9. PEN6C\_J

This represents the price of natural gas for households. Eurostat provide a series for the domestic price of natural gas from 1985 to 2000, PEN6C\_K\_EU. This is then linked to a similar series from the IEA, PEN6C\_K\_IEA, which runs from 1981 to 1999. The new series is linked to an ESRI series, PEN62, which goes back to 1970. Thus, a series for the price of natural gas for households from 1970 to 2000 is created.

#### 10. PEN6I\_K

This represents the price of natural gas for industry. The linking process is exactly the same as for households, with the Eurostat series (PEN6I\_K\_EU) linked to the IEA series (PEN6I\_K\_IEA), and then incorporating the same ESRI series (PEN62) to give a series for the price of natural gas for industry from 1970 to 2000.

#### 11. PEN7C\_K

This series gives the price of electricity for households. The IEA series PEN7C\_K\_IEA runs from 1978 to 1999, and this is linked with a series obtained from ESB dating back to 1955, PEN73\_T. The resulting series gives the price of electricity for households from 1955 to 1999.

#### 12. PEN7I\_T

This represents the price of electricity for industry, per TOE. It is generated by four linked series. The first is PEN7I\_K\_IEA, which is the IEA series for the price of electricity for industry running from 1978 to 1999. The Irish Energy Centre gives prices from 1981 to 1999 in PEN7I\_K. The third series used in the linking process is WPAM 406 from the CSO's Wholesale Price Index. This is an index of the price of electricity for industrial users, running from 1980 to 1995. The required series, PEN7I\_T, is formed by linking these series with an ESB series of electricity prices for industry, running from 1955 to 1999.

### 13. PEN6E\_K

This represents the price of natural gas for use in the generation of electricity. The IEA series PEN6E\_K\_IEA gives prices from 1985 to 1999. This is then linked with a series derived from data in ESB accounts, PEN6E\_T, running from 1979 to 1990. By linking these two series it is possible to form the required series for the price of natural gas used in the electricity generation sector, from 1979 to 1999.

### 14. PEN1E\_M

This represents the price of coal for use in the generation of electricity. The linking process is very similar to the previous series, with the IEA series (PEN1E\_M\_IEA) linked to another series derived from ESB accounts (PEN1E\_T). Here, though, the series runs from 1972 to 1999.

## A.3. Contents of Tables

**Table 6.**

|          |  |
|----------|--|
| C        | Personal consumption at constant prices, £ million.  |
| CAL      | consumption of alcohol, constant prices, £ million.  |
| CALB     | Beer, personal consumption, constant prices. Source: Unpublished CSO data.                 |
| CALBV    | Beer, personal consumption, current prices. Source: Unpublished CSO data.                  |
| CALO     | Other alcohol, personal consumption, constant prices. Source: Unpublished CSO data.        |
| CALOV    | Other alcohol, personal consumption, current prices. Source: Unpublished CSO data.         |
| CALS     | Spirits, personal consumption, constant prices. Source: Unpublished CSO data.              |
| CALSV    | Spirits, personal consumption, current prices. Source: Unpublished CSO data.               |
| CALV     | Consumption of alcohol, current prices, £ million.   |
| CCAR     | Cars, personal consumption, constant prices. Source: Unpublished CSO data.                 |
| CCARV    | Cars, personal consumption, current prices. Source: Unpublished CSO data.                  |
| CCLO     | Consumption of clothing, constant prices, £ million.                                       |
| CCLOV    | Consumption of clothing, current prices, £ million.  |
| CCVA     | $CCVA = CCVA1 + CCVA2 + CCVB2 + CCVA6 + CCVA5 + CSV - CENEXOV$                             |
| CCVA1    | $CCVA1 = (CNDV - CFOODV - COGOV + CENEXOV) / (1 + RV1)$                                    |
| CCVA2    | $CCVA2 = CDURV / (1 + RV2)$  |
| CCVA5    | $CCVA5 = CFOODV / (1 + RV5)$   |
| CCVA6    | $CCVA6 = CTREQV / (1 + RV6)$   |
| CCVB2    | $CCVB2 = COGOV / (1 + RV2)$  |
| CD       | Consumption of durables including transport equipment, constant prices, £ million.         |
| CDHO     | Domestic Heating Oil, personal consumption, constant prices. Source: Unpublished CSO data. |
| CDHOV    | Domestic Heating Oil, personal consumption, current prices. Source: Unpublished CSO data.  |
| CDUR     | Consumption of durables excluding transport equipment, constant prices, £ million.         |
| CDURV    | Consumption of durables excluding transport equipment, current prices, £ million.          |
| CDV      | Consumption of durables including transport equipment, current prices, £ million.          |
| CELEC    | Electricity, personal consumption, constant prices. Source: Unpublished CSO data.          |
| CELECV   | Electricity, personal consumption, current prices. Source: Unpublished CSO data.           |
| CENERGY  | Consumption of energy at constant prices, £ million.                                       |
| CENERGYV | Consumption of energy at current prices, £ million.  |
| CENTER   | Consumption expenditure on entertainment, constant prices, £ million.                      |
| CENTERV  | Consumption expenditure on entertainment, current prices, £ million.                       |
| CFD      | Consumption of food excluding non-alcoholic beverages, constant prices, £ million.         |
| CFDV     | Consumption of food excluding non-alcoholic beverages, current prices, £ million.          |
| CFOOD    | Consumption of food and non-alcoholic beverages, constant prices, £ million.               |
| CFOODV   | Consumption of food and non-alcoholic beverages, current prices, £ million.                |
| CFPOW    | Consumption of fuel and power, constant prices, £ million.                                 |
| CFPOWV   | Consumption of fuel and power, current prices, £ million.                                  |
| CKER     | Kerosene, personal consumption, constant prices. Source: Unpublished CSO data.             |
| CKERV    | Kerosene, personal consumption, current prices. Source: Unpublished CSO data.              |

|         |   |
|---------|---|
| CLPG    | LPG, personal consumption, constant prices. Source: Unpublished CSO data.   |
| CLPGV   | LPG, personal consumption, current prices. Source: Unpublished CSO data.  |
| CNALB   | Non-Alcoholic Beverages, personal consumption, constant prices. Source: Unpublished CSO data.                       |
| CNALBV  | Non-Alcoholic Beverages, personal consumption, current prices. Source: Unpublished CSO data.                        |
| CND     | Consumption of non-durables, constant prices, £ million.  |
| CNDV    | Consumption of non-durables, current prices, £ million.   |
| COFPOW  | Consumption, non-durables, constant prices, £ million.  |
| COFPOWV | Consumption, non-durables, current prices, £ million.   |
| COGO    | Consumption of other goods, constant prices, £ million.   |
| COGOV   | Consumption of other goods, current prices, £ million.  |
| COIL    | Consumption of kerosene and heating oil, constant prices, £ million.  |
| COILV   | Consumption of kerosene and heating oil, current prices, £ million.   |
| COTRAV  | Consumption of travel within the state excluding petrol, constant prices, £ million.                                |
| COTRAVV | Consumption of travel within the state excluding petrol, current prices, £ million.                                 |
| CV      | Personal consumption, current prices, £ million, B0501.   |
| CVRES   | Consumption - residual balancing item where individual series are linked independently, current prices, £ million.  |
| CPET    | Petrol, personal consumption, constant prices. Source: Unpublished CSO data.  |
| CPETV   | Petrol, personal consumption, current prices. Source: Unpublished CSO data.   |
| CPSER   | Consumption of professional and personal services, constant prices, £ million.                                      |
| CPSERV  | Consumption of professional and personal services, current prices, £ million.                                       |
| CRENT   | Consumption, rent, constant prices, £ million.  |
| CRENTV  | Consumption, rent, current prices, £ million.   |
| CRES    | Consumption - residual balancing item where individual series are linked independently, constant prices, £ million. |

**Table 11.**

|          |   |
|----------|---|
| EN1BA_T  | Energy Use - Change in stocks of Coal in TOE.   |
| EN1C_T   | Energy Use - Household consumption of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA . SOURCE: Brendan O'Loughlin, Dept. of Energy. |
| EN1E_T   | Energy Use - energy sector consumption of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN1FC_T  | Energy Use - final consumption of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN1G_T   | Energy Use - gas works consumption of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN1I_T   | Energy Use - industry sector consumption of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN1M_T   | Energy Use -Imports of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN1QD_T  | Energy Use -domestic production of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN1TD_T  | Energy Use - primary energy demand for Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN1X_T   | Energy Use -exports of Coal in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN3BA_T  | Energy Use -change in stocks of crude oil in TOE. Source: from 1980 from DOE. Earlier data from IEA   |
| EN3M_T   | Energy Use -Imports of crude oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN3R_T   | Energy Use - refineries consumption of crude oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN3TD_T  | Energy Use - primary energy demand for crude oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN3X_T   | Energy Use -exports of crude oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN41FC_T | Energy Use - final consumption of petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN41M_T  | Energy Use -Imports of petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN41QD_T | Energy Use -domestic production of petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN41ST_T | Energy Use - transportation sector use of petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN41TD_T | Energy Use - primary energy demand for petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN41X_T  | Energy Use -exports of petrol in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN42C_T  | Energy Use - Household consumption of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN42E_T  | Energy Use - energy sector consumption of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN42FC_T | Energy Use - final consumption of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN42G_T  | Energy Use - gas works consumption of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN42I_T  | Energy Use - industry sector consumption of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .                                      |
| EN42M_T  | Energy Use -Imports of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN42QD_T | Energy Use -domestic production of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN42ST_T | Energy Use - transportation sector use of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |

|            |   |
|------------|---|
| EN42TD_T   | Energy Use - primary energy demand for diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN42X_T    | Energy Use -exports of diesel in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN43E_T    | Energy Use - energy sector consumption of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN43FC_T   | Energy Use - final consumption of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN43G_T    | Energy Use - gas works consumption of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN43I_T    | Energy Use - industry sector consumption of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN43M_T    | Energy Use -Imports of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN43QD_T   | Energy Use -domestic production of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN43TD_T   | Energy Use - primary energy demand for fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN43X_T    | Energy Use -exports of fuel oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN49FC_T   | Energy Use - final consumption of other oil in TOE.   |
| EN49M_T    | Energy Use -Imports of other oil in TOE.  |
| EN4BA_T    | Energy Use -change in stocks of other oil in TOE.   |
| EN4C_T     | Energy Use - Household consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4E_T     | Energy Use - energy sector consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4FC_T    | Energy Use - final consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4G_T     | Energy Use - gas works consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4I_T     | Energy Use - industry sector consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4M_T     | Energy Use -Imports of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN4R_T     | Energy Use - refineries consumption of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN4ST_T    | Energy Use - transportation sector use of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN4TD_T    | Energy Use - primary energy demand for oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN4X_T     | Energy Use -exports of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN6BA_T    | Energy Use - Change in stocks of gas in TOE.  |
| EN6C_T     | Energy Use - Household consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .For 1979 from DoPE.  |
| EN6E_T     | Energy Use - energy sector consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN6FC_T    | Energy Use - final consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .For 1979 from DoPE.  |
| EN6G_T     | Energy Use - gas works consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .For 1979 from DoPE.  |
| EN6IMCHF_T | Energy Use - industry(Feedstock) consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .For 1979 from DoPE.  |
| EN6I_T     | Energy Use - industry sector consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .For 1979 from DoPE.  |
| EN6M_T     | Energy Use -Imports of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN6QD_T    | Energy Use - domestic production of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA. For 1979 from DoPE.  |
| EN6TD_T    | Energy Use - domestic production of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA.  |
| EN7A_T     | Energy Use -agricultural sector consumption of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN7BA_T    | Energy Use - Change in stocks etc. of electricity in TOE.   |
| EN7C_T     | Energy Use - Household consumption of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN7E_T     | Energy Use - energy sector consumption of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN7FC_T    | Energy Use - final consumption of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN7I_T     | Energy Use - industry sector consumption of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN7QD_T    | Energy Use - domestic production of electricity from renewables (hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN7RES_T   | Energy Use - demand for electricity from the commercial and public sectors in TOE   |
| EN7TD_T    | Energy Use - domestic production of electricity in TOE. Source: from 1980 from DOE. Earlier data from IEA.  |
| EN8BA_T    | Energy Use - Change in stocks etc. of peat in TOE.  |
| EN8C_T     | Energy Use - Household consumption of peat in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN8E_T     | Energy Use - energy sector consumption of peat in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN8FC_T    | Energy Use - final consumption of peat (including briquettes) in TOE. Source: from 1980 from DOE. Earlier data from IEA .   |
| EN8I_T     | Energy Use - industry sector consumption of peat in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN8QD_T    | Energy Use - domestic production of peat in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN8TD_T    | Energy Use - total consumption of peat in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN9C_T     | Energy Use - Household consumption of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA . SOURCE: Brendan O'Loughlin, Dept. of Energy. |
| EN9E_T     | Energy Use - energy sector consumption of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN9FC_T    | Energy Use - final consumption of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |
| EN9G_T     | Energy Use - gas works consumption of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .  |

|           |  |
|-----------|--|
| EN9I_T    | Energy Use - industry sector consumption of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA . |
| EN9M_T    | Energy Use -Imports of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .                      |
| EN9QD_T   | Energy Use -domestic production of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .          |
| EN9TD_T   | Energy Use - primary energy demand for Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .      |
| EN9X_T    | Energy Use -exports of Other Renewables (excluding Hydro) in TOE. Source: from 1980 from DOE. Earlier data from IEA .                      |
| ENBA_T    | Change in energy balances, thousand TOE.   |
| ENC_T     | Household energy consumption in thousand TOE.  |
| ENFC_T    | Total final energy consumption, thousand TOE.  |
| ENIMCHF_T | Energy Use - industry(Feedstock) consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA - unreliable.                |
| ENI_T     | Industrial sector energy consumption in thousand TOE.  |
| ENM_T     | Imports of energy in thousand TOE  |
| ENOL_T    | Other energy loss, thousand TOE.   |
| ENQD_T    | Domestic energy production in thousand   |
| ENRES_T   | ENRES_T = ENFC_T-ENI_T-ENST_T-ENC_T  |
| ENST_T    | Energy Use - transportation sector use of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA - unreliable.                      |
| ENTD_T    | Primary energy demand in thousand TOE.   |
| ENUL_T    | Utilities sector consumption of energy in thousand TOE   |

**Table 12.**

|            |  |
|------------|--|
| ENBA_T     | Change in energy balances, thousand TOE.   |
| ENC_T      | Household energy consumption in thousand TOE.  |
| ENFC_T     | Total final energy consumption, thousand TOE.  |
| ENIMCHF_T  | Energy Use - industry(Feedstock) consumption of gas in TOE. Source: from 1980 from DOE. Earlier data from IEA. |
| ENIMD42V_X | ENIMD42V_X = PEN44*EN42IMD_T   |
| ENIMD42_X  | ENIMD42_X = ENIMD42V_X/PEN44_X   |
| ENIMD43V_X | ENIMD43V_X = PEN43*EN43IMD_T   |
| ENIMD43_X  | ENIMD43_X = ENIMD43V_X/PEN43_X   |
| ENIMD4V_X  | ENIMD4V_X = ENIMD42V_X+ENIMD43V_X  |
| ENIMD4_X   | ENIMD4_X = ENIMD42_X+ENIMD43_X   |
| ENIMF42V_X | ENIMF42V_X = PEN44*EN42IMF_T   |
| ENIMF42_X  | ENIMF42_X = ENIMF42V_X/PEN44_X   |
| ENIMF43V_X | ENIMF43V_X = PEN43*EN43IMF_T   |
| ENIMF43_X  | ENIMF43_X = ENIMF43V_X/PEN43_X   |
| ENIMF4V_X  | ENIMF4V_X = ENIMF42V_X+ENIMF43V_X  |
| ENIMF4_X   | ENIMF4_X = ENIMF42_X+ENIMF43_X   |
| ENIMH42V_X | ENIMH42V_X = PEN44*EN42IMH_T   |
| ENIMH42_X  | ENIMH42_X = ENIMH42V_X/PEN44_X   |
| ENIMH43V_X | ENIMH43V_X = PEN43*EN43IMH_T   |
| ENIMH43_X  | ENIMH43_X = ENIMH43V_X/PEN43_X   |
| ENIMH4V_X  | ENIMH4V_X = ENIMH42V_X+ENIMH43V_X  |
| ENIMH4_X   | ENIMH4_X = ENIMH42_X+ENIMH43_X   |
| ENIMT42V_X | ENIMT42V_X = PEN44*EN42IMT_T   |
| ENIMT42_X  | ENIMT42_X = ENIMT42V_X/PEN44_X   |
| ENIMT43V_X | ENIMT43V_X = PEN43*EN43IMT_T   |
| ENIMT43_X  | ENIMT43_X = ENIMT43V_X/PEN43_X   |
| ENIMT4V_X  | ENIMT4V_X = ENIMT42V_X+ENIMT43V_X  |
| ENIMT4_X   | ENIMT4_X = ENIMT42_X+ENIMT43_X   |
| ENI_T      | Industrial sector energy consumption in thousand TOE.  |
| ENM_T      | Imports of energy in thousand TOE.   |
| ENOL_T     | Other energy loss, thousand TOE.   |
| ENQD_T     | Domestic energy production in thousand TOE   |
| ENRES_T    | ENRES_T = ENFC_T-ENI_T-ENST_T-ENC_T  |
| ENST_T     | Energy Use - transportation sector use of oil in TOE. Source: from 1980 from DOE. Earlier data from IEA        |
| ENTD_T     | Primary energy demand in thousand TOE.   |

|        |  |
|--------|--|
| ENUL_T | Utilities sector consumption of energy in thousand TOE |
| ENX_T  | Exports of energy in thousand TOE.                     |

**Table 28.**

|      |   |
|------|---|
| LPG1 | QUANTITY OF LPG ON WHICH DUTY IS PAID FOR CARS. ( 000 'S OF LITRES ) - FULLY DUTY PAID. SOURCE : REVENUE COMMISSIONERS REPORT (TABLE EX17 - FULL DUTY PAID )  |
| LPG2 | QUANTITY OF LPG ON WHICH DUTY IS PAID FOR OTHER THAN CARS ( 000 'S OF LITRES ) - PARTLY REBATED. SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE EX17 - PARTLY REBATED )  |
| LPGT | LPGT = LPG1+LPG2  |
| OIL1 | HEAVY OIL - DIESEL FOR ROAD USE , NON - REBATED. MILLION LITRES. SOURCE : REVENUE COMMISSIONERS REPORT - TABLE EX14 'HYDROCARBON OILS , OTHER SORTS' ( OIL1 AND OIL2 ADD UP TO THE NON - REBATED QUANTITY.____ DIRECT FROM REVENUE COMMISSIONER |
| OIL2 | HEAVY OIL - DIESEL FOR ROAD PASSENGER. MILLION LITRES. ( SEE OIL1 ) . SOURCE : DIRECT FROM THE REVENUE COMMISSIONERS (Gerry Kinsella 01 6748044) Jump in 1998 because of school buses being included.   |
| OIL3 | RESIDUAL FUEL OIL USED FOR OTHER PURPOSES. MILLION LITRES. SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE 12 - FROM 1994 TABLE CE15 ) (1999 TABLE EX14)  |
| OIL4 | HEAVY OIL - FUEL OIL FOR USE IN ESB. MILLION LITRES. SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE 12 - FROM 1994 TABLE CE15 ) (1999 TABLE EX14)  |
| OIL5 | OIL5 = OILT-(OIL1+OIL2+OIL3+OIL4+OIL6)  |
| OIL6 | HEAVY OIL FULLY REBATED AND DUTY FREE. MILLION LITRES SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE 12 - FROM 1994 TABLE CE15 ) (1999 TABLE EX14)   |
| OILB | OILB = OILT-OILP  |
| OILP | OILP = COIL/PLO   |
| OILT | THIS USED TO BE CALLED HOILT. HEAVY OIL - TOTAL CONSUMPTION M.LTRS. SOURCE : REVENUE COMMISSIONERS REPORT. TOTAL HYDROCARBON OILS AND OTHER SORTS. ( 1988 REPORT PAGE 72 ) ( 1989 __TABLE 12 ) ( 1994 TABLE CE15 )(1999 TABLE EX14)             |
| PET1 | MINERAL HYDROCARBON LIGHT OIL ( PETROL ) FULLY DUTY PAID QUANTITY. ( MILLION LITRES ) SOURCE : REVENUE COMMISSIONERS REPORT. FROM 1994 - TOTAL LEADED PETROL ) From 1996 onwards this includes super plus unleaded, Table EX11                  |
| PET2 | MINERAL HYDROCARBON LIGHT OIL ( PETROL ) - REDUCED DUTY.MILL.LITRES. SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE 11A 2 + 3 ONLY ) ( FROM 1994 TABLE CE12 - AVIATION GASOLINE + OTHER MHLO )   |
| PET3 | AMOUNT OF MINERAL HYDROCARBON LIGHT OIL DUTY FREE. ( MILLION LITRES ) SOURCE : REVENUE COMMISSIONERS  |
| PET4 | QUANTITY OF UNLEADED PETROL PURCHASED IN MILLION LITRES. SOURCE : REVENUE COMMISSIONERS REPORT ( TABLE CE12) (1999 TABLE EX11)  |
| PETB | PETB = PETT-PETP  |
| PETP | PETP = CPET/POO   |
| PETT | PETT = PET1+PET2+PET3+PET4  |

**Table 29.**

|          |  |
|----------|--|
| M01      | Imports SITC 0 and 1, constant prices, £ million   |
| M01V     | Imports SITC 0 and 1, current prices, £ million  |
| M0UNADV  | Imports SITC 0 unadjusted, current prices, £ million   |
| M0V      | Imports SITC 0, current prices, £ million  |
| M0VTEMAN | IMPORTS SITC 0 CURRENT PROCES TEMPORARY IMPORTS OF ANIMALS , ADJUSTED FOR 1972 AND EARLIER. ( £ M ) . YEARS. SOURCE : TRADE STATS BULLETIN IMPORTS SITC 0 CURRENT PROCES TEMPORARY IMPORTS OF ANIMALS , ADJUSTED FOR 1972 AND EARLIER. ( £ M ) |
| M1V      | Imports SITC 1, current prices, £ million  |
| M24      | Imports SITC 2 and 4, constant prices, £ million   |
| M24V     | Imports SITC 2 and 4, current prices, £ million  |
| M2V      | Imports SITC 2, current prices, £ million  |
| M3       | Imports SITC 3, constant prices, £ million   |
| M32V     | Imports SITC 32, current prices, £ million M32V = OVERLAY(SUBRANGE(M32V,NA,1990A),TSBA026/1000)  |
| M333     | IMPORTS OF CRUDE OIL (METRIC TONS). SOURCE: TRADE STATISTICS (December), IMPORTS SITC 33300  |
| M333V    | IMPORTS OF CRUDE OIL (METRIC TONS). SOURCE: TRADE STATISTICS (December), IMPORTS SITC 33300 IMPORTS OF CRUDE OIL (£000'S) AT CURRENT PRICES. SOURCE: TRADE STATISTICS (December)., IMPORTS SITC 33300  |
| M33V     | Imports SITC 33, current prices, £ million   |
| M34V     | Imports SITC 34, current prices, £ million   |
| M3V      | Imports SITC 3, current prices, £ million  |
| M4V      | Imports SITC 4, current prices, £ million  |
| M59      | Imports SITC 5 to 9, constant prices, £ million  |
| M59V     | Imports SITC 5 to 9, current prices, £ million   |
| M5V      | Imports SITC 5, current prices, £ million  |
| M6V      | Imports SITC 6, current prices, £ million  |
| M7V      | Imports SITC 7, current prices, £ million  |
| M8V      | Imports SITC 8, current prices, £ million  |
| M9UNADV  | Imports SITC 9 unadjusted, current prices, £ million   |
| M9V      | Imports SITC 9, current prices, £ million  |
| MCOV     | Distribution of Imports according to Main Use. Other Consumption Goods ready for use. IR£ million.   |
| MFDTV    | Distribution of Imports according to Main Use. Consumption Goods ready for use. IRE million.   |
| MG       | Imports of goods, constant prices, £ million   |
| MGS      | Imports of goods and services, constant prices, £ million  |

|            |   |
|------------|---|
| MGSV       | Imports of goods and services, current prices, £ million  |
| MGV        | Imports of goods, current prices, £ million   |
| MMADJV     | ADJUSTMENT TO MERCHANDISE IMPORTS : CURRENT PRICES. £ M. PRIOR TO 1965 , TO TAKE ACCOUNT OF NETTING OUT OF SHANNON. TRADE IN COINS ETC. (SEE PAPER BY J. FITZGERALD DEPT OF FINANCE )   |
| MMFPAV     | Distribution of Imports according to Main Use. Materials for Further Production in Agriculture. IR£ million.  |
| MMNIRL     | IMPORTS : BOP ADJUSTMENT , NON - AGRICULTURAL SMUGGLING NORTHERN IRL. SOURCE : UNPUBLISHED DATA CSO. - - TRADE SECTION DEPT. OF FINANCE   |
| MMSMUG     | IMPORTS : BOP ADJUSTMENT , AGRICULTURAL SMUGGLING NORTHERN IRL. SOURCE : UNPUBLISHED DATA CSO. - - TRADE SECTION DEPT. OF FINANCE   |
| MMUNAD     | MERCHANDISE IMPORTS AT CONSTANT1990 PRICES. £ M   |
| MMUNAD_I85 | MERCHANDISE IMPORTS AT CONSTANT PRICES. £ M UNADJUSTED FOR SHANNON TRADE PRIOR TO 1965. LINKING OF 1975. AND 1985 PRICES WAS DONE AT 1978 TO ACCORD WITH THE PRACTICE. OF THE NIE ( OLD 1978 VALUE : 4895.8 ). All expressed at constant 1985 p |
| MMUNAD_I90 | MERCHANDISE IMPORTS AT CONSTANT1990 PRICES. £ M   |
| MNE        | Imports of goods and services excluding energy, constant prices, £ million  |
| MNEV       | Imports of goods and services excluding energy, current prices, £ million   |
| MOS        | Imports of other services, constant prices, £ million   |
| MOSV       | Imports of other services, current prices, £ million  |
| MPCGV      | Distribution of Imports according to Main Use. Producers' Capital Goods ready for use. IR£ million.   |
| MS         | Imports of services, constant prices, £ million   |
| MSHANV     | IMPORTS INTO SHANNON : CURRENT PRICES. £ M. ADJUSTED TO TAKE ACCOUNT OF NETTING OUT OF SHANNON BACK PRIOR TO 1965. SOURCE : TRADE STATISTICS BULLETIN   |
| MSV        | Imports of services, current prices, £ million  |
| MTADJV     | ADJUSTMENT TO TOTAL IMPORTS , PRIOR TO 1965 TO TAKE ACCOUNT OF NETTING OUT OF SHANNON TRADE AND TRANSPORTATION RECEIPTS. SEE PAPER BY JOHN FITZGERALD - DEPARTMENT OF FINANCE   |

**Table 35.**

|         |   |
|---------|---|
| PC      | Price deflator, personal consumption at constant prices   |
| PCAL    | Price deflator, consumption of alcohol, constant prices   |
| PCALB   | Price deflator, beer, personal consumption, constant prices. Source: Unpublished CSO data.                    |
| PCALO   | Price deflator, other alcohol, personal consumption, constant prices. Source: Unpublished CSO data.           |
| PCALS   | Price deflator, spirits, personal consumption, constant prices. Source: Unpublished CSO data.                 |
| PCCLO   | Price deflator, consumption of clothing, constant prices  |
| PCD     | Price deflator, consumption of durables including transport equipment, constant prices                        |
| PCDHO   | Price deflator, domestic Heating Oil, personal consumption, constant prices. Source: Unpublished CSO data.    |
| PCDUR   | Price deflator, consumption of durables excluding transport equipment, constant prices                        |
| PCENTER | Price deflator, consumption expenditure on entertainment, constant prices                                     |
| PCFD    | Price deflator, consumption of food excluding non-alcoholic beverages, constant prices                        |
| PCFOOD  | Price deflator, consumption of food and non-alcoholic beverages, constant prices                              |
| PCFPOW  | Price deflator, consumption of fuel and power, constant prices  |
| PCKER   | Price deflator, Kerosene, personal consumption, constant prices. Source: Unpublished CSO data.                |
| PCLPG   | Price deflator, LPG, personal consumption, constant prices. Source: Unpublished CSO data.                     |
| PCNALB  | Price deflator, non-alcoholic beverages, personal consumption, constant prices. Source: Unpublished CSO data. |
| PCND    | Price deflator, consumption of non-durables, constant prices  |
| PCOFPOW | Price deflator, consumption, non-durables, constant prices  |
| PCOGO   | Price deflator, consumption of other goods, constant prices   |
| PCOIL   | Price deflator, consumption of kerosene and heating oil, constant prices                                      |
| PCOTRAV | Price deflator, consumption of travel within the state excluding petrol, constant prices                      |
| PCPET   | Price deflator, Petrol, personal consumption, constant prices. Source: Unpublished CSO data.                  |
| PCPSER  | Price deflator, consumption of professional and personal services, constant prices                            |
| PCRENT  | Price deflator, consumption, rent, constant prices  |
| PCS     | Price deflator, consumption of services, constant prices  |
| PCTOB   | Price deflator, consumption of tobacco, constant prices   |
| PCTREQ  | Price deflator, consumption of transport equipment, constant prices   |

**Table 37.**

|              |  |
|--------------|--|
| PEN1         | PRICE OF COAL, £ PER TOE, INCL. TAXES, VAT ETC.SOURCE:SCOTT 1993   |
| PEN11_M      | Price of Coal for households, £ per tonne. Source: Irish Energy Centre leaflet Comparison of Energy Costs, House Coal      |
| PEN12        | Price of Coal for industry, £ per TOE.   |
| PEN12_M      | Price of Coal for industry, £ per tonne. Source: Irish Energy Centre leaflet Comparison of Energy Costs , Industrial Fines |
| PEN13_JEAOLD | Anthracite - Average price paid at 1st January for 500kg lots  |



|               |   |
|---------------|---|
| PEN1C_M       | Price of Coal for households, £ per tonne. Source: linked series PEN11_M PEN1C_M IEA PEN1C_OLD  |
| PEN1C_M IEA   | Steam Coal (price per mt) Households Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN1C_OLD     | Price of coal, Index in CPI, linked. Source:CSO.  |
| PEN1E_M       | Steam Coal (price per mt) Elect. Generation Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN1E_M IEA   | Steam Coal (price per mt) Elect. Generation Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN1E_T       | Price of coal used in electricity generation, £ per TOE. This is derived from data in ESB accounts for cost of fuel and balance sheet data on fuel used. ESBFUELPRICE.XLS                                     |
| PEN11_M       | Price of Coal for industry, £ per tonne. Source: linked series PEN12_M PEN12 PEN1C IEAOLD PEN1C_M   |
| PEN41         | PRICE OF PETROL, £ PER TOE, INCL. TAXES, VAT ETC.(FROM AND INCL 1989 THE SERIES IS A WEIGHTED AVERAGE OF LEADED AND UNLEADED PRICES). SOURCE: SCOTT, 1993.  |
| PEN41A IEAOLD | Inland Transport Gasoline (Premium) Octane RM 95 and above - Average price paid at 1st January  |
| PEN41B IEAOLD | Inland Transport Gasoline (Standard) Octane RM 94 and below - Average price paid at 1st January   |
| PEN41L_L EU   | Premium leaded gasoline - IR£Price at the pump  |
| PEN41L_L IEA  | Automotive Fuels (price per litre) Leaded Prem. Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN41U_L      | Price of unleaded petrol, pence per litre. Source: Revenue Commissioners Statistical Reports  |
| PEN41U_L EU   | Premium unleaded gasoline 95 ron - IR£Price at the pump. Source: linked   |
| PEN41U_L IEA  | Automotive Fuels (price per litre) Unleaded Prem. (95 RON) Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN41_L       | Price of unleaded petrol, pence per litre. Source: Revenue Commissioners Statistical Reports  |
| PEN42         | Price of autodiesel £ per TOE.  |
| PEN42A IEAOLD | Inland Transport Diesel Oil - Average bulk price paid at 1st January  |
| PEN42 IEAOLD  | Inland Transport Diesel Oil - Average retail price paid at 1st January  |
| PEN42_L       | Price of autodiesel in litres, indexed to average of monthly Wholesale Price Index Series (Excluding VAT). Base Year 1985=100. Petroleum Fuels: Autodiesel. BASE 1985=100                                     |
| PEN42_L EU    | Diesel oil - IR£Price at the pump   |
| PEN42_L IEA   | Automotive Fuels (price per litre) Automotive Diesel Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN43         | Price of fuel oil per TOE indexed to average monthly Wholesale Price Index Series (Excluding VAT). Base Year 1985=100. Petroleum Fuels: Fuel Oil. BASE 1985=100   |
| PEN43C_L      | Heating gasoil - IR£ Price for Households (Deliveries between 2000 and 5000 litres annually) Source: linked series PEN43LC_L EU PEN43LC_L IEA PEN45C IEAOLD PEN43L_L  |
| PEN43L_L      | Light Fuel Oil (price per 1000 litres) Industry. Price IR£ Source: Linked series PEN43LI_L IEA COMPACT(WPAM404,0,1) PEN45L IEAOLD   |
| PEN43LC_L EU  | Heating gasoil - IR£Price for Households (Deliveries between 2000 and 5000 litres annually)   |
| PEN43LC_L IEA | Light Fuel Oil (price per 1000 litres) Households Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN43LI_L IEA | Light Fuel Oil (price per 1000 litres) Industry Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN44         | Price of Gas Oil (other than Autodiesel) per TOE indexed to average monthly Wholesale Price Index Series (Excluding VAT). Base Year 1985=100. Petroleum Fuels: Gas Oil (other than Autodiesel). BASE 1985=100 |
| PEN44E IEAOLD | Power Stations Heavy Fuel Oil - Average price paid at 1st January for an annual consumption of 300,000 tons   |
| PEN44E_M      | Heavy Fuel Oil (price per metric ton) Energy Sector Price IR£ Source: linked series PEN44I_M IEA PEN43 PEN44E IEAOLD  |
| PEN44I IEAOLD | Industrial Heavy Fuel Oil - Average price paid at 1st January for an annual consumption of 5,000 tons   |
| PEN44I_M      | Heavy Fuel Oil (price per metric ton) Industry. Price IR£ Source: Linked series PEN44I_M IEA COMPACT(WPAM405,0,1) PEN44I IEAOLD   |
| PEN44I_M IEA  | Heavy Fuel Oil (price per metric ton) Industry Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN45C IEAOLD | Domestic Gas/Diesel Oil - Average price paid at 1st January for 5,000 litre lots  |
| PEN45I IEAOLD | Industrial Gas/Diesel Oil - Average price paid at 1st January for an annual consumption of 500 tons   |
| PEN46C        | Price deflator for domestic consumption of kerosene. Source: PEN46C = CKERV/CKER  |
| PEN46C IEAOLD | Domestic Kerosene - Average price paid at 1st January   |
| PEN46I IEAOLD | Industrial Light/Medium Fuel Oil - Average price paid at 1st January for an annual consumption of 500 tons  |
| PEN6          | PRICE OF ALL GAS TO CONSUMERS, £ PER TOE, INCL. TAXES,VAT ETC. SOURCE: SCOTT, 1993.   |
| PEN61         | PRICE OF LPG TO CONSUMERS, £ PER TOE, INCL. TAXES, VAT ETC. SOURCE: SCOTT, 1993.  |
| PEN61C        | Deflator for personal consumption of LPG.PEN61C = CLPGV/CLPG  |
| PEN61_K       | PRICE OF LPG TO CONSUMERS, pence per kWh. Source: Irish Energy Centre leaflet Comparison of Energy Costs , delivered cost of propane in 47kg cylinder   |
| PEN62         | PRICE OF GAS TO CONSUMERS, £ PER TOE, INCL. TAXES, VAT ETC. SOURCE: SCOTT 1993  |
| PEN62_K       | PRICE OF GAS TO CONSUMERS, pence per kWh Source: Irish Energy Centre leaflet Comparison of Energy Costs , economy rate  |
| PEN63         | Price of gas to industry per TOE.PEN63 = PEN63_K/7.75e-005  |
| PEN63_K       | PRICE OF GAS TO Industry, pence per kWh Source: Irish Energy Centre leaflet Comparison of Energy Costs , rate for consumption 6000 to 15000 kWh.  |
| PEN6C_J       | Natural Gas for Households - IR£Price for Domestic standard consumer D3 consuming 83.7 GJ annually for cooking, water heating and central heating. Source: linked series PEN6C_J EU PEN6C_K IEA PEN62         |
| PEN6C_J EU    | Natural Gas for Households - IR£Price for Domestic standard consumer D3 consuming 83.7 GJ annually for cooking, water heating and central heating   |
| PEN6C_K IEA   | Natural Gas (average price per 10 <sup>7</sup> kilocalories GCV) Households Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN6E_K       | Natural Gas (average price per 10 <sup>7</sup> kilocalories GCV) Elect. Generation Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN6E_K IEA   | Natural Gas (average price per 10 <sup>7</sup> kilocalories GCV) Elect. Generation Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN6E_T       | Natural gas used in electricity generation, £ per TOE. This is derived from data in ESB accounts for cost of fuel and balance sheet data on fuel used. ESBFUELPRICE.XLS                                       |

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| PEN6I_K       | Natural Gas for Industry - IR£ Price for Industrial standard consumer I1 consuming 418.6 GJ annually. Source Linked series PEN6I_K_EU PEN6I_K_IEA PEN62  |
| PEN6I_K_EU    | Natural Gas for Industry - IR£ Price for Industrial standard consumer I1 consuming 418.6 GJ annually   |
| PEN6I_K_IEA   | Natural Gas (average price per 10 <sup>7</sup> kilocalories GCV) Industry Price IR£ Source: IEA Energy Prices and Taxes  |
| PEN7          | PRICE OF ELECTRICITY, £ PER TOE, INCL. TAXES, VAT ETC. SOURCE: SCOTT, 1993.  |
| PEN71_K       | Price of electricity to households. pence per kWh. Source: Irish Energy Centre leaflet Comparison of Energy Costs , general rate   |
| PEN71_T       | Price of electricity for industrial users. Average price per £ per TOE. Source: ESB. indexed to average of monthly Wholesale Price Index Series (Excluding VAT). Base Year 1985=100. Electricity BASE 1985=100 |
| PEN72_T       | Price of electricity for commercial users. Average price per £ per TOE. Source: ESB  |
| PEN73_T       | Price of electricity for household users. Average price per £ per TOE. Source: ESB   |
| PEN7C_IEAOLD  | Domestic Electricity - Average price paid at 1st January for an annual consumption of 3600 Kwh   |
| PEN7C_K       | Electricity (average price per kilowatt hour) Households Price IR£ Source: linked series PEN7C_K_IEA PEN73_T   |
| PEN7C_K_IEA   | Electricity (average price per kilowatt hour) Households Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN7I         | Price of electricity for industry, £ per TOE, Source: derived from CSO wholesale price index for recent years  |
| PEN711_IEAOLD | Industrial Electricity - Average price paid at 1st January for an annual consumption of 4000 Mwh   |
| PEN712_IEAOLD | Industrial Electricity - Average price paid at 1st January for an annual consumption of 15 Gwh   |
| PEN713_IEAOLD | Industrial Electricity - Average price paid at 1st January for an annual consumption of 60 Gwh   |
| PEN7I_K       | Electricity (average price per kilowatt hour) Industry. Price IR£ Source: linked series PEN7I_K_IEA PEN71_T  |
| PEN7I_K_IEA   | Electricity (average price per kilowatt hour) Industry Price IR£ Source: IEA Energy Prices and Taxes   |
| PEN7_T        | Price of electricity for all users. Average price per £ per TOE. Source: ESB   |
| PEN81         | PRICE OF TURF BRIQUETTES, £ PER TOE. SOURCE: SCOTT, 1993.  |
| PEN81_M       | Price of briquettes. £ per bale. Source: Irish Energy Centre leaflet Comparison of Energy Costs , briquettes, baled.   |
| PEN82         | PRICE OF BAGGED TURF, £ PER TOE, INCL. TAXES, VAT ETC. SOURCE: SCOTT 1993  |
| PEN82_M       | Price of machine turf. £ per tonne. Source: Irish Energy Centre leaflet Comparison of Energy Costs , machine turf.   |
| PEN8C_M       | Price of a tonne of briquettes: Source: derived from BnaM annual reports: PEN8C_M = QETBSV/QETBSQ  |
| PEN8E_M       | Price of a tonne of milled peat sold for electricity generation: Source: derived from BnaM annual reports: PEN8E_M = QETMSV/QETMSQ   |
| PENC          | Price deflator for domestic consumption of energy excluding petrol. Source linked series from the CSO CPI files.   |

**Table 42.**

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| PM01  | Deflator of imports, SITC 0 & 1  |
| PM24  | Deflator of imports, SITC 2&4  |
| PM3   | Deflator of imports, SITC 3 (energy)   |
| PM3F  | Deflator of imports, SITC 3 (energy), adjusted to foreign currency using effective exchange rate,                            |
| PM59  | Deflator of imports, SITC 5 to 9   |
| PMG   | Deflator of imports, goods   |
| PMGNE | Deflator of imports, goods, excluding energy imports   |
| PMGS  | Deflator of imports, goods and services  |
| PMNE  | Deflator of imports, goods and services excluding energy imports   |
| PMNEF | Deflator of imports, goods and services excluding energy imports, adjusted to foreign currency using effective exchange rate |
| PMOS  | Deflator of imports, other services  |
| PMS   | Deflator of imports, services  |
| PMTO  | Deflator of imports, services - tourism  |

**Table 45.**

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| PQE    | Price deflator for energy in Ireland (the price of imported energy).        |
| PQEIMD | Price deflator for energy inputs into the traditional manufacturing sector. |
| PQEIMF | Price deflator for energy inputs into the food processing sector.           |
| PQEIMH | Price deflator for energy inputs into the high tech. manufacturing sector.  |
| PQEIMT | Price deflator for energy inputs into the manufacturing sector              |

**Table 49.**

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| QE110T4V | Energy Input, £ Million. Mining and quarrying. NACE 10 - 14. Source:CSO, Census of Industrial Production.   |
| QE11511V | Energy Input, £ Million. Production and preserving of meat. NACE 1511. Source:CSO, Census of Industrial Production.   |
| QE11512V | Energy Input, £ Million. Production and preserving of poultrymeat. NACE 1512. Source:CSO, Census of Industrial Production.                                  |
| QE11513V | Energy Input, £ Million. Production of meat and poultrymeat products. NACE 1513. Source:CSO, Census of Industrial Production.                               |
| QE11520V | Energy Input, £ Million. Processing and preserving of fish and fish products. NACE 1520. Source:CSO, Census of Industrial Production.                       |
| QE11531V | Energy Input, £ Million. Processing and preserving of potatoes. NACE 1531. Source:CSO, Census of Industrial Production.                                     |
| QE11532V | Energy Input, £ Million. Manufacture of fruit and vegetable juice and Processing and preserving of fruit and vegetables n.e.c. 1532+1533.. NACE 1532, 1533. |

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|          | Source:CSO, Census of Industrial Production.   |
| QE1154V  | Energy Input, £ Million. Manufacture of vegetable and animal oils and fats. NACE 154. Source:CSO, Census of Industrial Production.   |
| QE1155V  | Energy Input, £ Million. Manufacture of dairy products. NACE 155. Source:CSO, Census of Industrial Production.   |
| QE1156V  | Energy Input, £ Million. Manufacture of grain mill products, starches and starch products. NACE 156. Source:CSO, Census of Industrial Production.  |
| QE11571V | Energy Input, £ Million. Manufacture of prepared feeds for farm animals. NACE 1571. Source:CSO, Census of Industrial Production.   |
| QE11572V | Energy Input, £ Million. Manufacture of prepared pet foods. NACE 1572. Source:CSO, Census of Industrial Production.  |
| QE11581V | Energy Input, £ Million. Manufacture of bread; manufacture of fresh pastry goods and cakes, 1581.. NACE 1581. Source:CSO, Census of Industrial Production.   |
| QE11583V | Energy Input, £ Million. Manufacture of sugar and Manufacture of cocoa; chocolate and sugar confectionery, 1583+1584.. NACE 1583, 1584. Source:CSO, Census of Industrial Production.   |
| QE11585V | Energy Input, £ Million. Manufacture of macaroni, noodles, couscous and similar farinaceous products and Manufacture of condiments and seasonings, 1585+1587.. NACE 1585, 1587. Source:CSO, Census of Industrial Production. |
| QE11586V | Energy Input, £ Million. Processing of tea and coffee. NACE 1586. Source:CSO, Census of Industrial Production.   |
| QE11588V | Energy Input, £ Million. Manufacture of homogenized food preparations and dietetic food. NACE 1588. Source:CSO, Census of Industrial Production.   |
| QE11589V | Energy Input, £ Million. Manufacture of other food products n.e.c.. NACE 1589. Source:CSO, Census of Industrial Production.  |
| QE1158XV | Energy Input, £ Million. Manufacture of homogenized food preparations and dietetic food and Manufacture of other food products n.e.c., 1588+1589. NACE 1588+1589. Source:CSO, Census of Industrial Production.               |
| QE11591V | Energy Input, £ Million. Manufacture of distilled potable alcoholic beverages. NACE 1591. Source:CSO, Census of Industrial Production.   |
| QE11594V | Energy Input, £ Million. Manufacture of cider and other fruit wines and Production of mineral waters and soft drinks, 1594+1598.. NACE 1594, 1598. Source:CSO, Census of Industrial Production.                              |
| QE11596V | Energy Input, £ Million. Manufacture of beer. NACE 1596. Source:CSO, Census of Industrial Production.  |
| QE11597V | Energy Input, £ Million. Manufacture of malt. NACE 1597. Source:CSO, Census of Industrial Production.  |
| QE1159V  | Energy Input, £ Million. Manufacture of beverages. NACE 159. Source:CSO, Census of Industrial Production.  |
| QE1159XV | Energy Input, £ Million. Manufacture of distilled potable alcoholic beverages and Manufacture of beer and Manufacture of malt, 1591+1596+1597. NACE 1591+1596+1597. Source:CSO, Census of Industrial Production.             |
| QE115T6V | Energy Input, £ Million. Manufacture of food products; beverages and tobacco. NACE 15 - 16. Source:CSO, Census of Industrial Production.   |
| QE115V   | Energy Input, £ Million. Manufacture of food products and beverages. NACE 151 - 158. Source:CSO, Census of Industrial Production.  |
| QE116V   | Energy Input, £ Million. Manufacture of tobacco products. NACE 16. Source:CSO, Census of Industrial Production.  |
| QE1171V  | Energy Input, £ Million. Preparation and spinning of textile fibres. NACE 171. Source:CSO, Census of Industrial Production.  |
| QE11721V | Energy Input, £ Million. Cotton-type weaving and Worsted-type weaving, 1721+1723.. NACE 1721, 1723. Source:CSO, Census of Industrial Production.   |
| QE11722V | Energy Input, £ Million. Woollen-type weaving. NACE 1722. Source:CSO, Census of Industrial Production.   |
| QE11725V | Energy Input, £ Million. Other textile weaving. NACE 1725. Source:CSO, Census of Industrial Production.  |
| QE1172XV | Energy Input, £ Million. Cotton-type weaving and Worsted-type weaving and Other textile weaving, 1721+1723+1725.. NACE 1721+1723+1725. Source:CSO, Census of Industrial Production.  |
| QE11730V | Energy Input, £ Million. Finishing of textiles and Manufacture of made-up textile articles, except apparel, 1730+1740. NACE 1730, 1740. Source:CSO, Census of Industrial Production.   |
| QE11751V | Energy Input, £ Million. Manufacture of carpets and rugs. NACE 1751. Source:CSO, Census of Industrial Production.  |
| QE11752V | Energy Input, £ Million. Manufacture of cordage, rope, twine and netting. NACE 1752. Source:CSO, Census of Industrial Production.  |
| QE11754V | Energy Input, £ Million. Manufacture of other textiles n.e.c.. NACE 1754. Source:CSO, Census of Industrial Production.   |
| QE11760V | Energy Input, £ Million. Manufacture of knitted and crocheted fabrics and Manufacture of knitted and crocheted hosiery, 1760+1771.. NACE 1760, 1771. Source:CSO, Census of Industrial Production.                            |
| QE11772V | Energy Input, £ Million. Manufacture of knitted and crocheted pullovers, cardigans and similar articles. NACE 1772. Source:CSO, Census of Industrial Production.   |
| QE117T8V | Energy Input, £ Million. Manufacture of textiles and textile products. NACE 17 - 18. Source:CSO, Census of Industrial Production.  |
| QE117V   | Energy Input, £ Million. Manufacture of textiles. NACE 17. Source:CSO, Census of Industrial Production.  |
| QE11810V | Energy Input, £ Million. Manufacture of leather clothes and Manufacture of other wearing apparel and accessories n.e.c., 1810+1824.. NACE 1810, 1824. Source:CSO, Census of Industrial Production.                           |
| QE11821V | Energy Input, £ Million. Manufacture of workwear. NACE 1821. Source:CSO, Census of Industrial Production.  |
| QE11822V | Energy Input, £ Million. Manufacture of other outerwear. NACE 1822. Source:CSO, Census of Industrial Production.   |
| QE11823V | Energy Input, £ Million. Manufacture of underwear. NACE 1823. Source:CSO, Census of Industrial Production.   |
| QE11830V | Energy Input, £ Million. Dressing and dyeing of fur; manufacture of articles of fur. NACE 1830. Source:CSO, Census of Industrial Production.   |
| QE118V   | Energy Input, £ Million. Manufacture of wearing apparel; dressing and dyeing of fur. NACE 18. Source:CSO, Census of Industrial Production.   |
| QE11910V | Energy Input, £ Million. Tanning and dressing of leather. NACE 1910. Source:CSO, Census of Industrial Production.  |
| QE1191XV | Energy Input, £ Million. Tanning and dressing of leather and Manufacture of luggage, handbags and the like, saddlery and harness, 1910+1920. NACE 1910+1920. Source:CSO, Census of Industrial Production.                    |
| QE11920V | Energy Input, £ Million. Manufacture of luggage, handbags and the like, saddlery and harness. NACE 1920. Source:CSO, Census of Industrial Production.  |
| QE11930V | Energy Input, £ Million. Manufacture of footwear. NACE 1930. Source:CSO, Census of Industrial Production.  |
| QE119V   | Energy Input, £ Million. Manufacture of leather and leather products. NACE 19. Source:CSO, Census of Industrial Production.  |
| QE12010V | Energy Input, £ Million. Sawmilling and planing of wood, impregnation of wood , 2010.. NACE 2010. Source:CSO, Census of Industrial Production.   |
| QE12030V | Energy Input, £ Million. Manufacture of builders' carpentry and joinery. NACE 2030. Source:CSO, Census of Industrial Production.   |
| QE12040V | Energy Input, £ Million. Manufacture of wooden containers. NACE 2040. Source:CSO, Census of Industrial Production.   |
| QE12051V | Energy Input, £ Million. Manufacture of other products of wood. NACE 2051. Source:CSO, Census of Industrial Production.  |
| QE120V   | Energy Input, £ Million. Manufacture of wood and wood products. NACE 20. Source:CSO, Census of Industrial Production.  |
| QE12112V | Energy Input, £ Million. Manufacture of paper and paperboard. NACE 2112. Source:CSO, Census of Industrial Production.  |
| QE12121V | Energy Input, £ Million. Manufacture of corrugated paper and paperboard and of containers of paper and paperboard , 2121.. NACE 2121. Source:CSO, Census of Industrial Production.   |

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| QEI2123V | Energy Input, £ Million. Manufacture of paper stationery. NACE 2123. Source:CSO, Census of Industrial Production.   |
| QEI2125V | Energy Input, £ Million. Manufacture of other articles of paper and paperboard n.e.c.. NACE 2125. Source:CSO, Census of Industrial Production.  |
| QEI21T2V | Energy Input, £ Million. Manufacture of pulp, paper and paper products; publishing and printing. NACE 21 - 22. Source:CSO, Census of Industrial Production.   |
| QEI21V   | Energy Input, £ Million. Manufacture of pulp, paper and paper products. NACE 21. Source:CSO, Census of Industrial Production.   |
| QEI221V  | Energy Input, £ Million. Publishing and Printing of newspapers and Printing n.e.c., 221-2222.. NACE 221-2222. Source:CSO, Census of Industrial Production.  |
| QEI2223V | Energy Input, £ Million. Bookbinding and finishing. NACE 2223. Source:CSO, Census of Industrial Production.   |
| QEI2224V | Energy Input, £ Million. Composition and plate-making. NACE 2224. Source:CSO, Census of Industrial Production.  |
| QEI2225V | Energy Input, £ Million. Other activities related to printing. NACE 2225. Source:CSO, Census of Industrial Production.  |
| QEI223V  | Energy Input, £ Million. Reproduction of recorded media. NACE 223. Source:CSO, Census of Industrial Production.   |
| QEI22V   | Energy Input, £ Million. Publishing, printing and reproduction of recorded media. NACE 22. Source:CSO, Census of Industrial Production.   |
| QEI2411V | Energy Input, £ Million. Manufacture of industrial gases, 2411.. NACE 2411. Source:CSO, Census of Industrial Production.  |
| QEI2413V | Energy Input, £ Million. Manufacture of other inorganic basic chemicals. NACE 2413. Source:CSO, Census of Industrial Production.  |
| QEI2414V | Energy Input, £ Million. Manufacture of other organic basic chemicals. NACE 2414. Source:CSO, Census of Industrial Production.  |
| QEI2415V | Energy Input, £ Million. Manufacture of fertilizers and nitrogen compounds. NACE 2415. Source:CSO, Census of Industrial Production.   |
| QEI2416V | Energy Input, £ Million. Manufacture of plastics in primary forms. NACE 2416. Source:CSO, Census of Industrial Production.  |
| QEI241XV | Energy Input, £ Million. Manufacture of industrial gases, Manufacture of dyes and pigments and other basic inorganic chemicals, 2411+2412+2413.. NACE 2411-2413. Source:CSO, Census of Industrial Production.                                   |
| QEI2420V | Energy Input, £ Million. Manufacture of pesticides and other agro-chemical products. NACE 2420. Source:CSO, Census of Industrial Production.  |
| QEI2430V | Energy Input, £ Million. Manufacture of paints, varnishes and similar coatings, printing ink and mastics. NACE 2430. Source:CSO, Census of Industrial Production.   |
| QEI2441V | Energy Input, £ Million. Manufacture of basic pharmaceutical products. NACE 2441. Source:CSO, Census of Industrial Production.  |
| QEI2442V | Energy Input, £ Million. Manufacture of pharmaceutical preparations. NACE 2442. Source:CSO, Census of Industrial Production.  |
| QEI2451V | Energy Input, £ Million. Manufacture of soap and detergents, cleaning and polishing preparations. NACE 2451. Source:CSO, Census of Industrial Production.   |
| QEI2452V | Energy Input, £ Million. Manufacture of perfumes and toilet preparations. NACE 2452. Source:CSO, Census of Industrial Production.   |
| QEI2461V | Energy Input, £ Million. Manufacture of explosives and Manufacture of glues and gelatines and Manufacture of essential oils, 2461 to 2463.. NACE 2461-2463. Source:CSO, Census of Industrial Production.  |
| QEI2470V | Energy Input, £ Million. Manufacture of man-made fibres. NACE 2470. Source:CSO, Census of Industrial Production.  |
| QEI24V   | Energy Input, £ Million. Manufacture of chemicals, chemical products and man-made fibres. NACE 24. Source:CSO, Census of Industrial Production.   |
| QEI251V  | Energy Input, £ Million. Manufacture of rubber products. NACE 251. Source:CSO, Census of Industrial Production.   |
| QEI2521V | Energy Input, £ Million. Manufacture of plastic plates, sheets, tubes and profiles. NACE 2521. Source:CSO, Census of Industrial Production.   |
| QEI2522V | Energy Input, £ Million. Manufacture of plastic packing goods. NACE 2522. Source:CSO, Census of Industrial Production.  |
| QEI2523V | Energy Input, £ Million. Manufacture of builders' ware of plastic. NACE 2523. Source:CSO, Census of Industrial Production.  |
| QEI2524V | Energy Input, £ Million. Manufacture of other plastic products. NACE 2524. Source:CSO, Census of Industrial Production.   |
| QEI25V   | Energy Input, £ Million. Manufacture of rubber and plastic products. NACE 25. Source:CSO, Census of Industrial Production.  |
| QEI2611V | Energy Input, £ Million. Manufacture of flat glass and Shaping and processing of flat glass, 2611+2612.. NACE 2611, 2612. Source:CSO, Census of Industrial Production.  |
| QEI2613V | Energy Input, £ Million. Manufacture of hollow glass and processing of other glass including technical glassware, 2613 and 2615.. NACE 2613, 2615. Source:CSO, Census of Industrial Production.   |
| QEI262V  | Energy Input, £ Million. Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic, 262.. NACE 262. Source:CSO, Census of Industrial Production.                                      |
| QEI2640V | Energy Input, £ Million. Manufacture of bricks, tiles and construction products, in baked clay. NACE 2640. Source:CSO, Census of Industrial Production.   |
| QEI265V  | Energy Input, £ Million. Manufacture of cement, lime and plaster and Manufacture of plaster products for construction purposes and Manufacture of mortars and Manufacture of fibre cement and Manufacture of other articles of concrete, plaste |
| QEI2661V | Energy Input, £ Million. Manufacture of concrete products for construction purposes. NACE 2661. Source:CSO, Census of Industrial Production.  |
| QEI2663V | Energy Input, £ Million. Manufacture of ready-mixed concrete. NACE 2663. Source:CSO, Census of Industrial Production.   |
| QEI2670V | Energy Input, £ Million. Cutting, shaping and finishing of stone. NACE 2670. Source:CSO, Census of Industrial Production.   |
| QEI268V  | Energy Input, £ Million. Manufacture of other non-metallic mineral products. NACE 268. Source:CSO, Census of Industrial Production.   |
| QEI26V   | Energy Input, £ Million. Manufacture of other non-metallic mineral products. NACE 26. Source:CSO, Census of Industrial Production.  |
| QEI274V  | Energy Input, £ Million. Manufacture of basic precious and non-ferrous metals, NACE 274.. NACE 274. Source:CSO, Census of Industrial Production.  |
| QEI27T8V | Energy Input, £ Million. Manufacture of basic metals and fabricated metal products. NACE 27 - 28. Source:CSO, Census of Industrial Production.  |
| QEI27V   | Energy Input, £ Million. Manufacture of basic metals. NACE 27. Source:CSO, Census of Industrial Production.   |
| QEI2811V | Energy Input, £ Million. Manufacture of metal structures and parts of structures. NACE 2811. Source:CSO, Census of Industrial Production.   |
| QEI2812V | Energy Input, £ Million. Manufacture of builders' carpentry and joinery of metal. NACE 2812. Source:CSO, Census of Industrial Production.   |
| QEI2821V | Energy Input, £ Million. Manufacture of tanks, reservoirs and containers of metal. NACE 2821. Source:CSO, Census of Industrial Production.  |
| QEI2822V | Energy Input, £ Million. Manufacture of central heating radiators and boilers and Manufacture of steam generators, except central heating hot water boilers, 2822+2830.. NACE 2822, 2830. Source:CSO, Census of Industrial Production.          |
| QEI2840V | Energy Input, £ Million. Forging, pressing, stamping and roll forming of metal; powder metallurgy, 2840.. NACE 2840. Source:CSO, Census of Industrial Production.   |
| QEI2852V | Energy Input, £ Million. General mechanical engineering. NACE 2852. Source:CSO, Census of Industrial Production.  |
| QEI2861V | Energy Input, £ Million. Manufacture of cutlery and Manufacture of locks and hinges, 2861+2863. NACE 2861, 2863. Source:CSO, Census of Industrial Production.   |
| QEI2862V | Energy Input, £ Million. Manufacture of tools. NACE 2862. Source:CSO, Census of Industrial Production.  |
| QEI2871V | Energy Input, £ Million. Manufacture of steel drums and similar containers. NACE 2871. Source:CSO, Census of Industrial Production.   |

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| QEI2872V | Energy Input, £ Million. Manufacture of light metal packaging. NACE 2872. Source:CSO, Census of Industrial Production.   |
| QEI2873V | Energy Input, £ Million. Manufacture of wire products. NACE 2873. Source:CSO, Census of Industrial Production.   |
| QEI2874V | Energy Input, £ Million. Manufacture of fasteners, screw machine products, chain and springs. NACE 2874. Source:CSO, Census of Industrial Production.  |
| QEI2875V | Energy Input, £ Million. Manufacture of other fabricated metal products, n.e.c.. NACE 2875. Source:CSO, Census of Industrial Production.   |
| QEI28V   | Energy Input, £ Million. Manufacture of fabricated metal products, except machinery and equipment. NACE 28. Source:CSO, Census of Industrial Production.   |
| QEI2911V | Energy Input, £ Million. Manufacture of engines and turbines, except aircraft, vehicle and cycle engines, NACE 2911.. NACE 2911. Source:CSO, Census of Industrial Production.  |
| QEI2913V | Energy Input, £ Million. Manufacture of taps and valves. NACE 2913. Source:CSO, Census of Industrial Production.   |
| QEI2914V | Energy Input, £ Million. Manufacture of bearings, gears, gearing and driving elements. NACE 2914. Source:CSO, Census of Industrial Production.   |
| QEI2921V | Energy Input, £ Million. Manufacture of furnaces and furnace burners, 2921.. NACE 2921. Source:CSO, Census of Industrial Production.   |
| QEI2922V | Energy Input, £ Million. Manufacture of lifting and handling equipment. NACE 2922. Source:CSO, Census of Industrial Production.  |
| QEI2923V | Energy Input, £ Million. Manufacture of non-domestic cooling and ventilation equipment. NACE 2923. Source:CSO, Census of Industrial Production.  |
| QEI293V  | Energy Input, £ Million. Manufacture of agricultural and forestry machinery. NACE 293. Source:CSO, Census of Industrial Production.  |
| QEI2940V | Energy Input, £ Million. Manufacture of machine- tools. NACE 2940. Source:CSO, Census of Industrial Production.  |
| QEI2952V | Energy Input, £ Million. Manufacture of machinery for mining, quarrying and construction. NACE 2952. Source:CSO, Census of Industrial Production.  |
| QEI2953V | Energy Input, £ Million. Manufacture of machinery for food, beverage and tobacco processing. NACE 2953. Source:CSO, Census of Industrial Production.   |
| QEI2954V | Energy Input, £ Million. Manufacture of machinery for textile, apparel and leather production and Manufacture of machinery for paper and paperboard production, 2954+2955.. NACE 2954, 2955. Source:CSO, Census of Industrial Production.        |
| QEI2956V | Energy Input, £ Million. Manufacture of other special purpose machinery n.e.c.. NACE 2956. Source:CSO, Census of Industrial Production.  |
| QEI295XV | Energy Input, £ Million. Manufacture of other special purpose machinery, machinery for mining, quarrying and construction, 2951,2952,2954-2956. NACE 2951+2952+2954+2955+2956. Source:CSO, Census of Industrial Production.                      |
| QEI297V  | Energy Input, £ Million. Manufacture of domestic appliances n.e.c.. NACE 297. Source:CSO, Census of Industrial Production.   |
| QEI29V   | Energy Input, £ Million. Manufacture of machinery and equipment n.e.c.. NACE 29. Source:CSO, Census of Industrial Production.  |
| QEI30T3V | Energy Input, £ Million. Manufacture of electrical and optical equipment. NACE 30 - 33. Source:CSO, Census of Industrial Production.   |
| QEI30V   | Energy Input, £ Million. Manufacture of office machinery and computers. NACE 30. Source:CSO, Census of Industrial Production.  |
| QEI3110V | Energy Input, £ Million. Manufacture of electric motors, generators and transformers. NACE 3110. Source:CSO, Census of Industrial Production.  |
| QEI3120V | Energy Input, £ Million. Manufacture of electricity distribution and control apparatus. NACE 3120. Source:CSO, Census of Industrial Production.  |
| QEI3130V | Energy Input, £ Million. Manufacture of insulated wire and cable. NACE 3130. Source:CSO, Census of Industrial Production.  |
| QEI3140V | Energy Input, £ Million. Manufacture of accumulators, primary cells and primary batteries. NACE 3140. Source:CSO, Census of Industrial Production.   |
| QEI314XV | Energy Input, £ Million. Manufacture of accumulators, primary cells and primary batteries and Manufacture of other electrical equipment n.e.c., 3140+3162. NACE 3140+3162. Source:CSO, Census of Industrial Production.                          |
| QEI3150V | Energy Input, £ Million. Manufacture of lighting equipment and electric lamps. NACE 3150. Source:CSO, Census of Industrial Production.   |
| QEI3161V | Energy Input, £ Million. Manufacture of electrical equipment for engines and vehicles n.e.c.. NACE 3161. Source:CSO, Census of Industrial Production.  |
| QEI3162V | Energy Input, £ Million. Manufacture of other electrical equipment n.e.c.. NACE 3162. Source:CSO, Census of Industrial Production.   |
| QEI31V   | Energy Input, £ Million. Manufacture of electrical machinery and apparatus n.e.c.. NACE 31. Source:CSO, Census of Industrial Production.   |
| QEI3210V | Energy Input, £ Million. Manufacture of electronic valves and tubes and other electronic components. NACE 3210. Source:CSO, Census of Industrial Production.   |
| QEI3220V | Energy Input, £ Million. Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy. NACE 3220. Source:CSO, Census of Industrial Production.  |
| QEI3230V | Energy Input, £ Million. Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods. NACE 3230. Source:CSO, Census of Industrial Production.  |
| QEI32V   | Energy Input, £ Million. Manufacture of radio, television and communication equipment and apparatus. NACE 32. Source:CSO, Census of Industrial Production.   |
| QEI3310V | Energy Input, £ Million. Manufacture of medical and surgical equipment and orthopaedic appliances. NACE 3310. Source:CSO, Census of Industrial Production.   |
| QEI332V  | Energy Input, £ Million. Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except and Manufacture of industrial process control equipment, 332+333.. NACE 332 - 333. Source:CSO, Census |
| QEI334V  | Energy Input, £ Million. Manufacture of optical instruments and photographic equipment and Manufacture of watches and clocks, 334+335.. NACE 334 - 335. Source:CSO, Census of Industrial Production.   |
| QEI33V   | Energy Input, £ Million. Manufacture of medical, precision and optical instruments, watches and clocks. NACE 33. Source:CSO, Census of Industrial Production.  |
| QEI3410V | Energy Input, £ Million. Manufacture of motor vehicles. NACE 3410. Source:CSO, Census of Industrial Production.  |
| QEI3420V | Energy Input, £ Million. Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers. NACE 3420. Source:CSO, Census of Industrial Production.  |
| QEI3430V | Energy Input, £ Million. Manufacture of parts and accessories for motor vehicles and their engines. NACE 3430. Source:CSO, Census of Industrial Production.  |
| QEI34T5V | Energy Input, £ Million. Manufacture of transport equipment. NACE 34 - 35. Source:CSO, Census of Industrial Production.  |
| QEI34V   | Energy Input, £ Million. Manufacture of motor vehicles, trailers and semi-trailers. NACE 34. Source:CSO, Census of Industrial Production.  |
| QEI351V  | Energy Input, £ Million. Building and repairing of ships and boats. NACE 351. Source:CSO, Census of Industrial Production.   |
| QEI3520V | Energy Input, £ Million. Manufacture of railway and tramway locomotives and rolling stock and Manufacture of aircraft and spacecraft, 3520+3530.. NACE 3520, 3530. Source:CSO, Census of Industrial Production.                                  |
| QEI3543V | Energy Input, £ Million. Manufacture of invalid carriages and Manufacture of other transport equipment n.e.c., 3543+3550.. NACE 3543, 3550. Source:CSO, Census of Industrial Production.   |
| QEI35V   | Energy Input, £ Million. Manufacture of other transport equipment. NACE 35. Source:CSO, Census of Industrial Production.   |
| QEI3611V | Energy Input, £ Million. Manufacture of chairs and seats. NACE 3611. Source:CSO, Census of Industrial Production.  |
| QEI3612V | Energy Input, £ Million. Manufacture of other office and shop furniture. NACE 3612. Source:CSO, Census of Industrial Production.   |
| QEI3613V | Energy Input, £ Million. Manufacture of other kitchen furniture. NACE 3613. Source:CSO, Census of Industrial Production.   |
| QEI3614V | Energy Input, £ Million. Manufacture of other furniture. NACE 3614. Source:CSO, Census of Industrial Production.   |
| QEI3615V | Energy Input, £ Million. Manufacture of mattresses. NACE 3615. Source:CSO, Census of Industrial Production.  |

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| QE13622V | Energy Input, £ Million. Manufacture of jewellery and related articles n.e.c. and Manufacture of imitation jewellery, 3622+3661.. NACE 3622, 3661. Source:CSO, Census of Industrial Production.  |
| QE13630V | Energy Input, £ Million. Manufacture of musical instruments. NACE 3630. Source:CSO, Census of Industrial Production.   |
| QE13640V | Energy Input, £ Million. Manufacture of sports goods. NACE 3640. Source:CSO, Census of Industrial Production.  |
| QE1364XV | Energy Input, £ Million. Manufacture of sports goods and games and toys, NACE 3640+3650.. NACE 3640+3650. Source:CSO, Census of Industrial Production.   |
| QE13650V | Energy Input, £ Million. Manufacture of games and toys. NACE 3650. Source:CSO, Census of Industrial Production.  |
| QE13662V | Energy Input, £ Million. Manufacture of brooms and brushes and Other manufacturing n.e.c. and Manufacture of refined petroleum products and recycling, 3662+3663+232+37.. NACE 3662, 3663, 232,37. Source:CSO, Census of Industrial Production |
| QE136T7V | Energy Input, £ Million. Manufacturing n.e.c.. NACE 36 - 37, 23. Source:CSO, Census of Industrial Production.  |
| QE14010V | Energy Input, £ Million. Production and distribution of electricity. NACE 4010. Source:CSO, Census of Industrial Production.   |
| QE14020V | Energy Input, £ Million. Manufacture of gas; distribution of gaseous fuels through mains and Steam and hot water supply, 4020+4030.. NACE 4020, 4030. Source:CSO, Census of Industrial Production.   |
| QE140V   | Energy Input, £ Million. Electricity, gas, steam and hot water supply. NACE 40. Source:CSO, Census of Industrial Production.   |
| QE141V   | Energy Input, £ Million. Collection, purification and distribution of water. NACE 41. Source:CSO, Census of Industrial Production.   |
| QE1IV    | QE1IV = QE1MTV+QE1UV   |

**Table 51.**

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| QE      | Domestic energy production valued using an artificial oil equivalent price, constant prices, £ million.  |
| QEEHQ   | NET HYDROELECTRIC PRODUCTION , CALENDAR YEAR EXCLUDING PUMPED STORAGE , GWH . SOURCE : 1960 / 72 EC ENERGY STATS. ADJ. TO EXCLUDE AUTO PRODUCERS. 1972 - 'ENERGY IN IRELAND' ( DEPT.OF ENERGY, BRENDAN O'LOUGHLIN, ISED DIVISION). |
| QEGQ    | DOMESTIC OUTPUT OF NATURAL GAS USED IN THE ENERGY TRANSFORMATION SECTOR , 000 'S TOE. SOURCE : DIRECT FROM DEPT.OF ENERGY (USED TO BE ALISON MYERS, NOW BRENDAN O'LOUGHLIN, ISED DIVISION).  |
| QEIMCFV | Energy inputs into industry - Clothing and footwear, current prices,£ million.   |
| QEIMCHV | Energy inputs into industry - chemicals, current prices,£ million.   |
| QEIMCLV | Energy inputs into industry - clothing and textiles, current prices,£ million.   |
| QEIMD   | Energy inputs into industry - traditional, constant prices, £ million.   |
| QEIMD1V | Energy inputs into industry - traditional - coal, current prices,£ million.  |
| QEIMD4V | Energy inputs into industry - traditional - oil, current prices,£ million.   |
| QEIMD7V | Energy inputs into industry - traditional - electricity, current prices,£ million.   |
| QEIMD9V | Energy inputs into industry - traditional - turf, current prices,£ million.  |
| QEIMDTV | Energy inputs into industry - drink and tobacco, current prices,£ million.   |
| QEIMDV  | Energy inputs into industry - traditional, current prices,£ million.   |
| QEIMF   | Energy inputs into industry - food processing, constant prices, £ million.   |
| QEIMF1V | Energy inputs into industry - food processing - coal, current prices,£ million.  |
| QEIMF4V | Energy inputs into industry - food processing - oil, current prices,£ million.   |
| QEIMF7V | Energy inputs into industry - food processing - electricity, current prices,£ million.   |
| QEIMF9V | Energy inputs into industry - food processing - turf, current prices,£ million.  |
| QEIMFDV | Energy inputs into industry - food and drink, current prices,£ million.  |
| QEIMFV  | Energy inputs into industry - food processing, current prices,£ million.   |
| QEIMGLV | Energy inputs into industry - cement etc., current prices,£ million.   |
| QEIMH   | Energy inputs into industry - high tech., constant prices, £ million.  |
| QEIMH1V | Energy inputs into industry - high tech. - coal, current prices,£ million.   |
| QEIMH4V | Energy inputs into industry - high tech. - oil, current prices,£ million.  |
| QEIMH7V | Energy inputs into industry - high tech. - electricity, current prices,£ million.  |
| QEIMH9V | Energy inputs into industry - high tech. - turf, current prices,£ million.   |
| QEIMHV  | Energy inputs into industry - high tech., current prices,£ million.  |
| QEIMMMV | Energy inputs into industry - metal and machinery products, current prices,£ million.  |
| QEIMMQV | Energy inputs into industry - mining and quarrying, current prices,£ million.  |
| QEIMOTV | Energy inputs into industry - other manufacturing, current prices,£ million.   |
| QEIMPPV | Energy inputs into industry - paper and printing, current prices,£ million.  |
| QEIMT   | Energy inputs into industry - transportable goods industries, constant prices, £ million.  |
| QEIMT1V | Energy inputs into industry - transportable goods industries - coal, current prices,£ million.   |
| QEIMT4V | Energy inputs into industry - transportable goods industries - oil,current prices,£ million.   |
| QEIMT7V | Energy inputs into industry - transportable goods industries - electricity, current prices,£ million.  |
| QEIMT9V | Energy inputs into industry - transportable goods industries - turf, current prices,£ million.   |
| QEIMTV  | Energy inputs into industry - transportable goods industries, current prices,£ million.  |
| QEIMTXV | Energy inputs into industry - textiles, current prices,£ million.  |
| QEIMV   | Energy inputs into industry - manufacturing, current prices,£ million.   |
| QEIMWDV | Energy inputs into industry - wood and furniture, current prices,£ million.  |

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| QEITV | Energy Inputs. Transportable goods industry, 1 to 3.. NACE Transportable Goods Industries 1 - 3 . Source:CSO, Census of Industrial Production.  |
| QEIUU | Energy inputs into industry - utilities, current prices,£ million.  |
| QETBQ | PRODUCTION OF TURF BRIQUETTES. MILLION TONNES. SOURCE : CENSUS OF INDUSTRIAL PRODUCTION - BORD NA MONA ANNUAL REPORTS   |
| QETFQ | OUTPUT OF TURF BY FARMERS , MILLION TONNES. SOURCE : ISB ( IRISH STATISTICAL BULLETIN , HENRY O'MARA ) OR CENSUS OF AGRICULTURAL PRODUCTION ( TABLE 1 )   |
| QETMQ | PRODUCTION OF MILLED PEAT. MILLION TONNES. SOURCE : CENSUS OF INDUSTRIAL PRODUCTION - BORD NA MONA REPORTS. NOTE : IN THE BORD NA MONA REPORT THE MILLED PEAT DELIVERED TO BORD NA MONA FACTORIES IS DEDUCTED FROM THE PRODUCTION OF MILLED |
| QETSQ | PRODUCTION OF SOD TURF. MILLION TONNES. SOURCE : CENSUS OF INDUSTRIAL PRODUCTION . NOW BORD NA MONA ANNUAL REPORT AND FINANCIAL STATEMENTS.   |

**Table 71.**

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|--------------------|--|
| ENVCO2_EN_GG       | Greenhouse gas emissions, CO2, Gigagrams, from energy, totalSource: EPA  |
| ENVCO2_ENIU_GG     | Greenhouse gas emissions, CO2, Gigagrams, from energy consumption in energy industriesSource: EPA                                |
| ENVCO2_ENIMT_GG    | Greenhouse gas emissions, CO2, Gigagrams, from energy consumption in manufacturing and buildingSource: EPA                       |
| ENVCO2_ENSMT_GG    | Greenhouse gas emissions, CO2, Gigagrams, from energy consumption by transportSource: EPA  |
| ENVCO2_ENSMO_GG    | Greenhouse gas emissions, CO2, Gigagrams, from energy consumption by other sectorsSource: EPA                                    |
| ENVCO2_INT_GG      | Greenhouse gas emissions, CO2, Gigagrams, from industrial processes, totalSource: EPA  |
| ENVCO2_INMIN_GG    | Greenhouse gas emissions, CO2, Gigagrams, from industrial processes, mineral productsSource: EPA                                 |
| ENVCO2_INCH_GG     | Greenhouse gas emissions, CO2, Gigagrams, from industrial processes, chemical industriesSource: EPA                              |
| ENVCO2_SOLV_GG     | Greenhouse gas emissions, CO2, Gigagrams, from solvent and other product useSource: EPA  |
| ENVCO2_LUF_GG      | Greenhouse gas emissions, CO2, Gigagrams, from land use change and forestry, netSource: EPA                                      |
| ENVCO2_F_GG        | Greenhouse gas emissions, CO2, Gigagrams, from forestry, netSource: EPA  |
| ENVCO2_SOIL_GG     | Greenhouse gas emissions, CO2, Gigagrams, from soil, netSource: EPA  |
| ENVCO2_TOTALADJ_GG | Greenhouse gas emissions, CO2, Gigagrams, Greenhouse gas emissions, CO2, Gigagrams,  |
| ENVCO2_TOTAL_GG    | Greenhouse gas emissions, CO2, Gigagrams,  |
| ENVCO2_BUNKT_GG    | Greenhouse gas emissions, CO2, Gigagrams, Greenhouse gas emissions, CO2, Gigagrams, Greenhouse gas emissions, CO2, Gigagrams,    |
| ENVCO2_BUNKAIR_GG  | Greenhouse gas emissions, CO2, Gigagrams, Greenhouse gas emissions, CO2, Gigagrams,  |
| ENVCO2_BUNKSEA_GG  | Greenhouse gas emissions, CO2, Gigagrams, Greenhouse gas emissions, CO2, Gigagrams,  |
| ENVCO2_BIOMASS_GG  | Greenhouse gas emissions, CO2, Gigagrams,  |
| ENVCH4_TOTAL_GG    | Greenhouse gas emissions, CH4, Gigagrams, TotalSource: EPA   |
| ENVCH4_ENERGY_GG   | Greenhouse gas emissions, CH4, Gigagrams, total from energySource: EPA   |
| ENVCH4_FCT_GG      | Greenhouse gas emissions, CH4, Gigagrams, total from fuel combustionSource: EPA  |
| ENVCH4_FCIM_GG     | Greenhouse gas emissions, CH4, Gigagrams, from fuel combustion, manufacturing and buildingSource: EPA                            |
| ENVCH4_FCSMT_GG    | Greenhouse gas emissions, CH4, Gigagrams, from fuel combustion, transportSource: EPA   |
| ENVCH4_FCSO_GG     | Greenhouse gas emissions, CH4, Gigagrams, from fuel combustion, other sectorsSource: EPA   |
| ENVCH4_FET_GG      | Greenhouse gas emissions, CH4, Gigagrams, fugitive emissions from fuelsSource: EPA   |
| ENVCH4_FEO_GG      | Greenhouse gas emissions, CH4, Gigagrams, fugitive emissions from fuels, oial and natural gasSource: EPA                         |
| ENVCH4_AGT_GG      | Greenhouse gas emissions, CH4, Gigagrams, total agricultureSource: EPA   |
| ENVCH4_AGENT_GG    | Greenhouse gas emissions, CH4, Gigagrams, agriculture, enteric fermentationSource: EPA   |
| ENVCH4_AGMAN_GG    | Greenhouse gas emissions, CH4, Gigagrams, agriculture, manure managementSource: EPA  |
| ENVCH4_WASTE_GG    | Greenhouse gas emissions, CH4, Gigagrams, wasteSource: EPA   |
| ENVN2O_TOTAL_GG    | Greenhouse gas emissions, N2O, Gigagrams, TotalSource: EPA   |
| ENVN2O_ENERGY_GG   | Greenhouse gas emissions, N2O, Gigagrams, total from energySource: EPA   |
| ENVN2O_FCT_GG      | Greenhouse gas emissions, N2O, Gigagrams, total from fuel combustion, energy industriesSource: EPA                               |
| ENVN2O_FCT_GG      | Greenhouse gas emissions, N2O, Gigagrams, total from fuel combustion, energy industriesSource: EPA                               |
| ENVN2O_FCIM_GG     | Greenhouse gas emissions, N2O, Gigagrams, from fuel combustion, manufacturing and buildingSource: EPA                            |
| ENVN2O_FCSMT_GG    | Greenhouse gas emissions, N2O, Gigagrams, from fuel combustion, transportSource: EPA   |
| ENVN2O_FCSO_GG     | Greenhouse gas emissions, N2O, Gigagrams, from fuel combustion, other sectorsSource: EPA   |
| ENVN2O_INT_GG      | Greenhouse gas emissions, N2O, Gigagrams, from industrial processes, totalSource: EPA  |
| ENVN2O_INCH_GG     | Greenhouse gas emissions, N2O, Gigagrams, from industrial processes, chemical industriesSource: EPA                              |
| ENVN2O_AGT_GG      | Greenhouse gas emissions, N2O, Gigagrams, total agricultureSource: EPA   |
| ENVN2O_AGMAN_GG    | Greenhouse gas emissions, N2O, Gigagrams, agriculture, manure managementSource: EPA  |
| ENVN2O_AGSOIL_GG   | Greenhouse gas emissions, N2O, Gigagrams, agriculture, soilsSource: EPA  |
| ENVGHG_CO2ADJ_GG   | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total CO2 emissions including removals by land use and forestrySource: EPA |
| ENVGHG_CO2_GG      | Greenhouse gas emissions, CO2, Gigagrams, total CO2 emissions excluding land use and forestrySource: EPA                         |
| ENVGHG_CH4_GG      | Greenhouse gas emissions, CO2, Gigagrams, total CH4 emissions excluding land use and forestrySource: EPA                         |
| ENVGHG_N2O_GG      | Greenhouse gas emissions, CO2, Gigagrams, total N2O emissions excluding land use and forestrySource: EPA                         |

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|--------------------|---|
| ENVGHG_TOTALADJ_GG | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total all greenhouse gas emissions including removals by land use and forestrySource: EPA |
| ENVGHG_TOTAL_GG    | Greenhouse gas emissions, CO2, Gigagrams, total all greenhouse gas emissions excluding land use and forestrySource: EPA                         |
| ENVGHG_ENERGY_GG   | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total from energy sectorSource: EPA   |
| ENVGHG_IND_GG      | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total from Industrial processesSource: EPA  |
| ENVGHG_SOL_GG      | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total from solvent and other product useSource: EPA                                       |
| ENVGHG_AG_GG       | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total from agricultureSource: EPA   |
| ENVGHG_LUCF_GG     | Greenhouse gas emissions, Gigagrams (CO2 equivalent), net total from land use change and forestrySource: EPA                                    |
| ENVGHG_WASTE_GG    | Greenhouse gas emissions, Gigagrams (CO2 equivalent), total from wasteSource: EPA   |

**Table 80.**

|           |  |
|-----------|--|
| ENGY01_NC | Consumption of energy by sector, Coal£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY02_NC | Consumption of energy by sector, Oil refining NACE 14.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY03_NC | Consumption of energy by sector, Production of electricity, NACE 161.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY04_NC | Consumption of energy by sector, Production of gas, NACE 162.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY05_NC | Consumption of energy by sector, Water supply, NACE 17.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY06_NC | Consumption of energy by sector, Extraction of non-ferrous metal ores, NACE 21.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY07_NC | Consumption of energy by sector, Production of iron and steel, NACE 221-223.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY08_NC | Consumption of energy by sector, Production, non-ferrous metals, NACE 224.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY09_NC | Consumption of energy by sector, Extraction of non-metallic minerals, NACE 23.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY10_NC | Consumption of energy by sector, Manufacture of non-metallic mineral products excluding glass and ceramic goods, NACE 241-246.£. Source: Census of Industrial Production, NACE70 classification. |
| ENGY11_NC | Consumption of energy by sector, Manufacture of glass and glassware, NACE 11.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY12_NC | Consumption of energy by sector, Manufacture of ceramic goods, NACE 248.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY13_NC | Consumption of energy by sector, Manufacture of basic industrial chemicals, NACE 251.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY14_NC | Consumption of energy by sector, Manufacture of paints varnishes and printing inks, NACE 255.£. Source: Census of Industrial Production, NACE70 classification.                                  |
| ENGY15_NC | Consumption of energy by sector, Manufacture of pharmaceuticals and chemical products, NACE 256-257.£. Source: Census of Industrial Production, NACE70 classification.                           |
| ENGY16_NC | Consumption of energy by sector, Manufacture of soap, perfume and toilet preparations, NACE 258.£. Source: Census of Industrial Production, NACE70 classification.                               |
| ENGY17_NC | Consumption of energy by sector, Manufacture of other chemical products (including man-made fibres), NACE 259-260.£. Source: Census of Industrial Production, NACE70 classification.             |
| ENGY18_NC | Consumption of energy by sector, Foundries, NACE 311.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY19_NC | Consumption of energy by sector, Forging, pressing and stamping of metals, NACE 312.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY20_NC | Consumption of energy by sector, Secondary transformation, treatment and coating of metals, NACE 313.£. Source: Census of Industrial Production, NACE70 classification.                          |
| ENGY21_NC | Consumption of energy by sector, Manufacture of structural metal products, NACE 314.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY22_NC | Consumption of energy by sector, Boilermaking, manufacture of tanks etc., NACE 315.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY23_NC | Consumption of energy by sector, Manufacture of finished metal articles, NACE 316-319.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY24_NC | Consumption of energy by sector, Mechanical engineering, NACE 32.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY25_NC | Consumption of energy by sector, Office and data-processing machinery, NACE 33.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY26_NC | Consumption of energy by sector, Manufacture of insulated wires and cables, NACE 341.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY27_NC | Consumption of energy by sector, Manufacture of electrical machinery, NACE 342,347,348.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY28_NC | Consumption of energy by sector, Manufacture of electrical apparatus for industrial use, NACE 343.£. Source: Census of Industrial Production, NACE70 classification.                             |
| ENGY29_NC | Consumption of energy by sector, Manufacture of equipment for telecommunications, NACE 344.£. Source: Census of Industrial Production, NACE70 classification.                                    |
| ENGY30_NC | Consumption of energy by sector, Radio and TV receiving sets, NACE 345.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY31_NC | Consumption of energy by sector, Domestic electrical appliances, NACE 346.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY32_NC | Consumption of energy by sector, Manufacture and assembly of motor vehicles< NACE 35.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY33_NC | Consumption of energy by sector, Shipbuilding, NACE 361.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY34_NC | Consumption of energy by sector, Manufacture of railway rolling stock, NACE 362.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY35_NC | Consumption of energy by sector, Manufacture of cycles, motor cycles, aerospace equipment, NACE 363-365.£. Source: Census of Industrial Production, NACE70 classification.                       |
| ENGY36_NC | Consumption of energy by sector, Instrument Engineering, NACE 37.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY37_NC | Consumption of energy by sector, Margarine and other fats, NACE 411.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY38_NC | Consumption of energy by sector, Slaughtering and preserving meat, NACE 412.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY39_NC | Consumption of energy by sector, Manufacture of dairy products, NACE 413.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY40_NC | Consumption of energy by sector, Processing of fruit and vegetables, NACE 414.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY41_NC | Consumption of energy by sector, Processing of fish, NACE 415.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY42_NC | Consumption of energy by sector, Grain Milling, NACE 416.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY43_NC | Consumption of energy by sector, Miscellaneous foodstuffs, NACE 417, 418, 423.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY44_NC | Consumption of energy by sector, Bread, Biscuit, NACE 419.£. Source: Census of Industrial Production, NACE70 classification.   |



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| ENGY45_NC | Consumption of energy by sector, Sugar, NACE 420.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY46_NC | Consumption of energy by sector, Cocoa, chocolate and sugar confectionery, NACE 421.£. Source: Census of Industrial Production, NACE70 classification.                           |
| ENGY47_NC | Consumption of energy by sector, Manufacture of animal and poultry foods, NACE 422.£. Source: Census of Industrial Production, NACE70 classification.                            |
| ENGY48_NC | Consumption of energy by sector, Spirit distilling, NACE 424.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY49_NC | Consumption of energy by sector, Wine, cider and soft drinks, NACE 425, 426, 428.£. Source: Census of Industrial Production, NACE70 classification.                              |
| ENGY50_NC | Consumption of energy by sector, Brewing and malting, NACE 427.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY51_NC | Consumption of energy by sector, Tobacco, NACE 429.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY52_NC | Consumption of energy by sector, Wool, NACE 431.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY53_NC | Consumption of energy by sector, Cotton, NACE 432.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY54_NC | Consumption of energy by sector, Silk, flax and jute, NACE 433-435.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY55_NC | Consumption of energy by sector, Knitting, NACE 436.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY56_NC | Consumption of energy by sector, Textile finishing, NACE 437, 439.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY57_NC | Consumption of energy by sector, Carpets and floor coverings, NACE 438.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY58_NC | Consumption of energy by sector, Tanning, NACE 441.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY59_NC | Consumption of energy by sector, Leather products, NACE 442.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY60_NC | Consumption of energy by sector, Footwear, NACE 451.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY61_NC | Consumption of energy by sector, Ready-made clothing, NACE 453-454.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY62_NC | Consumption of energy by sector, Household and other textile goods, NACE 455.£. Source: Census of Industrial Production, NACE70 classification.                                  |
| ENGY63_NC | Consumption of energy by sector, Furs and fur goods, NACE 456.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY64_NC | Consumption of energy by sector, Sawing and processing of wood, NACE 461, 462.£. Source: Census of Industrial Production, NACE70 classification.                                 |
| ENGY65_NC | Consumption of energy by sector, Manufacture of carpentry and joinery components, NACE 463.£. Source: Census of Industrial Production, NACE70 classification.                    |
| ENGY66_NC | Consumption of energy by sector, Manufacture of wooden containers and other wooden manufacture, NACE 464, 465.£. Source: Census of Industrial Production, NACE70 classification. |
| ENGY67_NC | Consumption of energy by sector, Articles of cork, straw etc. and brushes, NACE 466.£. Source: Census of Industrial Production, NACE70 classification.                           |
| ENGY68_NC | Consumption of energy by sector, Wooden furniture, NACE 467.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY69_NC | Consumption of energy by sector, Pulp, paper and board, NACE 471.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY70_NC | Consumption of energy by sector, Processing of paper and board, NACE 472.£. Source: Census of Industrial Production, NACE70 classification.                                      |
| ENGY71_NC | Consumption of energy by sector, Printing, publishing and allied industries, NACE 473, 474.£. Source: Census of Industrial Production, NACE70 classification.                    |
| ENGY72_NC | Consumption of energy by sector, Rubber products, NACE 481, 482.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY73_NC | Consumption of energy by sector, Plastics, NACE 483.£. Source: Census of Industrial Production, NACE70 classification.   |
| ENGY74_NC | Consumption of energy by sector, Jewellery, NACE 491.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY75_NC | Consumption of energy by sector, Toys and sports goods, NACE 494.£. Source: Census of Industrial Production, NACE70 classification.  |
| ENGY76_NC | Consumption of energy by sector, Miscellaneous manufacturing, NACE 492, 493, 495.£. Source: Census of Industrial Production, NACE70 classification.                              |
| ENGY01_OC | Consumption of energy by sector, Coal£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY02_OC | Consumption of energy by sector, Stone, slate, sand and gravel.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY03_OC | Consumption of energy by sector, Miscellaneous.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY04_OC | Consumption of energy by sector, Bacon factories.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY05_OC | Consumption of energy by sector, Slaughtering and meat.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY06_OC | Consumption of energy by sector, Creamery butter£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY07_OC | Consumption of energy by sector, Fruit and vegetables.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY08_OC | Consumption of energy by sector, Grain milling.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY09_OC | Consumption of energy by sector, Bread, biscuit etc.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY10_OC | Consumption of energy by sector, Sugar.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY11_OC | Consumption of energy by sector, Cocoa, chocolate etc.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY12_OC | Consumption of energy by sector, Margarine£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY13_OC | Consumption of energy by sector, Miscellaneous foods.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY14_OC | Consumption of energy by sector, Distilling£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY15_OC | Consumption of energy by sector, Malting£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY16_OC | Consumption of energy by sector, Brewing.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY17_OC | Consumption of energy by sector, Aerated mineral waters.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY18_OC | Consumption of energy by sector, Tobacco.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY19_OC | Consumption of energy by sector, Woollen and worsted.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY20_OC | Consumption of energy by sector, Linen and cotton spinning, weaving and manufactures.£. Source: Census of Industrial Production, ISIC classification.                            |
| ENGY21_OC | Consumption of energy by sector, Jute, canvas, rayon, nylon etc.£. Source: Census of Industrial Production, ISIC classification.   |

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| ENGY22_OC | Consumption of energy by sector, Hosiery£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY23_OC | Consumption of energy by sector, Boot and shoe£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY24_OC | Consumption of energy by sector, Mens' and boys' clothing£. Source: Census of Industrial Production, ISIC classification.                                 |
| ENGY25_OC | Consumption of energy by sector, Shirtmaking£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY26_OC | Consumption of energy by sector, Women's' and girls' clothing£. Source: Census of Industrial Production, ISIC classification.                             |
| ENGY27_OC | Consumption of energy by sector, Miscellaneous clothing£. Source: Census of Industrial Production, ISIC classification.                                   |
| ENGY28_OC | Consumption of energy by sector, Manufacture of made up textile goods.£. Source: Census of Industrial Production, ISIC classification.                    |
| ENGY29_OC | Consumption of energy by sector, Manufactures of wood and cork.£. Source: Census of Industrial Production, ISIC classification.                           |
| ENGY30_OC | Consumption of energy by sector, Furniture.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY31_OC | Consumption of energy by sector, Paper and paper products.£. Source: Census of Industrial Production, ISIC classification.                                |
| ENGY32_OC | Consumption of energy by sector, Printing and publishing.£. Source: Census of Industrial Production, ISIC classification.                                 |
| ENGY33_OC | Consumption of energy by sector, Fellmongery, tanning.£. Source: Census of Industrial Production, ISIC classification.                                    |
| ENGY34_OC | Consumption of energy by sector, Leather£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY35_OC | Consumption of energy by sector, Fertilisers.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY36_OC | Consumption of energy by sector, Oils, paints, inks.£. Source: Census of Industrial Production, ISIC classification.                                      |
| ENGY37_OC | Consumption of energy by sector, Chemicals and drugs.£. Source: Census of Industrial Production, ISIC classification.                                     |
| ENGY38_OC | Consumption of energy by sector, Soap, detergents£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY39_OC | Consumption of energy by sector, Glass and glassware, pottery etc.£. Source: Census of Industrial Production, ISIC classification.                        |
| ENGY40_OC | Consumption of energy by sector, Structural clay products etc.£. Source: Census of Industrial Production, ISIC classification.                            |
| ENGY41_OC | Consumption of energy by sector, metal trades.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY42_OC | Consumption of energy by sector, Manufacture and assembly of machinery except electrical.£. Source: Census of Industrial Production, ISIC classification. |
| ENGY43_OC | Consumption of energy by sector, Electrical machinery.£. Source: Census of Industrial Production, ISIC classification.                                    |
| ENGY44_OC | Consumption of energy by sector, Ship and boat building.£. Source: Census of Industrial Production, ISIC classification.                                  |
| ENGY45_OC | Consumption of energy by sector, Railroad equipment.£. Source: Census of Industrial Production, ISIC classification.                                      |
| ENGY46_OC | Consumption of energy by sector, Assembly, construction etc. of road vehicles.£. Source: Census of Industrial Production, ISIC classification.            |
| ENGY47_OC | Consumption of energy by sector, Assembly construction etc. of other road vehicles.£. Source: Census of Industrial Production, ISIC classification.       |
| ENGY48_OC | Consumption of energy by sector, miscellaneous manufacturing.£. Source: Census of Industrial Production, ISIC classification.                             |
| ENGY49_OC | Consumption of energy by sector, Building and construction.£. Source: Census of Industrial Production, ISIC classification.                               |
| ENGY50_OC | Consumption of energy by sector, Local authorities and Govt. Departments.£. Source: Census of Industrial Production, ISIC classification.                 |
| ENGY51_OC | Consumption of energy by sector, Canals, docks etc.£. Source: Census of Industrial Production, ISIC classification.                                       |
| ENGY52_OC | Consumption of energy by sector, Railways.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY53_OC | Consumption of energy by sector, Electricity£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY54_OC | Consumption of energy by sector, Gas works.£. Source: Census of Industrial Production, ISIC classification.   |
| ENGY55_OC | Consumption of energy by sector, Waterworks.£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY56_OC | Consumption of energy by sector, Laundry£. Source: Census of Industrial Production, ISIC classification.  |
| ENGY57_OC | Consumption of energy by sector, Turf production.£. Source: Census of Industrial Production, ISIC classification.   |

## 2. Discharges to Water and Use of Water Services

This section assembles the information on discharges to water and on use of water services, with the aim of linking data on quantities to their associated economic activities. A second aim is to establish the costs and revenues arising from water services. While there are no environmental taxes, strictly defined, applying to water services in Ireland, the under-recovery of costs could be viewed as a benefit-in-kind or as a form of negative environmental tax, as discussed in the Preface.

The information on water assembled here is somewhat exploratory and has been gathered by approaching several sources. Some of these sources are found to be considerably under-exploited at present. Some have the potential for being developed further and to become core sources of data in the future, with some minor alterations to procedure in certain areas. The sources are nevertheless difficult to use as they stand because the data were recorded with different purposes in mind.

The various sets of information in this section could be presented in several different ways. It would be desirable to report, separately, all information relating to discharges followed by all information relating to water supply. However, owing to the preliminary nature of this analysis and to the need for full explanation of data sources and approach, the presentation of information here will be made on the basis of the *sources of data*, in the following order.

First, information on physical **discharges to water** is investigated, availing of the EPA's data base mainly. Secondly, we present data on Public Water Services collected by the CSO in the process of assembling information on the **National Accounts**. This information covers the two activities, Public Water Supply and Waste Water Services. Combining it with, albeit hypothetical, information on quantities it will be possible to estimate highly provisional figures on subsidies per unit. Thirdly, the information collected in the course of conducting the **Census of Industrial Production** will be presented and assessed. The data discussed up to this point have been national. Fourthly and finally the results of a survey of individual water authorities are presented. The survey was undertaken especially for this project. The response rate was poor and only the results covering the **Greater Dublin area** are presented here, which comprises about a third of the state. In view of the requirement in the Water Framework Directive for EU member states to use the river basin as the unit of administration and analysis, the survey should enable one to assess the feasibility at present of recording essential economic data on a river basin basis.

### ***2.1 Discharges to water***

The EPA has assembled a detailed database of discharges of BOD, Nitrogen and Phosphorus (Cunningham, 2000). The database is constructed from information derived from various sources,

including information on agricultural activity, population size and the like as well as, in particular, information contained in the licenses issued to industrial enterprises. This database has already been used during the recent construction of *Satellite Environmental Accounts for Ireland 1996* (Eurostat 2000). It undergoes regular updates and forms part of the EPA's submission to the OSPAR Convention (Oslo and Paris conventions for the prevention of marine pollution) (EPA,1999).The database compilation follows the draft OSPAR guidelines for Harmonised Quantification and Reporting, also called HARP (OSPAR Commission, 1999).

Availing of this database represents an entirely different approach from that employed in the construction of the initial *Pilot Environmental Accounts* (CSO 1999), which related to 1994 and were assembled before the EPA's database had become sufficiently developed. In the pilot study a variety of means had been explored, and the experimental nature was emphasised with the reminder that the results were heavily dependent on the assumptions made. For example, in estimating diffuse losses of P from agriculture, forestry and erosion to water, a figure had been used that was the difference between (1) the measured P input from rivers into the sea and (2) P discharges at point sources (from industry mainly). The resulting figure for total P discharged to water consisted of a large range of between 7,580 and 9,690 tonnes. This compares with the more recent estimate of 8,911 tonnes, which falls within the range and indicates a reasonable degree of consistency between the two methods. For BOD, totals are comparable although the components differ. For N the recent estimate of losses to water from agriculture are considerably lower owing to the fact that the use of fertilisers in arable farming are omitted from the picture by the EPA in this dataset at present. Another benefit to be derived from use of the EPA's database on discharges is the level of sectoral detail given, which is based on the EPA's own coding system, listed in Appendix 2.1.

A few explanations of the EPA's method of recording the data are in order, though for a detailed description readers are referred to EPA 1999. The figures on industrial discharges are estimates, based on the license consents. It is found that companies tend to release about 25 per cent of their consent limit and this is the figure that is applied to the consent levels to give estimated discharges in the database. Licenses come under two headings, namely, the recent Integrated Pollution Control (IPC) licensing operated by the EPA and, secondly, the licensing by local authorities under the Water Pollution Legislation (called Non-IPC or WPL).

Information presented here refers to discharges generated and discharges that are lost to waters (or loads to waters). The amount *generated* is of interest because, with a given technology, this amount relates to the level of economic activity. The amount *lost to waters* is of interest because it tells us what are the loads going to the environment, given the extent and level of treatment. The actual figures are compiled as follows. Figures for generation are the sum of the amounts discharged directly to waters (that is, with no treatment subsequent to leaving the firm's premises) plus the amounts discharged to sewers (which will be subject to treatment in many cases). Figures for loss to waters are the sum of direct discharges to water plus the resulting amounts discharged to waters after treatment of that going

to sewers. Consequently the 'unsewered industry's' figures for generation and for loads to waters will be the same.

The following three tables, 2.1.1, 2.1.2 and 2.1.3, give the overall situation with respect to discharges of BOD, N and P broken down by broad economic activity. As mentioned, the figures for agriculture do not include the amounts arising from fertilisers used in arable farming. A major category is 'Urban residential including commercial' and ideally commercial would be separated out from residential. Another important sub classification, entered for interest, is 'urban waste water', which consists of all sewerage discharges, comprising contributions from sewerage industry and from so-called urban residential and commercial establishments. 'Urban' means sewerage. Rural households are unsewered and their contributions are estimates. The columns in the tables give the amounts generated and the loads that are lost to waters. The latter is further broken down into loads going to inland and to marine waters.

In relation to the magnitudes, it is worth noting that the figures for agriculture are very large. It is however the concentration rather than the amount of discharge that matters where damage to water quality, or pollution, is concerned. Therefore, in certain circumstances a small concentrated amount from a point-source, such as from 'urban waste water' may have more significance than larger but diffuse amounts emanating from agriculture.

**Table 2.1.1: Estimated BOD generated and lost to waters, inland and marine, by economic activity (thousand tonnes per year, 1998/99)**

| BOD                                      | Totals           |                 | of which:              |                        |
|--|------------------|-----------------|------------------------|------------------------|
|  | Generated        | Loads to waters | Loads to inland waters | Loads to marine waters |
| Agriculture <sup>1</sup>                 | 2046.000         | Unknown         |                        |                        |
| Forestry and Peatlands                   | Unknown          | Unknown         |                        |                        |
| Freshwater Aquaculture                   | 0.791            | 0.791           | 0.760                  | 0.031                  |
| Marine Aquaculture                       | 4.422            | 4.422           | 0.000                  | 4.422                  |
| <b>Total industry:</b>                   | <b>11.796</b>    | <b>9.664</b>    |                        |                        |
| Unsewered <sup>2</sup> Industry          | 2.784            | 2.784           | 1.914                  | 0.870                  |
| of which: Non-IPC                        | 1.054            | 1.054           |                        |                        |
| IPC                                      | 1.730            | 1.730           |                        |                        |
| Sewered <sup>2</sup> Industry            | 9.0116           | 6.880           |                        |                        |
| of which: Non-IPC                        | 4.341            | 3.253           |                        |                        |
| IPC                                      | 4.671            | 3.627           |                        |                        |
| Urban Residential incl. Commercial       | 54.888           | 40.958          |                        |                        |
| Subtotal: Urban Waste Water <sup>3</sup> | 63.900           | 47.838          | 7.277                  | 40.561                 |
| Rural Households                         | 28.600           | 1.429           | 1.214                  | 0.214                  |
| <b>TOTAL accounted for<sup>4</sup></b>   | <b>102.543 +</b> | <b>57.264 +</b> | <b>11.166 +</b>        | <b>46.098 +</b>        |
| Background Runoff                        | Unknown          | Unknown         |                        |                        |

*Notes:*

1. Agricultural BOD generated refers to animal waste and silage only. Source: table 5.1 of Cunningham (2000).
2. Unsewered means that discharges are made directly to water, sewerage means that discharges are dealt with by the public supply system.
3. Urban waste water consists of the contributions from sewerage industry and Urban Residential incl. Commercial.  
"Urban" means sewerage. The figure for the amount generated is taken from p. 43 of the Millennium Report (EPA, 2000).
4. The total refers to BOD emanating from economic activity and excludes background runoff, unknown discharges and loads from agriculture etc.

**Table 2.1.2: Estimated N generated and lost to waters, inland and marine, by economic activity (thousand tonnes per year, 1998/99)**

| Nitrogen                                 | Totals    |                 | of which: Loads inland waters | Loads to marine waters |
|--|-----------|-----------------|-------------------------------|------------------------|
|  | Generated | Loads to waters |                               |                        |
| Agriculture <sup>1</sup>                 | 597       | 102.996         | 89.899                        | 13.096                 |
| Forestry and Peatlands                   |           | 2.606           | 2.301                         | 0.305                  |
| Freshwater Aquaculture                   | 0.116     | 0.116           | 0.089                         | 0.026                  |
| Marine Aquaculture                       | 1.609     | 1.609           | 0.000                         | 1.609                  |
| Total industry:                          | 4.015     | 3.616           |                               |                        |
| Unsewered <sup>2</sup> Industry          | 1.133     | 1.133           | 0.858                         | 0.275                  |
| of which: Non-IPC                        | 0.404     | 0.404           |                               |                        |
| IPC                                      | 0.730     | 0.730           |                               |                        |
| Sewered <sup>2</sup> Industry            | 2.882     | 2.483           |                               |                        |
| of which: Non-IPC                        | 1.561     | 1.384           |                               |                        |
| IPC                                      | 1.321     | 1.099           |                               |                        |
| Urban Residential incl. Commercial       |           | 7.255           |                               |                        |
| Subtotal: Urban Waste Water <sup>3</sup> |           | 9.738           | 2.209                         | 7.528                  |
| Rural Households                         |           | 2.980           | 2.533                         | 0.447                  |
| <b>TOTAL accounted for <sup>4</sup></b>  |           | <b>121.178</b>  | <b>97.889</b>                 | <b>23.286</b>          |
| Background Runoff                        |           | 5.364           | 4.441                         | 0.922                  |

*Notes:*

1. Agricultural N refers to animal waste and silage and does not adequately cover fertiliser use in arable farming.
2. Unsewered means that discharges are made directly to water, sewerage means that discharges are dealt with by the public supply system.
3. Urban waste water consists of the contributions from sewerage industry and Urban Residential incl. Commercial.  
"Urban" means sewerage. The figure for the amount generated is taken from p. 43 of the Millennium Report (EPA, 2000).
4. The TOTAL refers to N emanating from economic activity and excludes background runoff, unknown discharges including unknown loads from agriculture etc.

**Table 2.1.3: Estimated P generated and lost to waters, inland and marine, by economic activity (thousand tonnes per year, 1998/99)**

| Phosphorus                               | Totals    |                 | of which: Loads<br>inland waters | Loads<br>to marine waters |
|--|-----------|-----------------|----------------------------------|---------------------------|
|  | Generated | Loads to waters |                                  |                           |
| Agriculture <sup>1</sup>                 | 96.000    | 4.590           | 4.075                            | 0.516                     |
| Forestry and Peatlands                   |           | 0.217           | 0.192                            | 0.025                     |
| Freshwater Aquaculture                   | 0.074     | 0.074           | 0.066                            | 0.008                     |
| Marine Aquaculture                       | 0.253     | 0.253           | 0.000                            | 0.253                     |
| Total industry:                          | 1.116     | 1.021           |                                  |                           |
| Unsewered <sup>2</sup> Industry          | 0.406     | 0.406           | 0.171                            | 0.235                     |
| of which: Non-IPC                        | 0.109     | 0.109           |                                  |                           |
| IPC                                      | 0.297     | 0.297           |                                  |                           |
| Sewered <sup>2</sup> Industry            | 0.710     | 0.615           |                                  |                           |
| of which: Non-IPC                        | 0.381     | 0.340           |                                  |                           |
| IPC                                      | 0.329     | 0.275           |                                  |                           |
| Urban Residential incl. Commercial       |           | 2.088           |                                  |                           |
| Subtotal: Urban Waste Water <sup>3</sup> |           | 2.703           | 0.574                            | 2.129                     |
| Rural Households                         |           | 0.310           | 0.264                            | 0.047                     |
| <b>TOTAL accounted for<sup>4</sup></b>   |           | <b>8.553</b>    |                                  |                           |
| Background Runoff                        |           | 0.358           | 0.296                            | 0.061                     |

*Notes:*

1. Agricultural P generated refers to animal waste and silage only.
2. Unsewered means that discharges are made directly to water, sewerage means that discharges are dealt with by the public supply system.
3. Urban waste water consists of the contributions from sewerage industry and Urban Residential incl. Commercial.  
"Urban" means sewerage. The figure for the amount generated is taken from p. 43 of the Millennium Report (EPA, 2000).
4. The total refers to P emanating from economic activity and excludes background runoff, unknown discharges including unknown loads from agriculture etc.



The row for industry in Tables 2.1.1 to 2.1.3 can be further broken down into the component sectors as classified by the EPA. Table 2.1.4 gives the breakdown according to the EPA's 13 sector breakdown. Information is again given on BOD, N and P and each of these is again broken down into the amounts that are generated and the amounts lost to waters.

Table 2.1.4: BOD, N and P generated and lost to waters broken down by EPA sector, tonnes per

| EPA Sectors                       | BOD           |               | N            |              | P            |              |
|-----------------------------------|---------------|---------------|--------------|--------------|--------------|--------------|
|                                   | Generated     | To waters     | Generated    | To waters    | Generated    | To waters    |
| 1. Minerals and other metals      | 280           | 279           | 1            | 1            | 2            | 2            |
| 2. Energy                         | 74            | 74            | 1            | 1            | -            | -            |
| 3. Metals                         | 1,256         | 992           | 970          | 840          | 241          | 218          |
| 4. Mineral Fibres and glass       | 53            | 51            | 68           | 68           | 3            | 3            |
| 5. Chemicals                      | 3,368         | 2,887         | 1,254        | 1,084        | 480          | 437          |
| 6. Intensive Agriculture*         | 911           | 832           | 125          | 123          | 75           | 75           |
| 7. Food and drink                 | 5,160         | 4,290         | 1,292        | 1,233        | 316          | 299          |
| 8. Wood paper, textiles, leather  | 1,085         | 810           | 346          | 320          | 40           | 36           |
| 9. Fossil fuels                   | 28            | 27            | 2            | 2            | 0            | 0            |
| 10. Cement                        | 33            | 27            | 1            | 1            | 0            | 0            |
| 11. Waste                         | 21            | 20            | 0            | 0            | 0            | 0            |
| 12. Surface coatings              | 189           | 112           | 25           | 22           | 24           | 18           |
| 13. Other: int circuits, ceramics | 130           | 54            | 45           | 36           | 8            | 7            |
| <b>TOTAL</b>                      | <b>12,586</b> | <b>10,455</b> | <b>4,131</b> | <b>3,732</b> | <b>1,190</b> | <b>1,095</b> |

Notes:

'Generated' includes direct discharges to waters and discharges to sewers before treatment.

'To waters' includes discharges to waters after treatment as well as direct discharges to

\* Intensive agriculture consists mainly of freshwater fishfarms which are included here. Excluding these (as shown below) yields the figures for 'Total industry' in previous tables.

Fishfarms, freshwater: 791 791 116 116 74 74

TOTAL excluding freshwater fishfarms: 11795 9664 4015 3616 1116 1021

(The figure for P excluding that from freshwater fishfarms (shown in the final note to Table 2.1.4) are the same as the figures given in Table 2.1.3 in the row for Total Industry.)

This information is graphed in Figures 2.1.1, 2.1.2 and 2.1.3. Each sector in the graph is represented by two stacks, the stack at the back giving the quantities generated and the stack at the front giving the amounts lost to waters. The difference between stacks within a sector indicates the amount of BOD, N or P removed by treatment. Some of the amounts generated are discharged directly and therefore not subject to treatment. About a quarter of the BOD and N and a third of P that are generated by industry are discharged directly and this goes some way to accounting for the small amounts of removal shown in the figures.

Figure 2.1.1: BOD generated by industry and lost to waters, by EPA sector, tonnes per annum

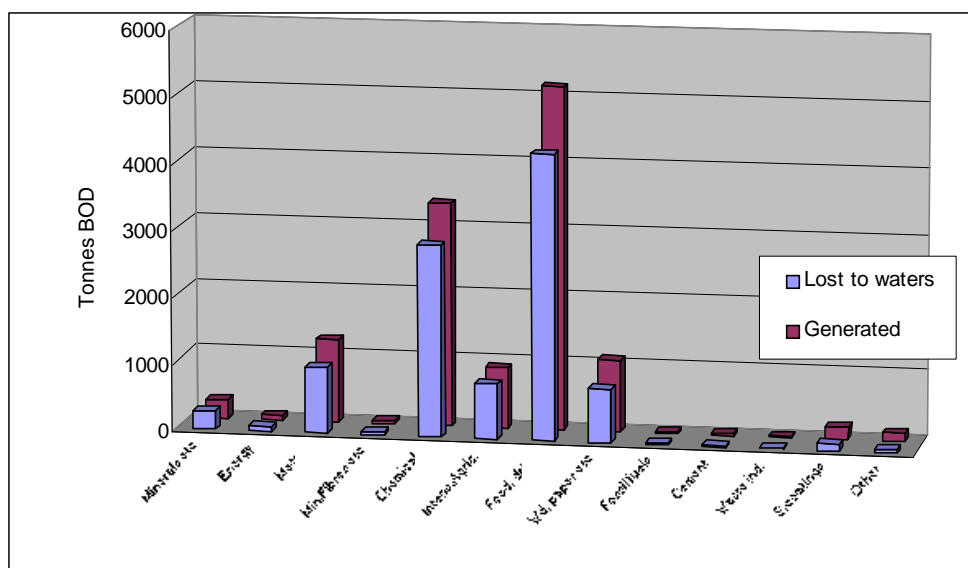


Figure 2.1.2: N generated by industry and lost to waters, by EPA sector, tonnes per annum

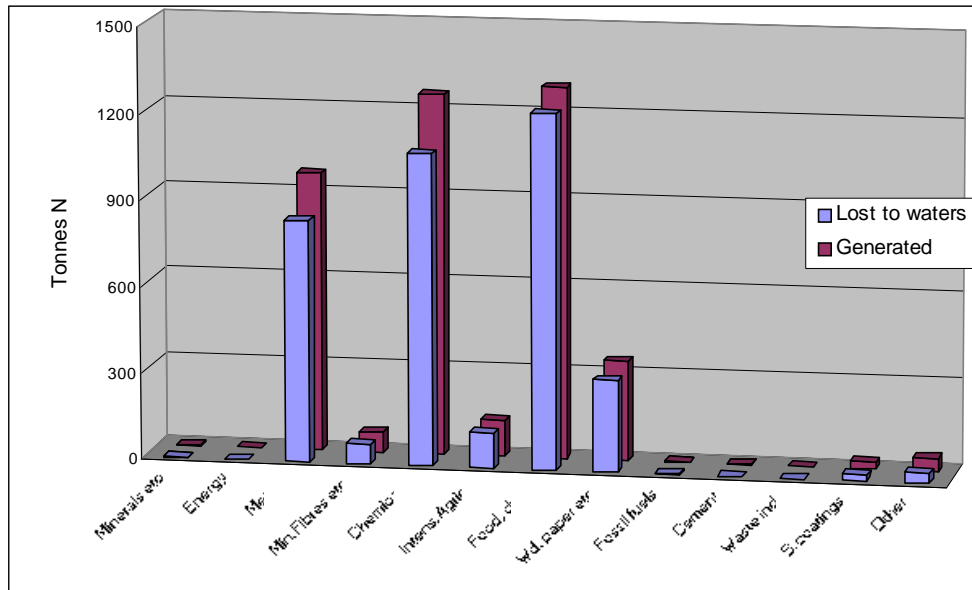
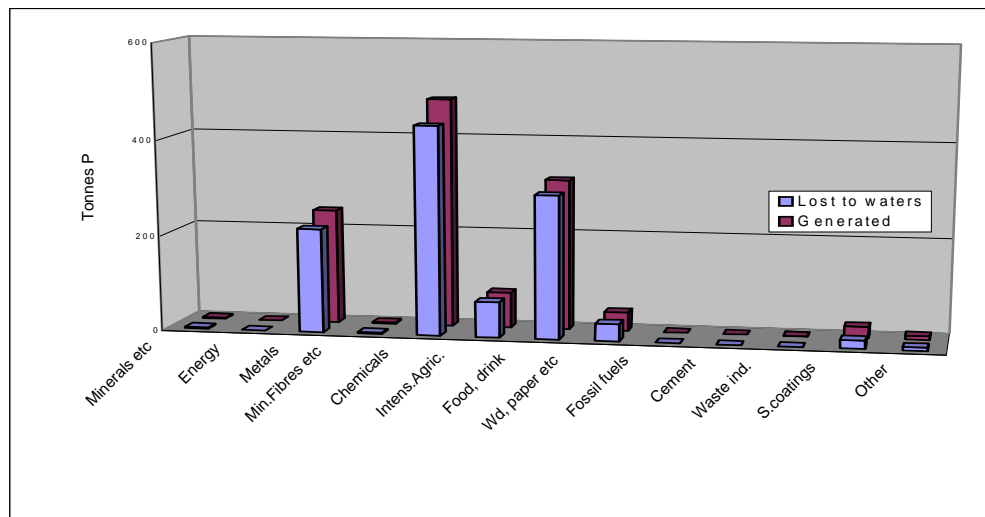


Figure 2.1.3: P generated by industry and lost to waters, by EPA sector, tonnes per annum



It can be seen that the food and drink sector, the chemicals sector and the metals sector stand out as major contributors. Intensive agriculture, which includes freshwater fishfarming, and wood and paper contribute on a smaller scale. Where BOD is concerned, food and drink and chemicals stand out and where P is concerned it is the chemicals sector that is prominent. When looking at the relative amount of treatment, or removal relative to the amounts generated, this appears to be quite small in the case of N and P removal from food and drink discharges

So far, the breakdowns of industry according to the EPA classification have been presented here. If one were to relate these quantities of discharge to economic output of the industries concerned or to numbers employed, there are two options. The first would be to obtain data on the value of output and the numbers employed in the sectors as broken down by the EPA. The second is to use figures available from the CSO based on the NACE rev1 (A60) classification and re-classify the figures on discharges accordingly. The latter option was attempted and the results are shown here. As this is the first attempt at this exercise, the results are provisional.

A concordance was constructed by the CSO that started with the EPA classification and description of sectors and then allotted the relevant NACE codes to the sectors. The resulting *Provisional Concordance between EPA and CSO Classifications* is shown in Appendix 2.1. Several EPA sectors have not yet been allotted a NACE class by CSO, though in the case of three of these that had non-zero discharges according to the EPA database, allocations had to be made and were carried out as follows. Extraction and processing of minerals was classed as NACE 13, which is mining of metal ores. Production of energy in combustion plant was classed as NACE 40, which is energy and water utilities; this classification is acceptable given that the companies in the EPA's category at present are indeed energy utilities. However if, say, a brewery installs a combustion plant that is recorded in the EPA's database as 'production of energy', then it will be necessary to classify that company's discharges in to the NACE category relevant to the drinks industry. The third allocation was marts and animal holding facilities, which were allocated to agriculture.

The resulting reclassification of the EPA's breakdown of discharges is shown in Table 2.1.5. In this table, only loads to waters are shown. Information on generation is not shown for the sake of brevity and because the figures were not hugely different, as shown in the graphs. Also in Table 2.1.5 are figures supplied by the CSO on Gross Value Added (GVA) at current basic prices and the numbers at work. Gross Value Added is a measure of the GDP arising in each sector. These economic data relate to the 1998. The figures on discharges relate in fact to 1998, 1999 and possibly to 2000 to a limited extent.

It is interesting to use the information to calculate discharges per unit of GVA and also per person employed. These can be viewed as measures of 'pollution intensity' of the sectors. The results are no more robust than the underlying data and allocations to sectors. Therefore previous comments about the

provisional nature of the figures apply - to a greater degree here because this is disaggregated data and inaccuracies could be magnified.

Figures 2.14 and 2.15 show tentative results for discharges per unit of GVA and per person at work, respectively. Leaving aside agriculture and fishing/fishfarms for a moment, it is seen that the most intensive dischargers of BOD per unit of GVA are, in descending order, (27) basic metals, (19) tanning and leather, (23) refining and coke, (17) textiles and (15) food and drink. Where N is concerned it is mainly (27) basic metals and (19) tanning and leather. Basic metals are also the most intensive in P loss to waters.

Again leaving aside agriculture and fishing/fishfarms, BOD loss to waters per person at work is highest for (27) basic metals, followed by (24) chemicals, (23) refining/coke, (15) food and drink, (14) quarrying, (19) tanning/leather and (21) paper. Losses to water of N per person employed is highest in (27) basic metals, followed somewhat behind by (24) chemicals, (15) food and drink and (19) tanning and leather. Where loss of P per person employed is concerned, (27) basic metals and (24) chemicals are prominent, with (15) food and drink and (21) paper playing minor roles.

The importance of concentrations of losses and their relevance in the case of agriculture has already been discussed above and will not be repeated here. Where fishing and fishfarms are concerned, the high amounts of BOD and N per unit of GVA and per person at work in fishing deserves some comment. The first point is that a high proportion is lost to marine waters. The second is that there is some uncertainty surrounding the numbers employed in fishing, added to which the numbers in fishfarms will have increased since 1998, the year of the economic data used (in the denominator).

**Table 2.1.5: Gross Value Added and numbers at work and tentative breakdown of industry's loads to waters of BOD, N and P, by NACE rev 1 classification, 1998 (discharges refer to 1998-2000)**

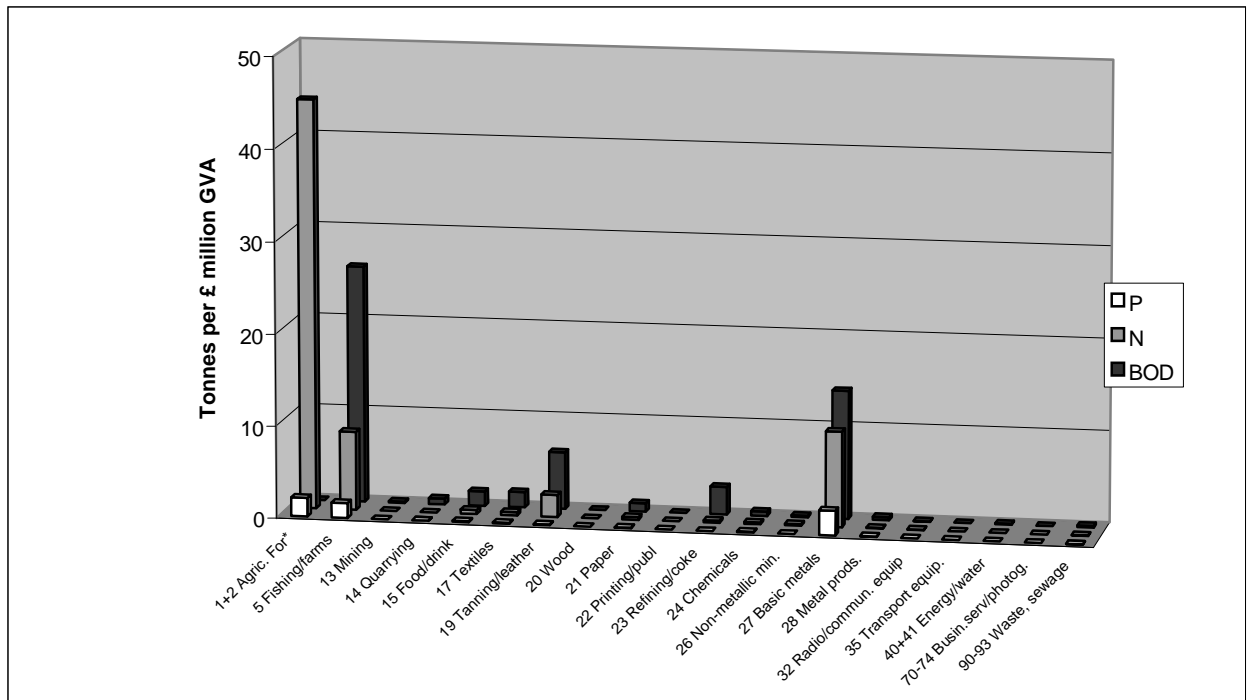
| NACE rev1<br>i.e. A60<br>classifica-<br>tion | Description  | GVA at current<br>basic <sup>3</sup> prices<br>£m | Nos at<br>work<br>000s | BOD<br>000 tonnes<br>per year | N<br>000 tonnes<br>per year | P<br>000 tonnes<br>per year |
|--|--|---|------------------------|-------------------------------|-----------------------------|-----------------------------|
| 1+2  | Agriculture <sup>1</sup> , forestry and related service <sup>2</sup> activities                  | 2,369.82  | 131.4                  | 0.041                         | 105.609                     | 4.808                       |
| 5  | Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing.  | 202.25  | 3.6                    | 5.213                         | 1.725                       | 0.327                       |
| 10   | Mining of coal and lignite; extraction of peat.  | 106.07  | 1.7                    | 0                             | 0                           | 0                           |
| 11   | Extraction of crude petroleum and nat. gas; service activities incidental to oil/gas extraction. | 49.55   | 0.2                    | 0                             | 0                           | 0                           |
| 13   | Mining of metal ores. <sup>2</sup>   | 43.67   | 0.9                    | 0.006                         | 0.001                       | 0                           |
| 14   | Other mining and quarrying.  | 211.82  | 2.1                    | 0.135                         | 0                           | 0.002                       |
| 15   | Manufacture of food products and beverages.  | 2,725.42  | 51.4                   | 4.291                         | 1.233                       | 0.299                       |
| 16   | Manufacture of tobacco products.   | 641.11  | 1.2                    | 0                             | 0                           | 0                           |
| 17   | Manufacture of textiles.   | 139.89  | 10.5                   | 0.233                         | 0.051                       | 0.014                       |
| 18   | Manufacture of wearing apparel; dressing and dyeing of fur.                                      | 167.37  | 8.6                    | 0                             | 0                           | 0                           |
| 19   | Tanning and dressing of leather; manufacture of luggage, saddlery, footwear etc.                 | 14.23   | 1.6                    | 0.088                         | 0.034                       | 0.001                       |
| 20   | Manuf. of wood and products of wood and cork, except furniture and other.                        | 130.71  | 6.7                    | 0.004                         | 0.001                       | 0                           |
| 21   | Manufacture of pulp, paper and paper products.   | 194.95  | 3.9                    | 0.179                         | 0.057                       | 0.008                       |
| 22   | Publishing, printing and reproduction of recorded media.   | 1,292.15  | 18.2                   | 0.016                         | 0                           | 0                           |
| 23   | Manufacture of coke, refined petroleum products and nuclear fuel.                                | 8.94  | 0.3                    | 0.027                         | 0.002                       | 0                           |
| 24   | Manufacture of chemicals and chemical products.  | 6,062.56  | 25.9                   | 2.925                         | 1.160                       | 0.440                       |
| 25   | Manufacture of rubber and plastic products.  | 337.89  | 11.4                   | 0                             | 0                           | 0                           |
| 26   | Manufacture of other non-metallic mineral products.  | 426.26  | 14.9                   | 0.077                         | 0.069                       | 0.003                       |
| 27   | Manufacture of basic metals.   | 80.66   | 3.8                    | 1.125                         | 0.836                       | 0.216                       |
| 28   | Manufacture of fabricated metal products, except machinery and equipment.                        | 343.86  | 22.1                   | 0.116                         | 0.026                       | 0.019                       |
| 29   | Manufacture of machinery and equipment n.e.c.  | 479.92  | 13.8                   | 0                             | 0                           | 0                           |
| 30   | Manufacture of electrical machinery and apparatus n.e.c.   | 911.94  | 17.7                   | 0                             | 0                           | 0                           |
| 31   | Manufacture of radio, television and communication equipment and apparatus.                      | 550.25  | 8.8                    | 0                             | 0                           | 0                           |
| 32   | Manufacture of radio, television and communication equipment and apparatus.                      | 870.08  | 21                     | 0.037                         | 0.036                       | 0.007                       |
| 33   | Manufacture of medical, precision and optical instruments, watches and clocks.                   | 676.81  | 14.8                   | 0                             | 0                           | 0                           |

|  |   |                  |               |               |               |              |
|--|---|------------------|---------------|---------------|---------------|--------------|
| 34   | Manufacture of motor vehicles, trailers and semi-trailers.                                | 93.98            | 4.9           | 0             | 0             | 0            |
| 35   | Manufacture of other transport equipment.   | 157.29           | 5.5           | 0.001         | 0             | 0            |
| 36   | Manufacture of furniture; manufacturing n.e.c.  | 392.45           | 18.2          | 0             | 0             | 0            |
| 37   | Recycling   | 7.98             | 0.7           | 0             | 0             | 0            |
| 40+41  | Energy and water utilities <sup>2</sup>   | 824.55           | 12.1          | 0.074         | 0.001         | 0            |
| 45   | Construction  | 3,300.65         | 126.2         | 0             | 0             | 0            |
| 50-52  | Retail trade services on motor vehicles and motorcycles and personal and household goods. | 5,638.19         | 211.3         | 0             | 0             | 0            |
| 55   | Hotel and restaurant services.  | 1,526.92         | 98.1          | 0             | 0             | 0            |
| 60-64  | Land, Water, Air and supporting transport services  | 3,106.25         | 86.8          | 0             | 0             | 0            |
| 65-67  | Services auxiliary to financial intermediation including insurance and pension funding    | 2,037.11         | 54.9          | 0             | 0             | 0            |
| 70-74  | Real estate and business services   | 8,826.43         | 116.8         | 0.005         | 0.001         | 0            |
| 75   | Public administration and defence services; compulsory social security services.          | 2,469.99         | 70.7          | 0             | 0             | 0            |
| 80   | Education services.   | 2,407.05         | 93.2          | 0             | 0             | 0            |
| 85,88  | Health and social work services.  | 3,137.49         | 121.2         | 0             | 0             | 0            |
| 90-93  | Waste, sewage and other services.   | 1,528.03         | 68.6          | 0.283         | 0.098         | 0.010        |
| 95   | Private households with employed persons.   | 56.23            | 8.4           | 0             | 0             | 0            |
| 99   | Services provided by extra-territorial organisations and bodies.                          | 0                | 0.2           | 0             | 0             | 0            |
| <b>TOTAL</b>   |   | <b>54,548.77</b> | <b>1494.3</b> | <b>14.876</b> | <b>110.94</b> | <b>6.154</b> |
| Agric, Forestry and peatl. and Aquaculture (both sorts)  |   |                  |               | 5.213         | 107.327       | 5.134        |
| <b>TOTAL less previous row (gives Total industry loads to water as in Tables 2.1.1 to 2.1.3)</b> |   |                  |               | <b>9.663</b>  | <b>3.613</b>  | <b>1.020</b> |

*Notes:*

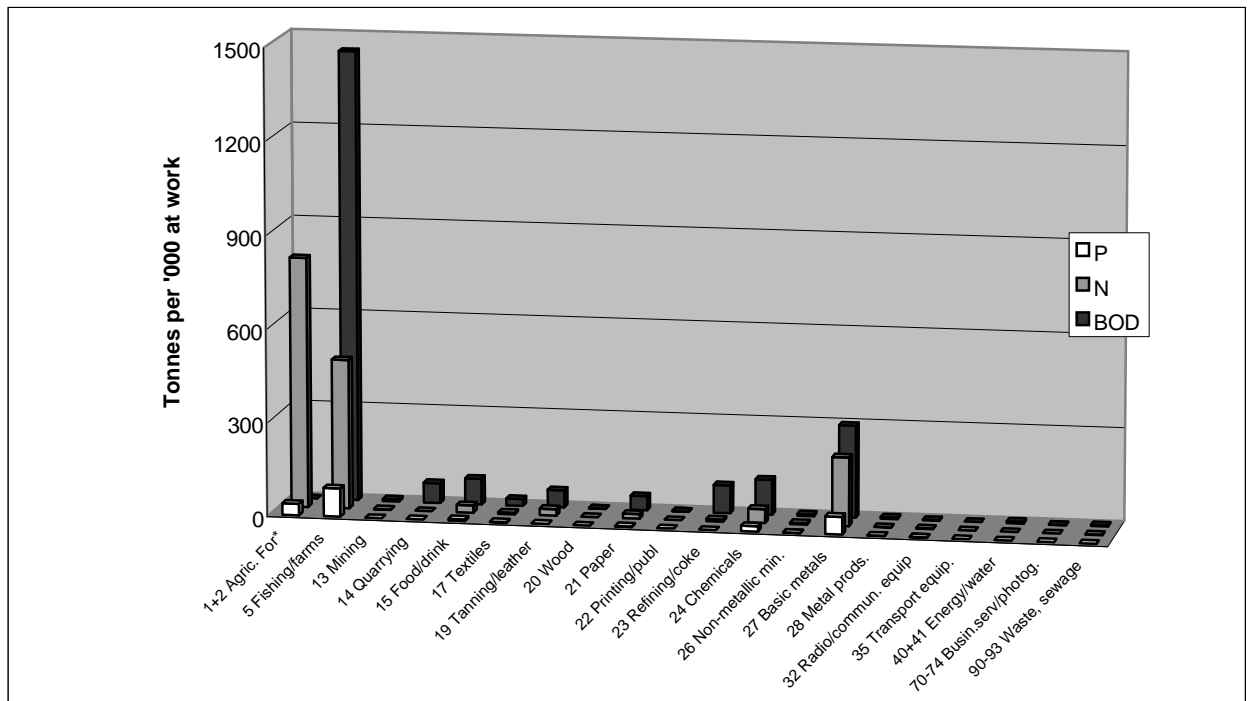
1. The figure for BOD excludes the large but unknown loads of BOD from Agriculture and Forestry and peatlands, recorded in Tables 2.1.1, 2.1.2 and 2.1.3.
2. Reclassification in this table from EPA codes to NACE rev1 A60 codes is provisional. Marts and animal holding and facilities Peatlands have been classified with Agriculture (1), extraction and processing of minerals have been classified with Mining of metal ores (13), and production of energy in combustion plant in Energy and water utilities (40).
3. Basic prices exclude VAT, import duties and excise duties. They are at factor prices plus taxes on production that are independent of quantity of output (e.g. Rates and payroll taxes). Basic prices plus taxes on products (including imports) such as VAT equals market prices.

Figure 2.1.4: Tonnes BOD, N and P lost to waters per £1 million Gross Value Added using NACE



\* As shown in Table 1.1.1 the amounts of BOD from agriculture and forestry is not known.

Figure 2.1.5: Tonnes of BOD, N and P lost to waters per thousand persons at work using NACE



As shown in Table 1.1.1 the amounts of BOD from agriculture and forestry is not known.

An alternative way of obtaining figures on the amount of discharges per person employed in fishfarms is to use data on aquaculture from Bord Iascaigh Mhara (the Irish Sea Fisheries Board). They supplied

figures on the numbers employed (and tonnage of product) in Marine and Freshwater Aquaculture in 1999. Combining these with the discharges of BOD, N and P from the EPA gives the levels per person employed given in Table 2.1.6. Here we see different amounts per person employed and, as expected, higher amounts per person employed in freshwater aquaculture, than suggested in the previous graphs. (Note that the graphs are expressed per thousand persons employed.

**Table 2.1.6: Loads to waters per person at work (tonnes per full-time equivalent person)**

|            | P     | N     | BOD   |
|------------|-------|-------|-------|
| Marine     | 0.176 | 1.119 | 3.075 |
| Freshwater | 0.525 | 0.823 | 5.610 |
| Total      | 0.207 | 1.092 | 3.301 |

These figures lead one to the conclusion that as orders of magnitude the original figures for fishing and fishfarms are reasonable. The numbers involved in freshwater fishfarms are in fact quite small with only 141 fulltime equivalents in 1999.

### ***FUTURE AVAILABILITY***

It is clear that this information collected by the EPA is a rich dataset and will form a key source of information on discharges to water for the future. As the coverage is extended, in terms of both the number of enterprises that come within the licensing procedure and the precision of data collection, so it will form an important basis for describing the interaction between economic activity and environmental effects.

A point that should be stressed is the need for the reclassification from EPA codes to the NACE classification system to become routine. This is essential to ensure continuity and consistency. The reclassification that was undertaken for this paper was experimental. It would be necessary that each individual firm in the licensing records, the names of which are readily accessible to the public, be reclassified to the same category accorded by the CSO at present. Otherwise calculations that combine EPA and CSO data run the risk of being misleading and analyses of the environmental effects of economic activity will not be soundly based.

A further breakdown of the information presented in this subsection on a regional basis would be very worthwhile. Given the localised nature of pollution, the importance of the condition of receiving waters and the concentrations of discharges, disaggregation of data by region, starting with the most vulnerable regions, would be a useful analytical resource.



## ***2.2 National Accounts data on public water services***

The aim in this sub-section is to analyse public water services with a view to providing time-series, for the nineties, of costs incurred by the providers and payments made by customers. Results of such an attempt have been published by Scott and Lawlor (1997) but only for one year, 1994. Difficulties in obtaining data were mentioned during that attempt and only partial improvements in data have occurred since then. These improvements consist of more thorough estimates of leakage and firmer figures of water consumption in the Greater Dublin area. There is still some uncertainty about the amount paid by customers in some cases, with the data problems described by Scott and Lawlor (1994) still persisting. Assumptions have had to be made and in what follows we only estimate time-series of costs and payments per unit of water consumed and stop short at continuing with estimation of costs and payments per unit of waste water serviced. The procedures for finalising the calculations are in a state of readiness, however. When the missing data are supplied, therefore, it will be possible to finish the exercise. Unfortunately it is still the case that results produced so far are tentative and dependent on the assumptions made, which are described fully.

Information is assembled here on expenditures by the providers of public water supplies and waste water services, which in Ireland are the local authorities. Subtraction of payments by customers yields estimates of the cost borne by the public purse, or the subsidy. On dividing expenditures and subsidies by quantities, the cost and subsidy per unit is obtained. We will see that obtaining data on expenditures is reasonably straightforward but that assembling data on payments by customers is more difficult and that the determination of quantities is more difficult still.

Tables 2.2.1 and 2.2.2 refer to public Water Supply and Waste Water services, respectively. The basis of the expenditure information presented is the data collected by the CSO in the course of constructing the National Accounts. Table 2.2.3 gives the information prior to manipulation to produce the previous two tables, for the record, and some details of this raw information are now described.

On current account and on capital account the CSO receive data from the DoELG itemising total expenditure according to the following categories. Using 1994 for illustration, the data are in the following form.

| <b>1994 Expenditure, £m</b>      | <b>Current</b> | <b>Capital</b> |
|----------------------------------|----------------|----------------|
| Public Water Supply              | 81.9           | 30.2           |
| Public/Sewerage Schemes          | 35.8           | 65.5           |
| Private Installation             | 0.5            | 00.1           |
| Administration and Miscellaneous | 26.0           | 0.5            |
| <b>TOTAL</b>                     | <b>144.2</b>   | <b>96.4</b>    |

*Source:* Central Statistics Office, National Accounts Section

The CSO figures shown above for Current Expenditure differ slightly from those that appear for the water supply and sewerage programme in the *Returns of Local Taxation* under the table headed “All Local Authorities Receipts and Expenditure Classified by Programme”. The difference appears to be partly explained by the allocation of Inter-Authority Expenditure to the relevant function in the CSO data presented here. This suits our purposes. The final figure shown above for total Capital Expenditure is very close to the figure for water supply and sewerage combined, given in aggregate only, in the *Returns of Local Taxation* in the table headed “All Local Authorities Capital Account Summary”.

Figures shown above for Private Installation refer to private water schemes in mainly rural areas. These do not form part of the system of public water services. No attempt at analysing them is made at this stage though, given their environmental impact (EPA, 2000), more attention could be focused on them in future. The item Administration and Miscellaneous approaches 20 per cent of the total but is not separately attributed to Public Water Supply and Public Sewerage Schemes. We have therefore attributed this item pro rata the share in the total of these two functions, the end results of this attribution appearing in Tables 2.2.1 and 2.2.2. As mentioned, Table 2.2.3 merely shows the raw data for 1990-1999.

At this stage the data become increasingly difficult to obtain and hypothetical in nature, and it is important for this to be borne in mind. Having established total expenditure by the providers of water services, the next step is to obtain figures of receipts from charges imposed on customers to defray the current costs of operation, and contributions mainly by industry to the capital cost. The DoELG are in a position to supply firmer data on receipts from charges for recent years than for earlier years. These include current receipts from charges (recently abolished) on the domestic household sector which are broken down between water and sewerage, and from the non-domestic or commercial sector, for which there is no breakdown between receipts for water supply and waste water services, except one rough estimate for the year 1994. Arbitrarily, the 1994 split between water supply and waste water services is applied to the other years.

Contributions to the capital cost are made by industry and estimates of the amounts paid are pending from DoELG, and again figures for earlier years are expected to be less certain. On foot of a questionnaire sent to local authorities, Scott and Lawlor (1994, 1997) gave a rough figure of £1 million apiece for industrial contributions towards the capital costs of water supply and waste water, as an order of magnitude. Recently the water authorities have been investing heavily and demanding a more realistic contribution towards their share of the capital costs from industrial customers, so that the figure is expected to have grown.

Finally and most uncertain of all are the quantities of water consumed and of waste water serviced. Several useful sources of information are to hand. The distribution input, that is, the water sent out into the public water supply system, was estimated by McCumiskey in 1991. Estimates for the Greater Dublin area have been presented in the Greater Dublin Water Supply – Strategic Study (GDWSSS) for

1994 and 1999. Incorporating the figures for 1994, McCarthaigh (1996) estimated water sent out, broken down by region and, an important step, by three consuming sectors, namely, domestic households, industry/commerce and agriculture.

Leakage figures include, in addition to leakage in distribution, estimates of operational use by the water supply system and losses of water on customers' premises. Knowing the distribution input and the percentage leakage enables one to calculate the desired figure of the amount of water consumed. Estimates of leakage have been made at various times, including by O'Connell in 1992. Leakage for the Greater Dublin area was estimated for 1994 and for 1999 in the GDWSSS. Atkins (2000) estimates leakage percentages for 1999 for the area outside Dublin. All these pieces of information on water quantities are assembled in Table 2.2.4.

Using the data described above, interpolating for the years in-between and assuming general stability of proportions, it is possible to produce a moderately coherent time-series of water consumption by the domestic sector for the 1990 to 1999 period. The result is presented in Table 2.2.5. It might be possible to produce similar time-series for water consumption by the industrial/commercial sector and agricultural sector. There is a problem however. The sectoral breakdowns for Dublin for the two years 1994 and 1999 are consistent but the breakdowns for the area outside Dublin imply that agriculture's share was 25 per cent and then 8 per cent, which throws doubt on the breakdowns. Consequently it seems prudent to leave industrial/commercial and agricultural use as one joint category and to call it "non-domestic".

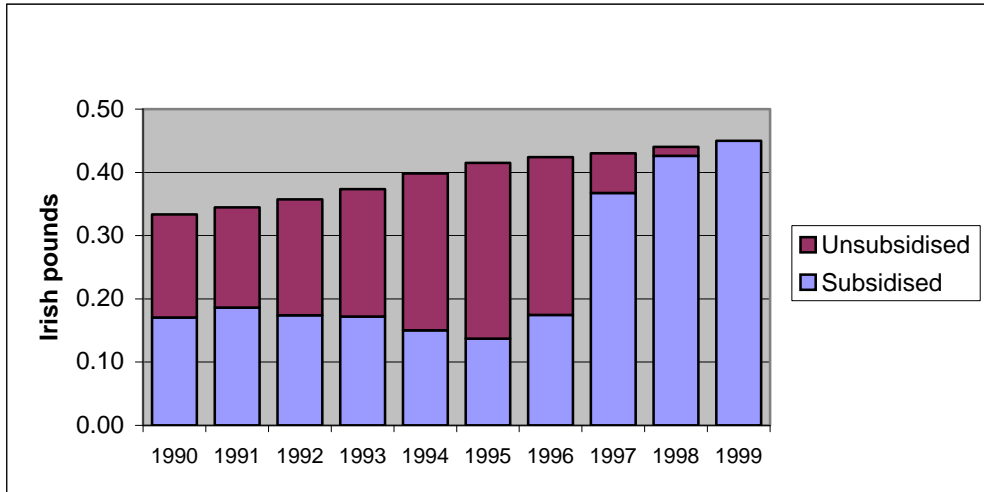
The resulting graphs below show the current cost per cubic metre of water consumed. (Note that this is expected to be higher than the cost of water sent out, which is a higher volume.) The current cost is split into that part that is paid for by customers and that part that constitutes the subsidy. The first graph, Figure 2.2.1, relates to the domestic sector and the second one, figure 2.2.2, to the non-domestic sector. Money values have not been adjusted for inflation and current costs show a rise of some 3.5 per cent per year. While increased quantities supplied could be expected to be associated with economies of scale such that declining unit costs might have been predicted, there is likely to have been a concomitant rise in treatment costs to meet quality standards.

Figure 2.2.1 also shows a marked rise in the subsidy from the year 1997 onwards, which is due to the abolition of domestic water charges from the beginning of that year. In fact the less than total subsidy in 1997 and 1998 merely reflects late payments. Estimates of payments per cubic metre by customers, the object of this sub-section, are illustrated in the top section of the bars.

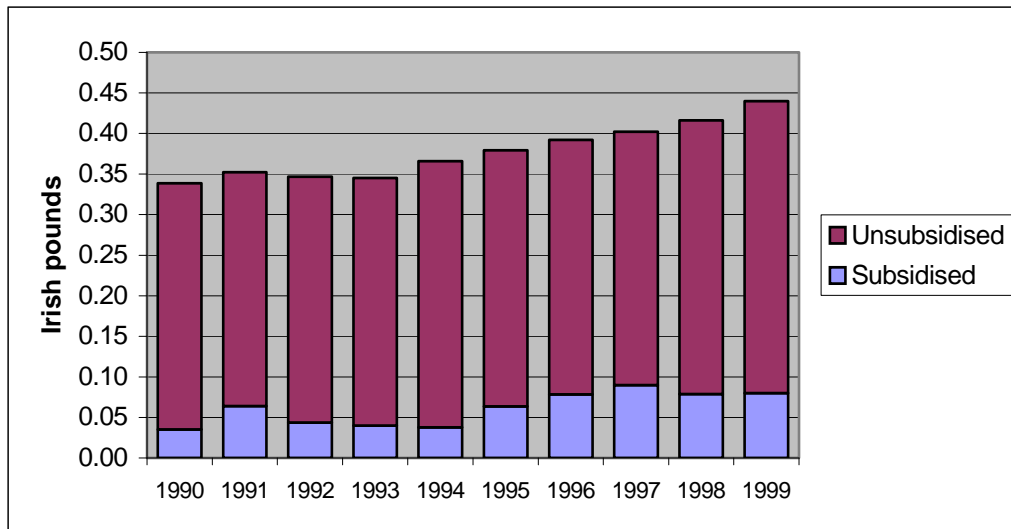
Figure 2.2.2 refers to industrial/commercial and agricultural consumption of water. A large share of water consumed by the industrial/commercial sector is paid for and full cost recovery is increasingly being applied. It is probably fair to say that the sector covers its costs fairly well. The subsidy shown in the graph therefore could represent a subsidy to the agricultural sector, though apparently it is charged

for water delivered by the public water supply system. It is not clear then to whom the subsidy should be attributed.

**Figure 2.2.1: Current cost and subsidy per cubic metre of water consumed by the domestic sector**



**Figure 2.2.2: Current cost and subsidy per cubic metre consumed by the non-domestic sector**



Capital expenditure on water supply would add between roughly a third and two thirds again on top of the current costs. This is actual capital expenditure that is not annualised, and to which financing charges have not been added. Industry will be increasingly paying a significant share of the capital costs that it imposes on the investment programme.

Turning attention from water supply to the waste water service, for reasons already outlined it is not feasible to produce illustrations similar to those above for this service yet. Constructing a time-series is not possible at this stage, however it is possible to give a few point estimates. A current cost figure of

£0.17 per cubic metre of waste water serviced with a subsidy of £0.14 per cubic metre was estimated for 1994 by Scott and Lawlor (1997). For the year 1999 Cunningham (2000) has estimated that waste water generated in the collection areas of sewerage schemes and serviced by the public waste water system, measured in terms of BOD, amounts to some 63,900 tonnes. The unit current cost, per tonne of BOD serviced in this case, therefore amounts to some £885, using the figure from Table 2.2.2 for total current expenditure in 1998 amounting to £56,518,000. The domestic component of BOD generated amounts to some 85 per cent and the entire domestic cost is subsidised in recent years. The industrial component constitutes the remaining 15 per cent, agriculture apparently not discharging to the public system. Table 2.2.2 gives receipts from current charges to industry in 1999 as £8,420,000. On this basis the subsidy to the industrial/commercial sector is perhaps small and the sector could be considered to be covering its current costs for BOD serviced. The per unit capital expenditure would of course add considerably to the cost. Contributions from industry to pay for its share of new investment are becoming more significant of late.

### ***FUTURE AVAILABILITY***

This is as far as the National Accounts information on water services in its present state can be exploited. New data could come to light along with other estimates to improve the accuracy of what has been assembled here. In particular better figures for payments and contributions, along with figures for quantities and sectoral breakdowns, would enable the picture to be completed. The remarkable persistence of problems with the data appears to mirror the underlying problem concerning the financing of water services in Ireland.

Apart from figures on expenditure, figures on revenues from charges, on quantities supplied or serviced and on unit costs of this £180 million industry (excluding capital expenditure) have not been systematically assembled before. A well-designed programme to collect data from local authorities in a thorough and consistent manner has been introduced by the DoELG recently and is described at the end of sub-section 2.4.

Table 2.2.1: National Accounts data on Public Water Supply - expenditure, receipts, subsidies and estimates per cubic metre of water consumed.

|  | 1990   | 1991   | 1992   | 1993   | 1994         | 1995    | 1996    | 1997    | 1998    | 1999 |
|--|--------|--------|--------|--------|--------------|---------|---------|---------|---------|------|
| <b>PUBLIC WATER SUPPLY</b>                     |        |        |        |        |              |         |         |         |         |      |
| <b>CURRENT ('000£)</b>                         |        |        |        |        |              |         |         |         |         |      |
| Total expenditure incl. Admin                  | 78,506 | 83,364 | 87,038 | 91,652 | 99,917       | 106,427 | 112,002 | 116,974 | 123,294 |      |
| of which:                                      |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 51,029 | 54,186 | 56,575 | 59,574 | 63,947       | 67,049  | 69,441  | 71,354  | 73,977  |      |
| Non-domestic                                   | 27,477 | 29,177 | 30,463 | 32,078 | 35,970       | 39,378  | 42,561  | 45,620  | 49,318  |      |
| Receipts from charges*                         | 49,530 | 48,780 | 55,650 | 60,490 | 72,030       | 77,650  | 74,920  | 45,860  | 42,310  |      |
| of which:                                      |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 24,920 | 24,890 | 29,030 | 32,110 | 39,780       | 44,880  | 40,870  | 10,400  | 2,310   |      |
| Non-domestic                                   | 24,610 | 23,890 | 26,620 | 28,380 | 32,250       | 32,770  | 34,050  | 35,460  | 40,000  |      |
| ', subsidy (current)                           | 28,976 | 34,584 | 31,388 | 31,162 | 27,887       | 28,777  | 37,082  | 71,114  | 80,984  |      |
| of which                                       |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 26,109 | 29,296 | 27,545 | 27,464 | 24,167       | 22,169  | 28,571  | 60,954  | 71,667  |      |
| Non-domestic                                   | 2,867  | 5,287  | 3,843  | 3,698  | 3,720        | 6,608   | 8,511   | 10,160  | 9,318   |      |
| <b>CAPITAL ('000 £)</b>                        |        |        |        |        |              |         |         |         |         |      |
| Expenditure incl. Admin                        | 35,531 | 55,347 | 47,329 | 27,726 | 30,418       | 68,080  | 66,173  | 82,208  | n.a.    |      |
| Receipts from contrib.                         | n.a.   | n.a.   | n.a.   | n.a.   | 1,000 Estim. | n.a.    | n.a.    | n.a.    | n.a.    |      |
| ', subsidy (cap)                               |        |        |        |        | 29,418       |         |         |         |         |      |
| <b>Quantity of water consumed (million m3)</b> |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 153    | 157    | 158    | 159    | 161          | 162     | 164     | 166     | 168     | 170  |
| Non-domestic                                   | 81     | 83     | 88     | 93     | 98           | 104     | 109     | 113     | 119     | 124  |
| <b>Current cost per m3 (£)</b>                 |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 0.33   | 0.34   | 0.36   | 0.37   | 0.40         | 0.41    | 0.42    | 0.43    | 0.44    | -    |
| Non-domestic                                   | 0.34   | 0.35   | 0.35   | 0.34   | 0.37         | 0.38    | 0.39    | 0.40    | 0.42    | -    |
| <b>Current subsidy per m3 (£)</b>              |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | 0.17   | 0.19   | 0.17   | 0.17   | 0.15         | 0.14    | 0.17    | 0.37    | 0.43    | -    |
| Non-domestic                                   | 0.04   | 0.06   | 0.04   | 0.04   | 0.04         | 0.06    | 0.08    | 0.09    | 0.08    | -    |
| <b>Capital subsidy per m3 (£)</b>              |        |        |        |        |              |         |         |         |         |      |
| Domestic                                       | n.a.   | n.a.   | n.a.   | n.a.   | 0.11         |         |         |         |         |      |
| Non-domestic                                   | n.a.   | n.a.   | n.a.   | n.a.   |              |         |         |         |         |      |
| <b>Total subsidy per m3 (£)</b>                |        |        |        |        |              |         |         |         |         |      |
|  | n.a.   | n.a.   | n.a.   | n.a.   | 0.22         |         |         |         |         |      |

\*Note: Receipts from current charges are from Denis McDonald for 1990, Deirdre Kearney for 1994 and from Joe Malone (all in DoELG) for other years. The shares of expenditure on domestic versus commercial/agricultural supply are taken pro rata quantities.

N.B. Receipts from charges to commercial customers are broken down between water supply and waste water treatment (in Waste Water table) pro rata the proportions in 1994 namely 84% and 16% respectively.

Commercial receipts for 1990 from Denis MacDonald, 1991-3 receipts are assumed to be 43 % of current receipts from "Goods/services" in "Returns of Local Taxation" reports, being the observed share in other years.

Table 2.2.2: National Accounts data on Waste Water Services - expenditure, receipts, subsidies and estimates per cubic metre serviced

|   | 1990   | 1991   | 1992   | 1993   | 1994   | 1995   | 1996   | 1997    | 1998   | 1999        |
|---|--------|--------|--------|--------|--------|--------|--------|---------|--------|-------------|
| <b>WASTE WATER SERVICES</b>                     |        |        |        |        |        |        |        |         |        |             |
| <b>CURRENT ('000 £)</b>                         |        |        |        |        |        |        |        |         |        |             |
| Total expenditure incl. admin                   | 34,574 | 37,187 | 39,881 | 41,215 | 43,652 | 45,212 | 48,449 | 51,483  | 56,518 | -           |
| of which:                                       |        |        |        |        |        |        |        |         |        |             |
| Domestic  | 29,388 | 31,609 | 33,899 | 35,033 | 37,105 | 38,431 | 41,181 | 43,761  | 48,040 | -           |
| Commercial                                      | 5,186  | 5,578  | 5,982  | 6,182  | 6,548  | 6,782  | 7,267  | 7,722   | 8,478  | -           |
| Receipts from charges*<br>from:                 | 5,930  | 5,600  | 6,260  | 6,670  | 7390   | 9490   | 9230   | 8580    | 7630   |             |
| Domestic  | 1,240  | 1,100  | 1190   | 1260   | 1340   | 3250   | 2740   | 1820    | 10     |             |
| Commercial                                      | 4,690  | 4,500  | 5070   | 5410   | 6050   | 6240   | 6490   | 6760    | 7620   | 8420        |
| ∴, subsidy (current)<br>of which                | 28,644 | 31,587 | 33,621 | 34,545 | 36,262 | 35,722 | 39,219 | 42,903  | 48,888 |             |
| Domestic  | 28,148 | 30,509 | 32,709 | 33,773 | 35,765 | 35,181 | 38,441 | 41,941  | 48,030 |             |
| Commercial                                      | 496    | 1,078  | 912    | 772    | 498    | 542    | 777    | 962     | 858    |             |
| <b>CAPITAL ('000 £)</b>                         |        |        |        |        |        |        |        |         |        |             |
| Expenditure incl. Admin                         | 35,315 | 52,114 | 57,476 | 45,871 | 65,905 | 56,654 | 67,615 | 104,440 | -      |             |
| Receipts from contributions                     | n.a.   |        |        |        | 1000   |        |        |         |        |             |
| ∴, subsidy (cap)                                |        |        |        |        | 64,905 |        |        |         |        |             |
| <b>Quantity of waste-water serviced '000 m3</b> |        |        |        |        |        |        |        |         |        |             |
| Domestic  |        |        |        |        |        |        |        |         | 63,500 | tonnes BOD  |
| Commercial                                      |        |        |        |        |        |        |        |         | 53,975 | tonnes BOD  |
| <b>Current cost per m3 (£)</b>                  |        |        |        |        |        |        |        |         |        |             |
| Domestic  |        |        |        |        |        |        |        |         | 9,525  | tonnes BOD  |
| Commercial                                      |        |        |        |        |        |        |        |         | 890    | / tonne BOD |
| <b>Current subsidy per m3 (£):</b>              |        |        |        |        |        |        |        |         |        |             |
| Domestic  |        |        |        |        |        |        |        |         | 890    | / tonne BOD |
| Commercial                                      |        |        |        |        |        |        |        |         | 890    | / tonne BOD |
| <b>Capital subsidy per m3 (£):</b>              |        |        |        |        |        |        |        |         |        |             |
| Domestic  |        |        |        |        |        |        |        |         | 770    | / tonne BOD |
| Commercial                                      |        |        |        |        |        |        |        |         | 890    | / tonne BOD |
| <b>Total subsidy per m3 (£):</b>                |        |        |        |        |        |        |        |         |        |             |
| Domestic  |        |        |        |        |        |        |        |         | 90     | / tonne BOD |
| Commercial                                      |        |        |        |        |        |        |        |         | 90     | / tonne BOD |

\*Note: Receipts from current charges are from Denis McDonald for 1990, Deirdre Kearney for 1994 and from Joe Malone (all from DoELG) for other years.

NB Receipts from charges to commercial customers are broken down between water supply and waste water treatment (in Water Supply table) pro rata the proportions in 1994 namely 84% and 16% respectively.

Commercial receipts for 1990 from Denis MacDonald, 1991-3 receipts are assumed to be 43 % of current receipts from "Goods/services" in "Returns of Local Taxation" reports, being the observed share in other years.

Table 2.2.3: National Accounts data on Water Services - current expenditure, capital expenditure and receipts. Source CSO and DoELG

|                        |                                    | (000 £) | 1990          | 1991          | 1992          | 1993          | 1994          | 1995           | 1996           | 1997           | 1998           | 1999 |
|------------------------|------------------------------------|---------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|------|
| <b>CURRENT ACCOUNT</b> | 3.1 Expend. On Public Water Supply |         |               |               |               |               |               |                |                |                |                |      |
|                        | 262 Programme Total                |         | 64,988        | 68,964        | 71,500        | 75,277        | 81,900        | 88,064         | 93,049         | 96,350         | 101,587        |      |
|                        | 3.2 Public Sew. Schemes            |         |               |               |               |               |               |                |                |                |                |      |
|                        | 280 Programme Total                |         | 28,621        | 30,764        | 32,762        | 33,851        | 35,781        | 37,411         | 40,250         | 42,406         | 46,568         |      |
|                        | Private installations              |         | 649           | 704           | 596           | 543           | 516           | 477            | 504            | 697            | 3,106          |      |
|                        | Admin + miscellan.                 |         | 19,606        | 20,969        | 22,788        | 23,857        | 26,001        | 26,263         | 27,254         | 29,851         | 32,321         |      |
|                        | GROUP Progr Total Expend.          |         | 113,864       | 121,401       | 127,646       | 133,528       | 144,199       | 152,217        | 161,058        | 169,303        | 183,582        |      |
|                        | (check)                            |         | 113,864       | 121,401       | 127,646       | 133,528       | 144,199       | 152,217        | 161,058        | 169,303        | 183,582        |      |
|                        | Adding admin and misc. pro rata:   |         |               |               |               |               |               |                |                |                |                |      |
|                        | <b>Water Supply incl admin.</b>    |         | <b>78,506</b> | <b>83,364</b> | <b>87,038</b> | <b>91,652</b> | <b>99,917</b> | <b>106,427</b> | <b>112,002</b> | <b>116,974</b> | <b>123,294</b> |      |
|                        | <b>Sewerage incl. admin.</b>       |         | <b>34,574</b> | <b>37,187</b> | <b>39,881</b> | <b>41,215</b> | <b>43,652</b> | <b>45,212</b>  | <b>48,449</b>  | <b>51,483</b>  | <b>56,518</b>  |      |
|                        | sum of above                       |         | 113,080       | 120,551       | 126,919       | 132,867       | 143,569       | 151,640        | 160,451        | 168,457        | 179,813        |      |
|                        | check                              |         | 113,080       | 120,551       | 126,919       | 132,867       | 143,569       | 151,640        | 160,451        | 168,457        | 179,813        |      |
| <b>Assume</b>          | Proportion Water supply serv:      |         |               |               |               |               |               |                |                |                |                |      |
|                        | domestic                           |         | 0.65          | 0.65          | 0.65          | 0.65          | 0.64          | 0.63           | 0.62           | 0.61           | 0.6            |      |
|                        | commercial                         |         | 0.35          | 0.35          | 0.35          | 0.35          | 0.36          | 0.37           | 0.38           | 0.39           | 0.4            |      |
| <b>Assume</b>          | Proportion Waste water serv:       |         |               |               |               |               |               |                |                |                |                |      |
|                        | domestic                           |         | 0.85          | 0.85          | 0.85          | 0.85          | 0.85          | 0.85           | 0.85           | 0.85           | 0.85           |      |
|                        | commercial                         |         | 0.15          | 0.15          | 0.15          | 0.15          | 0.15          | 0.15           | 0.15           | 0.15           | 0.15           |      |
| Cunningham p 44        |                                    |         |               |               |               |               |               |                |                |                |                |      |
| <b>CAPITAL ACCOUNT</b> | 3.1.1 Water Supply                 |         | 35,469        | 55,077        | 44,668        | 25,995        | 30,246        | 62,873         | 51,105         | 75,031         |                |      |
|                        | 3.1.2 Sewerage                     |         | 35,254        | 51,860        | 54,244        | 43,006        | 65,532        | 52,322         | 52,218         | 95,322         |                |      |
|                        | 3.1.3 Priv installations           |         | 162           | 343           | 151           | 48            | 75            | 1              | 2              | 1,474          |                |      |
|                        | 3.1.8 Admin + miscell.             |         | 123           | 526           | 5,903         | 4,600         | 546           | 9,540          | 30,465         | 16,436         |                |      |
|                        | 3. Tot Capital                     |         | 71,008        | 107,806       | 104,965       | 73,648        | 96,399        | 124,736        | 133,790        | 188,263        |                |      |
|                        | check                              |         | 71,008        | 107,806       | 104,965       | 73,648        | 96,399        | 124,736        | 133,790        | 188,263        |                |      |
|                        | <b>Water Supply + admin</b>        |         | <b>35,531</b> | <b>55,347</b> | <b>47,329</b> | <b>27,726</b> | <b>30,418</b> | <b>68,080</b>  | <b>66,173</b>  | <b>82,208</b>  |                |      |
|                        | <b>Sewerage + admin</b>            |         | <b>35,315</b> | <b>52,114</b> | <b>57,476</b> | <b>45,871</b> | <b>65,905</b> | <b>56,654</b>  | <b>67,615</b>  | <b>104,440</b> |                |      |
|                        | sum of above                       |         | 70,846        | 107,462       | 104,805       | 73,597        | 96,323        | 124,735        | 133,788        | 186,648        |                |      |
|                        | check                              |         | 70,846        | 107,462       | 104,805       | 73,597        | 96,323        | 124,735        | 133,788        | 186,648        |                |      |
|                        | <b>Receipts: "Other" *</b>         |         |               |               |               |               |               |                |                |                |                |      |
|                        | Water Supply + admin               |         |               | 1,796         | 997           | 2,270         | 4,476         | 3,753          | 3,310          | 8,825          |                |      |
|                        | Waste water treatment              |         |               | 1,266         | 1,900         | 1,508         | 3,259         | 1,935          | 4,956          | 4,582          |                |      |

\*CSO: "Other" means other than grants and loans, meaning private levies and industrial capital contributions (subject to verification).

Source: Annette Hayes, Mark O'Connor, Rod O'Mahony, Marie Carroll in CSO who receive the information from Joe Malone of DoELG.



Table 2.2 4: Water 1991-1999, distribution input, leakage and consumption

| Sources                               |           |  | Distribution<br>input<br>m3/day | Leakage<br>%       | Consumption<br>Total<br>m3/day | Sectoral breakdown of consumption |   |                             |
|---------------------------------------|-----------|--|---------------------------------|--------------------|--------------------------------|-----------------------------------|---|-----------------------------|
|                                       |           |  |                                 |                    |                                | Domestic<br>households            | Non-domestic:<br>Ind-commerc.      Agric. |                             |
| McCumiskey                            | 1991      | National                               | 1,290,000                       | 49                 | 657,900                        | 430,925<br>65.5%                  | 111,843<br>17%                            | 115,133<br>17.5%            |
| McCarthaigh/<br>GDWSSS/<br>W.S.Atkins | 1994-1996 | National<br>Gr. Dublin<br>Excl. Dublin | 1,380,800<br>437,500<br>943,300 | 47.3<br>41.6<br>50 | 727,150<br>255,500<br>471,650  | 442,874<br>164,600<br>278,274     | 162,364<br>86,900<br>75,464               | 121,913<br>4,000<br>117,913 |
|                                       | 1999      | National                               | 1,451,000                       | 44.5               | 805,740                        | 466,614                           | 230,978                                   | 108,148                     |
| GDWSSS<br>W.S.Atkins                  |           | Gr. Dublin<br>Excl. Dublin             | 461,000<br>990,000              | 38<br>47.4         | 285,000<br>520,740             | 175,000<br>291,614                | 106,000<br>124,978                        | 4,000<br>104,148            |

Notes: This table was assembled using diverse sources. Some inconsistencies are unavoidable.

**Distribution Input** = Water sent out: 1991 from Mc Cumiskey (1991) p.48. 1994-6 from GDWSSS ch 1 p 12 and MacCarthaigh p 107.

1999 from GDWSSS 2000 section 2.3. Non-Dublin: see Consumption below.

**Leakage** includes operational use and customer losses. 1991 losses are assumed to be the same as in 1994.

1994 leakage for Dublin are taken from p 12 of GDWSSS chap1. Leakage for the non-Dublin area is assumed to be 49% (note O'Connell (1992) p 53 gave 53%).

1999 leakage for Dublin is taken from GDWSSS 2000 section 2.3. Leakage for the non-Dublin area is taken from Atkins (2000) section 5.6.

**Consumption** for non-Dublin in 1999 assumes 2% p.a. growth from 1994 consumption.

**Sectoral breakdown** of consumption used the following sources:

1991 breakdown is pro rata MacCarthaigh's national sectoral breakdown for water sent out in 1996.

1994 uses GDWSSS chap1 p 12 for Dublin sectoral breakdown

1994 non-Dublin uses MacCarthaigh's non-Dublin sectoral breakdown.

1999 uses GDWSSS 2000 section 2.3 for Dublin sectoral breakdown.

1999 non-Dublin uses Atkins' (printout) sectoral breakdown, but using a 20% share for agriculture instead of 8% with corresponding reduction in the amount used by industry/comm.

(MacCarthaigh's share for agriculture in 1996 is 25%. The discrepancies here mean that the split between industry/commercial and agriculture is notional only.)

Table 2.2.5: Water Consumption from Public Water Supply 1990-1999 (million cubic metres per year)

|               | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---------------|------|------|------|------|------|------|------|------|------|------|
| NATIONAL      | 234  | 240  | 246  | 252  | 259  | 265  | 272  | 279  | 287  | 294  |
| Domestic      | 153  | 157  | 158  | 159  | 161  | 162  | 164  | 166  | 168  | 170  |
| Ind/Comm      |      | 41   |      |      |      | 59   |      |      |      | 84   |
| Agric.        |      | 42   |      |      |      | 44   |      |      |      | 39   |
| (Check total) |      | 240  |      |      |      | 265  |      |      |      | 294  |

Notes:

Domestic includes municipal, that is, schools, public administration, barracks etc.

Owing to discrepancies between sources, the figures for ind/commercial and agricultural consumption should be viewed as notional only.

### ***2.3 Water supply data based on the Census of Industrial Production***

The third source of information on water services is the annual Census of Industrial Production (CIP). The CIP is an under-exploited data source at present. A special questionnaire (Form W) is sent to water undertakings and the information collected on costs of inputs and labour and on values of outputs is detailed. Respondents are asked for the value of water supplied to four types of customer, namely, to the water undertakings, for public purposes such as street cleaning, to customers for domestic consumption and, fourthly, to trade and commercial customers. Furthermore there is a question asking for the volume of water, in millions of litres, distributed by the authority during the year. Results of the CIP for the years 1973 to 1998 are given in Table 2.3, in which figures for 1997 and 1998 would appear to be inconsistent and are perhaps preliminary. Alternatively there may be changes of definition which are not specified. (Owing to the unavoidable absence of the person with knowledge about the background of CIP coverage of water undertakings, some of the comments here are provisional.)

Several issues arise in connection with this data. The first is that the CIP only covers water supply, that is, NACE rev1 41, and not waste water treatment, NACE 90. The rationale for this is that water supply is considered to be the provision of a good, whereas waste water treatment is considered to be a service. Another issue is the change over time in the manner in which items are measured. Comparing the values of gross output of water supply, given in the first row of Table 2.3, with those given previously from the National Accounts source in Table 2.2.3, we see a close correspondence. For example, a comparison between the two sources for the years 1991 to 1996 is as follows:

| £ million           | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------------------|------|------|------|------|------|------|
| CIP Gross Output    | 68.3 | 71.7 | 81.2 | 82.8 | 84.2 | 94.2 |
| Public Water Supply | 69.0 | 71.5 | 75.3 | 81.9 | 88.1 | 93.0 |

(Table 2.2.3)

This indicates that the CIP figures for gross output are consistent with the National Accounts (raw data) that exclude the cost of administration. However, there is some uncertainty with respect to the CIP data in Table 2.3 as to the interpretation of Remainder of Net Output, which changes sign. It is negative in the early years perhaps representing a subsidy. From 1987 Remainder of Net Output becomes positive and its interpretation is unclear. It possibly represents purchases of outside services and contracted work as well as an increase in capital work.

A third issue is the question of coverage. The above check suggests that coverage is comprehensive. The results of the census include responses from 53 "local units", which have three or more persons employed. It is possible that some public water supply undertakings are excluded. There are 88 water authorities in the state but many of these do not supply water - they merely distribute water that is imported from other water authorities - in which case their exclusion is justified. Another check can be undertaken on the entries for the last two years given in Table 2.3 on the quantity of water supplied.

The figures for 1997 and 1998, converted to cubic metres sent out per day, are 1,506,000 and 1,561,000. These stand up moderately well when compared with the figure of 1,451,000 for 1999 derived by combining the figures of W.S. Atkins and GDWSSS, given in Table 2.2.4. The CIP figure is some 7½ per cent higher for 1998 but there may be double counting if water traded between authorities has not been netted out. In any event given the different sources and the circumstances of water management the results are encouraging as they are moderately close.

### ***FUTURE AVAILABILITY***

There is already a major improvement in the data collected by the CIP from water supply undertakings. In the last two years quantities of water supplied, for example, can now be reported. When the information collected is clarified it will be possible to explain some of the movements in the series more fully. It would be highly profitable if the CIP could obtain disaggregated replies on the amounts of water distributed (not just the value of sales) to the four types of customer and, if possible, ask for the amount actually charged in similar detail.

The CIP has strong potential as we have seen that the results are fairly consistent with other sources of information. It would be even more helpful if waste water services could also be covered in the survey. Given that generally the same bodies carry out the two functions of water supply and waste water services, inclusion of the latter in the data-gathering task would be an opportunity worth considering.

**Table 2.3: Water Supply information from the Census of Industrial Production (CIP), NACE1970 170, NACE rev1 41**

|                                       | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| AIAA011 Gross Output, IR£m            | 3.8  | 4.3  | 5.4  | 6.8  | 8.5  | 10   | 11.9 | 15.1 | 19   | 23.1 | 32.8 | 35.4 | 38.5 | 41.4 |
| AIAA161 Industrial Input, IR£m        | 1.7  | 2.4  | 2.9  | 3.5  | 4.6  | 5.5  | 7.3  | 9.7  | 11.9 | 14.8 | 15.3 | 16.7 | 20   | 21   |
| AIAA311 Net Output, IR£m              | 2.1  | 1.9  | 2.5  | 3.3  | 4    | 4.6  | 4.6  | 5.3  | 7    | 8.3  | 17.5 | 18.7 | 18.6 | 20.4 |
| AIAA461 Wages and Salaries, IR£m      | 2.4  | 3    | 4.3  | 5.1  | 5.9  | 6.7  | 8.9  | 10.5 | 12.2 | 14.4 | 16.4 | 18.1 | 19.9 | 21.2 |
| AIAA611 Remainder of Net Output, IR£m | -0.3 | -1.2 | -1.8 | -1.8 | -1.9 | -2.1 | -4.3 | -5.2 | -5.1 | -6.1 | 1.1  | 0.6  | -1.3 | -0.9 |
| AIAA761 Persons Engaged, number       | 1800 | 1800 | 1800 | 1900 | 1900 | 2000 | 2245 | 2284 | 2263 | 2298 | 2278 | 2282 | 2319 | 2357 |

Volume of Water distributed, million litres

|   | 1987 | 1988 | 1989 | 1990 | Change of format                            | 1991   | 1992   | 1993   | 1994   | 1995   | 1996   | 1997    | 1998    |
|---|------|------|------|------|---|--------|--------|--------|--------|--------|--------|---------|---------|
| AIAA011 Gross Output, IR£m                  | 48.4 | 51.6 | 55.4 | 58.9 | Gross Output, £m                            | 68.271 | 71.746 | 81.156 | 82.773 | 84.248 | 94.235 | 84.866  | 67.694  |
|   |      |      |      |      | Materials, £m                               | 12.933 | 13.421 | 12.474 | 13.12  | 15.175 | 17.999 | 20.165  | 19.966  |
|   |      |      |      |      | Energy, £m                                  | 8.752  | 9.067  | 9.824  | 9.469  | 9.103  | 9.179  | 9.13    | 9.237   |
| AIAA161 Industrial Input, IR£m              | 20.2 | 19.2 | 22.7 | 23.9 | Industrial input, £m                        | 21.685 | 22.488 | 22.298 | 22.589 | 24.278 | 27.178 | 29.295  | 29.203  |
| AIAA311 Net Output, IR£m                    | 28.1 | 32.4 | 32.7 | 34.9 | Net output, £m                              | 46.586 | 49.258 | 58.858 | 60.184 | 59.97  | 67.057 | 55.571  | 38.491  |
| AIAA461 Wages and Salaries, IR£m            | 21.7 | 20.2 | 22.3 | 23.9 | Wage Bill, £m                               | 24.353 | 26.209 | 28.131 | 28.22  | 29.491 | 29.42  | 31.313  | 33.847  |
| AIAA611 Remainder of Net Output, IR£m       | 6.5  | 12.2 | 10.4 | 11.0 | Rem. of net output, £m                      | 22.233 | 23.049 | 30.727 | 31.964 | 30.479 | 37.637 | 24.258  | 4.644   |
| AIAA761 Persons Engaged, number             | 2273 | 2111 | 2184 | 2261 | Nos. employed '000                          | 2.238  | 2.281  | 2.249  | 2.15   | 2.115  | 2.029  | 2.077   | 2.064   |
| Volume of Water distributed, million litres |      |      |      |      | Volume of Water distributed, million litres |        |        |        |        |        |        | 549,566 | 569,712 |

## ***2.4 Use of water services, based on Local Authority data.***

In this section our focus moves to the provision of water services by individual water authorities. Our approach here was to undertake a survey of the features of the water and waste water schemes for each authority and analyse the results (see Appendix 2.2 for questionnaire). As already mentioned, in view of the requirement outlined in the Water Framework Directive for EU member states to use the river basin as the unit of administration and analysis, this survey should enable one to assess the feasibility of obtaining information on economic aspects on a river basin basis at present.

Initially all local authorities in the Republic were surveyed. However owing to the low response, we concentrate on one region in particular, that of the area approximately covering the Greater Dublin region with some figures at the end for other areas. For the Greater Dublin region, the four local authorities were surveyed using our questionnaire. These authorities were

- Dublin Corporation
- Fingal County Council
- South Dublin County Council
- Dun Laoghaire-Rathdown County Council

Information on each will be reported in turn. There is a lot of detail and readers who are interested in the total figures for the Greater Dublin Region can skip to the end of this section.

All these Authorities responded with fairly comprehensive figures for the years 1998/9. Data for years 1995 to 1997 was available from most of the authorities but was not very detailed while for years preceding this all authorities reported that data was unavailable<sup>2</sup>. So our methodology will be to report the results for the years 1998/9 and then combine the figures to get total amounts for Greater Dublin. From this we will be able to infer costs. We have approximate figures for quantities, so that it is possible to derive notional costs per unit of water services. Taking account of receipts from charges, a notional subsidy per unit to consumers can be estimated. It is worth noting that only current costs will be considered here.

**Dublin Corporation's** Water Division produces and distributes water to the Greater Dublin area, including Dublin City, South Dublin, Dun Laoghaire-Rathdown and parts of Wicklow and Kildare. The total production of water is approximately 460 million litres per day from the water treatment works at Ballymore Eustace, Roundwood and Bohernabreena. The Ballymore Eustace Water Treatment Works provides most of the supply. Dublin Corporation handles quite a large amount of water in the Greater Dublin Region. Including its own use of 108,140,000 m<sup>3</sup>/year, it also produces and distributes approximately 60,060,000 m<sup>3</sup>/year to other authorities inside and outside the Greater Dublin area. The

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<sup>2</sup> Most Local Authorities said that a lack of resources in collection of the data was the main reason for this

financial contributions from other authorities therefore account for quite a significant amount of revenue of sales at 42 per cent while receipts from local charges account for the other 58 per cent. However a breakdown of costs could not be supplied. The amount exported is 35 per cent of the total quantity and it is assumed that the costs associated per unit exported are lower than costs of distributing to local customers. Therefore *a working assumption is made* that costs of exports are 20 per cent of total costs. The remaining costs are allocated pro rata quantities distributed to domestic and non-domestic customers. From these figures we calculate our current cost per unit input for domestic and non-domestic users at £0.18/m<sup>3</sup> and taking revenue into account our calculated implicit subsidy is £0.18m<sup>3</sup> for domestic users and -£0.05/m<sup>3</sup> for non-domestic users (that is a negative subsidy, current only).

**Table 2.4.1: Dublin Corporation - Water Supply (using working assumptions, see text)**

|   | Water Input<br>m <sup>3</sup> /year | Water Input<br>used Locally<br>m <sup>3</sup> /year | Current<br>Costs <sup>(1)</sup> (£) | Current Cost<br>per unit input<br>(£/m <sup>3</sup> ) | Total<br>Revenue<br>from<br>sales(£) <sup>(2)</sup> | % Cost<br>Recovery | Implicit<br>Subsidy<br>(£/m <sup>3</sup> ) |
|---|-------------------------------------|---|-------------------------------------|---|---|--------------------|--|
| Domestic  | 64,884,000                          | 64,884,000  | 11,407,643                          | 0.18  | -   | 0%                 | 0.18                                       |
| Non-Domestic  | 43,256,000                          | 43,256,000  | 7,605,095                           | 0.18  | 9,983,152   | 131%               | -0.05                                      |
| Exported to other <sup>(3)</sup><br>County Councils | 44,000,000                          | -   | 3,482,186                           | 0.08  | 5,205,714   | 149%               | -0.04                                      |
| Exported to <sup>(4)</sup><br>other areas           | 16,060,000                          | -   | 1,270,998                           | 0.08  | 1,900,085   | 149%               | -0.04                                      |
| <b>Total</b>  | <b>168,200,000</b>                  | <b>108,140,000</b>                                  | <b>23,765,922</b>                   | <b>0.14</b>   | <b>17,088,951</b>                                   | <b>72%</b>         | <b>0.04</b>                                |

(1) See discussion in text.

(2) A sum of 1,075,723 from Licences Water Pollution Acts and a sum of 3,625,833 from Central Management Support Services are not included in Total Revenue.

(3) Approximate amount of Water that is exported to South Dublin County Council and Dun Laoghaire-Rathdown County Council.

(4) This figure gives the amount of water exported by Dublin Corporation to areas outside greater Dublin. These areas include parts of Kildare and Wicklow and Bray UDC.

Table 2.4.2 for waste water unfortunately does not contain a significant amount of information. A breakdown of Quantity Discharged of waste water between sectors was not readily available but information was received about the amount of discharge into the Dublin Corporation area and especially to the Ringsend Wastewater Treatment Plant. A volume of 110,300,000 m<sup>3</sup>/year goes to this sewage treatment plant and if we exclude 4,900,000 m<sup>3</sup>/year of storm overflow we get the total amount of flow to treatment to the Ringsend plant at approximately 105,400,000 m<sup>3</sup>/year. Included in this total flow are discharges from other local authority areas, which are piped to the plant to be treated. These comprise 9,000,000 m<sup>3</sup>/year from Fingal, 26,100,000 m<sup>3</sup>/year from Dublin South and 17,800,000 m<sup>3</sup>/year from Dun Laoghaire-Rathdown. These are excluded from the total figure given below.

Also the following flows are discharged untreated through the Head of Howth. 17,400,000 m<sup>3</sup>/year comes from Dublin Corporation itself and an additional 4,100,000 m<sup>3</sup>/year comes from Fingal (which is not included in the total below).

A similar story arises with regard to revenue for waste water. About 36 per cent of revenue comes from other local authorities with the rest coming from local charges (commercial and trade effluent charges). However the cost recovery does not reflect this and is very low at 38 per cent.

**Table 2.4.2 Dublin Corporation - Waste Water**

| Quantity Discharged in the Dublin Corporation area m <sup>3</sup> /year | Current Costs (£) | Current Cost per unit input (£/m <sup>3</sup> ) | Total Revenue (£) | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|---|-------------------|---|-------------------|-----------------|--------------------------------------|
| 69,900,000  | 11,961,473        | 0.17  | 4,559,000         | 38%             | 0.11                                 |

Water supply to the **County of Fingal** is supplied from the County's treatment plant on the Liffey at Leixlip which is one of the largest in the Republic following extensions carried out in 1974 and 1985. Quality control of the drinking water supply is provided to ensure that it complies with E.U. and National regulations. A telemetry system relays information on reservoir levels, flows and pressures from remote sites and assists in the management of the water distribution system. A major upgrading and extension of the Telemetry System was completed in 1998.

Looking to Table 2.4.3 we see that Fingal also exports a significant percentage of its water supply (over 50 per cent) to other authorities, some going to Dublin Corporation and other amounts to other areas outside the Dublin region. As with Dublin Corporation a significant amount of revenue (48 per cent) comes from sales of water to other authorities with the remainder coming from Receipts on charges. Using these figures we calculate current cost per unit input for domestic and non-domestic users at £0.27/m<sup>3</sup> and taking revenue into account our calculated implicit subsidy is £0.27/m<sup>3</sup> for domestic users and zero for non-domestic users.



**Table 2.4.3: Fingal County Council - Water Supply**

|   | Water Input<br>m <sup>3</sup> /year | Water input<br>used locally<br>m <sup>3</sup> /year | Current<br>Costs <sup>(1)</sup> (£) | Current<br>Cost per<br>unit input<br>(£/m <sup>3</sup> ) | Total Revenue<br>from sales (£) | % Cost<br>Recovery | Implicit<br>Subsidy<br>(£/m <sup>3</sup> ) |
|---|-------------------------------------|---|-------------------------------------|--|---------------------------------|--------------------|--|
| Domestic  | 12,278,000                          | 12,278,000  | 3,313,529                           | 0.27   | -                               | 0%                 | 0.27                                       |
| Non-Domestic  | 6,484,000                           | 6,484,000   | 1,749,871                           | 0.27   | 1,775,995                       | 101%               | 0  |
| Exported to other <sup>(2)</sup><br>County Councils | 13,870,000                          | -   | 1,166,622                           | 0.08   | 1,166,622                       | 100%               | 0  |
| Exported to <sup>(3)</sup><br>other areas           | 7,665,000                           | -   | 473,978                             | 0.06   | 473,978                         | 100%               | 0  |
| <b>Total</b>  | <b>40,297,000</b>                   | <b>18,762,000</b>                                   | <b>6,704,000</b>                    | <b>0.17</b>  | <b>3,416,595</b>                | <b>51%</b>         | <b>0.08</b>                                |

(1) Pro rata water delivered. We assume that Fingal implements a non-profit policy on water exports to other authorities. Therefore current costs are equal to total revenue on water exported.

(2) This figure gives the approximate amount of water that is exported to Dublin Corporation.

(3) This figure gives the amount of water exported by Fingal to areas outside greater Dublin. These areas include parts of Kildare and Meath.

Again not a lot of information was received on Fingal's waste water service. The quantity discharged includes a figure of 1,054,029 m<sup>3</sup>/year discharged in the Fingal area plus the amount (13,100,000 m<sup>3</sup>/year) that is discharged into the Dublin Corporation region to the Ringsend Wastewater Treatment Plant (see previous discussion). Cost recovery is very poor at 13%, which is reflected in the small difference between the Current Cost per unit input of £0.19/m<sup>3</sup> and the implicit subsidy of £0.17/m<sup>3</sup>.

**Table 2.4.4: Fingal County Council - Waste Water**

| Quantity Discharged in<br>the Fingal area<br>m <sup>3</sup> /year | Current Costs (£) | Current Cost per<br>unit input (£/m <sup>3</sup> ) | Total Revenue<br>(£) | % Cost<br>Recovery | Implicit Subsidy<br>(£/m <sup>3</sup> ) |
|---|-------------------|--|----------------------|--------------------|---|
| 14,154,029  | 2,722,800         | 0.19   | 341,000              | 13%                | 0.17                                    |

**South Dublin County Council** provided better detail on its water supply and waste water services. The authority receives all its treated water from Dublin Corporation which amounts to about 23M m<sup>3</sup>/year (Table 2.4.5). This figure is broken down into its various sectors. Households account for the greater part (61 per cent) of this while commerce has 7 per cent of the share, industry also has 7 per cent of the share and finally agriculture has a very small share of around two-tenths of a per cent. Losses account for a quarter of the total water input. Of the total cost figure £2,100,000 is given to Operational Maintenance, £990,515 to Administration and Maintenance, £2,200,000 to Provision and Improvement (including a payment of £1,900,000 to Dublin Corporation for water purchased) and £324,485 for Miscellaneous. The total revenue raised of £1,686,000 relates to metered supplies. Our calculated figures indicate a current cost per unit input for domestic users at £0.20/m<sup>3</sup> and non-domestic users at £0.44/m<sup>3</sup> while taking revenue into account we get an implicit subsidy of £0.04/m<sup>3</sup> for non-domestic users and £0.20/m<sup>3</sup> for domestic users.

**Table 2.4.5: South Dublin County Council - Water Supply**

|                           | Water Input used Locally m <sup>3</sup> /year | Current Costs <sup>(1)</sup> (£) | Current Cost per unit input (£/m <sup>3</sup> ) | Total Revenue (£) <sup>(2)</sup> | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|---------------------------|---|----------------------------------|---|----------------------------------|-----------------|--------------------------------------|
| Agriculture               | 52,298  | 22,960                           | 0.44  |                                  |                 |                                      |
| Industry                  | 2,080,521                                     | 913,386                          | 0.44  |                                  |                 |                                      |
| Commerce                  | 2,070,917                                     | 909,169                          | 0.44  |                                  |                 |                                      |
| of which metered          | 2,017,260                                     |                                  |   |                                  |                 |                                      |
| unmetered                 | 53,657  |                                  |   |                                  |                 |                                      |
| <b>Total Non-Domestic</b> | <b>4,203,736</b>                              | <b>1,845,515</b>                 | <b>0.44</b>                                     | <b>1,686,000</b>                 | <b>91%</b>      | <b>0.04</b>                          |
| Households                | 18,546,264                                    | 3,769,485                        | 0.20  | -                                | 0%              | 0.20                                 |
| <b>Total</b>              | <b>22,750,000</b>                             | <b>5,615,000</b>                 | <b>0.25</b>                                     | <b>1,686,000</b>                 | <b>30%</b>      | <b>0.17</b>                          |

(1) Distributed pro rata water inputs. Administration and Maintenance Costs have been allocated to non domestic customers as suggested by the county council, though other allocations could be used.

(2) Information on Revenue could not be broken down between sectors.

The bulk of the County's wastewater (Table 2.4.6) is discharged to the Dublin Corporation area via the Dodder Valley Sewer and the Grand Canal Sewer and subsequently to the Ringsend Wastewater Treatment Plant (see previous discussion). The remaining 610,000 m<sup>3</sup>/year is discharged in the South Dublin area. It was not possible to determine how much is discharged by each of the sectors agriculture, industry etc. However South Dublin County Council was able to provide some figures based on trade effluent licences for 66 industries that are monitored. The figures are based on measured discharge flow supplemented with water supply consumption figures and figures agreed between consumers and the Council as to the annual discharge. A further 80 premises are licensed for trade effluent discharges but are not monitored as they are deemed to be too small in terms of discharge. Road Drainage/Surface Water Infiltration or misconnected surface water to the foul drainage system was considered to account for approximately 15 per cent of the total average discharge. Finally Dublin South County Council does not consider that the agricultural sector discharges significant quantities.

The Total Costs incurred by waste water services amounted to £2,893,000 and is broken down as follows: Operation and Maintenance came to £2,500,000 (which includes a payment of £800,000 to Dublin Corporation for the treatment of wastewater and disposal of sludge); wastewater treatment at the Council's own plants cost £91,000; planning and design cost £126,000 and Miscellaneous came to £182,000. With the total revenue amounting to £180,000 this left a minuscule cost recovery of 6 per cent. The implicit subsidy is therefore calculated at £0.10/m<sup>3</sup>.

**Table 2.4.6: South Dublin County Council - Waste Water**

|  | Quantity Discharged in the South Dublin area m <sup>3</sup> /year | Current Costs <sup>(1)</sup> (£) | Current cost per unit | Total Revenue (£) <sup>(2)</sup> | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|--|---|----------------------------------|-----------------------|----------------------------------|-----------------|--------------------------------------|
| Industry (Food)                            | 430,394   | 46,617                           | 0.11                  |                                  |                 |                                      |
| Industry (Pharmaceutical)                  | 16,727  | 1,812                            | 0.11                  |                                  |                 |                                      |
| Electronic                                 | 82,274  | 8,911                            | 0.11                  |                                  |                 |                                      |
| Other Industries                           | 189,636   | 20,540                           | 0.11                  |                                  |                 |                                      |
| Road Drainage / Surface Water Infiltration | 4,006,500   | 433,950                          | 0.11                  |                                  |                 |                                      |
| Other Sectors                              | 21,984,469  | 2,381,170                        | 0.11                  |                                  |                 |                                      |
| <b>Total</b>                               | <b>26,710,000</b>   | <b>2,893,000</b>                 | <b>0.11</b>           | <b>180,000</b>                   | <b>6%</b>       | <b>£0.10</b>                         |

(1) Distributed pro rata discharges.

(2) Information on Revenue could not be broken down between sectors.

Water in the **Dun Laoghaire-Rathdown County** is supplied from Dublin Corporation's water treatment plant which is located at Roundwood, Co Wicklow. This supply is augmented by Dublin Corporation's water treatment plants at Ballyboden and at Ballymore Eustace, Co. Kildare. The current cost on operation and administration amount to £4,510,000. Revenue Raised comes from charges amounting to £703,000. From these figures we calculate a current cost per unit input for both domestic and non-domestic users at £0.21/m<sup>3</sup> while taking revenue into account we get a small negative implicit subsidy of -£0.01/m<sup>3</sup> for non-domestic users and £0.21/m<sup>3</sup> for domestic users.

**Table 2.4.7: Dun Laoghaire-Rathdown County Council - Water Supply**

|              | Water Input used Locally m <sup>3</sup> /year | Current Costs <sup>(1)</sup> (£) | Current Cost per unit input (£/m <sup>3</sup> ) | Total Revenue (£) | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|--------------|---|----------------------------------|---|-------------------|-----------------|--------------------------------------|
| Domestic     | 17,600,000                                    | 3,834,590                        | 0.21  | -                 | 0%              | 0.21                                 |
| Non-Domestic | 3,100,000                                     | 675,410                          | 0.21  | 703,000           | 104%            | -0.01                                |
| <b>Total</b> | <b>20,700,000</b>                             | <b>4,510,000</b>                 | <b>0.21</b>                                     | <b>703,000</b>    | <b>16%</b>      | <b>0.18</b>                          |

(1) Distributed pro rata water inputs.

No wastewater data is given but information from the Ringsend Wastewater Treatment Plant operated by Dublin Corporation shows a discharge from Dun Laoghaire-Rathdown of 17,800,000 m<sup>3</sup>/year to this plant. This figure is included in Table 2.4.9 when we combine information on the waste water service for the Greater Dublin area.

### ***COMBINING INFORMATION ON THE GREATER DUBLIN AREA***

It is now possible to combine the information on the four local authorities comprising Greater Dublin. Tables 2.4.8 and 2.4.9 give the water supply and wastewater services respectively for the Greater Dublin Region. Owing to different accounting practises, these figures need to be viewed as tentative. Looking at water supply first and taking into account transfers from one authority to the next we have calculated a figure of 170,352,000 m<sup>3</sup>/year of water input used locally in the Greater Dublin region.

Two-thirds of it goes to domestic use while one-third goes to non-domestic use. Of the total amount Dublin Corporation handles 63 per cent of water input used locally, Fingal 11 per cent, South Dublin 13 per cent and Dun Laoghaire-Rathdown 13 per cent. Costs of exporting water and payments made from one local authority to another are excluded so the figures relate to total costs incurred by and revenue raised from domestic and non-domestic customers. We calculate the current cost per unit input for domestic users at £0.20/m<sup>3</sup> and non-domestic users at £0.21/m<sup>3</sup>. Taking revenue into account we derive an implicit subsidy of £0.20/m<sup>3</sup> for domestic users and a small negative subsidy of - £0.03/m<sup>3</sup> for non-domestic users.

**Table 2.4.8: Greater Dublin - Water Supply (tentative figures).**

|                               | Water Input used locally m <sup>3</sup> /year | Current Costs <sup>(1)</sup> (£) | Current Cost per unit input (£/m <sup>3</sup> ) | Total Revenue (£) <sup>(2)</sup> | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|-------------------------------|---|----------------------------------|---|----------------------------------|-----------------|--------------------------------------|
| Domestic                      | 113,308,264                                   | 22,325,247                       | 0.20  | -                                | 0%              | 0.20                                 |
| Non-Domestic                  | 57,043,736                                    | 11,875,891                       | 0.21  | 13,550,147                       | 168%            | -0.03                                |
| Total Domestic & Non-Domestic | 170,352,000                                   | 34,201,138                       | 0.20  | 13,550,147                       | 59%             | 0.12                                 |

Moving to wastewater in the Greater Dublin region we estimated that the total amount of water discharged is 146,364,029 m<sup>3</sup>/year. Again in calculating this figure we took into account the flows from one authority to another and so the problem of double counting was eliminated. Of this total figure Dublin Corporation discharged 72 per cent of the wastewater serviced in its own area (included in this is the amount discharged to Dublin Corporation from Dun Laoghaire-Rathdown), Fingal 10 per cent and South Dublin 18 per cent. However looking at where the wastewater is discharged rather than by whom we see that Dublin Corporation receives 87 per cent of all discharged wastewater with Fingal and South Dublin taking the rest. Payments made to local authorities are netted out so with our estimates of cost and revenues we calculate cost recovery at 29 per cent and the implicit subsidy at £0.10/m<sup>3</sup>.

**Table 2.4.9: Greater Dublin - Waste Water (tentative figures)**

| Waste Water Serviced in the Greater Dublin area m <sup>3</sup> /year | Current Costs (£) | Current Cost per unit (£/m <sup>3</sup> ) | Total Revenue (£) | % Cost Recovery | Implicit Subsidy (£/m <sup>3</sup> ) |
|--|-------------------|---|-------------------|-----------------|--------------------------------------|
| 128,564,029  | 17,577,273        | 0.14                                      | 5,080,000         | 29%             | 0.10                                 |

To conclude this subsection giving data on a local authority basis, information on charges is presented next. The following table shows prices of water charged to metered customers by a number of local authorities (Table 2.4.10). There are two points to note. The prices are rather higher than the cost per unit derived from previous tables, which may suggest that marginal cost pricing is employed, to some extent. Secondly the prices are broadly similar indicating that water is in some way a tradeable good. Additional evidence on this comes from our previous tables which have illustrated that water is traded between different authorities in the Greater Dublin region and brings in a significant amount of revenue

to Dublin Corporation, for example. For interest a table of water charges paid by metered customers in 1984 is also presented. Prices in nominal terms have roughly doubled between 1984 and 1999. Table 2.4.11 gives the charges for waste water treatment. The observations above apply to a lesser extent.

Note that the prices actually charged are based on the water that is delivered. On account of leakage and use by the system, prices charged are higher than the price per unit sent out or “per unit input” shown in the previous tables.



**Table 2.4.10: Examples of Water Charges<sup>(1)</sup>**

| Year | Dublin Corporation                        |  | Fingal<br>Co Co    | S Dublin<br>Co Co  | Dun Lao. Rath.<br>Co Co | Cork Corporation   |  | Cork County<br>Council (South) |                                | Cork County<br>Council (North) | Cork County<br>Council (West) |
|------|---|--|--------------------|--------------------|-------------------------|--|--|--------------------------------|--------------------------------|--------------------------------|-------------------------------|
|      | Commercial<br>Rate (in the<br>pound)<br>£ | Commercial<br>Water<br>Charges<br>£ / m <sup>3</sup> | £ / m <sup>3</sup> | £ / m <sup>3</sup> | £ / m <sup>3</sup>      | Commercial<br>Rate (in the<br>pound) <sup>(2)</sup><br>£ | Commercial<br>Water<br>Charges<br>£ / m <sup>3</sup> | Industry<br>£ / m <sup>3</sup> | Commerce<br>£ / m <sup>3</sup> | £ / m <sup>3</sup>             | £ / m <sup>3</sup>            |
| 1994 | -   | -  | -                  | -                  | -                       | 3.40   | 0.39   |                                |                                |                                |                               |
| 1995 | 34.10                                     | 0.433  | -                  | -                  | -                       | 3.57   | 0.41   |                                |                                |                                |                               |
| 1996 | 35.00                                     | 0.447  | -                  | -                  | -                       | 3.60   | 0.42   |                                |                                |                                |                               |
| 1997 | 36.02                                     | 0.469  | -                  | -                  | -                       | 3.65   | 0.44   |                                |                                | 0.407                          |                               |
| 1998 | 37.18                                     | 0.493  | 0.41               | 0.435              | 0.41                    | 3.70   | 0.46   | 0.396                          | 0.363                          | 0.451                          | 0.389                         |
| 1999 | 38.80                                     | 0.517  | 0.43               | 0.455              | 0.45                    | 3.90   | 0.48   | 0.411                          | 0.374                          | 0.495                          | 0.418                         |
| 2000 | 40.54                                     | 0.543  | 0.45               | 0.475              | 0.50                    | 4.10   | 0.50   | 0.429                          | 0.385                          | 0.506                          | 0.462                         |
| 2001 | -   | -  | -                  | -                  | -                       | 4.30   | 0.53   | 0.462                          | 0.396                          |                                | 0.495                         |

(1) To convert from £ / m<sup>3</sup> to £ per 1000 gallons, multiply by 4.545.

(2) This Commercial Rate (£ in £ Valuation) applies to a few consumers outside the Corporation area and to Vintners not supplied by Meter. Other business where water is supplied other than by meter pay a fixed fee per annum.

Table 2.4.10 continued: Local Authority Water Charges 1984

| Leinster       |                        | Ulster   |                        | Munster         |                        | Connacht  |                        | State                  |
|----------------|------------------------|----------|------------------------|-----------------|------------------------|-----------|------------------------|------------------------|
| County         | Price p/m <sup>3</sup> | County   | Price p/m <sup>3</sup> | County          | Price p/m <sup>3</sup> | County    | Price p/m <sup>3</sup> | Price p/m <sup>3</sup> |
| Louth          | 17.60                  | Monaghan | 22.00                  | Cork Corp       | 26.50                  | Sligo     | 22.00                  |                        |
| Meath          | 9.24                   | Cavan    | 24.20                  | Cork Co Co      | 22.00                  | Leitrim   | 26.84                  |                        |
| Dublin Corp    | 20.46                  | Donegal  | 11.00                  | Kerry           | 22.00                  | Mayo      | 14.30                  |                        |
| Dublin Co Co   | 22.00                  |          |                        | Limerick Co Co  | 19.80                  | Galway    | 14.52                  |                        |
| Wicklow        | 15.20                  |          |                        | Limerick Corp   | 17.80                  | Clare     | 23.76                  |                        |
| Wexford        | 13.20                  |          |                        | Tipp NR         | 27.50                  | Roscommon | 22.00                  |                        |
| Longford       | 11.00                  |          |                        | Tipp SR         | 22.00                  |           |                        |                        |
| Carlow         | 17.60                  |          |                        | Waterford Corp  | 15.40                  |           |                        |                        |
| Kilkenny Corp  | 17.60                  |          |                        | Waterford Co Co | 21.10                  |           |                        |                        |
| Kilkenny Co Co | 19.80                  |          |                        |                 |                        |           |                        |                        |
| Offaly         | 22.00                  |          |                        |                 |                        |           |                        |                        |
| Kildare        | 22.00                  |          |                        |                 |                        |           |                        |                        |
| Laois          | 15.40                  |          |                        |                 |                        |           |                        |                        |
| Westmeath      | no data                |          |                        |                 |                        |           |                        |                        |
| Average        | 17.16                  |          | 19.07                  |                 | 21.57                  |           | 20.57                  | <b>19.59</b>           |
| Maximum        | 22.00                  |          | 24.20                  |                 | 27.50                  |           | 26.84                  | <b>27.50</b>           |
| Minimum        | 9.24                   |          | 11.00                  |                 | 15.40                  |           | 20.57                  | <b>9.24</b>            |

**NOTE: THE SECOND DECIMAL PLACE FIGURE RESULTS FROM THE CONVERSION OF SOME PRICES QUOTED IN IR£/1000 GALLONS TO P/M<sup>3</sup>.**

Compiled by the Institute for Industrial Research and Standards (forerunner of Enterprise Ireland) from a telephone survey of local authorities.  
Source: R. Foley, Enterprise Ireland.



**Table 2.4.11: Examples of WasteWater Charges**

| Year | Dublin Corporation <sup>(1)</sup>                        | Fingal Co Co <sup>(2)</sup> | S Dublin Co Co <sup>(3)</sup> |
|------|--|-----------------------------|-------------------------------|
| 1998 | -  | -                           | -                             |
| 1999 | 10.27p/m <sup>3</sup> + (St/303 x 2.18p/m <sup>3</sup> ) | -                           | £0.28/m <sup>3</sup>          |
| 2000 | 10.27p/m <sup>3</sup> + (St/264 x 3.29p/m <sup>3</sup> ) | -                           | £0.35/m <sup>3</sup>          |
| 2001 | 12.36p/m <sup>3</sup> + (St/270 x 2.81p/m <sup>3</sup> ) | £0.20/m <sup>3</sup>        | -                             |

(1) Where St is the concentration of Suspended Solids of Trade effluent, measured in mg/l.

This charge is based on the Mogden formula. St is total Suspended Solids of trade effluent

(2) Proposed for Jan. 2001 and imposed where effluent is disposed of without treatment

(3) Obtained from licensing of trade effluents.

### ***FUTURE AVAILABILITY***

The quality of local authority data that we have presented is not very comprehensive. Past data was unavailable while even present data was not very detailed. Here we discuss some of the ongoing projects that will enhance the availability and quality of future data on water and waste water services.

Presently there is a policy framework agreed by the Government and the Department of the Environment for the development of a more comprehensive and transparent system of charging for water and waste water services in the non-domestic sector (Circular L 4/00). As outlined in this circular, the Government policy framework provides that the full operational cost, including administrative, maintenance and repair costs, in respect of the provision of water and waste water services to non-domestic users, should be recovered. Recovery should be on the basis of the rate of usage using average unit costs', with universal metering of non-domestic users by 2006 at the latest. Therefore a key task for local authorities in giving effect to the policy framework will be the compilation of baseline data to permit proper quantification of the true cost of providing water and waste water services to non-domestic users. The information that will be sought by the Department of the Environment will include: -

#### **Cost and Cost Recovery of Public Water Production**

- Total Volume of Production (m<sup>3</sup> per annum)
- Total Cost of Production (per annum/excluding capital costs) (£m)
- Metered charge per user per annum per m<sup>3</sup>
- Amount of flat rate charge per user per annum
- Total Costs Recovered

#### **Cost and Cost Recovery of Public Waste Water Service**

- Total Capacity of Waste Water Service (p.e.)
- Total Cost of Waste Water Service (per annum/excluding capital costs) (£m)

- Metered charge per user per annum per m<sup>3</sup>
- Amount of Flat rate charge per user per annum

The Department of the Environment will be seeking Periodic Reports to assist in monitoring the achievement of the objectives of the policy framework. The first such report is being requested towards the end of the year 2000 with a reporting deadline of 28<sup>th</sup> February 2001.

Providing such information however is a difficult task as we have encountered. To cope with these difficulties two computer based systems have been developed to provide a database of information on water and waste water services and related activities.

One such example is the Computer Information System (CiS) for water services. This project stemmed from the Government initiative on Programme for Change, which requires that new procedures must be put in place throughout local authorities to instil the principles of efficiency, effectiveness and value in the delivery of public services. The prime function of the CiS system is the establishment of a national information and management system for water services in Local Authorities that will integrate the broad areas of Cost, Quality, Operations and Infrastructure. The system is targeted for use as the backbone of daily operations and management of water services in Local Authorities with associated local and national reporting functionality. The concept of a Complete Information System (CiS) for Water Services evolved from pilot projects undertaken in the development of Management Information Systems in Tipperary North and Donegal County Councils in the period 1994 to 1997. These projects confirmed that Water Services operations in Local Authorities needed a modern, effective and integrated operations and management information system to assist in the provision of the levels of service demanded. After those pilot schemes a special software development team was established in Kerry County Council in mid 1998 to provide for development of the system in close association with the ultimate users – local authority operational staff. It was expected that CiS National Release 2.0, the most updated version, would be completed and distributed to Local Authorities in April 2000, however it appears to us from our collection of data that the CiS has not become fully functional in many local authorities.

A more up to date example, which is along similar lines to the CiS, is *ENVISAGE*. This is a Government Information System (GIS) software package designed for the management of Water Catchment Projects. It addresses various aspects of the water catchment area including:

- Schemes (Water Supply Schemes & Waste Water Schemes)
- Rivers & Lakes
- Farms
- Water Quality (Drinking Water, Bathing Water, Ground Water, River Quality & Lake Quality)
- Discharges (Discharge Points & Pollution Incidents)

- Sludge
- Bathing water (Blue Flag Beaches and other categories)
- Geology

Using the software, detailed maps for any of the above modules (and combination of modules) can be produced. The benefits of ENVISAGE include:

- Automatic production of Water Quality reports for the Environmental Protection Agency
- Recording of Pollution Incidents including cause, severity, fish kills, details of investigation, actions taken, follow up details
- Recording of farm details including assessment of risks posed to neighbouring water sources, details of slurry/manure and silage storage and details of types and numbers of animals on farms
- Recording of Discharge Points including details of licences granted, samples taken and notices issued
- Recording of details regarding Treatment Plants, types of treatment undertaken and disposal methods.

#### **Summary of 2.4**

In summary this sub section analysed the provision of water services by individual water authorities. Due to data restraints we focussed particularly on the greater Dublin region. With regard to our project title 'Time series and Eco-Taxes', firstly, we were unable to produce any time series data. The data that we presented covered just a year and the information here was not entirely comprehensive. Price data was available for 1984 but other figures that were obtained were not informative. This led us to discuss the availability of future data and it seems that in this regard there is some progress brought on by Government initiatives and the need for a more effective and efficient operation of the public services by local authorities. Secondly we conclude from the data that we have presented that in this case Eco-taxes are not charged by local authorities. The water and waste water services are subsidised to households but not to industry and commerce. The subsidies to households could be viewed as a negative eco-tax.

## ***2.5 Conclusion***

This section presented information on discharges to water and use of water services and also assessed the scope of the data and possible developments.

In section 2.1 data on discharges to water for a recent year was presented in considerable detail with breakdowns by economic sector and by industrial sectors in particular. The industrial breakdown was converted from the classification used by the EPA, which undertakes the assembly of data, to the NACE classification, albeit with some difficulty. It was possible to present the 'pollution intensities' of various industrial sectors, that is, the amounts of BOD, N and P lost to waters per unit of value added or per person employed. The EPA's database is still evolving and it is expected that data collection and coverage will become more extensive in future. The outlook for its use as a major source of information is promising provided, that is, that the reclassification of firms into NACE categories becomes an established routine task.

Section 2.2 availed of National Accounts data and presented time series on public provision of water services, that is, water supply and waste water services, for the years 1990 to 1998. Figures were given for total current expenditure on provision of the services, on receipts from charges (current charges) and consequently on the total amount of subsidy. Only in the case of water supply was it possible to give quantities and hence cost per unit and subsidy per unit. Time series of the current cost per unit of water consumed were presented showing the extent of cost recovery from deliveries to the non-domestic and the domestic sectors. It was seen that charges for water supplied to the domestic sector were abolished from the beginning of 1997 so that there is now a 100 per cent subsidy. It might alternatively be termed a benefit-in-kind or a negative eco-tax, in so far as water consumption has environmental implications. There are indeed instances of where some options for expanding water supply could affect water levels in rivers, for example. As stated by the EPA, as a consequence of urban population growth many local authority treatment facilities are under severe pressure, and are sometimes unable to cope with increasing volumes of waste water generated.

Section 2.3 presented information for 1973 to 1998 collected in the Census of Industrial Production on the water supply industry. The interpretation of some of the components recorded is uncertain and there have been changes of definition that need to be elaborated. The Census holds out the possibility of becoming an important source of information as the questions are quite detailed, asking for costs of supplying four types of customer and for total quantity of water sent out. Extending the detail to the four types of customer in the questions to cover quantities and revenue, not to mention extension of the Census to cover waste water services, would be ideal.

Section 2.4 attempted to collect information on water services from local authorities with a view to investigating the extent to which economic data on water services could be reported on a river basin basis, as will be required under the Water Framework Directive. This Directive also requires each

individual sector, such as agriculture, industry and the domestic sector, to pay its way (though Ireland has an opt-out with respect to the domestic sector which accounts for about two thirds of the demand). Attention was focused on the Greater Dublin area by combining four constituent local authorities. The main difficulty found by authorities lay in disaggregating their expenditures by category of customer, which also includes other water authorities. This is not the type of question that they have been required to answer of late and most of them therefore do not address it. It proved difficult to assemble a coherent picture of quantities, expenditures/revenues and charges/subsidies per unit of service owing to apparent inconsistencies. While the domestic sector does not pay for water services, the non-domestic sector is probably paying its way on current costs of water supply, as suggested previously by the figures derived from National Accounts data. Major reforms to the reporting systems of local authorities are underway.

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## Appendix 2.1

### PROVISIONAL CONCORDANCE

#### between EPA and CSO CLASSIFICATIONS

D:/eurostat/EPA-CSOclassificationConcordance.doc; 29 January 2001

EPA classification is taken from: **OSPAR Screening Procedure for Eutrophication Risk in Irish Maritime Waters - Schedule of Industrial Sectors, amended from:**

Environmental Protection Agency Act, 1992, FIRST SCHEDULE

Amendments to the First Schedule, catering for non-IPC Licensable Industry, in *italics* (from P Cunningham 18 August 1999)

**CSO classification is from NACE Rev1, at 99 sector level.**

| <b>EPA code</b> | <b>EPA description</b>   | <b>NACE Rev 1 A60 code</b> | <b>NACE description</b>             |
|-----------------|--|----------------------------|-------------------------------------|
| 1.              | <b><i>MINERALS AND OTHER MATERIALS</i></b>   |                            |                                     |
| 1.1             | The extraction, production and processing of raw asbestos.   | 14.50                      | Mining & quarrying of asbestos.     |
| 1.2             | The extraction of aluminium oxide from an ore.   | 27.42                      | Production of aluminium oxide.      |
| 1.3             | The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts, 1940 to 1979, and storage of related mineral waste. | No NACE Code (used 13)     |                                     |
| 1.4             | The extraction of peat in the course of business which involves an area exceeding 50 hectares.   | 10.30                      | Extraction & agglomeration of peat. |
| 1.5             | Quarries, Aggregates   | 14.10                      | Quarrying of stone                  |
|                 |  |                            |                                     |
| 2.              | <b><i>ENERGY</i></b>   |                            |                                     |
| 2.1             | The production of energy in combustion plant the rated thermal input of which is equal to or greater than  | No NACE Code               |                                     |



|     |   |                |  |
|-----|---|----------------|--|
|     | 50MW other than any such plant which makes direct use of the products of combustion in a manufacturing process.   | (used 40+41)   |  |
| 2.2 | The burning of any fuel in a boiler or furnace with a nominal heat output exceeding 50MW.   | No NACE Code   |  |
|     |   |                |  |
| 3.  | <b><i>METALS</i></b>  |                |  |
| 3.0 | Engineering, Garages, Manufacturing Industry  |                |  |
| 3.1 | The initial melting or production of iron and steel.  | 27.10          | Manufacture of basic iron and steel and of ferro-alloys (ECSC) <sup>26</sup> |
| 3.2 | The processing of iron and steel in forges, drawing plants and rolling mills where the production area exceeds 500 square metres.   | No NACE Code   |  |
| 3.3 | The production, recovery, processing or use of ferrous metals in foundries having melting installations with a total capacity exceeding 5 tonnes.   | 27.51<br>27.52 | Casting of iron in foundries.<br>Casting of steel in foundries               |
| 3.4 | The production, recovery or processing of non-ferrous metals, their compounds or other alloys including antimony, arsenic, beryllium, chromium, lead, magnesium, manganese, phosphorus, selenium, cadmium or mercury, by thermal, chemical or electrolytic means in installations with a batch capacity exceeding 0.5 tonnes. | 27.45          | Other non-ferrous metal production..   |
|     |   |                |  |
| 3.5 | The reaction of aluminium or its alloys with chlorine or its compounds.   | No NACE Code   |  |
| 3.6 | The roasting, sintering or calcining of metallic ores in plants with a capacity exceeding 1,000 tonnes per year.  | 13.10          | Mining of ores.  |
| 3.7 | Swaging by explosives where the production area exceeds 100 square metres.  | No NACE Code   |  |
| 3.8 | The pressing, drawing and stamping of large castings where the production area exceeds 500 square metres.   | 29.52          | Manufacture of machinery for mining quarrying and construction.              |
| 3.9 | Boilermaking and the manufacture of reservoirs, tanks and other sheet metal containers where the production area exceeds 500 square metres.   | 28.21          | Manufacture of tanks, reservoirs and containers of metal.                    |

|      |   |              |   |
|------|---|--------------|---|
| 4.   | <b><i>MINERAL FIBRES AND GLASS</i></b>  |              |   |
| 4.1  | The processing of asbestos and the manufacture and processing of asbestos-based products.   | 14.50        | Mining and quarrying of asbestos  |
| 4.2  | The manufacture of glass fibre or mineral fibre.  | 26.14        | Manufacture of glass fibres.  |
| 4.3  | The production of glass (ordinary and special) in plants with a capacity exceeding 5,000 tonnes per year.   | 26.11        | Manufacture of flat glass.  |
| 4.4  | The production of industrial diamonds.  | 26.15        | Manufacture & processing of other glass                                       |
| 5.   | <b><i>CHEMICALS</i></b>   |              |   |
| 5.1  | The manufacture of chemicals in an integrated chemical installation.  | 24.14        | Manufacture of other organic basic chemicals                                  |
| 5.2  | The manufacture of olefins and their derivatives or of monomers and polymers, including styrene and vinyl chloride.   | 24.14 ?      | Manufacture of other organic basic chemicals?                                 |
| 5.3  | The manufacture, by way of chemical reaction processes, of organic or organo-metallic chemical products other than those specified at 5.2.  | 24.14 ?      | Manufacture of other organic basic chemicals?                                 |
| 5.4  | The manufacture of inorganic chemicals.   | 24.13        | Manufacture of other inorganic basic chemicals                                |
| 5.5  | The manufacture of artificial fertilisers.  | 24.15        | Manufacture of fertilisers and nitrogen compounds                             |
| 5.6  | The manufacture of pesticides, pharmaceuticals or veterinary products and their intermediates.  | 24.20        | Manufacture of pesticides and other agro-chemical products.                   |
| 5.7  | The manufacture of paints, varnishes, resins, inks, dyes, pigments or elastomers where the production capacity exceeds 1,000 litres per week.   | 24.30        | Manufacture of paints, varnishes and similar coatings, printing ink & mastics |
| 5.8  | The formulation of pesticides.  | 24.20        | Manufacture of pesticides and other agro-chemical products.                   |
| 5.9  | The chemical manufacture of glues, bonding agents and adhesives.  | 24.62        | Manufacture of glues and gelatine.  |
| 5.10 | The manufacture of vitamins involving the use of heavy metals.  | No NACE Code |   |
| 5.11 | The storage, in quantities exceeding the values shown, of any one or more of the following chemicals (others than as part of any other activity)-methyl acrylate (20 tonnes); acrylonitrile (20 tonnes); toluene di-isocyanate (20 tonnes); anhydrous ammonia (100 tonnes); | No NACE Code |   |

|     |  |                                     |  |
|-----|--|-------------------------------------|--|
|     | anhydrous hydrogen flouride (1 tonne).   |                                     |  |
| 6.  | <b><i>INTENSIVE AGRICULTURE</i></b>  |                                     |  |
| 6.1 | The rearing of poultry in installations, whether within the same complex or within 100 metres of that complex, where the capacity exceeds 100,000 units have the following equivalents-  | 01.24                               | Farming of poultry.                              |
|     | 1 broiler = 1 unit   |                                     |  |
|     | 1 layer, turkey or other fowl = 2 units.   |                                     |  |
| 6.2 | The rearing of pigs in installations, whether within the same complex or within 100 metres of that complex, where the capacity exceeds 1,000 units on gley soils or 3,000 units on other soils and where units have the following equivalents- | 01.23                               | Farming of swine.                                |
|     | 1 pig = 1 unit   |                                     |  |
|     | 1 sow = 10 units.  |                                     |  |
| 6.3 | Fish Farming (Freshwater)  | 05.02                               | Operation of fish hatcheries and fish farms.     |
| 6.4 | Marts, Animal Holding Facilities   | No NACE Code (used 1)               |  |
|     |  |                                     |  |
| 7.  | <b>Food and Drink</b>  |                                     |  |
| 7.1 | The manufacture of vegetable and animal oils and fats where the capacity for processing raw materials exceeds 40 tonnes per day.   | 15.40                               | Manufacture of vegetable & animal oils and fats. |
| 7.2 | The manufacture of dairy products where the processing capacity exceeds 50 million gallons of milk equivalent per year.  | 15.50                               | Manufacture of dairy products.                   |
| 7.3 | Commercial brewing and distilling, and malting in installations where the production capacity exceeds 100,000 tonnes per year.   | 15.91,<br>15.96,<br>15.97,<br>15.98 | Distilling, Brewing & Malting.                   |
| 7.4 | The slaughter of animals in installations where the daily capacity exceeds 1,500 units and where units have the following equivalents-   | 15.11,<br>15.12                     | Slaughtering & slaughtering of poultry.          |
|     | 1 sheep = 1 unit,  |                                     |  |
|     | 1 pig = 2 units,   |                                     |  |

|     |  |                 |  |
|-----|--|-----------------|--|
|     | 1 head of cattle = 5 units.  |                 |  |
| 7.5 | The manufacture of fish-meal and fish-oil.   | 15.20,<br>15.41 | Manufacture of fishmeal and fish oil production.   |
| 7.6 | The manufacture of sugar.  | 15.83           | Manufacture of sugar.  |
| 7.7 | The rendering of animal by-products.   | 15.11           | Production and preserving of meat.   |
| 7.8 | Fish Processing  | 15.20           | Processing and preserving of fish & fish products.   |
| 7.9 | Confectionery, Bakery  | 15.81,<br>15.84 | Manufacture of rusks & biscuits; manufacture of preserved pastry goods & cakes. Manufacture of cocoa; chocolate and sugar confectionery. |
| 8.  | <b><i>WOOD, PAPER, TEXTILES AND LEATHER</i></b>  |                 |  |
| 8.1 | The manufacture of paper pulp, paper or board (including fibre-board, particle board and plywood) in installations with a production capacity equal to or exceeding 25,000 tonnes of product per year. | 21.11           | Manufacture of pulp.   |
| 8.2 | The manufacture of bleached pulp.  | 21              | Manufacture of pulp.   |
| 8.3 | The treatment or protection of wood, involving the use of preservatives, with a capacity exceeding 10 tonnes per day.  | 20.10           | Sawmilling and planing of wood, impregnation of wood.  |
| 8.4 | The manufacture of synthetic fibres.   | 24.70           | Manufacture of man-made fibres.  |
| 8.5 | The dyeing, treatment or finishing (including moth-proofing and fireproofing) of fibres or textiles (including carpet) where the capacity exceeds 1 tonne per day of fibre, yarn or textile material.  | 17.30           | Finishing of textiles.   |
| 8.6 | The fell-mongering of hides and tanning of leather in installations where the capacity exceeds 100 skins per day.  | 19.10           | Tanning and dressing of leather.   |
| 8.7 | Laundrying   | 93.01           | Washing and drycleaning of textile and fur.  |
| 8.8 | Non-Synthetic Textiles   | 17.00?          | Preparation and spinning of cotton-type fibres?  |
| 8.9 | Photographic Film Processing   | 74.81           | Photographic activities.   |

|      |   |               |  |
|------|---|---------------|--|
| 9.   | <b><i>FOSSIL FUELS</i></b>  |               |  |
| 9.1  | The extraction, other than offshore extraction, of petroleum, natural gas, coal or bituminous shale.  | 11.10         | Extraction of crude petroleum and natural gas.                 |
| 9.2  | The handling or storage of crude petroleum.   | No NACE Code? |  |
| 9.3  | The refining of petroleum or gas.   | 23.20         | Manufacture of refined petroleum products.                     |
| 9.4  | The pyrolysis, carbonisation, gasification, liquefaction, dry distillation, partial oxidation or heat treatment of coal, lignite, oil or bituminous shale, other carbonaceous materials or mixtures of any of these in installations with a processing capacity exceeding 500 tonnes per day. | 23.20         | Manufacture of refined petroleum products.                     |
| 9.5  | Oil Storage Depots  | 23.20         | Manufacture of refined petroleum products.                     |
| 10.  | <b><i>CEMENT</i></b>  |               |  |
| 10.1 | The production of cement.   | 26.51         | Manufacture of cement.   |
| 11.  | <b><i>WASTE</i></b>   |               |  |
| 11.1 | The incineration of hazardous waste.  | 90            | Sewage and refuse disposal, sanitation and similar activities. |
| 11.2 | The incineration of hospital waste.   | 90            | Sewage and refuse disposal, sanitation and similar activities. |
| 11.3 | The incineration of waste other than that mentioned in 11.1 and 11.2 in plants with a capacity exceeding 1 tonne per hour.  | 90            | Sewage and refuse disposal, sanitation and similar activities. |
| 11.4 | The use of heat for the manufacture of fuel from waste.   | 37.10         |  |
| 12.  | <b><i>SURFACE COATINGS</i></b>  |               |  |
| 12.1 | Operations involving coating with organo-tin compounds.   | 28.51         | Treatment & coating of metals.                                 |
| 12.2 | The manufacture or use of coating materials in processes with a capacity to make or use at least 10 tonnes per year of organic solvents, and powder coating manufacture with a capacity to produce at least 50 tonnes per year.   | 28.51         | Treatment & coating of metals.                                 |

|      |  |       |   |
|------|--|-------|---|
| 12.3 | Electroplating operations.   | 28.51 | Treatment & coating of metals.  |
| 13.  | <b><i>OTHER ACTIVITIES</i></b>   |       |   |
| 13.1 | The testing of engines, turbines or reactors where the floor area exceeds 500 square metres.                             | 35.30 | Manufacture of aircraft & spacecraft.                                       |
| 13.2 | The manufacture of integrated circuits and printed circuit boards.   | 32.10 | Manufacture of electronic valves and tubes and other electronic components. |
| 13.3 | Production of lime in a kiln.  | 26.52 | Manufacture of lime in a kiln.  |
| 13.4 | The manufacture of coarse ceramics including refractory bricks, stoneware pipes, facing and floor bricks and roof tiles. | 26.26 | Manufacture of refractory ceramic products.                                 |
| 13.5 | Printing Industry  | 22.22 | Printing n.e.c.   |

## ***Appendix 2.2:***

Questionnaire to Local Authorities requesting information on quantities, costs and revenues relating to water supply and waste water services. Included are the letter, a form to be filled out on water supply and another form on waste water services.



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October 2000

Dear Mr.....,

We are writing to you about a project that we are currently undertaking for EUROSTAT, the EU's Statistical Office. The project, in the *Environmental Accounts* series, includes assembly of data for Ireland on waste water arising and water consumption. In particular it entails estimation of quantities, charges, revenues and costs. We are writing to ask if you would be in a position to help us and whether you would be willing to do so.

The two tables attached provide the frame for the data that we would like to obtain relating to your water authority. The columns refer to quantities, charges, revenues and costs, and the rows give a breakdown of customers. We realise that this is a tall order as much of the information will not be to hand. Even more demanding is the fact that we are interested in obtaining the data for as many years as possible going back in time. However, we gather that some water authorities have detailed records relating to certain areas. For example, information on costs has been assembled over the years in the process of working out the charge in the Rate. In our previous work, such as our study<sup>3</sup> of capital charges to industry, detailed information was readily available to us in some cases and it is by consulting you again that we can see what is feasible now.

It should be added that if you think that you can help but would need assistance with extracting figures, we might be in a position to supply that assistance. We would be grateful if you could fill in the tables and return them in the enclosed s.a.e., even if sections of the tables are left blank. Please do not hesitate to telephone us with your queries or comments. We look forward to hearing from you.

Yours sincerely,

John Eakins

encl.: sae, 2 tables

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<sup>3</sup> *Waste Water Services: Charging Industry the Capital Cost*, 1994. Economic and Social Research Institute, S. Scott and J. Lawlor, Policy Research Series no. 22.



**WATER**

**1998**

**Name of Sanitary Authority:**

.....

|   | Quantity used         | Charge imposed <sup>4</sup> | Total revenue raised <sup>5</sup> |                       | Total costs incurred <sup>6</sup> |                   |
|---|-----------------------|-----------------------------|-----------------------------------|-----------------------|-----------------------------------|-------------------|
| SECTOR using the water:                 | Cubic metres per year | In £ per cubic metre        | £ million                         |                       | £ million                         |                   |
|   |                       |                             | Operational                       | Capital contributions | Operation + admin                 | Capital repayment |
| Agriculture                             |                       |                             |                                   |                       |                                   |                   |
| Industry                                |                       |                             |                                   |                       |                                   |                   |
| Commerce                                |                       |                             |                                   |                       |                                   |                   |
| Households                              |                       |                             |                                   |                       |                                   |                   |
| <b>TOTAL</b>                            |                       |                             |                                   |                       |                                   |                   |
| <b>Direct abstractions <sup>7</sup></b> |                       |                             |                                   |                       |                                   |                   |

Would it be possible to provide this information for several years going back? (Please tick)      Yes %      No %

<sup>4</sup> Please state if the charge is raised as a flat fee or if it includes a separate charge related to peaks or a capital charge recouped separately.

<sup>5</sup> This is the revenue accruing from charges that are specifically raised on water use, and should not include revenue raised through the Rates.

<sup>6</sup> These are total costs incurred by the authority in dealing with water supply.

<sup>7</sup> Direct abstractions would include use of water that the authority does not handle, so that total use is covered in this column.

FURTHER COMMENTS CAN BE WRITTEN OVERLEAF

**WASTE-WATER**

**1998**

**Name of Sanitary Authority:.....**

| SECTOR making the discharges:   | Annual quantity discharged <sup>8</sup> |            |           |          |          | Charge imposed <sup>9</sup>      |        |       |      |      | Total revenue raised <sup>10</sup> |                  | Total costs incurred <sup>11</sup> |                   |
|---|---|------------|-----------|----------|----------|----------------------------------|--------|-------|------|------|------------------------------------|------------------|------------------------------------|-------------------|
|   | m <sup>3</sup> p.a.                     | BOD tonnes | SS tonnes | N tonnes | P tonnes | In £ (per whichever units apply) |        |       |      |      | £ million                          |                  | £ million                          |                   |
|   |   |            |           |          |          | m <sup>3</sup>                   | kg BOD | kg SS | kg N | kg P | Operational                        | Capital contrib. | Operational                        | Capital repayment |
| <b>Agriculture</b><br><i>(if relevant)</i>                                  |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>Industry, of which:</b><br>Food<br>Pharmaceutical<br>Electronic<br>Other |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>Road drainage</b>  |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>Commerce</b>   |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>Households</b>   |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>TOTAL</b>  |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |
| <b>Other discharges <sup>12</sup></b>                                       |   |            |           |          |          |                                  |        |       |      |      |                                    |                  |                                    |                   |

Would it be possible to provide this information for several years going back? (Please tick)      Yes %      No %

<sup>8</sup> This level of detail is not expected to apply to all authorities.

<sup>9</sup> If the charge is imposed as a flat fee or if it relates to concentration or to peak capacity, please describe, briefly.

<sup>10</sup> This is the revenue accruing from charges that are specifically raised on discharges, and should not include revenue raised through the Rates.

<sup>11</sup> These are total costs incurred by the authority in dealing with waste water.

<sup>12</sup> Other discharges would include direct discharges that the authority does not handle, so that total discharges are covered in this column.

FURTHER COMMENTS CAN BE WRITTEN OVERLEAF

## 3. Disposals of Solid Waste

### *3.1 Data Description*

The development of a national waste database by the Environmental Protection Agency (EPA) has resulted in reliable and consistent data series on solid waste streams in Ireland. Prior to the development of the database and its associated data collection structures estimates of national disposals of solid waste were quite limited, concentrating on narrow sectors and with varying accuracy. The doubts on the reliability of earlier estimates can be seen by comparing EPA estimates for 1995 and best alternative estimates for 1994, where the magnitudes of solid waste streams in the two years should be broadly equal. The best alternative estimates for 1994 of urban wastewater sludges is less than 5% of the EPA's estimate for 1995, while the hazardous waste estimate for 1994 is 41% of the EPA's estimate for 1995. For municipal waste the 1994 estimate is much closer to the 1995 estimate at 91% but the composition between household and commercial is grossly at odds between the two years. The EPA's estimates for 1995 being 45% higher for household waste and 38% lower for commercial waste than the alternative estimates for 1994.<sup>13</sup>

The EPA is the agency with responsibility for all waste streams generated in the country and it has the authority to gather all necessary information for this function. Since 1995 it has implemented the necessary structures to collect a consistent data series through time. It has adopted standard procedures, such as the European Waste Catalogue and Hazardous Waste List System, which will enable cross-country comparison. The development of the national waste database by the EPA will play an important role in the development of time series statistics on solid waste.

The focus in the solid waste section of this report is to describe and present the most reliable existing time series on solid waste. Almost all of the time series presented will be collected in the future and therefore represent the basic data sources for inclusion in an environmental time series database. The next section describes in some detail the solid waste data series, which will be followed by some basic analysis of the presented solid waste data. Future availability of these time series is also discussed.

### *3.2 Data Series*

The primary source of solid waste data is the EPA's national waste database, which collates information on sources, types, recovery and disposal of solid waste. Except where otherwise specified the EPA's waste database is the source of data. The EPA database began with data for 1995 and was updated in 1998, thus far providing information for just two years.

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<sup>13</sup> See Table 3.1 in the appendix for the actual estimates of solid waste arising in 1994 and 1995.

### ***Estimates of Solid Waste Arisings***

Aggregate estimates of solid waste are compiled in Table 3.1. This table provides an overall assessment of the level of solid waste arising in the broad sectoral categories, e.g., agriculture and manufacturing, and also estimates of specific types of waste, e.g., hazardous waste and wastewater sludges. The figures presented are for 1995 and 1998 with figures also presented for 1994, though the estimates for 1994 are from alternative sources and not consistent with EPA estimates. The 1994 figures are included to demonstrate their inconsistency with data from later years. As future solid waste data collection will be consistent with the series for 1995 and 1998 this report concentrates on the most accurate time series that will continue to be collected into the future.

### ***Composition Estimates of Household Waste Streams***

Given the relative importance of municipal waste streams in waste management, determining the constituent material in this waste stream is quite important. Table 3.2 decomposes the aggregate figure for the household sector in Table 3.1 into estimates of constituent materials such as paper, glass, metals and textiles. The figures presented include estimates of the gross quantity of waste available for collection, waste landfilled and waste recovered of each of the constituent wastes. The gross quantity of waste available for collection will be always less than the quantity of waste arising (in Table 3.1) and the difference represents an estimate of the quantity of waste arising in the household sector not provided with a waste collection service.

A supplementary table (Table 3.2a) presents the growth rate in the various household waste activities (waste available, landfilled, recovered) between 1995 and 1998. This table shows that the gross quantity of waste available for collection increased by 13% between 1995 and 1998. Also included in Table 3.2a is the percentage share of constituent materials in 1998, which shows that almost 12% of household waste landfilled constituted plastics.

### ***Composition Estimates of Commercial Waste Streams***

Municipal waste largely comprises of wastes from the household and commercial sectors. Tables 3.3 and 3.3a present a similar set of waste composition estimates for the commercial sector as was presented for the household sector in Tables 3.2 and 3.2a

### ***Estimates of Industrial Waste Arisings by NACE Sector***

The industrial sector is the largest source of non-agricultural waste in the economy but the amount of industrial waste generated differs widely between sub-sector industries. To provide more detail on waste arisings in the industrial sector estimates are dis-aggregated by one and two letter NACE codes

with estimates for both hazardous and non-hazardous wastes. These estimates are presented in Table 3.4.

### ***Disposal/Recovery Practices in Surveyed Industrial NACE Sectors***

The estimates of solid wastes from the industrial sector are based on industry surveys, however, this is not feasible for disposal and recovery practices. Disposal/Recovery practices differ significantly across firms so it may not be prudent to estimate disposal/recovery of solid waste based on partial surveys. Rather than present potentially unreliable estimates for the entire industrial sector the estimates presented are actual levels of disposal and recovery of solid wastes in surveyed firms. The table also indicates the total amount of solid waste that is covered by the survey and share of solid waste surveyed in each industrial sector, therefore, indicating the sector coverage of the presented results. The estimates are presented in Table 3.5. The total industrial sector generated 11.8m tonnes of waste in 1998 (from Table 3.4). The survey on waste disposal/recovery practices covered 7.9m tonnes of this waste. Of the 7.9m tonnes of waste surveyed 5.8m tonnes was disposed and 2.1m tonnes were recovered, as presented in Table 3.5. Table 3.5 also indicates that the 7.9m tonnes of surveyed waste in 1998 represents 67% of total solid waste arising in the industrial sector.

Within year sub-sector shares of disposal and recovery practices are presented as supplementary Table 3.5a (Sub-sector shares of Disposal/Recovery Practices in Surveyed Industrial NACE Sectors). These shares simply indicate the sub-sector shares of total industrial sector waste disposal/recovery, e.g. in 1998 the food products sector recovered 69% of all waste recovered by the industrial sector.

### ***Household Waste Charges – 2000***

There is no readily available information on prices for solid waste services in Ireland. Except for private waste management operators who set their own fees, individual local governments determine the fee for solid waste services within their own jurisdiction. Therefore, a variety of systems and pricing structures operate throughout the country without any central reporting agency. There are no environmental taxes charged on solid waste management services.

As an indication of the variety of charges for solid waste services the results of an existing one-time-only survey are presented. The Consumer Association of Ireland surveyed all local governments in 2000 requesting information on household waste collection/disposal. The results of this survey are presented in Table 3.6. Household waste service is generally charged in the following three ways: by volume (e.g. 240 litre bin), by bag (requiring a prepaid tag attached), on by an annual service fee. The table presents the fee information in these three categories for all the local authority jurisdictions for 2000 and denominated in Euro. Although the table is presented in local authority areas the fee information also incorporates charges by private operators, where the information was supplied.

### ***Solid Waste Time Series – Analysis***

Any analysis of waste streams has to consider the associated economic situation. When examining the changes in waste streams between 1995 and 1998 it is important to realise that economic activity was substantially higher in the latter year, 45% higher when using gross domestic product at factor cost as a measure of economic activity. It is not surprising therefore that solid waste has increased in the 1995-98 time period but there have been significant changes in the types of waste generated and how this waste is disposed. These changes are discussed below under the title of each main table in the appendix.

### ***Estimates of Solid Waste Arisings***

The striking feature of Table 3.1 is the very substantial increase in the total weight of solid waste arising per annum between 1995 and 1998. The 1998 estimate at 80m tonnes is almost twice the solid waste arisings in 1995. The primary source of the increase is from the agricultural sector with an increase of 33m tonnes. And the primary source of agricultural waste is animal slurries. During the 1995-98 period there was a large increase in the numbers of agricultural animals, a 17% increase in pig numbers and a 9% increase in cattle numbers, which partly explains the significant increase in agricultural wastes.

The buoyant Irish economy is reflected in several places in the figures in Table 3.1. The solid waste output of the manufacturing sector increased by 38%, while per annum waste output in the utilities sector increased by 28%. Correlated with economic growth the two areas that have seen significant solid waste increases are construction/demolition waste and discarding old vehicles. 1998 construction waste was twice its 1995 level while scrap metal waste (end of life vehicles) in 1998 was 3.5 times higher than 1995.

### ***Composition Estimates of Household Waste Streams***

Table 3.2 presents details of household waste streams from households that have a waste collection service available. Similar to other sectors of the economy the per annum level of waste has increased, overall by 13%. The types of materials that contribute most to the increase in household waste streams are glass, plastics (which is consistent with the apparent increase in packaging) and metals. Parallel with the increase in solid waste generated by the household sector is an increase in the quantity of waste being landfilled. The amount of solid wastes recovered in 1998 decreased from an already low level. The small levels of waste recovery mean that relatively minor changes in recovery lead to the large percentage changes reported in Table 3.2a for organic and plastics.

### ***Composition Estimates of Commercial Waste Streams***

The increase in waste from the commercial sector is even more dramatic and concentrated in specific materials than the household sector. Per annum waste generated has increased by 44% between 1995 and 1998 with the increase being primarily composed of paper and plastics. Quantity landfilled has increased also but waste recovery increased considerably for both paper and plastics

### ***Estimates of Industrial Waste Arisings by NACE Sector***

In the industrial sector per annum solid waste arisings increased by over 50% between 1995 and 1998 though the increase was entirely confined to non-hazardous waste streams. Estimated arisings of hazardous waste in 1998 fell below the 1995 level. Four industrial sectors account for the majority of the increase in solid waste: the mining, food products, chemicals, and construction sectors. On a lesser scale, waste from the textile and wood products sectors also increased. One sector with a significant reduction in solid waste was the non-metallic mineral product sector (NACE code DI), which reduced solid waste from 1.5m tonnes to 0.25m tonnes per annum between 1995 and 1998.

### ***Disposal/Recovery Practices in Surveyed Industrial NACE Sectors***

Table 3.5 examines the disposal/recovery practices of surveyed industrial firms. In line with elsewhere in the economy the amount of solid waste disposed is increasing and is significantly larger than waste recovered. The changes in disposals/recovery presented in Table 3.5 partially reflect changes in survey coverage with the remainder reflecting actual changes in waste management practices. In 1995 58% of industrial waste was covered in the survey and this increased to 87% in 1998. This increase in coverage is directly reflected in the increased tonnage disposed and recovered. As the coverage percentage improves in the future, this table will provide a more accurate reflection of changes in disposal/recovery practices in the industrial sector.

### ***Household Waste Charges – 2000***

Household waste collection/disposal charges are presented in Table 3.6 for all the local administration areas in the country. With the myriad of schemes and pricing structures and lack of information on actual number of households serviced by each scheme it is not possible to determine an accurate average household charge for solid waste services. However the table condenses the information into three types of charges from which we can gauge that the average cost per household is roughly between 130-170 Euro per annum. However, charges vary from a high of 229 Euro per annum to being free. Free solid waste management services were available in some of the Dublin local authority areas. Currently there are no environmental taxes included in solid waste charges.

### ***3.3 Future Availability of Data***

Except for the data on household waste charges, which was from a one-time-only survey, the data series presented will be readily available in future time periods. The source of this data is the Environmental Protection Agency's national waste database, which was established with the collection of data on waste streams during 1995. The database has since been updated with data for 1998 and it is anticipated that the database will continue to be updated in the future, though the frequency of updates is unlikely to be annual.

The national waste database consists of a number of customised sub-databases, which are the local authority/municipal database, an industry database, a waste contractors and recycling organisations database, an agricultural wastes database, a healthcare wastes database and a radioactive wastes database. The overall management and responsibility of the national waste database is with the EPA though local authorities gather information for input into the database. The EPA also gathers information directly from industrial and other sources.

### ***REFERENCES***

- Barrett, Alan and John Lawlor, 1995, *The Economics of Solid Waste Management in Ireland*, Policy Research Series No. 26, Economic and Social Research Institute, Dublin.
- Consumer Choice, *The Magazine of the Consumers' Association of Ireland*, October 2000.
- Environmental Protection Agency, 1996, *National Waste Database Report 1995*, P.O. Box 3000, Johnstown Castle Estate, County Wexford, Ireland
- Environmental Protection Agency, 2000, *National Waste Database Report 1998*, P.O. Box 3000, Johnstown Castle Estate, County Wexford, Ireland



**DATA**

**Table 3.1: Estimates of Solid Waste Arisings**

|                                    | <b>1994*</b><br>tonnes | <b>1995</b><br>tonnes | <b>1998</b><br>tonnes |
|------------------------------------|------------------------|-----------------------|-----------------------|
| Agricultural                       |                        | 31,000,000            | 64,578,724            |
| Manufacturing                      |                        | 3,393,576             | 4,876,406             |
| Energy, Gas & Water Supply         |                        | 351,849               | 448,674               |
| Mining and Quarrying               |                        | 2,200,002             | 3,510,778             |
| Hazardous Waste                    | 99,393                 | 243,754               | 370,328               |
| Municipal Waste:                   | 1,678,699              | 1,848,232             | 2,056,652             |
| :Household                         | 911,665                | 1,324,521             | 1,220,856             |
| :Commercial                        | 767,034                | 476,920               | 754,797               |
| :Street Cleaning                   |                        | 46,791                | 80,999                |
| End of Life Vehicles/Scrap metal** |                        | 52,154                | 187,484               |
| Construction & Demolition Waste    |                        | 1,318,908             | 2,704,958             |
| Urban Wastewater Sludges***        | 37,686                 | 851,380               | 505,686               |
| Drinking Water Sludges             |                        | 58,095                | 38,988                |
| Dredge Spoils                      |                        | 784,600               | 734,000               |
| <b>Total</b>                       | <b>1,815,778</b>       | <b>42,102,550</b>     | <b>80,012,678</b>     |

Source: EPA(2000), and Barrett and Lawlor (1995)

\* 1994 figures are not consistent with other two years

\*\* 1995 figure relates solely to end of life vehicles

\*\*\* 1995 figure is based on a lower percentage solids than was applied in 1998

**Table 3.2: Composition Estimates of Household Waste Streams**

|              | Gross Quantity Available |                  | Quantity Landfilled |                  | Quantity Recovered |               |
|--------------|--------------------------|------------------|---------------------|------------------|--------------------|---------------|
|              | 1995                     | 1998             | 1995                | 1998             | 1995               | 1998          |
|              | tonnes                   | tonnes           | tonnes              | tonnes           | tonnes             | tonnes        |
| Paper        | 233,790                  | 26,723           | 202,151             | 219,573          | 31,639             | 7,150         |
| Glass        | 57,623                   | 75,626           | 49,718              | 61,526           | 7,905              | 14,100        |
| Plastic      | 100,869                  | 134,100          | 100,710             | 133,453          | 159                | 648           |
| Ferrous      | 21,326                   | 23,854           | 20,958              | 22,793           | 368                | 1,062         |
| Aluminium    | 9,346                    | 11,711           | 8,406               | 11,231           | 940                | 480           |
| Other Metals | 3,862                    | 5,828            | 3,862               | 5,828            | -                  | -             |
| Textiles     | 31,224                   | 35,954           | 27,724              | 32,708           | 3,500              | 3,247         |
| Organics     | 352,189                  | 376,207          | 352,159             | 370,542          | 30                 | 5,665         |
| Others       | 216,022                  | 273,213          | 216,022             | 268,046          | -                  | 5,167         |
| <b>Total</b> | <b>1,026,251</b>         | <b>1,163,216</b> | <b>981,710</b>      | <b>1,125,700</b> | <b>44,541</b>      | <b>37,519</b> |

The difference between waste arisings in Table 3.1 and the amount available for collection in Table 3.2 represents an estimate of the quantity of waste arisings in households not provided with a waste collection service

Source: EPA (1996 & 2000)

**Table 3.2a: Composition Estimates of Household Waste Streams - growth rates and shares**

|              | Gross Quantity Available |              | Quantity Landfilled |              | Quantity Recovered |              |
|--------------|--------------------------|--------------|---------------------|--------------|--------------------|--------------|
|              | Growth rate              | 1998 (%)     | Growth rate         | 1998 (%)     | Growth rate        | 1998 (%)     |
|              | 1995-1998                | composition  | 1995-1998           | composition  | 1995-1998          | composition  |
| Paper        | -3.0                     | 19.5         | 8.6                 | 19.5         | -77.4              | 19.1         |
| Glass        | 31.2                     | 6.5          | 23.7                | 5.5          | 78.4               | 37.6         |
| Plastic      | 32.9                     | 11.5         | 32.5                | 11.9         | 307.5              | 1.7          |
| Ferrous      | 11.9                     | 2.1          | 8.8                 | 2.0          | 188.6              | 2.8          |
| Aluminium    | 25.3                     | 1.0          | 33.6                | 1.0          | -48.9              | 1.3          |
| Other Metals | 50.9                     | 0.5          | 50.9                | 0.5          |                    | 0.0          |
| Textiles     | 15.1                     | 3.1          | 18.0                | 2.9          | -7.2               | 8.7          |
| Organics     | 6.8                      | 32.3         | 5.2                 | 32.9         | 18783.3            | 15.1         |
| Others       | 26.5                     | 23.5         | 24.1                | 23.8         |                    | 13.8         |
| <b>Total</b> | <b>13.3</b>              | <b>100.0</b> | <b>14.7</b>         | <b>100.0</b> | <b>-15.8</b>       | <b>100.0</b> |

**Table 3.3: Composition Estimates of Commercial Waste Streams**

|              | Gross Quantity Available |                | Quantity Landfilled |                | Quantity Recovered |                |
|--------------|--------------------------|----------------|---------------------|----------------|--------------------|----------------|
|              | 1995                     | 1998           | 1995                | 1998           | 1995               | 1998           |
|              | tonnes                   | tonnes         | tonnes              | tonnes         | tonnes             | tonnes         |
| Paper        | 275,583                  | 415,429        | 223,222             | 328,277        | 52,361             | 87,152         |
| Glass        | 40,014                   | 41,132         | 19,419              | 19,232         | 20,595             | 21,900         |
| Plastic      | 38,509                   | 66,303         | 38,274              | 59,475         | 235                | 6,828          |
| Ferrous      |                          | 8,705          |                     | 5,698          |                    | 3,007          |
| Aluminium    |                          | 3,744          |                     | 3,493          |                    | 251            |
| Other Metals | 4,603                    | 409            | 4,603               | 381            | -                  | 28             |
| Textiles     | -                        | 3,434          | -                   | 3,434          | -                  | -              |
| Organics     | 90,112                   | 84,662         | 90,112              | 84,662         | -                  | -              |
| Others       | 28,100                   | 65,417         | 28,100              | 55,417         | -                  | 10,000         |
| <b>Total</b> | <b>476,921</b>           | <b>689,235</b> | <b>403,730</b>      | <b>560,069</b> | <b>73,191</b>      | <b>129,166</b> |

The difference between waste arisings in Table 3.1 and the amount available for collection in Table 3.3 represents an estimate of the quantity waste from commercial enterprises not provided with a waste collection service  
Source: EPA (1996 & 2000)

**Table 3.3a: Composition Estimates of Commercial Waste Streams - growth rates and shares**

|              | Gross Quantity Available |              | Quantity Landfilled |              | Quantity Recovered |              |
|--------------|--------------------------|--------------|---------------------|--------------|--------------------|--------------|
|              | Growth rate              | 1998 (%)     | Growth rate         | 1998 (%)     | Growth rate        | 1998 (%)     |
|              | 1995-1998                | composition  | 1995-1998           | composition  | 1995-1998          | composition  |
| Paper        | 50.7                     | 60.3         | 47.1                | 58.6         | 66.4               | 67.5         |
| Glass        | 2.8                      | 6.0          | -1.0                | 3.4          | 6.3                | 17.0         |
| Plastic      | 72.2                     | 9.6          | 55.4                | 10.6         | 2805.5             | 5.3          |
| Ferrous      |                          | 1.3          |                     | 1.0          |                    | 2.3          |
| Aluminium    |                          | 0.5          |                     | 0.6          |                    | 0.2          |
| Other Metals | -91.1                    | 0.1          | -91.7               | 0.1          |                    | 0.0          |
| Textiles     |                          | 0.5          |                     | 0.6          |                    | 0.0          |
| Organics     | -6.0                     | 12.3         | -6.0                | 15.1         |                    | 0.0          |
| Others       | 132.8                    | 9.5          | 97.2                | 9.9          |                    | 7.7          |
| <b>Total</b> | <b>44.5</b>              | <b>100.0</b> | <b>38.7</b>         | <b>100.0</b> | <b>76.5</b>        | <b>100.0</b> |

**Table 3.4: Estimates of Industrial Waste Arisings by NACE Sector**

|  | NACE<br>code | Hazardous      |                | Non-Hazardous    |                   | Total Industrial |                   |
|--|--------------|----------------|----------------|------------------|-------------------|------------------|-------------------|
|  |              | 1995<br>tonnes | 1998<br>tonnes | 1995<br>tonnes   | 1998<br>tonnes    | 1995<br>tonnes   | 1998<br>tonnes    |
| Mining (excludes quarrying)                              | C            | 2              | 865            | 2,200,002        | 3,510,778         | 2,200,004        | 3,511,643         |
| Food Products; Beverages and Tobacco                     | DA           | 3,653          | 2,343          | 894,931          | 2,356,418         | 898,584          | 2,358,761         |
| Textiles and Textile Products                            | DB           | 101            | 932            | 53,206           | 116,052           | 53,307           | 116,984           |
| Leather and Leather Products                             | DC           | 19             | 23             | 208,783          | 53,790            | 208,802          | 53,813            |
| Wood and Wood Products                                   | DD           | 5              | 1,061          | 21,816           | 287,257           | 21,821           | 288,318           |
| Pulp, Paper and Paper Products; Printing, Publishing     | DE           | 216            | 1,107          | 181,946          | 164,267           | 182,162          | 165,374           |
| Coke, Refined Petroleum Products and Nuclear Fuel        | DF           | 6,886          | 6,690          | 3,581            | 22,584            | 10,467           | 29,274            |
| Chemicals, Chemical Products and Man-made Fibres         | DG           | 179,809        | 208,592        | 149,695          | 1,324,407         | 329,504          | 1,532,999         |
| Rubber and Plastic Products                              | DH           | 1,870          | 1,051          | 56,051           | 24,974            | 57,921           | 26,025            |
| Other Non-metallic Mineral Products (includes quarrying) | DI           | 16,125         | 874            | 1,533,931        | 265,755           | 1,550,056        | 266,629           |
| Basic Metals and Fabricated Metal Products               | DJ           | 13,109         | 5,497          | 205,174          | 114,301           | 218,283          | 119,798           |
| Machinery and Equipment not elsewhere classified         | DK           | 539            | 1,975          | 35,601           | 40,118            | 36,140           | 42,093            |
| Electrical and Optical Equipment                         | DL           | 4,157          | 4,385          | 44,492           | 48,401            | 48,649           | 52,786            |
| Transport Equipment                                      | DM           | -              | 2,183          | 1,326            | 32,228            | 1,326            | 34,411            |
| Manufacturing not elsewhere classified                   | DN           | 581            | 348            | 3,043            | 25,856            | 3,624            | 26,204            |
| <i>Sub-total Manufacturing</i>                           |              | <i>227,070</i> | <i>237,061</i> | <i>3,393,576</i> | <i>4,876,408</i>  | <i>3,620,646</i> | <i>5,113,469</i>  |
| Electricity, Gas and Water Supply                        | E            | 1,458          | 966            | 351,849          | 448,674           | 353,307          | 449,640           |
| Construction   | F            | 1,212          |                | 1,318,908        | 2,704,958         | 1,320,120        | 2,704,958         |
| Transport, Storage and Communication                     | I            | 13,257         |                | 136,568          |                   | 149,825          | -                 |
| Unspecified  |              | 756            |                | 10,082           |                   | 10,838           | -                 |
| <b>Total</b>   |              | <b>243,755</b> | <b>238,892</b> | <b>7,410,985</b> | <b>11,540,818</b> | <b>7,654,740</b> | <b>11,779,710</b> |

Source: EPA (1996 & 2000)

**Table 3.5: Disposal/Recovery Practices in Surveyed Industrial NACE Sectors**

|  | NACE code | Disposal         |                  | Recovery       |                  | Other        |             | Total Surveyed*  |                  | Survey as a % of total waste* |             |
|--|-----------|------------------|------------------|----------------|------------------|--------------|-------------|------------------|------------------|-------------------------------|-------------|
|  |           | 1995 tonnes      | 1998 tonnes      | 1995 tonnes    | 1998 tonnes      | 1995 tonnes  | 1998 tonnes | 1995 tonnes      | 1998 tonnes      | 1995 %                        | 1998 %      |
| Mining (excludes quarrying)                              | C         | 2,200,002        | 3,498,083        | 2              | 13,560           |              |             | 2,200,004        | 3,511,643        | 100.0                         | 100.0       |
| Food Products; Beverages and Tobacco                     | DA        | 215,844          | 188,085          | 142,011        | 1,449,218        | 573          | 0           | 358,428          | 1,637,303        | 39.9                          | 69.4        |
| Textiles and Textile Products                            | DB        | 10,741           | 68,636           | 9,806          | 14,442           | 277          | 5           | 20,824           | 83,083           | 39.1                          | 71.0        |
| Leather and Leather Products                             | DC        | 4,930            | 7,454            | 5,901          | 13,603           |              |             | 10,831           | 21,057           | 5.2                           | 39.1        |
| Wood and Wood Products                                   | DD        | 865              | 22,882           | 1,608          | 221,377          | 5            |             | 2,478            | 244,259          | 11.4                          | 84.7        |
| Pulp, Paper and Paper Products; Printing, Publishing     | DE        | 16,291           | 5,212            | 63,843         | 14,287           |              |             | 80,134           | 19,499           | 44.0                          | 11.8        |
| Coke, Refined Petroleum Products and Nuclear Fuel        | DF        | 3,566            | 22,598           | 6,901          | 6,676            |              |             | 10,467           | 29,274           | 100.0                         | 100.0       |
| Chemicals, Chemical Products and Man-made Fibres         | DG        | 149,209          | 1,320,233        | 121,029        | 178,757          | 216          | 70          | 270,454          | 1,499,060        | 82.1                          | 97.8        |
| Rubber and Plastic Products                              | DH        | 23,463           | 9,535            | 5,264          | 8,123            | 26           |             | 28,753           | 17,658           | 49.6                          | 67.9        |
| Other Non-metallic Mineral Products (includes quarrying) | DI        | 401,741          | 204,405          | 42,336         | 8,482            | 534          |             | 444,611          | 212,887          | 28.7                          | 79.8        |
| Basic Metals and Fabricated Metal Products               | DJ        | 60,082           | 19,667           | 9,563          | 67,023           |              | 86          | 69,645           | 86,776           | 31.9                          | 72.4        |
| Machinery and Equipment not elsewhere classified         | DK        | 15,039           | 1,253            | 525            | 2,491            | 72           |             | 15,636           | 3,744            | 43.3                          | 8.9         |
| Electrical and Optical Equipment                         | DL        | 16,125           | 14,915           | 6,607          | 8,829            | 281          | 1           | 23,013           | 23,745           | 47.3                          | 45.0        |
| Transport Equipment                                      | DM        | 5                | 5,903            | 5              | 1,341            |              |             | 10               | 7,244            | 0.8                           | 21.1        |
| Manufacturing not elsewhere classified                   | DN        | 265              | 4,552            | 560            | 8,017            | 137          |             | 962              | 12,569           | 26.5                          | 48.0        |
| <i>Sub-total Manufacturing</i>                           |           | <i>918,166</i>   | <i>1,895,330</i> | <i>415,959</i> | <i>2,002,666</i> | <i>2,121</i> | <i>162</i>  | <i>1,336,246</i> | <i>3,898,158</i> | <i>36.9</i>                   | <i>76.2</i> |
| Electricity, Gas and Water Supply                        | E         | 262,540          | 377,757          | 60,746         | 71,883           |              |             | 323,286          | 449,640          | 91.5                          | 100.0       |
| Construction   | F         | 152,090          |                  | 280,764        |                  | 824          |             | 433,678          | -                | 32.9                          |             |
| Transport, Storage and Communication                     | I         | 106,295          |                  | 953            |                  | 21           |             | 107,269          | -                | 71.6                          |             |
| Unspecified  |           | 6,506            |                  | 4,060          |                  | 272          |             | 10,838           | -                | 100.0                         |             |
| <b>Total</b>   |           | <b>3,645,599</b> | <b>5,771,170</b> | <b>762,484</b> | <b>2,088,109</b> | <b>3,238</b> | <b>162</b>  | <b>4,411,321</b> | <b>7,859,441</b> | <b>58%</b>                    | <b>67%</b>  |

Source: EPA (1996 & 2000)

\* Data on disposal/recovery practices is survey based. The figures in the final two columns represent the percentage of waste arisings for which disposal/recovery data is available through survey

**Table 3.5a: Sub-sector shares of Disposal/Recovery Practices in Surveyed Industrial NACE Sectors\***

|  | NACE<br>code | Disposal |         | Recovery |         | Other   |         |
|--|--------------|----------|---------|----------|---------|---------|---------|
|  |              | 1995     | 1998    | 1995     | 1998    | 1995    | 1998    |
|  |              | % share  | % share | % share  | % share | % share | % share |
| Mining (excludes quarrying)                              | C            | 60.3     | 60.6    | 0.0      | 0.6     | -       | -       |
| Food Products; Beverages and Tobacco                     | DA           | 5.9      | 3.3     | 18.6     | 69.4    | 17.7    | 0.0     |
| Textiles and Textile Products                            | DB           | 0.3      | 1.2     | 1.3      | 0.7     | 8.6     | 3.1     |
| Leather and Leather Products                             | DC           | 0.1      | 0.1     | 0.8      | 0.7     | -       | -       |
| Wood and Wood Products                                   | DD           | 0.0      | 0.4     | 0.2      | 10.6    | 0.2     | -       |
| Pulp, Paper and Paper Products; Printing, Publishing     | DE           | 0.4      | 0.1     | 8.4      | 0.7     | -       | -       |
| Coke, Refined Petroleum Products and Nuclear Fuel        | DF           | 0.1      | 0.4     | 0.9      | 0.3     | -       | -       |
| Chemicals, Chemical Products and Man-made Fibres         | DG           | 4.1      | 22.9    | 15.9     | 8.6     | 6.7     | 43.2    |
| Rubber and Plastic Products                              | DH           | 0.6      | 0.2     | 0.7      | 0.4     | 0.8     | -       |
| Other Non-metallic Mineral Products (includes quarrying) | DI           | 11.0     | 3.5     | 5.6      | 0.4     | 16.5    | -       |
| Basic Metals and Fabricated Metal Products               | DJ           | 1.6      | 0.3     | 1.3      | 3.2     | -       | 53.1    |
| Machinery and Equipment not elsewhere classified         | DK           | 0.4      | 0.0     | 0.1      | 0.1     | 2.2     | -       |
| Electrical and Optical Equipment                         | DL           | 0.4      | 0.3     | 0.9      | 0.4     | 8.7     | 0.6     |
| Transport Equipment                                      | DM           | 0.0      | 0.1     | 0.0      | 0.1     | -       | -       |
| Manufacturing not elsewhere classified                   | DN           | 0.0      | 0.1     | 0.1      | 0.4     | 4.2     | -       |
| <i>Sub-total Manufacturing</i>                           |              | 25.2     | 32.8    | 54.6     | 95.9    | 65.5    | 100.0   |
|  |              | -        | -       | -        | -       | -       | -       |
| Electricity, Gas and Water Supply                        | E            | 7.2      | 6.5     | 8.0      | 3.4     | -       | -       |
|  |              | -        | -       | -        | -       | -       | -       |
| Construction   | F            | 4.2      | -       | 36.8     | -       | 25.4    | -       |
| Transport, Storage and Communication                     | I            | 2.9      | -       | 0.1      | -       | 0.6     | -       |
| Unspecified  |              | 0.2      | -       | 0.5      | -       | 8.4     | -       |
|  |              | -        | -       | -        | -       | -       | -       |
| <b>Total</b>   |              | 100.0    | 100.0   | 100.0    | 100.0   | 100.0   | 100.0   |

\* Data on disposal/recovery practices is survey based. The figures in the Disposal, Recovery and Other columns give industry shares of total disposal/recovery practices surveyed.

**Table 3.6: Household Waste Charges - 2000**

| Authority  | Type <sup>1</sup> | per year overall <sup>2</sup> (Euro) | per 240 litre bin yearly (Euro) | per tag or bag (Euro) | Authority                      | Type <sup>1</sup> | per year overall <sup>2</sup> (Euro) | per 240 litre bin yearly (Euro) | per tag or bag (Euro) |
|--|-------------------|--------------------------------------|---------------------------------|-----------------------|--------------------------------|-------------------|--------------------------------------|---------------------------------|-----------------------|
| <b>Council Councils</b>  |                   |                                      |                                 |                       | <b>Urban District Councils</b> |                   |                                      |                                 |                       |
| Carlow   | p                 |                                      | 152-198                         | 1.65-1.90             | Arklow                         | p                 | 165                                  |                                 | 1.90                  |
| Cavan  | pc                | 122-127                              |                                 |                       | Athlone                        | c                 | 95                                   |                                 |                       |
| Clare  | pc                |                                      | 152                             |                       | Athy                           | p                 | na                                   |                                 |                       |
| Cork   | pc                | 152                                  |                                 | 2.03                  | Ballina                        | pc                | 152                                  |                                 |                       |
| Donegal  | p                 | na                                   |                                 |                       | Ballinasloe                    | p                 |                                      | 141                             |                       |
| Dun Laoghaire/Rathdown   | c                 | 191                                  |                                 |                       | Birr                           | p                 |                                      | 190                             | 1.65                  |
| Fingal   | c                 | free                                 |                                 |                       | Bray                           | p                 |                                      |                                 | 1.90                  |
| Galway   | p                 | 229                                  |                                 |                       | Buncrana                       | p                 | 99                                   |                                 | 1.90                  |
| Kerry  | c                 |                                      | 178                             |                       | Bundoran                       | p                 | na                                   |                                 |                       |
| Kildare  | p                 |                                      | 146                             |                       | Carlow                         | p                 | 193                                  |                                 | 1.27                  |
| Kilkenny   | p                 |                                      | 190-198                         | 1.59-1.90             | Carrickmacross                 | p                 | 122                                  |                                 |                       |
| Laois  | p                 |                                      | 152                             | 1.65                  | Carrick-on-Suir                | pc                | 121                                  |                                 |                       |
| Leitrim  | p                 | 152                                  |                                 |                       | Cashel                         | c                 | 133                                  |                                 |                       |
| Limerick   | pc                | 83-165                               |                                 |                       | Castlebar                      | pc                |                                      | 152-165                         | 2.22                  |
| Longford   | p                 |                                      | 152                             | 1.27                  | Castleblaney                   | p                 | 122                                  |                                 |                       |
| Louth  | p                 |                                      | 213                             |                       | Cavan                          | p                 | 127                                  |                                 |                       |
| Mayo   | pc                |                                      | 152                             |                       | Clonakilty                     | c                 | 152                                  |                                 |                       |
| Meath  | p                 |                                      | 190-213                         | 1.97-2.03             | Clones                         | p                 |                                      | 122                             |                       |
| Monaghan   | p                 |                                      | 122-213                         |                       | Cobh                           | pc                | 152                                  |                                 |                       |
| Offaly   | p                 |                                      |                                 | 1.65                  | Dundalk                        | p                 | 127                                  |                                 |                       |
| Roscommon  | p                 |                                      | 152-213                         |                       | Dungarvan                      | c                 | 132                                  |                                 | 2.54                  |
| Sligo  | p                 |                                      | 145-184                         |                       | Ennis                          | c                 |                                      | 114                             |                       |
| South Dublin   | pc                | free                                 |                                 |                       | Enniscorthy                    | c                 |                                      | 210                             |                       |
| Tipperary North  | p                 | 145-190                              |                                 | 1.65-2.16             | Fermoy                         | c                 |                                      |                                 | 2.03                  |
| Tipperary South  | pc                | 152                                  |                                 |                       | Kells                          | p                 | 190                                  |                                 |                       |
| Waterford  | pc                |                                      | 183                             | 1.52-1.65             | Killarney                      | pc                | 146                                  |                                 |                       |
| Westmeath  | b                 |                                      | 54                              |                       | Kilrush                        | p                 |                                      | 127                             |                       |
| Wexford  | c                 |                                      | 152-190                         | 1.97                  | Kinsale                        | pc                | 152                                  |                                 |                       |
| Wicklow  | p                 |                                      | 152-178                         | 1.52-2.03             | Letterkenny                    | p                 | na                                   |                                 |                       |
| <b>County Borough Corporations</b>   |                   |                                      |                                 |                       | Listowel                       | c                 | 157                                  |                                 |                       |
| Cork   | c                 | 152                                  |                                 |                       | Longford                       | p                 |                                      | 152                             |                       |
| Dublin   | c                 | free                                 |                                 |                       | Macroom                        | p                 | 140                                  |                                 |                       |
| Galway   | pc                | 152                                  |                                 |                       | Mallow                         | c                 | 102                                  |                                 |                       |
| Limerick   | p                 | na                                   |                                 |                       | Middletown                     | c                 | 152                                  |                                 |                       |
| Waterford  | c                 |                                      |                                 | 2.54                  | Monaghan                       | c                 | 114                                  |                                 |                       |
| <b>Borough Corporations</b>  |                   |                                      |                                 |                       | Naas                           | p                 |                                      | 152                             |                       |
| Clonmel  | c                 | 140                                  |                                 |                       | Navan                          | p                 |                                      | 190                             | 1.97                  |
| Drogheda   | c                 | 140                                  |                                 |                       | Nenagh                         | p                 |                                      | 145-165                         | 1.65-2.16             |
| Kilkenny   | c                 | 152                                  |                                 |                       | New Ross                       | c                 |                                      | 204                             |                       |
| Sligo  | c                 | 127                                  |                                 |                       | Skibbereen                     | c                 | 152                                  |                                 |                       |
| Wexford  | c                 | 124                                  |                                 |                       | Templemore                     | p                 |                                      | 145-190                         | 1.65-2.16             |
| 1. Type refers to the source from which the data derives.<br>'p' refers to a private operated waste service and 'c' refers to a council operated waste collection service. |                   |                                      |                                 |                       | Thurles                        | pc                |                                      |                                 | 1.59                  |
| 2. Where information was not available/supplied, this is indicated by 'na'.  |                   |                                      |                                 |                       | Tipperary                      | c                 | 121                                  |                                 |                       |
|  |                   |                                      |                                 |                       | Tralee                         | c                 | 184                                  |                                 |                       |
|  |                   |                                      |                                 |                       | Trim                           | p                 |                                      | 190-213                         | 1.97-2.03             |
|  |                   |                                      |                                 |                       | Tullamore                      | p                 |                                      | 190-198                         | 1.65                  |
|  |                   |                                      |                                 |                       | Westport                       | c                 |                                      | 152                             |                       |
|  |                   |                                      |                                 |                       | Wicklow                        | p                 | 178                                  |                                 |                       |
|  |                   |                                      |                                 |                       | Youghal                        | c                 | 152                                  |                                 |                       |

Source: Consumer Choice, October 2000

