Sustainability, global responsibility and ecological industrial policy – perspectives for international cooperation

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Abstract:

Expectations made of environmental policy and the use of scarce resources are rising in Germany. But as one of the most powerful economies in Europe, with a strong export-oriented industry, the question arises how that can be combined under the umbrella of sustainability. On the one hand Germany is heavily dependent on imported raw materials. What are the environmental, but also the social backpacks carried by these commodities? Companies in industrialized countries must pay more attention to the conditions in their supply chains and in their producing countries. They have a responsibility for how and under what conditions commodities are extracted and obtained. Methods of analysis include Life Cycle Assessments and Life Cycle Sustainability Assessments.

On the other hand Germany, especially the state of Baden-Wuerttemberg, exports products as well as many capital goods in the machine manufacturing and plant engineering industries. The more efficient, resource-saving and environmentally friendly these machines are, the more they can contribute to solving the problems in the world and to the value added for all involved. Resource-efficient technologies are therefore a key area of innovation for the German economy. There is a chance in the cooperation between Germany and resource-rich countries. The global challenge is to close material cycles and to protect the environment. In the state of Baden-Wuerttemberg, the issue of resource efficiency currently forms the focus of the sustainability strategy of the first “green” state government in Germany.

Keywords: affluence, global gross domestic product, life cycle thinking, resource efficiency, sufficiency, technical innovation

1. INTRODUCTION

Sustainable development is a global task. It is invoked by international organisations such as the UN and is included in national government programmes (UNCAD 1992; Bundesregierung, 2002). Especially in Germany, where environmental protection has played a major role for decades, sustainability has become a key, integrative guiding concept. In a national survey conducted among around 2000 citizens in the year 2012 to identify the most important tasks, environmental protection took second place directly after economic and financial policy (UMWELTBUNDESAMT, 2013).

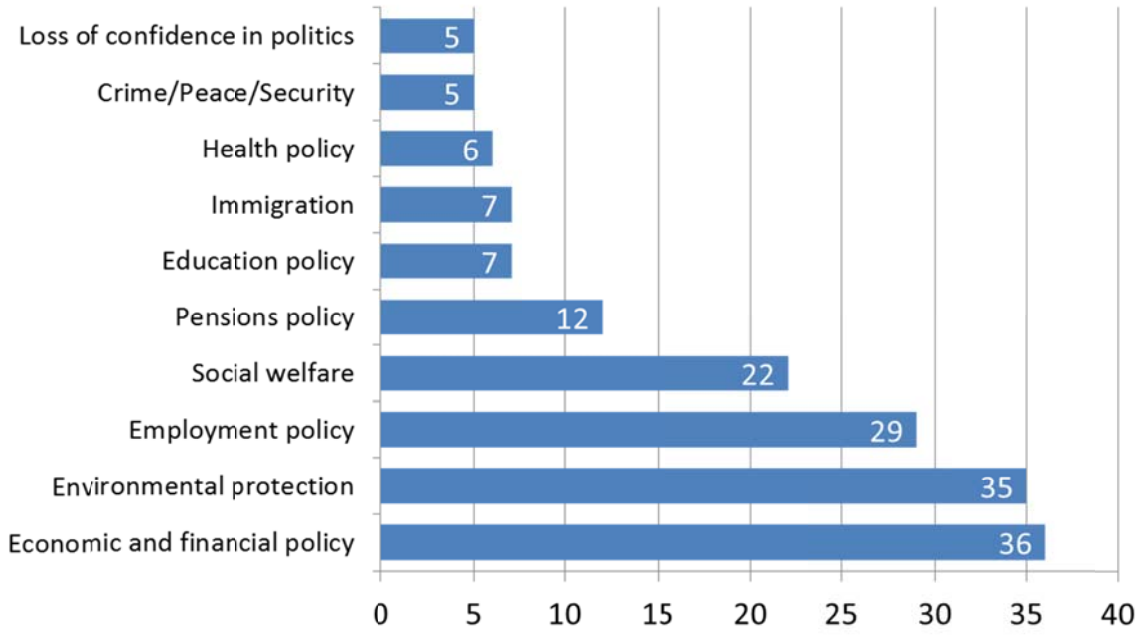

Fig. 1: Ranking list of political task areas in Germany. Question: "What do you believe is the most important problem confronting our country today?" Source: (UMWELTBUNDESAMT, 2013)

The State of Baden-Wuerttemberg in the south of Germany enjoys particular significance in this connection. About 10.8 million people live here in this heavily industrialised state. Well-known firms such as Daimler, Bosch or Porsche are based here. The state is relatively affluent; the annual GDP per inhabitant is EUR 36,000 a year (approx. 46,000 US-$/a) (STATISTISCHES LANDESAMT, 2013). This is one of the most innovative regions in Europe and home to numerous strong medium-sized firms. Many of these belong to the "hidden champions", i.e. they are world market leaders in their specific technology segment.

Since 2011 this state has been governed by a Minister President appointed by the Green Party. It is the first state government in Germany to be headed by the Green Party. The essential concern of

the Green Party is environmental protection and – to put it a little more broadly – sustainability. At present preparations are underway for the departure from nuclear energy and renewable energy systems are being massively promoted. This is being described as the “turnaround in energy policy”.

It is therefore particularly interesting to examine the importance of sustainability in such a highly industrialised state. Industry, especially the automotive industry, does not generally enjoy the reputation of being particularly environmentally kindly. It burdens the environment with CO_2 emissions, uses lots of raw materials, requires cheap energy and produces products such as luxury cars that are not specifically resource-saving. The state thus causes around 8.7 t CO_2 equivalents of greenhouse gas emissions per year and resident (BÜRINGER; KURZ, 2012). On the other hand, precisely this industry forms the foundation of the affluence of the citizens in this state. The policy-makers, including green politicians, have to cope with this conflict. The State Government established an Advisory Council on Sustainable Development in 2012 in which persons from industry, academia and NGOs are represented. They are currently together seeking a way of promoting sustainability for the industrial State of Baden-Wuerttemberg without jeopardising its economic and ecological livelihoods.

2. THE VISION OF SUSTAINABILITY

Much has already been said about sustainability in public and in expert discussions. The idea of describing sustainability with the triple bottom line or the three pillars of environment, economy and society has become generally accepted worldwide. All three pillars need to be taken into account equally (ELKINGTON, 1998). However, in expert circles this image also encounters resistance (e.g. NORMAN; MACDONALD, 2004). For example the German Advisory Council on the Environment already noted critically in 2002: *”The politically influential three-pillar concept in Germany has initially led to an upgrading of environmental matters, as it postulates equal ranking of economic, environmental and social development. Results of research projects working with this concept as well as the political handling of this concept make it clear, however, that the three-pillar concept is deteriorating to a kind of wish list in which each actor enters what appears to him to be most important. The concept thus increasingly favours arbitrary fixings.”* (SACHVERSTÄNDIGENRAT FÜR UMWELTFRAGEN, 2002).

It would have been more expedient to interpret the three-pillar concept as a magic triangle, as can be formed for example in economic theory from price stability, full employment and foreign trade equilibrium. The three objectives mutually exclude each other (which is why the triangle is termed “magic”) and have to be balanced out suitably. If sustainability is not simply meant to describe a

visionary wish list, but instead to give concrete guidance for action, then the dependencies and conflict of goals between the three pillars must be described. The requirements made of goals for action must be based on causal or even decision-making models that map the interdependencies of various areas and define influencing factors.

Fig. 2 shows these dependencies in diagrammatic form in both directions – clockwise and anti-clockwise. Wealth and distribution of wealth, in other words the social component, depend directly on the economic system. Wealth is still considered a key prerequisite for taking environmental protection issues seriously. An intact environment with sufficient supplies of resources is in turn a competitive advantage for industry. The circle thus closes here in one direction. In the opposite direction an intact environment is viewed as an important prerequisite for sustained well-being and a good life. Social peace is an important factor for the economic development of a state or country and an efficient economy allows costly efforts to be undertaken for environmental protection. Here too, the circle closes. If these conditions are not satisfied, then the network of results and impacts leads to a double deadlock and the question arises as to where this can best be broken. The "simplistic" three-pillar or triple bottom line model hardly helps anyone further at this point.

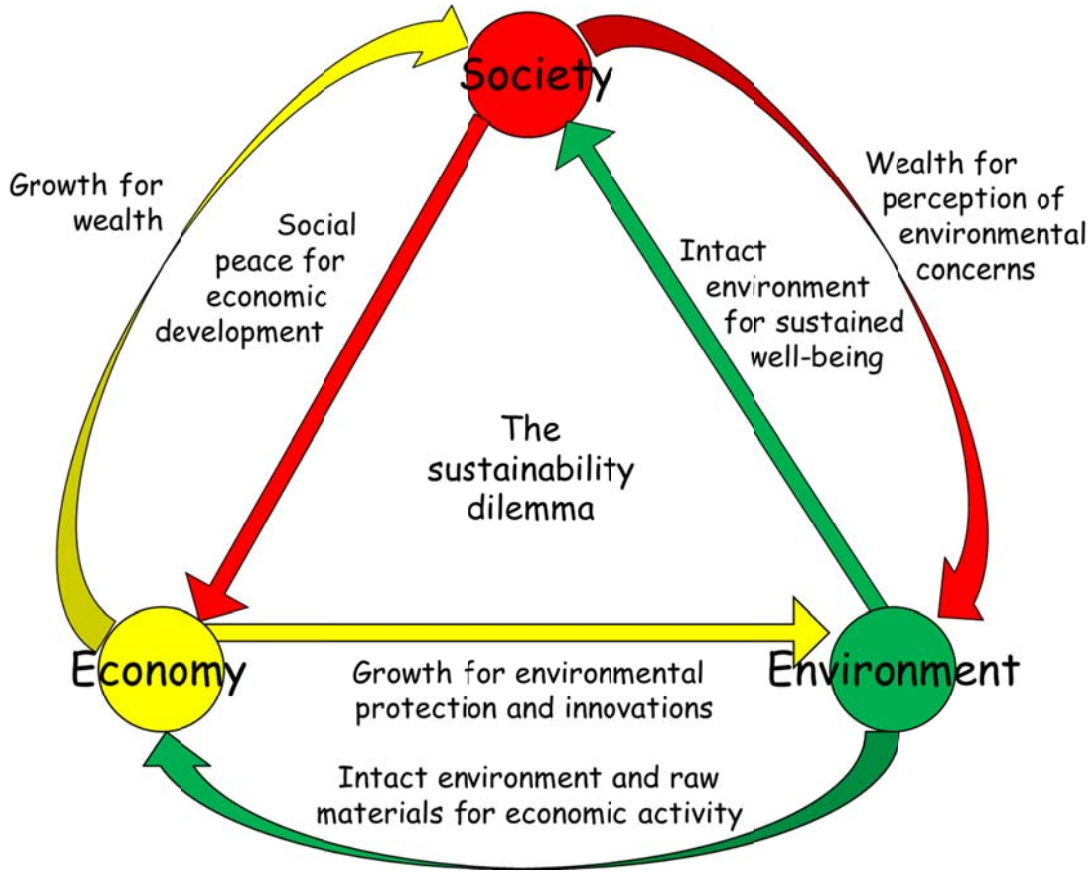

Fig. 2: Dependencies between the various sub-sectors of sustainability.

A special problem in the three-pillar model is the separation of the social dimension from the economic dimension. The economy is not an end in itself, but has a social task, namely to supply people with the necessary goods and services. The social task, namely covering human needs sufficiently and ensuring a "good life", therefore tops the list of priorities. The economy has a serving function here, namely optimal allocation of the means. It is not conceivable without human needs – it would otherwise serve no purpose. Its main task therefore consists in efficient deployment of resources and environmental goods. What affluence, or conversely what sufficiency we want, is on the other hand not a primary economic question, but instead a social question. In other words it cannot be represented or answered solely by the "economy pillar".

The environment, on the other hand, defines the limits within which society can engage in economic activity. However, the economy as well as the social affairs sector frequently disregard these limits, even though both are affected by them. Not only inefficient supplies (the economy), but also altogether incommensurate supplies of material goods (social affairs) can endanger environmental goals. Economic researchers recently drew the attention of the German public to this (EWRINGMANN et al., 2012): *"The discussion of equal opportunity and fair distribution regularly lacks any reference to the potentials and natural resources that are altogether still available for distribution."*

If we want to describe sustainability, then the greatest challenge lies precisely in this conflict – environmental limits versus society's striving for material growth. However, this striving is part of both the social and the economic dimension.

The Agenda 21 (UNCED, 1992) too originally comprised the social and economic aspects under a joint heading. It was only the UN Commission on Sustainable development (UN CSD, 1996) that separated social affairs from economic affairs and allocated e.g. poverty reduction, including unemployment reduction, to the social aspect (see discussion by Giegrich et al., 2003). However, this is hardly conceivable without economic instruments.

It would therefore be more helpful for an actual sustainability policy to define the contradictions between various goals, to appraise the effects against each other and to point up possible options for action. For instance Giegrich et al. (2003) pursued such an approach within the context of discussing national indicators for sustainable development. They start from the basis of inter-related effects in line with the DSR approach (division into "Driving-force, State, and Response-Indicators") and form a two-sphere model: society and the environment.

While ecological aspects can clearly be allocated to the "environment sphere", the areas of social affairs, the economy and institutions can all be seen as components of the "human/society sphere".

With the help of this approach it becomes less significant how those themes which can sometimes not be clearly allocated (e.g. unemployment – to the economy or social affairs?) have to be considered. In the structure presented above, such aspects belong clearly to the society sphere. The supportability of the environment then stands against the needs of humans and society. Human activities are generally oriented to needs, but at the same time involve burdens on the environment and must take the finite nature of the earth system into account.

This two-sphere model (Fig. 3) was used as a basis to define objectives and indicators for the sustainability process in Baden-Wuerttemberg. The limiting environmental factors were set against the factors striving for "more", the "affluent factors". The two areas were called the "environmental supportability" and the "good life". What is needed is to balance these two areas against each other.

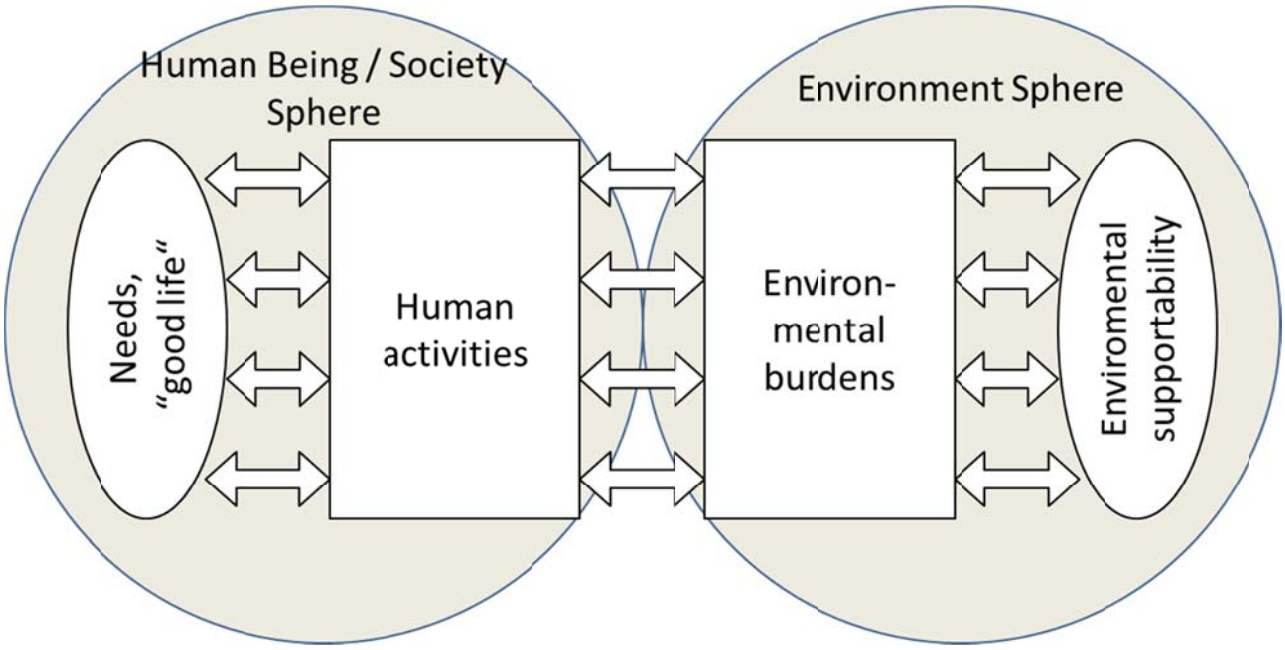

Fig. 3: Conflicts between two spheres

Table 1 sets out the challenges for sustainable development in the industrialised State of Baden-Wuerttemberg. Observing the environmental viability (Section A) and at the same time satisfying people and promising them a "good life" (Section B) is like trying to put a square peg in a round hole, especially when frameworks such as an ageing society or over-indebted national budgets that make matters particularly difficult have to be taken into account (Section C). The Advisory Council on Sustainable Development ultimately derived guiding principles (Table 2) and objectives and indicators for measuring them from these challenges.

A. Environmental supportability
A1. Climate change Climate change is a central challenge to the sustainable development of Baden-Wuerttemberg. It is important to limit climate change and keep the impacts on the State as low as possible.
A2. Resource consumption Consumption of non-renewable sources leads to depleting stocks and making them more expensive, and ultimately to their irretrievable loss, especially for following generations.
A3. Biological diversity The biological diversity of the State of Baden-Wuerttemberg is increasingly jeopardised. Stopping further decline is a key task in securing our livelihoods.
B. Needs and "good life"
B1. Well-being and satisfaction Every individual has a claim to a reasonable standard of living that enables well-being and satisfaction themselves and their family.
B2. Environmental and social modernising of the economy The environmental and social modernising of the economy is a long-term prerequisite for securing the wealth of the State.
B3. Cultural diversity and integration Our society is changing through immigration, secularisation and changes in values. Recognition and respect for the growing cultural diversity create a prerequisite for successful development of our community.
C **Intermediary factors and framework conditions**
C1. Indebtedness Financing expenditures via indebtedness has led to an enormous amount of debt that threatens to constrain the scope for action of future generations too.
C2. Legitimation Transparency and citizen participation are becoming increasingly more important for acceptance of political decisions.
C3. Demographic change The demographic change will influence the economic, political and social situation in the coming decades.
C4. Education and knowledge society With the increasing significance of knowledge as a key to perceiving and solving social challenges and as a production factor, the importance of education and research is growing. These also serve as a basis for the economic success of Baden-Wuerttemberg.
C5. Globalisation The rapidly growing economic, social and cultural international interlinkages are both a challenge and an opportunity for Baden-Wuerttemberg. It is important to use the globalisation economy via high innovativeness and competitiveness, but also to shape their consequences in the State and assume global responsibility.

Table 1: Challenges for sustainable development in Baden-Wuerttemberg

"Acting sustainably in Baden-Wuerttemberg means…"
…implementing the turnaround in energy policy swiftly and involving civil society.
…promoting and implementing innovative and environmentally compatible mobility concepts.
…implementing future-oriented urban and regional development.
…optimising the efficient deployment of resources.
…protecting and conserving the diverse nature and unique cultural landscapes of the State.
…creating equal education opportunities for all and promoting competence in shaping sustainable development.
…promoting top performance in science and research and supporting innovations.
…enabling all people in the State to have a fair and equal stakeholding in society.
…consolidating the budget for subsequent generations in a socially responsible manner.
…taking decisions openly and transparently, involving civil society in the State at an early stage.
…assuming responsibility for fair development within the context of globalisation and contributing the strengths of Baden-Wuerttemberg on the international stage.
…advancing the change in industry towards sustainability while securing competitiveness and resilience.
…promoting responsible styles of consumption (for consumers).
…recognising cultural diversity as an enrichment and effectively countering any forms of exclusion.

Table 2: Guiding principles for sustainable development in Baden-Wuerttemberg

3. MODERATION OR GREATER EFFICIENCY?

Two strategies repeatedly come up against each other in the discussion on policy. Can the conflict between the limited environmental supportability and growing human needs be achieved by more efficient use of resources and the environment, or by limiting or changing the quality of human needs? The former is described as the efficiency strategy, the latter as the sufficiency strategy – moderation and refraining from material superfluity.

The two approaches can be explained in very simple terms using the master equation of industrial ecology, the IPAT equation (CHERTOW, 2001):

$$I = P \cdot A \cdot T$$

I: impact P: population

A: affluence T: technology

The equation represents a mathematical tautology, i.e. the same stands on the left side and the right side, but skilfully expanded and converted into ratios:

$$\text{Impact} = \text{Population} \cdot \frac{\text{Economic Good}}{\text{Population}} \cdot \frac{\text{Impact}}{\text{Economic Good}}$$

Impact is understood to be the general effects on the environment, e.g. the emission of pollutants or the consumption of natural resources. The quotient “Impact/Economic Good” can be understood as the technical factor T: How much impact results per product or per economic good? Eco-efficiency addresses precisely this factor and tries to reduce it. The objective is thus fewer emissions, less consumption of resources, less waste per product or per economic good.

The quotient “Economic Good / Population” on the other hand is the material welfare level per person. How many goods does the individual need? In the IPAT equation this is termed as “Affluence” (A). A sufficiency strategy, a strategy of moderation, addresses this factor. And the factor P must not be neglected – the number of population. After all, the environmental impacts depend not only on the efficiency and level of affluence, but also on the absolute number of people who lay claim to this affluence.

If the goal is now to reduce I, in other words the environmental burden, the consumption of resources etc., where must we start? There is no blanket answer to this question, as in different regions of the world different factors dominate the IPAT equation. While in the rich industrialised countries the factor A is very large, in many other regions of the world the factor P dominates – coupled with a low A. While in rich countries a reduction in the material affluence level can rightly be discussed (in other words via sufficiency), in many other countries the affluence level is much too low to satisfy the needs of all the people.

This situation is described very well in Fig. 4. Here the gross domestic product (GDP) per person for various regions of the world is compared with the population figures. The areas give the absolute GDP of the respective world region. If the material affluence of this world were to be distributed equally among all world citizens, this would result in a per capita value of $ 10,100 as shown in Fig. 5. Many poor regions of the world, e.g. Africa or Southern Asia, would then be substantially better off. For South America practically nothing would change. However, the rich industrialised countries (USA, Europe etc.) would have to drastically reduce their wealth. Some of them would fall below the limit that they describe as the poverty line in their own country. In the USA, for instance, this is 12,000 $/a/capita and in Germany even 15,000 $/a/capita.

Although affluence would then be distributed “more justly”, in global terms I (the environmental impacts) would not yet have changed. As an example the emissions of greenhouse gases (GHG) are considered and represented in graph form in the same way as affluence. This results in charts as can be seen in Figs. 6 and 7.

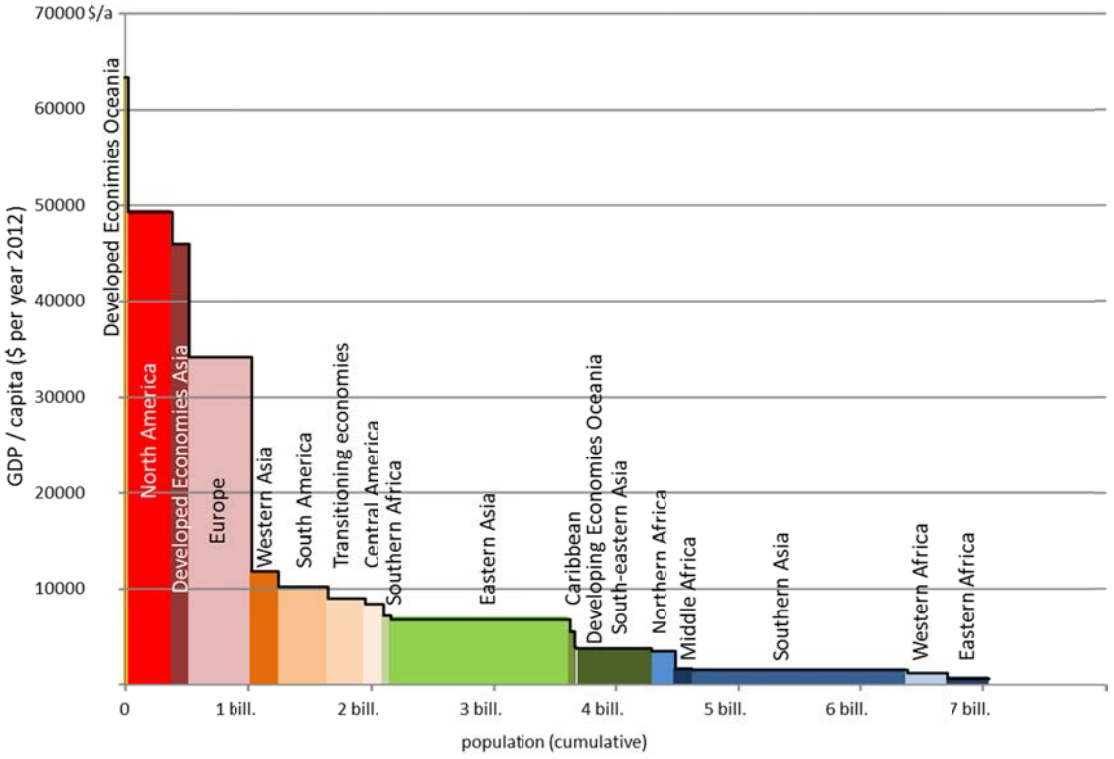

Fig. 4: GDP per inhabitant (vertical) in the various regions of the world measured against the population size (horizontal). Source: UNCTAD (2012).

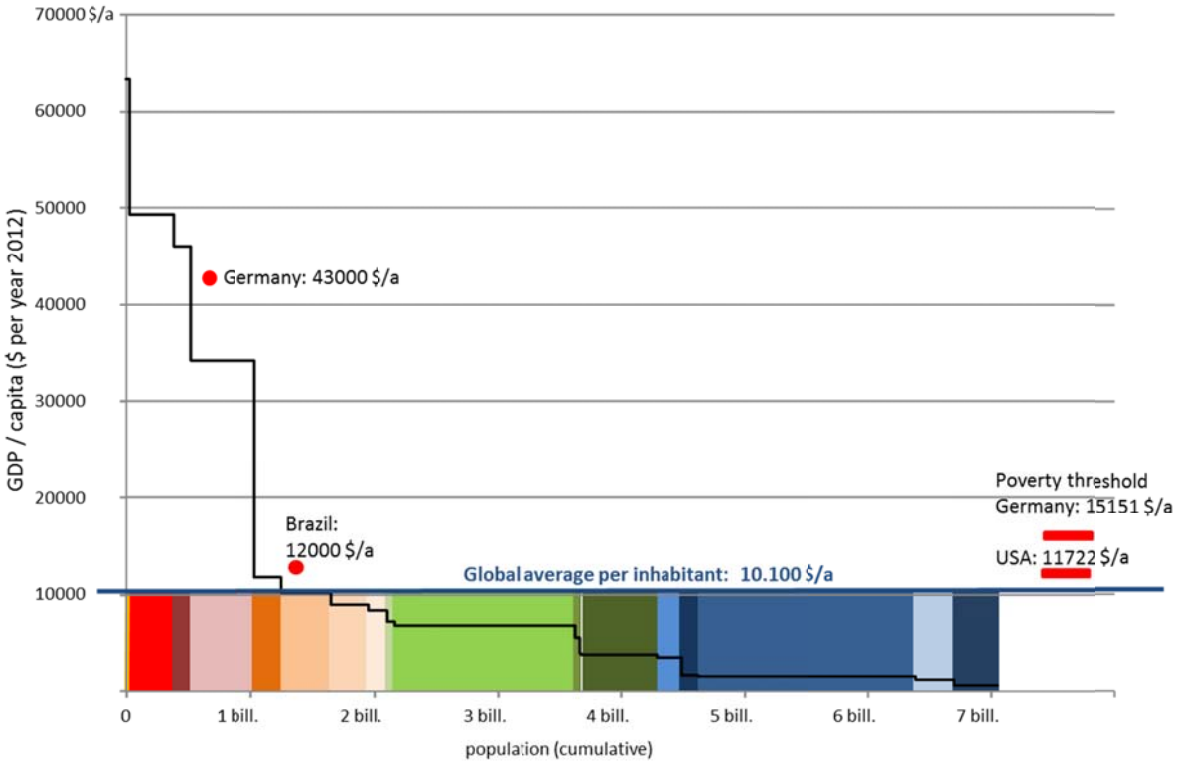

Fig. 5: Levelling of the GDP worldwide to the average value per inhabitant of 10,100 $/a.

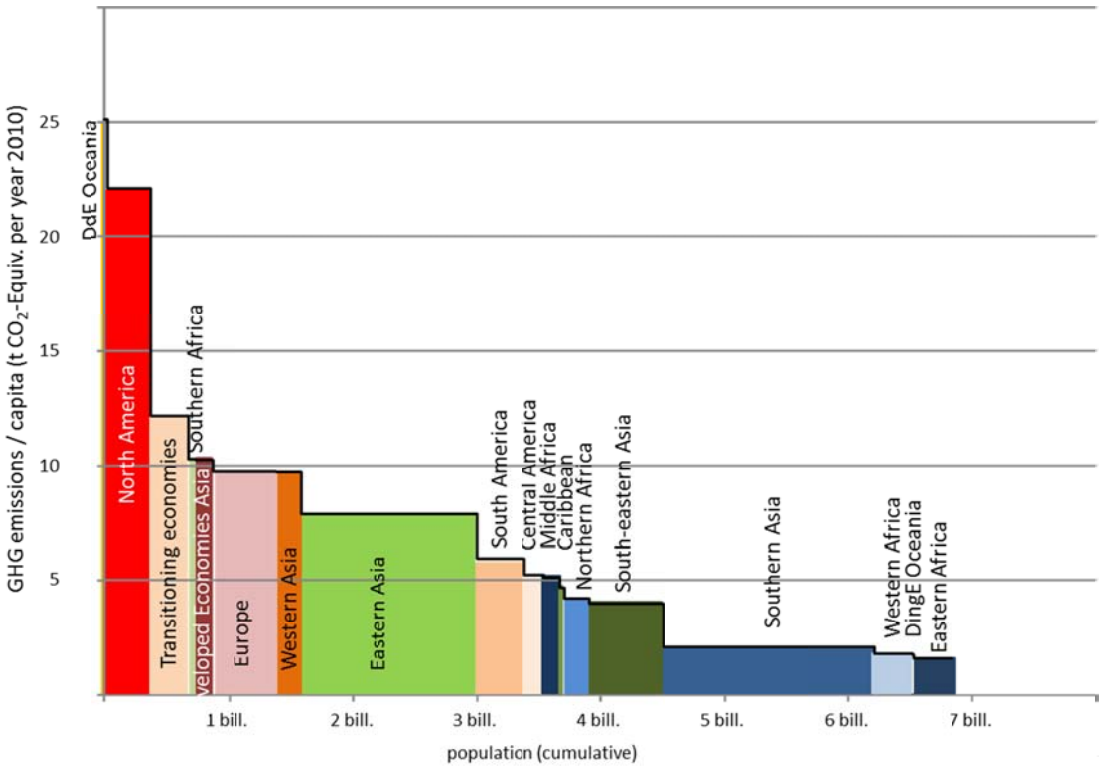

Fig. 6: Greenhouse gas emissions per inhabitant (vertical) in the various regions of the world measured against the population size (horizontal). Source: WRI (2013).

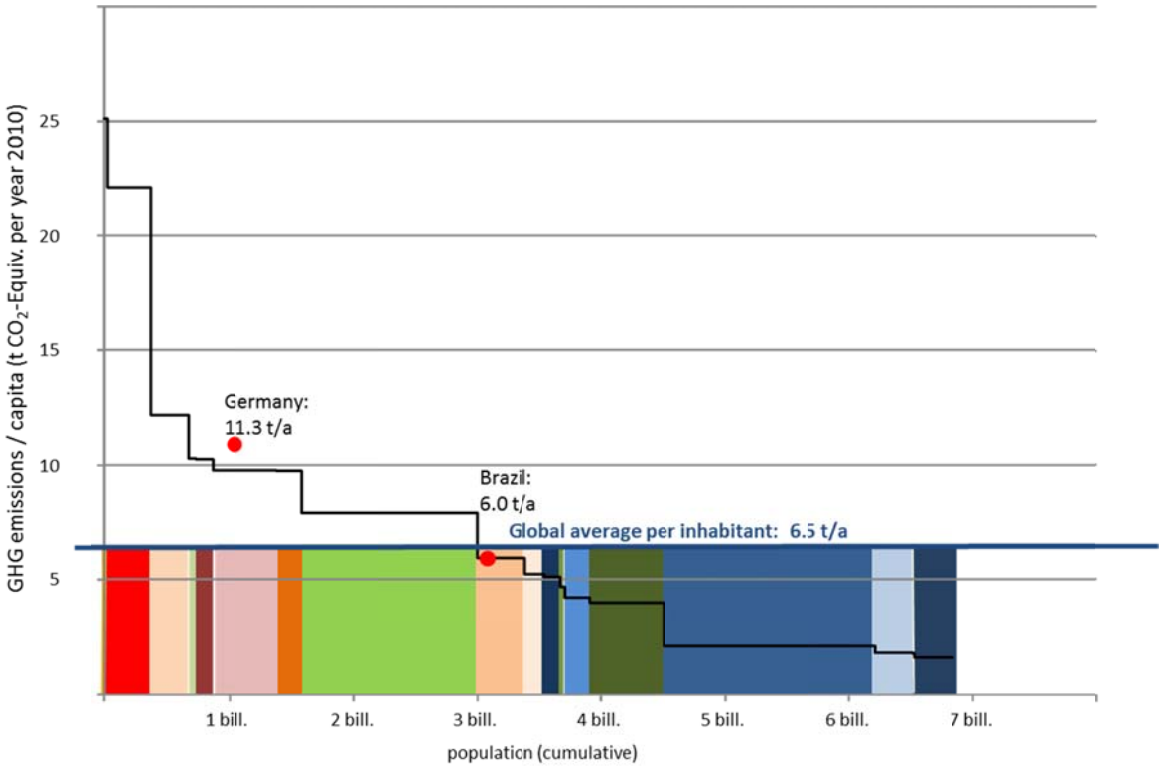

Fig. 7: Levelling of the GHG emissions worldwide to the average value per inhabitant of 6.5 t/a.

While in Oceania (Australia, New Zealand …) and the USA the per capita emissions in 2010 were well above 20 t CO_2 equivalent, the value for East Africa or for India did not even reach 2 t/a. For China the figure was 7.8 t/a. Global levelling here would lead to an average value of 6.5 t/a. This would perhaps be more just, but it would still not be linked to any global reduction in greenhouse gas emissions. In order to achieve the two degrees objective of the United Nations Framework Convention on Climate Change (UNFCCC), by 2050 only half as much as this, in other words about 3 t/a, should be released – worldwide.

These simple model calculations show that the global environmental problems cannot be solved simply by redistributing affluence and limiting affluence, in other words by altering the factor A in the IPAT equation. The number of population P and above all the technology T also play a major role. And it is precisely at this point that those countries with stronger economies are called upon to deploy their know-how and their infrastructure to distinctly improve the factor T worldwide.

4. SUSTAINABLE ECONOMIC ACTIVITY IN BADEN-WUERTTEMBERG

In the second quarter of 2013 the Advisory Council on Sustainable Development of the State Government of Baden-Wuerttemberg discussed approaches for identifying possible contributions to sustainability by the manufacturing industry. The starting point was a discussion paper with ten theses which were debated:

Thesis 1: Casting off simple catchwords

Sustainable economic activity – this is not confined to photovoltaic installations, wind power or e-mobility. In Baden-Wuerttemberg this also affects classic branches of industry such as machinery manufacture and plant engineering, vehicle construction, or metal production and processing, e.g. by more efficient and better technologies, also and particularly for export business. This is where our strengths and our opportunities lie.

Thesis 2: Using potentials for economic savings

The potentials for saving energy and material resources are considerable – viewed from the economic aspect too. We can improve the competitiveness of our economic activity by producing more efficiently. However, what applies for our already highly developed and technology-based society holds all the more true for other countries. These are the potential markets for machinery and installations from Baden-Wuerttemberg. It is generally known that products from our state are of high quality. They also need to be particularly efficient. This aspect must be promoted and made marketable and “visible”.

Thesis 3: Fostering broad-based capabilities for innovation

There will not be just the one, single, paramount key innovation above all others, for instance in hydrogen technology, in nano-materials or in battery technology. Focusing on individual innovations distracts from the fact that our actual strength in Baden-Wuerttemberg lies in the

breadth of our technical innovations and their interaction. We need continuous innovations in many areas. Above all system innovations help us to tackle complex problems and they protect us against easy plagiarism by third parties.

Thesis 4: Cultivating know-how comprehensively and developing it further

For the future too we need broad-based know-how and the experience and innovations from many different sectors of the economy and engineering. These resources must not be neglected, technical discontinuities must be avoided. Research and development as well as education and training are key competences – particularly in interplay with economic activity. Baden-Wuerttemberg has an excellent starting position here that must be expanded and consolidated.

Thesis 5: Avoiding purely regional crowding out effects

Supposedly "dirty" or energy-intensive industries cannot be simply picked out of the overall system and negated. In fact they are often even indispensable if we do not want to do completely without certain products (or e.g. a recycling economy). It is important to not simply crowd out these industries (regionally), but instead to improve them!

Thesis 6: Allocating more responsibility for the entire value chain

Industry must assess its products holistically, from the cradle (extraction of raw materials) to the grave (waste disposal) – in environmental and social terms. What environmental backpacks and social injustices are connected with the product? Manufacturers and consumers must be willing to assume more responsibility for the entire value chain. To this end thinking in "product life cycles" must be substantially reinforced and promoted in Baden-Wuerttemberg.

Thesis 7: Helping from a position of strength

Baden-Wuerttemberg is a relatively prosperous state. With its good infrastructure and economic structure, outstanding technologies, excellent knowledge and expertise, sound environmental judgement and a sense of social proportion, Baden-Wuerttemberg is ideally placed to offer solutions to pressing problems in our world. Baden-Wuerttemberg can highlight this profile in its strengths and its offerings to others – e.g. in cooperation with other countries.

Thesis 8: Cultivating efficiency

It is clear that efficiency alone does not produce sustainability. However, without efficiency there can be no sustainability either! That is why an efficiency strategy on the part of industry is not reprehensible, but instead mandatory and should not be dismissed out of hand. However, it must be accompanied by appropriate measures in order to avoid rebound effects.

Thesis 9: Consistency

Two key technical strategies are equally vital and must represent the long-term goal: greater use of renewable energy sources, and the closing of material cycles and hence conservation of resources and the environment. Both technical and system innovations are of great significance for improved material cycles. Where do the products and their materials end up? How can we use them again in an expedient, socially compatible and environmentally kindly fashion? This ought to be made a core topic of Baden Wuerttemberg's economic and environmental policy.

Thesis 10: Sufficiency

The sufficiency concept is difficult in this context and – apart from a few exceptions – is misleading. Viewed globally, the majority of mankind is far removed from the "good life" and instead is struggling with material deficits. Lasting elimination of these deficits with consideration

> given to environmental constraints and social justice is the real challenge of our age. “Economic activity” is accorded a key role here. And that is an opportunity for our highly developed economy in Baden-Wuerttemberg too.

The task of the theses was to focus on particular thematic policy areas. Baden-Wuerttemberg’s industry should be called upon to proactively co-structure and co-advance the process of sustainable development. Efficient use of natural resources is particularly important here. Companies have been called upon to develop energy-conserving and material-saving processes and products and make them marketable.

This was based predominantly on the underlying experience that the manufacturing industry has substantial potentials for saving energy and material resources. In Germany’s industrial sector materials now account for 47 percent of manufacturers’ costs – more than the cost of human resources (18 %) or energy (2 %) (SCHMIDT; SCHNEIDER, 2013). Analyses conducted at more than 1000 small and medium-sized enterprises in Germany have shown that the companies can save on average 2 % of their costs (measured against turnover) by applying material-efficient methods. From case to case the savings potential is even distinctly higher. This figure is amazing considering that processes in Germany are already technically very mature and efficient. The crucial point here is that corresponding resource-saving measures not only make sense environmentally, but also represent an economic advantage for the enterprises.

However, this is not only a matter of lowering production costs, but also of developing new, efficient products, for example machinery and installations that manage with lower energy consumption or are material-sparing, or environmental systems that can be used to improve the environment situation. Such products are needed worldwide. The market for them is growing, as a study by the firm of consultants Roland Berger on behalf of the German Federal Ministry of the Environment in 2012 has shown (BMU, 2012). At present the annual global market volume for green technologies is in excess of Euro 2000 billion (Fig. 8). The predicted growth rates currently lie between 3 - 9 % a year. Germany has a share of approx. 15 % of this world market.

This greentech market is, however, by no means ruled by pure environmental engineering. Baden-Wuerttemberg’s industrial structure is currently dominated by machinery and plant construction, the automotive industry and the chemical industry. That is why it is interesting that innovative “green” products enjoy a clear share of the world market in these established industries too (Fig. 9). This represents a chance for Baden-Wuerttemberg’s industry.

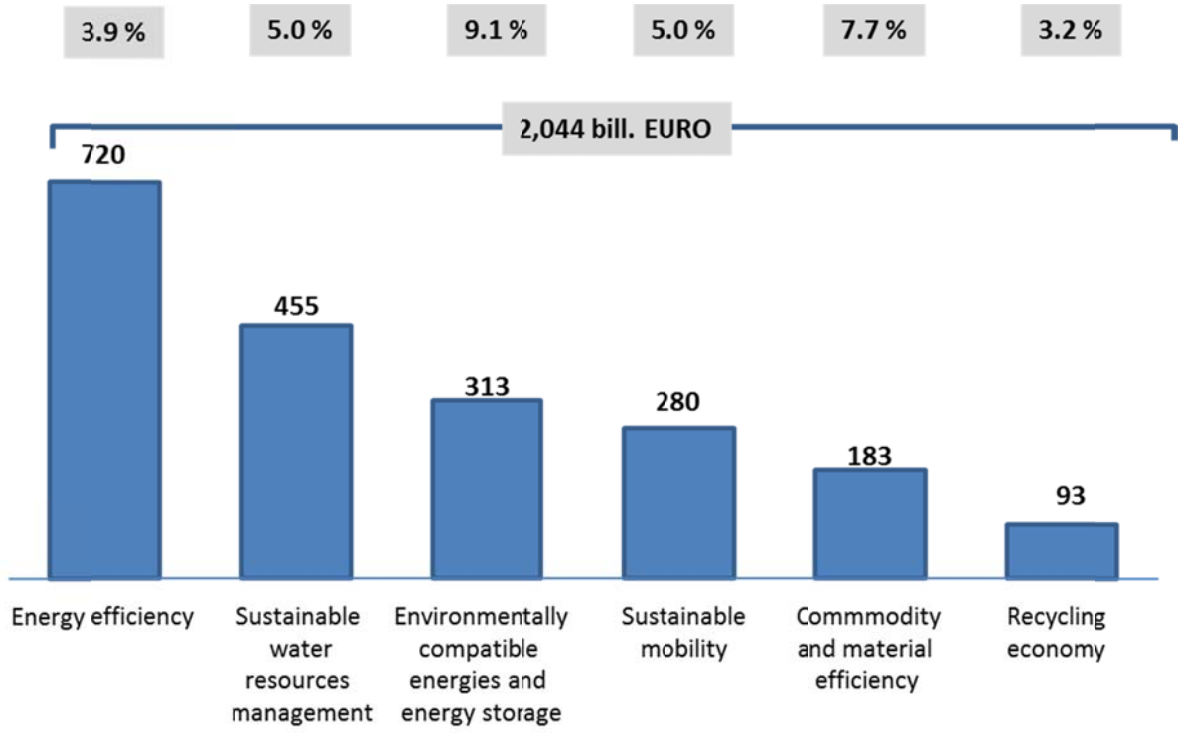

Fig. 8: Global volume of the individual greentech leading markets in 2011 (in € billion and mean annual change 2011-2025 in %). Source: BMU (2012).

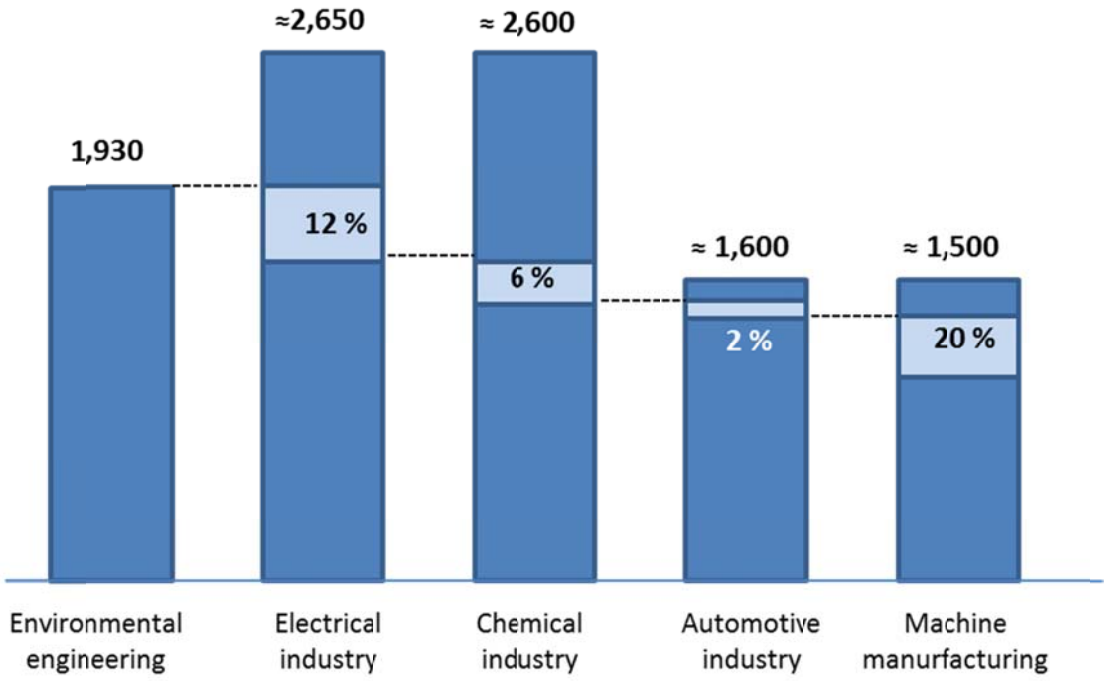

Fig. 9: GreenTech share of the global market volume of selected industries (in € billion). Source: BMU (2012).

5. LIFE CYCLE THINKING

Theses 6 and 7 from the position paper cited above focus on a further major aspect of “green” industrial policy. An industrialised state like Baden-Wuerttemberg and its citizens also bear responsibility for the entire life cycle of the products they produce and consume. They are thus co-responsible for the extraction of raw materials and the disposal of wastes in other countries. What environmental or social consequences are involved in extracting minerals or energy resources? Where is electronic scrap disposed of or recycled? How can the ecological or social situation in these countries be improved?

For a state like Baden-Wuerttemberg this leads to a number of different obligations. On the one hand suitable analysis tools must be made available for recording the environmental and social impacts of products along their entire life cycle. It is not just the environmental impacts in Baden-Wuerttemberg or in Germany that are crucial, but also the global impacts. These relate e.g. to the greenhouse effect, water consumption, demand for raw materials, release of pollutants, or the use of natural areas.

Such analyses have been conducted in the environmental sector for many years with the aid of Life Cycle Assessments (LCA) complying with ISO norms 14040 and 14044. Recently, simplified analyses such as e.g. carbon footprints or water footprints have been applied too (BERGER; FINKBEINER, 2010). These function along the same principle – cradle-to-grave analyses. They have now been joined by Life Cycle Social Analyses (NORRIS, 2006; WEIDEMA, 2006; KLOEPFFER, 2008) in which the social impacts in other countries are considered as well, e.g. working conditions, health hazards, “fair production” etc. These analyses must be intensified and expanded. Studies examining the scarcity or critical nature of raw materials are also conducted (ERDMANN; GRAEDEL, 2011). How scarce are natural commodities? What risk of insufficient supplies exists? What possibilities of substitution are there?

However, bearing responsibility does not mean simply analysing, but also eliminating environmental and social ills – outside Baden-Wuerttemberg, at least in some cases. Transnational cooperation arrangements in which Baden-Wuerttemberg can deploy and pass on its knowledge and technical capabilities can serve here. Here too greater commitment on the part of industrial enterprises is desirable, as are exchanges between universities and researchers.

6. CONCLUSIONS

Under the aspect of Sustainable Development the economic strength of an industrialised state like Baden-Wuerttemberg can be considered either as a disadvantage or as an advantage. The high consumption of resources due to the high level of affluence and production activity can be a problem. A logical requirement would thus be to reduce the material affluence, possibly even cut down on manufacturing industry, in other words to de-industrialise. The consumption of resources and the burden on the environment would drop directly. Although this would make a non-material contribution to fairness in affluence, it would in no way help achieve a concrete solution to the global environmental problems. One could say that the influence of the A in the IPAT equation is simply too low to really have any effect.

However, the economic strength of an industrial location can also become a chance for sustainable development. For this, a state or a country must deploy its expertise, its economic capacities and its infrastructure to develop efficient and environmentally compatible products and production methods. These products can be offered on the world markets and the state or country (and the companies operating there) can cooperate with other countries to solve their environmental and social problems.

However, for this second strategy to work willingness to undertake active measures is necessary – on the part of the government and on the part of industry. In recent years Baden-Wuerttemberg has repeatedly set up programmes to promote resource efficiency or to develop innovative, environmentally kindly processes and products. Every two years the State Government presents the Environmental Technology Award to the most innovative enterprises in the state. The most recent presentations took place in the middle of 2013. In addition a congress on the topic of resource efficiency is held every year with the participation of the industrial sector at which the latest progress and advances are introduced. Thus in the near future the region with the highest innovative force in Europe could also become the region that gives key technological impulses for Sustainable Development.

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