INDO-GERMAN EXPERT GROUP
ON GREEN AND INCLUSIVE ECONOMY

POLICY PAPER

DECOUPLING ECONOMIC GROWTH FROM RESOURCE CONSUMPTION

A TRANSFORMATION STRATEGY WITH MANIFOLD SOCIO-ECONOMIC BENEFITS FOR INDIA AND GERMANY

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ABOUT

INDO-GERMAN EXPERT GROUP ON GREEN AND INCLUSIVE ECONOMY

Green Economy has been recognized by the Rio+20 Summit as "one of the important tools available for achieving sustainable development". It is emphasized that Green Economy should "contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems". Such a transition towards a green and inclusive economy requires major efforts both on a national and international level, and cooperation and exchange of experiences is key to support the process.

India and Germany are major players in this transition. Against this backdrop, an interdisciplinary working group of renowned experts from leading research institutions and political think tanks in India and Germany has been set up in November 2013 to enhance collaborative learning, contribute to informed decision making in both countries and feed into the international debate on a Green and Inclusive Economy.

Five key topics are:

- Frameworks and challenges for a green and inclusive transformation
- Natural resources and decoupling growth from resource consumption
- Sustainable lifestyles
- Green and inclusive cities
- Transformation of the private sector

This policy paper was elaborated based on discussions in the context of the 2nd expert group meeting on 3–4 February 2014 in Delhi.

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SUMMARY

Current patterns of production and consumption, in particular in the global North, cannot be transferred to the rising world population, in particular in the global South, without severe environmental and societal consequences. The global middle class is expected to double by 2030 and might scale up unsustainable consumption and production patterns; yet scientific modelling demonstrates that already today levels of resource use exceed what is considered sustainable; at least 3 of 9 identified "planetary boundaries" have been overshot and others are dangerously close to scientifically "safe" thresholds. Increased fluctuations of commodity prices and rising price trends since 2000 (e.g. for food, metals, energy) indicate possible shortages of strategic important natural resources in the near future.

These ecological challenges bring economic risks that quite clearly indicate: Business as usual is no longer an option. On the other hand the global scarcity of natural resources could incentivize a more "resource light" type of technological progress if embedded into supporting framework conditions and social innovations. Thus a "Great Global Transformation" is needed, especially in the global North, but in the global South as well, which decouples the use of nature from economic activity. This policy paper argues that innovative governance can turn the ecological necessity of decoupling into economic opportunities. From a country and development specific perspective it is necessary to differentiate:

- Relative decoupling (e.g. in developing and emerging countries) means that the growth rate of resource use or impacts is lower than the growth rate of a relevant economic indicator (for example GDP); e.g. for India this strategy would make ecological and economic sense.
- Absolute decoupling (e.g. in developed countries) means that resource use declines, irrespective of the development of the economic drivers. In the past this happened only occasionally, but scenarios of the future demonstrate that it is technically feasible for many countries. For example the energy concept of the German government (September 2010) aims to reduce total primary energy consumption by about 50% up to 2050, at the same time phase out nuclear energy (up to 2022) and reduce CO_2 by 80–95% (2050) – combined with an annual real GDP growth of about 1% with estimated macroeconomic benefits.

A "resource efficiency revolution" and a paradigm shift from the dominantly "linear" economy of today toward the "circular" economy of the future are perceived as key strategies toward an ambitious factor 4–10 decoupling by 2050. In the "linear" economy, goods are manufactured from raw materials, sold, used, and then discarded ("take-make-dispose"). The circular economy, on the other hand, provides sufficient goods and services for the growing world population; it is built on sustainably sourced natural resources and is characterized by products that are designed to be repaired, re-used, remanufactured and recycled. It follows the principle idea of "waste becoming a resource" and correlates heavily with the concept of waste prevention.

The global potential of a circular economy has been estimated at USD 700 billion in global consumer goods material savings alone.

McKinsey identified 15 groups of opportunities (e.g. in the energy, agriculture, transport sector) for fostering resource productivity and calculated their total resource benefit as well as their cost/benefit ratios. In 2030 around 75% of the total resource savings potential (building energy efficiency alone being the largest with USD 696 billion) could be implemented with an attractive cost-benefit ratio, taken a societal perspective.

The German Federal Ministry for the Environment has monitored the global development of "lead markets", which offer large business opportunities for suppliers of "green tech" and impressive cost reduction options in all sectors:

- Energy efficiency (€720 bn with 3.9% annual growth expected),
- Sustainable water management (€455 bn with 5% annual growth expected),
- Environmentally friendly power generation and storage (€313 bn with 9.1% annual growth expected),
- Sustainable mobility (€280 bn with 5% annual growth expected),
- Material efficiency (€183 bn with 7.7% annual growth expected) and
- Waste management and recycling (€93 bn with 3.2% annual growth expected).

A total global potential of more than EUR 2,000 billion was estimated for the six global "lead markets" in 2011. It is likely that this volume will more than double by 2025 to EUR 4,400 billion with high annual growth expected in particular for environmentally friendly power generation and storage and material efficiency.

From a technological perspective these green "lead markets" in principle encompass options to substitute "brown" technologies (e.g. fossil fuels), to reduce material and resource use and at the same time to mitigate climate change and foster sustainable development. This stresses the economic rationale for integrated resource and climate protection strategies in Germany, in India and elsewhere.

Despite the potential gains of adopting resource efficient options, barriers and market failures impede the widespread diffusion of innovations with an environmental and economic benefit. A supporting governance structure is needed to implement decoupling in real markets. Global cost/benefit-analysis is only one step and must be complemented by in-depth analysis of country, sector, technology and actor specific barriers to develop a targeted mix of policies and measures.

SUMMARY

It also requires knowledge on how to cushion counterproductive "rebound effects" over time. For example, even though the technical feasibility of an absolute decoupling and a tremendous increase of resource productivity were demonstrated by scenarios and might be the aim of national resource policies, counteracting social and economic reactions (direct/indirect rebound effects; growth, structural and quantity effects) can "eat up" even massive increases in product, process or sector specific resource productivities. Therefore it is the triangle of efficiency ("more with less"), sufficiency ("less can be more") and consistency ("better than more") on which policies and measures for decoupling should be based.

A comprehensive societal dialogue on sufficiency policies can be based on the empirical fact that in OECD countries after a certain threshold rising GDP is perversely decoupled from life satisfaction indicators.

In spite of many differences between a highly developed economy, like in Germany, and an emerging economy, like in India, this policy paper identified 15 common key activities for how a decoupling process in India and Germany can be driven by policies and measures.

- Setting targets and developing indicators
- Conducting joint scenario analysis on the (macro-)economic impacts of decoupling
- Speeding up the development and use of indicators
- Establishing an innovative institutional setting
- Improving information for better decision making and on reporting
- Putting the prices right and phasing out environmentally harmful subsidies
- Supporting high-quality recycling
- Promoting new, resource efficient business models
- Enabling consumers to make more sustainable choices
- Improving resource efficiency in business–to-business relations
- Taking forward a coherent, resource efficient product policy framework
- Delivering a stronger and more coherent implementation of Green Public Procurement
- Developing instruments for SMEs
- Supporting employment and skills
- Guiding the financial sector to enable the transition

1 WHAT IS DECOUPLING?

This policy paper is based on materials and discussions of the "Indo-German Expert Group on Green and Inclusive Economy"[1]. One main focus is to understand and address the common, but differentiated challenges and opportunities of decoupling economic growth from resource consumption in India and in Germany.

Decoupling in this context refers to delinking economic growth from resource use and from environmental impacts:

- Resource decoupling means reducing the use of (primary) natural resources per unit of economic activity.
- Impact decoupling means raising economic output while reducing negative environmental impacts that arise from the extraction of natural resources (e.g. groundwater pollution due to mining or agriculture), production (e.g. land degradation, wastes and emissions), use of commodities (e.g. CO_2 emissions from transportation), and in the post-consumption phase (e.g. wastes and emissions).

Another important distinction has to be made from a country and development specific perspective:

- Relative decoupling of resources or impacts means that the growth rate of resource use or impacts is lower than the growth rate of a relevant economic indicator (for example GDP); e.g. in India, this implies that the yearly increase rate of traditional primary energy production (fossil; nuclear) should be reduced by fostering energy efficiency and raising the share of renewable energies.
- Absolute decoupling means that resource use declines, irrespective of the development of the economic driver. Only very few countries, and even those over very short periods, have actually achieved such an overall decline of resource consumption within a certain time period, e.g. Germany between 1995 and 2005, which was mainly due to a significant decrease in construction and coal mining products[2]. Acording to the energy concept of the German government (September 2010)[3], in comparison to today the total primary energy consumption should be absolutely reduced by about 50% up to 2050, at the same time phasing out nuclear (up to 2022) and reducing $C0_2$ by 80–95% (2050). Scenarios demonstrate that these targets could be reached with an annual real GDP growth of about 1% and macroeconomic benefits.

1 Background paper "Natural resources – decoupling growth from resource consumption".

2 ETC/SCP 2011

3 See BMU/BMWi 2011; quantitative targets for a „Resource Efficient Germany" are still under development; See BMU 2012b

2 HOW TO MEASURE DECOUPLING?

The results of decoupling analysis depend on the choice of indicators. Basically, material flows analysis is used to monitor the physical flows (e.g. in tonnes) of materials into, through, and out of countries using trade and resource extraction statistics. The simplest input and consumption indicators used for international comparisons are Direct Material Input (DMI) and Domestic Material Consumption (DMC), which only take direct flows into account. A second set of indicators – Raw Material Input (RMI) and Raw Material Consumption (RMC) – also take indirect flows into account. These are the material inputs used to produce a product, but which are not included in the final product itself (also known as ecological rucksacks). Total Material Requirement (TMR) and Total Material Consumption (TMC) are the more comprehensive indicators, incorporating both indirect flows and unused extraction[4]. Data on TMR and TMC for international comparison are still limited, but are gradually becoming available[5].

In respect to measuring resource productivity (e.g. GDP/TMR) not only the denominator (TMR) should be understood and used carefully, but also the numerator (GDP), if it is meant to be a measure of economic well-being. In general, the short comings of GDP as an indicator of quality of life are now widely accepted and increasingly challenged, not only by the research community but by politics as well.[6] For these reasons, the debate on the "right set" of indicators continues.

4 Unused extraction describes the excavation of natural material in order to get access to more precious materials. It includes e.g. the overburden in mining, harvest residues in agriculture and forestry as well as the by-catch in fishing. As resources become more difficult to access, unused extraction grows.

5 See the Annex of O'Brien et al. 2012 for an overview of countries with available TMR data based on H. Schütz, Wuppertal Institute

6 See for example Stiglitz et al. 2009, German Enquete Commission 2013, and Constanza et al. 2014

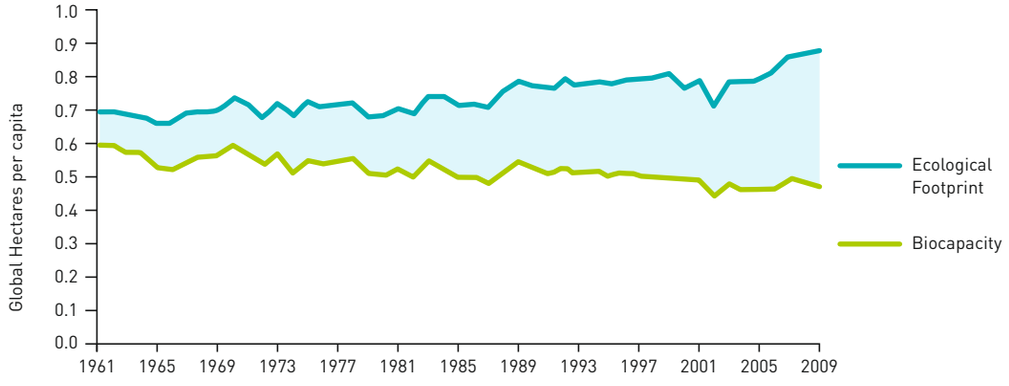
3 THE NEED FOR DECOUPLING: UNSUSTAINABLE GLOBAL TRENDS

There is clear evidence that the current patterns of unsustainable production and consumption of the global North cannot be transferred to the rising world population, in particular in the global South. Business as usual is no longer an option. There are many strong arguments pointing to why a great global transformation, especially in the global North, but in the global South as well, is needed:

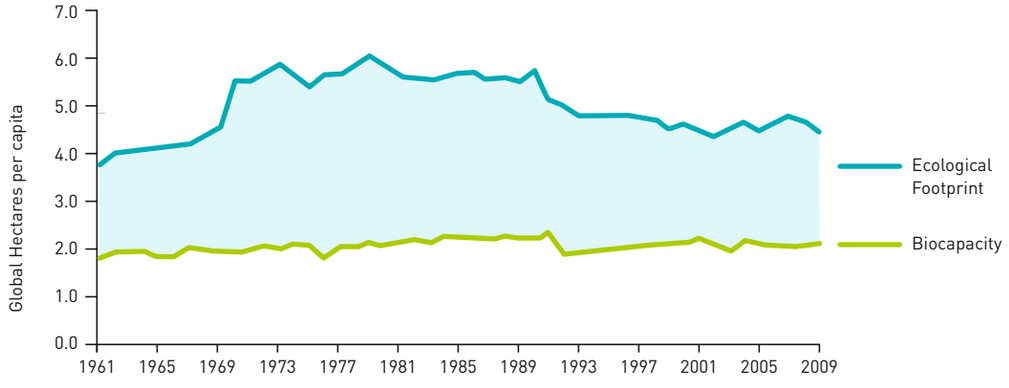
- Scenarios offer clear indications that even current levels of resource consumption exceed what is considered sustainable; at least 3 of 9 identified planetary boundaries have overshot and others are dangerously close to scientifically safe thresholds[7].

The figures show both India and Germany are *"ecological debtors"* – they are consuming more than the available bio-capacity[8].

Ecological footprint and bio-capacity of India



Ecological footprint and bio-capacity of Germany



Source: Foot Print Network

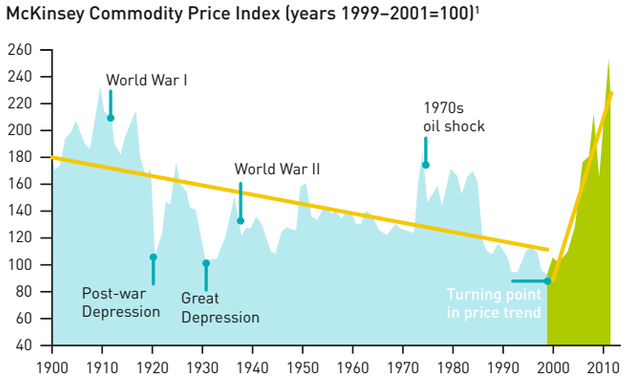
7 Rockstrom et al. 2009, p. 472
8 IGEP 2013

- The International Resource Panel developed a scenario in which the average metabolic rates of industrial countries remain stable and developing countries "catch up" to the same rates by 2050. This scenario would result in a global resource need of 140 billion tonnes, or around 2.5 times the current demand for natural resources[9]. The global material consumption jumped from 35 billion tonnes in 1980 to nearly 68 billion tonnes in 2009[10]. Of these, India consumed nearly 5 million tonnes; if India continues its current development trajectory its *"resource demand will more than triple"* by 2030 – a figure equivalent to the current consumption of all the OECD countries[11].
- The level of resource consumption differs dramatically across the world. On average, around 8.5 tonnes DMC/person were consumed globally in 2008[12]. In that year, India's per person consumption was around 4.0 tonnes/person whereas Germany consumed around 14.8 tonnes/person. This unequal distribution and in general the "resource curse" increasingly affect security issues[13].
- As an indicator of resource inequity, nearly 80% of the world's resources are consumed by the wealthiest 20% of the world's population; while the poorest 20% are not able to consume enough to meet their basic needs[14]. Furthermore, according to the OECD, a 1.8 billion strong middle class over-consumes 50% of the natural resources. Such unsustainable consumption disproportionately affects the disadvantaged and marginalized. This is especially obvious with regard to food and water[15].
- It has been estimated[16] that the global share of middle class consumption[17] will rapidly grow in India and China between 2025 and 2050. According to these projections, in 2050 this share could rise for India to 31% and for China to 22%, leaving the EU, USA and Japan (together ca. 13%) far behind. Thus the agenda of common, but differentiated patterns of consumption seems to be converging.
- The efficiency of resource use is quite different across the globe: Globally, productivity (GDPUS$ PPP cont. 2005/tonne DMC) was US$ 952 in 2008. For India it was US$ 696 and for Germany US$ 2,278[18]. These differences do not only mirror different resource endowments and patterns of (unsustainable) production and consumption, but a huge "technological divide" in comparison to "best available technologies "(BAT) as well. Thus leap frogging ("tunnelling through") to advanced technological and societal standards can help to close the resource efficiency gap much quicker than in the past.

9 UNEP 2011, p. 28
10 SERI 2011
11 IGEP 2013
12 Dittrich et al. 2012
13 Bringezu and Bleischwitz 2009, p. 12
14 Carroll 2012
15 EEA 2010
16 Sea Kharas 2010 cited after EEA 2010
17 In this study „middle class" is defined as housholds with per capita daily spending between USD 10 and 100 purchasing power parity.
18 Dittrich et al. 2012

- There is still a great global potential for technological leap-frogging: While global resource efficiency grew by around 27% between 1980 and 2009, it rose by 98% in India, 118% in China and 139% in Germany. Over the past several decades, economies in general have grown faster than their resource consumption, and in some countries significantly so.
- There is evidence that fluctuations of commodity prices and a rising price trend (*see Figure 1*) indicate increasing global shortages of natural resources in the near future. In no other decade, except possibly just after World War II, has the world witnessed a pattern of steady and steep food price increases, such as the one we have experienced recently. There is evidence that biofuels increase the link between energy and agricultural market prices, which may affect welfare and trade patterns[19]. As a result of the food price rises since June 2010, there has been a net increase in the number of people living in extreme poverty of around 44 million, mostly in low- and middle-income countries[20]. *"If predictions of several organizations, such as the OECD or FAO, turn out to be true, there will be two decades of steadily rising prices–something that has not happened before"*[21].

Figure 1: Sharp price increase in commodities since 2000 have erased all real price declines of the 20th century



1 Based on arithmetic average of 4 commodity sub-indices: food, non-food agricultural items, metals, and energy; 2011 prices based on average of first eight months of 2011.

SOURCE: Grilli and Yang; Pfaffenzeller; World Bank; International Monetary Fund; Organisation for Economic Co-operation and Development statistics; UN Food and Agriculture Organization; UN Comtrade; Ellen MacArthur Foundation circular economy team

Source: Ellen MacArthur Foundation 2013

19 Wicke et al. 2014
20 World Bank 2011
21 UNEP 2014, p. 37

4 KEY SECTORS FOR DECOUPLING

The potential to use resources more efficiently is vast. Recent research has revealed that five product groups are responsible for the majority of resource use at the final consumption end of Europe's economy[22]:

- Construction
- Food, Beverages and Tobacco
- Agriculture, Forestry and Fishing
- Electricity, Gas and Water
- Coke, Refined Petroleum Products and Nuclear Fuels.

Regarding their economic performance, the identified five product groups represent 18% of the consumption expenditure and two-thirds of resource use in the examined EU countries in 2005. It implies that channelling investment towards less resource intensive goods and services (e.g. education has low resource intensity) can enhance decoupling. Nevertheless, the indirect material and resource base of services and a growing service sector would need to be better accounted for. In the Indian context the sectors construction, industry (especially manufacturing and power generation) and agriculture are energy and resource intensive sectors. These findings are supported by other studies listing construction, agriculture, and food & beverages as main material consuming sectors[23].

Food is the most resource-intensive product (highest resource use per unit of expenditure) in the EU and its resource intensity has been increasing since 1995[24]. Food waste is a serious challenge: the FAO estimates that consumers in Europe and North America waste 95–115 kg/year. This is 10–15 times more wastage as compared to consumers in Sub-Saharan Africa and South/Southeast Asia[25]. It also reveals a high potential for reducing impacts by combating food waste, through education and waste prevention campaigns. There is also a considerable potential to reduce food loss at production and transport stages in developing countries. For example in Africa, post-harvest losses of food grains are estimated to be about 25% of the total harvest[26] and losses of perishable and fresh foods are especially high in postharvest handling and storage in many developing countries, also as a result of warm and humid climates[27]. Investing in infrastructure, encouraging the build-up of storage facilities and encouraging co- operatives that can produce at economies-of-scale necessary for gaining credit or advanced payment for crops to discourage farmers in need of cash from harvesting too early, are policy options to mitigate food loss. If global food waste and food loss were halved by 2025, resources, land, nutrients (e.g. from fertilizer) and energy could be saved; moreover, almost one billion more people could be fed[28].

The resource intensity of housing is also high, but has been decreasing since 1995 in the EU[29]. One of the key challenges related to lowering the primary resource requirements of construction is material recycling, and it has been pegged as one of the most important activities for material savings at the economy-wide level[30]. Experiences in Germany and other EU member states demonstrate the power

22 According to calculations of the Wuppertal Institute in ETC/SCP 2011. Calculations refer to 9 EU countries for 2005: Austria, Czech Republic, Germany, Denmark, France, Italy, Netherlands, Portugal and Sweden.
23 SERI et al. 2009, BIS 2011
24 ETC/SCP 2011
25 Gustavsson et al. 2011
26 Lundqvist et al. 2008
27 Gustavsson et al. 2011
28 Kummu et al. 2012
29 ETC/SCP 2011
30 Mudgal et al. 2011

of regulatory compliance to drive innovation in the recycling sector for recoverable construction and demolition minerals: a C&D landfill ban forced the market to innovate to create new economically beneficial recycling applications, and led e.g. in the Netherlands to a 25% decrease of waste to landfills from 1995 to 2006[31]. The Indian cement industry has decreased its emission intensity from 1.04 Mt CO_2/Mt cement in 1995 to about 0.79 Mt CO_2/Mt cement in 2007 due to the addition of industrial waste like fly ash and blast furnace slag[32]. Energy efficient multi-family timber houses receive a growing attendance in Europe e.g. in Switzerland or Austria, because timber as a renewable construction material allows for CO_2 storage, causes only small construction waste on site and requires little energy to produce.

It should be noted that this does not necessarily mean that interventions are needed for resource intensive sectors alone. For instance, in Germany, the average material requirement per € 1,000 of value added is 44 kg in service sectors compared to 557 kg across all economic sectors and 1,861 kg in manufacturing industries[33]. Pursuing a resource-efficiency transition strategy does not imply focusing on just manufacturing alone (although there are abundant low-hanging fruit opportunities in manufacturing). This is because there would be no services without the use of products, machines, and infrastructure. In other words, aiming for service-based economies might shift resource-intensive activities elsewhere, but does not terminate them.

More systemic studies on economic structural change on the way to a resource-efficient and green economy are needed to assess the potential and trade-offs of increased resource efficiency in all sectors[34].

31 Dawkins and Allan 2010
32 Parikh et al. 2009
33 Statistisches Bundesamt 2009
34 O'Brien et al. 2012

5 RESOURCE SAVING OPPORTUNITIES

The focus of a decoupling transition must be to develop an economic system capable of providing a high standard of living to its citizens based on a sustainable level of primary resource use. McKinsey[35] identified 15 groups of opportunities for fostering resource productivity and calculated their total resource benefit as well as their cost/benefit ratios. Around 75% of the total resource savings potential in 2030 could – taken a societal perspective – be implemented with an attractive cost-benefit ratio between 1.2 and 0.2 (*See Figure 2*).

The German consultancy company Roland Berger[36] identified six global "lead markets" on behalf of the German Federal Ministry for the Environment. These markets in principle[37] offer large business opportunities for suppliers of "green tech" and impressive cost reduction options in all sectors:

- Energy efficiency (€720 bn with 3.9% annual growth expected),
- Sustainable water management (€455 bn with 5% annual growth expected),
- Environmental friendly power generation and storage (€313 bn with 9.1% annual growth expected),
- Sustainable mobility (€280 bn with 5% annual growth expected),
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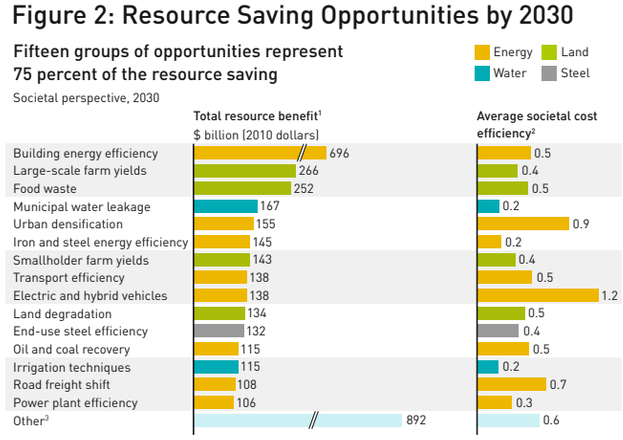
A total global potential of more than EUR 2,000 billion was estimated for the six global "lead markets" in 2011. It is likely that this volume will more than double by 2025 to EUR 4,400 billion with high annual growth expected in particular for environmental friendly power generation and storage and material efficiency.

From a technological perspective these green "lead markets" encompass options to substitute "brown" technologies (e.g. fossil fuels), to reduce material and resource use and at the same time to mitigate climate change and foster sustainable development. This explains the economic rationale for integrated resource and climate protection strategies in Germany, India and elsewhere.

While there are huge potential gains of adopting resource efficient methods – making such choices very attractive in principle – many barriers and market failures impede the uptake and implementation of such options in practice. Thus, global cost/benefit-analysis is only one step and must be complemented by in-depth analysis of country, sector, technology and actor specific barriers to better understand how a targeted mix of policies and measures can be developed.

Figure 2: Resource Saving Opportunities by 2030



1 Based on current prices for energy, steel, and food plus unsubsidized water prices and a shadow cost for carbon.
2 Annualized cost of implementation divided by annual total resource benefit.
3 Includes other opportunities such as feed efficiency, industrial water efficiency, air transport, municipal water, steel recycling, wastewater reuse, and other industrial energy efficiency.

Source: McKinsey 2011

35 McKinsey 2011
36 BMU 2012a
37 „In principle" is used in this context because the huge potentials of „GreenTec" can be converted into real self-regulating „lead markets" only if barriers and market failures are removed by policy interventions.

6 CHALLENGES AND BARRIERS

The need for global decoupling has been well-established, but – as demonstrated in the following chapters – the question of *how* to foster decoupling is more difficult. Differentiation is needed with respect to countries in different development stages as well as concerning segments of the economy and consumption patterns within and across countries. Complexity has to be reduced for political decisions. With this background, policies to target sustainable energy systems could be understood as being a part of the comprehensive agenda of sustainable resource use and policies. The technical feasibility of absolute decoupling of energy consumption and CO_2 from economic growth has been clearly demonstrated in scenarios globally and for industrialized countries[38]. The implementation processes to make this happen could be an important societal learning field for how to handle a "Great Transformation".

6.1 THE DICHOTOMY OF ECONOMIES

While the basic challenge of decoupling is comparable across the globe, the targets and the pathways are quite different depending on the consumption patterns and economic development stages of different countries. It has been estimated that the per capita ecological footprint of the richest one per cent of people in India is 17 times that of the poorest 40%[39]. Although there are many different national contexts, it is convenient to differentiate decoupling concepts at least for two broad categories of the global economy: the developed and the developing economies.

However, this is no longer a geographical divide, especially because the *'developed' part of societies*, characterized by high consumption levels, enjoying high levels of material, physical comforts and access to opportunities, co-exist with underdeveloped poverty stricken communities in almost all geographies today. In many OECD countries, like the US or Germany this gap is widening. This results in excessive demands and unsustainable lifestyles among the richer segments, which places immense stress on the environment. The poorer segments, especially in the global South, are unable to meet basic needs for food, health care, shelter and education.

The developed economies, typically representative of affluent lifestyles and consumerism, are exploiting a large share of the global natural resource base. They represent the consumption society *(or "new consumer classes")*. These unsustainable lifestyles are based on and are intricately interwoven with the consumption and production patterns of the current economic development model of the global North[40]. The challenge is maintaining and distributing prosperity more equally while finding ways to dematerialize the economy and society through absolute decoupling.

While significant improvement in overall quality of life in developing countries is a remarkable achievement, the current unsustainable structural transformation is fostering aspirations and lifestyles of consumerism like that of the global North through media as well as trade and market policies. The increased presence of multinational corporations, luxury brands, international hospitality chains and promotion of material-intensive lifestyles stand testimony to this fact in India and other economies of the global South.

38 Compare WWF et al. 2011; GEA 2012; for Germany: VDW 2011; Hennicke and Welfens 2012

39 Kothari et al. 2012

40 Mont 2007

Given this scenario, it makes sense for India to adopt green and inclusive economic systems for sustainable production and consumption at this juncture of its growth story[41].

On the other hand, developing economies, with large numbers of poor living in substandard conditions, are both agents and victims of environmental degradation. They represent the 'subsistence society' with high 'direct dependence' on natural resources for livelihoods and basic needs. A reduction in stocks of natural capital and flows of ecosystem services disproportionately harms the wellbeing of the poor and the resilience of their communities. Therefore, a strategy towards relative decoupling – by improving resource efficiencies and minimizing environmental impact while fostering economic growth – seems appropriate.

However, poverty can also exert a negative impact on the environment. In their quest for food security and basic need provision, the poor overuse limited resources available to them, leading to environmental degradation and further reinforcing this downward spiral or "vicious circle"[42]. This makes them more vulnerable to impacts of environmental degradation, including degradation wrought by others.

In developing economies, the challenge is how to foster an economic system that meets the needs of people in a way that is compatible with long-term resource conditions, rather than copying mindlessly the unsustainable production and consumption patterns of the developed economies. This means taking advantage of leapfrogging opportunities, such as energy efficiency in new buildings, developing sustainable transportation systems and developing infrastructure for better waste recovery.

The global perspective of decoupling strategies can be summarized under the concept of "contraction and convergence" (it might be called: "common, but differentiated responsibilities toward sustainable futures"). This concept is crucial for evaluating the goals and the results of national resource policies in developed countries like Germany, emerging economies like India, and elsewhere. The concept includes three key messages:

- In the long run all economies of the world must converge to a per capita resource consumption that is sustainable. Current best estimates indicate that this implies a target of somewhere between 6 and 8 tonnes per person per year on average.
- Highly developed countries currently consuming natural resources above this level must, by all means available (including e.g. technological innovation, social innovation, business model innovation, and new support policies and governance frameworks), bring their average per capita consumption levels down as rapidly as possible.[43]
- There is an urgent need in developing countries to raise per capita consumption to a level that meets the basic requirements for a healthy and productive life. Support tools using and fostering knowledge, technologies and changes in socio-economic behaviour to achieve

41 IGEP 2013
42 IFAD 2011

43 Concerning the energy sector, a possible application of this trangle and the technical feasibilty of absolute decoupling have been demonstrated for Switzerland by the concept of a 2000-watt per capita society. See Morrow. and Smith-Morrow (2008); for concrete target setting an the city level compare (UGZ 2011)

resource efficiencies that enable a tunneling through to an acceptable standard of living within the resource boundaries agreed to on an international level are needed.

6.2 THE DECOUPLING TRIANGLE

One basic challenge of fostering global decoupling through the increase of resource productivity is supporting micro-level activities that are compatible with long-term goals and conditions. This requires a systemic perspective and a way to link the micro level of where change happens to the macro level of where impacts are measured, policies are made and targets are set.

It also requires knowledge on how to cushion rebound effects[44] over time. For example, even though the technical feasibility of an absolute decoupling and a tremendous increase of resource productivity were demonstrated by scenarios and might be the aim of national resource policies, counteracting social and economic reactions (direct/indirect rebound effects; growth, structural and quantity effects) can eat up even massive increases in product, process or sector specific resource productivities. Therefore, resource policies based on technology driven scenario analysis and respective policy mixes to overcome barriers and to disseminate advanced technologies should always be aware of these counterproductive side-effects. It is the triangle of efficiency ("more with less"), sufficiency ("less can be more") and consistency ("better than more") on which policies and measures for decoupling should be based. For example: Instead of owning a private Sports Utility Vehicle (SUV) a more sufficient and consistent option could be to share highly efficient electric cars (or even electric bicycles) which are better adapted to the needs of city mobility.

In the past "sufficiency" has often been understood as a strong moral plea for individual behaviour and life styles to move to more environmental benign patterns. Thus "sustainable consumption" was perceived only as a matter of individual responsibility and decision making. But without enabling "sufficiency policies"[45], the necessary comprehensive societal shifts (acknowledging unequally distributed capabilities and resources of low and high income households) will not be effective enough to drive societal transformation and absolute decoupling processes.

"Sufficiency policies" are a sensitive field of policy making because citizens and voters understandably do not want the state to regulate individual behaviour and life style shifts. A ban on smoking or obligatory car seatbelts are successful examples of why and how current policies intervene with general regulation to protect a common good (e.g. public health).

In a certain sense "sufficiency policies" focus on the protection and enlargement of public goods ("global commons"). Given the concept of a proactive state with sufficient and fair distributed tax income, an open access to relatively "resource light" service sectors like education, care for health and for an aging society, culture, sustainable infrastructures (e.g. sustainable mobility), security, and sound environment could be addressed by sufficiency policies based on probably high societal acceptance.

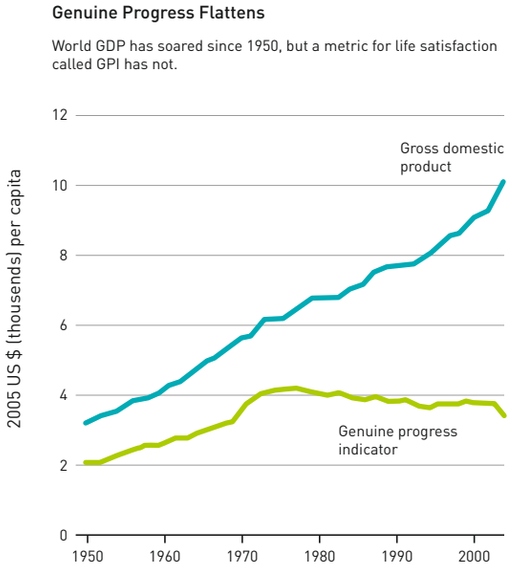
44 See for example Madlener and Alcott 2011. Here the term „rebound effect" is used in a general and pragmatic way to include e.g. direct/indirect rebound effects as well as growth, structural and quantity effects.

45 See for example Zahrnt and Scheidewind 2013

A comprehensive societal dialogue on sufficiency policies advocating the idea "less can be more" can be based on the empirical fact that in a growing number of fields of production and consumption indeed "more can be less", especially because – at least at the macroeconomic level – a "perverse decoupling" of economic growth (consumption) and (constant or even lower) life satisfaction can been seen.

Figure 3 reveals that for 17 OECD countries the GDP/capita and the Genuine Progress Indicator (GPI)/capita developed in parallel from 1950 until about 1978, but then they decoupled dramatically[46].

Figure 3:
Genuine progress indicator versus GDP per capita



Source: Costanza et al. 2014 based on Kubiszewski et al. 2013

Thus this "perverse decoupling" trend has to be reversed: it is necessary to add a further important perspective to the decoupling agenda, focussing on whether and how *more* quality of life (life satisfaction) or happiness can be derived from each additional unit of economic development. This is by far not only a debate on the right metrics or on indicators, but it is a fundamental societal and political challenge, in particular for developed countries and for the middle and upper class of developing and emerging countries as well.

Due to tremendous technological and societal innovations developing and emerging countries can tunnel through to much les s resource intensive infrastructures, processes and products than in the past. Thus the Kuznets development phase – getting rich and dirty – must not happen at all or could be shortened, if failures of developed countries were avoided during the take-off phase of development. In this sense structural change in the sectors which contribute to macroeconomic growth will be tremendous and decoupling can be supported by a resource efficiency revolution.

At the end of the day, what counts from an ecological and ethical perspective is to sustain ecosystem services for all peoples and generations to come[47]. Thus in a fundamental perspective equity would be a prerequisite of the green economy of the future.

46 Costanza et al. 2014 based on Kubiszewski et al. 2013

47 This simplified definition summarizes the often cited Brundtland definition of sustainable development; the strength and impact of substitution between „nature" and „capital" (strong vs. weak concept of sustainability) can not be debated in this context.

6.3 SUPPORTING SOCIAL EQUITY

UNEP (2011) has defined a resource efficient and green economy as one that raises human well-being and creates social equity while reducing environmental degradation and observing ecological limits. Fostering social equity needs, in particular, to consider:

- Imbalances in the power structure and access to resources that increase vulnerabilities and reduce resilience of the poor.
- Effects on people's capacity to take advantage of employment and other opportunities associated with green economy, and to change their consumption patterns.
- Wide-scale income disparities that create social unrest leading to adverse impacts on public policy and other agreements to address the problems of poverty eradication, climate change and low growth.

Inequity matters for both instrumental as well as normative reasons such as fairness and meritocracy[48]. However, mostly an instrumentalist approach as to why high or rising inequity can hinder development has been adopted. The three principles of equity, in order of priority, are[49]:

- Equal life chances: The circumstances and conditions of an individual (those not under his/her control like gender, ethnicity and fathers/mothers job etc) should not have an effect on the outcome (such as health, educational attainment and availability of opportunities etc).
- Equal concern for people's needs: Basic necessities (such as food, shelter, water and sanitation etc) distributed according to the level of need.
- Meritocracy: Rewards and benefits are distributed as per an individual's ability based on the notion of fair competition.

48 Cobham and Sumner 2013
49 Jones 2009

7 BARRIERS AND CORE STRATEGIES FOR DECOUPLING

7.1 BARRIERS TO SYSTEMIC CHANGES

There are a number of ways to classify barriers. As decoupling is about systemic change, we consider typical system failures, which include shortcomings in[50]:

- Firms – limited capability of companies to act in their own best interests; for example, through shortcomings in managerial and organisational capacity, learning ability, or a focus on up-front costs and short pay back periods instead of life-cycle cost analysis and long term gains.
- Knowledge Institutions – inadequacies in universities, research institutes, patent offices; rigid disciplinary orientation in universities (silo thinking) and consequent inability to adapt to changes in the environment.
- Networks – problems in the interaction among actors in the innovation system causing transition failures and lock-ins.
- Frameworks – gaps and shortcomings of regulatory frameworks, intellectual property rights (IPR), health and safety rules, etc., and other background conditions, such as the consumer demand, culture and social values.

The symptoms of systemic problems include, for example, a low demand for secondary resources from companies and consumers due to a limited environmental awareness, lack of information and failure to recognise externalities in the price of primary resources. Political risks associated with market and structural failures make it more difficult for governments to act. In the context of decoupling, one of the key roles of a policy framework is to provide a level playing field for economic activity while safeguarding common goods, including non-renewable natural resources. However, difficult economic environments make short-term policies to boost economic growth the easier option, instead of experimenting with long-term pathways or encouraging leapfrogging. Distortions on international commodity markets – such as unfair trade with asymmetrical gains, illicit trade with critical minerals from conflict areas, market power of state-owned and other emerging miners on commodity markets and pre-emption of scarce assets such as rare earth minerals – make the policy challenge more complicated.

Technology risks make it more difficult to find investments for clean technologies. Information asymmetries among investors, project developers and policy makers inhibit resource efficiency. Improved long-term orientation would help foster synergies between policy and technology transitions toward absolute decoupling and lower risk for investors. Facilitating multi-stakeholder dialogues on economy-wide targets for resource use would not only raise awareness but also pave the way for future investments and company activities.

50 EIO 2012, Smith 2010

7.2 CORE STRATEGIES IN DECOUPLING

Past experiences suggest that structural change has been driven by "waves of innovation"[51] converging technological potential with collective shifts in perception. The challenge is to create synergies between technological and socio-economic benefits as well as environmental objectives to overcome structural barriers such as systemic lock-ins and market failures. This will require strategic changes in a number of areas, including[52].

- New types of knowledge are needed to understand, foster, manage and improve the green economy transition. Sustainability research, for example, is a relatively new field that aims to take a more comprehensive and integrated (inter- and trans-disciplinary) approach to creating knowledge about the interactions between humans and natural systems. Targets for decoupling resource use based on scientific knowledge in light of risk and uncertainty are necessary. Participatory processes are essential in the production and usage of scientific knowledge.
- Capacity in skills and innovation are required in both developed and developing countries. Among the most important internal barriers to material efficiency encountered by companies is a lack of knowledge and skills. Awareness on material efficiency and knowledge on how to create a successful green business model is low. To this end, the structure of universities with rigid disciplinary orientation and institutional inertia needs to be revisited to equip the next generation of scholars, entrepreneurs and employees to handle challenges of the future.
- Policy needs to play a dual role for promoting decoupling. Policies need to build the framework and set an overall direction for change. This includes stating clear and binding targets for resource use and emissions (related to the "safe operation space") and creating a level playing field for eco-innovators by recognising both the economic and environmental costs and benefits of their activities. Secondly, policies provide support for eco-innovation through science, innovation and enterprise, as well as through green public procurement and public-private partnerships[53]. Refer to Chapter 10 for more examples of policies.
- Technologies are expected to play a crucial role in the shift to a resource efficient economy and the corresponding restructuring of industrial processes needed to modernise industry and foster competitiveness. Key enabling technologies exist in the areas of biotechnology, advanced materials, nanotechnology, photonics and micro and nano-electronics. New technologies that look at resource replacement, use of wastes or by-products from one production process into another (e.g. circular systems) are critical, in particular in developing economies where production is expected to continue to grow for the next three to four decades. Carbon capture and storage systems as well as systems of carbon capture and re-use have also been highlighted as key activities[54]. Application and adaption of information and

51 See Altenburg et al. 2014
52 EIO 2013
53 EIO 2012
54 EC 2009 and Bringezu 2009

communication technology (ICT) in construction, energy or transportation sectors has already led to radical innovation in the ways things are done. It is estimated that ICT can help mitigate around 13% man-made GHG emissions resulting from transport by reducing travel needs, influencing travel choices, changing driver and vehicle behaviour, increasing network efficiency and increasing vehicle load factor[55]. In the future, innovations like the internet of things, machine-to-machine communication and radio-frequency identification devices (RFID) could be used in collaboration with other sectors to develop new and creative applications. Nevertheless, there are also risks connected to the ever increasing expansion of ICT and the connected increase of waste around the planet. The use of short-lived electronic appliances, which often consist of rare or hazardous materials and create additional energy requirements, can increase on pressure on the planet.

- Frugal innovations: The pursuit of resource efficiency not only leads to high-tech but also to low-tech and affordable solutions for customers in emerging markets. More creative ways of approaching functionality, changed consumption behavior and social innovation are essential to any systemic change. This could be a major opportunity for entrepreneurs in developing countries. These frugal innovations aim to bring products back to a level of basic simplicity and are designed to be inexpensive, robust and easy to use. Being frugal also means being sparse in the use of raw materials and their impact on the environment. Although a relatively young concept, frugal innovation has been featured in popular media (The Economist 2010, The Financial Times 2012, and Time Magazine 2013) and could play a more important role in the future.
- A major bottleneck for the diffusion of green technologies and expertise is financing. Thus finance and finance structures are key to providing the means for investing in a sustainable transition. In Europe, an identifiable trend suggests that government support for clean technology equity financing is gaining importance[56]. New approaches urgently need to bring together technical and financial experts in order to develop and implement business models and innovative financing schemes. A key question for further research is how to finance innovations with long-term paybacks, when profits for the company are needed over the short term.
- Structural and behavioural changes in how business and governments are run, especially in rich countries, are key to meeting future demands with limited resources. Currently businesses (especially large businesses) typically treat environmental issues as an externality and not as part of their core business. Integrating environmental sustainability in value creation and distribution leads to a restructuring of value chains and new types of producer-consumer relationships[57]. Similarly, the organization of public administration into ministries and agencies dealing with individual issues separately hinders coherence, cooperation and systemic solutions and may lead to opposing objectives (like perverse subsidies). To overcome these institutional lock-ins, changes in the organisation of government may be necessary along with strong leadership and overarching targets.

55 OECD 2010

56 EIO 2012

57 OECD 2012 and EIO 2013

8 FRAMING DECOUPLING IN A CIRCULAR ECONOMY

In Europe, the discussion on a resource efficient economy has been intensified in recent years. The European Resource Efficiency Platform (EREP) summarizes the rationale and goals: "...resource efficiency will boost our economy, keep us within planetary boundaries, decouple economic growth from the use of natural resources and improve our quality of life... We call upon the EU to set a target for a substantially increased decoupling of growth from the use of natural resources, in order to improve competitiveness and growth as well as quality of life. The target should aim to secure at least a doubling of resource productivity as compared with the pre-crisis trend. This would be equivalent to an increase of well over 30% by 2030"[58].

Accelerated increases of resource productivity and ambitious impacts of decoupling by a factor 4–10 could be reached by a paradigm shift from the linear to a circular economy: "...The last 150 years of industrial evolution have been dominated by a one-way or linear model of production and consumption in which goods are manufactured from raw materials, sold, used, and then discarded"[59]. This "exceptionally successful" linear model ("take-make-dispose") of the past will not have a global future for providing sufficient goods and services for a growing world population within safe boundaries. In particular, high average per capita resource consumption levels in the global North will not be able to transfer to the rapidly increasing global middle class of the global South. It has been estimated that the global middle class will more than double to nearly 5 billion by 2030[60]. Thus, the linear model must be gradually displaced by an economy based on the principles of a "circular economy", in which „....resources and products are sustainably sourced, designed to be re-used, remanufactured and recycled so that waste becomes a resource and less primary raw material needs to be used"[61]. The global potential of a circular economy has been estimated „....to be as much as USD 700 billion in global consumer goods materials savings alone"[62].

Within the European Union around 2.7 billion tonnes of waste are generated annually. On average only 40% of the solid waste is re-used or recycled; the rest is land-filled or incinerated. Yet, in some Member States more than 80% of waste is recycled, indicating the possibilities for securing a greater supply of raw materials while increasing resource efficiency. From a resource point of view the optimal approach is to prevent waste generation in the first place (promoting sufficiency but also design for re-use, product longevity and durability). The European Commission has obligated all member states to develop national waste prevention programmes that describe in detail how the generation of waste can be decoupled from economic development.

In principle, the circular economy approach not only significantly decreases demand for natural resources, but also offers massive opportunities for green business models. Against this background, a well functioning circular economy would enlarge and reinforce a resource efficient economy in many respects.: *"Economies will benefit from substantial net material savings, mitigation of volatility and supply risks, positive multipliers, potential employment benefits, reduced externalities, and long-term resilience of the economy"*[63].

58 EREP 2014, S. 8
59 Ellen Mac Arthur Foundation 2013, p.2
60 Ellen Mac Arthur Foundation 2013, p.2

61 EREP March 2014, p.8
62 Ellen McArthur Foundation 2013, p.2
63 EllenMacArthur Foundation 2013, p. 66

9 GOVERNANCE FOR DECOUPLING

Traditional environmental policy has primarily focused on end-of-pipe measures to "clean-up" the environment, in terms of e.g. clean water and air at the output side of the economy. The transition to a green and circular economy requires a different kind of policy action; one which focuses on the input side and includes the concept of dematerialization. This will tackle problems at source and enable the reduction of environmental degradation from both a precautionary principle and a combating one. Furthermore, input oriented action is more cost effective and will allow achievement with less effort[64].

Appropriate environmental policy strategies must be based on a systemic perspective of the interactions between the economy and the environment at different scales and across time. This means that both local (e.g. water scarcity) and global (e.g. climate change) challenges must be taken into account in light of expected trends (e.g. population) in order to prevent problem shifting between different environmental pressures, product groups, countries or over time.

In spite of many differences between a highly developed economy like in Germany and an emerging economy like in India, the following general guidelines for a "decoupling road map" can be identified[65]:

SETTING TARGETS AND DEVELOPING INDICATORS

Quantitative longterm targets are needed to set the direction and pace of change. Targets play many roles, in particular, to guide action, lower risk for long term investment decisions and benchmark progress ("are we moving in the right direction"?). Indicators monitor progress and the distance to targets at both macro and sectoral levels. Every country may develop targets and indicators according to its own framework conditions and development stages, but bilateral cooperation of e.g. India and Germany (and the EU) and joint research could help to speed and scale up the policy agenda. According to ProgRess (Germany) and to the "Roadmap to a resource efficient Europe" (EU 2011) targets and indicators could be developed and jointly compared with Indian efforts.

Against this background specific attention may be given to valuing ecosystems, identifying the opportunities arising from a circular economy, from waste management and recycling, and to developing footprint indicators to account for burden shifting by imports.

CONDUCTING JOINT SCENARIO ANALYSIS ON THE (MACRO) ECONOMIC IMPACTS OF DECOUPLING

The expected benefits of a resource efficient, green and circular economy are a strong driver of change in policies and in business. While a number of studies estimate the savings potential of resource efficiency at European and country levels (based on e.g. case study approaches, surveys and expert judgment) only one study[66] is based on modelling. It revealed that as a rule of thumb average for EU Member States, a reduction of the Total Material Requirement of the economy by 1% is accompanied by a € 12 to € 23 billion rise in GDP and an increase in jobs (of 100,000 to 200,000 people). More comprehensive assessments and modelling work are needed to quantify the likely economic, environmental and social

64 Giljum et al. 2005

65 This chapter is based on EC, European resource efficiency platform (EREP) Brussels, December 2012, June 2013 and March 2014), McKinsey (2011) and Ellen Mac Arthur Foundation (2013). Some recommendations of the EREP have been taken literally and adapted to the context of the Indo-German Expert Group. Further discussions on the applicability to the Indian context is needed.

66 Meyer et al. 2012

implications of large systemic shifts. Key aspects to consider include rebound effects due to resource efficiency increases, spill-overs of material input reductions across sectors and along value chains, resource prices and material substitution options as well as impacts of demand changes due to changes in consumer behaviour and life-styles[67].

A recent report by the World Bank, "Greening India's Growth" (2014), estimates the cost of environmental degradation to be 5.7% of India's GDP in 2009 or US$ 80 billion annually.[68] It further showed that greening India's growth is affordable costing only 0.02 – 0.04 % of annual GDP growth depending on which scenario is selected[.69].

It would be of high political relevance (e.g. rising awareness) if a joint "Indo-German Scenario Panel" conducted relevant scenario analysis under the guidance of the Indo-German Expert Group. However decision making and public awareness campaigns based on scenarios should be handled carefully because even the best projection is never able to incorporate all surprises and uncertainties of societal and technological development.

SPEEDING UP THE DEVELOPMENT AND USE OF INDICATORS

Indicators that show progress towards a resource efficient economy are needed. This includes indicators that cover resource use along the production chain, both in Europe and globally, to raise public awareness of the global effects of EU/German and Indian production and consumption. Additional indicators should be considered to measure social and environmental progress beyond GDP.

Footprints and other indicators measuring the use of carbon, land, water and materials need to be brought to an adequate level of robustness and relevance for both policy and business.

ESTABLISHING AN INNOVATIVE AND DECENTRALIZED INSTITUTIONAL SETTING

The transformation from a linear to a circular economy needs a paradigm shift from the supply to the demand side of the energy and raw material markets and in many cases from centralized decision making to citizens participation and new decentralized activities. In Germany about 900 new energy cooperatives – financed by citizens capital – have been founded up to 2014 to implement the "Energiewende". To support this paradigm shift an innovative "polycentric governance structure "(Elinor Ostrom) for conceptualizing, guiding, encouraging and evaluating the transformation process seemed to be necessary. With the Bureau of Energy Efficiency (BEE) India has founded a good practice example to foster the market introduction of energy efficient technologies which is unique in the world. It could be a model for other countries (e.g. for Germany) and – in the future – might develop an even more comprehensive mandate and adequate resources to foster energy and material (resource) efficiency.

India's target for the contribution of renewables towards meeting its total energy demand, especially of the poor will require decentralised generation and distribution management by communities and businesses in villages and towns. The German model provides significant lessons in this regard.

67 EIO 2012
68 World Bank 2014
69 ibid

IMPROVING INFORMATION FOR BETTER DECISION MAKING AND REPORTING

Many actors operating across different levels (local to global) and from a variety of backgrounds will play a joint role in the transition. State agencies, private organizations and enterprises should measure and report progress on their activities in a transparent and easy to understand way. The active participation of business should be encouraged, keeping in mind the needs of SMEs. Companies should take up non-financial reporting and develop pragmatic ways of integrating and disclosing resource related risks.

GETTING THE PRICES RIGHT AND PHASING OUT ENVIRONMENTALLY HARMFUL SUBSIDIES

As a matter of urgency, environmentally harmful subsidies should be phased out. In particular subsidies to fossil fuels and the use of water in agriculture, energy and industry should be addressed. "This should also cover fiscal advantages as well as distortionary pricing schemes. Special care should be taken to design measures to address the needs of those least able to pay higher charges for using resources."[70] Ecological fiscal reform may also be used to shift the tax burden away from jobs to resource use in order to promote resource efficiency. The steering effect of the change of relative prices is important, but the impact of using tax revenues to incentivize investments for ecological modernization might be even more effective.

External costs should be internalized into cost calculations by taxes or emission trading schemes. For example in Germany, the external cost of electricity from coal has been calculated between ca. 8 (hard coal) and 9 (lignite) cts/kWh[71]. A step wise approach is one way to leave time for adaptation and accompanying measures to protect poor households.

Failure to reflect the real value of ecosystems and their services in decision-making has significant negative economic and social impacts. Mainstream natural capital accounting methodologies are needed as the first step toward accounting, understanding and then valuing the use of nature.

SUPPORTING HIGH-QUALITY RECYCLING

Recycling has significant potential for creating jobs and growth in the EU. To this end, innovation in the waste sector must move beyond end-of-pipe solutions (waste as a problem) toward system approaches that encompass inputs (design) and outputs (waste) in a way that optimises post-use options (waste as a resource). Parallel activities focused on waste prevention will encourage the shift toward a resource efficient, circular economy, characterized by a harmonized approach to remanufacturing, re-use, repair and waste-to-energy. To this end, an integrated recycling infrastructure across countries that could allow incineration and recycling facilities to operate at necessary economies of scale could be developed[72].

Market based instruments may be used to set the right incentives (pay-as-you-throw schemes, charges and taxes), accompanied by regulatory measures (infrastructure, technical criteria and carefully targeted bans) in a coherent policy mix. Instead of concentrating just on the volume of waste, the future regulatory framework may focus on the potential material qualities of waste as a secondary resource. In Europe, ways to encourage, expand and improve

70 European Comission 2012, p. 6

71 See BMU 2011

72 Wilts and von Gries 2014

Extended Producer Responsibility (EPR) schemes to promote more efficient use and re-use of resources should be explored. Research is needed on whether and how EPR could play a role in India.

PROMOTING NEW, RESOURCE EFFICIENT BUSINESS MODELS

The transition toward more resource-efficient and service-based business models (e.g. leasing, sharing, product-service systems) should be encouraged. Business models that increase product-life, enable easy repairs, encourage reuse, and ease recycling options can provide win-win opportunities for the economy and environment. There is some evidence that business models selling function (e.g. mobility), instead of products (e.g. a car) contribute to dematerialization, in particular when manufacturers retain greater control over the life-cycle of their products (for maintenance, reconditioning and recovery), while customers only pay for the service they need[73]. However, rebounds must also be addressed (e.g. customers overusing leased products). Smart policy frameworks are needed to shift predominant business models of the linear economy (focused on selling high quantities) to business models of the circular economy (with different interactions between producers and customers requiring the build-up of new infrastructures).

ENABLING CITIZENS TO MAKE MORE SUSTAINABLE CHOICES

Making sustainable choices available, accessible, attractive and affordable for all citizens may be supported by incentive policies (financial, taxation and pricing policies) as well as marketing campaigns, education, counseling and labeling. It may include regional and local efforts to expand instruments that alleviate upfront costs to consumers, as well as financial disincentives for unsustainable products. Information campaigns could point toward the use of services and sharing as an alternative to owning products and regulatory instruments, like standards, may be used to increase user's trust. The establishment of take-back schemes could change behaviours to pave the way toward more circular economies. Municipalities may also lead by example but integrating green public procurement across all activities.

IMPROVING RESOURCE EFFICIENCY IN BUSINESS–TO-BUSINESS RELATIONS

Principles for sustainable sourcing standards should be developed and piloted for priority materials and commodities. In particular voluntary schemes, led by industry and retailers, may be encouraged. These could draw on lessons learnt from existing schemes in the areas of fish, timber, and palm oil and incorporate capacity building for suppliers, especially SMEs.

In the context of a circular economy transition, information on what resources a product contains and how it can be repaired or recycled is inadequate. One option is the development of a "product passport", such as an Environmental Product Declaration, to make such information easily accessible for manufactures, remanufactures and recyclers across the supply chain. Another option to foster business-to-business relations in the circular economy is the development of a network of industrial symbiosis initiatives to help companies source inputs and gain value from their residues.

73 EIO 2014

TAKING FORWARD A COHERENT, RESOURCE EFFICIENT PRODUCT POLICY FRAMEWORK

A dynamic fiscal and regulatory framework that gives appropriate signals to producers and consumers regarding the environmental impacts of products over the whole life cycle is needed. This implies the adoption of a coherent product policy that requires mainstreaming, consolidating and ensuring consistency among existing instruments (e.g. ecodesign and ecolabels) and closing loopholes. Providing clear and trustworthy signals to producers and consumers may be achieved through warranties, durability, upgradability or recyclability requirements, eco-design requirements, as well as indicators, benchmarks and financial and non-financial incentives.

DELIVERING A STRONGER AND MORE COHERENT IMPLEMENTATION OF GREEN PUBLIC PROCUREMENT

Public expenditure should reflect decoupling priorities. It can also be an effective tool to promote eco-innovation and create a market demand for resource efficient technologies and solutions. Support for municipalities and administrations to engage in GPP could be aided by the establishment a network to exchange good practices, standardized approaches and guidance on issues such as life cycle costing methodologies and the use of labels. A systematic monitoring mechanism based on real public tenders could track progress and identify areas for further support.

DEVELOPING INSTRUMENTS FOR SMES

Resource efficiency offers major economic opportunities for SMEs, both in terms of cost savings as well as opportunities to offer greener products and services in existing and emerging markets. To take advantage of these opportunities, SMEs need the capacity, skills and improved access to finance. Building on best practices at national and regional levels, networks may develop locally tailored support, combining resource efficiency audits/consultancy, access to finance and advice and skills development for SMEs. Programmes such as demea, from the German Material Efficiency Agency, may be used as a good practice example and the possibility for implementing similar programmes in other countries, like India, should be explored[74].

SUPPORTING EMPLOYMENT AND SKILLS

Creating more and better employment is an explicit aim of the transition. To this end governments should develop a broad strategy for greening jobs, skills and education which integrates sustainability objectives, identifies labour market instruments, mobilizes funding, supports the exchange of good practice, and promotes awareness raising and engagement. Coordinated support in terms of investment, infrastructure, technology and skills development should focus on sectors and occupations with a strong green jobs creation potential and where the greening of skills is essential to ensure their competitiveness. Entrepreneurship and skills for young people to take new business and employment opportunities arising from greening the economy should also be promoted.

74 O'Brien et al. 2012

Educational and training curricula should be revised to meet existing and anticipated labour market needs for green skills, and make them part of mainstream education and life-long learning. Local and regional authorities should include green employment opportunities in their development strategies. Social partners should further ensure close workers' involvement in matters related to environmental management, energy and resource use and emerging risks at the work place, including on health and safety aspects, enhance workers' rights to information and consultation, and develop sector-wide resource efficiency roadmaps covering in particular skills and training requirements.

GUIDING THE FINANCIAL SECTOR TO ENABLE THE TRANSITION

Governments should encourage investment in resource efficiency research and development, eco-innovation and green business models. Against the background of reform in the financial system, barriers to leveraging more private financing for resource efficiency should be addressed. For example, the annual investments needed for the German "Energiewende" up to 2020 are calculated at about 30–40 bn €.

The macroeconomic effect on the German economy "are positive"[75], because the low investment rate and slow innovations dynamics of the German economy could be raised. There is much evidence that these positive effects of the restructuring process by "ecological modernization" hold true for many countries if parts of the still rapidly growing financial assets could be re-channeled into ecological investments in the real economy.

In order to enable for example institutional investors to invest more broadly into resource efficiency, the potential of the bonds market should be explored, including for small projects and SMEs.

75 See DIW 2014

10 DEEPENING THE INDO-GERMAN EXCHANGE ON A RESOURCE EFFICIENT AND CIRCULAR ECONOMY

Projects on international cooperation have a longer lasting impact on transformation processes if

- the necessary joint research is interdisciplinary and solutions oriented („transition" or „implementation" research)
- good and bad lessons learned from other countries will be assessed and evaluated from the beginning while proving the applicability to different conditions
- resources and time frame are sufficient (3–5 years) to initiate and evaluate pilot projects and at the same time develop roadmaps to scale up pilots
- focus on priority sectors (e.g buildings, transportation) which are "hot spots" concerning their environment, economic and social impact on the whole society.

STEPPING TOWARDS A JOINT RESEARCH AGENDA

At its 2nd meeting, February 3rd–4th, 2014 in Delhi the Indo-German Expert Group on Green and Inclusive Economy identified a list of topics which could be part of a collaborative research roadmap for Germany and India. These options include:

- the analysis of the necessary fundamental changes in value systems and life styles,
- the identification of leap frogging in the technical and institutional sphere,
- the mitigation of rebound, comfort and growth effects,
- the consideration of equity and fairness including all stakeholders,
- the concept of innovative institutional setting,
- the analysis of how disruptive innovations and business models could play a role, and
- the systemic view on key sectors, like buildings, transport and agriculture.

SELECTING THE BUILDINGS SECTOR AS A STARTING POINT

In many respects the building sector is key for transforming a core field of needs towards a green economy. All the above mentioned parts of a collaborative roadmap are crucial elements to close the knowledge and implementation gap in the buildings sector. Leap frogging technologies, proven policy packages, innovative institutions and good practice examples to foster energy and material efficient and green building in Germany and India are available. Scaling up good practice examples of new and retrofitted buildings, establishing knowledge management on efficient buildings, integrating life style changes and policies to mitigate rebound effects could be the focus of a joint research project of the Expert Group. Integrating energy efficient and green buildings into the broader arena of green cities could be the next consequent stage for joint research, which then would include sustainable infrastructures (e.g. mobility, water and waste management, regional food supply or urban gardening (as e.g. in many German cities, in Habana or Sao Paulo).

This starting point for joint research of the Indo-German Expert Group could create many synergies if based on existing international cooperation and networks, in which e.g. DA, BEE and TERI in India and KfW, GIZ, BMUB and Wuppertal Institute are involved from the German side.

CHOOSING "TRANSITION AND IMPLEMENTATION RESEARCH" AS METHODOLOGICAL BACKGROUND

The group decided to focus the discussion towards developing clear targets and on making focused recommendations instead of getting lost in theoretical constructs and complexities. The broad policy level as well as the detailed sectoral levels (with in-depth research) should be addressed. Research to support implementation is the target. While policy and private sector decision makers in both countries are the main target group of the proposals, the expert group perceives it also important to reach out to a broader audience.

It might be especially useful to jointly identify technical, societal and structural leap frog (or tunnelling through) options for sustainable production and consumption between developed and developing countries. The challenge for emerging economies like India is to find a way to circumvent the lock-jam of highly capital intensive unsustainable infrastructures, e.g. in the energy system, which are targets of ambitious transformation processes in developed countries, e.g. in Germany. Not only are such installations locking more and more capital, they are also preventing R&D or adaptation of smaller scale, eco-system based service options and especially circular economy approaches. New "Greentech" and "GreenSoc" innovations like energy cooperatives, prosumers, smart grids, integrated city mobility, urban gardening or social enterprises, guilds and other artisan groups might be applicable in Germany and India as well. In addition, research based political consultancy is needed now, because turning the juggernaut is a slow process.

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