The Employment Effects of Environmental Protection in Germany

In the autumn of 1996 four of Germany's leading economic research institutes presented a study, commissioned by the Federal Ministry of the Environment, in which the employment effects of environmental protection were estimated.[1] According to the study, in 1994 almost one million jobs in Germany were sourced by environmental protection. In an earlier study by the DIW the level of environmental-protection-induced employment in Germany in 1990 was estimated at 0.7 million. In the public debate this difference has been interpreted by some as a sharp increase in environmentally induced employment. In fact, however, the difference is due largely to improved statistical coverage of east Germany. Closer analysis of those sectors for which comparison is possible show that employment induced by environmental protection expanded only moderately during the first half of the 1990s. For the coming years, too, an expansion of the magnitude forecast by the DIW, under the premise of further impulses from a continuation of the largely end-of-pipe-oriented environmental policy of the 1980s, no longer seems likely. Although an environmental policy orientation towards an impact on innovation and competition will be associated with positive employment effects, these will not be reflected in "environmental protection-induced employment" as recorded in the statistics.

Employment induced by environmental protection in 1994

In 1994 more than 950 000 people were employed in environmental protection in Germany.[2] Environmentally linked employment has thus reached a level around 2.7% of the labour force can be classified under this field of activity. There is a substantial difference in the proportion of total employment induced by environmental protection in west and east Germany.[3] The approximately 650 000 jobs in west Germany induced by environmental protection represent around 2.3% of the regional labour force, whereas the proportion in east Germany is around twice as high: the employment of around 300 000 persons in the new federal states is induced by environmental protection, representing 4.7% of the labour force. The relative importance of environmentally induced employment is primarily an expression of the efforts being made to cope with the still huge need to remove environmental pollution in eastern Germany. It should be noted that this largely involves recourse to the "secondary" labour market: 40% of the environmental protection employees in east Germany consist of participants in labour market policy measures, most of which involve clean-up and restructuring measures.

More than half a million employees directly involved in environmental protection

At over 500 000 people,[4] more than half of those employed in Germany in 1994 in the environmental protection field directly performed environmental protection tasks at work (cf. figure 1), although not necessarily exclusively such activities. Of these, almost 200 000 were employed in the public sector. The fields of activity with the largest number of employees are waste water and waste disposal including street cleaning (70 000), care of parks and gardens (57 000) and planning, administration and implementation (52 000). Around 90 000 were employed in waste disposal and recycling firms (private and public waste disposal companies and wholesale trade in recycled materials). Only a relatively

[1] The full report, compiled by the DIW, the Institut für Wirtschaftsforschung (ifo), the Institut für Wirtschaftsforschung Halle (IWH) and the Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI), is available in German in the series *Umweltpolitik* published by the environment ministry under the title "Aktualisierte Berechnung der umweltschutzinduzierten Beschäftigung in Deutschland", Bonn 1996.

[2] The calculation of the employment induced by environmental protection faces a number of statistical and definitional problems. The production of environmental protection goods is circumscribed rather narrowly here, encompassing, in the main, the goods deployed to protection of ambient air, waste management, waste water management and noise abatement. A relatively broad definition was used, on the other hand, regarding the personnel directly involved in environmental protection, encompassing, among others, those involved in nature and landscape protection. Energy-saving measures and environmental transport planning were not included. The level of employment resulting directly and indirectly from the production of environmental protection goods was quantified using input output analysis. The methodological issues are discussed in detail in the main report (cf. footnote 1); see also Jürgen Blazejczak and Dietmar Edler, Methodological Aspects of Environmental Labour Market Analysis, *DIW Discussion Paper No. 147,* Berlin 1997.

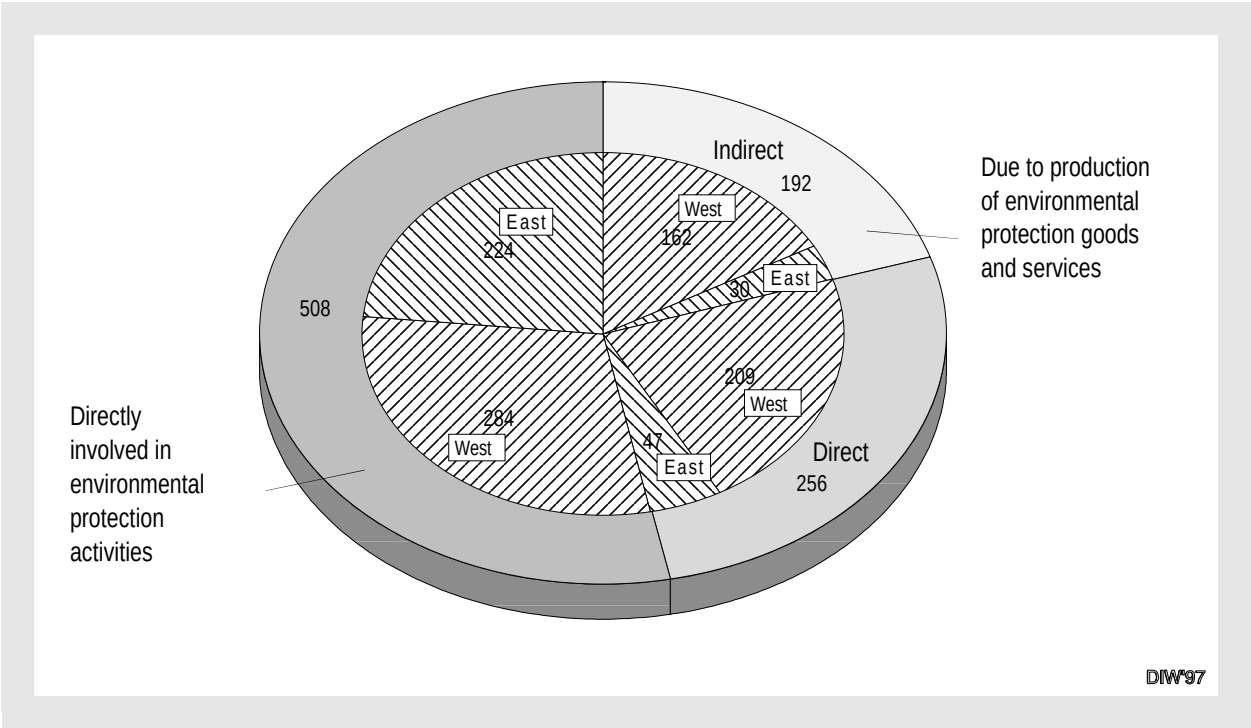
[3] Initially the authors refrained from considering environmental employment in east and west Germany separately in view of the uncertainties surrounding the estimation. On the basis of an earlier study of environmentally induced employment in Berlin a rough estimate has, however, been provided for the two regions.

[4] No attempt was made to convert part-time into full-time equivalents in the case of those involved directly in environmental protection activities.

Figure 1

Employment Through Environmental Protection in Germany in 1994

in thousands



small number of people perform direct environmental protection tasks in manufacturing industry (50 000).

Around 450 000 employed in the production of environmental protection goods

An additional 450 000 jobs in the economy result from the production of environmental protection goods: investment goods used for the purpose of environmental protection and primary and auxiliary materials. Of these just under 260 000 jobs were induced directly by the production of environmental protection goods, while 190 000 jobs were located in firms producing intermediate goods for the production of environmental protection goods. Of the directly induced jobs one-third (84 000) were in construction firms and just less than a quarter in mechanical engineering companies.

Service employment predominates even in environmental protection

While the jobs indirectly induced by environmental protection are distributed throughout the economy, there is a concentration in services. Overall, environmental protection now primarily means the provision of services: around 55% of the jobs induced by environmental protection are in service industries. Of these, market services are slightly more important than public sector services.

Developments during the 1990s

In a study published in 1993, the DIW put the level of employment induced by environmental protection as covered by the statistics at the start of 1990 at 680 000.[5] However, it is not possible on this basis to draw conclusions on employment trends induced by environmental protection between 1990 and 1994 for Germany as a whole. This is due to the lack of statistical data for east Germany in the earlier study, which precludes a comparative methodological approach as was taken for west Germany. Consequently, the figure of just over 130 000 for the level of employment induced by environmental protection in east Germany was considered by the DIW

[5] German Institute for Economic Research, The Impact of Environmental Protection on Employment – Situation and Perspectives. An Information Paper of the Federal Environment Ministry, Bonn 1993; The Importance of Environmental Protection for German Employment. In: *Economic Bulletin,* vol. 31, no. 2, February 1994, pp. 9–14.

to mark the minimum level. Since then the statistical database has improved to such an extent that the same procedure used to determine environmentally induced employment in west Germany can now be applied to east Germany. A drawback of this, however, is that the results for 1991 and 1994 are thus rendered incomparable.

Thus conclusions on the development of environmentally induced employment in the first half of the 1990s can only be drawn for west Germany. Even here, however, given that a number of the definitions on which the estimation is based have been adjusted in the light of the information now available, the data needed to be adjusted accordingly.

In its 1993 study the DIW put the number of persons performing direct environmental protection tasks in west Germany at 206 000. On the definitions used in the recent study the figure is 255 000 persons. The most important reason for the revision is the more up-to-date data provided by the Federal Statistical Office, which provide a better basis for determining the number of public sector employees working in parks and gardens. Moreover, a proportion of the labour deployed in cleaning buildings is classified as performing environmental protection tasks.

Bearing these factors in mind, the number of persons performing direct environmental protection tasks has increased by around 30 000 (more than 11%) on the 1990 figure (cf. table 1). This is largely due to higher employment in waste disposal. The number of jobs in "other services", the non-profit sector and government, has also increased.

The employment induced directly by the production of environmental protection goods and services scarcely changed at all between 1990 and 1994 if definitions are held constant.[6] In terms of the direct producer effects, the increase is calculated to amount to 25 000 people (18%).

Taking all the areas of employment induced by environmental protection covered by the statistics together, there has been a rise of 58 000 jobs (almost 10%). Compared with registered unemployment of 3.7 million in 1994, this expansion may well appear modest. Yet even so, the field of environmental protection constitutes one of the few experiencing positive employment growth: for the west German economy as a whole employment fell by almost 250 000 between 1990 and 1994.

Table 1
West German Employment Induced by Environmental Protection, 1990 to 1994

	1990[1)]	1994	Change 1990 to 1994	
	in 1 000 persons			in %
Employees with direct environmental protection tasks	255	284	+29	11.2
Employment due to the production of environmental protection goods and services	341	371	+30	8.8
– direct	203	209	+6	3.0
– indirect	137	162	+25	18.2
Total (in the areas covered)	597	655	+58	9.7

1) Revised. — Columns may not sum to totals due to rounding.
Source: Calculations and estimates by a joint project group from the DIW, ifo, IWH and by DIW.

Prospects

West Germany

Assuming a continuation of environmental policy in line with past trends, the DIW had originally, on the basis of estimations of demand, expected west German employment induced by environmental protection to rise by 240 000 between 1990 and the year 2000. This was contingent on an assumed annual average rate of growth of spending on environmental protection – more precisely that proportion of spending impacting on the domestic economy – of 6% at constant prices.

In actual fact, however, public and private sector investment in environmental protection in west Germany declined in real terms at an annual average rate of more than 7% between 1990 and 1994[7] (cf. table 2), following an annual average increase of almost 5% in the second half of the 1980s. This means that investment in environmental protection has more than halved compared with its peak in 1988, whereby the decline in private sector investment in environmental protection (at an annual average of –13%) was sharper than that of public sector investment (–3.6%)

[6] When the four institutes updated the figures on employment induced by environmental protection, spending on environmental protection for 1994 was assumed at a level that, following the publication of an official estimate by the Federal Statistical Office, has since proved excessive (by 11%).

[7] Data from the Federal Statistical Office.

Table 2
Expenditure on Environmental Protection in West Germany
in DM million at 1991 prices

	1990	1994	Annual average change 1990 to 1994 in %
Private sector	19 020	17 250	–2.4
Public sector	20 820	21 590	0.9
Total	39 840	38 840	–0.6
of which:			
Investment	18 580	13 860	–7.1
Private sector	7 520	4 310	–13.0
Public sector	11 060	9 550	–3.6

Source: Federal Statistical Office.

Total spending on environmental protection has decreased to a lesser degree, however. Between 1990 and 1994 it fell in real terms at an average annual rate of 0.6%, whereby the decline in the private sector of 2.4% p.a. was not fully offset by an annual increase of 0.9% in the public sector.[8] Overall spending on environmental protection continued to rise until 1992, even in real terms: the decline in measures to combat air pollution since 1988 was more than offset by continued strong growth in waste disposal and water protection. According to the most recent data, spending in these two areas of environmental protection has also begun to decline since 1993.

The information available from individual federal states for 1995 suggests that the decline in private sector investment in west Germany continued in that year.[9] In Bavaria investment by manufacturing industry in fixed capital for environmental protection was down by 17% on the previous year. In Baden-Württemberg manufacturing enterprises invested 13% less in environmental protection; in contrast to the two previous years, the decline in environmental protection investment in these states in 1995 was against the background of a marked increase in total investment. In the mining and manufacturing sectors of Lower Saxony, investment in environmental protection fell by more than 7%, whereas total investment increased by 15%. For Hesse, too, a decline in environmental protection investment of the order of 15% is reported, contrasting with an increase in overall investment of almost 8%.

The contrary trends of environmental and overall investment in the private sector suggest that the decline in expenditure on environmental protection in west Germany is not merely cyclical in nature. Following the additional investment in older plant necessitated by the tightening of the regulations on air pollution, which was completed by the end of the 1980s, the development of an "environmental capital stock" has now largely been achieved in the areas of waste water treatment and waste disposal. No further major impulses have come from environmental policy – the central determinant of environmental market trends – in recent years. Consequently, an increase in spending, as assumed by the scenario calculations made by the DIW in 1993, are now unlikely.

East Germany

Until relatively recently it was particularly difficult to forecast the prospects for environmentally related employment in east Germany. Due to the lack of statistical data it was not possible to determine the level of employment in environmental protection by means of methods comparable to those deployed for west Germany. Moreover, the actual requirements for environmental clean-up in the region and in particular the pace at which a cleaning-up programme would be implemented were highly uncertain. Against this background the DIW put environmentally induced employment in east Germany in the year 2000 at 340 000.

An estimation comparable in methodological terms to that for west Germany is now available for 1994 and this puts environmentally linked employment in the region at 300 000. The structure of this employment differs significantly, however, both from the prevailing structures in west Germany and the structures originally thought likely to emerge in eastern Germany. Employment resulting from the demand for environmental protection goods is lower than had been expected. This indicates that the environmental protection industry in east Germany has not been able to free itself from the competitive disadvantages from which east German industry as a whole suffers. More than proportional – in terms of population size – on the other hand is the level of public sector employment of people directly performing environmental protection tasks. While this may be partly due to the special requirements resulting from the need to catch up in terms of environ-

[8] The data on current spending on environmental protection are estimates by the Federal Statistical Office.

[9] The following figures are based on press reports and information provided by federal state statistical offices.

mental protection (for instance in the area of environmental planning), it cannot be precluded that staffing levels are still too high in certain areas. A special role is played in eastern Germany by environmental employment within the framework of publicly funded job creation measures: in 1994 such programmes encompassed 130 000 people.

The structure of east German environmental employment is such that it can be expected to decline in the coming years. Given the budgetary restrictions facing state and local government, public sector environmental employment is likely to be brought down to west German levels. Of greater importance, however, will be the expected cutbacks in job-creation measures. Although the need to combat environmental pollution remains, the tight resource constraints on the Federal Labour Office and other financing institutions are likely to lead to a reduction in these measures over the medium to longer term.[10] This seems all the more likely in view of the fact that, given the more than adequate supply of unused commercial sites and properties, from a purely economic point of view the urgency of recycling industrial sites is declining markedly. Thus in the longer term the relationship in eastern Germany between environmentally induced and overall employment is expected to come into line with that in west Germany.

The employment effects of integrated environmental protection

The measurement concepts used to determine the volume of employment induced by environmental protection fail to take full account of the impact of integrated environmental protection. The term "integrated environmental protection" is used to denote solutions that prevent the incidence of environmental damage from the beginning. It is based on production plants and products that impose less of a burden on the environment than otherwise similar, "standard" plants and products. Given that such comparative standards often do not exist in practice, the deployment of more environmentally friendly production plants and products is inadequately covered by the statistics.

Whereas the statistics covering private sector investment in environmental protection reveal no trend towards a greater use of integrated environmental technology,[11] reports on a large number of individual examples of such technology point to the existence of such a trend in reality. Another indicator of this can be seen in the increased importance of services in employment induced by environmental protection as covered by the statistics: integrated environmental protection solutions require greater support from specialised consultancy, planning, maintenance and other similar services than ex post solutions.

If – as is to be supposed – the deployment of integrated environmental technology is in fact systematically understated by the statistics, a trend towards the greater use of integrated solutions would be reflected in a decline in the employment induced by environmental protection as reported by the statistics, but one which could not be interpreted as a weakening of efforts towards environmental protection. Indeed, it could not even be interpreted as a reduced contribution by environmental protection to overall employment.

There has so far been very little empirical study of the employment effects of integrated environmental protection.[12] Theoretical arguments, too, suggest that it cannot be determined whether greater efforts towards integrated environmental protection would be associated with a strengthening or weakening of employment impulses.[13] On the one hand, employment would fall in, for example, waste disposal and the production of end-of-pipe environmental technology due to the reduced volume of pollutants while, on the other, the production of integrated technology and the provision of the accompanying services would create additional employment

[10] The regulations on job creation under § 249 h of the Labour Promotion Law require co-financing by third parties – such as the Bundesanstalt für vereinigungsbedingte Sonderlasten (BvS – a fund set up to finance measures rendered necessary by unification), state and local government, institutions implementing measures – if measures are to be realised. Although this stipulation may be justified in terms of the coordination it engenders between various policy-making areas, it does have the effect – in times of a general scarcity of financial resources – of reducing the opportunities for actually implementing measures.

[11] In the private sector statistics investment in environmental protection constituting part of real capital, are itemised separately. Such investment can be taken as a rough indicator for the deployment of integrated environmental technology. According to the Federal Statistical Office in 1985 such investment accounted for around 16% of total investment in environmental protection in the west German private sector, compared with around 18% in 1994.

[12] Isolated studies of selected technologies confirm that integrated solutions may well induce positive employment impulses. It has been shown for heat exchange systems, for example, that energy-saving technologies can generate positive employment effects. As far as their effects at the macroeconomic level are concerned, this type of integrated technologies is characterised by a potential substitution of domestic productive activity for imported energy, and thus, in general a positive impact on domestic employment. In view of the repeated calls for a more integrated approach to environmental protection and the fact that it makes sense in both ecological and economic terms, there is clearly a need for further research in this area.

[13] Cf. Jürgen Blazejczak and Dietmar Edler, Methodological Aspects of Environmental Labour Market Analysis, op. cit.

opportunities. Moreover, the greater use of integrated environmental technology is likely to improve corporate competitiveness, as integrated environmental protection tends to be more cost-effective than the ex post control and removal of pollution. Savings on energy and other primary goods may even – on balance – lead to a reduction in a firm's costs.

Last but not least, integrated environmental protection may induce broad-based innovative impulses and thus contribute to a general modernisation of the economy. The productivity growth associated with this constitutes a precondition for the maintenance and expansion of employment. To this extent a policy focusing on the innovation and competitiveness effects of environmental policy would be able to make a contribution to easing the pressure on the labour market.

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