

THE EMPLOYMENT EFFECTS OF ENVIRONMENTAL POLICY: AN INTERNATIONAL COMPARISON: GERMANY AND USA*

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ABSTRACT

This paper deals with the problem of environmental policy and its effects on the level of employment. The first section sets the conceptual framework and evaluates the studies undertaken for Germany and USA, while in the second section broader issues of environmental policy will be discussed. Despite the difficulty of securing reliable estimates of employment effects of environmental policy some conclusions can be drawn: The presently implemented conventional programs are purely technological measures and control mainly the symptoms and not the causes of environmental degradation. The macro-economic models seem to indicate that the overall employment effect is moderately positive. In the ongoing debate regarding environmental quality and other economic objectives the author believes that a conventional environmental policy will not succeed in the long-run to improve environmental quality and to alleviate the problems of unemployment and inflation.

THE PROBLEM

In the last decade, the advanced industrialized societies of Western Europe and North America have been shaken by a series of severe, obstinate crises. First there was the painful realization over the extent and seriousness of environmental problems; followed by the threat of the apparent energy shortage; and now for the last few years the economies are confronted with the malaise of "stagflation." Generally these crises have been viewed as unrelated and separated problems and, consequently, each was attempted to be solved on its own terms, namely,

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environmental degradation by antipollution programs; the energy crisis by exploitation of new sources of energy and the economic crisis by traditional policies of aggregate demand management.

However, each attempt to solve one crisis apparently seems to conflict with the solution of the other crisis, namely, pollution controls may worsen the employment situation, while energy conservation may aggravate the economic recession. Inevitably, the proponents of one solution become opponents of the others with the result that the development of effective policies was delayed and the implementation of remedial measures procrastinated, adding to the growing uncertainty of the industrialized societies. A comprehensive solution of these various crises demands that the complex interactions between the ecosystem and the economic system are fully understood. One finally has to recognize that the economic system is only a subsystem of the global biophysical system of ecological interdependence. This ecosystem determines the set of constraints to which the economic system must conform, at least this is the rational ideal. However, in reality it appears to be just the other way around. Until recently these ecological constraints were disregarded because they seemed not to become effective, but the rapid deterioration of environmental quality indicates that the ecosystem has been disastrously affected by the production process of the modern economic system. Thus, the advanced industrialized societies are not confronted by a series of independent crises, but by a faulty design of the modern economic system. Ultimately, the solution to all these problems will depend upon the capability with which the economic system can adjust to the ecological constraints.

In this paper we will limit our analysis to the problem of environmental policy and its effect on the level of employment. The first section sets the conceptual framework and evaluates the studies undertaken for Germany and USA, while in the second section broader issues of environmental policy will be discussed.

ENVIRONMENTAL POLICY AND ITS EMPLOYMENT EFFECTS

The Macroeconomic Context

In the last ten years, most of the advanced industrialized nations have introduced and implemented environmental programs. In general these programs can be distinguished into two major categories, namely, regulations imposed on polluters to confine their emissions to various environmental quality standards and public environmental expenditures of all levels of government to finance and subsidize the construction and installation of pollution abatement equipment within the public and private sector.

The economic consequences of environmental measures can be examined under different aspects at different levels of aggregation. From the point of view of an industry the environmental programs are analyzed at the micro-economic level to assess their impact on cost and profits of individual firms and/or industries. At the macroeconomic level both the scope and the objective of the analysis of environmental programs are different. From the general economic policy point of view it is interesting to analyze how the aggregate demand arising directly from public environmental expenditures and indirectly from environmental regulations will effect the allocation of the resources in general, and the economic goals, including the employment level, in particular. Today the significance of employment gains and losses of environmental programs has to be considered against the background of high unemployment, about 5.0 per cent in OECD-countries. It is mainly for this reason that environmental policies are presently reviewed for their employment effects and are in some cases used as part of governmental anticyclical employment-creating measures [1].

Environmental policies and the related employment effects are here analyzed only in a relatively narrow sense, namely, the employment effects of measures to control air, noise and water pollution.¹ Even within these programs there are a number of cases which should be included but are not for practical reasons, e.g. measures to prevent oil spills etc. Furthermore there exists a grey area of anti-pollution measures for which conceptual and practical difficulties arise and therefore complicate evaluation of the magnitude of the employment impact, e.g. nuclear safeguards, or expenditures on energy conservation. Presently, there are no international standardized conventions on categories of these various pollution abatement programs and the related impacts and national practices vary substantially. Consequently, this shows up in the various empirical studies and explains, at least partly, the considerable divergence of opinion concerning the employment effects which can be associated with environmental programs.

The Measurement of Employment Effects

The purpose of this section is to outline a method to estimate the employment effect and to illustrate the conditions which could substantially influence its magnitude. The starting point for the determination of the employment effect is the estimation of the total expenditures for environmental protection. These expenditures are composed of the necessary expenditures by individuals and firms which have to comply with the legal environmental standards and, furthermore, by the government which too has to undertake expenditures in areas for which it is solely responsible. As an outcome of the implementation

¹ Environmental policy in a broader sense would include all measures which will lead to the stability of the overall ecological system.

of environmental policies jobs are simultaneously created and lost in various sectors of the economy. Customarily, the resulting employment effects are conceptually distinguished between direct and indirect effects [2].

The direct employment effects are the first-found responses in demand for labor initiated by the expenditures for pollution abatement. This additional demand labor, which is generally readily observable, is stimulated by two types of expenditures, namely, outlays on pollution control equipment and outlays on labor and materials required for its operation. However, these are only partial employment effects resulting from the implementation of environmental policies. Most of the major macro-economic studies include only these effects which are relatively easy to estimate [3].

An exact determination of the direct employment effect requires that the expenditures on environmental protection are specified according to expenditures for investment and operation cost (including labor, materials, and maintenance costs) of the pollution abatement equipment. If the component of the labor cost of these operation costs are known, then with help of a simple division, namely labor cost component divided by average labor cost per employee per year, the number in employment can be estimated. With the same method the employment effect of the investment expenditures can be calculated. If the investment expenditures could be distinguished between specific investment categories (e.g. filters, sewage treatment plants etc.), then the exact magnitude of the effective demand resulting from environmental protection for each industrial sector can be determined. The direct employment effect of the investment expenditures can be estimated then, as follows: firstly, the component of the labor cost of the sales for each industry has to be determined; secondly, the average labor costs per employee per annum (i.e. an employment-year) have to be calculated; thirdly, the effective demand for each industrial sector multiplied by the industry specific proportion of the labor cost component represents the total labor cost induced by the additional expenditure on environmental investment. Finally, the division of total labor cost by average labor cost per employment-year provides the estimate of the direct employment effect [4].

The indirect employment effects which are more difficult to determine are referred to as second and third round responses and contribute also positively and/or negatively to the overall employment level. These indirect effects operate through:

1. demand for intermediate goods and services created by pollution abatement expenditures;
2. increased wage incomes generating additional aggregate demand and employment; and
3. changes in relative wage rates and prices in response to environmental protection [2, pp. 13-14].

The indirect employment effect can be estimated by the same method as described above. If the interindustry demand is known from existing input-output tables then the employment effect can be determined again through the division of the total labor cost of the demand for intermediate commodities and the average labor cost per employment-year.

Before proceeding to a review of existing American and German studies a few qualifications to these employment estimates and processes, through which environmental expenditures are affecting the employment level, are in order:

1. The magnitude of the employment changes are substantially influenced by the state of the overall economy at the time the environmental programs are implemented. In case the economy is in a boom period than the impact will mainly result in a shift rather than an absolute increase of employment, while in the downswing of the business cycle one could expect that environmental expenditures will lead to an absolute change in the employment level.
2. The employment effect of environmental programs depends also upon the type of environmental measures implemented, because, for example, the construction of a municipal sewage treatment plant may lead to a different labor intensity per unit of expenditure than the installation of industrial control equipment.
3. The implementation of pollution control, relying on present technology, will in most cases require larger amounts of capital per unit of output, and, therefore may lead to slower rates of economic growth. However, if the potential slower growth could cause a rise in unemployment, this will depend upon whether the environmental investments are undertaken in addition to the profit-oriented investments or are substituting them. In the latter case, the potential employment effect will be effected by the eventual different labor-intensity of environmental-versus profit-oriented investment.
4. In addition, the size of the employment effect will be influenced by the fact whether or not a country has to import a substantial portion of its antipollution equipment. If the import dependence is high, then employment will be created abroad and not in the domestic economy.
5. Potential employment losses may occur temporarily or permanently from a delay and/or cancellation of installing or operating plants due to ongoing environmental assessment studies.
6. Furthermore, due to different environmental quality standards some countries may become "pollution havens" and, thereby attract pollution-intensive industries. Present studies suggest that environmental considerations only play a minor part in foreign investment [5].

Finally, one has to recognize that various countries are implementing different levels of environmental quality, which results in different employment

effects. However, if one makes some allowances for different environmental standards, and if the same types of models are used then the employment effects of national environmental policies can be compared.

An Evaluation of German and American Studies

In recent years, quantitative studies estimating the employment effect are now becoming available for a number of countries. The data for Germany and USA are brought together in this section and the main results, methods and conclusions of these studies will be evaluated. However, it should be noted that precise inter-country comparisons are not feasible, because the quantitative data are subject to numerous national divergent factors, such as the desired level of environmental quality, the type of environmental measures, timing, and completeness of environmental data. Consequently, the data approximate only roughly the magnitude of the employment effects.

Germany—Despite the incomplete available quantitative information about the environmental protection industry, it will be attempted to determine the employment effect of environmental expenditures. The following estimates are based on a study of the German Batelle-Institute [6] and on a report by Hödl and Meissner [4, pp. 100-111]. Since a detailed decomposition of the environmental expenditures does not exist for the various industries which are benefiting from this new aggregate demand, it is assumed that the private investment outlays for environmental protection in the first round will be directed towards the capital goods industry. The resulting induced demand (i.e. the secondary and tertiary demand) of the capital goods industry for intermediate goods are then computed on the basis of the input-output tables of the German Institute for Economic Research (DIW) [7]. The resulting direct and indirect employment effects are then estimated according to the method described above, namely through the division of the total labor cost component per industry and the industrial average labor cost per employment-year.² For the public environmental expenditures on environmental investment it is assessed that predominantly the construction industry will benefit from these governmental outlays. The direct and indirect employment effects are again determined by the above method of the labor cost component.

More difficult is the estimation of the employment effects resulting from the expenditures for operating costs of pollution abatement equipment. However, no estimates of the distribution of the operating costs between pollution abatement equipment and production capital and, further more, of the decomposition of operating costs into its various components are available either for Germany or for the USA.³ A more recent OECD-study remains also vague on this subject

² The labor cost components are calculated from the statistics provided by the DIW. See reference [8].

³ A study sponsored by the CEQ, Department of Commerce, and EPA also does not provide these estimates [9].

and states merely that it expects that the “operating costs will in all cases be strongly labour intensive. . . .” [10] On the basis of several case studies Hödl and Meissner estimate the labor cost component of the private and public environmental expenditures which then enables them to estimate the employment effect using the above described method.

Table 1 shows the total average annual employment effect, estimated at 218,000 employment-years for the period 1970-74 and 366,000 employment-years for the period 1975-79. The sum of private and public environmental expenditures for the period amounts approximately to 0.8 per cent of GNP while the additional employment created by these expenditures is roughly of the same magnitude, namely 0.8 per cent of the total German work force.⁴

The study for Germany has at least the following shortcomings. Firstly, the used method assumes the constancy of the labor cost component in the sales volume. However, changes in the labor productivity and technical progress may invalidate this assumption. Secondly, the indirect employment effects are calculated on the basis that the initial expenditure increase will lead to an induced demand which in turn will increase the labor cost. The indirect employment effect was then calculated from the labor cost component of the additional induced demand. However, it is possible that the labor cost may increase without resulting in an additional employment effect, namely, then, when the presently employed labor force works overtime. Thirdly, apparently due to the lack of available data the authors do not provide an industrial and/or occupational breakdown of employment effects. Fourthly, the estimated positive direct and indirect employment effect appears to be unnecessarily conservative, because only two rounds of inter-industry demand were calculated and, furthermore, potential multiplier effects resulting from additional labor income were not assessed. Finally, this study does not provide an estimate of the overall net employment effect by making no allowance for the potential employment losses due to the implementation of environmental policies.

USA—Sponsored by the US-Council on Environmental Quality (CEQ) and the US-Environmental Protection Agency (EPA), the Chase Econometric Associates has developed a comprehensive macro-economic model for estimating the various effects, including the net employment effect of the US-environmental policy for the period 1970-1983 [12]. The analysis was performed using the Chase Econometrics macroeconomic and input/output models which are linked together to permit the analysis of both the impacts that different industries have on another and on the interaction between pollution abatement expenditures and economic objectives such as inflation, unemployment, and growth. This macroeconomic model is updated regularly and employed to analyze the

⁴In a different study the estimated employment effect for 1975 was computed as 152,000 employment-years. The impact on employment was calculated by employing a slightly different approach, namely average sales per employee ratios to the incremental sales estimates [11].

Table 1. Estimates of Total Environmental Expenditures and the Employment Effect (1970-1979)

Source	Type	EE ^a -direct		EE ^a -indirect		Sum (Average per year)	
		1970-74	1975-79	1970-74	1975-79	1970-74	1975-79
Private Industry	Investment	29,850	40,980	19,390	26,450	49,240	67,430
	Operating Cost	51,200	96,800	31,570	60,290	82,770	157,090
Public Expenditure	Investment	54,360	74,240	14,650	20,220	69,010	94,460
	Operating Cost	9,600	27,200	7,650	20,100	17,250	47,300
						218,270	366,240

^a EE = Employment Effect

Source: W. Meissner and E. Hödl [4, p. 105].

estimates of the pollution control expenditures released by the CEQ and EPA.

The model uses these estimates of the incremental annual costs of air and water pollution abatement, imposed by the federal pollution control programs, as exogenous shocks to the economy and traces its impacts on the macroeconomic variables through several channels. The result of these impacts can be briefly summarized as follows:

1. The incremental investment costs for each industry increase the final demand for plant and equipment investment. The cost increases will be passed on to the prices in order to maintain the normal rate of return.
2. In addition, the annual operating and maintenance costs for the installed antipollution equipment are increasing the industrial production costs and, therefore, will lead as well to higher prices.
3. Since pollution control investment is conventionally viewed as not resulting in more output, labor productivity has to be adjusted downward in the industries undertaking these investments.
4. The index of industrial production was increased to reflect the manufacture of automotive emission devices.
5. Due to increasing costs of operating and maintaining automotive pollution abatement devices the final demand for transportation services was increased.
6. The federal environmental programs have increased the debt of the federal government.

Using the environmental expenditures as exogenous shocks to the economy, the Chase macroeconomic model is solved to estimate the effects of environmental policy on the price level, unemployment, private investment, balance of payments, real growth, etc. These effects are estimated over time, the macroeconomic analysis performed with this model indicates that the overall impact of environmental policy on the economy is relatively modest. With respect to the employment level this study discloses that these programs have a net beneficial impact on employment. The most updated analysis estimates that the unemployment rate in 1976 is roughly 0.4 per cent lower with federal pollution programs than it would have been without them. This means that approximately 400,000 persons have benefited from the program. Obviously, this positive employment can only take place during periods when the economy is facing a recession. The study assumes that the positive employment will disappear as the economy recovers from the recession and as the price increases associated with pollution control expenditures begin to have a slight retarding effect on the rate of growth. However, even in the long run, this study does not seem to indicate that environmental programs will lead to significant net average employment effects (Figure 1). A recently completed macroeconomic

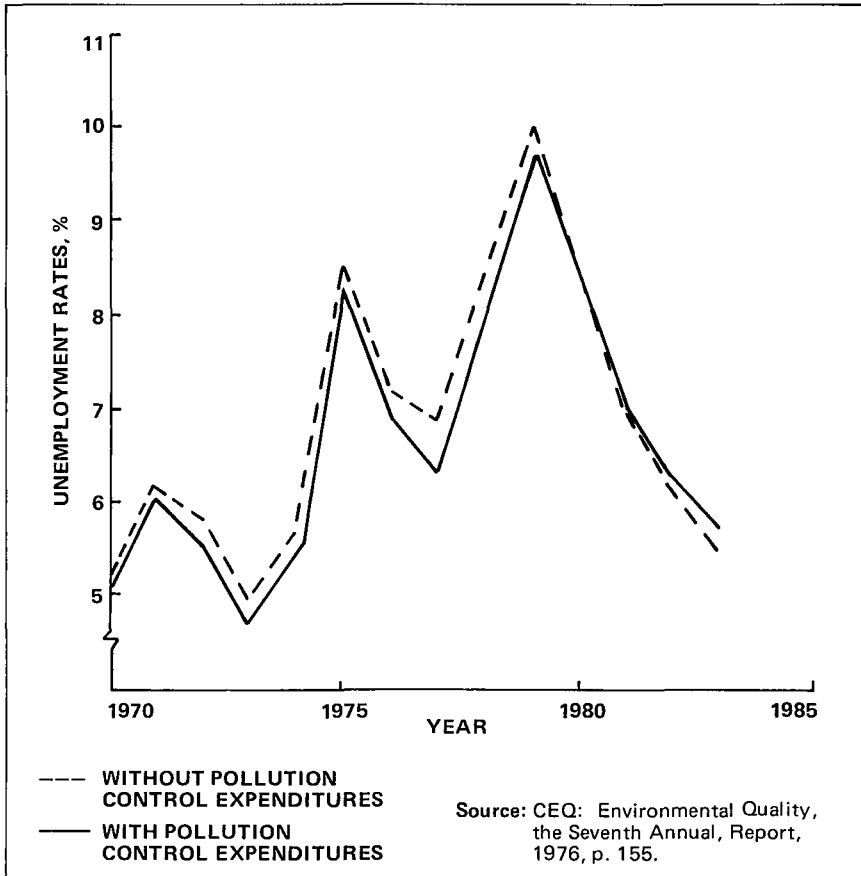


Figure 1. Estimated unemployment rate with and without pollution abatement expenditures.

analysis supported by CEQ and EPA reaffirms this result, namely that these programs have very little net impact on the unemployment rate (Figure 2).^{5, 6}

While the Chase model provides the most sophisticated analyses on this issue, they are, nevertheless, limited by several factors. The estimates of the incremental cost supplied by CEQ and EPA are not quite convincing, since they assume that:

⁵ For the USA are also several sectoral studies available. For example, two employment-studies associated with the construction of municipal sewage treatment plants ranges from 53,000 to 82,000 [13, 14].

⁶ A National Academy of Science committee estimated that about 677,900 persons were employed in pollution abatement activities during the year 1974 [15].

1. environmental standards will be met on schedule;
2. the appropriate pollution abatement strategy will be end-of-pipe treatment;
3. there will be no by-product recovery.

Consequently, these estimates are likely to be biased upward. The estimated employment effects are extremely aggregative. No occupational breakdowns are provided. Perhaps most importantly the estimated employment effect is not comprehensive, since this estimate does not reflect the full range of US-environmental policy, but only air and water pollution control programs.

The Potential Employment Losses—Often it is claimed that environmental policy is threatening or destroying jobs by the closing down of marginal plants. Many of these firms would have gone out of business in the near future anyway due to competitive market forces, however, it appeared that it was politically more convenient to blame the closings on environmental policies. The statistics on this subject are very scanty for the USA and nonexistent for Germany. According to the CEQ, Department of Commerce, and EPA, which sponsored an economic impact study on selected key industries, they estimated that out of approximately 12,000 plants under construction only 200 to 300 plants will

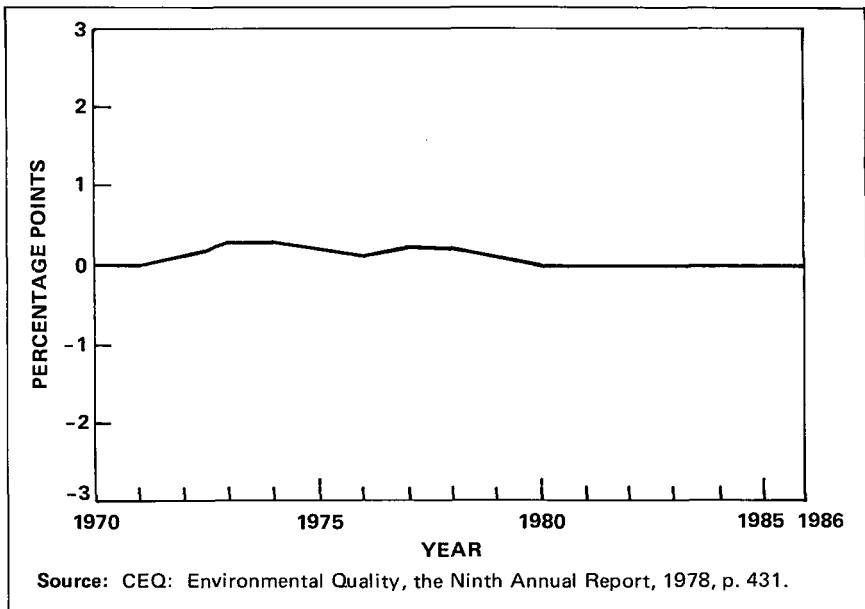


Figure 2. Estimated change in unemployment rates with pollution control expenditures.

be forced to close because of environmental programs. This suggests that the direct employment loss may amount from 50,000 to 125,000 jobs, or approximately 0.05 per cent of the 1970 total US-work force [9, pp. 9-11].

Since the magnitude of this problem is relatively insignificant, it should therefore not be allowed that this issue will influence negatively the formulation and implementation of environmental programs.

Furthermore, some qualitative information is available on potential negative employment effects, namely new jobs cannot be created due to environmental regulations. In this respect the following cases are possible, that either due to environmental regulations or pending environmental impact studies, the construction or operation of new plants are delayed and/or firms are moving to other countries because of lower pollution control costs elsewhere.

However, in either case, no direct statistical information is available on the potential employment losses.

ENVIRONMENTAL POLICY AND ANTICYCLICAL ECONOMIC POLICY

A high employment level, both at the national and international level, together with price stability, have become the major concerns of economic policy for many national governments and international organisations. The ongoing debate about the nature and level of unemployment focuses on the main causes of the existing unemployment, namely whether structure dislocation factors or fluctuations in the business cycle are responsible for this situation. The discussion is important with respect to the appropriate measures to be implemented to reduce unemployment. In this context then, the question arises "how does the environment-employment issue, described above, fit into the overall debate about unemployment programs?" If both public demand and biological and technical necessity to protect the society will continue to request environmental improvement, then the question of environmental employment opportunities will have to be seriously considered. Few countries have already implemented environmental programs as part of their general anticyclical and reflationary economic policies [1, pp. 125-130]. If such economic policies are employed than they have to be coordinated with the overall pollution control objectives, with macroeconomic and employment policies.

The purpose of such an employment-oriented environmental program is obviously to support the general employment policy. This dual function of environmental programs will be most efficiently achieved, when in regions with high unemployment, local environmental projects will be implemented in which labor demand requirements coincide with the available regional labor supply.

The regional unemployment can be distinguished between urban and rural, and furthermore, with respect to the qualifications of the unemployed.

According to statistics, the level of urban unemployment is generally lower than the level of rural unemployment, while the urban unemployed is better qualified and trained than his rural counterpart [16]. The choice of employment-creating environmental projects for urban regions is therefore larger than for rural regions because of the different available labor quality.

The matching of the regional unemployment profile with the labor requirements of individual pollution abatement projects requires in addition the information about the regional distribution of environmental problems, which are intended to be controlled under such an employment-oriented environmental program. Consequently, an efficient anticyclical environmental policy will have strongly accentuated regional features, because, firstly the employment effects of individual projects are in size and duration too limited to exercise any substantial influence on labor mobility and secondly, the environmental problems are, in general, regionally determined.

An appropriate employment-creating environmental project has furthermore to fulfill the following criteria for being suitable as an anticyclical measure, namely, it requires firstly, administrative flexibility of initiation and timing of environmental expenditures, and secondly, flexibility of duration of the project during its implementation time. Obviously the desired program flexibility will depend upon the type of project under consideration ⁷

In Germany the "Bundesanstalt für Arbeit" supports the following employment-creating projects in the area of environmental protection, for example:

1. construction of irrigation installations
2. fortifying river banks
3. improvements of public parks and forests
4. planning and construction of drainage and sewage facilities
5. controlling and maintaining waste deposit sites
6. renovation of historical buildings and sites.

Similar projects are sponsored in the USA, e.g., for urban regions:

1. accelerated construction of sewage treatment plants. It is assumed that one billion dollars creates approximately 85,000 jobs;
2. repair work of roads;
3. renovation of historical buildings;

and for rural regions:

1. reclamation of strip mining land. It is estimated that the reclamation of fifty acres requires one employment year;
2. improvement of public land, e.g., planting trees, preventing erosion [19].

⁷ For an evaluation of employment-creating programs, see references [17, 18].

The above discussion has led to the conclusion that besides the general and continuing environmental policy it is possible to add a variant of environmental policy which is flexible enough to pursue also the employment aspect. However, despite the potential positive employment-creating effect of certain environmental project, one has to realize that the magnitude of this employment effect is too small to play a major anticyclical role.⁸

THE COMING ECONOMIC TRANSITION

The "Council of the Wise Men," a group of eight international economists, who were in charge of preparing a report about the economic problems in the OECD-countries and of proposing policy actions, have published in June 1977 their recommendations: Growth rates of real GNP of about 5.5 per cent a year for the OECD-area over the next five to ten years are desirable and feasible [20]. They assume that with appropriate aggregate demand management and in pursuing a "concerted action" approach, full employment at price stability is achievable.

But are these recommendations appropriate which ignore environmental and social problems? A mere expansionary economic policy is neither suitable to eliminate environmental degradation nor to reduce the wasteful use of resources in the industrialised societies. Questions about social behavior and causes of the environmental crises remain unconsidered, instead an environmental destructive expansionary economic policy is suggested to increase the employment level. It seems, therefore, that conventional economic policies are apparently inappropriate to cope with the problems of modern industrialised societies.

Until today the economic policy of all western societies was mainly oriented towards the achievement of the economic goals of price stability, full employment, equilibrium of the balance of payments, and occasionally a more equitable income distribution. All these economic goals are, however, subordinated to the overall and main goal of quantitative economic growth.

Periods of battling inflation alternate with periods of expansionary employment policies, depending upon which economic school is shaping the economic policy, the "Monetarists" or the "Keynesians." However, the long-term safeguarding of the ecological life-supporting system remains until now excluded from the economic theory and no government accepts it as the overall goal of its economic and social policies. Instead the control of the consequences of unrestricted quantitative growth is exercised only by a sectoral, and consequently subordinated, environmental policy. Therefore, it is no longer unthinkable to speculate whether industrial societies are approaching some sort of evolutionary cul-de-sac of conventional economic theory and policy. Consequently, the

⁸ One has to realise that the total environmental expenditures in Germany and USA are presently approximately only one per cent of GNP.

introduction of the goal of “environmental stability” may not jeopardise the achievement of economic stability, but rather may become its prerequisite for long-term economic and social stability. This means, price stability and full employment can only be achieved by an economic policy, which simultaneously prevents environmental degradation [21].

The traditional aggregate demand management in Keynesian or monetarist style appears to be unsuccessful in the long-run mainly for the following two reasons:

Firstly, the stop-and-go policies of governments to control business cycles enhance the uncertainty of economic activities and over time may weaken private economic activities. This implies that the governments in their efforts to control inflation and recession are caught in conflicting advices from economists to use their monetary and fiscal instrumentarium and alternately to inflate and deflate their respective economies. However, after each of these government interventions the economy emerges in a flabbier and weaker condition than before, with residually high levels of both inflation and unemployment. Obviously the problems are structural, namely the macro-economic policies which pump up the whole economic system to eliminate structural pockets of unemployment are now becoming too costly. The accompanying accelerated rates of inflation and energy consumption cannot be maintained. In the reverse situation, trying to deflate the whole economic system will again not change the structural causes of inflation, namely oligopolistic pricing and government protectionism and furthermore, it will not cope with the rising global competition for energy resources. Inflation, no longer understandable as the tradeoff for unemployment, has now become a structural feature of most developed economies, and recession strikes all industries which depend heavily on the use of the increasingly scarce and expensive energy and other natural resources. Resource prices are likely to surge again from time to time, in particular, since the industrialized countries have lost the political control over large parts of resource exploitation and, therefore, have to accept the energy prices set by the resource, mainly oil, producing countries. Consequently, a restrictive economic policy in the industrialized countries cannot any more substantially revise this development.

Secondly, the traditional expansionary policy, e.g., in form of investment grants and/or accelerated depreciation, is with respect to the employment objective counterproductive. If private investment expands due to low interest rate policy of the central bank and due to the autonomous investment spending of the government, even then the investment will not necessarily lead to the desired employment effect, because of the different types of investment: the “rationalization investment which eliminates jobs, and the “expansion investment” which creates new jobs. As long as the production capacities are not fully utilized, the entrepreneurs are induced to take advantage of the government investment aid programs and they will implement mainly rationalization

investment. The result is that in the capital goods sector the demand for labor will increase, while in the consumption goods sector labor will be dislocated. When eventually the production capacities are fully utilised and private expansion investment becomes profitable, then there will be in general already full employment in the respective sectors of the economy. Consequently, the demand resulting from expansion investment will fuel the wage demands and the inflationary process. The wage-price spiral turns again. Therefore, the “stop-and-go” policy which is directed toward a long term economic growth will fail also, i.e., it will lead to “stagflation” with inflation and unemployment while the environmental deterioration continues as well. Consequently, the lack of intention of the government, to integrate the goal of environmental stability and to give it major attention in its overall economic and social policies, does not only reveal government myopia to recognize the ecological constraints but it demonstrates also the inaptness to handle the economic problems.

Fortunately, the current policy confusion and official resignation to high levels of unemployment is at least opening up discussion to the development of new economic concepts and thoughts of qualitative growth [22]. An economic system that is built on the consumption of cheap natural resources, and has enjoyed a long historical period of sustained quantitative growth, cannot be shifted dramatically in the short run without serious social dislocation. Conventional environmental policy in this respect may help to ameliorate some of the symptoms of a threatened economic system in the short-run.

The customary environmental measures, as they are presently being implemented by the industrialized nations—and in this paper implied in the above empirical discussion on the environment-employment issue—are in their majority measures for controlling only symptoms.⁹ The same science, technology and economic system which are responsible for the existing environmental problems, are now being utilized to abate the symptoms: air pollution with filters and emission controls for automobiles; water pollution with the construction of canalisation and sewage treatment facilities, noise pollution with stronger insulated buildings, etc. The purely technologically conceived concept of controlling pollution conforms with the present economic system. It contributes to quantitative growth and increases the GNP. Therefore, it is not surprising that the environmental protection industry is now enjoying one of the largest growth rates in the economy.

A series of stop gap policies is called for to ease the transition and to enable a smooth readjustment. However, a positive and permanent effect can only be accomplished if attention is turned to the *causes* of the environmental problems, namely to the necessary long-term structural changes in consumption patterns,

⁹ None of the available studies on the employment-environmental issue makes any attempt to suggest long-term changes and to assess their consequences.

life styles, and social values. At the same time a mandatory shift is required for sustainable forms of production and energy consumption based on renewable resources, while, furthermore, an accompanying reduction of rates of material throughput and high conservation of nonrenewable resources are vital. Thus environmental programs are only then meaningful, when they are not only converging up short-term symptoms of environmental degradation, but rather eliminating its causes in the long-run, and thereby becoming a therapy which will transform quantitative growth into qualitative growth.

The prerequisite for the successful transition to a sustained yield economy based on renewable resources and highly conservative in its use of nonrenewable resources will be strong political leadership and programs of public education to explain the basis for such dramatic policy changes.¹⁰ However, only a successful longer-term structural readjustment to a sustainable economy will restore the lost flexibility of our economic system to cope with inflation and unemployment.

CONCLUSIONS

It is not feasible to evaluate all the American and German studies on the environment-employment issue in this brief paper. Despite the difficulty of securing reliable estimates of the employment effects of environmental policy, some general conclusions can be drawn:

1. The presently implemented conventional environmental programs are in their majority purely technological measures, i.e., "end-of-pipe" treatment, and control mainly the symptoms and not the causes of environmental degradation.
2. The macroeconomic models which incorporate these environmental programs seem to indicate that the overall employment effect is moderately positive. For the USA, these positive employment effects may gradually disappear over-time and may even become negative, when profit-oriented investment demands are offset by the loss in productivity and slower real growth accompanied by rising prices due to the installation of pollution abatement equipment.
3. The studies are not detailed enough and are therefore, inconclusive to provide information about potential changes of the occupational composition of the labor force caused by environmental programs.
4. The available empirical information seems to indicate that the negative employment impacts from plant closings ascribed to environmental programs are very marginal. Furthermore, the causal relationship is not

¹⁰ President Carter's attempt to introduce his new energy plan is a move in the right direction. It would have far-reaching effects if implemented.

quite clear, since market forces would probably have led anyway to the closing of these firms.

5. Few countries have parts of their environmental programs integrated into their anticyclical and reflationary economic policies. Despite the positive employment-creating effects of certain environmental projects, the overall importance of such anticyclical environmental policy is relatively insignificant because the magnitude of these expenditures is too small.
6. In the ongoing debate regarding environmental quality and other economic objectives, the author believes that a conventionally environmental policy will not succeed in the long-run to improve environmental quality and to alleviate the economic problems of unemployment and inflation. Instead, environmental policy has to be understood in a broader sense, namely as a policy which transforms the existing production system into a sustained yield economy based on renewable resources and which is highly conservative in its use of non-renewable resources. This type of environmental policy will not only enhance the quality of life by reducing morbidity; mortality and providing more attractive uses of physical amenities but, more importantly, it also will restore the lost flexibility of the economic system to cope with unemployment and inflation.

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