11 What's going on abroad?

Monitoring international resource policies

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Introduction: the relevance of resource efficiency and objective of the research project 'MoniRess'

The current and growing purpose of many countries towards rising prosperity comes along with an increased amount of resources that are needed to facilitate this prosperity. Global raw material extraction has more than tripled since 1970. According to the International Resource Panel of the UN Environment, 85 billion tons of raw materials were extracted worldwide in 2015, on average 11.2 tons per capita, accordingly. Often, intensive resource use is linked to negative social and environmental impacts. The rise in global resource use, thus, has intensified environmental problems such as climate change, soil degradation and the loss of biodiversity. With an increasing world population and continuing economic growth, material use is projected to rise to 180 billion tons in 2050 if current trends continue (UN Environment 2019a, 2019b). Eventually, this would contribute to an even greater increase in global and local environmental impacts.

In this context, policies have been launched at the multinational and national level to promote more efficient and sustainable use of natural resources. Various countries and supranational organisations have formulated policies to promote resource productivity and material efficiency. At the international level, the United Nations International Resource Panel (IRP) released various reports on current state and options of efficient use of resources such as 'Global Resources Outlook 2019' (IRP 2019). The G7 has put resource efficiency on its agenda in 2015, which has since become an established field of activity for the G7. OECD offers policy advice on resource efficiency and conducts several projects to inform countries about resource efficiency potentials (BMU 2015). Moreover, in 2017, the G20 Resource Efficiency Dialogue was launched to share best and good practise examples, to exchange knowledge about policy options and to improve the scientific basis (BMU 2017). Also, the European Commission published the Roadmap to a Resource Efficient Europe (European Commission 2011) and the Circular Economy Action Plan (European Commission 2015). At the national level, Germany ranks among the pioneers in the field of resource

efficiency with the adoption of the German Resource Efficiency Programme (BMU 2012, 2016).

In the meantime, many countries worldwide have started to formulate their own policies to foster efficient and sustainable use of natural resources. However, many policies and measures are not known as they are not at the top of the national agendas but parts of strategies or policies.

Against this background, the German Environment Agency (UBA) launched the research project 'Monitoring international resource policies' (MoniRess). MoniRess has been carried out and scientifically elaborated between 2016 and 2019 by the ifeu (Institut für Energie- und Umweltforschung Heidelberg GmbH) in co-operation with GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH).

The research project MoniRess aims at bringing to light the variety of measures and policies, which are fostered, abroad to increase the efficient use of resources. MoniRess seeks at providing detailed, regular and up-to-date syntheses of policies and activities of selected countries in the area of resource efficiency. In line with ProgRess, the focus was set on abiotic raw materials in the value chain stages of production, consumption as well as waste management and recycling.

This paper provides an overview of the monitoring approach developed in the project and presents a summary of main results of the MoniRess monitoring. While the monitoring was implemented using a country perspective, this article structures the monitoring results along the value chain. Starting with the overall setting of resource efficiency policies in the countries under study, the article summarises typical approaches and highlights good examples in the area of production, consumption and waste.

Monitoring approach

MoniRess focused on countries, which are not yet analysed regularly, and in detail as e.g. European countries with the series 'More From Less' (EEA 2016). The country selection process was based on a screening of 46 countries outside Europe. Criteria for the selection have been, amongst others, the existence of resource efficiency measures or policies. For this monitoring, the countries Brazil, China, India, Indonesia, Mexico, Russia, South Africa, Republic of Korea and the USA were selected (Dittrich et al. 2020).

As a starting point, individual country profiles were compiled at the beginning of the monitoring in January 2017. Besides, a first survey of the structure of resource use, actors, policies and programs as well as resource efficiency activities, in general, were carried out.

For the quarterly monitoring, a reporting scheme (Figure 11.1) was developed which allows an easy overview of major changes and upcoming issues. The scheme was also used to structure the research during the monitoring phase between 2017 and 2019. The information was gathered based on desktop research, for example, information from ministries and further organisations, as well as based on interviews with local experts.

Figure 11.1 Reporting scheme for monitoring.
Source: © ifeu; Dittrich et al. (2020).

Given that no common understanding of resource efficiency policy exists at the global level, a tight definition of policies was omitted deliberately. On the contrary, the monitoring seeks at comprising a broad collection covering strategic policies, different measures, specific activities, particular threads and good examples that aim at increasing resource efficiency in the countries.

Resource efficiency as part of overarching strategies and actors

Few countries under study have adopted a strategy or law similar to the German Resource Efficiency Program (ProgRes), which explicitly addresses the efficient use of raw materials across the value chain. In this respect, India launched the Indian Resource Efficiency Program (IREP) in 2017. IREP includes a short- and medium-term Action Plan 2018–2020 with action points on material flow indicators, environmental labels, recycling standards, best practices for green mining, industry clusters, sustainable public procurement, information sharing and awareness-raising (NITI Aayog National Institution for Transforming India, EU External Action, 2017).

The majority of the surveyed countries have adopted either an overarching framework or sub-strategies in the areas of sustainable development and green growth. Raw material efficiency is, hereby, often mentioned as an aspect or even designated as a critical component (Renault et al. 2016). South Africa, for example, has developed the National Framework for Sustainable Development (Department of Environmental Affairs South Africa 2011) in which the efficient use of natural resources is a crucial component. Another example is the Republic of Korea where resource efficiency is part of the 2010 Framework Act on Low Carbon Green Growth. Countries such as Mexico,

Brazil and Indonesia promote resource efficiency within the framework of action plans and special programs, which are integrated into overarching strategies for sustainable development.

In other countries, resource efficiency is promoted through so-called partial strategies (Renault et al. 2016). One example is China, a raw material importing country, which has adopted the Circular Economy Development Promotion Law with the objective to integrate secondary materials much stronger to contribute to future raw material supply (Li & Lin 2016). The USA is promoting raw material efficiency as part of the Sustainable Materials Management Program (2009) which supports raw material efficiency in consumption and waste management in the sectors of food, construction and packaging (USEPA 2019b).

In most of all countries under study, the central actors to foster resource efficiency are environmental ministries or administrative agencies and strategic planning institutions within the governments. In the monitored Latin American countries, companies and universities are actively pushing the topic. Civil society and non-governmental initiatives have been found in all countries under study mostly in the field of waste management.

Compared to the other countries under study, the institutional approach in India is outstanding with the Indian Resource Panel established in 2015. The Indian Resource Panel is a group of ten experts who assist the Indian government in advising and promoting resource efficiency. Its members include former environment ministers, NGO representatives, companies and scientists. With its focus on resource efficiency, the panel is the first of its kind at the national level. Its main task is to advise the Indian Ministry of the Environment (MoeFCC) and the National Planning Commission NITI Aayog on the design and implementation of a national resource efficiency strategy (Government of India, NITI Aayog National Institution for Transforming India, 2017).

Approaches in the area of production

All of the countries under study promote raw material efficiency in the production sectors. Mostly, the approaches reflect the level of economic alignment, the sectoral focus of the industries and the strategic field of interest for the development of the countries. In almost all countries, the promotion of raw materials efficiency in production is linked to the promotion of innovation and competitiveness, economic development and the creation or safeguarding of jobs.

The Republic of Korea and China explicitly combine the promotion of raw material efficiency and green technology with the aim of becoming global market leaders in selected industries and technologies. The Republic of Korea addresses a 'green ecosystem of creative industries' focusing on key technologies such as next-generation secondary batteries, LED displays, green PCs, or high-efficiency solar cells (Global Green Growth Institute 2015). China fosters

on ten key sectors such as energy-saving vehicles, information and communications technology or aerospace technology in its development plan *Made in China 2025* (State Council of the Peoples Republic of China 2015). Based on the Concept of the Long-Term Socio-Economic Development for the Russian Federation for the period up to 2020, Russia aims at the modernisation of traditional industrial sectors such as metallurgy, chemicals and agriculture (Ministry of Economic Development of the Russian Federation 2015). Mexico chose to promote green growth e.g. by supporting the waste and recycling industry and additionally, the government established an additional program for sustainable production and consumption, the Programa Especial de Producción y Consumo Sustentable (Gobierno de Mexico n.d.).

An overall topic is packaging and construction. Both industries were addressed in many of the surveyed countries, regardless of their economic strengths. With respect to packaging, the objective is to reduce the quantity of short-lived packaging and to modify the design to make the recycling as simple as possible. In the material-intensive construction sector, one objective is to reduce the quantity of primary materials by introduction of secondary raw materials as building materials by certification systems and innovative building materials.

The instruments used by governments to promote resource efficiency in production are diverse. Among others, they include economic incentives for resource-efficient production, the definition of 'Best Available Technologies' (BAT) for domestic manufacturing sites, awards from innovative companies and training for companies and fostering cooperation between companies.

In Russia, the modernisation of the production facilities and the domestic industry is realised by the introduction of the best available techniques. The Russian government has created a list of critical areas for which environmental impacts of technologies are assessed and described in specific BAT inventories (Romanov 2016). Addressed sectors are the mining sector, the basic chemicals industry, iron casting and the cement industry. The concept is implemented between 2015 and 2040 by the Bureau of BAT, located in the Chamber of Commerce (Romanov 2016). The implementation comprises economic instruments such as incentives (reduction of environmental taxes) and penalties (fees for environmental pollution) as well as regulative instruments; Production facilities have to comply with best available technology in order to receive an operating license by the Bureau of BAT (GTAI 2018; Romanov 2016).

Awards are widely used, for example, in Indonesia, which credits innovative, and resource-efficient companies with three different awards: The Green Industry Award honours innovative and resource-efficient companies. Besides, there is a Green Company Award, an award by the business magazine SWA in cooperation with the KEHATI Foundation for 'best sustainable performance company'. Indonesia has furthermore PROPER, which includes a particular approach to the corporate procurement system: rating systems

and awards for companies (Afsah et al. 2011), creating strong visibility and incentives for companies to build their reputation through actions towards cleaner technologies (Kanungo & Moreno 2003). The United States award the WasteWise Award (USEPA 2019c) and Brazil awards the Fiesp (Federação das Indústrias do Estado de São Paulo) Environmental Merit Award for companies recycling materials and other natural resources (FIESP 2016).

Training and technical advice is an instrument implemented in all countries. In the United State, for example, the Green Suppliers Network provides technical advice how to reduce waste in the supply chain, for example, in automotive industries or health services (USEPA n.d.). For many developing and emerging countries, the promotion of resource efficiency in production and respective training programs is often linked to the UN Program on Sustainable Consumption and Production (SCP). Examples are the SCP networks in Indonesia, South Africa, Brazil and Mexico. Raw material efficiency is often implemented in addition to the approaches to increase energy efficiency. The instruments to promote resource efficiency in production are similar in developing and emerging countries. They include among others training of companies by centres and institutions to analyse and monitor their resource management, as well as online tools and manuals, for example by the National Cleaner Production Center (NCPC) or by the Global Network for Resource Efficiency and Clean Production (RECPnet), both sponsored by UNIDO and UN Environment (UNIDO n.d.).

Fostering cooperation between companies in industrial areas is an instrument, which turns the concentration of pollution and ineffective resource use in industrial zones into opportunities. The spatial proximity between different companies can serve as a breeding ground for cooperation for industrial symbiosis where the residues of one company become the raw material of another. This concept is implemented in China by specifically targeting companies in industrial parks and connecting their material flows (Qi et al. 2016). The USA is promoting the exchange of residual materials and waste streams through regional materials marketplaces (Materials Marketplace n.d.). In South Africa, this approach is implemented managed by the National Cleaner Production Center South-Africa. Three regional programs are operating, in April 2019 the fourth Industrial Symbiosis Program started at the province level. The Western Cape Industrial Symbiosis Program, for example, founded in 2013, consisting of 300 companies sharing their resources. According to their annual report, the program has diverted 4,950 tons of waste from landfill and saved 25,100 tons of greenhouse gas emissions till the end of 2017 (GreenCape 2017).

Approaches in the area of consumption

Raw material efficiency in the area of consumption is a bit more challenging as countries usually avoid the promotion of reduction of consumption but try to govern consumption with the following main approaches being pursued:

- a in the context of public procurement, raw material efficiency is one criterion among several sustainability criteria;
- b through standards, labelling and certifications;
- c through awareness formation and information; and
- d through so-called credit or eco-points.

In many countries, public procurement is regulated by environmental standards. In the US, for example, the Environmental Preferable Purchasing Program streamlines environmental performance standards and ecolabels for federal agencies. Another example is the Federal Green Challenge, implemented by the USEPA, which fosters competition between public institutions to reduce the environmental impact (USEPA 2019a). The Republic of Korea has the Act to Promote Green Products and the Mandatory Green Public Procurement, where in particular the second one obligates to prioritise the purchase of environmentally friendly, eco-labelled products.

Voluntary instruments, like standards, eco-labelling or certifications, are established in various countries. The labels cover different aspects, and resource efficiency is included in different ways: for example, by rewarding products (partially) made of recycled material or with low ecological impacts during production and usage. These aspects are addressed, e.g. in the Republic of Korea by the Korean Eco-label and Good-Recycled Mark (Good Recycled n.d.; KEITI n.d.).

Civil society and companies are addressed with educational programmes for sustainable development and programmes to raise awareness. An example of an awareness campaign in the USA is the Waste Recycling Action Program (WRAP) which targets the recycling of plastic film packaging (American Chemistry Council 2019). Another example is the information by the Mississippi Department of Environmental Quality on how to avoid waste of decoration and gift wrap particularly during the holiday season and between Thanksgiving and New Year (ECOS 2017). In Brazil, companies were the target group of guidelines for sustainability in consumption and production (CEBDS 2016).

The Korean government is promoting a sustainable society in its current five-year plan (PCGG 2014). Among others, the Korean Ministry of the Environmental Industry & Technology Institute (KEITI) is pursuing a distinctive approach to provide an incentive for resource-efficient consumption. By using the Green Credit Card, consumers can collect so-called Eco Points when they purchase environmentally friendly products, save energy or use public transport. The points can be used either as cash-back at participating companies or for reduced entry into public institutions. As of December 2016, a total of 15 million Green Credit Cards had been issued and 1,957 products from 224 companies were registered (Korea Bizwire 2016).

However, none of the countries under study is pursuing an absolute reduction of consumption or promoting sufficiency approaches.

Approaches in the field of recycling and circular economy

All of the studied countries are promoting the recycling of waste. Yet, the extent of the efforts varies, respectively. Almost all countries have defined recycling rates for individual waste fractions or materials, either centrally or on a local level. Comprehensive approaches on circular economy appear less frequently, although some approaches are widespread in Asian countries.

Within the frame of this monitoring, all countries mention the increase of waste volumes and the growing challenges on disposal of waste as problems. Resource efficiency in general and recycling, in particular, are considered as an approach to reduce the amount of waste. In Russia, for example, still the majority of waste is deposited. With the recent strategy for the Development of Industry of Sorting, Recycling and Treatment of Waste until 2030 and the formation of an integrated system for the treatment of urban solid waste the amount of treated urban solid waste should be raised up to 36% in 2024 compared to currently 4%. Sorting and recycling of waste are important means to reach the goal (Vedomosti, 2019; green evolution n.d.). China as a second example started recently the pilot program Zero-Waste City in order to minimise solid waste for disposal and maximise recycling in urban areas. Until 2020, an index system for waste-free cities, as well as a technical and institutional system for managing waste-free cities, is planned (ChinaDaily 2019).

Beyond minimising the problem of waste, the increase of raw material availability, both in quantity and in the number of raw materials, is an essential driver for the promotion of recycling and closing material loops. Thus, raw material importing countries are more actively implementing comprehensive approaches of the circular economy. For example, China adopted the Circular Economy Development Promotion Law in 2009, and since then, the circular economy is further developed in each of the Five-Year Plans (FYP). For the first time globally, the law explicitly aimed at decoupling as a strategic goal. Thereby, the concept of renewable resources is used to promote the recovery of metals to increase the production of secondary raw materials (Qi et al. 2016). After a period in which eco-design, clean-production strategies in companies and recycling technologies have been developed, the regulative framework for the industrial and national level was set up to implement circular economy at large scale (Qi et al. 2016). In the current 13th FYP, the Economical, intensive, and circular resource use Initiative supports 75% of national industrial parks and 50% of provincial industrial parks, implements 50 industrial centres for re-use and recycling of industrial waste and demonstration centres for raw material recycling in 100 cities (CCCCPC Central Committee of the Communist Party of China 2016).

Among raw material exporting countries, the availability of raw materials has not been mentioned yet as a reason for the promotion of resource efficiency. South Africa is one of the few exceptions promoting the recycling of iron and steel in conjunction with the implementation of export restrictions for metal scrap to compensate for the declining production quotas (ITAC 2019).

The promotion of re-use and recycling comprises a high variety of materials. As the construction sector is one of the most material-intensive sectors the promotion of recycled construction materials is a prominent strategy in many of the monitored countries. South Africa, for example, promotes innovative regional building materials such as blocks of compressed earth with construction waste as part of the Rambrick project (USE-IT 2019). India, as another example, recognises the use of certified paving stones with recycled inputs already as part of the Green Rating for Integrated Habitat Assessment (GRIHA) – the Indian building certification.

Summary of findings, conclusion and outlook

An important finding is that almost all countries are pursuing approaches to promote the efficient use of raw materials. The countries, however, differ in the extent to which they promote raw material efficiency, in the priorities they set and in the application of tools and approaches. By sorting them along the value chain and by considering raw material used in the respective countries, some general observations can be discerned.

The majority of the surveyed countries have adopted either an overarching framework or sub-strategies in the areas of sustainable development and green growth with resource efficiency as an integral part. In other countries, resource efficiency is promoted through so-called partial strategies. Few countries formulated a national resource efficiency strategy.

In almost all countries, approaches concerning waste prevention and recycling are most widespread. Against the backdrop of the environmental pressure resulting from an increasing amount of waste in almost all countries, this stands to reason. Even in countries such as Germany where resource efficiency is a separate policy field, the topic has evolved from the waste sector. Recycling is mainly promoted through quotas and technology funding, in exceptional cases, also by export restrictions. Among the countries under study, China has created one of the most advanced and comprehensive circular economy programs.

Approaches to promote efficient production are found in almost all countries studied. Differences exist between the sectors addressed (for example, basic materials, processing sectors, high technology, services) and the level being aspired (e.g. to reach international production standards, to become a world market leader). Irrespective of the differences in scope, the applied instruments such as consulting tools, incentive schemes (e.g. awards for best practice companies) and the creation of regional/sectoral company networks are very similar.

The approaches addressing consumption are also similar in the countries under study. All approaches focus on informing citizens using educational programs and product labelling or certifications. Specific targets are set exclusively for public procurement. None of the countries has established restrictions or strong governance for private consumption. The approach by the Republic of Korea is the most extensive approach in this context with the nationwide and cross-sectoral Green Credit Card System.

Outlook

The research project MoniRess has successfully implemented a monitoring system of international resource efficiency policies. The results show impressively how complex the topic of resource efficiency and sustainable resource use policies is. Further, the project indicates that the success of policy approaches towards the sustainable use of natural resources can differ strongly among countries. Based on the information gathered in this project, the focus of future research should be channelled towards the analysis of impacts that determine the success of resource efficiency measures in the countries as well as the evaluation of the outcome of respective resource policies. Identifying factors that contribute most effectively to the success of resource efficiency policies will be helpful in order to further develop and conceptualise resource efficiency policies. UBA continues the research project with the start of 'MoniRess II' in autumn 2019.

List of abbreviations

BAT	best available technologies
BMU	German Federal Minister for the Environment, Nature Conservation, and Nuclear Safety
ECOS	United States Environmental Council of the States
FYP	Five-Year Plan
G20	Group of 20
G7	Group of 7
GRIHA	Green Rating for Integrated Habitat Assessment
GTAI	Germany Trade and Invest
IREF	Indian Resource Efficiency Program
IRP	International Resource Panel
MoniRess	Monitoring international resource policies
NCPC	National Cleaner Production Center
NGO	non-governmental organisation
NITI Aayog	Indian National Planning Commission
OECD	Organisation for Economic Co-operation and Development
ProgRess	German Resource Efficiency Program
PROPER	Indonesia's Program for Pollution Control, Evaluation, and Rating
RECPnet	Global Network for Resource Efficiency and Clean Production
SCP	Sustainable Consumption and Production
UBA	German Federal Environmental Agency
UN	United Nations
UNIDO	United Nations Industrial Development Organization
USEPA	United States Environmental Protection Agency

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