HOW TO REACH A SUSTAINABLE ECONOMY**

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Today, some 20 % of the people an earth consume more than 80 % of the natural resources. The rest of humanity is eager and getting ready to join this ecologically suicidal race. There can be no doubt that the as yet less industrialized countries will need a bigger resource share in the future if they are to secure health and social welfare for their people. And yet, the present global material flows must be curtailed, at least by half.

For same 20 years we have successfully implemented policies aimed at controlling man-made pollutants. With growing sophistication we have hunted toxic environmental chemicals - often at nanogram levels. Consequently, some parts of the world have become cleaner and healthier - at great economic cost and at the expense of additional energy and materials. And all the while the state of the eoosphere has worsened.

Each consumption of coal, steel, gravel, and sand, each moving or re-direction of soil, water, and overburden by technical means induces ecological changes - without fail. No scientific effort will ever suffice to predict fully the nature, the intensity, the place and timing of these consequences. Today, mankind moves, converts and consumes megatons of materials - already now at more than twice the geological rate and at extremely low market prices. Globally, transportation is highly subsidized. Economic development of populous countries like China or lndia, and population increases worldwide aggravate the situation continuously.
One essential goal must therefore be to de-materialize the creation of human welfare, using much less energy in the process than was hitherto the case.

The more materials we move to create material well-being, the graver the ecological consequences will become. Humankind is well on its way to changing its ecological surroundings drastically and converting itself into early biological fossils as a consequence.

Of course, fewer physical inputs into the world eoonomies will result in correspondingly reduced waste streams, including toxic chemicals. We must find acceptable ways to stop ecologically dangerous misallocations of resources by technical, economic, social, and political means.

** A book has recently been published on the topic presented here: F. Schmidt-Bleek. Wieviel Umwelt braucht der Mensch?- MIPS das Maß für ökologisches Wirtschaften, Birkhäuser (Berlin, Boston, Basel), 1993, ISBN 3-7643-2959-9

The technical hallmark of a sustainable economy is its high resource productivity: the more wellbeing we can generate mit out of each gram of nature, the better for the ecosphere. One motto ot sustainability must therefore be: more wellfare from less environment - In addition to avoiding environmental pollution, we must guard against the un-necessary consumption of natural resources.

A technical eco-efficiency revolution is therefore required. Recent design studies at the Wuppertal Institute show that one can provide the same high quality services with a fifth or even a tenth or less of energy and materials through the deliberate re-design of machines.

The market prices of goods and services do not reflect the ecological truth (Weizsäcker) - that is, the ecological changes resulting from the human over-use of natural resources hardly influence market decisions. The “invisible hand“ reaches into the dark and obviously cannot fulfil its functions properly.

The market itself cannot internalize the ecological risks created through the material intensity of processes, products, and services.

The adjustment of market signals must therefore be achieved purposely through societal agreements, private and government actions - aiming at an enhanced “scarcity“ of natural resources for technical uses. Various economic instruments are available to reach this goal, such as taxes and lowering ecologically counterproductive subsidies. Wherever possible, new revenues thus generated should be used to reduce the cost of labour.

The industrialized countries have led the way to our current ecological predicament. This has little to do with consciously careless actions. lt is the consequence of our boundless drive to make material-based amenities available to all people, coupled with the fact that it took two hundred years before we realized that the ecosphere has no choice hut to react substantially to our ways of satisfying human wants.

This is the reason why there is urgent need to begin improving the resource productivity of the western style economies, the goal being an average factor of 10. Infrastructures, processes, goods and services must be de-materialized, cradle to grave.

The speed of these changes depends - *inter alia* - upon the speed with which appropriate technology improvements can be achieved - and upon the readiness of people to accept changes. Moreover, the timing is critically contingent upon the speed by which ‘the South“ adopts today´s high material- and energy-intensive goods, services - and in particular long-lived infrastructures.

It is to be expected that countries which begin eco-restructuring first will eventually reap the most benefits on the world market.If Europe is indeed looking for new competitive edges here is a good place to start.

In order to assess the resource intensity of goods on the market in a consistent manner, and thus to accomplish a first comparison of their respective environmental impact potential, the MIPS has been defined. MIPS stands for “Material Inputs Per unit of Service” and must be computed from cradle to grave. The MIPS concept allows (for example) the monitoring of progress toward sustainability on the product er process level, or for families, firms, regions or countries; the concept is a transparent basis for environmental statistics and labelling of products and services; it allows the internationally harmonized greening of GATT; it has already been used successfully to design industrial products; the concept can be used to construct a resource tax in the form of a “material added tax“; it can be applied to determine the unecological nature of subsidies; and it allows the determination at which point re-cycling er repairs become ecologically nonsensical. In short, this concept offers a bridge between economy and ecology. MIPS does not, however, account for toxic materials er noise pollution.

Eco-restructuring begins on the market or it does not happen at all. For it to proceed, however, an internationally accepted measure tor the environmental impact potential of all economic outputs is mandatory . Such a measure is the MIPS.

Technology improvements alone, however, will not suffice to reach an ecologically sustainable global state of affairs. Economic accounting methods, as well as economic goals and priorities, consumptive behaviours, material oriented value preferences, and new concepts for human recognition must be re-defined so as to fit within ecological boundary conditions. And present perceptions of work and performance, as well as traditional concepts of reductionist scientific approaches must be reviewed as regards their contributions toward sustainability of human life on earth.

To reach a sustainable economy, not only will a technical eco-efficiency revolution need to be achieved, but a correspondingly intensive improvement of human sufficiency just as well.

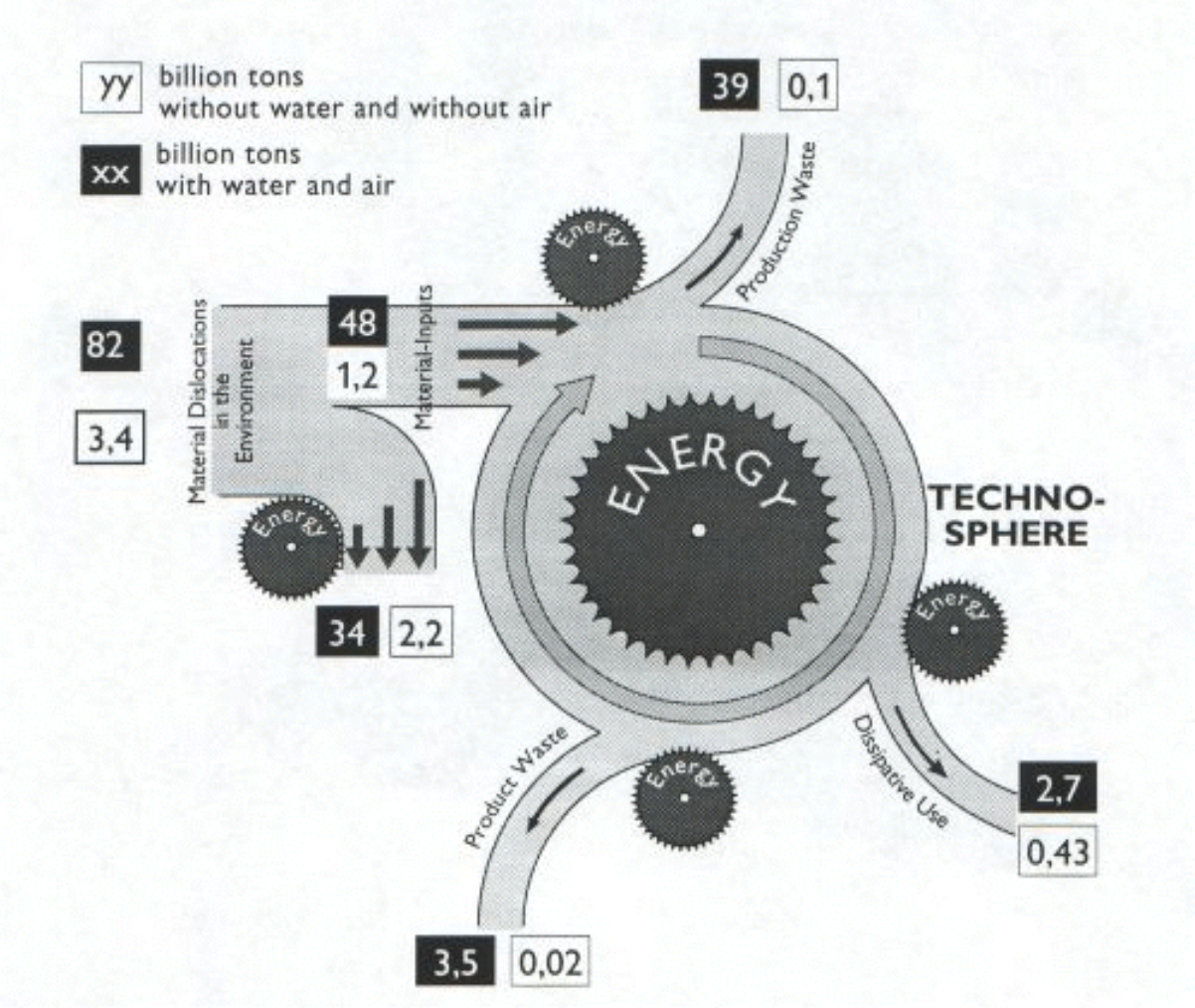
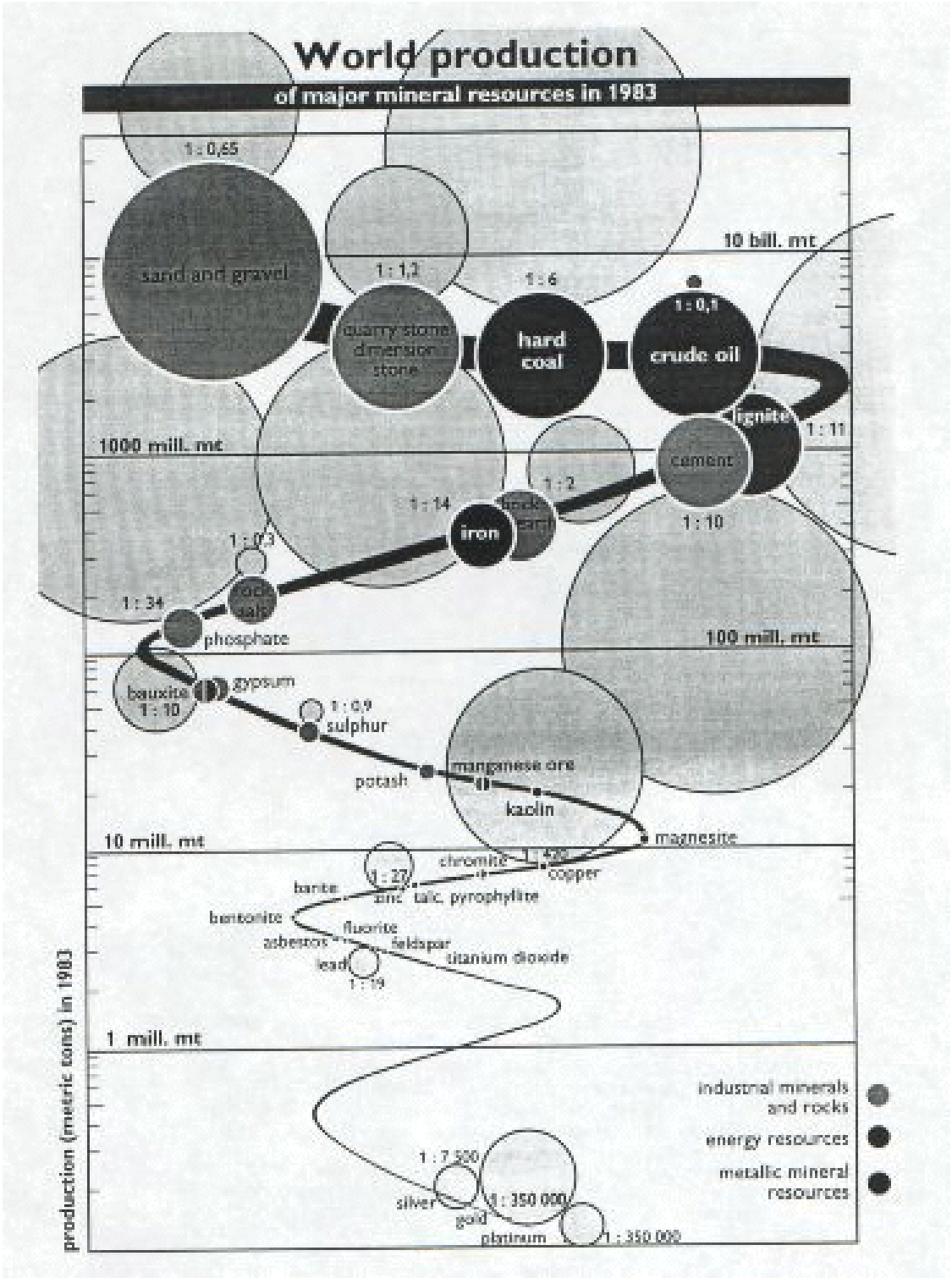


Fig 1: The present material flow situation in Germany. More than half of the quantities moved at the original resource base does not enter the industrial metabolism. Only a small portion of the total anthropogenic mass streams can be recycled

Fig 2: next page: The dark circles in this figure represent the world production of various materials in 1983. The lighter shaded circles indicate the “ecological rucksacks”, that is the total quantities of natural materials moved in order to make the respective basic commodities available to the market.


World production
of major mineral resources in 1983
1 : 0,65
sand and gravel
1 : 1,2
quarry stone
dimension stone
1 : 6
hard coal
1 : 0,1
crude oil
10 bill. mt
1000 mill. mt
lignite
1 : 11
cement
1 : 2
rock salt
1 : 14
iron
1 : 10
1 : 0,3
rock salt
1 : 34
phosphate
100 mill. mt
bauxite
1 : 10
gypsum
1 : 0,9
sulphur
potash
manganese ore
kaolin
magnesite
10 mill. mt
chromite
1 : 420
copper
1 : 27
zinc
barite
talc, pyrophyllite
bentonite
fluorite
asbestos
feldspar
titanium dioxide
lead
1 : 19
1 mill. mt
industrial minerals and rocks
energy resources
metallic mineral resources
1 : 7 500
silver
1 : 350 000
gold
platinum
1 : 350 000
production (metric tons) in 1983

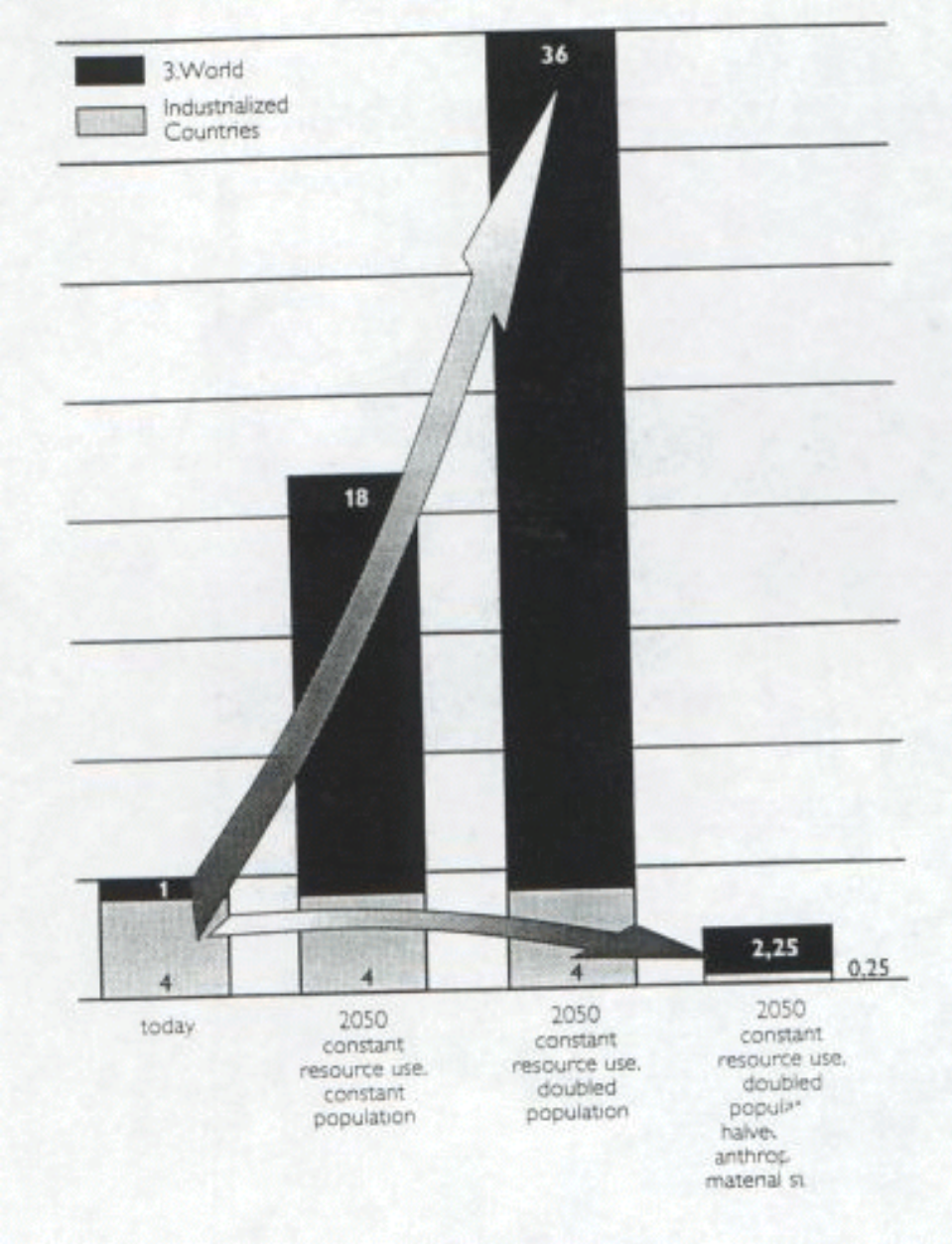


Fig 3: The per capita access to natural resources as a basis for material wealth is un-equally distributed at present. Industrialized countries with some 20% of the worlds population command more than 80%. If in 2050 equity would have been reached on the basis of constant per capita western resource use, and at constant world population, the movement of natural materials would have risen by about a factor 4 compared to today. And if the world population would have doubled by that time, the factor would have reached 8. This is not sustainable. In fact, the present global anthropogenic material streams must be halved as a first important step to slow down anthropogenic ecological changes. For this reason, western style economies must be de-materialized by more than a factor 10.

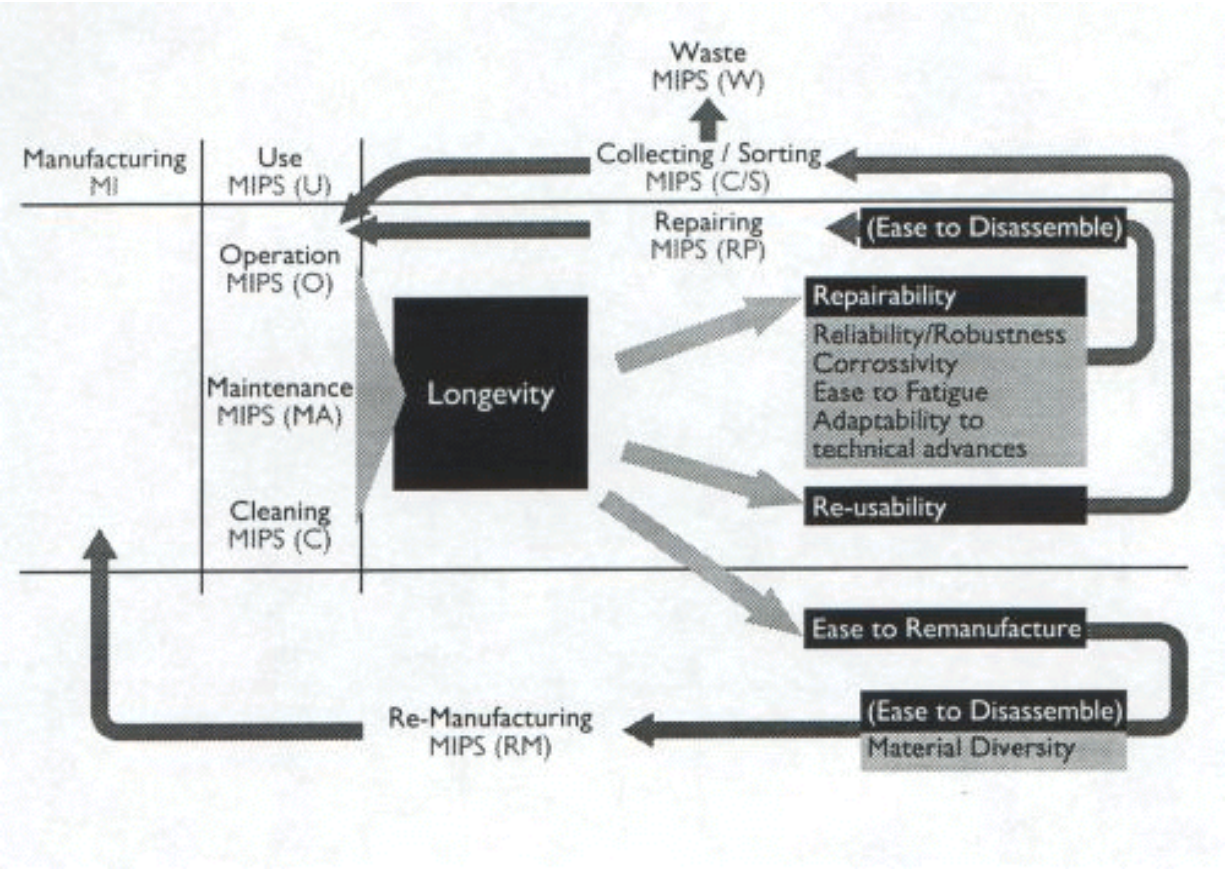


Fig 4: Survey of the different phases during the life of a product. The various types of possible MI and MIPS-(Material Input Per unit Service)-computations are indicated.

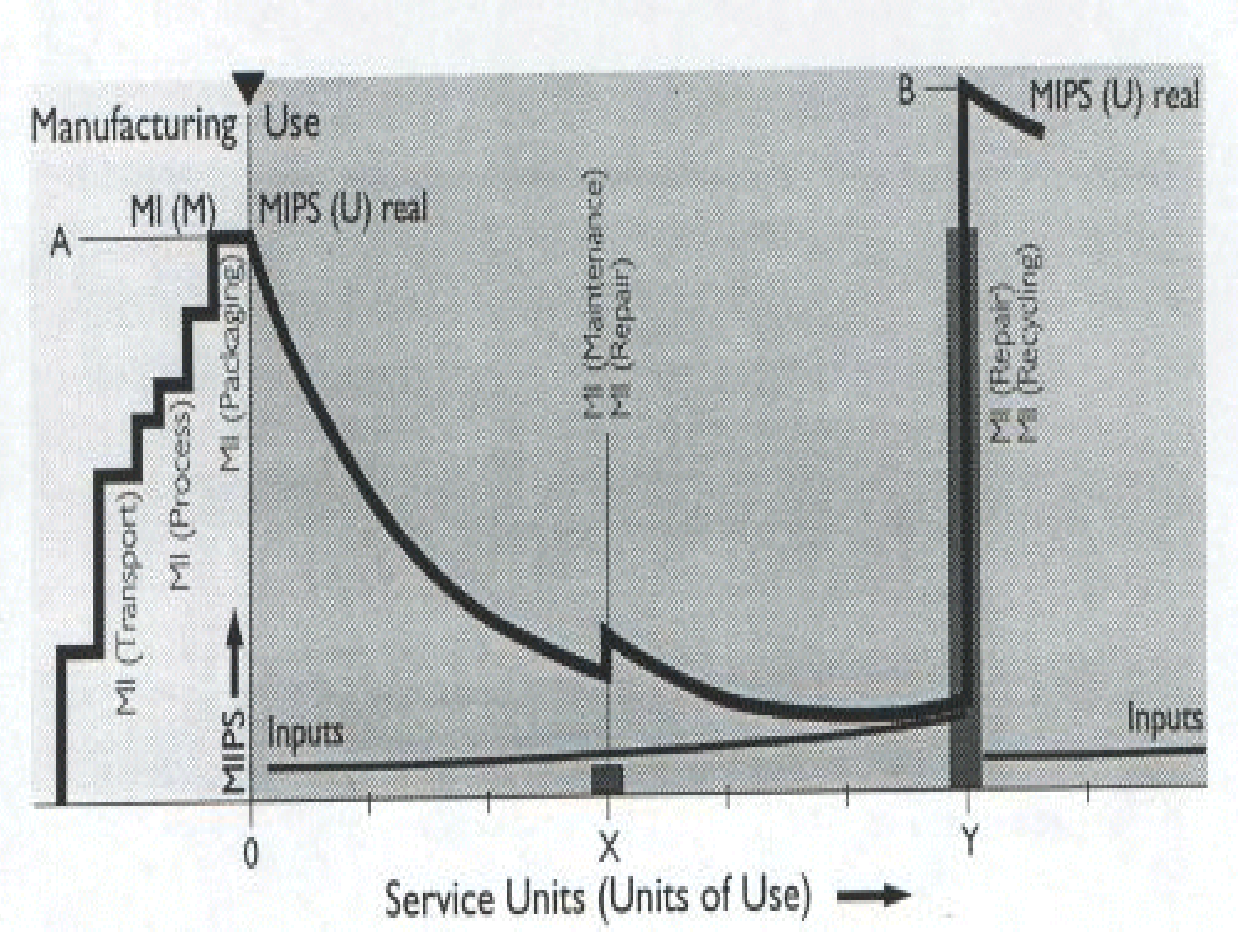


Fig 5: The changes of MI and MIPS during a life of a product, as for instance a washing machine. At point X a small repair is applied, and at point Y a major repair or a recycling phase takes place. As is indicated, the resource inputs (Including transportations, packaging etc) at point Y can be so large as to surpasse the starting MI after original manufacturing. In this case, a repair or recycling becomes ecologically nonsensial.

Fig 6: The new Yin and Yang for an ecologically sustainable future.