

**NORTHERN IRELAND'S  
ENVIRONMENTAL INDUSTRY:  
EMPLOYMENT FORECASTS TO THE  
YEAR 2000**

*Introduction*

Environmental industry within the European Union (EU) has expanded considerably since 1990, and is expected to continue to grow as we move towards the 21st Century (BERENDS, 1995; ENVIRONMENTAL INDUSTRIES COMMISSION (EIC), 1995; INTERNATIONAL ENVIRONMENT REPORTER (IER), 1995; WILKES, 1995). This article sets out some estimates of the employment impact of this growth for Northern Ireland up to the year 2000. The European Commission (EC) has estimated that there were over one million jobs, in 1994, in the EU's eco-industries (EC, 1997). They also concluded that both in output and employment growth, this area will outstrip the

rest of the economy in the future. In 1996, a study commissioned by the Northern Ireland Department of Economic Development (EASTWOOD *et al.*, 1996) examined the region's prospects for expansion in this sector. As with the above and previous EU studies (EC, 1993), a production side approach was adopted and 11 main groups of environmental output were identified, each with sub-sectors. These groups included not only those identified in the EC studies but also additional areas such as energy conservation, recycling, eco-tourism, and forestry and organic farming. It is not our intention here to contribute to a debate on the definition of eco-industries. However, and to avoid any confusion, we call our broader grouping the Green Production Sector (GPS) – (see EASTWOOD *et al.*, 1995, for further details). Over 10 different data sources were used in our study, including the Censuses of Production, Employment, and the Kompass Ireland data bank.

*Table 1. Persons working in the Northern Ireland green production sector, by type of production and employment status, 1993<sup>1</sup>*

Type of green production (main groups)	All employment	%	Full-time	Part-time
1. Pollution control and treatment	3,119	24.1	3,091	28
2. Waste disposal and collection	2,012	15.6	1,999	13
3. Recycling and re-use	1,225	9.5	1,172	53
4. Energy conservation	2,337	18.1	2,153	184
5. Consultancy and monitoring	835	6.5	668	167
6. Heritage, eco-tourism	1,368	10.6	1,094	274
7. Research and education	296	2.3	296	–
8. Forestry and organic farming	621	4.8	598	23
9. Eco-capital equipment	796	6.2	745	51
10. In-firm green production	230	1.8	230	–
11. Green product production	77	0.6	72	5
Total	12,916	100.0	12,118	798

Note: 1. Including self-employed.

Source: UUC GPS database, 1996.

Table 1 shows that, in 1993, Northern Ireland's Green Production Sector gave jobs estimated at over 12,900 persons. This amounted to 2.06% of Northern Ireland's total civilian employment and, as such, exceeds employment in the region's banking, shipbuilding, paper, synthetics and chemical industries (NORTHERN IRELAND ANNUAL ABSTRACT OF STATISTICS (NIAAS), 1996, Table 11.5). The traditional areas of environmental action – pollution control and treatment, and waste disposal and collection – accounted for almost 40% of this employment. The other main areas were energy conservation (18%), heritage and eco-tourism (10%), and recycling and re-use (9.5%). Of these five areas, three account for 77% of the forecasted increase in GPS employment (see Table 5). In this review we examine these three groups in greater detail and outline a series of tentative employment projections to the turn of the century. Data were collected only for 1983, 1988 and 1993. Forecasting is thus restricted to an analysis of trends between these three points and was conditioned by expected developments in the next few years.

*Pollution control and treatment*

This is the largest green production employment group with over 3,100 jobs in 1993. In Table 2 we identify

*Table 2. Persons working in pollution control and treatment by subgroups, 1983–93*

Subgroup	1983		1988		1993	
	Units	Employment	Units	Employment	Units	Employment
Disinfection	2	25	2	16	2	21
Oil Pollution	1	2	1	2	4	22
Effluence, sewage and water purification	16	2,735	27	2,798	31	2,753
Noise pollution	1	2	2	22	3	26
Air pollution	2	128	2	127	4	297
Total	22	2,892	34	2,965	43	3,119

Source: UUC GPS database, 1996.

five subgroups and a growth in the number of units (broadly speaking – departments, firms or institutions) from 22 in 1983 to 43 in 1993. Most of these are very small units. The dominating employer, with over 90% of the jobs in the entire main group, is the NI Department of the Environment's (DoE) Water Executive. This body is responsible for the supply of purified water etc. on the one hand, and sewage disposal on the other. In most European countries (England and Wales are partial exceptions) water and sewage disposal are supplied jointly. There are two reasons for this. The first is that 99% of sewage is water. Secondly, sewage imposes serious negative externalities on the supply of good quality clean water. One method of internalizing these external costs is through the principle of joint supply.

From a theoretical basis, we must be aware that neither water supply nor sewage disposal *per se* is a public good. Their consumption possesses both 'rivalness' and 'excludability' – the classic properties of a private good. However, the existence of externalities (such as the reduced risk of disease) and the fact that water is seen as a merit good means that these supplies are different from normal private goods. Moreover, the supplies of both involve geographically natural monopolies. It is for these reasons that not only do we generally have joint supply in most countries but also local or regional government control. Again, an exception to this pattern is the privatized provision in England and Wales.

A second feature is that water–sewage disposal has been legislation driven. In Northern Ireland, the Public Health Acts of the nineteenth century along with a host of subsequent legislation have provided guidelines. More recently, the ever growing EU Directives have continued to set the parameters to supply and disposal. The legislation applies irrespective of state or private provision. Sewage disposal is invariably supplied to meet demand and is paid for by flat rate charges (e.g. via household rates) in Northern Ireland. Water supply is similar, with the exception that commercial use (about 25% of total supply) is metered. The outcome is that both outputs are demanded up to the point where marginal utility is zero and supply is either forthcoming or shortages arise.

The supply of water in Northern Ireland has fluctuated around a constant output over the last 15 years. This is contrary to rising trends elsewhere, suggesting perhaps some water use conservation in the region. This has been accompanied by a small decrease in DoE Water Executive employment between 1983–93. There are several reasons why, in the long term, it might be expected that employment may stabilize at this level. Reductions in employment due to productivity increases may be offset by increasing outputs resulting from ever more stringent EU Directives. For example, there have been recent Directives relating to drinking water, bathing water, and urban waste water treatment.

To these, have been added the 1996 Water (Northern Ireland) Order and, in 1998, a new Directive preventing the disposal of partly or totally untreated sewage into the sea. Moreover, the NI Water Resource Strategy plans for £400 million capital expenditure up to the year 2021. To all this, we could add consumer pressures for purer water, evidenced by the growing demand for bottled water and home water purifying apparatus. There may also be increased pressures resulting from the agency status of the DoE's Environmental Protection Agency, an act that may distance 'gamekeeper and poacher' in the environmental game. In turn, all of this may be heightened by the anticipated loss of Crown protection by the Water Executive in the future. Consequently, all these factors point to at least the maintenance of present employment levels within the *public* domain.

In contrast, the remaining employment units in this subgroup were in the *private* sector. The number of such units had doubled from 15 in 1983, to 30 by 1993. Employment by these units had also risen from 148 persons to 237 persons, with the bulk of this employment growth occurring since 1988. Expansion, in these cases, entails a growth of very small units employing less than 30 persons. Most of them are in the pollution clean-up as opposed to pollution prevention business.

As most people are aware, the basis of modern pollution legislation is that the polluter must pay. Unless legislation involves 'corner solutions', i.e. either insisting on or implying zero pollution, then it is likely to encourage, in the short term, a market in pollution clean-up. In the longer term, producers may seek either inputs or production processes that avoid pollution. This would be equivalent to a fall in the demand for pollution. The employment implications of such a shift are, however, impossible to predict at this stage. Legislation which would limit pollution to very low levels where the costs of marginal clean-up would exceed marginal benefits (such as clean drinking water and CFCs) will also be more likely to encourage pollution prevention techniques.

The other subgroups involved in pollution control and treatments are also subject to legislation. Disinfection (subgroup 1) has long been controlled by the Public Health Acts and there is no clear-cut trend in employment change. Moreover, there is no reason to expect significant employment change in this area in the future.

Employment in the other three green production subgroups – oil, noise and air pollution – has grown. It has increased from 132 persons in 1983 to 345 in 1993. Over 90% of this growth has taken place since 1988. There are several reasons why this growth is likely to continue. These include the implementation of the Clean Air Act of 1993, the Industrial Pollution Control Order of 1996, the National Air Quality Strategy of 1996, and forthcoming noise legislation.

Each of these will continue to exert pressure and induce employment increases in these areas (see DEPARTMENT OF THE ENVIRONMENT (DoE), 1996). Our analysis would, therefore, predict a zero employment change in the DoE Water Executive and in the disinfection area. For the remaining areas it is assumed that employment will continue to grow at the same rate as between 1988 and 1993. If this is correct then the approximate level of regional employment in the area of pollution control and treatment will be 4,200 by the year 2000. This represents a significant increase of 1,100 new workers (see Table 5).

#### *Recycling and re-use*

Recycling is the processing of materials after initial use for further use. These materials may be household generated recyclables or, alternatively, they may be intermediate inputs used by industry such as oil, sawdust, etc. Recycling differs from re-use in that it involves an element of further processing.

Northern Ireland's involvement in recycling is relatively large compared to other EU countries (EC, 1995). In Table 3, 13 subcategories of recycling units were identified, comprising 12 different types of recyclables and one general group of recycling material collecting agents. Employment in recycling grew by almost 124% between 1983 and 1993, and by 114% between 1988 and 1993, which is just over 15% per annum. The major source of employment (61% in 1993) was in paper and board recycling and this subgroup accounted for 67% of the total employment growth. The second largest group (the traditional area of metals recycling) accounted for 17% of total employment in 1993. Metals recycling comprised not only iron, steel, lead, copper and tin, but also aluminium, where recycling is actually cheaper than production from the virgin bauxite ore. Significantly, this sub-

sector has contributed to 10% of the employment growth since 1983.

Employment in all but two of the subgroups has grown. The range of recyclable materials has expanded with the addition of rubber, vegetable oil, furniture and laser cartridges since 1983. Only in mineral oil recycling has employment failed to increase since 1983.

There is now a well-established market in recyclables. The main determining factors in this market are: (1) the prices of virgin materials; (2) the costs of collecting and transporting products for recycling; and (3) the technology of recycling which decides the cost and quality of recycled materials. All these elements will combine to produce an optimum ratio of recycled supply to total supply at any given time. Over a period, we would expect rising real extraction costs to increase as resources are depleted and as improved environmental behaviour is required of mining companies and the like. New technologies will bring down the cost and improve the quality of recycled material. Thus, the recycling ratios should rise and there has been evidence of this in several markets, most notably paper and glass (EC, 1995). For these reasons we forecast that recycling employment in Northern Ireland will continue to grow at 15% per annum, i.e. the rate experienced between 1988 and 1993. This points to a level of 3,280 persons by the year 2000, again a significant increase of over 2,050 new jobs.

However, the situation in this sector is more complicated because the supply of recyclables is not only influenced by commercial forces. For example, noticeable proportions of paper and glass for recycling are supplied free of charge by households, industries, etc. through voluntary contribution and collection schemes. A total commercial market would be dominated by buy back contracts and collection units. This is the case for much scrap iron and steel, and partially so for aluminium cans. However, the distorting element in the recyclable market is the cost of disposing of

Table 3. *Persons working in recycling and re-use by subgroups, 1983-93*

Subgroup	1983		1988		1993	
	Units	Employment	Units	Employment	Units	Employment
Sawdust re-use	12	27	14	32	16	54
Metals recycling	8	92	10	101	18	185
Compost digesters	1	4	2	5	3	19
Paper and board recycling	8	339	8	335	15	752
Rubber and tyre recycling	-	-	-	-	1	28
Mineral oil recycling	2	25	2	14	2	12
Vegetable oil recycling	-	-	-	-	2	6
Plastics recycling	2	8	4	26	4	22
Glass recycling	1	36	2	21	4	36
Furniture re-use	-	-	1	3	2	5
Textile recycling	4	6	5	7	6	44
Photocopiers and laser cartridge recycling	-	-	-	-	1	4
General scrap and waste collectors for recycling	2	11	6	30	10	58
Total	40	548	53	574	84	1,226

Source: UUC GPS database, 1996.

materials if they are not recycled. Recycling is part of the waste disposal mechanism and, as the alternative options of landfill or incineration are subject to stringent legislation, taxation (for landfill) or rising costs, this role will become more significant. Already, recycling targets have been imposed on the packaging industry under the recent EC Directive on Packaging and Packaging Waste (DoE, 1996). The European Commission has imposed recycling targets for municipal solid waste (MSW). The UK Government is aiming for a 25% recycling rate for household waste by the year 2000 and a 40% recovery rate for all MSW by 2005. In contrast, the Fifth Environmental Action Programme of the EU has recommended a 50% target recycling rate for plastics, glass and paper by the year 2000 (EUROPEAN ENVIRONMENT AGENCY, 1995).

Recycling programmes such as those in Germany and Japan encourage manufacturers to code material inputs and design for recycling separation. Practices such as this could either be enforced by legislation or encouraged by tax (in Northern Ireland by rates) rebates. A further stage would involve the collections process. These can either be municipally organized or privately run. The latter would be more susceptible to market conditions and would avoid the paper and can 'mountains' that some German Green Point recycling schemes have produced. However, private provisions, if they are to meet EU targets, may require the formation of a market whereby suppliers of recyclable materials pay the users to take such materials, the limit of such a payment being the minimum cost of alternative disposal. This would, in effect, be a recycling subsidy for the user that should produce cheaper inputs and conserve on virgin inputs. Given these developments, our prediction of over 2,050 new jobs by the year 2000 may actually be a conservative estimate.

#### Energy conservation

Table 4 shows that this was the second largest sector in Northern Ireland's GPS in 1993 with nearly 2,340 employees. Employment had doubled since 1983. The sector comprises six sub-sectors, five related to energy

use conservation and another to alternative energy sources (see Table 4). In Northern Ireland, as with the rest of the UK, electricity is now privatized but subject to stringent regulations on pollution and emissions. There are three separation power station companies. The Northern Ireland Electricity (NIE) is now a private monopoly subject to regulation by the Office of Electricity Regulation (OFFER NI).

The UK has set out a target 1,500 megawatts (MW) of electricity from renewable resources by the year 2000. To this end, there is a non-fossil fuel obligation (NFFO) on suppliers, and NIE has been instructed to purchase 1% of electricity from such sources. This figure will rise to 3% (just over 45 MW) by the year 2005. We should add that, in the UK, nuclear power and hydroelectricity supplies the NFFO. However, nuclear power stations are absent in Northern Ireland and wind farms would appear to be the NFFO alternatives (see subgroup four in Table 4).<sup>1</sup> OFFER NI in a recent report (OFFER NI, 1996) proposed that the government promote combined heat and power (CHP) systems. All these may contribute to fulfilling the NFFO. The impact on employment is, however, more difficult to predict. At best, we might expect employment in alternative fuels to grow at the 1988-93 rate of change - an increase of only 50 persons - to an approximately 60-70 employment level.

Northern Ireland electricity prices are much higher than those in Great Britain and the Republic of Ireland (SMYTH, 1996). This, of course, may change with development of interconnectors to Scotland and Ireland and the growth of small scale self-generators linked into the regional system. Intensified competition and pressures from the Regulator may also lead to a reduction in relative prices. This, in turn, may reduce the pressures to save on energy costs, despite encouragement from government sources. The Government is planning, through the Energy Saving Trust, to promote activities such as cavity wall insulation, condensing boilers and space heating controls. The Government partly funds the Trust, although direct subsidies to homes, offices and factories may be a more efficient allocation of finance. A case could also be made for

Table 4. Persons working in energy conservation by subgroups, 1983-93

Subgroup	1983		1988		1993	
	Units	Employment	Units	Employment	Units	Employment
Double glazing	26	502	41	755	73	1004
Other insulation	21	494	31	642	47	791
Energy management	8	119	9	173	20	400
NFFO energy	0	0	1	1	4	13
Water conservation	0	0	0	0	2	12
Energy efficient heating	7	68	11	112	11	117
Total	62	1,183	93	1,683	157	2,337

Source: UUC GPS database, 1996.

helping the promotion of double glazing and loft insulation in older, single glazed buildings. It has been estimated that such measures contributed to a 32% reduction in GB domestic energy consumption between 1970 and 1989 (DoE, 1992). In addition, value added tax (in the March 1998 budget) has been reduced on certain government funded energy savings schemes.

These issues do have, therefore, implications for employment in subgroups one, two, three, and six shown in Table 4. The four subcategories employed 2,312 persons in 1993. This may rise by 1,400 persons up to the year 2000 if both the 1988–93 and 1983–93 growth patterns persist. It will also be dependent upon effective encouragement by both central and regional government, particularly in the areas of double glazing, insulation and energy management. The remaining subcategory (five) – water conservation – is an area of recent jobs' growth. If this continues, then the general increase in employment in this main group could be 1,500 persons by the year 2000 reaching a total of 3,800 (plus) persons.

### CONCLUSION

In Table 5, we summarize the employment forecasts made for each GPS group based on a series of employment trend extrapolations since 1983. They point to a GPS employment level, in Northern Ireland, of 18,950 persons by the turn of the century. This represents a potential increase of just over 6,000 new GPS jobs; that is 3.15% of the total civilian employment.<sup>2</sup> This

Table 5. Predicted increase in green production sector employment, 1993–2000

Group	Private sector	Public sector	Voluntary sector	Total
1. Pollution control and treatment	1,100	–	–	1,100
2. Waste disposal and collection	300	–300	00	00
3. Recycling and re-use	2,055	–	–	2,055
4. Energy conservation	1,500	–	–	1,500
5. Consultancy and monitoring	220	200	–	420
6. Heritage and eco-tourism	–	230	130	360
7. Research and education	200	100	–	300
8. Forestry and organic farming	50	–50	–	–
9. Eco-capital equipment	100	–	–	100
10. In-firm green employment	150	–	–	150
11. Alternative green product production	50	–	–	50
Total	5,725	180	130	6,035
%	94.9	3.0	2.1	

Source: UUC GPS database, 1996.

speculative forecast also places much emphasis on an increase in the private sector, some 95% of the total.

However, we must remember that employment gains in the GPS might be offset against reductions that may occur elsewhere because of the imposition of environmental legislation. This feature is impossible to accurately quantify, although we can point to an approximate impact. For example, environmental legislation in the future will increase the costs of production which, in turn, may lead to job losses if demand declines. This decline could occur if: (1) there is a reduction in the competitiveness of exports; (2) there is an increase in substitution of domestic production by cheaper imports; and (3) there is a reduction in domestic demand due to a fall in real incomes resulting from rising prices.

A recent study by the NORTHERN IRELAND ECONOMIC RESEARCH COUNCIL, 1995, on the export of goods, both manufacturing and non manufacturing, offers possible insights. A cursory examination reveals that at least 35% of gross domestic product (GDP) is exported. Approximately 15–20% of these exports may go to countries that either have and will have no comparable environmental legislation (e.g. in some Asian countries). HITCHENS and BIRNIE, 1994, p. 210, state that, 'the Irish economies are competing in those market segments where the impact of low wage NICs is likely to be greatest'. Countries such as Germany, the Netherlands, USA and Japan have already, in anticipation, introduced relevant legislation. Exports in this area involve the employment of between 11–12,000 persons. A worse case scenario would have all workers losing their jobs. An equally unlikely situation would be to assume no job losses. A more likely outcome involves assuming a (clearly overestimated) 10% rise in costs, due to environmental legislation, combined with a unitary export price elasticity. This means that around 1,100 jobs may suffer.

There is no information on Northern Ireland's imports. Using the National Incomes Identities suggests that imports amount to between 60% and 70% of GDP. It is impossible to even tentatively speculate on what proportion of these imports are substitutes for domestic production. Neither can we state which of the imports come from countries unaffected by the legislation, nor finally, what the price differences and price elasticities will be. It would be surprising if, given Northern Ireland's narrow production base, the impact on imports was as large as the export impact. Finally, we would anticipate that the real incomes impact would be partially offset by the growth in real incomes, productivity and competitiveness generated by environmental legislation. HITCHENS and BIRNIE, 1994, lay strong emphasis on the role of competitiveness. Thus, by the year 2000 we might have a maximum 2,000 job losses to offset against the estimated 6,000 job gains outlined in Table 5.

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### Notes

1. In the Republic of Ireland, hydroelectricity stations account for 15% of generating capacity and 5% of total supply. They are used largely for peak loading and are far less expensive to operate than thermal stations. Hydroelectricity can be on both large and small scale operations – equally cost effective.
2. Total civilian employment (TCE) is extrapolated from a reported total working population of 717,000 in Northern Ireland by the year 2000. The TCE is estimated as totalling 602,000 persons.

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