Material Efficiency & Resource Conservation

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Core Strategies for a Successful Resource Policy and the Instruments Proposed for Their Effective Implementation

Executive Summary of the Policy Recommendations of the MaRess Project

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1 Overview of Policy Options

To create a successful resource policy, policymakers can use the six core strategies developed in the MaRess project for orientation. The core strategies and the instruments proposed for their effective implementation are discussed in detail in the following. Tab. 1 provides an overview.

Tab. 1: Overview of the Core Strategies and the Policy Instruments Proposed for their Implementation

Core strategy	Instruments
"Mobilising Institutions – the Key to Successful Diffusion"	Resource efficiency agency (including evaluation to optimise funding structures)
	Resource efficiency stimulus and advisory programme
	Expansion of the pool of advisors and regional structures
"Giving Innovation a Direction – “Sustainable Future Markets for Resource Efficiency Solutions"	Resource efficiency innovation and market launch programme
	Innovation agents
	Innovation laboratory specialising in resource efficiency
	Venture capital for resource efficiency solutions
"Resource-Efficient Products and Services"	Dynamic standards and labelling requirements (amendment to the EU Ecodesign Directive)
	Promoting resource efficiency-orientated product design
	Hybrid governance to increase the use of secondary materials of rare metals in new products
	Primary construction material tax
"Incentives for Resource Efficiency Solutions through the Financial Sector"	Enquete Commission "Resource Efficiency and Sustainability in the Financial Sector"
	Resource-related Key Performance Indicators (R-KPI)
"Government as a Consumer and Provider of Infrastructure"	Procurement based on lifecycle costs as a mandatory procurement criterion
	Demand bundling to minimise risks for innovation processes
	Resource efficiency-optimised infrastructure systems
"Changing Attitudes"	Resource Efficiency Network
	Resource efficiency campaign: Target group of (future) decision-makers
	Concerted action resource efficiency
	Qualifying advisors
	Establishing a “virtual resource university”
	Developing course materials for schools

Source: Kristof / Hennicke 2010

2 Core Strategies and Policy Instruments

2.1 Core Strategy: “Mobilising Institutions – the Key to Successful Diffusion”

The core strategy "Mobilising Institutions – the Key to Successful Diffusion" contains the institutional foundation on which the other core strategies are based. For this reason it has been given top priority and recommended for rapid implementation. It also plays an important role in the economy overall because it is largely self-financing and will modernise institutional structures. The idea here is, on the one hand, to scale up existing institutions at the federal or state level (e.g. demea, North Rhine-Westphalia Efficiency Agency) and advisory structures (e.g. pool of advisors) and, on the other, to expand and concentrate existing funding options – e.g. VerMat (for improving material efficiency), NeMat (for promoting networks for material efficiency), FONA (for research on sustainable development). The institutions and the funding programmes are considered to have achieved convincing and robust results (e.g. Kristof / Lemken / Roser / Ott 2008) so that solid reasons exist for a considerable expansion of institutions and funding nationwide.

The core strategy "Mobilising Institutions – the Key to Successful Diffusion" comprises three components that build on and mutually reinforce one another: establishing a federal resource efficiency agency (including independent evaluation to optimise funding structures); launching a resource efficiency stimulus and advisory programme; and expanding the pool of advisors and regional structures. EUR 450 million are proposed annually for implementation of the core strategy. These three components define in more concrete terms the “mobilising institutions” (“caretaker” function) that the state requires as a “guiding and helping hand” at all levels in order to successfully implement resource efficiency policy. For it is only through these institutions that the target group, e.g. small and medium enterprises (SMEs), can really be reached. Designing and implementing strategies that span more than one area of institutional competence and are not limited to one term of political office is a task that exceeds traditional institutional capability and thus needs the support of relatively independent intermediary institutions and networks. Empirical evidence also shows that many theoretically highly profitable micro-economic measures undertaken to conserve resources are not yet automatically being applied comprehensively and rapidly. The core strategy therefore focuses on offering a consolidated package of measures intended to accelerate diffusion and make use of existing economic resource efficiency technologies and solutions to lower the cost of resources. Using a funding programme that combines advice and implementation support with start-up funding (particularly for SMEs) coupled with business advice and local support has proven an effective way of removing obstacles and should thus be scaled up.

Resource Efficiency Agency
(including evaluation to optimise funding structures)

The Resource Efficiency Agency will be formed as a new institution at federal level to bundle public diffusion and financing options for companies, company networks and associations and to play the necessary role of "caretaker" for all core strategies. The resource efficiency agency will coordinate, support and evaluate activities for companies – particularly SMEs – throughout Germany via the resource efficiency stimulus and advisory programme with the aim of rapidly realising the considerable potential that exists for increasing resource efficiency in production processes and product development. It will also be responsible for expanding the pool of advisors and regional structures. The agency will be a lean organisation that will operate nationwide and at all levels. It will create networks for existing actors and structures and develop them further. The main tasks of this core strategy will be to create networks for actors (at all federal levels, with private-sector consultants and existing intermediary institutions such as the Resource Efficiency Network) and to act as a guide for companies (using the principle of a central point of contact). To be able to fulfil its responsibilities as well as possible, the agency will also require a solid international network (e.g. cooperation with international organisations at EU level, initiating new supranational activities, learning from the experiences and achievements of others). The Resource Efficiency Agency's activities are not, however, limited solely to implementing this core strategy but also extend to all other core strategies.

It is also envisaged that the Resource Efficiency Agency will commission independent evaluators to continually analyse the achievements of the resource policy instruments using standard, central criteria and thus to provide a sound basis to further develop the instruments (particularly to optimise the funding structures) and the policy mix. The goal is make funding structures more effective and easier to access. This will also enable the structure of funding programmes with other primary goals to be addressed with a view to integrating the issue of resource efficiency. The funding programmes of the EU and of the German federal and state governments with their broad spectrum of subsidies, low-interest loans and assumption of equity and liabilities serve as an indispensable component in financing innovation and market launch processes, particularly in the SME sector. Yet the programme structures often lack clarity, transparency and flexibility, while for many SMEs the procedures for applying for funding and managing projects are also a major obstacle. Unlike in other countries, funding programmes and the entire research funding system in Germany have so far not been comprehensively evaluated using comparable criteria. This is, however, an important prerequisite for evaluating their success, for using public resources more efficiently and for further optimising the programmes. It is thus important to establish an independent evaluation which, if used intelligently, will also reduce costs in the long run.

Resource Efficiency Stimulus and Advisory Programme

The Resource Efficiency Agency’s Resource Efficiency Stimulus and Advisory Programme will provide advice and support for companies and company networks en-

gaged in integrating resource efficiency into their production processes or product design as well as for resource efficiency activities that span the entire value chain. As a side effect of this programme existing efficiency technologies, solutions and services will be able to penetrate the market more quickly (diffusion). Thus in its role as "caretaker" for implementation, the agency could be mobilised not only to help increase resource efficiency in companies and their value chains but also in the area of public and private resource consumption. Here the agency should involve actors already working in the area of resource efficiency – both those with their own economic interests such as advisors but also publicly funded intermediaries such as the North Rhine-Westphalia Efficiency Agency or NGOs active in the field of resource efficiency like the Nature and Biodiversity Conservation Union (NABU). It could also, however, indirectly encourage implementation, e.g. through tenders for innovation competitions.

Expanding the Pool of Advisors and Regional Structures

The regional structures that play an important role in reaching companies should be strengthened across the board, while in some regions, new structures will have to be created. As part of this process, the pool of independent advisors who motivate and support companies in implementation should be drastically increased. An institutionalisation programme called "für die Fläche" (for the region) (based on the example of several states such as North-Rhine Westphalia and Rhineland Palatinate) will be created to help expand the pool of advisors and the regional structures. The regional structures can be supported by various actors (e.g. by state-level institutions, chambers of commerce and industry, chambers of trade, the RKW (German Centre for Productivity and Innovation), the VDI (Association of German Engineers), business and professional associations, business angel networks, existing regional networks) and should be firmly anchored in institutional structures with a clear financing framework so as to be able to work successfully (e.g. efficiency offices affiliated with existing institutions). Expanding the pool of advisors aims to provide advice embracing all kinds of resources and the technical, organisational and business expertise necessary for implementation. It should be accompanied by an extensive qualification programme for (accredited) advisors and the development of an accreditation system (including methods to monitor success and basic data). The existing activities (e.g. demea, KfW, North-Rhine Westphalia Efficiency Agency) should be incorporated here.

2.2 Core strategy: “Giving Innovation a Direction – Sustainable Future Markets for Resource Efficiency Solutions”

Consensus exists that innovation drives economic and technical development. But not everything that is new is truly innovative, useful to society, responsible or conducive to sustainable development. “Giving Innovation a Direction”, however, means exactly this forward-looking orientation aimed at creating sustainable future markets. Innovation should generally be geared towards solving problems and, to this end, should bring together technical and social innovations to successfully contribute more to protecting

the climate and conserving resources. This also includes, for example, cooperative innovative processes (such as innovation agents or innovation laboratories specialising in resource efficiency) and systematically promoting creative technical and social experiments.

Of course “Giving Innovation a Direction” does not mean that binding government requirements are imposed on basic and applied research. Nevertheless, the government should exercise the steering prerogative it has over a major portion of its R&D funding (e.g. FONA) to create more incentives for joint projects with innovations and investments to increase resource efficiency. The focus should be on ambitious reduction targets for resource consumption so that R&D activities as well as demo and pilot projects have a reliable long-term standard on which to orient themselves. The innovation programme should also be combined with a market launch programme and venture capital made available to prevent “breakdowns” like the famous “Valley of Death” (e.g. failure of projects for financing reasons after the first phase of funding has ended).

Taking all this into account, the core strategy "Giving Innovation a Direction – Sustainable Future Markets for Resource Efficiency Solutions" is based on four instruments: the resource efficiency innovation and market launch programme, funding for innovation agents, the institutionalisation of innovation laboratories committed to resource efficiency and the availability of venture capital for resource efficiency solutions. The funding requirement for the first three instruments is estimated at EUR 300 million, while venture capital totalling EUR 100 million should be made available in revolving funds. The innovation and market launch programme and support for innovation agents should be pursued as the top priorities and implemented quickly. The other two instruments should then follow. The findings of the MaRess task "Identification and Analysis of the Potential of Innovative Groundbreaking Products, Technologies and Markets to Increase Resource Efficiency" can be used to pinpoint more precisely where funding should be targeted.

Resource Efficiency Innovation and Market Launch Programme

The goal of the resource efficiency innovation and market launch programme is to stimulate the research and development of new and more resource-efficient technologies, materials, products, services and systems solutions from “cradle to grave” and to provide incentives for resource efficiency-oriented process and product design. Target groups of the programme are:

- Producers and users of resource-efficient technologies (e.g. functional materials, surface finishing processes, waste-free production processes, optimised maintenance / service cycles, flexible factory).
- Suppliers of resource-efficient products / product-service systems (e.g. insulation systems, lightweight vehicles, cascaded use systems, resource-optimised packaging systems, modularisation / multifunctional devices, services for resource efficiency-oriented process and product design).

The goal is to systematically focus existing joint R&D programmes more specifically on resource-efficient solutions with solid financial support (in particular KfW, Federal Ministry of the Environment, Federal Ministry of Education and Research) or, to put it another way, to systematically direct the constantly changing focus of research funding towards resource efficiency. The market launch of resource-efficient products and product-service systems must also be given targeted support for groundbreaking technologies, products and services. Pilot and flagship projects are also important to develop product-service systems that increase resource efficiency (e.g. in the area of mobility services).

Innovation Agents

To overcome the dearth of knowledge and expertise in companies, actors with the appropriate qualifications and specialisations play an important role in providing professional and / or financial support for innovation processes in companies from invention through to market launch. In addition to government subsidies, one of the chief sources of funding for innovation projects is private investment capital. This is where innovation agents come in. Innovation agents are, on the one hand, innovation coaches who as advisors on innovation management supply the expertise and knowledge the company lacks and, on the other hand, act as business angels who supply the company with the necessary private capital, expertise and outside contacts. This allows additional synergies for increasing resource efficiency to emerge, particularly in the early phases of innovation. The activities of innovation coaches are supported by a funding programme that can be based on existing federal and state financing programmes. The two target groups are producers and users of resource-efficient technologies and suppliers of resource-efficient products / product-service systems.

Innovation Laboratories Specialising in Resource Efficiency

When it comes to innovation processes, SMEs in particular often have difficulty compensating for the disadvantages of their size compared to large companies. Industrial research on resource efficiency is also not yet sufficiently well-established. The innovation laboratories instrument was conceived to tackle these two issues. Companies work together in innovation laboratories with support from research institutions to promote cross-company innovations in resource efficiency. Timelines and organisation are flexible. Complex or large-scale research projects are set up as joint projects and can make use of the infrastructure provided by the innovation laboratories. Equipment, expertise and personnel resources are shared to overcome the disadvantages SMEs face in terms of size. The different experiences and perspectives of the companies and research institutions involved are the primary driving force in the creation of new types of non-technology-specific solutions.

Venture Capital for Resource Efficiency Solutions

The innovation and market launch programme is closely linked to this instrument to make it easier to procure the venture capital necessary to launch resource-efficient innovations onto the market in a targeted fashion. The basis is a revolving mixed asset fund with basic government funding. Suppliers of innovative, resource-efficient technologies, products and services form the target group of this instrument.

2.3 Core Strategy: “Resource-Efficient Products and Services”

The core strategy "Resource-Efficient Products and Services" aims to incorporate the criterion of resource efficiency into consumer goods, buildings and services. The concept and design of a product determine not just the form, quality, aesthetics and functional characteristics but also the material composition, the consumption of material, energy and water during use and how it can be used at the end of the product lifecycle (e.g. reuse, recycling, conversion). Dynamic standards and labelling requirements are hence very important, e.g. in line with the top-runner principle. They should, to the extent possible, create incentives to keep the entire product lifecycle in mind and to consider when designing a product what can be done during the consumption phase, during reuse and at the end of the product lifecycle in terms of recycling. In addition to product design, it is important to develop special instruments for large material flows, such as construction materials, but also for the material flows of raw materials that are particularly interesting for economic reasons. The metals processed in ICT products are not reused or recycled (e.g. at the end of a product’s life), because the products are kept in households (e.g. mobile phones that are no longer in use) or (illegally) exported (e.g. old vehicles to circumvent laws on old cars). For these reasons the cycle sometimes fails to come full-circle because the incentives to use recycled materials are too weak.

This is precisely where the proposed instruments of this core strategy come in. The dynamic standards and labelling requirements – stipulated in the amended EU Ecodesign Directive – eliminate the “dirty end” and create incentives to improve resource efficiency on the entire market. Promoting resource-efficient product design – combined with these dynamic standards – establishes a resource efficiency orientation more quickly in the day-to-day work of product designers and creates opportunities for more resource efficiency-oriented product-service systems. The hybrid governance for rare metals negotiated between companies in a value chain and government institutions creates new incentives to bring material cycles full-circle by defining minimum percentages of recycled materials that must be used in new products and stipulates their implementation in global value chains by way of information and certification requirements. The primary construction material tax supports a shift to secondary construction materials. The target groups of all four instruments are product manufacturers and the service providers operating at the end of the product lifecycle (e.g. those involved in reuse and recycling).

EUR 50 million are required for the first three instruments. The primary construction material tax will generate roughly EUR 1,200 million and can thus finance the entire policy mix of all core strategies proposed. With the exception of hybrid governance which, as a new instrument, requires a longer leadtime and more intense negotiation, the instruments should implemented in the short term as a matter of priority.

Dynamic Standards and Labelling Requirements (amended EU Ecodesign Directive)

The dynamic standards aim to increase the resource efficiency of products – from production through (re)use all the way to recycling – and to encourage more use of secondary materials and renewable raw materials. The idea behind making the minimum product-specific standards dynamic is to continually take account of technical advances and stimulate innovation. In concrete terms, the specific resource consumption can, for example, be stipulated (e.g. maximum consumption of water in the use phase or in production) and a minimum set for the percentage of specific secondary materials that must be used in new products. Information and certification requirements could be established to make data easier to obtain. To keep pace with technical advancements the minimum standards could be made dynamic – as is the case in the EU Ecodesign Directive – either through dialogue with experts at fixed intervals or by applying the top-runner principle. The latter uses the most resource-efficient devices on the market as a benchmark for imposing stricter standards, and manufacturers are given a certain period of time to bring their products into line. The top-runner principle produces good results if the competitive market is dynamic. Top-runner approaches generally lower the costs of providing information and give the standard more legitimacy because proof of the technical feasibility of the standard already exists.

Pioneers could and should benefit from labelling requirements as the successful example of appliances has clearly shown. But the labelling categories must be continually adjusted to technical advancements, so that Category A is always reserved for the small group of top-performing devices on the market and no new labelling categories (e.g. A++) are created that might be confusing to consumers. To accelerate the extension of the Ecodesign Directive to all resources (i.e. to energy and, in some cases, to water consumption in the use phase) and to the entire value chain (i.e. from resource through to production and even after the use phase), Germany should become more intensively involved in the consultations on the Ecodesign Directive and its further development as well as associated activities at EU level.

Promoting Resource Efficiency-Orientated Product Design

Pilot product design projects should be used to encourage a resource efficiency orientation over a product’s entire lifecycle. In addition, given that prizes and awards are common for design, other possible ideas for furthering resource efficiency would be competitions for sustainable and resource efficiency-oriented product design, a re-

source efficiency design award or manufacturer prizes for the development and market launch of top-performing devices.

Hybrid Governance to Increase the Use of Secondary Materials for Rare Metals in New Products

The proposed hybrid governance model is based on goals negotiated between companies in a global value chain and government institutions (such as a “minimum percentage of secondary materials” to increase the amount of secondary resources used in new products) coupled with mandatory information and certification requirements related to resource conservation (“no data, no market”). These requirements ensure verification that the agreed minimum quantities have actually been complied with in the final product. The instrument combines self-regulation and knowledge generation approaches with legislative approaches. Hybrid governance is an important way of promoting resource efficiency in global value chains to which national policy has only very limited access. Rare metals are interesting for this new policy form because currently the closure of material cycles involving rare metals is not of a sufficiently high quality and these metals are of great economic and ecological importance. In developing countries in particular, the inefficient and low-tech recovery / extraction of a relatively small number of metals has a considerable environmental impact and also entails health risks and material losses. The instrument should initially be developed and tested in an exemplary manner for mobile phones that contain these rare metals. It could then be extended to other products and material cycles based on the experience with mobile phones.

Primary Construction Material Tax

The use of primary construction materials such as sand, gravel, crushed rock and limestone has a massive direct and indirect environmental impact along the entire value chain. The result of high primary construction material extraction and consumption is extensive destruction of the landscape and a negative impact on ecosystems (e.g. emissions, adversely affected groundwater, habitat fragmentation). Particularly in the production of concrete and cement, high energy consumption causes considerable greenhouse gas emissions. The uninterrupted physical growth of infrastructure in building and road construction also entails extensive land use and surface sealing. The ratio between new construction and maintenance is a decisive factor as well as the percentage of secondary construction materials used. Germany extracts roughly 550 million tons annually to meet its domestic demand and is the third-largest producer of construction minerals after Spain and France (BGS 2009). The percentage of recycled and secondary construction materials, however, is only approx. 10% (compared with 25% in Britain). To encourage more use of recycled and secondary building materials, the German government is proposing to impose a nationwide consumption tax on the extraction and import of primary building materials based on the successful British model. The tax would affect companies that extract and import raw materials and would initially be at least EUR 2 for every ton of sand, gravel, crushed rock and limestone ex-

tracted. The revenue from a primary construction material tax would therefore be around EUR 1.1 billion and would be sufficient to finance all the core strategies proposed here. Because the primary construction material tax is designed to encourage a reduction in the consumption of primary construction materials, a quantity tax would be preferable. An annual 5 percent progression announced far in advance would counteract the loss in value of the quantity tax brought about by inflation and create a steadily increasing incentive.

2.4 Core Strategy: “Incentives for Resource Efficiency Solutions via the Financial Sector”

The financial sector can play a key role in ecological modernisation and increasing resource efficiency because it can control financial flows on the basis of various criteria. The financial sector has a hand in deciding whether resource efficiency innovations can be financed in companies and, if so, how financial support can be provided for extensive market launches by companies. Resource efficiency is currently only a peripheral issue in the financial sector, both in the debate about the relevant financial issues as well as in the key decision-making factors, i.e. the key performance indicators. These determine not just the direct financing conditions for companies but also the rating and risk-management processes on the financial markets and the listing conditions for prime market segments on stock exchanges. With this in mind, it is important to establish resource efficiency as a key factor for competitiveness in the financial sector – as a central starting point for lowering costs and as a dynamic growth market for GreenTech. To achieve this goal, a Enquete Commission focusing on “Resource Efficiency and Sustainability in the Financial Sector” should first be set up. Second, resource-related Key Performance Indicators (R-KPI) must be developed because in the financial sector they are a central basis for evaluation and decision-making processes. The R-KPIs translate the idea of resource efficiency into directly usable criteria for the financial sector in its day-to-day work, including rating, risk- management or listing. To generate solid data for their work quickly, the financial authorities should use the R-KPIs to define the legal and supervisory rules for risk management by financial service providers more precisely, and reporting on R-KPIs should be made mandatory in company management reports. When resource efficiency starts to play a more important role in the financial sector and the R-KPIs provide adequate indicators, it will be easier to convince stock exchange operators and the stock exchange council to integrate R-KPIs as a listing condition for prime market segments on stock exchanges.

The instruments should be implemented in the short term and given high priority. Around EUR 10 million is proposed for implementation, primarily for the research programme.

Enquete Commission “Resource Efficiency and Sustainability in the Financial Sector”

An Enquete Commission should be set up that focuses on "resource efficiency and sustainability in the financial sector" to stimulate the debate on the critical role of the financial sector in environmental modernisation and in the implementation of a resource efficiency strategy and to further reinforce the political decisions in this complex field. The mission of the Enquete Commission would be to explore this range of issues for political decisions – supported by a research programme – and to involve the primary stakeholders from both the financial and other sectors. Political strategies could then be developed on this basis. Setting up a Enquete Commission could also help bring back together the financial sector and the real economy, which have drifted away from one another, and to pursue a more forward-thinking development path. Given the central role of the financial sector, establishing a Enquete Commission should be a matter of high priority. The research programme should be interdisciplinary so that concepts ready for implementation can be developed with actors from the financial sector and other stakeholders.

Resource-Related Key Performance Indicators (R-KPI)

Financial service providers do not at present include resource efficiency in their financing and investment decisions because the appropriate indicators and necessary data are still lacking. Because the issue of resources has not yet been established as a risk aspect, the current regulation of risk management among financial service providers does not include the risks of company resource use although the financial authorities could already today exploit the latitude they have for interpreting the applicable regulations – for example to allow rating agencies to change their rating and risk-management processes. The goal is hence to develop a set of widely applicable and relevant resource-related Key Performance Indicators (R-KPI) and to create the necessary data basis quickly and efficiently. The R-KPIs should represent resource consumption at company level in a meaningful way that permits comparison and practical application. The set should also include usable industry-wide and industry-specific indicators for the financial sector for which KPI sets would serve as the basis. The indicators should be gathered by companies independently and it should be possible to reference the data from the Federal Statistical Office for upstream chains. The relevant stakeholders – financial sector, private sector, auditors, Federal Statistical Office, relevant research institutions – should be included in developing the R-KPIs and creating the concept for the data basis. Work should begin soon on developing the R-KPIs and creating a concept for the data structures and should be completed as quickly as possible as part of the discussion already being held on the reform of the financial sector. R-KPIs can be used at various levels in the financial system and offer a simple way to represent resource issues in the day-to-day work of financial service providers. They should also be used by the financial authorities to further refine the legal and supervisory rules for risk management of financial service providers in Germany and could be integrated via the appropriate bodies into the international process of financial market

regulation (Basel III ff.). In addition, R-KPIs could be made mandatory in company management reports; this would entail using the R-KPIs to make the commercial requirements for disclosing non-financial performance indicators more precise. The publication of management reports on this basis would then make the information supplied by the R-KPIs relevant for auditing. German stock exchanges impose extensive requirements on capital market companies seeking admission to their prime segments (e.g. Prime Standard). In this context the R-KPIs could be used to provide adequate indicators about resources and could be included as listing conditions. This could be an interesting option for stock exchange operators or the stock exchange council if the issue of resource efficiency started to play a more important role in the financial sector. The stock exchange regulatory authorities of the German federal states could support this process.

Developing the R-KPIs should be given high priority owing to their potential widespread impact; the costs for developing and implementing the R-KPIs are contained in the funding programmes slated for this core strategy.

2.5 Core Strategy: “Government as a Consumer and Provider of Infrastructures”

The government is a central actor both as a consumer of products and services and as a provider of infrastructures. The government has a 24.4% share in the demand for goods and services and a 10% share in construction demand (Federal Statistical Office 2009). The fact that the government could also capitalise on its market power to create sustainable future markets is often forgotten – as is its ability to function as a role model. The government has considerable room to manoeuvre within its own area of activity, and at the federal level could take the lead in lowering costs by increasing resource efficiency in the public arena. On account of its considerable market volume the government can change markets by increasing demand for resource-efficient products and services (e.g. lowering development risks through contractually agreed minimum demand) hence sending signals for innovation and market development. Increasing resource efficiency through the government involves decisive control variables at three levels: lifecycle costs as a mandatory procurement criterion for purchasing products and services; demand bundling to encourage innovation towards more resource-efficient products and solutions through a guaranteed sales volume; and resource efficiency-optimised infrastructure systems. At the request of the task sponsor, public procurement was only addressed in the general analysis phase of the MaRess task “Consumer and Customer-Oriented Approaches to Increasing Resource Efficiency”, which identified the central political approaches.

The three instruments proposed must and can be implemented without incurring costs if the policy is designed accordingly. Experts estimate that approx. EUR 100 million will be needed for the launch phase and the pilot projects, a sum that could be recouped through the potential savings. Making lifecycle costs a mandatory procurement criterion should be given high priority in the short-term, followed by the other two instruments.

Lifecycle Costs as a Mandatory Procurement Criterion

The goal is to change the procurement guideline with the aim of establishing lifecycle cost considerations as a mandatory procurement criterion and thus promote resource efficiency. The ongoing simplification and modernisation of the German public procurement law (legal and administrative regulations in particular) could be used to achieve this goal. Implementation should be vigorous at all political levels (from “the very top”) because resource efficiency reduces the costs of public procurement over the lifecycle of the purchased products; additional costs are usually only generated in the short term when procurement routines are changed.

Demand Bundling to Minimise Risks for Innovation Processes

Bundling of government demand for innovative and particularly resource-efficient products creates an incentive for companies to come up with new solutions because the risk is minimised by a minimum guaranteed purchase quantity. The goal is to develop a concrete implementation concept for demand bundling in the field of resource efficiency. Specifically adapted solutions should be developed, tested and optimised for deployment in other product categories on the basis of pilot projects for two to three selected product categories. The product groups should be selected in terms of their high relevance to the public procurement system and their suitability for demand bundling. The results of the MaRess task “Identification and Analysis Potential of Innovative Groundbreaking Products, Technologies and Markets to Increase Resource Efficiency” should be used in this process. Implementation can start in the short term and be completed in the medium term. Start-up financing is important for the launch phase. Once the instrument becomes established, support will no longer be necessary.

Resource Efficiency-Optimised Infrastructure Systems

The infrastructure provided by the government is resource-intensive. Consequently, in expanding, renewing and maintaining this infrastructure it is important to take resource efficiency into account. Alternative system solutions optimised for resource use (e.g. transport; drinking water and wastewater; telecommunications; and electricity, gas and district heating) must also be considered. The data basis for the infrastructures developed in the “Metal Raw Materials, PGM and Infrastructure” task of the MaRess project offers a data basis for this. The goal is to derive policy recommendations for the individual infrastructure systems and implement them as quickly as possible because infrastructure systems usually have long lifecycles. The focus on cost-saving non-resource-intensive infrastructures will lower costs and hence enable the necessary concept studies, policy analyses and pilot projects to be financed.

2.6 Core Strategy: “Changing Attitudes”

While the significance of climate protection and energy efficiency is generally acknowledged today, this is not yet the case for resource problems, which are really just as

urgent. Target group-oriented agenda setting and qualification programmes should thus inform decision-makers from the private sector, professional associations and the political realm as well future decision-makers currently in training or studying at universities about the key issue of resource efficiency and motivate them to take action and put it into practice. Instruments at two levels are recommended for the core strategy “Changing Attitudes” to create a successful resource policy:

- Agenda setting focused on selected target groups: continuation of the Resource Efficiency Network formed by the Federal Ministry of the Environment in 2007; a short resource-efficiency campaign targeted at (future) decision-makers followed by a Concerted action resource efficiency that brings together the top representatives from politics, business and the media.
- Appropriate qualification options for selected target groups. These would serve as the basis for implementing increases in resource efficiency more successfully and easily. Priority should be given at the outset to options for qualifying advisors and establishing a "virtual resource university" followed by the development of course materials for schools.

The instruments were chosen because we realised that the success of the other core strategies would be questionable if they were not accompanied by a general change in awareness (“Changing Attitudes”). The idea here is to raise awareness about the issue, make successes more visible and to raise qualifications. Because the resources for agenda setting and educational activities are limited, the leveraging effect of multipliers must be used and the focus placed on selected target groups open to change (Kristof / Liedtke 2010). The costs for the instrument selected for this core strategy are estimated at approximately EUR 300 million.

Resource Efficiency Network

Continuing the successful activities of the Resource Efficiency Network should be given priority. In addition to the network conferences that take place every six months with multipliers from politics, business and environmental associations, companies, private or public advisory institutions, media, etc., on-site conferences that target companies (SMEs in particular) should also continue to be offered in various regions and industries. An annual international resource conference would also be important because the issue of resource efficiency is increasingly gaining momentum internationally. In support of this, a short English version of the website would also be useful to help advance internal EU discussions. The network should be supplemented, as has been the case until now, by newsletters, the website and, increasingly, also by qualification options for advisors, the financial sector and other intermediaries. Co-operative network activities in which the Resource Efficiency Network supports and assists the activities of the various actors should also continue to be initiated and supported. Here, the experience from the dialogues and roadmaps already incorporated into the Resource Efficiency Network can be built on. Pilot or flagship projects could play an important role in concrete implementation and diffusion. Regular theme-based campaigns

or special offers for the younger generation of skilled workers or Web 2.0 users would also be conceivable. The Resource Efficiency Network is designed as a learning network so that it always has the ability to adapt to the current needs of its members in a rapidly changing world. Consequently, further developing the concept of the network design based on a regular evaluation is useful.

Resource-Efficiency Campaign

The resource efficiency campaign is a very important resource policy instrument for winning people over. A market-ready campaign was designed for (future) decision-makers from universities in the MaRess task "Strategies for Successful Marketing" (Albrecht / Baum, 2009). The results of the possible activities for private households discussed in the task “Consumer and Customer-Orientated Approaches to Increasing Resource Efficiency” in the MaRess project could be used to reinforce the content. The resource-efficiency campaign should start as soon as possible. The necessary impact cannot be achieved with a budget of less than approximately EUR 2.5 million for the launch phase; the campaign should be continued and expanded in subsequent years for other target groups.

A Concerted Resource-Efficiency Campaign

Leading representatives from politics, business and media could then be brought together in a concerted campaign to give the message of resource efficiency a more central place in the public debate. The concerted campaign could capitalise on the momentum generated by the resource efficiency campaign. The people involved have an impact as role models and multipliers, they are mouthpieces to the social groups they represent and they convey credibility through their own commitment, – e.g. via flagship projects – which lends this issue the urgency it needs. The issue could take on symbolic power much more quickly this way. The process and the flagship projects will require funding that could be supplied jointly by all the participating actors.

Qualifying Advisors

To truly be able to increase resource efficiency in concrete terms, companies need qualifications and technical, methodological and social expertise. However, this is often lacking. Companies primarily receive support from their environment, i.e. from advisors, qualification facilities, chambers of industry and commerce, chambers of trade and from other publicly and privately financed actors. Evaluations show, however (e.g. Kristof / Lemken / Roser / Ott 2008), that these actors have considerable gaps in knowledge and require further qualification in the areas of technical, social, methodological and implementation expertise when it comes to resource efficiency. As a result, one important goal should be to properly qualify private and intermediary actors who advise and support companies as soon as possible and to create the necessary qualification structures. This would increase companies’ chances of success in their bid to increase resource efficiency. The goal is to gauge the qualification needs of professional training

facilities, multipliers and other actors and to jointly develop educational concepts and course materials with relevant active intermediaries and qualification providers.

Establishing a “Virtual Resource University”

The goal of a "virtual resource university" would be to tap into synergies by creating networks for research departments already working on resource efficiency (including energy and energy efficiency) and hence boost research and education in the area of resource efficiency. The university network for resource efficiency should conduct interdisciplinary research, develop joint research projects and apply for funding. To reach this goal, a concept for the network must be developed and joint projects for implementation initiated. Shared research infrastructure and jointly funded innovation campus projects could strengthen network activities but also encourage the exchange of scientists and the diversity of the courses offered. The activities should start soon to further expand the network of universities initiated in the MaRess project through the broadly based involvement of partners from universities and harness the momentum that the resource efficiency campaign is intended to bring to universities.

Developing Course Materials for Schools

Study seminars designed to train future teachers can be used to educate teachers nationwide about resource efficiency. Courses and training could first be developed for the study seminars to familiarise future teachers with the issue. Second, the future teachers could develop course materials for resource efficiency as part of their practical work coached by their trainers. These could then be distributed via an Internet platform to capitalise on additional synergies. The goal of the Internet platform would be to make well-designed course materials about resource efficiency available nationwide. The educational materials would be freely available to teachers but also for professional training and adult education. These activities should take place after the "virtual resource university" has been established.

3 Summary and Outlook

To create a successful resource policy, policymakers can use the six core strategies in the MaRess project and the instruments proposed for their effective implementation for orientation. The following core strategies and policy instruments are proposed:

Three instruments are proposed for the **core strategy “Mobilising Institutions – the Key to Successful Diffusion”**. The first and central component is a nationwide resource efficiency stimulus and advisory programme. This is coupled with the second component, which entails setting up and expanding the Resource Efficiency Agency as the hub for all diffusion activities in and for companies and for programme bundling, evaluation and further development. Successful implementation requires “caretakers” and intermediary coordination as an operationally extended and politically independent lever of a cross-departmental and modern resource policy. Third, on-site support for

implementation must be increased because the federal resource efficiency agency must have a lean structure and will primarily fulfil an initiation and support function based on the resource efficiency stimulus and advisory programme. The key actors for increasing resource efficiency are the relevant advisors, regional intermediaries and company networks in regions and industries. The expansion and qualification of the existing pool of advisors and the support for regional structures and networks can thus offer the necessary technical and implementation expertise for the companies in a region. The core strategy can build on the existing advisory institutions at federal, state and regional level as well as on the established funding programmes and the Resource Efficiency Network.

The **core strategy "Giving Innovation a Direction – Sustainable Future Markets for Resource Efficiency Solutions"** can be pursued first by systematically setting new resource-efficiency-related focal points in existing funding programmes / funding priorities with the aim of creating a closed-loop innovation and market launch programme for resource efficiency that is more in line with ambitious resource efficiency targets and existing potential. Second, easier access to venture capital should be encouraged because venture capital is a key prerequisite for successful diffusion on the market – closely linked to the innovation and market launch programme. The entire financing chain is thus integrated and the opportunities for real innovation increase. In addition to procuring venture capital, it is also important for companies to be able to professionally implement innovation processes both internally and in cooperation with other companies and research institutions. To achieve this goal, the third component is to encourage innovation agents and the fourth component, resource efficiency-oriented innovation laboratories.

The **core strategy “Resource-Efficient Products and Services”** has four instruments to create resource-saving incentive structures that support the transformation of the market: First, establishing dynamic standards and labelling requirements for resources as part of the amendment to the EU Ecodesign Directive; second, and directly related, supporting resource efficiency-oriented product design; third, introducing a primary construction material tax based on the British model; and fourth, a hybrid governance model that combines self-regulation and knowledge generation in value chains with regulatory approaches that aim to increase the secondary resource percentage of rare metals used in new products. The selected instruments will make it possible to promote particularly resource-efficient products and make them more visible: It will also help increase the resource efficiency of average products on the market and to gradually eliminate the “dirty end”.

In the **core strategy “Incentives for Resource Efficiency Solutions via the Financial Sector”**, a Enquete Commission “Resource Efficiency and Sustainability in the Financial Sector" will explore the issue of resource efficiency in the financial sector which scarcely plays a role today. In addition, resource-related Key Performance Indicators (R-KPI) will be developed and the respective data basis created to make the issue of resources more transparent for the decision-making processes in the financial

sector (e.g. for risk management and lending rules). The R-KPIs should also be used for financial oversight and corporate reporting.

By virtue of its considerable market volume the government can systematically send signals for market development if it increases demand for resource-efficient products and services and reduces development and marketing risks. The **core strategy “Government as a Consumer and Provider of Infrastructure”** is therefore made up of three elements. First, purchases should only be made on the basis of lifecycle costs as a mandatory procurement criterion. Second, bundling of government demand for innovative and particularly resource-efficient products creates an incentive for companies to come up with new and particularly resource-efficient solutions because the risk is minimised by a minimum guaranteed purchase quantity. The publicly available or controlled infrastructures are often resource-intensive; which is why a third component is necessary: optimising their construction and maintenance with a view to increasing resource efficiency. The question of whether switching infrastructure systems makes sense from the perspective of resource efficiency and costs should also be analysed.

The **core strategy “Changing Attitudes”** first aims to inform (future) decision-makers from the private sector, professional associations, politics and academia about resource efficiency through target group-oriented agenda setting and to motivate them to take action and put it into practice. Second, offering opportunities for additional qualification can create a basis for increasing resource efficiency more successfully and easily. The Resource Efficiency Network formed by the Federal Ministry of the Environment in 2007 is slated to play a key role. In addition, a resource efficiency campaign with the target group “(future) decision-makers” is to be launched for which a market-ready campaign concept was developed under the auspices of the MaRess project (Albrecht / Baum 2009). The issue could then be further addressed in a concerted campaign that brings together leading representatives from politics, business, academia, society and the media with the goal of making it an issue of broad public discussion. The priorities in terms of qualification should initially be on further qualifying advisors, on establishing a “virtual resource university” and on developing course materials for schools. These instruments were selected in view of the awareness that the success of the other core strategies will be limited unless they are accompanied by a change in mentality and visible achievements.

Tab. 2 summarises the core strategies, the proposed instruments allocated to them and the budget impact. It also provides information about priorities and the proposed timeline and sequence. The target groups and resources are also outlined. According to expert projections from the MaRess Consortium and a short expert report for the Federal Ministry of the Environment (Hennicke et al. 2008), the financial volume affecting the budget for these programmes is estimated at roughly EUR 1.3 billion per year. The total volume of approximately EUR 1.3 billion per year could be covered by the proposed primary construction material tax or by self-financing instruments (e.g. reduced costs of public procurement). The macro-economic multiplier effect is considerable and produces additional state revenues. If the primary construction material tax is not implemented, the funding should be made available by re-allocating existing re-

sources. After five years, the implemented instruments should be evaluated. The proposed policy instruments can then be further developed and secured, possibly by passing a framework law on increasing resource efficiency and, if necessary, scaled up.

Tab. 2: Core Strategies, Prioritised Policy Instruments and Estimated Budget Impact

Core strategy	Instruments	Priority	Timeline	Target groups	Target resources	Budget impact
"Mobilising Institutions – the Key to Successful Diffusion"	Resource efficiency agency (including evaluation to optimise funding structures)	1.	Short-term	Company	All	EUR 450 million
	Resource efficiency stimulus and advisory programme	1.	Short-term	Company		
	Expansion of the pool of advisors and regional structures	1.	Short-term	Advisors and intermediaries		
"Giving Innovation a Direction – “Sustainable Future Markets for Resource Efficiency Solutions"	Resource efficiency innovation and market launch programme	1.	Short-term	Producers and users of resource-efficient technologies and suppliers of resource-efficient products / product-service systems	All (focus on TOP 20 from Task 1)	EUR 300 million
	Innovation agents	1.	Short-term			
	Innovation laboratory specialising in resource efficiency	2.	Medium-term	Co-operation between companies and research institutions		
	Venture capital for resource efficiency solutions	2.	Medium-term	Innovative suppliers of resource efficiency-oriented technologies, products and services		Refinancing (EUR 100 million)
"Resource-Efficient Products and Services"	Dynamic standards and labelling requirements (amendment to the EU Ecodesign Directive)	1.	Short-term	Producers of products and services at the end of the service life (e.g. reuse, recycling or disposal)	Abiotic / biotic materials, water	EUR 50 million
	Promoting resource efficiency-orientated product design	1.	Short-term		All	
	Hybrid governance to increase the use of secondary materials of rare metals in new products	2.	Medium-term		Metals	
	Primary construction material tax	1.	Short-term		Materials	Revenues of EUR 1,100 million
"Incentives for Resource Efficiency Solutions through the Financial Sector"	Enquete Commission “Resource Efficiency and Sustainability in the Financial Sector"	1.	Short-term	Policymakers, financial sector and academia	All	EUR 10 million (research programme in particular)
	Resource-related Key Performance Indicators (R-KPI)	1.	Short- and medium-term	Financial sector and academia		

Core strategy	Instruments	Priority	Timeline	Target groups	Target resources	Budget impact
"Government as a Consumer and Provider of Infrastructure"	Procurement based on lifecycle costs as a mandatory procurement criterion	1.	Short-term	Those responsible for public-sector procurement	All	Cost-neutral (EUR 100 million for the initial phase refinanced by lowered costs)
	Demand bundling to minimise risks for innovation processes	2.	Medium-term	Those responsible for public-sector procurement	All (focus on TOP 20 from Task 1)	
	Resource efficiency-optimised infrastructure systems	2.	Medium-term	Public sector as provider of infrastructure		
"Changing Attitudes"	Resource Efficiency Network	1.	Continue	Companies and intermediaries	All	EUR 300 million
	Resource efficiency campaign: Target group of (future) decision-makers	1.	Short-term	(Future) decision-makers		
	Concerted action resource efficiency	2.	Medium-term	Multipliers from politics, business, academia, society, media		
	Qualifying advisors	1.	Short-term	Qualification providers and advisors		
	Establishing a “virtual resource university”	1.	Short-term	Academia		
	Developing course materials for schools	2.	Medium-term	Teacher training		

Source: Kristof / Hennicke 2010

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