A COMPARATIVE ANALYIS OF NATIONAL RAW MATERIALS POLICY APPROACHES - WITH A FOCUS ON RARE EARTH ELEMENTS IN EUROPE [1]

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Abstract

The EU is highly dependent on raw material imports due to a combination of factors, such as price volatility, geo-political regimes affecting trade, and a global surge in demand. Consequently, in 2008 the European Commission launched a process for the development of a policy framework ([1, 2]) fostering the sustainable supply and use of raw materials. However, since many regulatory issues are in the competence of EU Member States, specific and tailor-made policy responses need to be designed and implemented on the national level.

Therefore, this paper analyses national policy mechanisms in 4 EU Member States (Austria, Finland, Greece, and Sweden) that address REE challenges and formulate policy responses in the context of general raw materials policy. It will shed light on policy instruments and governance procedures regarding different approaches to tackle raw materials supply in the context of governance for SD (participation, reflexivity, and long-term vision and short term action). Hence, the paper's remit lies in explicating the policy governance regime and making a case for best practices with regard to different sustainable raw materials supply approaches.

Introduction

Overall, the functioning of economies and society's well-being largely depends on the secure supply and use of natural resources and raw materials in particular. However, with world population projections estimating more than 9 billion in 2050 and rapid economic growth in newly industrialising countries, raw materials demand continues to rise strongly ([3, 4]). Furthermore, per capita raw material consumption is currently substantially higher in industrialised nations than in less developed countries ([5]). Continuing population growth, combined with increasing affluence, does not only put a strain on resource availability, but also influences the amount of waste and

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emissions produced. In the long run, these trends will lead to surpassing planetary boundaries and thus will also affect the well-being of people and the environment ([6, 7, 8]).

Additionally, the rapid development of emerging economies in the Asia-Pacific region led to an increased metal ores and industrial minerals consumption by a factor of 8.6 during the period of 1970-2008 ([9]). Furthermore, if the world economy continues to grow following its current development path, i.e. a "business-as-usual" scenario, global resource extraction would significantly grow in the future ([10]).

European Union security of supply challenges

Threats to secure supply of certain raw materials and the emergence of critical materials in the EU depend on a series of different political, economic and technological factors. Among the most crucial factors threatening EU's secure supply of certain raw materials is its high dependency on raw material imports. In 2011, for example, the EU trade balance ([5]) for fuel and mining products showed an immense asymmetry between imports and exports (i.e. the EU imported over six times more fuel and mining materials than it exported).

In this regard, the EU's import dependency is subject to a range of market distortion factors, such as price volatility, as well as the interaction (i.e. distortions through in-transparency and speculation) between physical and financial commodities markets, and export restrictions or privileged access ([2]). Beyond international aspects, competition on different land use types (recreation, agriculture, built-up land) might further restrict the access to European raw material sources ([11]).

In addition, the physical raw material demand for development and rapid diffusion of key enabling technologies such as renewable energy technologies in the future will aggravate these trends ([11, 12]).

The European Union raw materials policy framework

Besides tackling environmental and social impacts of raw material supply and use, one of the major challenges in the raw materials policy debate is to achieve a secure supply base. Raw material shortages are an imminent threat to the EU's secure supply and availability.

As a consequence of these above mentioned trends, the EU acknowledged the importance of raw materials supply for its economic development and society overall. Thus, in 2008 the EU instigated the Raw Materials Initiative (RMI) to manage responses to non-energy and non-agricultural raw material issues. As outlined by Tiess ([13]), so far the European Union did not pursue a common minerals policy.

Since then, the EU has pursued a 3 pillar-based approach to improving access to raw materials for Europe (see Figure 1) which got reinforced in a new strategy document in 2011 ([2]). This three-pillar approach encompasses actions on "1. ensuring a level playing field in access to resources in third countries"; "2. fostering sustainable

supply of raw materials from European sources; and "3. boosting resource efficiency and promoting recycling." ([1]). Another important element of this strategy engages in an international approach by embedding the EU raw materials policy agenda in the wider set of its external policies. In this regard, it aims to foster good governance, human rights, conflict resolution, transparency of activities, and creation of local value added in developing countries.

Subsequently, this EU level development prompted the design of raw material or mineral strategies (henceforth referred to as National Mineral Strategies – NMS) in several EU Member States (Austria, Denmark, Finland, France, Germany, Greece, the Netherlands, Portugal, Sweden, United Kingdom) to better accommodate particular national economies raw materials needs and specific circumstances ([2]).

Furthermore, recent developments dealing with security of supply issues in EU policy directly (European Innovation Partnership-EIP) or indirectly (i.e. through resource efficiency and waste management policies: Europe 2020 "Resource Efficiency Flagship Initiatives"; "Roadmap to a Resource-Efficient Europe") have been put forward. Since then, these strategies are shaping the European Union and Member State policy framework on raw materials security of supply and resource efficiency.

A Rationale for a governance for SD approach in National Mineral strategies

In that sense, this paper investigates how the European framework for sustainable supply and use of raw materials outlined in the Raw Materials Initiative (RMI) and the role of rare earth elements (REE) scarcity is taken up in tailor-made policy strategies at the national level in four European Member States (Greece, Finland, Sweden, Austria).

From our perspective, we detect three specific aspects why governance for sustainable development (SD) plays a major role for successful NMS:

1. The RMI calls for "defining a National Minerals Policy, to ensure that mineral resources are exploited in an economically viable way, harmonised with other national policies, based on sustainable development principles (…)" ([2]). Following this proposition for SD within National Minerals Policies, we argue that governance principles for SD ([14]) are a fundamental basis for applying effective minerals policy at the national level.
2. Overall, governance for SD consists of major building blocks, such as stakeholder participation and reflexivity that are prerequisites for societal self-steering. Specifically, with regard to the inclusion of non-state actors in policy making and societal steering in general governance for SD provides a striking rationale: In that sense, governments usually have certain limitation, for instance, lack of i) necessary authority or means to tackle societal challenges; ii) adequate general or collective interest and legitimacy ([15]). Following these limitations, governance for SD refers to the involvement of and interaction among multiple societal actors for a deliberative process of collecting and generating knowledge to successfully

tackle societal challenges ([14]). In the context of sustainable raw materials management, and, in particular, the extractive sector multi-actor approaches ([16]) guarantee greater commitment and acceptance for state-designed intervention (EIP on Raw Materials).

3. In the context of primary extraction and, particularly, challenges tackled in NMS, a large number of diverse stakeholders are directly impacted or involved, and a manifold set of issues are to be addressed. Such stakeholders and issues cover, inter alia, "not in my backyard" constellations and local communities, mining impacts on ecosystems, long-term business investment decisions for prospection and extraction etc. Consequently, governance for SD aspects, such as inclusive stakeholder participation during NMS design and implementation, are crucial to facilitate legitimacy of policy options and steering.

Following this rationale, we will shed light on policy instruments and governance procedures during the design and implementation phase with regard to governance for SD principles ([17, 18, 19, 20]): participation, reflexivity, and long-term vision as well as short term action. Thus, the paper's remit lies in explicating different approaches to tackle raw materials supply in the context of governance for SD.

Methodology

The data basis for the analysis was created by a two-pronged approach: Through desktop research of the respective policy documents (i.e. NMS of Austria, Finland, Sweden and Greece) and qualitative interviews with policy makers of the respective countries (who carrying major responsibilities for design and implementation of corresponding strategies[2]) form the basis of the data collection methodology. The four strategies in our analysis are:

- Austria: "Austrian Mineral Resources Plan" (2010)
- Greece: "National Policy for the Exploitation of Mineral Resources" (2012)
- Sweden: "Sweden's Minerals Strategy" (2012)
- Finland: "Finland's Minerals Strategy" (2010)

By means of these two data collection methods, the authors address the following research questions:

Firstly, the questions to what extent major building blocks or governance principles for SD are incorporated into the strategy by means of qualitative interviews with policy makers. In doing so, the authors apply as analytical criteria for principles of governance three major buildings blocks to the concept of governance for

[2] Ministries of interviewed policy makers: Federal Ministry of Science, Research and Economy (AT); Ministry of Employment and the Economy (FI); Ministry of Environment, Energy and Climate Change (GR); Ministry of Enterprise, Energy and Communications (SE)

sustainable development: i) participation and stakeholder involvement, ii) reflexivity and learning, and iii) long-term visioning and short-term action.
Secondly, the authors investigated the specific role rare earth elements play with regard to the three-pillar approach by means of text analysis and interviews with policy makers.

Results

The following paragraphs explicate on the research questions outlined in the methodology section: In doing so, the first part outlines the policy genealogy and how specific EU Member State conditions are taken into account, and the role of access to REE plays. In the second part the authors outlined the degree to which governance principles for SD (i.e. participation, reflexivity, and long-term visioning and short-term action) are applied during the design and implementation stage of NMS.

Policy genealogy and driving forces of national raw material strategies

As regards the four represented case study countries, all share the fact that their present NMS is the first umbrella strategy encompassing a strategic approach towards access to raw materials on a national level. Greece, Sweden and Finland reported that the EU level policy framework – the 2008 RMI – was the common driver for initiating the development of their NMS. Only in the case of Austria, in 2001 the parliament ("*Nationalrat*") instigated the development for an overall strategy for more cross-cutting as well as coherent policy mechanisms securing access to raw materials. In that sense, the Austrian Mineral Resources Plan, although still influenced by the RMI, has been considered as a best practice example by the European Commission.
Apart from the European Commission providing a major impetus for the development of NMS, national framework conditions have strongly contributed to their development and content focus. In particular in the case of Sweden and Finland, economic factors played a major role. In these two countries, a "mining boom" through increased investment in mining and exploration activities led to augmented political awareness on the extractive sector's activities., Moreover, environmental challenges and more effective land use planning (avoiding conflicts in use and guaranteeing access to important mineral deposits) have been vital concerns for the development of the Austrian and Greek strategies. In Austria, the issue of public acceptance or conflicts with local communities for on-going and future mining projects contributed to development of a NMS.
Prior to this development, none of the four countries did have a coherent and strategic approach (i.e. predecessor umbrella strategy) for access to raw materials from domestic sources. Instead, these countries only had a mix of single stand-alone

instruments addressing different issues, such as land-use planning, covering different materials and different industrial sectors. Only in the case of Greece, mineral policy has been managed through a tripartite approach of three different laws for raw materials forming a more coherent framework.

Addressing access to Rare earth elements

This paper explores to what extent NMS are focusing on access to REE and if they foresee concrete actions. As regards the four country cases, none of the strategies makes a clear reference or encompasses actions specifically addressing access to REE. Nevertheless, in some countries, non-commodity specific actions include aspects on REE scarcity and access. In relation to exploration activities Greece and Austria either already identified respective deposits (Austria) or are currently prospecting for potential deposits or anomalies (Greece). Sweden is taking measures for a criticality assessment of certain materials where REE might play a role. Interestingly, in Finland some companies involved in the implementation of concrete strategy actions consider extracting REE from old tailings in case world market prices increase.

Despite some more sporadic and unspecific efforts with regard to REE, none of these countries engage in actions for REE extraction yet. However, increased efforts for exploration (Greece) and safeguarding access to deposits by restricting other land uses (Austria) might lead to future extraction projects.

While there is no significant REE production in Europe, but only uncharacterised and unexplored deposits ([21]), NMS of Austria, Finland, Sweden and Greece show no commodity specific focus on securing REE supply. This to some extent depicts a perceived mismatch of EU level topical importance of REE supply compared to EU MS follow up in NMS. Nonetheless, the RMI's other two pillars cover issues such as raw materials diplomacy with exporting countries and strategies increasing recycling rates of WEEE which highlights a different non-primary extraction approach towards securing REE supply. These two pillars are taken up in several EU MS policy strategies but go beyond the scope of this paper.

Participation and stakeholder involvement in policy design and implementation

One of the key principles of SD is participation and stakeholder involvement throughout the whole policy cycle (i.e. ranging from policy design to implementation, evaluation and revision). In that sense, we asked policy makers about the respective role stakeholders (state as well as non-sate actors) played in the design, implementation and monitoring of the respective NMS.

In general, depending on the responsibility for raw materials management in the respective country, the ministry of environment (Greece) or the ministry of economics (Austria, Finland, Sweden) had the main responsibility for policy design.

In terms of involvement of state actors, the four countries cases basically feature three different collaboration approaches during the *design phase* of NMS: 1) exclusive development, 2) partially inclusive, and 3) fully inclusive strategy development process. The three approaches are based on the degree of involvement of i) state actors (i.e. ministries), and ii) non-state actors (i.e. industry, public authorities, academic as well as private research institutions, and civil society organisations such as environmental NGOs).

Concerning the exclusive development approach, the Greek Ministry of environment was solely responsible for strategy development, involving only a limited number of non-state actors, such as one industry association, one public authority and two academic institutions. On the other end of the scale, the Swedish NMS is characterised by a fully inclusive development approach: Not only have all ministries been consulted and involved in the design process, but also a broad variety of non-state actors covering industry, public authorities, academic and private research as well as civil society and environmental organisations. Both Austria and Finland are characterised by a partially inclusive development process, involving two ministries in the co-development process and a number of non-state actors such as industry, public authorities, academia and private research as well as civil society and environmental organisations.

In a next step, we explored the extent to which non-state actors are taken on board during the *implementation* of actions of the respective NMS. For our four country cases, we again identified three different approaches for strategy implementation and the role non-state actors play: 1) “state-actor-only implementation”, 2) “shared but differentiated implementation”, and 3) “fire-and-forget implementation”. As regards “state-actor-only implementation”, the Greek NMS is mainly followed up by state actors (i.e. ministry of environment supported by other ministries where responsibilities overlap). Non-state actors are involved on a rather ad-hoc and on-demand basis in respective consultation procedures or committees during the implementation process. A similar case can be found concerning the steering of the Austrian NMS where the responsibility for implementation is not located on national ministerial level but rather on the level of federal states.

An implementation approach with a higher degree of non-state actor involvement (“shared but differentiated implementation”) is applied in the NMS of Sweden. Essentially, the government appoints one authority responsible for implementation of individual actions. More specifically, the government provides the framework conditions (financing, goals and targets, time-frames, monitoring), whereas these authorities enjoy a considerable amount of freedom and independence during the implementation process.

Concerning the more active role of non-state actors, Finland’s NMS allows for the largest degree of freedom and non-state actor involvement during implementation. Generally, the responsibility for implementing action proposals (outlined in the 2013

action plan) in the NMS is split among different actors: State-actor steering is limited in so far, as the action plan only comprises non-binding advice on actor's involvement and provides opportunities for new actors entering action proposals. Leading actors in these actions proposals cover a broad variety, such as industry associations or environmental NGOs. These actors are also participating in the government steering group which regularly follows up on the development status of strategy implementation.

Finland and Sweden, when compared to Austria and Greece, feature greater inclusive stakeholder participation during NMS action implementation and to a lesser extent in policy design. Since primary extraction challenges necessitate such multi-stakeholder approaches (see for example recent EU policy developments such as the EIP on raw materials), these policy regimes, on the one hand, might contribute to increased legitimacy for steering, and, on the other hand, facilitate implementation of individual actions.

Reflexivity and learning in the implementation process

Another important building block of governance for SD refers to the concept of reflexivity and learning as an ability to adapt to changing conditions within a given (governance) system. The following paragraphs highlight the instruments for monitoring and evaluation applied in NMS to adapt to either changing framework conditions or respond to varying degrees of action implementation.

Generally, the four country cases exhibit quite diverse systems, e.g. applying more ad-hoc or systemic and ex-ante in-built approaches towards institutionalised learning in NMS.

Regarding Greece, for example, 9 broad objectives are outlined in the NMS for which currently no monitoring or evaluation mechanism (i.e. no indicator or assessment frameworks) exists for assessing the implementation status. In the case of Austria, the main criteria for successful implementation will be the translation of the major instrument (land use planning law) into federal state law. However, no current monitoring and evaluation system exists to measure its implementation process.

The Swedish NMS applies a mixed approach of several targets apportioned to 12 actions areas and two horizontal objectives. However, no concrete indicator framework exists for measuring these targets but instead the responsible authorities produce a yearly qualitative evaluation report. This report not only informs the government and all involved actors but also a wider group of stakeholders at a yearly forum.

On the other end of the scale, Finland developed the most comprehensive system for policy learning and reflexivity. Besides a set of 12 general as well as specific objectives, the NMS features an indicator framework for following up on the measurement of objectives and produces a qualitative evaluation report.

As regards reflexive learning, concrete evaluation and monitoring approaches combined with multi-actor involvement, as in the case of Finland and to a lesser extent for Sweden, allows for flexibility to address changing conditions and facilitated by the collective knowledge and understand of plurality of interests and needs.

Engaging in long term visioning and short term actions

This part engages in the process of envisioning long-term transformation processes, fundamental to sustainable development, and translating them into short term actions necessary for applying policy instruments.

Generally, the patterns of specific time frames, actions, and overall implementation frameworks is quite diverse: While Greece, Austria, and Sweden do not have a concrete implementation or roadmap, Finland has a fully fledge "sustainable extractive industry" action plan. In order to better understand the different nature of implementation framework, we categorised the four country cases into 1) no implementation framework (Greece, Austria) with "continuous and unspecific", 2) "overall specific", and 3) "differentiated specific" time-frames and actions for implementation.

With regard to the first category, we consider a continuous implementation of actions (no concrete action plan or implementation framework) with no concrete time schedule for specific actions. While in the case of Greece, a mix of short and long—term actions are initiated and followed up in a step by step basis, the Austrian NMS' major instrument is under gradual negotiation with federals states for changing their legislation accordingly.

Furthermore, "overall specific" in the case of Sweden refers to a partial implementation framework which considers an overall time frame (3 years) for short as well as longer-term actions with a specific financial framework for that given period. On the other hand, Finland developed a fully-fledged policy action plan (2013) encompassing differentiated and specific implementation time frames across short and longer term actions.

Considering, on the one hand, for long-term perspectives while, at the same time, strategically designing implementation for the short-term, is especially relevant for successful societal transformation processes, such as sustainable development in the extractive sector. In that case, Finland provides a best practice case through a balanced combination of:

- Long-term envisioning: such as a set of broad objectives outlined in an umbrella strategy (i.e. NMS), and at the same time; and
- Short-term actions: strategically designing short actions accompanied by specific time-frames, implementation pathways, financial framework and multi-actor consortia (i.e. policy action plan).

Discussion and conclusions

As outlined in the previous sections, EU MS NMS demonstrate diverse policy regimes with regard to 1) the three major building blocks in governance for SD, and 2) the actual accentuation for securing REE from a primary extraction perspective.
In a nutshell, we want to highlight four major differences and similarities in terms of approaches to REE supply and policy governance regimes for SD:

- Common among the four selected NMS is a perceived mismatch of EU level topical importance of REE supply compared to EU Member State follow up in NMS in the area of primary extraction.
- Since primary extraction challenges necessitate multi-actor approaches, Finland and, to a minor extent, Sweden support these policy regimes and, thus, contributing to increased legitimacy for steering and facilitate implementation of individual actions.
- Concrete policy learning approaches, combined with multi-actor involvement as in the case of Finland and to a lesser extent for Sweden, allow for flexibility to address changing conditions facilitated by collective knowledge.
- Both, considering long-term perspectives and, at the same time, strategically designing implementation for the short-term through policy roadmaps and action plans (Finland), is especially relevant for successful societal transformation processes such as sustainable development in the extractive sector.

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