Session I: 3R Business Trends

"3R Business in Germany and Europe: Trends and Emerging Policies"

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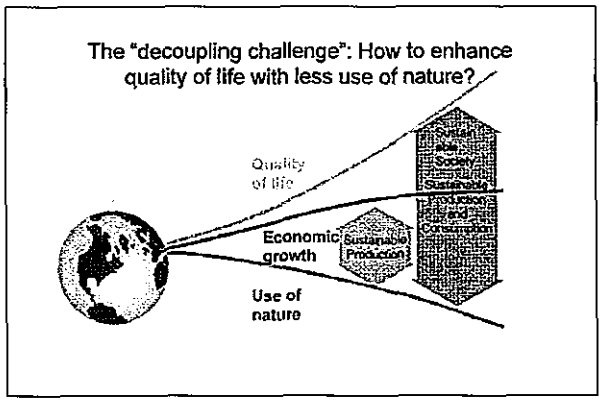
I will be reporting today on trends and emerging policies in the 3R business of Germany and Europe.

1 Decupling the environment and economy

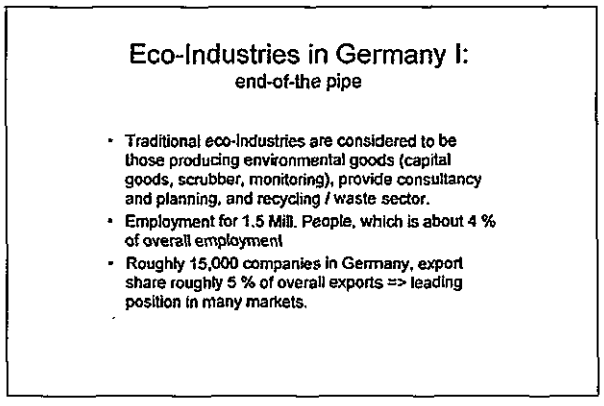


This slide illustrates the decoupling between economic growth and material consumption and the quality of life, through which the use of natural resources is reduced to a minimum, a high standard of living is guaranteed for all members of society and economic growth is good. This is the development of a sustainable society.

2 Eco-industry in Germany

Here, I would like to present the various types of eco-industries.

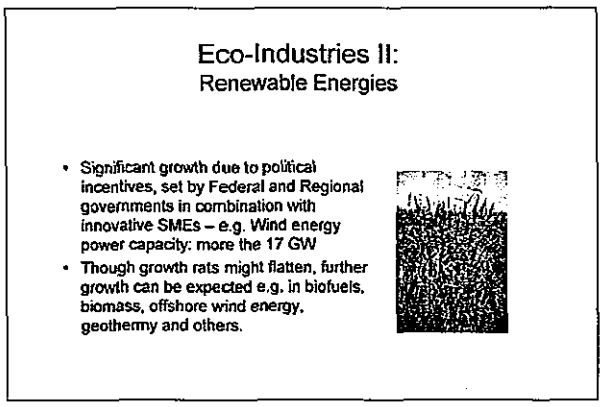
This slide summarizes the end-of-the-pipe type of eco-industry in Germany. Traditional end-of-the-pipe industry has been a very important industry for some



time. This end-of-the-pipe industry removes and treats the air pollutants or wastes generated at the end of production processes. For example, there is the manufacture of capital assets such as incinerators and exhaust gas scrubbers, as well as consulting, water treatment and the waste field.

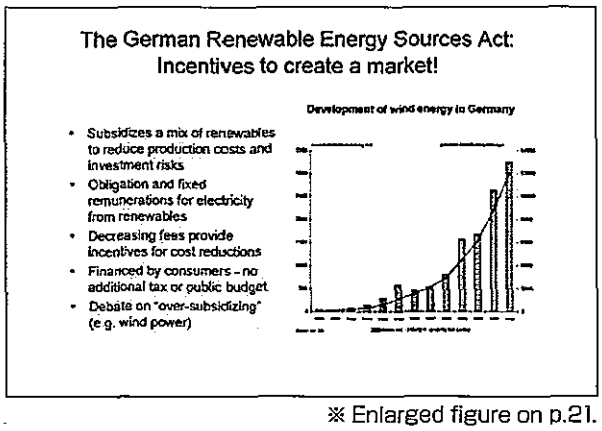
In Germany, there are 15,000 such businesses employing 1.5 million people, accounting for 4% of all employment. Though this is an older way to look at it, it is a very important industry for both domestic and export markets. Moreover, environmental technology accounts for 5% of all exports. This German environmental technology is in a leading position world wide.

One area of the eco-industries that is growing strongly is renewable energies. This, too, is one type of eco-industry. Because measures for reducing the emission of greenhouse gases are needed, the German



Federal Government is providing incentives, and which, combined with business innovation activities, is spurring strong growth in renewable energies. For example, today, wind power generation systems have a capacity of 17 GW.

Though growth rate in land-based wind power energy may flatten, biofuels and biomass, sea-based wind power energy and geothermal energy are expected to grow further.



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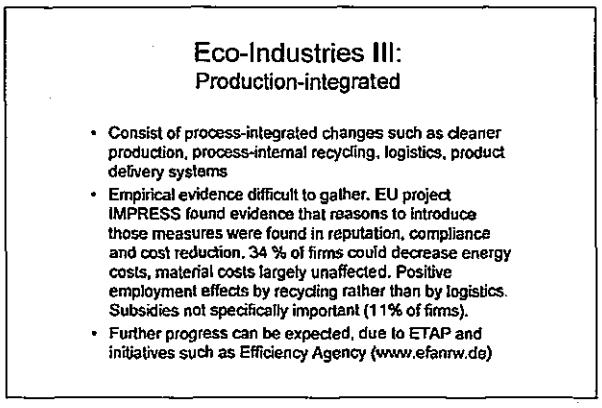
From a long-term perspective, hydrogen may replace oil as a strategic energy in the year 2020 and beyond. However, the demand for energy-saving technology will not decrease. Instead, renewable energies and energy-saving technologies are being looked at as a complementary strategy that requires one and the other.

Germany put into force the Renewable Energy Sources Act in 2000. A similar law existed before that, but the new law provides subsidies for activities that use renewable energies and allows revenues to be earned by selling electricity. As a result, it is helping to lower production costs of power companies and reduce investment risks for investors. Moreover, energy providers are required to purchase renewable energies at a fixed price. This scheme is reducing production costs and utility rates for renewable energies.

An important note is that electricity rates are borne by the consumer and not the taxpayer. With public subsidies, budgets are limited and approval is needed from the European Commission. Germany's Renewable Energy Sources Act cleverly bypasses this. Spain has a similar legal framework. With this scheme, incentives work and renewable energies are solidly introduced on the market.

Taking example, some German states have started introducing policies that make it harder to establish new wind farms. The Federal Government claims that the subsidies of the Renewable Energy Sources Act are not in excess. In any case, some cases of success can be seen.

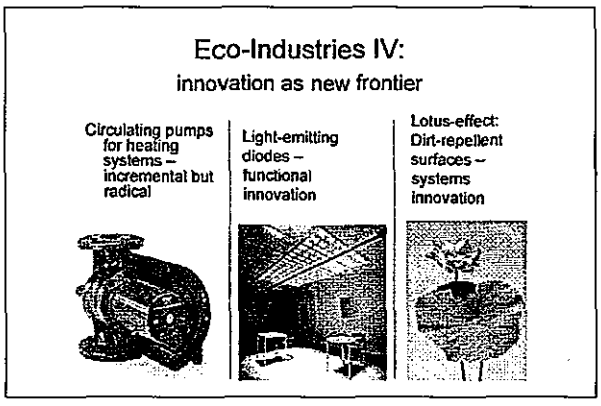


The third type of eco-industry is production-integrated. It consists of process-integrated changes such as cleaner production, in-process recycling, logistics, product delivery systems, and so forth.

Nevertheless, it is hard to gather empirical evidence that integrated production is reducing environmental load. The EU research project IMPRESS found that these measures were introduced because of business brand, compliance and to reduce costs. Businesses that have introduced integrated production have reduced their energy consumption and material

costs, and found that recycling rather than logistic has a positive effect on employment.

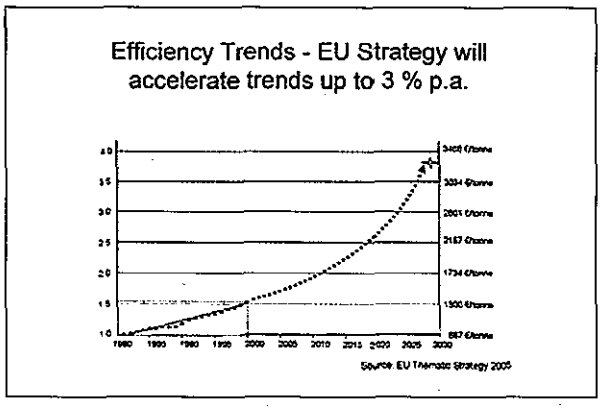
Integrated production is expected to spread further because of the Environmental Technology Action Plan (ETAP) and incentives such as the Efficiency Agency.



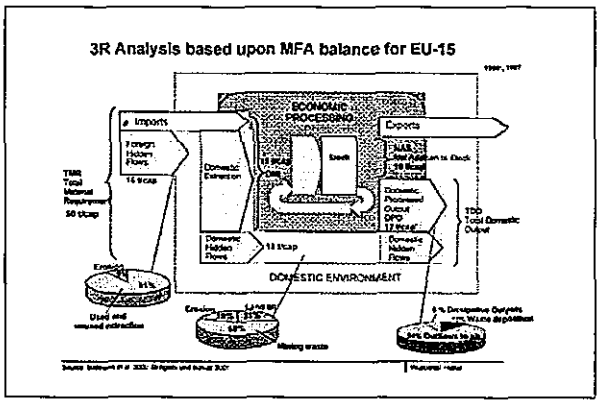
The fourth type of eco-industry is an innovative type that serves as a new frontier. For example, there are circulating pumps for heating systems that slightly but radically improve performance, functional innovation such as light emitting diodes (LED), and bio-mimicry, which applies mechanisms of plants such as the surface of the lotus leaf that repels dirt.

3 Material flow analysis and 3R policy

Material efficiency is a new trend in 3R policies. At the call of the German Ministry for Economy, large conferences have been held on raw material security with the participation of the German Federal Industry Association (BDI). Behind this activity is the rising cost of raw materials for industry, such as copper and iron ore. Moreover, the EU is studying thematic strategies for sustainable resource management. Concrete policies will be devised from these thematic strategies. One sustainability strategy being promoted by the EU and Germany is "resource productivity and material efficiency".



The EU is studying strategies to accelerate material efficiency. The current material efficiency is 1.5%, but the target is to raise it by 3% annually every year up through 2030. Within the thematic strategies for sustainable resource management, studies are looking at creating a hub organization for material flow information in EU, and having each sector and nation develop action plans.



Our research institute has been thinking about how to measure and manage resources exploited in economic activity from the cradle of a product to its grave. We are now measuring resource flow using a tool known as Material Flow Analysis (MFA). It is used by the Statistics Bureaus of the EU and Germany, member states of the European Union, and

Japan's National Institute for Environmental Studies. Material flow analysis is supported by OECD, as well.

The slide shows a material flow analysis of the 15 member states of the EU. It measures all types of materials whether for agriculture or industry.

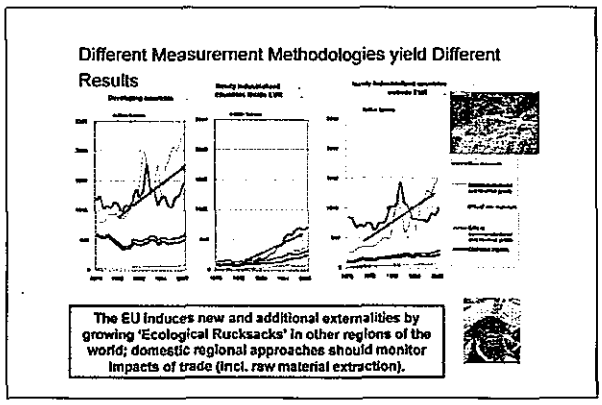
The Total Material Requirement (TMR) per person required by the average EU resident in a year is 50 tons. Within that are 16 tons of foreign hidden flows that come with imports.

There are 19 tons of domestically extracted materials per person and 15 tons of Domestic Hidden Flows; mining waste fits in here. As a part of the input, 10 tons are added to stock. These are used for infrastructure such as construction and roads. However, if looked at from a 3R perspective, this infrastructure itself becomes waste. Therefore, it is necessary to raise construction field in policy management.

On the right of the slide is the nation's output, which measures waste and gas emissions including CO_2.

Material flow analysis will eventually be necessary for countries, businesses and regions to get involved with material productivity. That is because 3R management is not possible without understanding material flow.

Hidden flows are complicated. A breakdown of hidden flows is given in the pie chart at the bottom. Foreign hidden flows include both that which is not used and that which is used; domestic hidden flows consist of mining waste, soil erosion and landfill. A large portion of the hidden flows on the output side comes as outflows to the air. Hidden flows are even more complicated in regional and business strategies.



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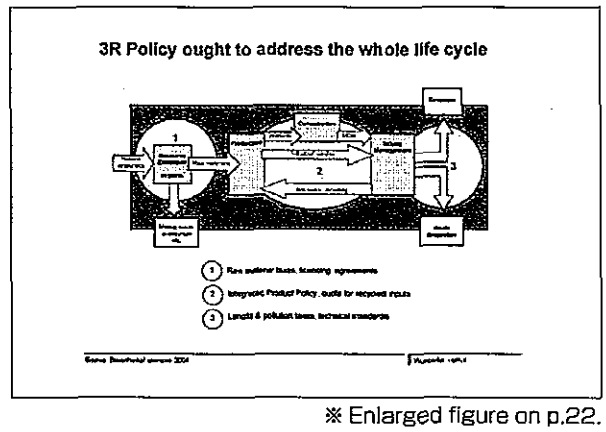
Without hidden flows, the total foreign material use has been flat since 1976. However, the result is completely different when hidden flows are added in. The line indicating the ecological rucksacks of intermediate and finished products rises to the right. If compared against a materials-only line, a large difference is easily recognized. Results are very different when all materials are measured and when materials are measured in a narrower sense.

In order to measure all materials, foreign hidden flows must be included. And, measured values must be used in statistics. In order for this measurement method to become an international standard, cooperation is needed amongst statistics bureaus, experts, etc. Businesses, too, need material flow analysis to measure material investment from an international perspective.



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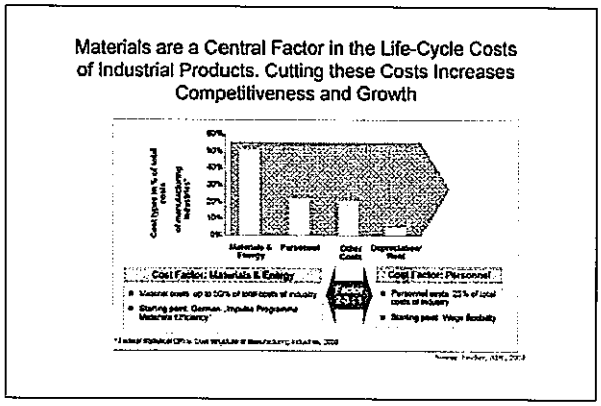
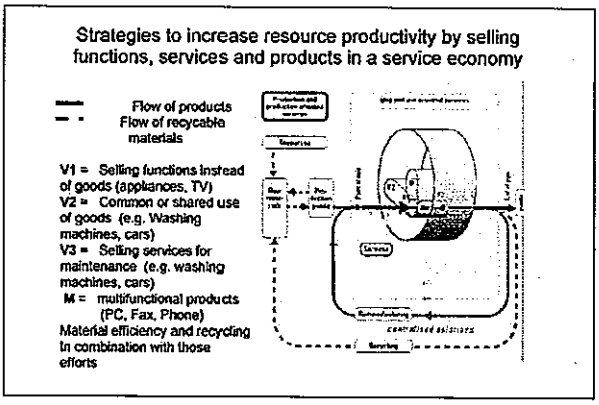
This slide shows the target areas of policies. It is questionable whether or not existing policies are sufficient for each lifecycle stage of a product, but waste management of the third stage is working well. Nonetheless, the transition from material extraction of the first stage to production of the second stage is not sufficiently managed. Policy tools should be applied more to managing the first stage.

Materials are a central factor of the lifecycle costs of a product. This figure illustrates what percentage



of the costs of an average product are material costs. Resultantly, the material costs and energy costs account for about 50% of product costs, which is more than the percentage of manpower costs.

If business managers are asked where they can cut costs, most respond by "cutting personnel expenses". This is shocking. By reducing material costs and energy costs, production costs as a whole can be decreased, but this has always been looked at lightly.



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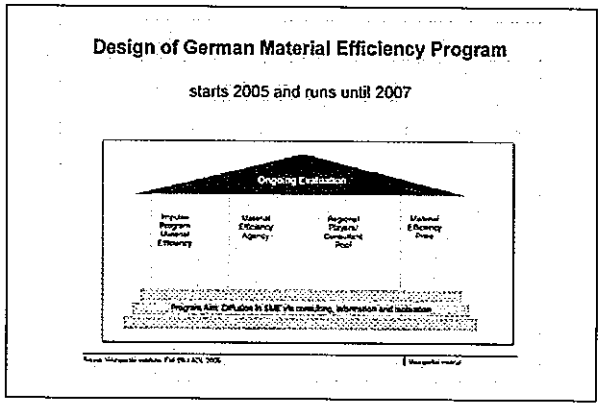
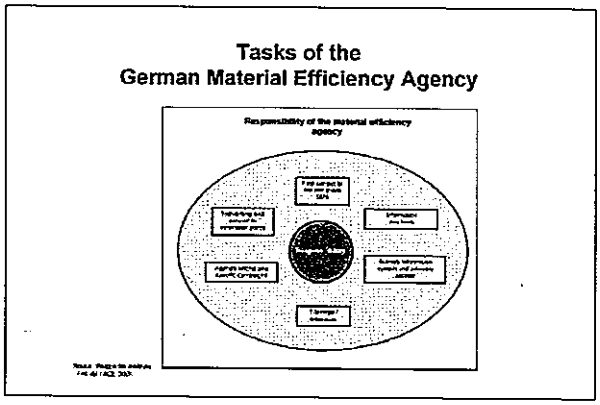
The figure conceptualizes Product Service Systems (PSS), which businesses in Germany, Europe, Japan and elsewhere are getting into.

V1 provides function rather than goods. One example is rental services for home appliances or TVs. V2 is about common or shared use of goods such as washing machines and cars. V3 provides maintenance services for washing machines, cars, etc. M is about selling multifunctional products such as PCs and faxes. It is also important in these types of business to consider material flow over a product's lifecycle.



As a proposal to Germany's Federal Ministry of Economy, the Wuppertal Institute created a Material Efficiency Program this summer in cohort with Arthur D. Little, Inc. and the Fraunhofer Institute.

The program deals with material efficiency. Studies are underway to create a Material Efficiency Agency on the federal level, provide consulting on how to increase material efficiency and give awards.



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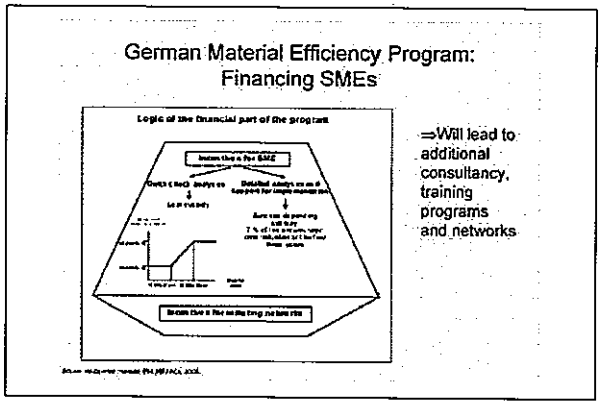

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The operations of the envisioned German Material

Efficiency Agency would be consulting and advice for particularly small and medium size businesses. They would first visit the site and then provide financial assistance for implementing improvements on the spot. Furthermore, they would provide expert consulting and educational programs.

Insights from recent Research

- Policy coherence important: integration of waste, resource management, climate and other policies.
- Regional clusters of technology and networks.
- Regional competitiveness driven by other factors too. Business participation is pivotal for any success. Efficiency Agency can be a supportive factor.

Some things that have been learned from recent research are shown here. In other words, not only waste and resource management but also integration with climate and other policies is important towards a 3R economy. Climate policy is a big theme in Europe and emissions trading is already being done. Moreover, harmony with overall economic policy and employment policy is important.

On the regional level, it will become important to form clusters of technologies and networks.

Because regions will need to be more competitive, it is important to strengthen networks and improve material efficiency of the region in addition to reducing production costs and material costs; the participation of the business world will be absolutely essential. An organization like an Efficiency Agency in NRW could be supportive.

The 3R trend has appeared markedly in German and European policy. And, it does not stop with conventional waste management and end-of-the-pipe technologies. One particularly hopeful area is material efficiency. This is not only because of environmental concerns but also because it reflects on material costs. With support for businesses in the form of new incentives, material efficiency will become the driving force of further innovation in Europe.

Conclusions

- 3R trends emerging, go clearly beyond waste and end-of-the pipe technologies.
- Concern for raw materials costs as a new driving factor.
- Policy might enhance materials efficiency via learning tools – German program ready for take off.
- Measurement schemes should be clarified.
- Business efforts integrate sustainability management, procurement, strategic R&D, customer relationships, stakeholder dialogues, value chain management.
- Approaching sustainable growth for sustainable societies !

Germany has just launched a Material Efficiency Program. Businesses are making efforts to maximize the potential of existing processes and crank up existing management tools.

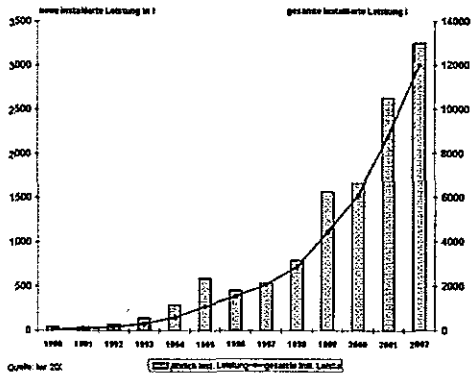
However, problems remain in measurement concepts, performance indicators, targets and so forth, and they must be resolved.

The undertakings in Japan, Germany and Europe are looked at as promising efforts that will enable sustainable societies to attain sustainable growth.

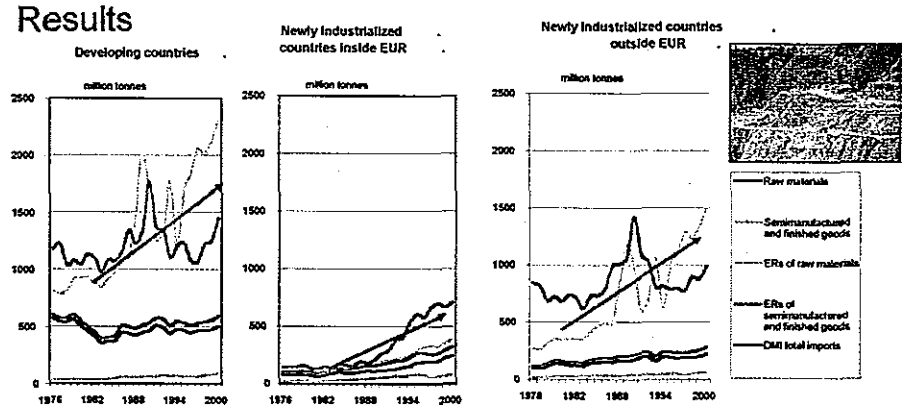
The German Renewable Energy Sources Act: Incentives to create a market!

- Subsidizes a mix of renewables to reduce production costs and investment risks
- Obligation and fixed remunerations for electricity from renewables
- Decreasing fees provide incentives for cost reductions
- Financed by consumers - no additional tax or public budget
- Debate on "over-subsidizing" (e.g. wind power)

Development of wind energy in Germany

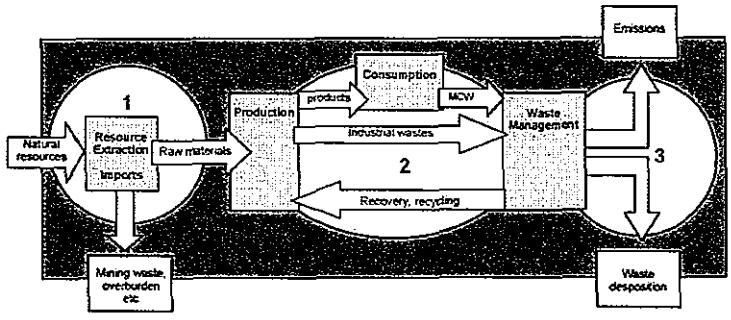


Different Measurement Methodologies yield Different Results



The EU induces new and additional externalities by growing 'Ecological Rucksacks' in other regions of the world; domestic regional approaches should monitor impacts of trade (incl. raw material extraction).

3R Policy ought to address the whole life cycle



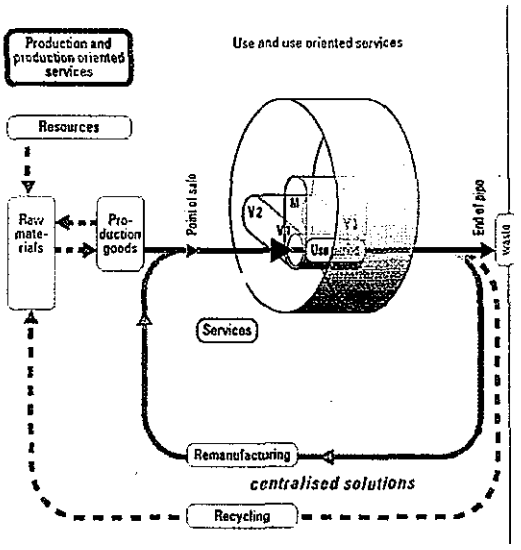
1. Raw material taxes, licencing, agreements
2. Integrated Product Policy, quota for recycled inputs
3. Landfill & pollution taxes, technical standards

Source: Bleischwitz/Hennicke 2004 | Wuppertal Institut

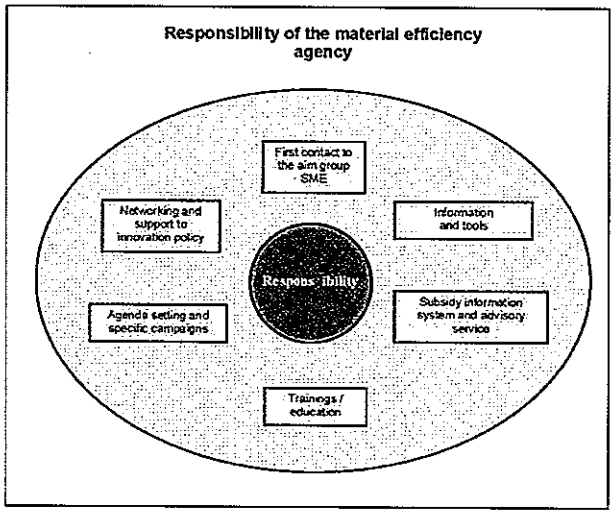
Strategies to increase resource productivity by selling functions, services and products in a service economy

Flow of products
Flow of recycable materials

V1 = Selling functions instead of goods (appliances, TV)
V2 = Common or shared use of goods (e.g. Washing machines, cars)
V3 = Selling services for maintenance (e.g. washing machines, cars)
M = multifunctional products (PC, Fax, Phone)
Material efficiency and recycling In combination with those efforts

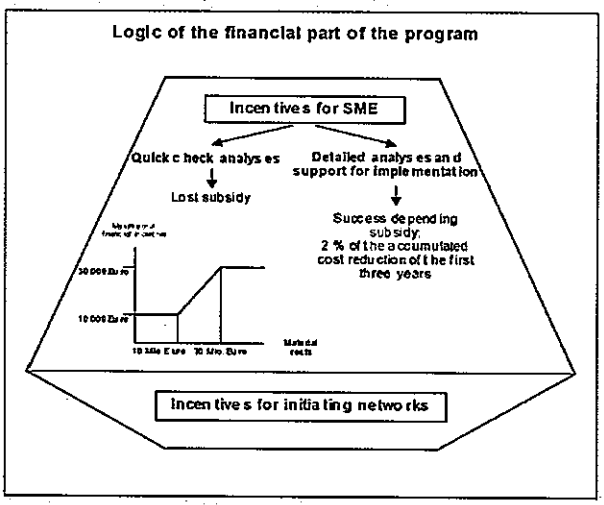


Tasks of the German Material Efficiency Agency



Souce: Wuppertal Institute , FHI ISI / ADL 2005

German Material Efficiency Program: Financing SMEs



⇒Will lead to additional consultancy, training programs and networks

Souce: Wuppertal Institute, FHI ISI / ADL 2005.