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## Sustainable development - will the technology option work?

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# Sustainable Development—Will the Technology Option Work?

Udo E. Simonis

"... a fundamental problem with economics is the inflated view that economists have of the very real but limited success of their discipline."

*Paul R. Ehrlich*

## Introduction

The topic of this workshop<sup>1</sup> reminds me of an American economist and a German philosopher. The American economist (E. G. Dolan) once said:

Two thirds of the job of the economists in conserving the environment would already be done if they succeeded in establishing reliable accounting systems at the national and the business level that include the environmental costs of production and consumption.

The German philosopher (A. Schopenhauer) once gave a definition of happiness:

To be happy and to remain happy you have two options: Either decrease your expectations or increase your efforts!

Regarding our topic, there is probably a third option, i. e., a combination of the two:

Let us decrease our expectations *and* increase our efforts!

Why to ask for such a modest approach? There are several reasons, all of which have to do with the *real* world which is so much different from our *ideal* world.

In a background paper to our workshop Robert Repetto and John Pezzey say: "Sustainable development requires improvement of policy failures no less than of market failures." I cannot but fully agree to that judgment. But we have to add one additional failure, with which I would

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<sup>1</sup> Intervention at the Workshop on "The Economics of Sustainable Development," Washington, D.C., January 23-25, 1990.

like to start my contribution, and that is the failure of the economists to treat ideal for real worlds!

Ideally, pollution could be prevented and emission-free technology and products be promoted, by emission charges or resource taxes or transferable emission permits or different tariff systems, etc., etc.

In the real world, however, those various theoretical concepts have been traded against each other by the politicians and the business people. None of these concepts actually was bought by them implemented in practice in full scale.

Ideally, it is possible to construct improved information systems that facilitate sustainable development by incorporating the environmental dimension into the relevant accounting systems. However, I know of only two empirical studies on a Net National Welfare (NNW) indicator (by American and Japanese colleagues); and I know of only two countries in which systematic analyses of the defensive (or compensatory) expenditures in the GNP have been undertaken (Japan and Germany). But I know of a dozen sophisticated social indicator systems that were developed to complement the traditional national accounts, all of which sooner or later were abolished and never implemented.

For these, and probably for some other reasons, one might declare the economics profession as one that is, in actual fact, not very much interested in the implementation of its own proposals. If we really were, the state of the world could not be as it is!

And it is exactly for these reasons that when talking about "sustainable development" my plea is for more modest expectations and for some more serious efforts.

Being asked for operational dimensions of sustainable development in general, and technological improvements in particular, I would like to make that plea somewhat more specific by focusing on three levels, on which a real break-through is possible if our expectations are not too high and our efforts high enough: (1) information base, (2) environmental principles, (3) economic instruments. Put differently, one could say that the task is to correct certain information failures, market failures and policy failures.

## Information base

The Brundtland Commission has stated that it is theoretically possible to achieve increased output with decreased energy and materials consumption. The evidence of this *decoupling* of GNP growth from the growth of environmentally harmful effects is, however, not well established and not widely spread.

Several approaches are possible, one or two of them should be implemented worldwide and on a continuous basis. My personal priorities are the following:

### *Model 1: Decoupling*

In a study undertaken in Berlin on 32 countries from East and West, we have focused on four input factors (or industries) whose negative environmental impacts are self-evident: energy, steel, cement, and transport.

We asked whether there was a (relative) decoupling of these factors from the GNP or even a (absolute) decrease of production and pollution in these industries since the early 1970s. The result of the research was that there are cases of rapid decoupling (Sweden), slow decoupling (FRG, Japan), and no decoupling (CSSR, GDR).

I would like to see similar studies commissioned on other environmentally important input factors (industries) and the results published on a regular basis. In particular, the agricultural sector should be included, and also chemical industry.

### *Model 2: Environmental productivity*

Environmental productivity can be measured by levels of output per unit of natural resource input and/or per unit of waste discharged. Such productivity indicators should be compiled and continuously monitored.

Repetto and Pezzey observe that traditional productivity studies ignored an important dimension, namely the efficiency—better: the inefficiency—with which materials and services generated by nature are being used. Particularly, energy efficiency should be measured and published for all countries on a yearly basis.

All of us know, or would expect, that the ranking of the countries of the world would be very much different if energy productivity became a major indicator of economic success instead of the GNP indicator. Repetto and Pezzey rightly demand that governments and economists should at least devote the same attention to measuring and analyzing

these aspects of productivity as to conventional indicators of economic efficiency.

*Model 3: Net national welfare-indicator*

I am still very much in favour of the NNW-approach and of related approaches of an improved measurement of welfare. And I am grateful that some Japanese colleagues have continued work on that welfare indicator although they got nearly no support for their efforts from the international academic community. To be sure: without an alternative understanding and measuring of welfare we will neither reach ecological sustainability nor pollution-free technology.

For some reasons of methodology but mainly because of shortage of resources, in my institute we somewhat modified the NNW-approach and studied thoroughly the growth of the "defensive (or compensatory) expenditures" in the GNP. The share of such expenditures in the Federal Republic of Germany rose from 5 percent in 1975 to some 12 percent in 1988! I would like to see more studies of this type in all the OECD countries.

Economists are not technicians. But with these kinds of qualified information they could provide helpful guidelines for the technicians on the question in which direction technical innovations should be pursued.

For instance, the NNW is focusing on the services (!) from private consumer goods and government infrastructure, and is declaring environmental protection expenditures as defensive, and environmental damages and costs of urbanization as losses, not benefits of industrial development.

Several new accounting systems were developed, but only a few of them were empirically tested. A common effort seems needed to establish what the priorities of further research on that topic should be. Most certainly, an international project on improved environmental information systems is required and should be funded by one of the international institutions.

There is a special East-West aspect involved here, not yet mentioned. Recently we often hear, "the East should learn from the West." However, there might also be something to be learned from the East. For instance, there is a long tradition in the East in using materials balances which in some way are needed to link economic and environmental accounting.

## **Environmental principles**

In the background paper mentioned Repetto and Pezzey say:

Decisions made by enterprises (and households) in response to perceived economic advantage largely determine the direction of technological change; market incentives dominate the search for and diffusion of new technologies.

I think, no one will oppose to this hypothesis. Unfortunately, however, there are only few or no market incentives to seek and adopt low-emission technologies. On the contrary, there are still considerable incentives to save priced inputs at the expense of greater environmental damages that are not paid by the polluter but by nature or the public at large (the tax payer). In the paper it is said: "perverse incentives" that lead to resource-intensive production technology.

The good news is that many emerging technologies offer exciting opportunities. The bad news is that no "hidden hand" is operating to guide technology . . . The needed transformation is technological, but the drive for it will come from another realm . . . , particularly from the people's insistence that some things that seem to be wrong are just that! (Gus Speth)

Environmental policy of some kind has been established in more than 120 countries in the world, and that makes quite a difference to 1972, when only 17 were counted. But there is strong evidence that this environmental policy predominantly is a react-and-cure policy. Despite all the talking and writing on the "polluter-pays principle," in the real world it is mostly the taxpayer (and future generations) that bear the costs, and not the polluter himself. "Preventive environmental policy" is up to now not much more than a metaphor.

This state of environmental policy means that the larger part of environmental technology still is of an add-on-type, or "end-of-pipe technology," and not integrated, "low-emission technology." As to Germany, we have some evidence that approximately 70 percent of what can be classified as environmental technology is add-on-technology. (A study on the USA, a few years ago, showed a similar percentage.)

So, the transformation of technology, the "greening of technology" (Gus Speth) has at best just begun. There are promising solutions, no doubt. But guiding and speeding the application of solution-oriented technology will require strong institutional innovation.

Gus Speth recently promoted the idea of having an EPA that is not organized according to the environmental media (air, water, soil), but according to the main polluting activities—transportation, manufacturing,

agriculture, energy, housing, the sectors of the economy that are technology-based and technology-driven.

Regarding the future of environmental policy, I think that contrary to what most economists believe there will be only limited trade-offs between environmental regulations on the one hand and economic instruments on the other. Technology-forcing regulations and economic incentives must both be harnessed. And this is so for various reasons.

First, countries with an established administrative culture (like Western Europe) and high enforcement potential (like Japan) will never give up regulation, though they might be willing to employ some additional economic instruments. Secondly, with an increasing environmental awareness and pressure from below, governments in the future will be forced to phase out certain products and technologies. Where the exhaustion of resources and the extinction of species is at stake, quantitative restrictions, not taxation and pricing are needed. Thirdly, preventive planning and action will be promoted by actively introducing liability rules and by shifting the burden of proof, a field mainly held by law-making and law-interpreting people who are very much inclined toward regulation.

Still, there are many tasks for economists. I would particularly like them to establish more and better evidence on the "greening of technology." I would like to see more work on promoting and disseminating low-emission technology, because I still have trust in the "power of information" and also in the educational role of the "good example." Modern information and communication technology could be used to spread the idea and the economics of "clean technology" to all the technology-based and technology-driven sectors of the economy. Such need for dissemination of knowledge, of course, has an international dimension. Day by day, too many of the "old mistakes" are being repeated throughout the world.

To some extent, however, this state of affairs is a consequence of the fact that there is no clear-cut definition and no consensus on what "clean technology" really is. This is particularly due to one inherent problem: There is clean technology leading to dirty products, and there are clean products relying on dirty production technology.



## **Economic instruments**

Robert U. Ayres recently wrote the following:

The current resource-intensive and energy-intensive technology of the industrial world has been shaped by decades of cheap energy (and resources) ... This history determines its present appetite for energy and mineral resources ... But this is exactly the same technology that would be exported to the developing countries if they only could afford it.

Ayres concluded:

... although there is no necessary link between GNP and energy/materials consumption, there is certainly an actual one.

No doubt, we need a tighter economic linkage between energy and resource use and the damages attributable to that use—regardless of where the resources are obtained and how and where they are used. It is particularly the intensive international trade of material resources that makes resource taxation an international task.

Theoretically, I am quite in sympathy with "grand designs" for a global resource tax, or a system of "green taxes." But, coming back to my initial warning, we better should lower our expectations because the efforts needed for such designs are rather high. However, we have to "put the prices right" in order to encourage and promote low-emission technology and products. Prices must reflect the true costs to society, the environment, and future generations.

As Johannes B. Opschoor and colleagues have shown, so far there are only a few countries that effectively use resource taxes and emission charges on a larger base and to a greater degree. There is even one case (Japan) where an emission charge was abolished after a few years in use.

In Germany, in a strict sense, there is only one emission charge in effect, namely in the water sector (*Abwasserabgabe*). Through strict regulation it was possible to decrease the sulphur dioxide (SO<sub>2</sub>) emissions. But the great problems are with the increasing nitrogen oxide (NO<sub>x</sub>) emissions, the still high carbon dioxide (CO<sub>2</sub>) emissions, and particularly the increasing toxicity (not the volume) of waste.

In view of climate change, the German environment minister is actively favouring a CO<sub>2</sub> emission charge; but so far he has no sufficient support, neither in the cabinet nor in his own party, nor in the European Community and the OECD. In contrast, two opposition parties (the Social Democrats and the Greens) are favoring a resource tax (energy tax) and four to six emission charges. So, if the current government stays in power, in Germany we at best will get a CO<sub>2</sub>-emission charge, depending on

whether the other European countries will join respective agreements. If, instead, the opposition parties gain power, we have two major proposals at the moment:

- SPD: special tax on gasoline, providing approximately 10 percent of the federal budget (30 billion DM) and four to six emission charges (8 billion DM). These funds shall enter the general government budget without specified spending prescriptions. Parallel to this, the wage tax shall be reduced accordingly.
- Greens: tax on primary energy (including coal and nuclear energy) in the range of approximately 27 percent (80 billion DM) of the federal budget. These funds shall be allocated for the promotion and application of low-waste technology, particularly public transport and renewable energy.

The message of these proposals is clear: Make energy and extractive resources more expensive and human labor cheaper! The substitution of cheap energy for expensive labor and capital must be reversed (see Ayres).

When taking past experience, present public debate and future needs into consideration, a medium-range approach of using economic instruments for inducing technology change seems most likeable: Not comprehensive, perfect, ideal models will be implemented but pragmatic, well-defined models might get a chance. However, quite some coordination effort is needed to get such a medium-range approach going, particularly if we not only think of the OECD countries alone, but of the world as a whole.

## Conclusion

I would like to end by quoting a Norwegian peace researcher who once said:

A policy proposal that cannot be understood by somebody with ten years of education within ten minutes, is not a democratic proposal but an academic or political power instrument. (Johan Galtung)

To paraphrase this quotation with regards to the topic of our workshop: The message of "sustainable development" will not reach its addressees, the people in general, and the technicians and the politicians in particular,

if the economists propagating it do not make themselves better and more easily understood!

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