

Deliverable D5.6

Report on RMI implementation status quo and needs in EU-28

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ACRONYMS AND ABBREVIATIONS

BMWWF	Austrian Federal Ministry of Science, Research and Economy
CEC	Circular Economy concept
COMES	Committee on Strategic Metals (in French <i>Comité pour les métaux stratégiques</i>)
CRIRSCO	Committee for Mineral Reserves International Reporting Standards for Exploration Results, Mineral Resources and Mineral Reserves.
DMC	Domestic Material Consumption
DGD	Digital geological database
DGEG	The Directorate-General of Energy and Geology (in Portuguese <i>Direção-Geral de Energia e Geologia</i>)
DG JRC	Directorate-General Joint Research Centre (European Commission)
EIA	Environmental impact assessment
EMD	Exploration and Mining Division of the Department of Communications, Climate Action and Environment (Ireland's exploration and mining authority)
EOLV	End of Life Vehicles Directive (also commonly abbreviated as the ELV Directive)
EPA	Environmental Protection Agency (Ireland)
EUROSTAT	Statistical Office of European Union
EU-28 MSs	European Union (28) Member States
EW-MFA	Economy-wide Material Flow Accounts
GDP	Gross domestic product
JORC	Joint Ore Reserves Committee (member of CRIRSCO)
LUP	Land use planning
MC	Mineral consumption
MCA	Mineral consumption analysis
MDoPI	Mineral deposit of public importance
MFA	Material flow analysis
MIA	Mineral inventory analysis
MPF	Mineral policy framework
MSS	Minerals supply security
NAMR	Romania's National Agency for Mineral Resources
NE	National economy
NEEI	Non-energy extractive industry
NEPA	Romania's National Environmental Protection Agency
NERC	United Kingdom's Natural Environment Research Council
PERC	Pan-European Reserves and Resources Reporting Committee (member of RIRSCO)
PORMIAN	Mineral Resources Planning of Andalusia 2010–2013
PTCP	Italian Wide-area spatial plan at provincial level (in Italian <i>Piano Territoriale di Coordinamento Provinciale</i>)
REAP	Austrian Resource Efficiency Action Plan
RMC	Ram materials consumption
RMI	Raw Materials Intelligence
RMI-M	RMI MATRIX
SDGs	Sustainable Development Goals

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UNFC	United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources
WFD	Waste Framework Directive
WEEE	Waste from Electrical and Electronic Equipment

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PURPOSE

Deliverable D5.6 completes the *Work package 5 - Policies: Minerals Policy context* series and is a result of *Task 5.3: Testing of RMI in Europe and its wider context*. Its main purpose is to screen the raw materials intelligence (RMI) status quo in European Union Member States and analyse how it influences the mineral policy development. The analysis is provided in a wide multi-national context and governance paradigms, i.e. considering the concepts of circular and low-carbon economy, responsible mining and sustainable development. The screening is provided by country reports with the aim of identifying which functions are assigned to which authority, what are the interactions between them and whether these interactions result in synergetic or antagonistic effects. An important task of this deliverable is to understand the respective influences of different mineral policy aspects of the RMI-MATRIX (RMI-M), already described in Deliverable 5.2 (Hamadová *et al.*, 2017), and how RMI and mineral policies can be effectively implemented by member states. The provided contextualization, including social issues, results in recommendations and completes the picture about the impacts stakeholders may have on mineral policy development.

This deliverable continues the work of previous WP5 reports, specifically, Deliverable D5.1 (Falck *et al.*, 2017) and D5.2 (Hamadová *et al.*, 2017). D5.1 investigated the key functions of RMI in minerals policies and which methods and tools can be used (by which stakeholders). D5.1 mapped key functions of RMI and their relevance for minerals policy development in particular future capacities needed at different levels – for industry, member states, regions, the EU and the role of the EU in international relations. These functions were used for the RMI-MATRIX development that was subject of Deliverable 5.2. A RMI-M allows the identification of strong, medium and worst cases for RMI development. The minimum set of tools/methods needed to develop a coherent and comprehensive mineral policy-making framework was investigated in D5.2.

Finally, the objective of D5.6 is to evaluate the RMI implementation status quo in EU-28 using as a screening method the simplified RMI-M developed in D5.2.

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EXECUTIVE SUMMARY

The minerals sector¹ is a complex system influenced by a number of different internal and external factors, i.e. economic, natural, environmental, geopolitical, social and technological, all closely interrelated to each other (MinPol, 2017). The trade with mineral commodities occurs at different levels: from low-value **aggregates and construction materials** distributed within short-distances from the place of origin/extraction site, different **industrial minerals** usually traded regionally according to the distribution of different industries to globally traded **metallic minerals**. Especially the last group of minerals (metals) is subject to trends and initiatives from intergovernmental organizations like the United Nations (2030 Sustainable Development Goals – SDGs, Paris Agreement on Climate Change) the UNEP's International Resource Panel (IRP) and OECD's initiatives on Resource Efficiency and Circular Economy, the World Trade Organization (10 Principles of Fair Trade, Corporate Social Responsibility) and others that aim to promote respect for human rights, foster nature conservation or encourage the mitigation of climate change, the efficient management of natural resources and a transition towards a Circular Economy. The most important trends and long-term visions framing the raw materials sector are described in *Deliverable D3.1: Global raw materials policy context report* (MinPol, 2017) of the FORAM project². It describes the emerging challenges and rapid global changes covering a wide spectrum of topics (from population growth, globalization, digitalization, industrialization of developing countries to conflict minerals, illegal mining, market trends, etc.).

While the previously mentioned topics are discussed internationally among the global stakeholders and scientific community, they are based on experiences/problems or challenges faced in particular cases, and in specific places/countries. Yet, there is a long path between general discussions and the implementation of sustainability principles (e.g. UN 2030 SDGs) into national policy frameworks and consequently their impact in practice. It should be highlighted that a dedicated and sophisticated policy framework alone does not necessarily guarantee that mineral development projects will progress adequately as such frameworks only provide the set of “playing rules”. In spite of that, national mineral policy frameworks are of importance as they show political commitments and need to encourage a **fair, transparent and competitive environment for all players**. Within the MICA project, Work Package 5 (WP5) provided an overview of mineral policy framework. For a better understanding of relations between stakeholders' needs (WP2), relevant RMI tools and methods (WP4) and corresponding data (WP3), the complex RMI-MATRIX was elaborated within Deliverable D5.2 (Hamadová *et al.*, 2017). After that, only seven most important tools for mineral sector development (**mineral consumption analysis - MCA, material flow analysis - MFA, mineral inventory analysis and digital geological database - MIA/DGD, protection of mineral deposits via land-use planning - MDoPI/LUP, Circular Economy, mineral consumption forecasting - MC/forecast and mineral policies**) were selected to be used for the screening of the EU-28 mineral policy framework status-quo (cf. Hamadová *et al.*, 2017; simplified RMI-MATRIX, p. 32). Implementation of every tool/parameter was screened in the EU Member States and evaluated as strong/medium/weak. The details of the evaluation process

¹ In this report the term mineral(s) is referring to non-energy and non-agricultural mineral raw materials in the sense of the Raw Materials Initiative COM (2008) 699 and according to the scope of the MICA project.

² www.foramproject.net/

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are described in the Methodology in Chapter 1.2. Finally, the evaluation of overall RMI status-quo in the country was provided.

Main findings of EU-28 RMI Screening

As shown in Figure 1 (see ‘valuation’ column), ten countries were found to **have an overall strong (strong or medium) national (or regional) mineral policy framework** and are implementing most of the key parameters pointed out to be most important for a positive mineral development scenario. The countries are Austria, Czech Republic, Denmark, Ireland, Italy, Netherlands, Poland, Portugal, Sweden and the UK. **Cyprus and Luxembourg**, according to the screening, represent countries with a **weak** mineral policy scenario. In the case of Luxembourg, no sufficient information is available about most of the aspects of RMI, thus the statement about the policy scenario in that specific country should not be taken as a definitive. **The majority (16) of the countries are indicating a medium (medium or weak) scenario** (see Figure 1, ‘valuation’ column). It means that they are applying some of the tools to a certain extent but have room for improvement.

As shown in Figure 1, it is evident that the weakest areas of RMI status in EU Member states are mineral consumption-oriented forecasting (MC/Forecast; only 3 countries strong scenario, 12 medium, 14 weak), the mineral consumption analysis (MCA; only 5 countries strong, medium 11, weak 12) and protection of mineral resources via land-use planning (MDoPI/LUP; only 7 countries having strongly developed this tool, 13 medium, 8 weak).

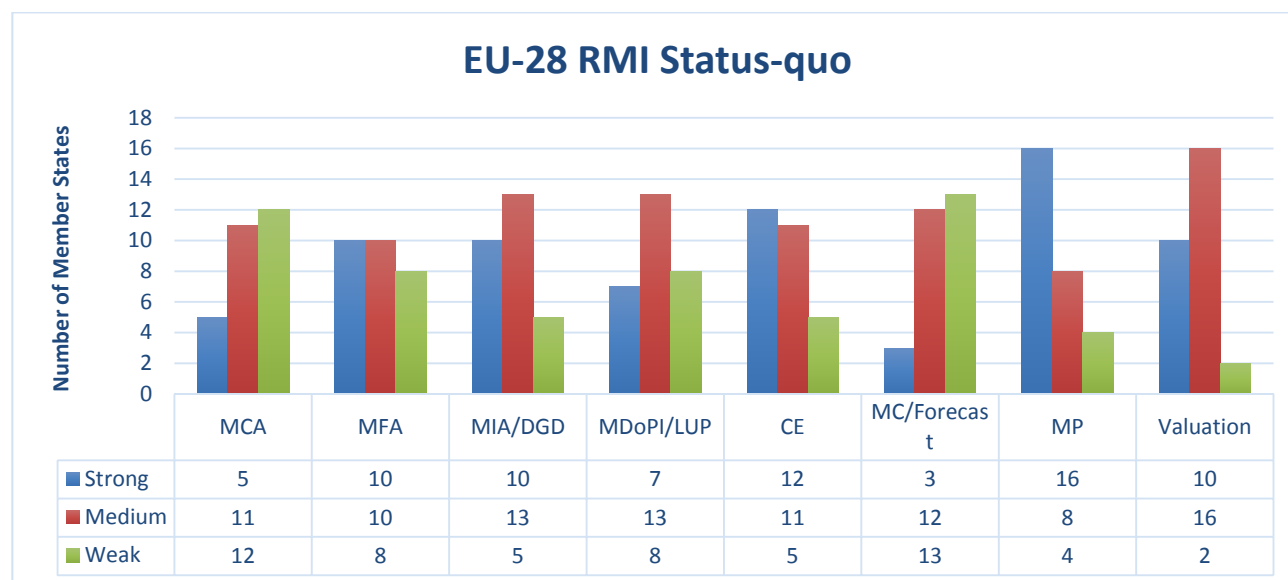


Figure 1 EU-28 RMI Status-quo per parameter.

Note: MCA-mineral consumption analysis, MFA-material flow analysis, MIA-mineral inventory analysis, DGD-digital geological database, MDoPI-“Mineral Deposits of Public Importance”, LUP-land-use planning, CE-Circular Economy, MC/Forecasts-mineral consumption forecasting tools, MP-mineral policies/strategies

All EU-28 countries are conducting **MFA and monitoring domestic material consumption (DMC) and other indicators based on Economy-wide Material Flow Account (EW-MFA)**. For instance, they are using indicators based on DMC for monitoring resource efficiency,

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resource productivity (GDP/DMC). However, the potential of using MFA/MCA or indicators derived from DMC is much higher; e.g. are these indicators not commonly used for identifying strategic minerals and design of minerals policies oriented to securing supply of these minerals.

Countries which have **Circular Economy** (CE) targets as a priority in their agenda are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, Malta, Netherlands, Slovenia, and the UK. Most of the countries in the EU are only partly dealing with the CE topic and, thus, they are classified in a medium scenario: Croatia, Estonia, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Slovakia, Spain and Sweden. It means that they are either implementing some of the resource efficiency tools into their policy framework (especially the waste management-oriented actions in the form of a National Waste Management Plan) or transposing some of the EU Directives from the CE package (EoLV, WEEE, WFD, etc.) into their national legislation or have at least identified the CE as an important topic and are taking initiative to move it forward. The remaining countries have very poorly implemented CE and resource efficiency concepts (Bulgaria, Cyprus, Greece, Latvia and Romania).

The majority of the assessed countries (20 out of 28) have some kind of mining/mineral/raw materials related policy or strategy focused on (mineral) raw materials or at least the extraction part (mining policies). With the exception of Austria and the Netherlands, they are not based on future mineral consumption analysis (MCA). In principle, demand forecast is not often used, and some countries use it only for aggregates demand. In turn, however, **back cast (based on DMC) is used** for back cast trend check to design mining policies (14 countries).

The research on **mineral inventory analysis** was already done within the MINVENTORY project³ which mapped 11 countries with no centralised data collection, other 11 countries with centralised data collection but no harmonization, while the remaining countries are having a centralised and harmonised collection of data about mineral resources and reserves within their territory.

A consequent implementation of mineral resources identified as having mineral potential into land use planning (LUP) is not always present (cf. Horváth *et al.*, 2016). There are countries which implement only active mines into LUP (Ireland, Hungary, Italy, Slovenia, Croatia, Serbia and Romania). Others have some kind of determination of mineral resources in LUP also for potential areas or resources identified by mineral exploration (e.g. Czech Republic and Slovakia).

A number of EU funded Horizon 2020 or other Research and Innovation Framework programme projects were or have been dealing with topics related to Raw Materials Intelligence tools, such as data collection, mapping of mineral potential in Europe, mapping of initiatives and mobilizing stake-

³ MINVENTORY <https://ec.europa.eu/jrc/en/scientific-tool/mininventory>

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holders, fostering the cooperation among, and activating stakeholders by networking. These projects⁴ include: Min-GUIDE, MINATURA 2020, SCRREEN, MinFuture, MINLAND, MIREU, FORAM, MINVENTORY, MINERALS4EU. Continuing this path closer to all stakeholders (to regional and local level) would have a significant impact on the raw materials sector in Europe. **The sharing of good practices is becoming a vital element of such development.**

A recommendation of MICA project's *Work Package 5* policy is to use the DMC/MFA approach more often for mineral policy discussion. Certainly, relevant for minerals supply security is mineral consumption analysis (MCA), which has a more detailed mineral consumption approach. For the more efficient design of mineral policies it would be helpful if MCA was applied for all kinds of minerals and linked to the whole supply chain (material flows). It could for instance help to identify which materials are strategic for the national economy and take proper actions towards securing the supply of such material. Other concepts which are highly recommended for implementation in national policies are related to resource efficiency and Circular Economy – how waste can be turned into a resource (closing the loop initiatives).

In this regard, having a **minerals policy based on the MCA approach** would facilitate the development towards the protection of mineral resources. The increasing EU import dependency of minerals (particularly metals and critical raw materials⁵) connected to high supply risk will always be endangering the economic stability within the EU. Therefore, **to have access to its domestic resources** (see also the II. pillar of the Raw Materials Initiative – COM 699(2008)) is crucial to be the main objective of mineral policy of every country.

⁴ Min-GUIDE www.min-guide.eu/mineral-policy; MINATURA 2020 <http://minatura2020.eu/>; SCRREEN <http://scrreen.eu/>; MinFuture <http://minfuture.eu/>; MINLAND, MIREU, FORAM www.foramproject.net/, , MINERALS4EU www.minerals4eu.eu/

⁵ http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

DELIVERABLE REPORT

I Introduction

I.1 Framing the Issue

Raw Materials Intelligence (RMI) is part of the complex system of sectoral policies (mineral, environmental, energy, fiscal, foreign, security/defence, development, spatial planning, water resources, investment, etc.) involving correspondent stakeholders at different levels of government, as well as other non-governmental actors e.g. industry, investors, NGO's and the public/society.

The analysis of the RMI status-quo requires a systematic approach with knowledge of data available (WP3; D3.1, Petavratzi & Brown, 2017) and relations among the above-mentioned stakeholders, their competences (WP2, D2.1, Erdmann *et al.*, 2016) and the different tools and methods (WP4; D4.1, Bide *et al.*, 2017 and WP5; D5.1 Falck *et al.*, 2017) enabling proper RMI development. Such a multi-dimensional approach was performed in a RMI-MATRIX (RMI-M) developed in deliverable D5.2 (Hamadová *et al.*, 2017) in order to understand interdependencies and cross-linkages among different aspects and policies. D5.2 also highlights the importance of mineral consumption analysis (MCA), as no reliable and efficient policy scenario(s)/trends/ strategies can be discussed and developed without that (discussed in D 5.1; Falck *et al.*, 2017, chapter 4). The RMI-M shall provide a simple and fast guide for checking the state of the art of the mineral policy in the EU-28 Member States, identifying gaps and consequently determine objectives and strategy for improvement.

The objective of D5.6 is to evaluate/assess and analyse the RMI implementation status in EU-28 Member States and its wider context based on the RMI-M developed in D5.2. Such screening is set in the wider international context of fast developing and globally changing resource governance.

In *Chapter 1*, an Introduction and framing of the topic is provided together with presentation of the methodology used in D5.6. *Chapter 2* contains the technical/policy information summary of all 28 EU Member States about the status-quo of relevant key RMI tools in such countries compiled from different sources. All references used are listed at the end of the report. *Chapter 3* illustrates the RMI-M for each EU-28 Member State based on country reports compiled in the previous chapter. An analysis of the RMI-M is provided in *Chapter 4* which entails a discussion about the key RMI tools implementation status in EU-28 and an introduction into the wider contextualization of global topics (e.g. sustainability, social responsibility, climate change). Finally, *Chapter 5* draws conclusions and recommendations based on the analysis part.

I.2 Methodology

The starting point is the RMI-MATRIX (RMI-M) developed in D5.2 (Hamadová *et al.*, 2017; p 31). The RMI-M concept is built on a two-dimensional framework that is based on the mineral policy (vs. mining policy) paradigm (discussion on Scoping the RMI in D5.1, pp. 17-19). The **first dimension** is the interdisciplinary approach represented by different sectors (financial, mining, manufacturing, environmental, social affairs, foreign affairs and security) and its relevant aspects. The **second dimension** is based on the key features (sectors i.e. Data, Tools and Methods (RMI), Policies and Stakeholders) which should be monitored when screening these aspects across the different

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sectors (Hamadová et al., 2017; pp 16-24). This kind of detailed screening could be recommended as a guide for the analysis of the raw materials sector in a selected country. The matrix could serve as a tool for identifying gaps, strengths, weaknesses, opportunities and threats (SWOT) of the governance system.

In the MICA pSoject, in order to provide a quick check of the policy status of EU Member states (EU-28 MSs) a simplified RMI-M will be used as indicated in D5.2 (see Table 1). The matrix includes various parameters (*tools/methods*), i.e. **MC/MFA, MIA/DGD, MDoPI/LUP, CE, MC/forecast**⁶. These parameters have been selected in D5.2 as they represent **key parameters** for designing mineral policies; also, because they enable the screening/comparison of EU-28 in an effective way and they have been developed based on results from different Work Packages of the MICA project. The level of implementation of each parameter into the national policy framework indicates whether the conditions for raw materials development appears to be more or less favourable.

Table 1 Simplified RMI-M used for screening the RMI status quo in EU-28 (Hamadová et al., 2017);

RMI (policy) scenar- ios/value	MCA	MFA	MIA/DGD	MDoPI/LUP	CE	MC/Fore- cast	Mineral policies/ strategies
Strong		x	x	x	x		x
Medium						x	
Weak							

Note: MCA - mineral consumption analysis, MFA - material flow analysis, MIA - mineral inventory analysis, DGD - digital geological database, MDoPI - Mineral Deposits of Public Importance⁷, LUP – land use planning, CE - Circular Economy, MC/Forecasts - mineral consumption forecasting tools

One important issue here are the sources from where the information will originate. According to previous experiences of collecting data and information from across the EU-28 MS, it is clear that often much of the information is only available in the original language of the MS and not in English, sometimes not even in digital format. This represents a limitation in the information collection method that needs to be acknowledged and it actually creates a barrier for effective data/info collection if no speaker of such language is collecting it. We need to acknowledge this shortcoming because it is at the heart of the deliverable which seeks to screen the EU countries for the implementation of RMI and describe the strategy to be applied to overcome it.

Another issue involves the availability of national vs. regional information. In countries with decentralised (federal) governance system (i.e. Belgium, Germany) or with strong autonomy of some regions/communities (Italy and Spain) and the UK (4 territories – England, Scotland, Northern Ireland and Wales), there is a lot of variation in information and “regions” sometimes have their own tools, own analyses which may not be available at the national/federal level.

⁶MCA=minerals consumption analysis; MFA=material flow analysis; MIA= Mineral inventory analyses, DGD=digital geological database

⁷In this context, the term MDoPI make reference to a wider context, i.e. it means any tool member states apply to protect their mineral resources.

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The aim of this deliverable is not to investigate and provide new information about a EU member states mineral policy status where the language barrier would probably play a significant role. In order to work more efficiently, such information has been extracted from existing results collected and compiled from different sources, e.g. the Encyclopedia of minerals and energy policy publication (Tiess *et al.*, 2017)⁸, MINLEX⁹, MINATURA2020, or DG JRC's Raw Materials Information System (RMIS)¹⁰, Min-GUIDE and MINVENTORY projects. Information collected/mapped for the different MSs are provided in a summarised way in *Chapter 2*, based on the research period.

The RMI-M includes several possibilities in relation to strong/medium/weak minerals supply security (MSS) scenarios. Based on such RMI-M three different policy case scenarios (strong, medium or weak) were developed and proposed. The difference between these scenarios lies predominantly in whether mineral demand forecasts and other elements are used to guide policy-making:

- **Strong scenario** could be expected in the case the policy framework of a country (or region) is based on all key parameters. This is the case when an analysis is done for mineral demand back-casts and forecasts via MCA or MFA, mineral inventory analysis, safeguarding the access to mineral resources via land use planning, and promoting the CE and resource efficiency.
- **Medium scenario** would be in the case that a country (or region) is implementing an MCA or MFA but no MC forecast (mid-term/long-term) is conducted. The country (or region) is requiring (or implementing) at least a mineral inventory analysis and has some kind of mineral policy. The concept of CE and/or resource efficiency is acknowledged in strategic policy documents, but it is not implemented and transformed to actions yet.
- **Weak scenario** is the perspective of a country (or region) whose policy contains no MCA, no MFA, no MC forecast. Any policy discussion is unrealistic, i.e. no statistics or forecasts are implemented to guide policy-making. In other words, there is no realistic opinion possible how the minerals development of a national economy has been and could be in the near (or more distant) future.

Some of the countries has not clearly resulted as strong/medium/weak. It means they that has implemented 3 or 4 parameters at higher (strong/medium) level and 3 or 4 at lower (medium/weak) level. These countries were evaluated as having overall “STRONG or MEDIUM” respectively “MEDIUM or WEAK” scenario. In *Chapter 2*, the selected key parameters dedicated to screening of EU-28, were observed and evaluated as following:

Governance

⁸(Tiess *et al.*, 2017) <https://link.springer.com/referencework/10.1007/978-3-642-40871-7>; publication is still under preparation. The chapters which were already published and used in this report are cited as and listed in the references list

⁹(European Union, 2016a) „Legal framework for mineral extraction and permitting procedures for exploration and exploitation in the EU“ <https://publications.europa.eu/en/publication-detail/-/publication/18c19395-6dbf-11e7-b2f2-01aa75ed71a1/language-en/format-PDF>

¹⁰<http://rmis.jrc.ec.europa.eu/>

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Type of governance was identified – centralised or decentralised, what are the authorities responsible for issuing an exploration and mining permits. Potentially, if the country is practicing a one-stop-shop for permitting procedures related to mineral development projects.

Mineral Policy

The evaluation of a Mineral Policy Conception is based on the criterion that if a nation is having a dedicated raw material national policy which is updated at regular intervals – it is evaluated as ‘strong’. If there just exists a raw material policy or raw material is covered in any of the general developmental policies or the country has a mining policy (cf. mining vs. mineral policy discussion in Falck *et al.*, 2017) – then it is marked as ‘medium’. For any country having no mineral policy strategy or any document covering raw materials policy or if a policy is proposed/under construction but not implemented yet, it is marked as ‘weak’.

MFA – Material flow analysis

In the case of MFA as well of MCA it is difficult to find out how the countries are using the data they are collecting. As mentioned in D5.2 (Hamadová *et al.*, 2017), EW-MFA is obligatory for all EU28 MSs. The strong scenario is considered if there is clear evidence of building policies or strategies up to indicators resulting from MFA including DMC. Medium was indicated for the countries when there is evidence that they are using MFA, but it is not clear to which extent it is used in designing policies. A weak valuation was given to a scenario when information indicates that the country is only reporting the EW-MFA to Eurostat, but there is no evidence of more actions on that respect, i.e. that the data is being used for policy-making purposes.

MCA – Mineral consumption analysis

A strong scenario could be expected if the country would have held dedicated analysis of mineral consumption and if the current mineral policy was based on such data (regularly updated). Medium scenario is for questionable updating of an analysis and weak means that data about mineral consumption could only be extracted from DMC reported for Eurostat, and no evidence was found that MCA was used to guide policy documents.

MCA – forecasting

Strong scenario could be supposed when the country is providing forecasting for all types/groups of mineral raw materials and relevant authorities are using the data for supporting the decision-making. Medium scenario is indicated for countries providing forecasting only for some types of materials (e.g. aggregates). Weak scenario (a weak valuation) was assigned to countries for which there is no evidence that forecasts for mineral raw materials are performed.

Identification of Mineral resources and LUP

In this parameter the important indicator is the connection between the process of identification of mineral resources and land use planning. In the strong scenario, the areas with identified mineral potential are properly protected enabling their best use in the future. A positive sign is if the country has determined minerals of special interest/importance or a concept similar to mineral deposits of public importance (MDoPI) defined in the MINATURA 2020 project (cf. Tiess & Murguía, 2016). A medium scenario is possible when there is at least some kind of link to LUP in the mineral resources identification or permitting process. The weak scenario means no linkage to LUP with areas having mineral potential or hosting known mineral resources.

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Mineral Inventory Analysis

Mineral Inventory Analysis is an important aspect of mineral policy design. In the screening, the legal requirements (centralised/decentralised data collection) for mineral inventory and responsible authorities were mapped. In the strong scenario, these are ideally correlated with internationally recognised reporting codes e.g. JORC, CRIRSCO, UNFC. Medium scenario is foreseen in countries where there is no harmonization of codes used for identification of mineral resources. Weak scenario could be predicted if there is no legal requirement to collect and report data about mineral resources.

Circular Economy and resource efficiency

Strong scenario is considered for the countries where the concept of resource efficiency and Circular Economy is already implemented into the specific policy actions/strategy and legal framework (i.e. transposition of EU Directives from the Circular Economy package¹¹). Medium scenario was designated for countries which have at least identified these concepts in their strategic documents and they are planning some future actions in these regards or the country is addressing some of the aspects of circular economy (e.g. waste collection and treatment). A weak scenario was assigned to countries which do not have such concepts in their up-to date policy actions.

¹¹ As part of a new Circular Economy package, in December 2015 the EC presented an Action Plan for the Circular Economy, together with four legislative proposals amending the following legal acts: Waste Framework Directive; Landfilling Directive; Packaging Waste Directive; Directives on end-of-life vehicles (EoLV), on batteries and accumulators and waste batteries and accumulators, and on waste electrical and electronic equipment (WEEE). (European Parliament, 2016)

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2 Country reports of EU-28 Member States

This chapter includes a summary of the information about the current RMI status in all EU-28 MSs containing relevant and consolidated information. Thereby, **existing** (policy and legal) **information from D5.1** (Annex) will be used/indicated¹². Besides, extensive information has been collected for each MS but has not been included in the annex in order to reduce the size of the document. GDP¹³, DMC/MFA information by material category (D5.6 considers non-metallic minerals, metal ores, biomass) will be used from existing resource efficiency reviews provided by the European Environment Agency in 2011 (*EEA Survey of resource efficiency policies*) and 2016 (*More from less – material resource efficiency in Europe: 2015 overview*)¹⁴. This information was combined with more recent: *the EU environmental implementation review package* (European Union, 2017). The **DMC/MFA including back casting approach plays a significant role for MSs** with regards to the development of resource policies. In order to point this out, GDP/DMC trends are illustrated for most of the MSs (the figures, where existing, were sourced from the country profiles of the previously mentioned reviews).

2.1 Austria

Austria published its mineral strategy in 2012, the Resources efficiency plan (REAP) in 2012 as well as the AUT MINPLAN (using demand forecasting) in 2012 (Federal Ministry of Science, Research and Economics, 2017). As an indicator for the set targets, the resource productivity – gross domestic product (GDP) generated per unit of domestic material consumption (GDP/DMC) is used.

Figure 2A illustrates resource productivity (DMC/GDP) trends in Austria. Year 2000 was used as reference point. We can clearly see that, while the GDP follows an upward trend (interrupted only in the year 2008-2009 due to the global financial crisis), Austria's DMC has been declining since 2011 (with peak anomalies in 2002, 2007 and 2011 explained mainly due to the dynamics of consumption of non-metallic minerals, see Figure 2B). REAP's target is to achieve an increase in resource efficiency/productivity (GDP/DMC): of 50 % by 2020 compared to 2008; and by a factor of 4–10 by 2050 (European Environment Agency, 2016 – Austria). DMC as a part of MCA information provides an important input.

In Austria, there is a legal requirement to survey mineral resources, but not to quantify either mineral resources or reserves. However, there is a national code (ÖNORM G 1050, 1989) to be used when assessing mineral deposits. Although originally based on the UNFC, the ÖNORM G 1050 national system of reporting is no longer aligned with international standard codes (Parker *et al.*, 2015). The Austrian consumption of raw materials is predominantly consisting of non-metallic minerals (in tonnage). An important part of the extractive sector is connected to aggregates and a wide spectrum of industrial minerals. However, in Austria there is also metallic mining of iron ore (Erzberg) and tungsten ore (Mittersill) which is providing significant economic value.

¹²Therefore, information will only be indicated; for details the reader can consult D5.1/Annex.

¹³Note: GDP plays an important role in the MCA approach, as discussed in MICA D5.1.

¹⁴MSs have to apply the Eurostat approach according to Regulation Nr.691/2011 (discussed in D5.2).

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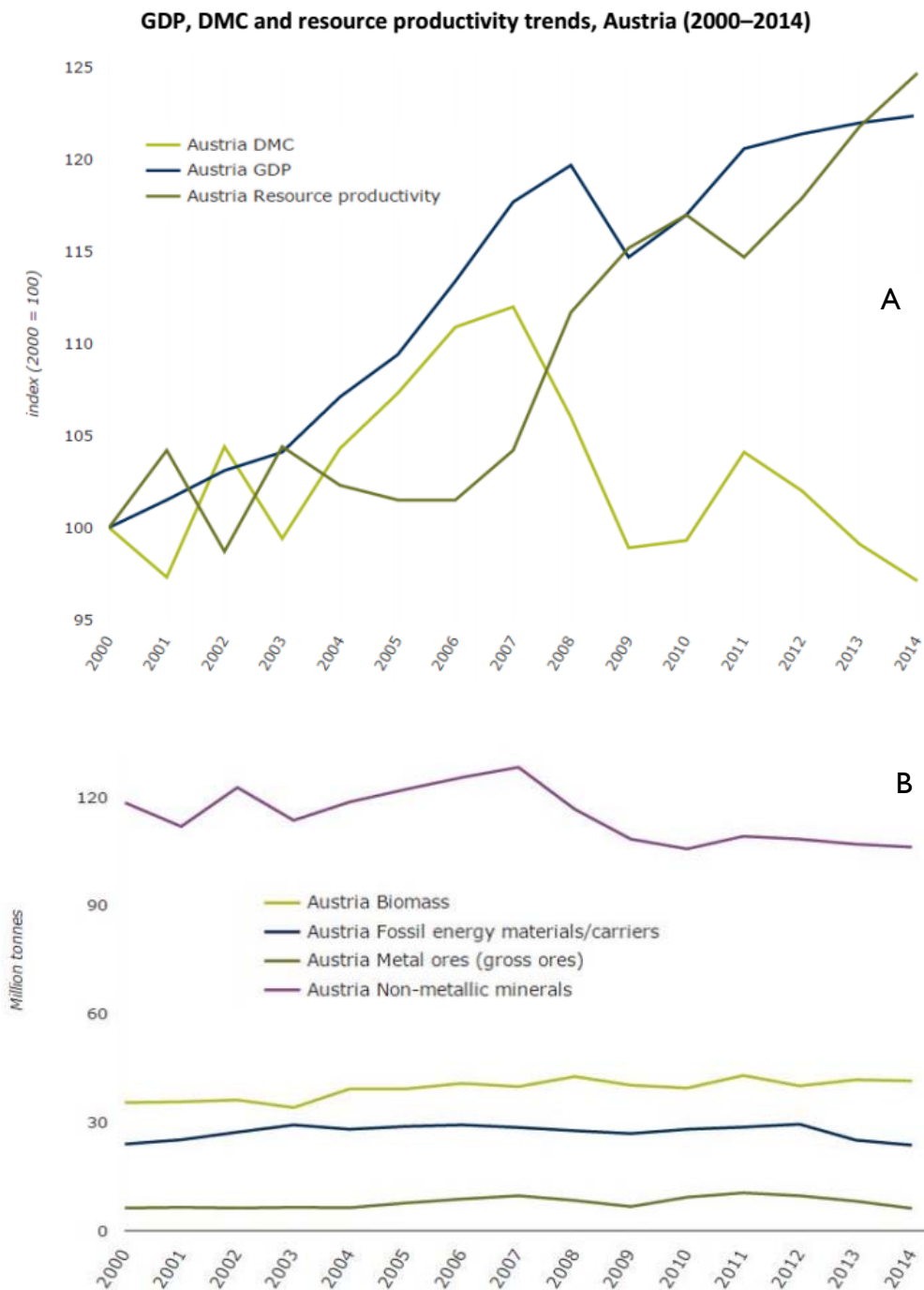


Figure 2 Austria: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption, by category (2000–2014). Source: European Environment Agency, 2016 – Austria.

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2.2 Belgium

Belgium has no centralized data collation and harmonization processes in place (Horváth *et al.*, 2016). The 4th Environmental Policy Plan MINA 4: 2011-2015 was published in 2010 by the Flemish government (Departement Leefmilieu, Natuur en Energie, 2011). It includes a series of objectives for 2015 on eco-efficiency, consumption of materials, natural resources and energy, and the use of substitutes and renewable energy. Currently, the MINA 5 is under preparation (European Environment Agency, 2016 – Belgium). Moreover, several relevant plans and programmes for Circular Economy have been initiated at the federal level, i.e. a roadmap – proposals for action to transition towards a more circular economy issued by federal administration in 2014 (European Union, 2017 – Belgium). Future extractive development is forecasted for the next 25 years as part of a general mineral resources plan in Flanders. In Wallonia, this is not present.

In Flanders, all areas have a specific function, like habitation, industry, agriculture, mineral extraction, etc. These functions are indicated on maps covering the whole of Flanders, called “*gewestplannen*” in Belgian Dutch. In such maps, it is possible to change the function of an area and this is done by way of a spatial implementation plan. In order to make a long term sustainable planning of extraction, every five years a General Surface Mineral Resources Plan (abbreviated in Dutch as AOD) is elaborated (Tiess & Murguía, 2016).

In Wallonia, sector plans (“*plans de secteur*”) are carried out. The area reserved for quarries is the “extraction zone”, classified in the “urbanizable” zones. The sector plans are drawn up by decrees of the Walloon Government (Tiess & Murguía, 2016). As illustrated in Figure 3A, the DMC as well as the resource productivity in Belgium were very variable with no clear trend over the last 15 years. Some kind of forecasting of these indicators or development of policy strategies based on them could be a challenging task.

2.3 Bulgaria

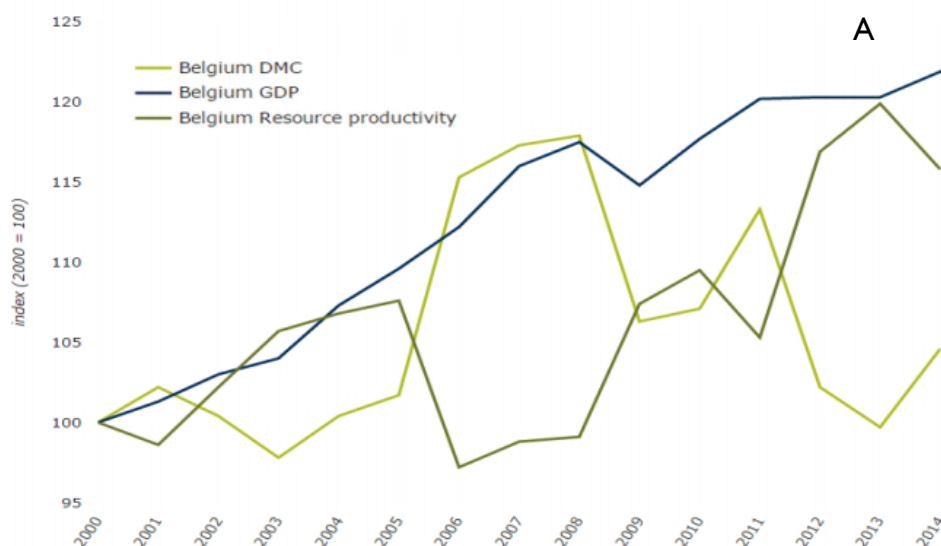
The Bulgarian National Strategy for the Development of the Mining Industry 2030 was published in 2015; for selected minerals, demand forecasting was done. The strategy is aimed at achieving the sustainable development of the mining industry by safeguarding a “balanced economic, social and environmentally responsible approach to the exploration, mining and processing of mineral resources in the country”¹⁵. According to the strategy, Bulgaria would set up a system for monitoring the exploration, extraction and processing of mineral resources, with an emphasis on preventing illegal mining in the country. The implementation of general and specific strategic goals of the document creates prerequisites and guarantees for sustainable development of the mining industry in Bulgaria in accordance with the EU raw materials initiative, and a uniform and clear government policy on mineral resources of the country. As a result of the strategy, the Balkan country could become a regional leader in the rational utilization of mineral resources by 2030.

There are currently no specific policy approaches that focus on closing material loops or national resource efficiency strategy or action plan in Bulgaria; and in general, no minerals protection based on land use planning.

¹⁵ The Strategy is available online in English here: <http://www.bta.bg/en/c/DF/id/1146099> [Accessed on: 10.12.2017]

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GDP, DMC and resource productivity trends, Belgium (2000–2014)



Trends in material consumption, Belgium by category (2000–2014)

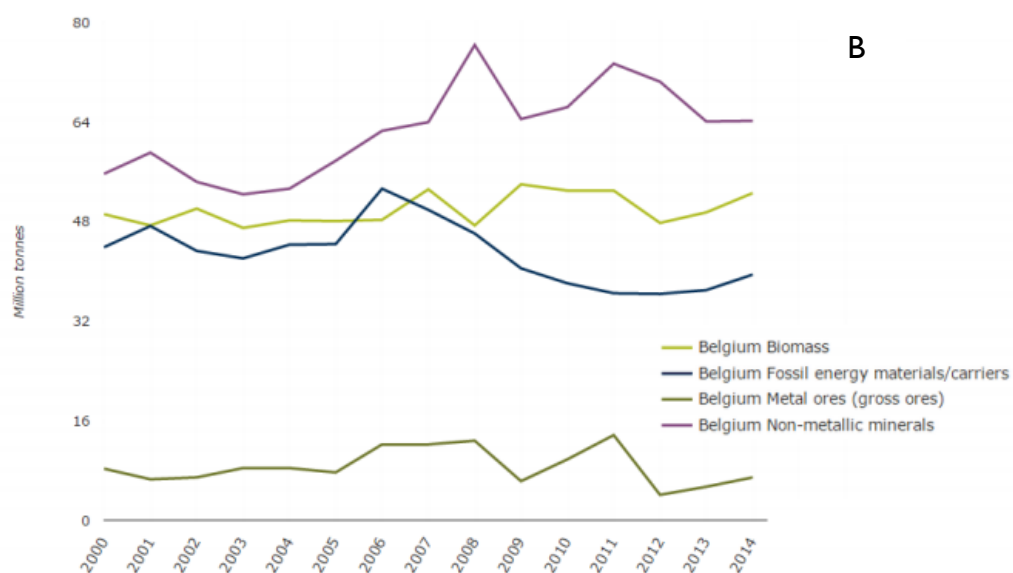


Figure 3 Belgium: A) GDP, DMC and resource productivity trends, Belgium (2000–2014); B) Trends in material consumption, Belgium by category (2000–2014). Source: European Environment Agency, 2016 – Belgium.

Bulgaria has centralized data collation and harmonization procedures for mineral inventory analysis required by law. The responsibility for the collection of data on mineral resources and reserves

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lies with the National Geological Survey (Natural Resources and Concessions Directorate, Ministry of Economy, Energy and Tourism). Data providers must report their data using the national code which is aligned with the UNFC (Parker *et al.*, 2015).

There are 3 different procedures on how to obtain a license for prospecting and exploration or for exploitation of subsurface resources: 1. *Competition* (more than one candidate applies, or the initiative belongs to the state), 2. *Tender* (the target is an already known/registered area of economic/commercial value as well as for commodities in the shelf and the exclusive economic zone), 3. *By right* of application in cases of a single applicant (MinPol, 2017).

According to Figure 4, we can observe a strong impact of the global financial crisis in 2008 in Bulgaria. This is evident from the trend of GDP and DMC, especially in the case of non-metallic minerals (Figure 4A and Figure 4B). The recycling rate did not exceed 30% before 2014 and afterwards it declined considerably (Figure 4D). The National Waste Management Plan 2014–2020 is counting on increasing that rate from 50-70% to 2020 according to the type of material.

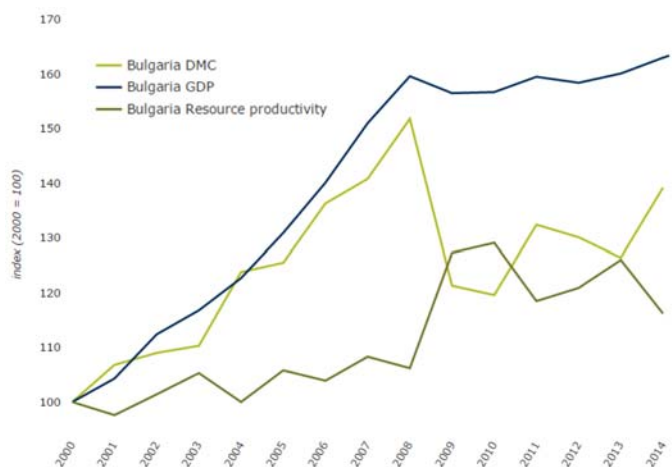
2.4 Croatia

Croatia has a centralized data collection scheme. Companies must report their data using a national code (modified Soviet code), not aligned internationally (Parker *et al.*, 2015). In Croatia, country level land use plans are used for mineral identification. At regional level there are county spatial plans. Mineral deposits must be included on county level, or municipal level of spatial planning. They can be exploited if authorities determine that there are no conflicts with the spatial plan documentation (however, deposits are not safeguarded in the land use plans) (Tiess & Murguía, 2016).

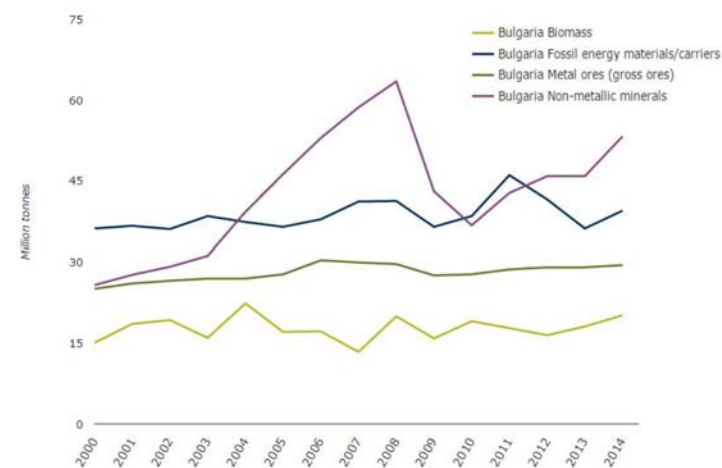
Material resource efficiency is not specifically addressed through a single strategy or action plan. As part of promoting a Circular Economy and close the materials loop, via the Act on Sustainable Waste Management (OG 94/13), Croatia is committed to providing separate collections of waste streams (paper, metal, plastic and glass, WEEE, waste batteries and accumulators, end-of-life vehicles, waste tyres, waste oil, waste textiles and medical waste) from January 2015 onwards (European Environment Agency, 2016 – Croatia). The new Mining Act (2013) establishes greater procedural transparency and sets in place defined criteria, conditions, and requirements for obtaining authorization to explore for and produce mineral commodities in Croatia.

Croatia (as Bulgaria) significantly felt the financial crisis in 2008. It is visible, especially in non-metallic raw materials consumption (Figure 5B) which are contributing by 50% of the DMC. Since the same period, the recycling rate is increasing rapidly.

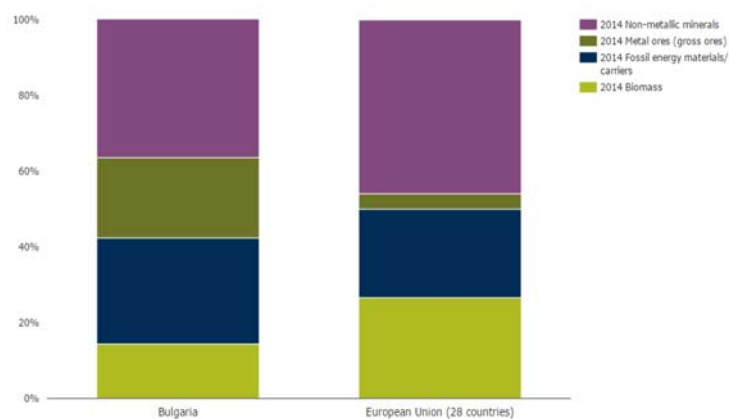
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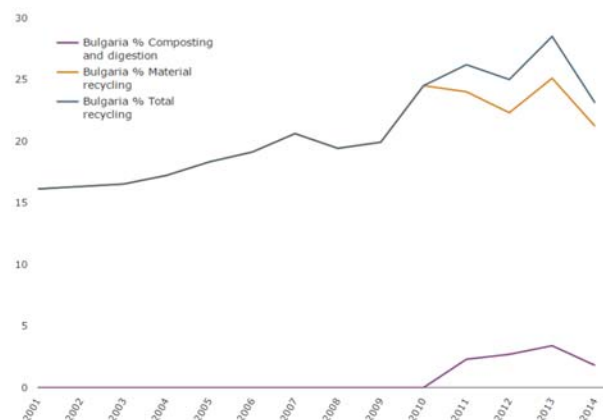
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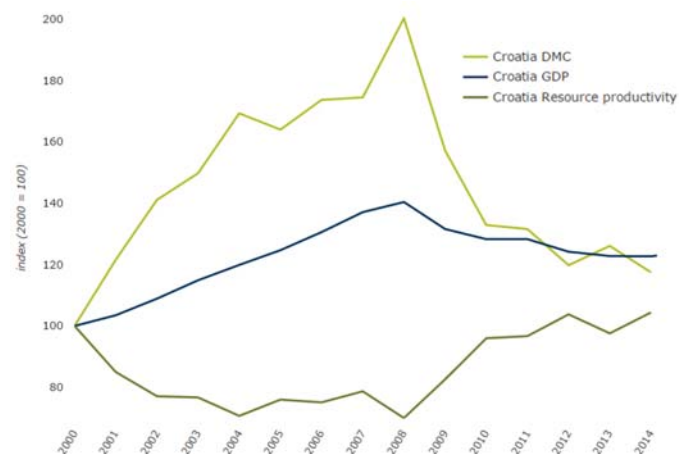
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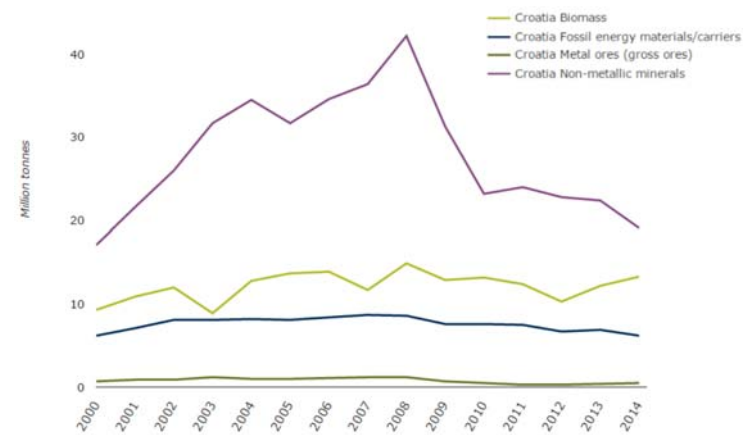
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Figure 4 Bulgaria: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014). Source: European Environment Agency, 2016 – Bulgaria.

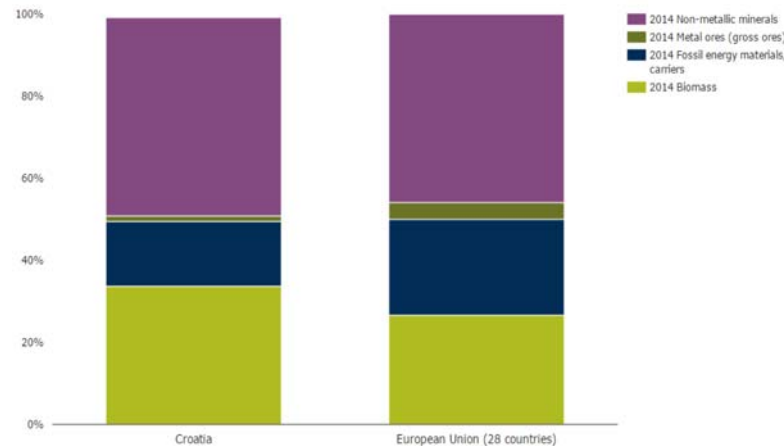
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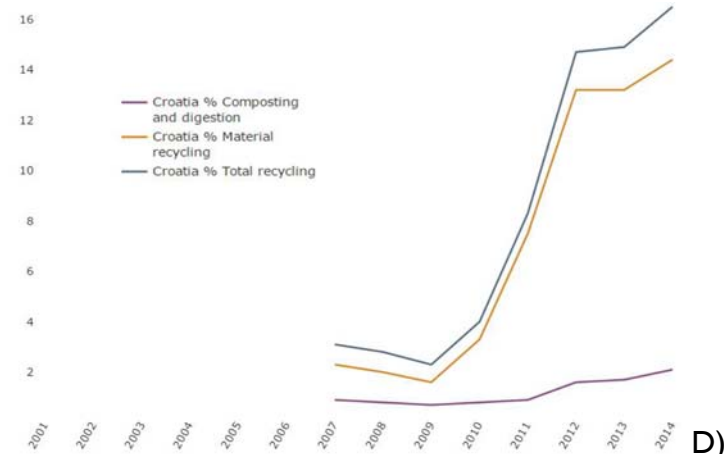
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Figure 5 Croatia: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014). Source: European Environment Agency, 2016 – Croatia.

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2.5 Cyprus

The Republic of Cyprus created the Committee for the Sustainable Development of Mineral Resources in Cyprus to issue recommendations on mineral resources. It discusses mineral resources securing supply, conservation, efficient use and recycling of mineral resources. It indicates the relevance of raw material criticality in the future and proposes certain possible actions. In addition to this, a proposal for a Green Economy Programme was elaborated¹⁶. Data has to comply with a system of codes defined by the Cyprus' Mines and Quarries Regulation Law.

The Geological Survey Department and Mines Service of the Ministry of Agriculture, Natural Resources and Environment is collecting all data related to all types of primary minerals. However, no harmonization procedures are held, and data does not comply with internationally recognised reporting codes (Parker *et al.*, 2015).

The Council of Ministers is the authority granting the licenses for exploration and exploitation; however, the process is implemented by the Mines Service in tandem with the Council of Ministers. In case any mineral activity is desired at any of the areas outside the control of the Republic, other authorities shall be involved (European Union, 2016a). There is no dedicated policy framework for the Circular Economy in Cyprus. Policy and funding measures and mechanisms promoting Circular Economy is still largely financially supported through the European Structural and Investment Fund (European Union, 2017). As shown in Figure 6A, the resource productivity was below the EU-28 average until 2015. Waste generation and its treatment is slowly approaching EU average standards (Figure 6B).

2.6 Czech Republic

The 'New Raw Material Policy for Minerals and Their Resources' (MPO, 2017), is an updated version of the former raw materials policy of 1999, to develop a coherent strategy for the next 15 years.

In the Czech Republic there is a centralized data collection. The Czech classification system is reasonably well aligned with internationally recognised standard codes (modified Soviet code) (Parker *et al.*, 2015).

Resource efficiency is highlighted within the National Strategy for Sustainable Development, the Ten-Year Programme for Sustainable Consumption and Production, the State Environmental Policy, the Secondary Raw Materials Policy (2014), the Waste Management Plan and the Waste Prevention Programme. In the Secondary Raw Materials Policy, particular priority materials are listed including metals, paper, plastic, glass, construction materials, (end-of-life) vehicles, electrical and electronic equipment (EEE). Results from the Secondary Raw Materials Policy are elaborated in the Action Plan on Self-Sufficiency in the Czech Republic. It highlights the substitution of raw materials by secondary raw materials (European Environment Agency, 2016 – Czech Republic).

¹⁶Cyprus – Minerals Policy Governance. www.min-guide.eu/content/cyprus-minerals-policy-governance

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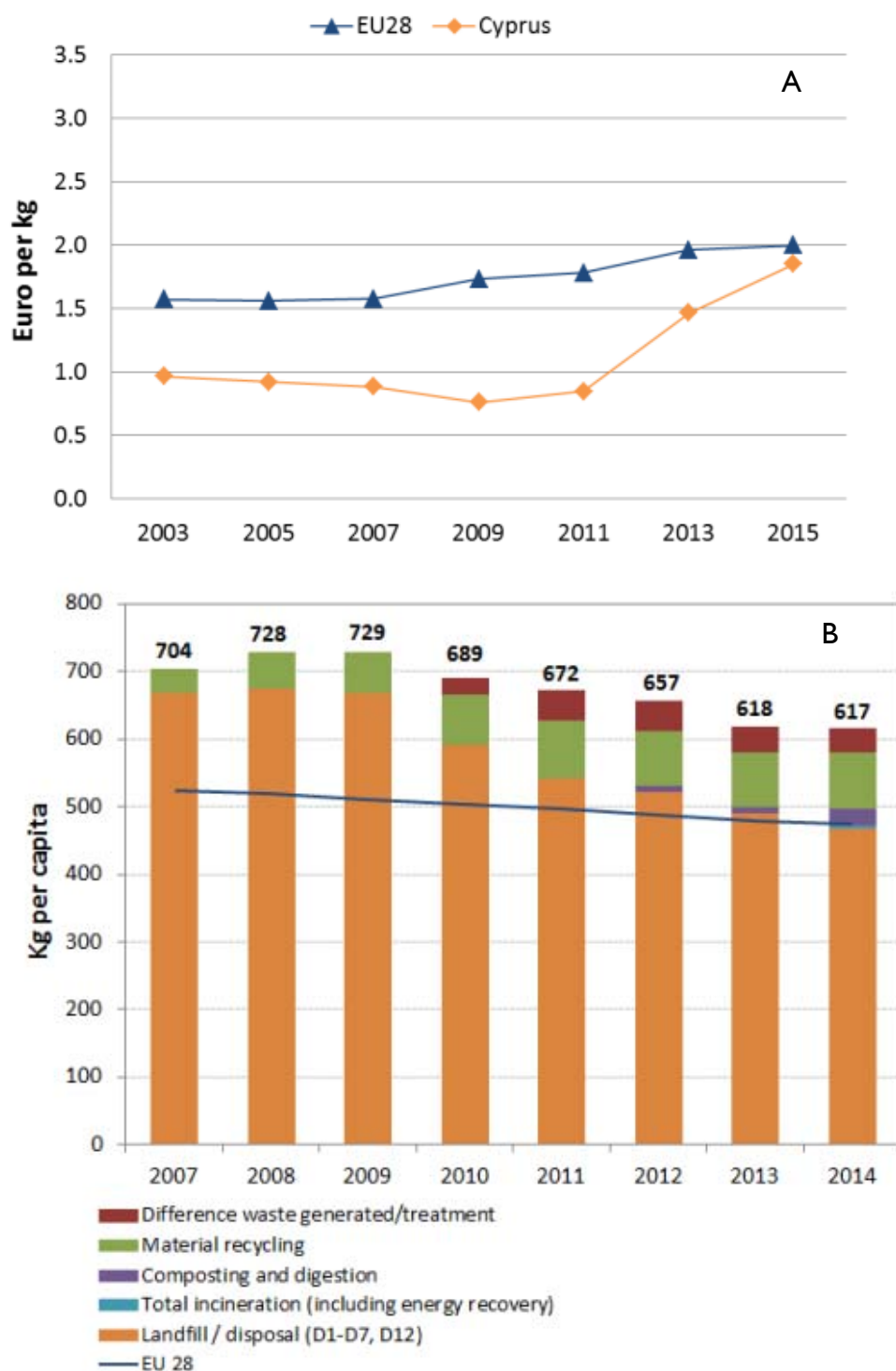


Figure 6 Cyprus: A) Resource productivity (GDP/DMC) for years 2003-2015; B) Municipal Waste by treatment (2007-2013) (Source: European Union, 2017 – Cyprus).

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The identification of mineral resources is divided into three stages: a) prospecting areas, b) protected mineral deposit areas and c) mining leases. These stages are connected to exploration and mining licensing procedures (Horváth *et al.*, 2016). Protected deposit area (or mineral deposit protection area) ensures the protection of a reserved deposit (deposit containing ‘reserved minerals’, i.e. energy minerals, ores and most of the industrial minerals which belong to the state) against prevention or obstruction of its extraction. It is established during the stage of prospecting or exploration, after the issuing of a reserved deposit certificate. It is established by the Ministry of the Environment of the Czech Republic in cooperation with the Ministry of the Industry and Trade of the Czech Republic after agreement with the territorial planning authority and the Construction Office (Tiess & Murguía, 2016). The Czech Geological Survey (CGS) compiles maps of protected mineral deposits at scale 1:50 000 according to Act No. 62/1988, on geological work, and according to Act No. 44/1988, on the protection and use of mineral resources (the Mining Act). The maps depict identified ‘reserved’¹⁷ mineral deposits protected according to the Mining Act and probable deposits in areas with specific geological structures as defined by the Geological Act (Tiess & Murguía, 2016).

In the field of exploration of mineral deposits, the Ministry of Environment is the most important authority, i.e. the Ministry lays down the exploration areas. In the sphere of exploitation, the District Mining Authorities are the most important state bodies. The District Mining Authorities (eight in total) are part of the State Mining Administration (SMA), which is composed also by the Czech Mining Office in Prague (central mining authority), establishing a centralised permitting regime.

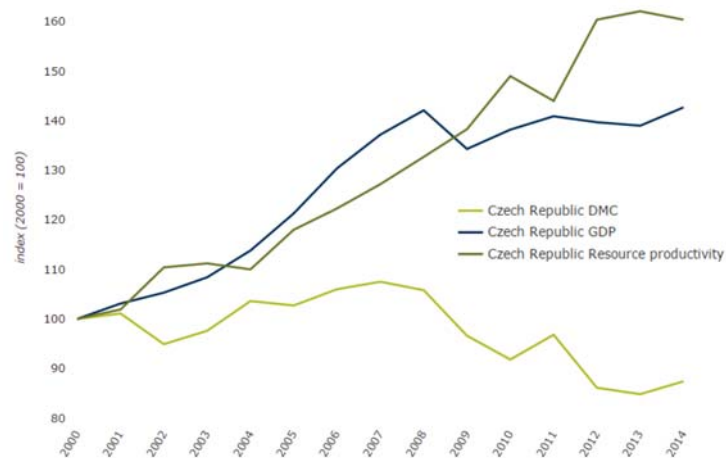
Since 2008, the DMC of non-metallic minerals is slightly decreasing. Non-metallic minerals formed nearly half of the total consumption in 2014 (Figure 7). Future demand is estimated only for construction minerals at a regional level (Tiess *et al.*, 2018).

2.7 Denmark

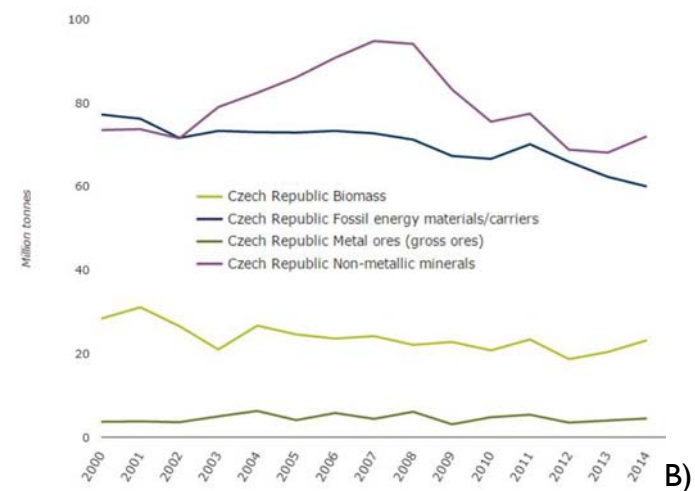
The “Kingdom of Denmark, Strategy for the Arctic 2011-2020”, is the strategy most obviously related to raw materials, aiming for sustainable growth and social sustainability in the development of the Arctic region. It also gives an overview of critical minerals and the mining opportunities for these in Greenland (Ministry of Foreign Affairs, 2011). In 2013, the Danish Ministry of the Environment published the strategy “Denmark without waste. Recycle more – incinerate less”, which has little connection to the raw materials policy (The Danish Government, 2013). Regional raw material plans regulate in which areas it is permitted to extract raw materials (in Danish: *råstofindvindingsområder* or *graveområder*) and areas safeguarded for future extraction called “areas of interest” (in Danish *interesseområder*) (Tiess & Murguía, 2016). The Circular Economy is high on the political agenda in Denmark (Denmark without waste II, Strategy for Waste Prevention points to the fact that companies can design products in a way where they can enter back into new production) (European Union, 2017 – Denmark).

¹⁷The term ‘reserved’ minerals is used to refer to the kind of minerals that by national law are defined to be state-owned.

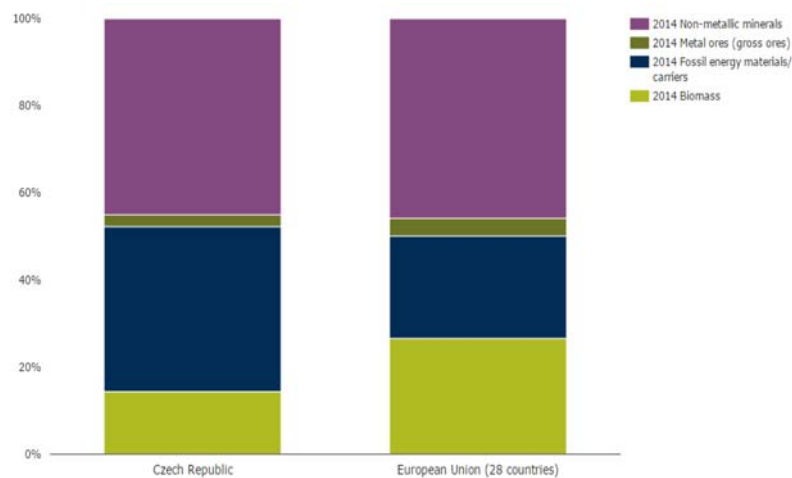
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A)



B)



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Figure 7 Czech Republic: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 (Source: European Environment Agency, 2016 – Czech Republic).

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The Regional Councils are the authorities responsible for surveying raw materials within their respective jurisdictions and planning for their extraction and supply. The Regional Councils develop a plan for extraction and supply of raw materials in their particular region of Denmark based on the survey and expectation of demands for raw material (forecasts of future mineral consumption). Each plan contains, besides the forecasts, an assessment of the mineral and raw material resource supplies in the region (Tiess & Murguía, 2016).

Denmark has a decentralised permitting regime for land-based minerals and a centralised regime for offshore ones. Denmark has a “one-stop shop” for the issuing of permits (exploration, extraction) related to land and marine-based minerals. In the case of land-based minerals, when the Regional Council receives an application it acts as a “one-door-authority” and thus has the responsibility of sending the application in hearing among the public entities affected by the application so that the information provided can be assessed in parallel (under a principle known as the “Coordination Obligation”) (European Union, 2016a). The development of the DMC in Denmark has been very dynamic in the last 15 years but in general it has been declining (Figure 8A). The total recycling rate has increased about 15% in the same period (Figure 8D).

2.8 Estonia

Estonia published its minerals strategy in 2017. Estonia has neither a dedicated national resource efficiency strategy nor an action plan. The topic is covered in a number of other policies and strategies. Resource efficiency has broad meaning in “Estonia 2020 – National Reform Programme”: achieving sustainable economic growth which means continuous development of a more resource efficient, nature conserving and competitive economy. However, the scope has not yet been defined. Resource efficiency and waste policies are linked in the National Waste Management Plan 2014–2020, which focuses on waste prevention. It also focuses on modern product design, clean resource saving production and the recycling of already produced materials (European Environment Agency, 2016 – Estonia).

The Estonian Mineral Resource Classification system is built upon internationally accepted principles (Parker *et al.*, 2015). Mineral deposits of national importance are listed in a Regulation issued by the Government. A criteria for their selection are: (1) the deposit is located in a transboundary water body, on the territorial sea or in inland maritime waters, in the exclusive economic zone; (2) the quality or quantity of mineral resources is of significant importance in view of the economic development of the state; (3) are used for the manufacture of products with export potential; and (4) the significant environmental impact of the extraction of mineral resources extends to several counties or crosses the state border (Tiess & Murguía, 2016). The main responsible authority for mining permitting is the Ministry of Environment (if mining is planned in a mineral deposit of national importance), otherwise the Environmental Board is the organism with competence on permitting procedures (European Union, 2016a). The Estonian DMC has an almost constantly increasing trend (Figure 9A). Non-energy abiotic raw materials consumption is represented only by non-metallic minerals (no metal gross ore consumption). The recycling rate is dynamically increasing (Figure 9C).

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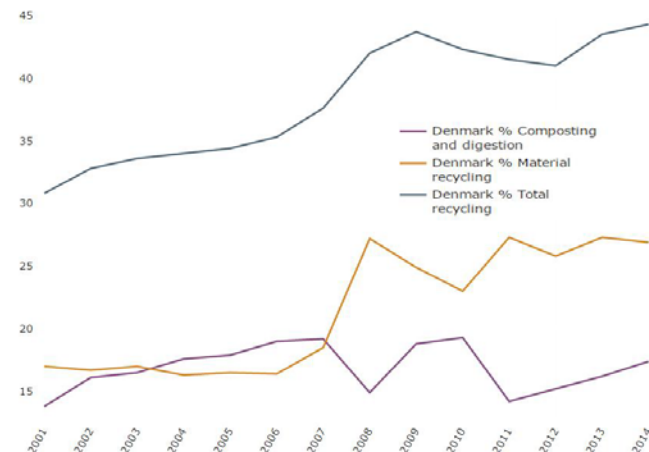
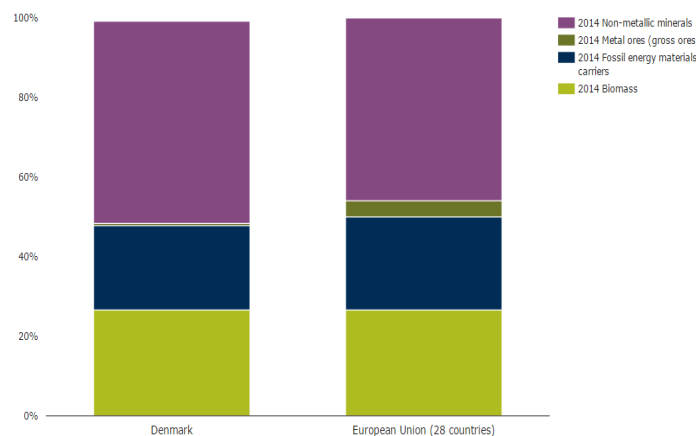
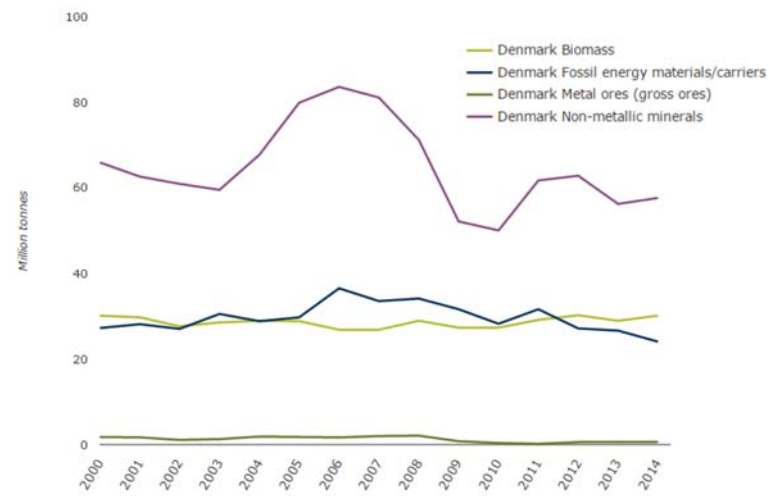
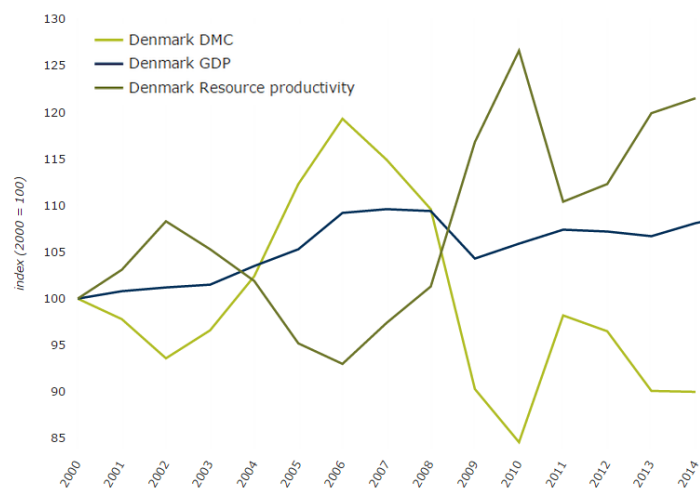
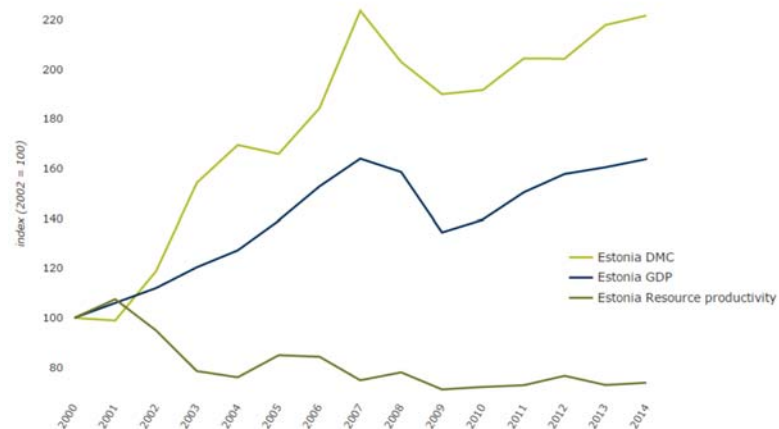
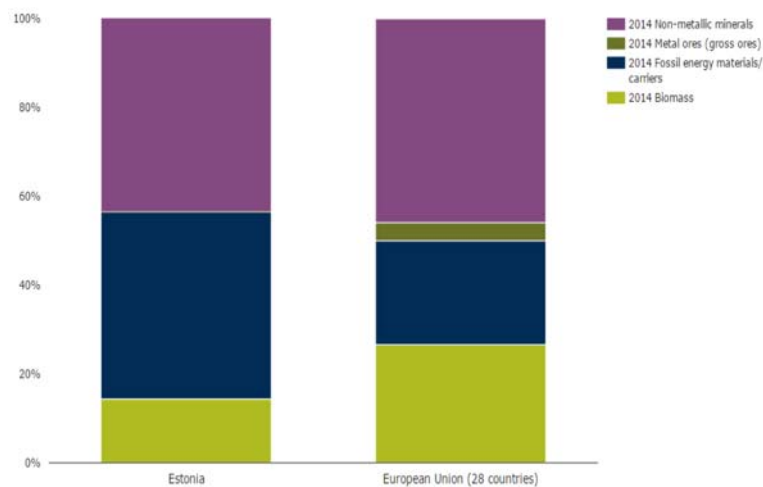


Figure 8 Denmark: GDP, DMC and resource productivity trends (2000–2014); Trends in material consumption by category (2000–2014); Domestic Material Consumption by category in 2014 and Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Denmark).

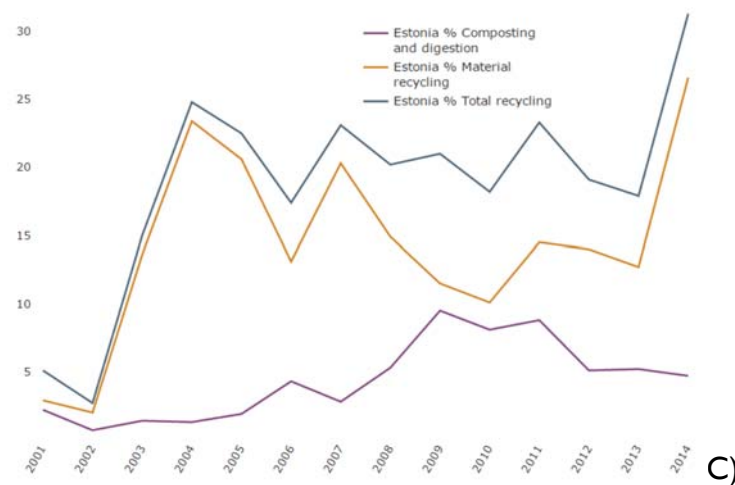
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Figure 9 Estonia: A) GDP, DMC and resource productivity trends (2000–2014); B) Domestic material consumption by category in 2014; C) Recycling of Municipal waste (2000–2014) (Source: European Environment Agency, 2016 – Estonia).

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2.9 Finland

Finland (2010) published a Minerals Strategy VISION 2050 and Action Plan. Exploration and mining companies are required to report data to an international standard code, but the mining law does not specify which code (Parker *et al.*, 2015).

Finland does have a dedicated resource efficiency strategy applied based on MFA, in the form of the 2013 National Material Efficiency Programme. According to the Material Efficiency Programme, material efficiency in production means the sparing use of natural resources, the effective management of secondary flows and wastes, a reduction in the volume of waste and the recycling of materials at different phases of a product's life cycle (European Environment Agency, 2016 – Finland). Local municipalities allocate areas in their local plans to secure the future supply of, for instance aggregates, to satisfy local needs. However, no use of the safeguarding concept has been identified (Tiess & Murguía, 2016) nor has evidence been found on the use of future mineral demand estimates.

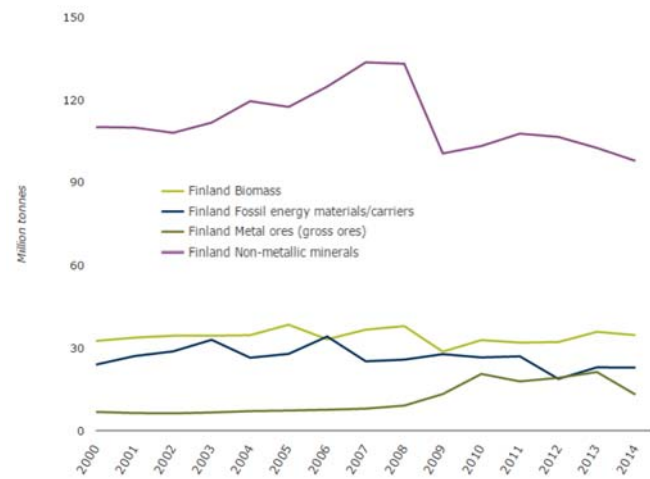
Finland's Mineral Strategy only presents information on global scenarios of future demand (Tiess & Murguía, 2016). According to the Strategic Programme of the Finnish Government (2015), the growing opportunities offered by a Circular Economy are to be utilized with a focus on achieving the greatest impact. The recycling rate of municipal waste is expected to be raised by at least a 50%. Taking recyclable waste to landfill will be prohibited by law from 2025.

The new National Waste Management Plan and Waste Prevention Programme, which are designed to support the Circular Economy, are being prepared and are expected to come into effect in 2017. The steering group has approved seven goals, which represent the anticipated status of waste management in Finland in 2030. The Mining Authority responsible for onshore and offshore mining permits (exploration: ore prospecting permits, extraction: mining permit) is the Finnish Safety and Chemicals Agency (Tukes). The Regional State Administrative Agencies grant the environmental permits whereas the EIA procedure is supervised and controlled by the regional Centres for Economic Development, Transport and the Environment (ELY Centres). Domestic material consumption drastically fell in 2008, mainly because of non-metallic consumption, which is forming around one third of total DMC (Figure 10A).

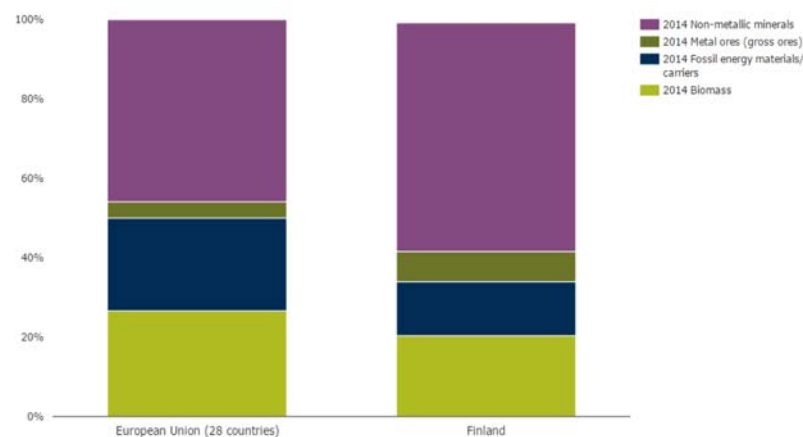
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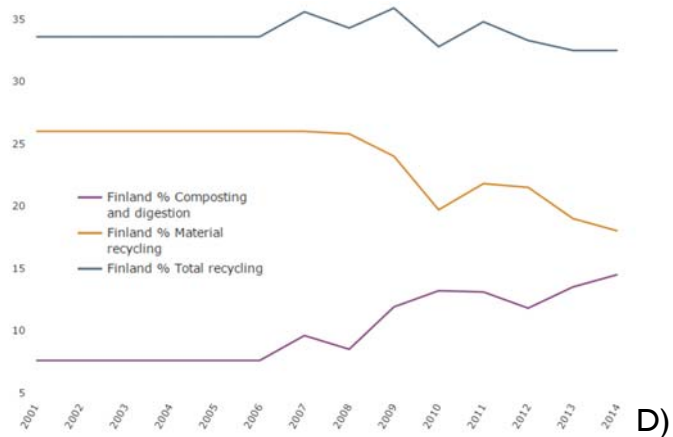
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Figure 10 Finland: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Finland).

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2.10 France

The Strategic metals plan (2010) is a general policy for metals whose basic aim is to secure the raw materials supply thereby contributing to promote the competitiveness of the French industry. It considers metals as commodity of specific national importance. It is covering supply, competitiveness, and substitution. The Committee for Strategic Metals (COMES) (2011) is the Committee for bringing together all the stakeholders in France (European Environment Agency, 2011a). The French National Sustainability Strategy 2010-2013 treats resource efficiency as a central topic. The aim of the strategy is to strengthen France position in the field of the “Green Economy”.

It is not a legal requirement to collect data on mineral resources in France. Thus, there is no centralized data collation on mineral resources and reserves nor harmonization of reporting codes is done (Horváth *et al.*, 2016). France has at least two spatial planning instruments which support mineral development projects (of quarrying substances, i.e. aggregates). The departmental quarry scheme, launched in 1992, which is an instrument which serves to define the areas and optimal scope of extraction operations (only industrial minerals and aggregates) as well as to anticipate the development of operations in order to determine the future of the sites once operations have been completed. Schemes allow the identification of areas in which the establishment of quarries is incompatible with a strong environmental protection. Decisions for building a quarry must meet a series of environmental criteria. It provides efficient localisation for the building of quarries: some areas require environmental compensation and others are called 'white areas' where building requires no environmental compensation (European Environment Agency, 2016 – France). In 2017, 16 special zones were identified (see www.mineralinfo.fr) with quarry substances as follows: gravels and sand, diatomite, cement rock, brick-clays, andalusite, kaolin and metamorphic minerals (Tieess & Murguía, 2016).

To date, France does not have a dedicated resource efficiency plan or strategy but has undertaken several initiatives related to resource efficiency with the aim of integrating this topic in all relevant sector policies (more in Country Report – FRANCE: European Union, 2017). For onshore minerals, the main authority responsible for issuing mining permits (ministerial authorisation) for non-energy minerals is the Ministry of Economy and Finance. Quarry materials depend on the Ministry of Environment, Energy and Sea. Quarries are divided into large ones including dump heaps & tips, under a Prefectural authorisation before starting field works and small ones which can be exempted from the whole opening procedure if the small extraction is done to meet the needs of historical buildings. Both are in accordance with the Quarry Departmental / Regional Scheme. For quarrying activities on the near Continental Platform and offshore minerals, permits are provided by the Ministry of Economy and Finances and fieldwork operations authorisations are provided by the Prefect (European Union, 2016a). The resource productivity as well the recycling rate has a steady positive trend (Figure 11A, Figure 11D).

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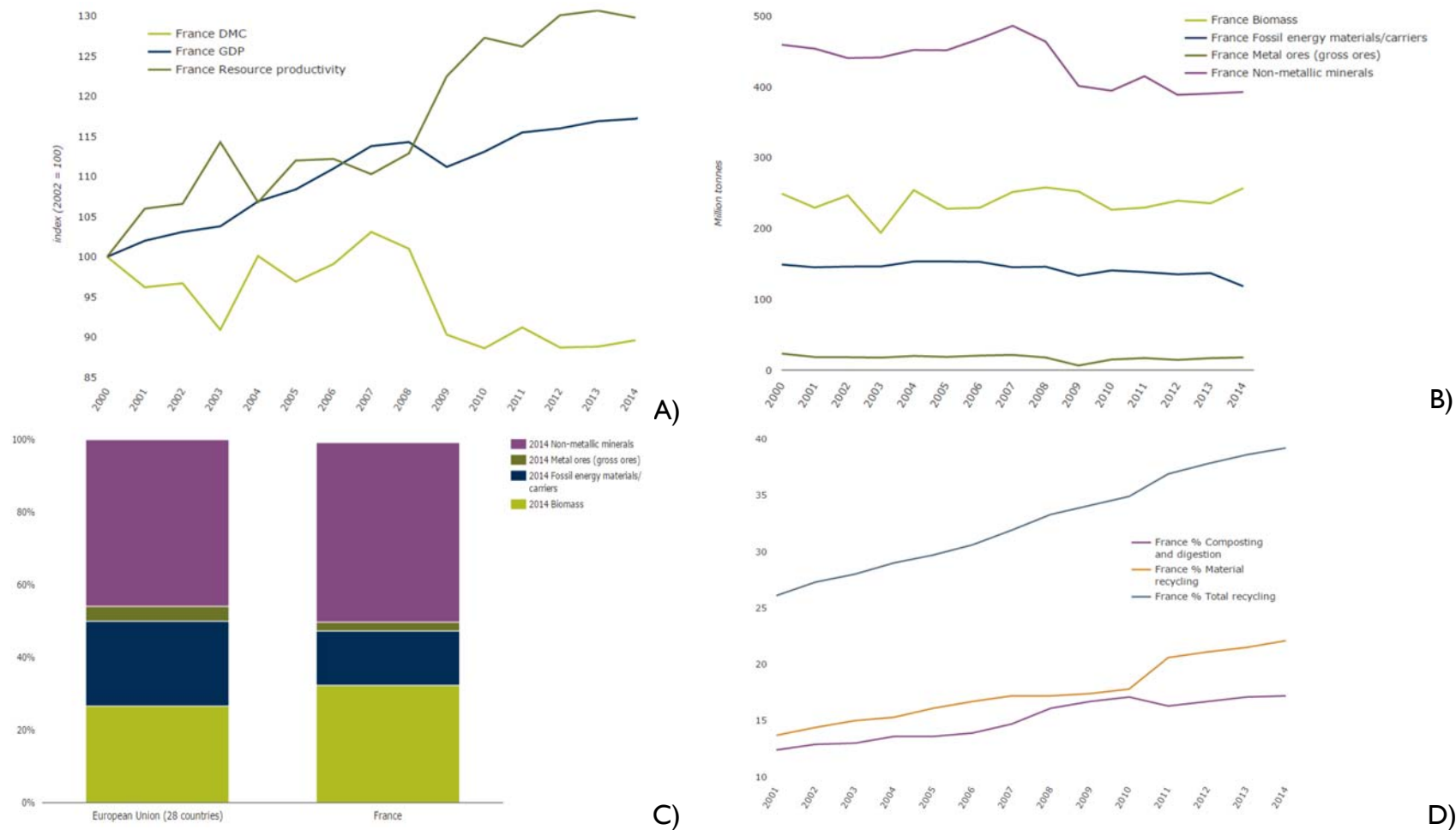


Figure 11 France: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – France).

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2.11 Germany

Collection of data on mineral resources and reserves is legally not required in Germany, thus, no centralized data collation and harmonization is used in inventory analysis at federal level (Horváth *et al.*, 2016). Information on resources is classified using each federal state individual regional codes (e.g. Baden-Württemberg, Saxony-Anhalt). These codes do not correlate with any of the international resource classification systems. International codes are not being used in any case. Overall mineral resources and reserves are classified according to the Federal Mining Law (Parker *et al.*, 2015).

A Raw Materials Strategy of Germany was published in 2010 by the Federal Ministry of Economics and Technology. The key goal of this is to secure a sustainable supply of non-energetic mineral raw materials for the German economy. Germany is large and stable economy. The resource productivity (GDP/DMC) as well as the recycling rate have been continuously increasing in the period considered (2000-2014) (Figure 12 A, Figure 12 D).

The Federal land use legislation enables the designation of *priority* and *reservation areas* which are designated at by the federal states (the *Länder*). The *prioritisation* is based on the assessment of different uses. As the result, the non-prioritised uses are excluded in the area because they are judged to be incompatible. If an area is determined as a “*Vorranggebiet*” for mining, this effectively means that mining is permitted. It consequently means that area is safeguarded against contradictory uses. This equates to the definition of extraction being allowed in principle. The designation as a *reservation area* (*Vorbehaltsgebiet*) does not in itself determine the land uses allowed in this area. It is still necessary to carry out a planning procedure to define the aims and preferred land uses in the area concerned. This equates to an area where extraction will be allowed subject to certain conditions (Tiess & Murguía, 2016). The public authorities oversee the execution of the Federal Mining Act as part of the administration structure of the federal states. The regional authorities have comprehensive administrative instruments for efficient supervision (European Union, 2016 - Germany).

As informed in the report of the Ad Hoc Working Group (2010), it is relatively common practice to quantify the need for construction materials. Some evidence has been found of research institutes and universities analysing the global and German situation of present and future supply and demand of some minerals of relevance for the German economy (mainly metals) (Tiess & Murguía, 2016).

Germany has a dedicated strategy for material resource efficiency. In February 2012 the German government adopted the German Resource Efficiency Programme (ProgRes) as a result of the government's decision in its Raw Materials Strategy of October 2010. The term resource efficiency is not defined explicitly in ProgRes. Its current overarching aim is the double decoupling of raw material use. Through reduced and efficient use of raw materials, it should be decoupled from economic growth and from environmental impacts. The German government wants to develop waste and closed-cycle management into a sustainable resource-efficient materials flow management over the coming years. By strictly separating wastes through pre-treatment, recycling and the recovery of energy, Germany aims to make full use of substances and materials bound in wastes and therefore make landfill disposal of wastes superfluous. The renewed Closed Cycle

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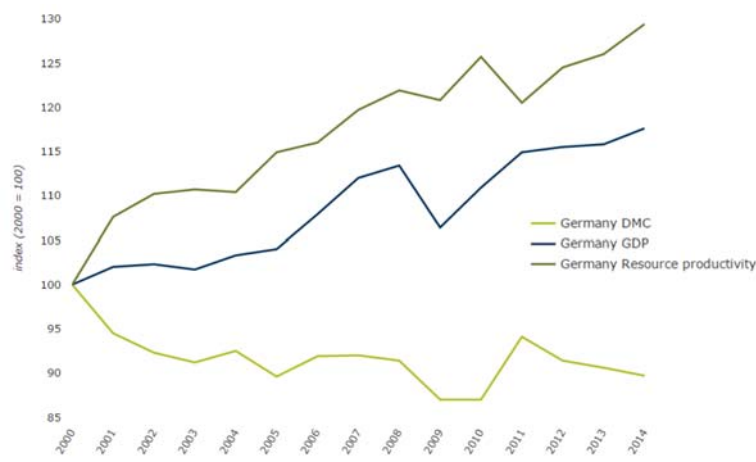
Management Act, adapted in 2012, aims to improve the contribution of waste management to environmental and climate protection as well as to increase resource efficiency in waste management through strengthening waste prevention and recycling (European Environment Agency, 2016 – Germany).

2.12 Greece

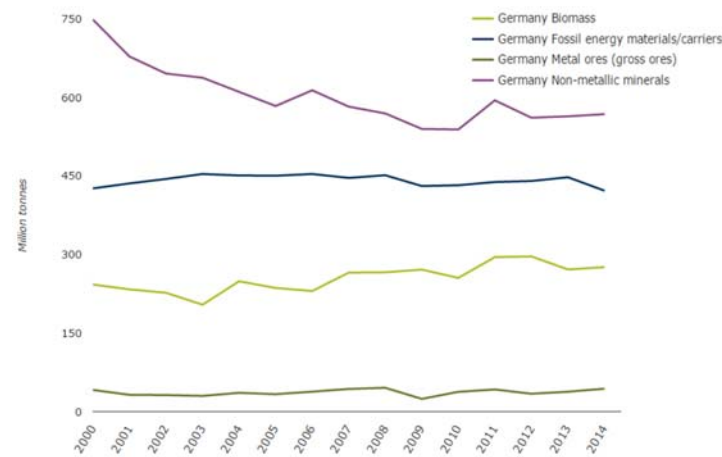
The National Policy for the Strategic Planning and Exploitation of Mineral Resources was adopted in February 2012 to ensure the supply of minerals to society in a sustainable way and in compliance with national development policies for 2030 (Ministry of Environment, Energy and Climate Change, 2015). In the policy document, one of the main policy axes is “*adequate land-use planning that shall ensure the possibility of access to the mineral raw material deposits and contribute to the resolution of issues related to the competition of different land uses*”. It then refers to striking a balance between various factors, including a sustainable supply of the necessary mineral raw materials. Thus, demand does play a role though details into forecasting future demand (which minerals, method) are not given (at least not published in English) (Tiess & Murguía, 2016). No specific information/data is available that supports Circular Economy and resource efficiency practices in Greece. Municipal waste treatment, according to the last Environmental implementation report (European Union, 2017), had no clear positive trend. The resource productivity is almost with the constant difference below the EU-28 average (Figure 13).

Data collection on mineral resources is legally not required in Greece. Standard reporting codes are not required for mineral resources and reserves. No centralized data collation and harmonization processes are applied (Horváth *et al.*, 2016). In Greece, the main first-instance authorities responsible for issuing permits and licences relevant to the NEEI sector are, at the national level, the Ministry of Environment and Energy (YPEN) and, at the regional/local level, the 7 de-centralised (Regional) administrations (tiers of ministries) and the 13 Administrative Regions (L.3852/2010). Who issues which permit depends on the mineral type, size of the project/activity, any land use peculiarities of the area of intervention (i.e. frontier area, protected area), or/and the land ownership legal status (European Union, 2016a).

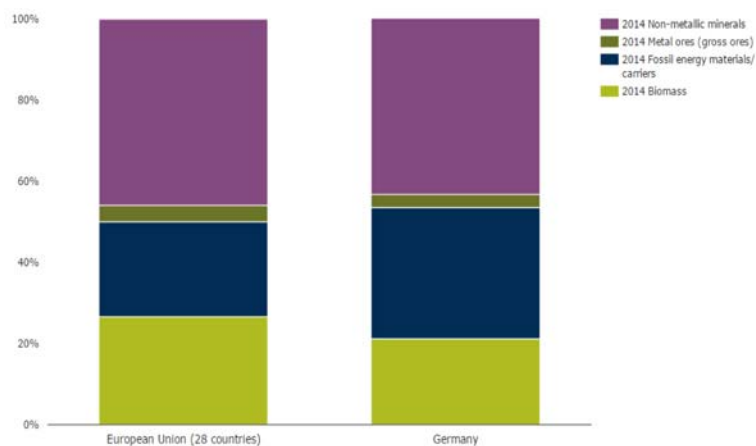
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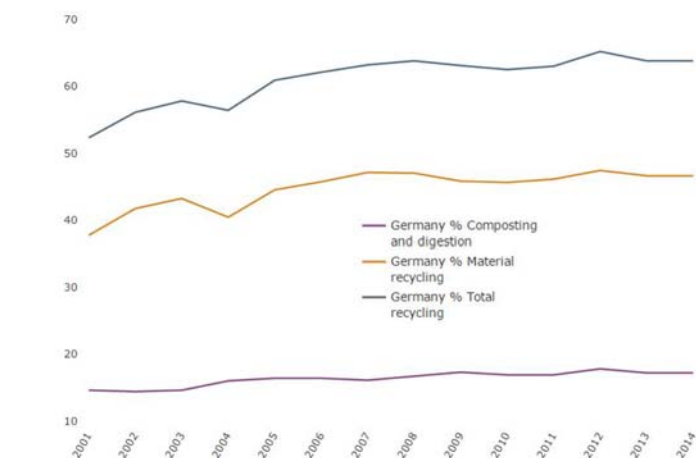
A)



B)



C)



D)

Figure 12 Germany: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Germany).

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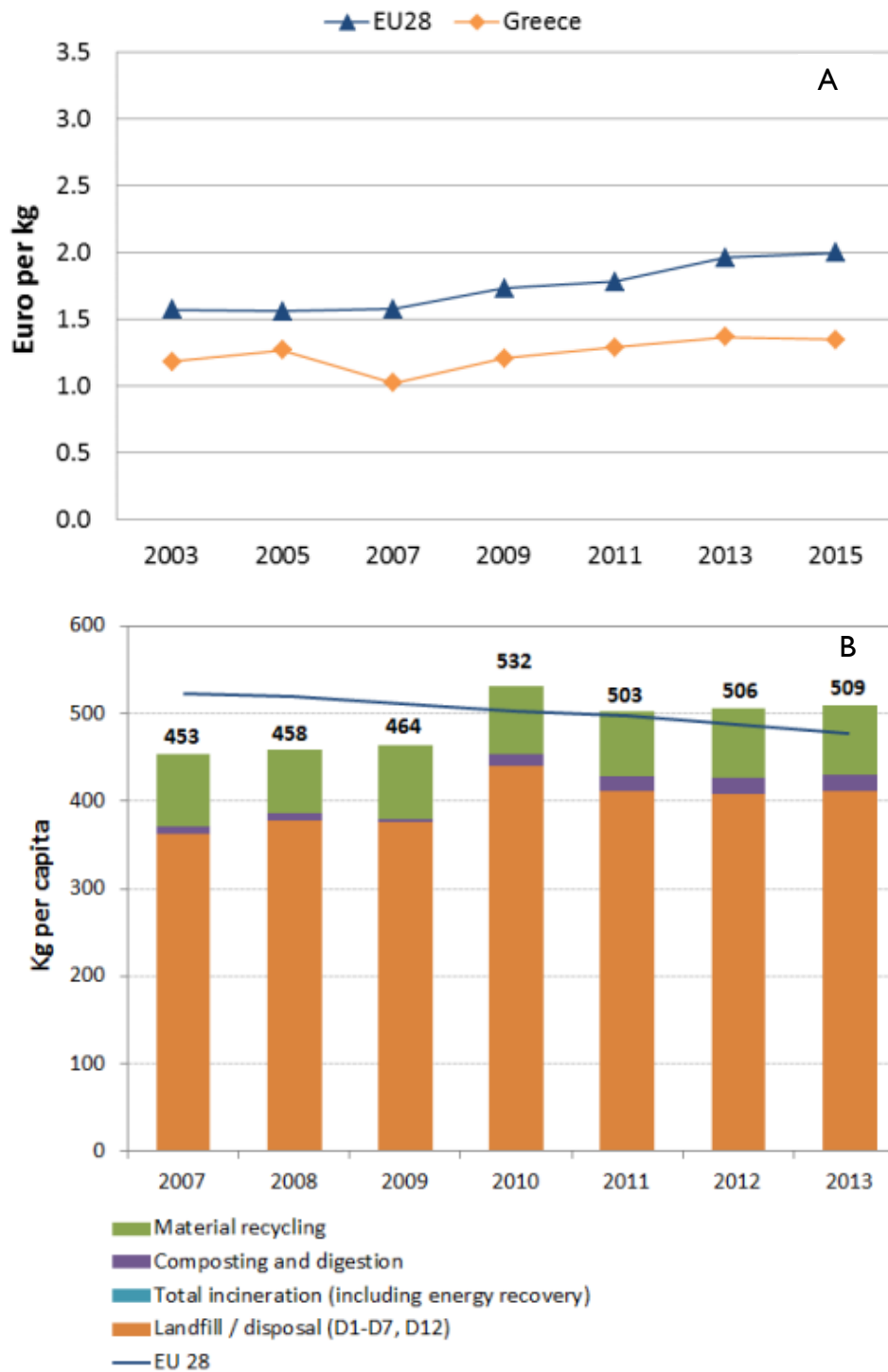


Figure 13 Greece: A) Resource productivity (GDP/DMC) for years 2003-2015; B) Municipal Waste by treatment (2007-2013) (Source: European Union, 2017 – Greece).

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2.13 Hungary

Independent or governmental-related agencies are involved in data collection on mineral resources. Centralized data collation and harmonization procedures are implemented in Hungary to a certain extent (Horváth *et al.*, 2016). Using of standards is not obligatory: the type of reporting standard is not prescribed by law, however, traditionally the “Russian” system¹⁸ is used in Hungary. Usually CRIRSCO aligned standards are used in case of ores by operators and foreign investors (Parker *et al.*, 2015).

A comprehensive Hungarian mineral policy addressing all kinds of minerals is in progress. An important document establishing the solid mineral strategy is the Parliamentary Resolution No. 77/2011 (14.10) on the implementation of the National Energy Strategy approved by the Hungarian Parliament in 2011. Based on the authorization of this resolution the “Mineral Resource Assessment and Utilization Action Plan” was prepared in 2015. This document deals mainly with domestic energy minerals (hydrocarbons, geothermal energy, coals, uranium), rare earth elements and carbon capture and storage but declares the need of a domestic mineral resource management strategy that addresses all kinds of minerals (European Union, 2017). Mineral resource areas come under rational land use plan there. The Act is formed on the National Land Use Plan which states that present use of these areas should not hinder the future use of resources (Horváth *et al.*, 2016).

Hungary has no strategy exclusively dedicated to natural resource efficiency; however, several national strategies and action plans address the topic. The 4th National Environment Programme is the overarching environmental policy giving high priority to resource efficiency. The total recycling rate has grown rapidly from almost zero in 2001 to nearly 30% in 2014 (Figure 14D). Non-metallic material consumption peaked between 2004 and 2005 and since then has considerably decreased (Figure 14B) which was reflected in the total DMC development (Figure 14A).

Since April 2015 regional mining authorities and several other authorities have merged to form “Government Offices” (20 in total including Budapest), and now the permitting procedure is considered a “one-stop-shop”. For the exploration of ore minerals, a permit may be obtained only via concession tenders which are issued by the The Hungarian Office for Mining and Geology. For minerals not requiring a concession tender procedure (for which the area is “open”, i.e. for construction and industrial minerals), first instance permitting authorities are the decentralised 20 Government Offices (19 counties plus Budapest) (European Union, 2016a).

2.14 Ireland

Ireland has centralized data collation and harmonization procedures. Agencies other than government agencies are also involved in collecting data on mineral resources (Horváth *et al.*, 2016). Companies reporting mineral resource and reserve data to the Department have to use a CRIRSCO aligned code such as PERC or JORC. There is a legal requirement to provide resources and reserves data for ‘scheduled minerals’ (most metallic and industrial minerals) on the basis of specific requests submitted by persons or organisations (Parker *et al.*, 2015).

¹⁸The Russian State Reporting System is derived from the reporting system originally used in the Soviet Union and some Warsaw Pact countries from the 1960s. For more details see: Glossary of Minventory project: <https://ec.europa.eu/jrc/en/scientific-tool/minventory>

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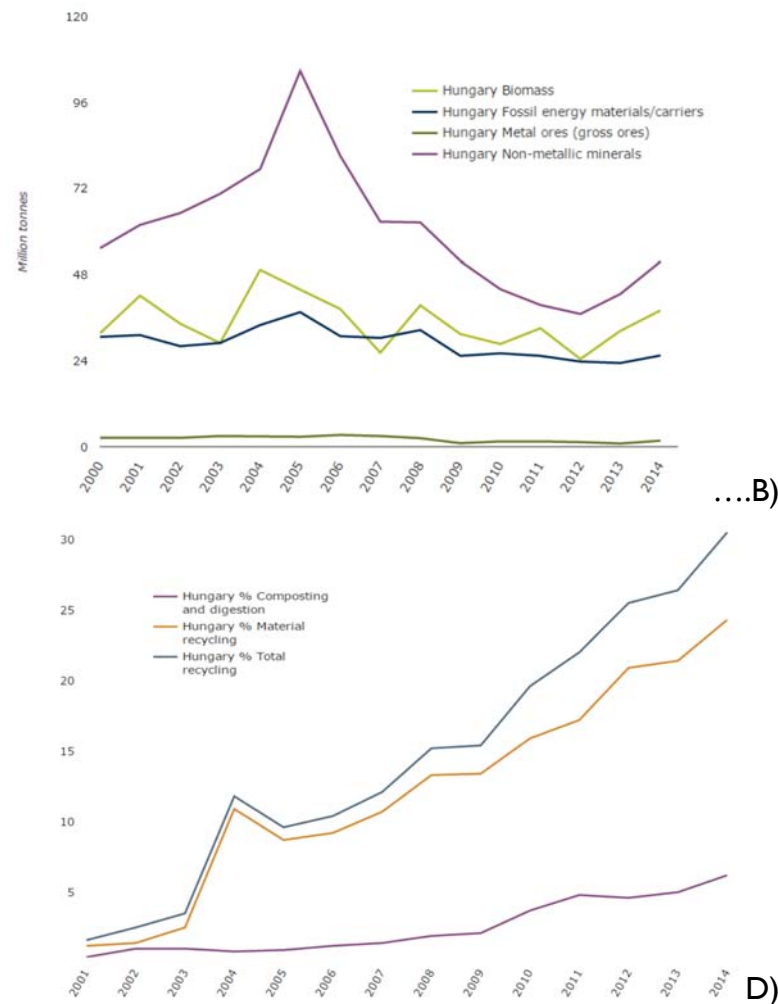
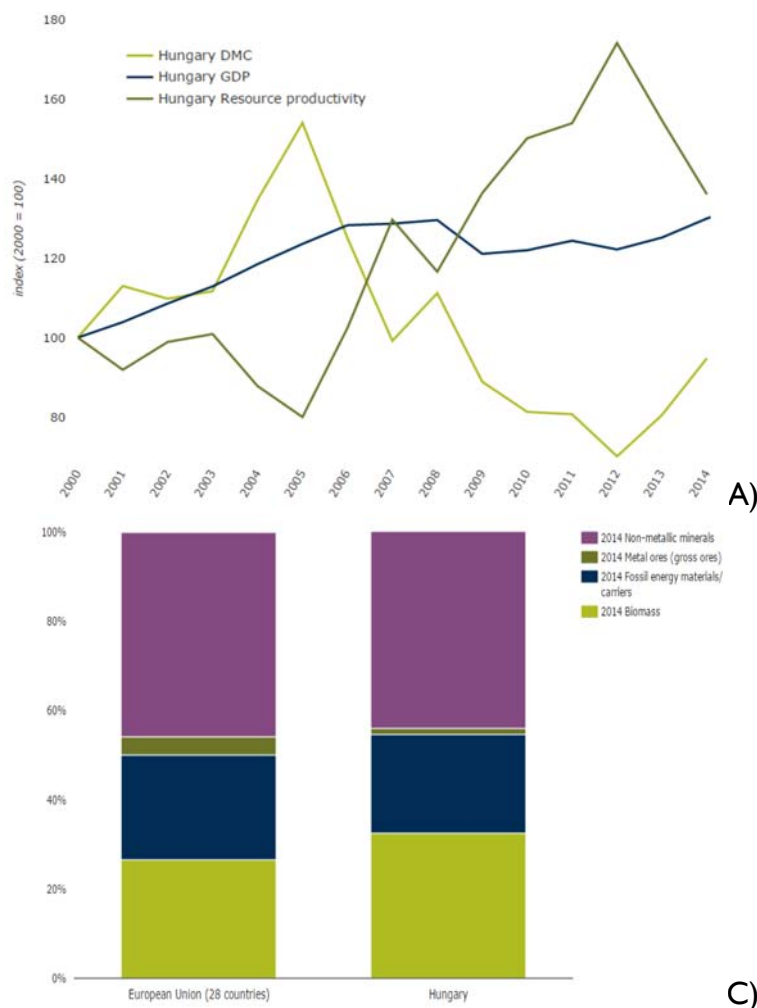


Figure 14 Hungary: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Hungary).

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Ireland has a significant mining and ore processing activity, but there is no direct minerals policy established. The Irish Department of the Environment, Community and Local Government Issued a sustainability strategy under the name of “*Our Sustainable Future: A Framework for Sustainable Development in Ireland*” in 2012 (Department of the Environment, Community and Local Government, 2012). The objective is to identify and prioritize policy areas and mechanisms where a sustainable development approach will add value and enable continuous improvement of quality of life for current and future generations and set out clear measures, responsibilities and timelines in an implementation plan. Ireland’s Minerals Exploration and Mining Policy (2015) contains general development policy, sustainable development, social development.

Mining sites (NEEI minerals) are included in the land use plans but there is no concept of mineral safeguarding included (Tiess & Murguía, 2016). Ireland does not have a dedicated national resource efficiency strategy or action plan. Actions in this area are largely guided by the National Waste Prevention Programme – which has been in operation since 2004. The latest phase of the Programme is titled ‘Towards a Resource Efficient Ireland’ which runs over the period 2014-2020. However, resource efficiency is not explicitly defined in the document (European Environment Agency, 2016 - Ireland). Government agencies take into account future domestic minerals supply/demand (Tiess & Murguía, 2016). The resource productivity significantly declined in 2008 due to a rapid fall of the non-metallic material consumption after the financial crisis in 2008 (Figure 15A). The total recycling rate was rounding 35% in 2014.

For onshore mineral developments, the Exploration and Mining Division (EMD) of the Department of Communications, Climate Action and Environment, the Irish Environmental Protection Agency (EPA) and the local authorities (County Councils) are the three agencies whose permission is needed before any development can start. The main authorisation, granted by the Minister, is called “State Mining Facility” or “State Mining Lease/Licence” and is subject to the Minerals Development Acts. Such authorisation is normally granted when permits have been obtained from two other agencies. These permits are Planning Permission from the Local Authority and an Integrated Pollution Control licence from the EPA and they are required for any development involving “scheduled minerals” (European Union, 2016a).

2.15 Italy

In Italy, the centralized data collation and harmonization procedures are done for mineral inventory analysis (Parker *et al.*, 2015). In the Emilia-Romagna region, the mining sector is ruled by the Regional Law 17/1991 “Regulation of Mining Activities”. With this law, the planning of mining activities has been delegated to the provinces, that take care of this by providing the PIAE (Intraregional Plan for Extractive Activities), and the municipalities, which, based on the contents of the PIAE, define the PAE (Municipal Plan for Mining Activities). The Provinces develop the PIAE and make observations and comments on PAE and the plans of cultivation and final settlement of the quarries (which are approved by the municipalities) (Tiess & Murguía, 2016).

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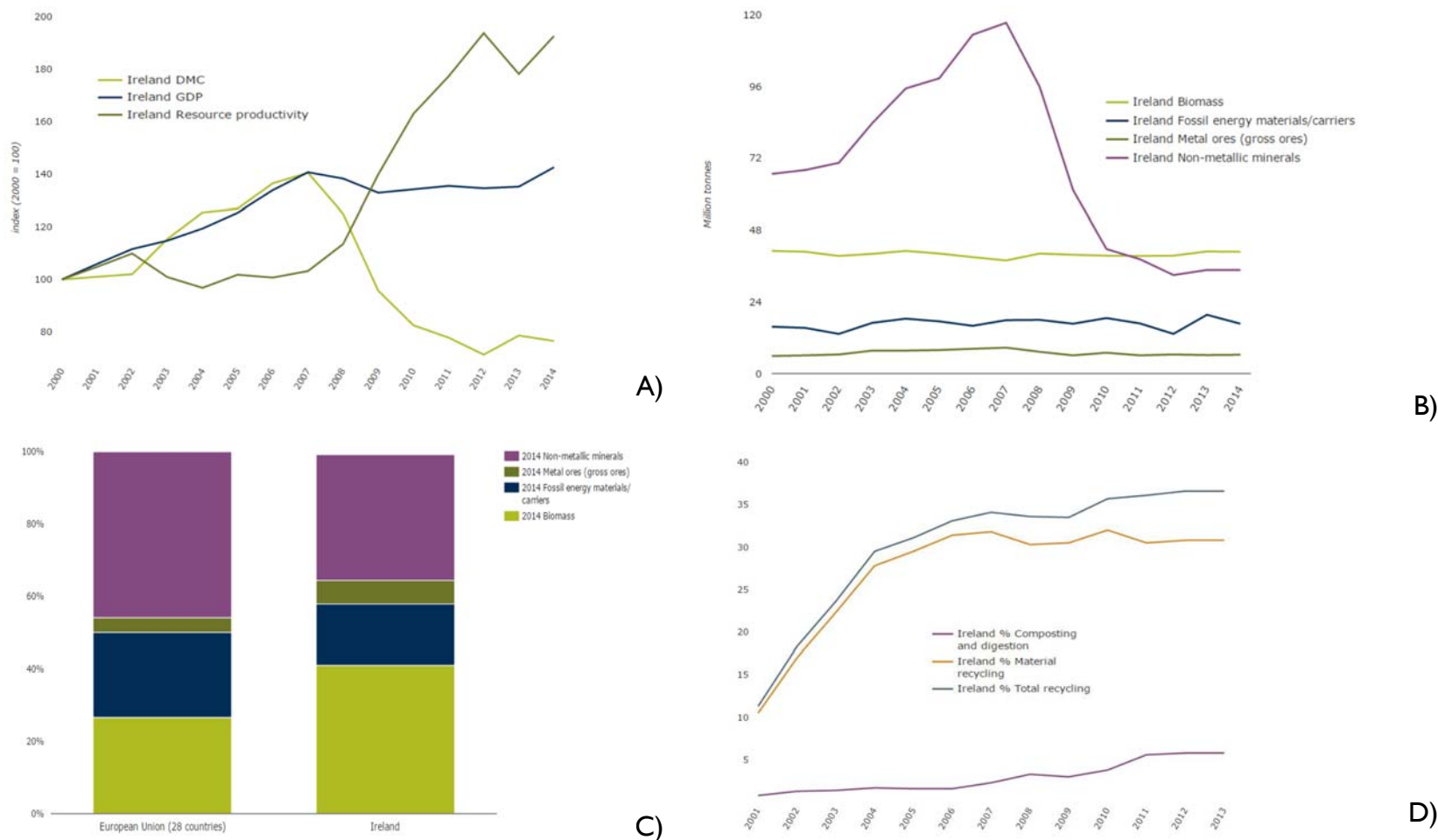


Figure 15 Ireland: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Ireland).

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Italy does not have a dedicated strategy or action plan for material resource efficiency. The topic is covered in other policies. There is no specific definition of the term 'resource efficiency' or of the scope (which resources are addressed). Policy documents generally refer to sustainable or long-term use of natural resources. National and regional policies generally refer to 'reducing material inputs, minimising waste, improving resource management, changing consumption patterns of civil society and improving production processes'. The National Programme of Waste Prevention presents reduction targets for certain waste streams, including food, paper, packaging, and electrical and electronic devices (European Environment Agency, 2016 – Italy).

In the Emilia-Romagna region, the mineral demand forecasting is part of the PIAE which take in consideration different ambits and extraction sectors to set-up a demand forecasting. On the basis of the demand, taking care of all the constraints defined within the PTCP (Wide-area spatial plan at the level of Provinces), the PIAE defines the potential area of extraction. This process drives LUP authorities to a right determination of the material needs and to the correct localization of mining areas, through a broader view of issues related to mining activities as well as a more accurate knowledge of the territory and its resources (Tieess & Murguía, 2016). Italian domestic material consumption of non-metallic minerals has been continuously decreasing during the last 15 years (Figure 16 B) while the total recycling rate is keeping a positive trend (Figure 16 D).

2.16 Latvia

A national (modified Soviet) code is used in Latvia for the identification of mineral resources (Parker *et al.*, 2015).

Policy documents for promoting and applying the principles of a circular economy are in the early stages of development. In the chapter on Spatial development perspectives of the Sustainable Development Strategy of Latvia until 2030 (Saeima of the Republic of Latvia, 2010) natural resources, which include forests, agricultural lands, mineral resources and water, are seen as specific rural assets which have to be used for local development. The strategy suggests that the development of the national economy should be based on innovation and a transfer to the low-carbon manufacture of goods and services, as well as the domestic use of renewable energy, healthy food and the commercialisation of eco-system services. (European Environment Agency, 2016 – Latvia).

The National Development Plan of Latvia for 2014–2020 (2012) emphasises the need for the rational and efficient use of domestic resources as a policy objective. It addresses resource issues from the perspective of competitiveness and productivity, calling for investment that increases resource efficiency and reduces the export of raw materials. The Plan sets two strategic objectives related to the resource efficiency: material and energy efficiency (under Priority: Growth of national economy); sustainable management of natural and cultural capital (under Priority: Growth for regions) (European Environment Agency, 2016 – Latvia). All these elements are, to some extent, related to resource efficiency in a broader sense of the term. No evidence was found on the use of future mineral demand estimates by the authorities (Tieess & Murguía, 2016). As shown in Figure 17, the Latvian resource productivity temporary improved due to the 2008 crisis (Figure 17A).

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With regards to extraction, if a person/company wants to deal with mining activities, it must first obtain land ownership or acquire lease rights (the subsoil belongs to the landowner). After that, it is necessary to clarify whether the geological survey has been carried out and whether the stocks belong to the A (accepted) or N (assessed) category as it is possible to extract minerals just in case the stocks are accepted in the A or N category. If the territory intended for the extraction of mineral resources has not been previously explored or stocks are not accepted, then, before extraction can begin, a geological exploration shall be performed, and a report of the geological exploration should be submitted to the Latvian Environment, Geology and Meteorology Centre for approval. When the research has been carried out, and stocks of mineral resources are approved, the person or company should submit an application to the State Environmental Service for granting a passport of the deposit¹⁹ (European Union, 2016a).

2.17 Lithuania

Apparently, a Lithuanian State Strategy of Use of Underground Resources is under preparation with the aim of ensuring the rational use of mineral resources and contributing to the country's modern economic creation. In order to achieve this objective, it is expected that a change in the use of mineral resources legislation will be required (European Environment Agency, 2016 - Lithuania).

Lithuania has centralized data collation processes for inventory analysis, but there is no requirement for harmonization procedures. The Lithuanian Geological Survey is providing the data collection on primary raw material resources and reserves on behalf of the Ministry of the Environment. Data is collected for selected construction minerals, industrial minerals and iron ore by purity. All data must be reported using a national code that does not comply with an internationally recognised standard code, but is comparable to the UNFC (Parker *et al.*, 2015).

The National Sustainable Development Strategy is the main strategic document on the efficient consumption of natural resources. It suggests that the growth in the consumption of natural resources is expected to be half the rate growth of production and services. The National Waste Management Plan and National Waste Prevention Programme are the documents in which waste avoidance principles and measures have been clearly established and have to be implemented to ensure the rational consumption of energy and resources, thus contribute to the transition towards a Circular Economy (European Environment Agency, 2016 – Lithuania). The total recycling rate jumped from 5% to 30% during a few years (2010 to 2014) (Figure 18D**Fejl! Henvisningskilde ikke fundet.**).

¹⁹A „passport“ of the mineral deposit is a document containing the overall description and evaluation of the deposit. In some countries, e.g. Latvia it can even be legally required.

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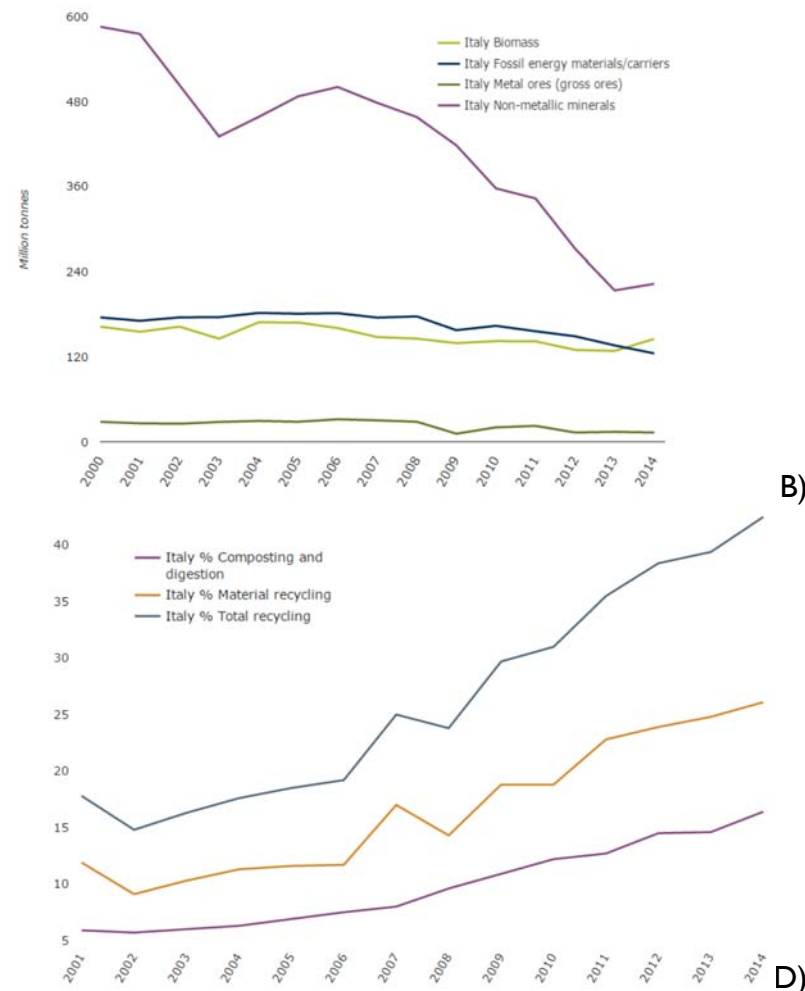
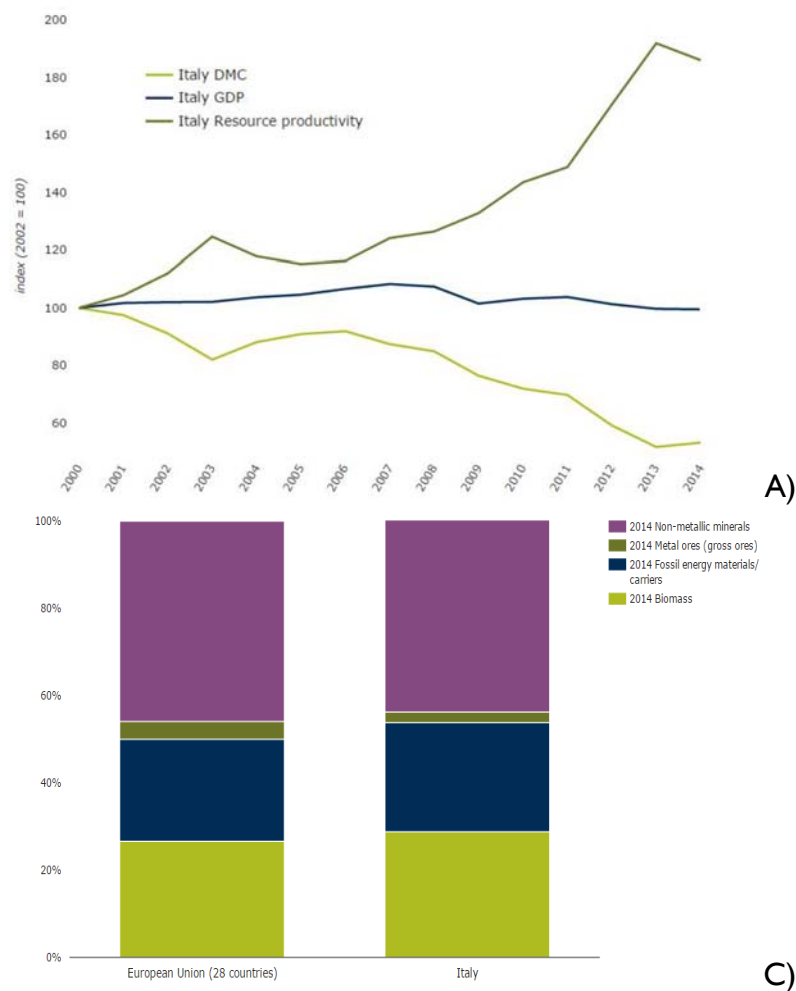


Figure 16 Italy: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Italy).

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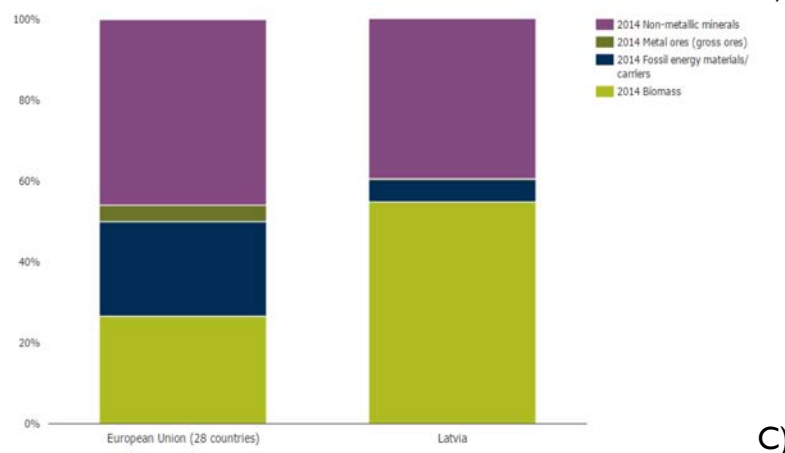
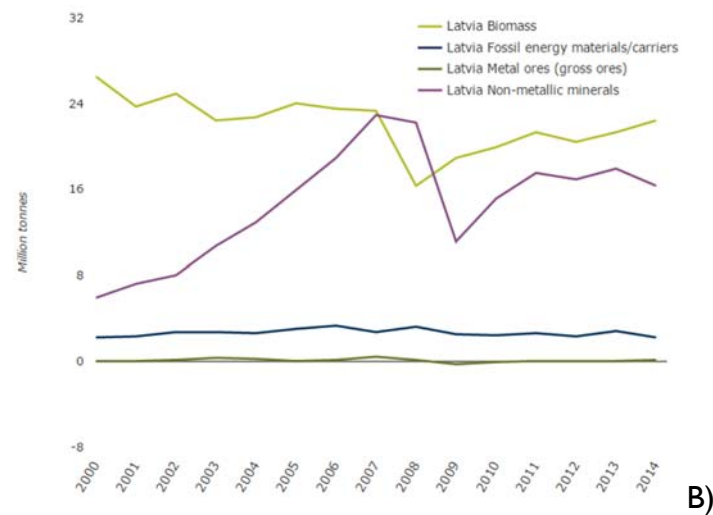
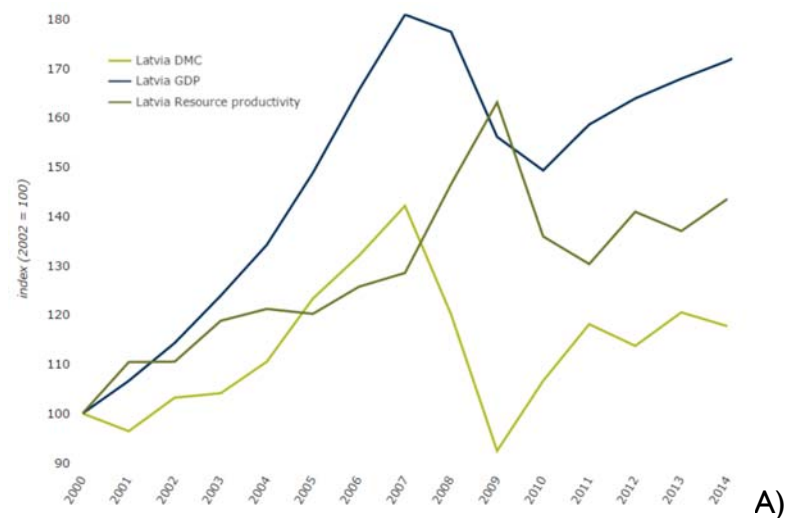
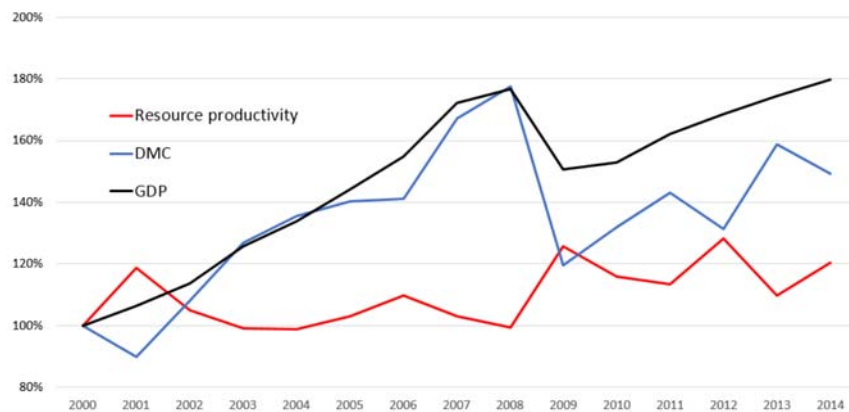
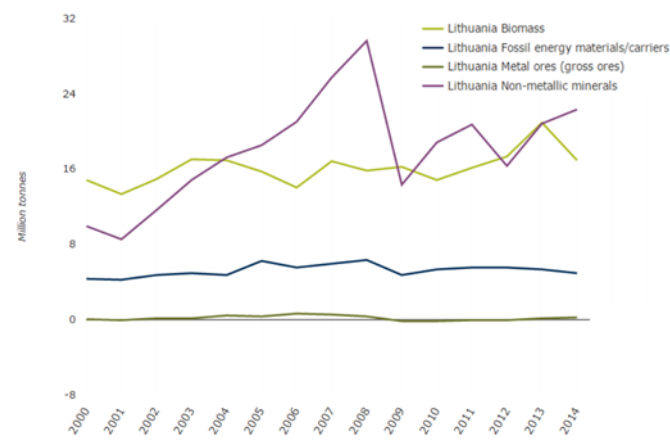


Figure 17 Latvia: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014; (Source: European Environment Agency, 2016 – Latvia).

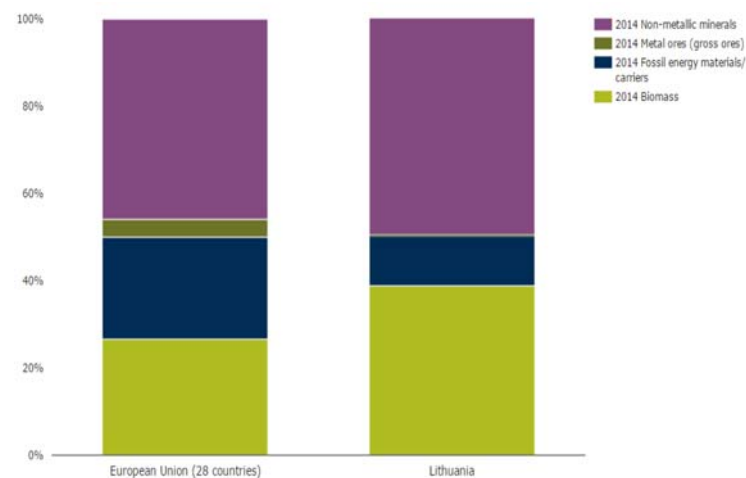
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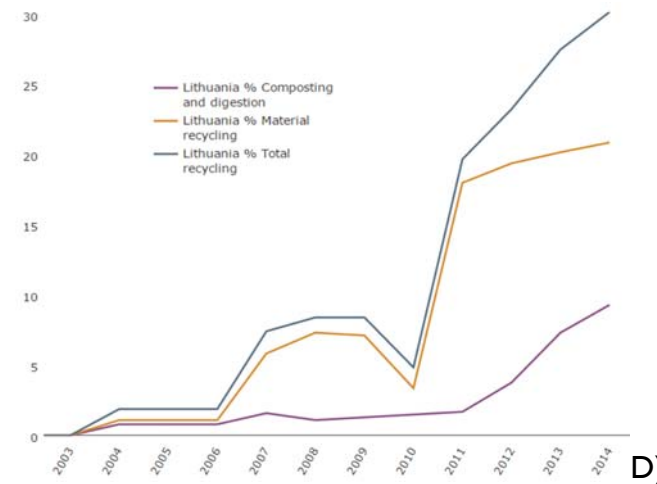
A)



B)



C)



D)

Figure 18 Lithuania: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Lithuania).

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The competent authority granting exploration and extraction permits is the Lithuanian Geological Survey (under the sphere of the Ministry of Environment). Other relevant co-authorities include the Environmental Protection Agency in charge of approving EIAs and issuing permits for surface water use, 60 municipalities, the National Land Service, the State Territorial Planning and Construction Inspectorate (only relevant for the extraction and post-extraction phases), the Directorate General of State Forests, the State Service for Protected Areas and the Cultural Heritage Department (European Union, 2016a).

2.18 Luxembourg

Relevant authorities are the Ministry of Labour, Employment and Social and Solidarity Economy and the Ministry of Sustainable Development and Infrastructure which are the competent authorities for issuing the “authorisation to operate” supported by its Inspectorate of Labour and Mines and the Department of Environment (organized in three Administrations: Environment, Nature & Forests and Water Management), the Administration of the Environment, the College of burgomasters and aldermen and the Communes (municipalities) (European Union, 2016a). No evidence was found on the use of future mineral demand estimates by the authorities (Tiess & Murguía, 2016). There is a lack of information about mineral inventory of Luxembourg (Parker *et al.*, 2015). Also, no information was found with respect to the MCA, MFA and concept of safeguarding of mineral deposits.

Figure 19 A shows that Luxembourg's resource productivity has increased slightly since 2003, but it has been decreasing again since 2011. The structure of the types of waste treatment is balanced, but it remains above the EU-28 average (Figure 19 B).

Within BENELUX there is also cooperation on the Circular Economy. It is also high on the agenda of the government of Luxembourg. Under the governance of the secretaries of state for economic and environmental affairs an inter-ministerial committee “Strategic group for a Circular Economy” was set up in 2015 with the aim to unite all relevant stakeholders and coordinate their actions and to share information (European Union, 2017 – Luxembourg).

2.19 Malta

A Malta Environment and Planning Authority (MEPA) provided a Draft Mineral Subject Plan which includes the main outcomes of the Minerals Resource Assessment and the reserves estimation. There is no requirement to report to a single international reporting code to any governmental body (Parker *et al.*, 2015). The Malta Environment and Planning Authority is responsible for land use planning and regulations related to the environment and mineral resources.

Under the Development Planning Directorate of MEPA, the Minerals Unit is responsible for processing the permit applications for new quarries/extensions to existing ones and the monitoring of quarrying sites and related operations. During the first half of the 1990s, MEPA commissioned a Minerals Resource Assessment with the aim to identify potential future resources of hardstone and softstone which resulted in identifying 26 areas of interest. These areas were classified according to a level of confidence in terms of geology: inferred or indicated. Indicated resources were

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further classified to determine development constraints in Level 1 (good degree of geological confidence and apparent lack of conflict with other land uses), and Level 2 (a lesser degree of confidence and further investigations are required) (Parker *et al.*, 2015).

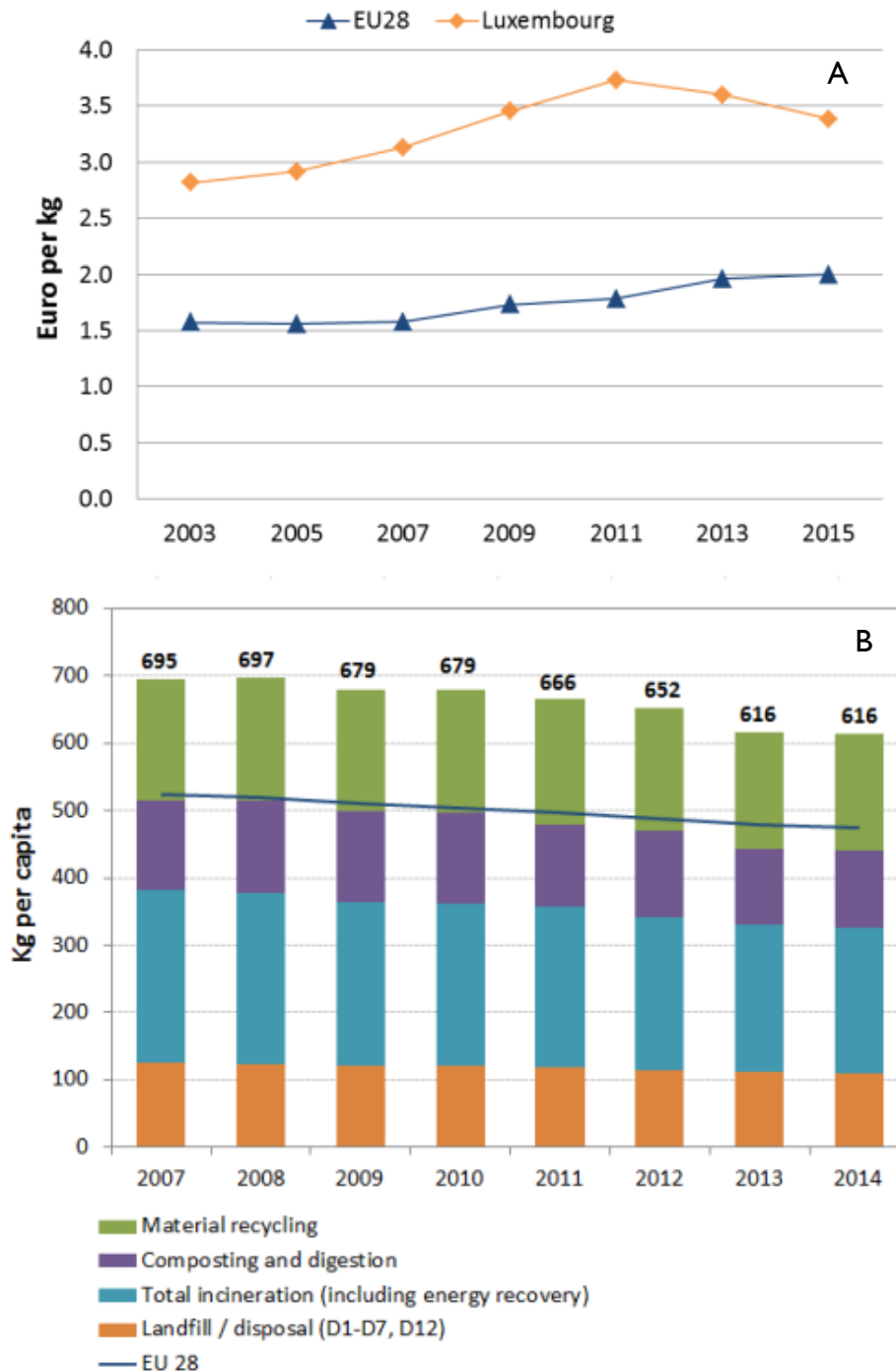


Figure 19 Luxembourg: A) Resource productivity (GDP/DMC) for years 2003-2015; B) Municipal Waste by treatment (2007-2013) (Source: European Union, 2017 – Luxembourg).

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No evidence was found on the use of future mineral demand estimates by the authorities (Tieess & Murguía, 2016). Between 2003 and 2013, Malta was practically copying the resource productivity of the EU-28 average. In the 2015 it declined as illustrated in Figure 20A. Malta is giving a high value to the implementation of a Circular Economy and sustainability agenda. The Green Economy Strategy and Action Plan of Malta were adopted in December 2015.

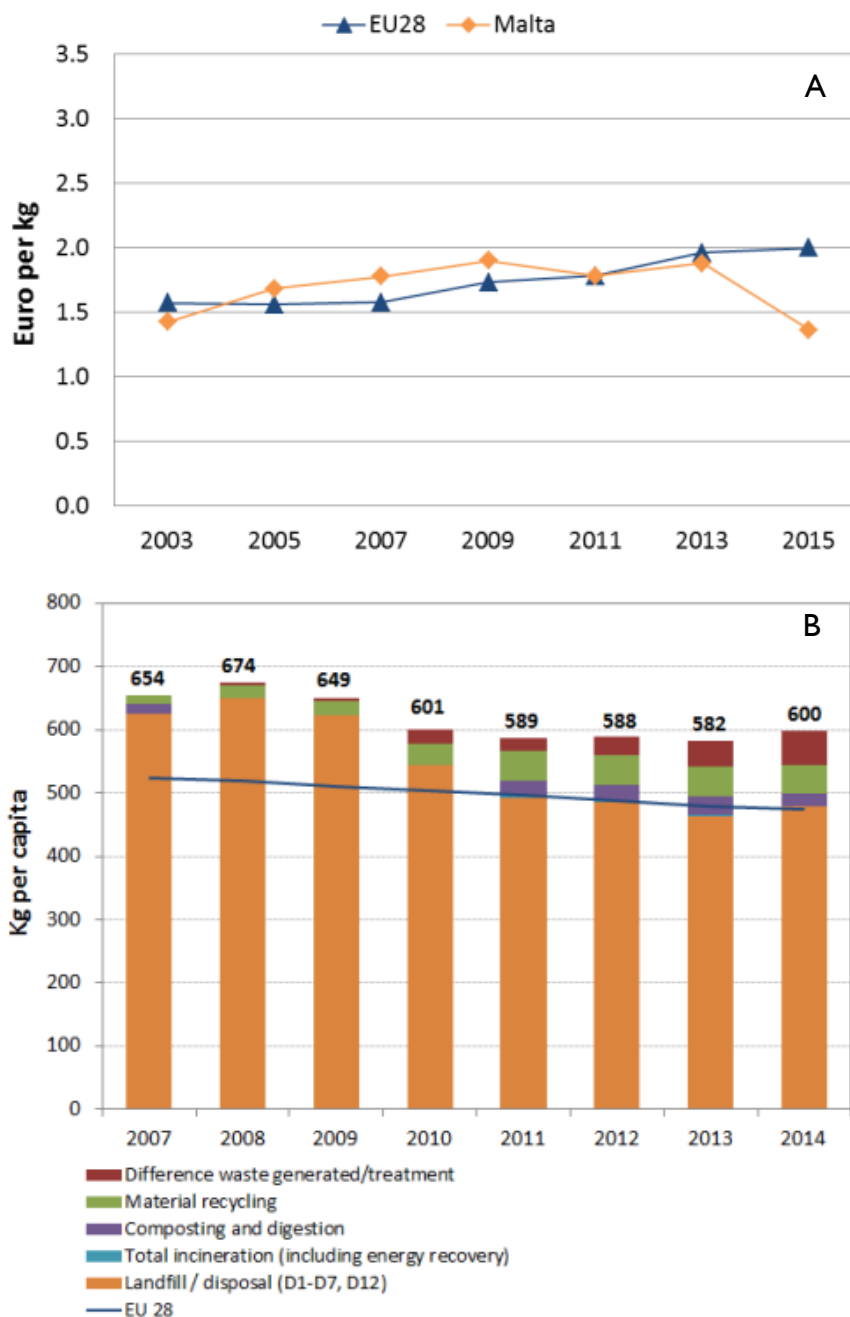


Figure 20 Malta: A) Resource productivity (GDP/DMC) for years 2003-2015; B) Municipal Waste by treatment (2007-2013) (Source: European Union, 2017 – Malta).

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2.20 Netherlands

The Raw Material document ("*Grondstoffennotitie*") (2011) provides general policy for raw materials. The primary policy goals of the Raw Material Document (2050 vision) are to increase R&D expenditures, to preserve free trade and to support sustainable development and is considering mineral consumption (The Dutch national government, 2011). It covers both biotic and non-biotic raw materials with a slight focus on the latter one. Since extension of land towards and protection of existing land from the sea is a crucial question in the Netherlands, the Ministry of Infrastructure and Environment has a very prominent role in the Dutch resource efficiency policy. Policies related to resources have primarily an environmental and sustainability character. The "Policy Document on Raw Materials" (2013) only refers to trends in the global demand for raw materials, but no domestic demand forecasts are presented (Tiess & Murguía, 2016).

In the Netherlands, the Ministry of Economic Affairs and the Ministry of Infrastructure and the Environment are responsible for collecting information about mineral resources and reserves. National legislation requires the data collection due to the requirement to produce environmental impact assessments for extraction sites and the need for national spatial planning which includes the assessment of reserves on a local scale. However, there is no requirement to report to a single international reporting code (Parker *et al.*, 2015).

In 2016, a government wide Programme on Circular Economy was developed in close cooperation with at least four ministries – Infrastructure and the Environment; Economic Affairs; Foreign Affairs; and Interior and Kingdom Relations – under the leadership of the Ministry of Infrastructure and the Environment. It will combine and integrate the Circular Economy policies of the different departments and will include the programme "From Waste to Resource". Its objectives are: a) keeping the natural capital vibrant; b) improving the security of supply; and c) reinforcing the earning power of the Dutch economy (European Union, 2017). The recycling rate is rounding 50% in Netherlands (Figure 21D**Fejl! Henvisningskilde ikke fundet.**). The domestic material consumption (DMC) mainly consists on biomass and fossil fuels. The non-metallic and metallic mineral consumption is contributing by less than 30%.

The State Supervision of Mines is the agency within the Ministry of Economic Affairs that oversees the production of minerals and the Netherlands' continental shelf. The agency is responsible for drafting and enforcing mining laws, mine safety, and mineral production regulations on onshore and offshore mineral deposits. Netherlands has a mixed (centralised-decentralised) permitting regime in which the State Supervision of Mines grants the exploration and extraction permits, and the Ministry of Infrastructure and Environment grants the environmental and water extraction permits; however, the consent of the provincial governments is also mandatory whereas the municipalities and local water authorities only provide consultative (legally non-binding) opinions (European Union, 2016a).

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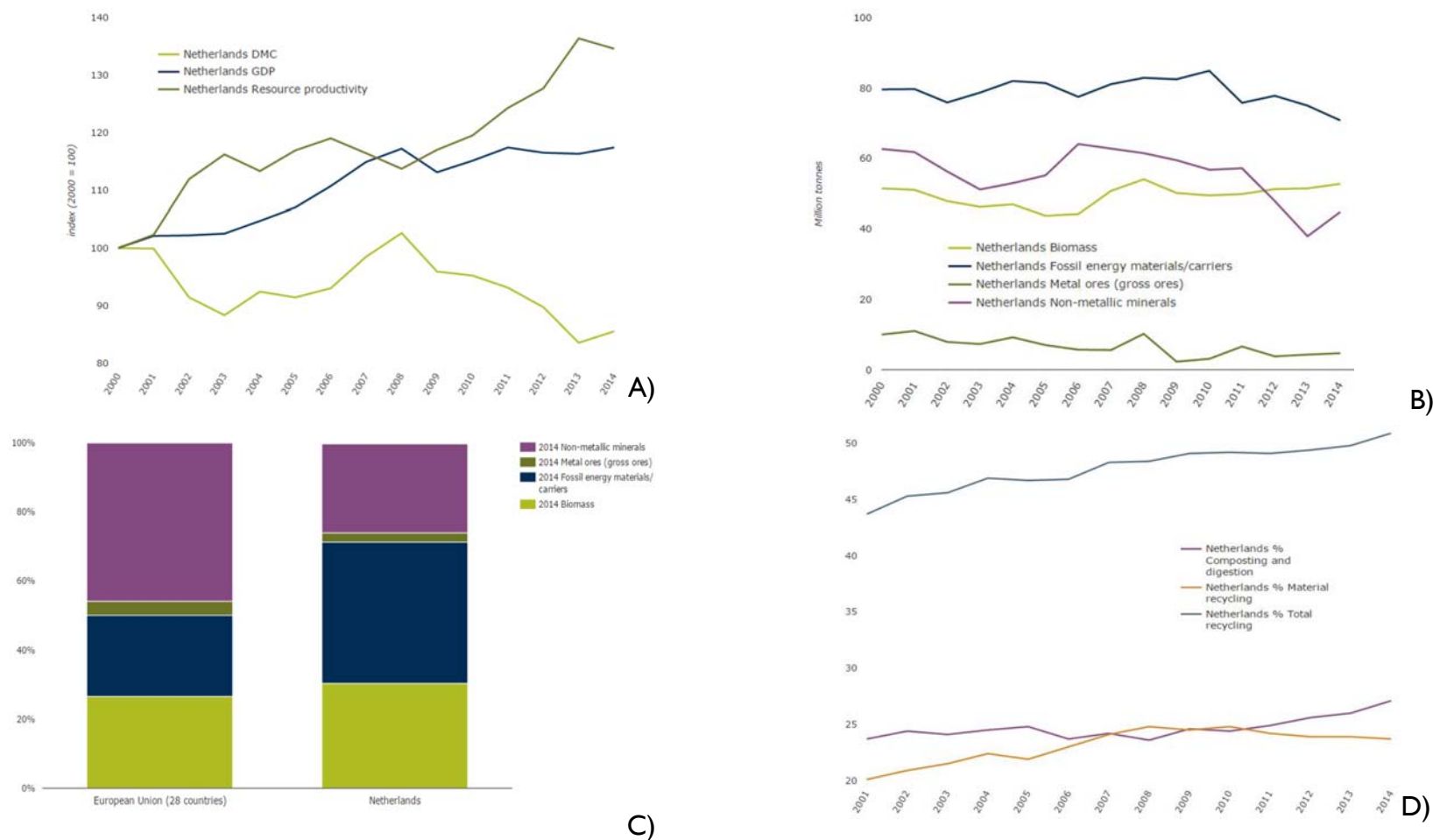


Figure 21 Netherlands: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Netherlands).

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2.21 Poland

Poland's non-energy minerals security issues have been developed by the Ministry of Economy, with participation of the Ministries of Environment, of Infrastructure and Development, of Foreign Affairs, and of Science. Mineral resources management in Poland is currently being discussed in a few government documents, e.g., *Strategy for Innovation and Efficiency of the Economy* (2013), *Strategy on Energy Security and Environment* (2014), and *National Spatial Development Concept until 2030* (2011) (Galos, n.d). The new Mining policy was finished in 2017. Poland's mineral security action plan is to date under development (min-guide.eu, 2018a). With respect to Circular Economy, the Minister for Economic Development established in 2015 a multi-stakeholder group, whose task is to develop a circular economy roadmap (European Union, 2017 – Poland).

Important (strategic) mineral deposits should be included in the Provincial Spatial Management Plan. Borders of mineral deposits (polygons) should be included in the Commune Spatial Management Plan. Mineral deposits are protected in the local spatial plan only where there is confirmed knowledge that the resources are present (Tiess & Murguía, 2016). The Geological and Mining Law of Poland treats the protection of mineral deposits (Horváth et al., 2016). The main strategic objective for Poland up to 2020 is to develop a sustainable economy. This principle should be based on the efficient use of resources, respect for the environment and higher competitiveness as important elements. Forecasts of mineral demand in Poland are performed on an irregular basis by the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences and some universities (Tiess & Murguía, 2016). The Polish economy has a firm direction towards a growth supported by an increasing recycling rate (Figure 20D).

In Poland, data on resources and reserves is provided as a 'national balance of mineral resources' by the Polish Geological Institute-National Research Institute (PGI-NRI). National mineral resource classification system applied is based on legal requirements. The Polish classification system can be compared with other ones through UNFC. However, it is not so easy to harmonize it with the JORC Code - CRIRSCO template due to different terminology used and classification purposes. All relevant data (i.e. data on Poland's mineral raw material deposits, resources, output and future potential) are collected in the 'System of Management and Protection of Mineral Resources in Poland' (MIDAS) (Parker et al., 2015). The exploration licence is granted by the Ministry of the Environment and this includes also a binding contract for mining usufruct²⁰. For state-owned minerals, the total number of public entities involved in the process is four: Minister of the Environment, the Head of Municipality, the competent geological administration authority approving the geological documentation and the environmental authority (European Union, 2016a).

²⁰'mining usufruct'- According to the Polish Geological and Mining Act, any party intending to explore for or exploit minerals owned by the Treasury must obtain so called "mining usufruct" (a right established by way of a commercial agreement) and a license (Given, 2017).

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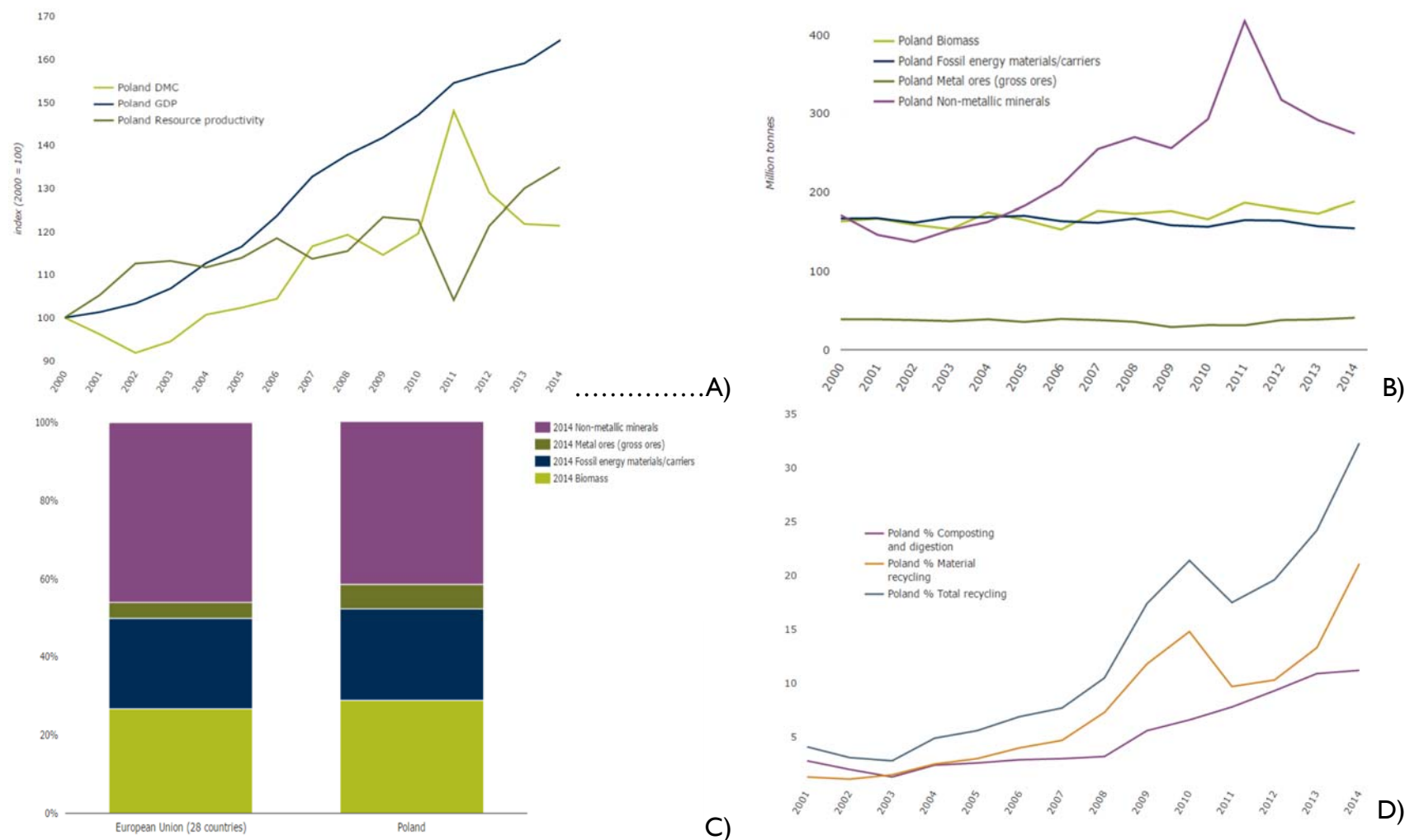


Figure 22 Poland: A) GDP, DMC and resource productivity trends (2000–2014); B) in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Poland.)

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2.22 Portugal

The National Strategy for Geological Resources – Mineral Resources (2012) is a general development policy for raw materials. It looks into economic and regional development and aims at promoting a mining sector contributing to the GDP by ensuring raw material supply and generating revenues itself and that is able to promote regional development (minguide.eu, 2018b). No evidence was found on the use of future mineral demand estimates by the authorities (Tiess & Murguía, 2016).

Data on primary raw materials and its resources is collected for a range of construction, industrial and metallic minerals. The data collection is the responsibility of the Ministry of Economy and Employment (*Ministério da Economia e do Emprego*). Companies are not obliged to use a standard national code, which means that there is no harmonization of data collected. Usually they use JORC and NI 43-101. The data is spatially referenced and variably INSPIRE compliant (Parker *et al.*, 2015).

There are two safeguarding concepts: “Reserve Areas” are defined for the safeguarding of any type of geological resource with high known interest for the local, regional or national economy; and “Captive Areas” are only defined for the safeguarding of mineral masses. Mining sites are included in land use plans at several levels. A new regulatory framework has as its objective the valorisation of land as a raw material source, specifying that the land use management tools should proceed to the identification, delimitation and regulation of areas assigned to the exploitation of geological resources, i.e. the areas assigned to the exploitation of geological resources must be identified and included in all land use plans. The National Program of Land Use Policy is the code where the main strategic guidelines for the Portuguese territorial development model are established²¹ (Tiess & Murguía, 2016).

Portugal has no dedicated policy on Circular Economy. However, several initiatives have at its objective topics related to resource efficiency (e.g decoupling economic growth from material consumption and waste production, increasing integration of waste in the economy; reducing waste production, the amount of waste disposed and emissions of greenhouse gases from the waste sector; preventing waste production; promoting the closure of material cycles) (European Environment Agency, 2016- Portugal).

Since the crisis in 2008, the DMC fell until 2013 (Figure 23 A). On the other hand, the recycling rate has been growing continuously since 2003 (Figure 23 D).

The Portuguese national mining authority for state-owned minerals is the the Directorate-General of Energy and Geology (DGEG; under the Ministry of Economy and Employment) which acts as a “one-stop shop” for mining permits in the exploration, extraction, and post-extraction phases. Therefore, DGEG is the sole institution granting exploration rights and mining concessions to applicants. For obtaining exploration rights, no environmental impact assessment is required. The granting of extraction rights for state-owned minerals is carried out by means of a Government

²¹For further details see MINATURA2020 D3.1, Annex 3 (Tiess & Murguía, 2016).

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issued contract. Extraction (mining) activities are subject to a mandatory EIA to be evaluated by both National Environmental Institutions – the Portuguese Environmental Agency and the Regional Coordination and Development Commissions – and Geological Institutions of DGEG and National Laboratory of Energy and Geology), depending on the location, dimension, and type of resource to be mined (European Union, 2016a).

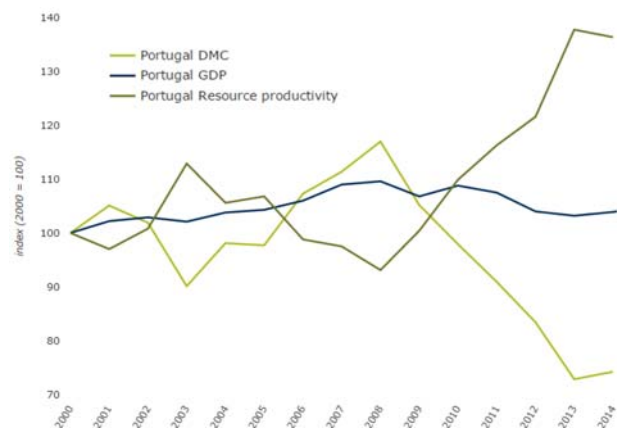
2.23 Romania

Its report “The Strategy of the Mining Industry 2012-2035” (“*Strategia Industrii Miniere 2012-2035*”) issued by the Ministry of Economy (2012) is a minerals policy document, describing the situation and objectives concerning the mineral resources in Romania. This document is regularly renewed, since the previous version envisaged the policy for the period 2008-2020. The goal of the strategy is to boost the activity in the mining industry and thereby to increase the production of raw materials and ultimately support employment and economic growth (min-guide.eu, 2018c). No evidence was found for the use of future mineral demand estimates by the authorities. Romanian resource productivity has a slowly increasing trend but still deeply below the EU average (Figure 24A). It is probably not caused by resource scarcity, but rather by the lack of efficient resources management. Resource efficiency is low, and the Circular Economy remains underdeveloped. First of all, a Waste management remains a key challenge in the country (European Union, 2017 – Romania).

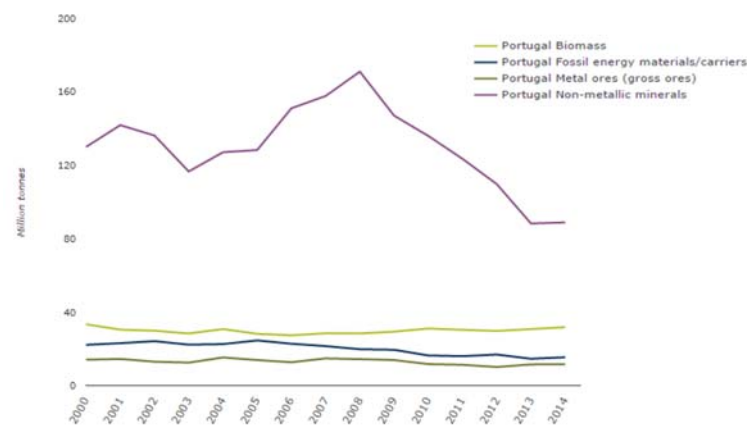
Both independent and governmental related agencies are responsible for the collection of data on mineral resources. The country uses centralized data collation processes for mineral inventory, but harmonization procedures are not used. The title holders/administrators of the mining activities have to submit annually a report on the changes in the quantity of the mineral resources/reserves, using the UNFC-1998 classification. Data on resources and reserves held by National Agency for Mineral Resources complies with the UNFC classification system. Since 1998, the UNFC classification system has been used in Romania (Parker *et al.*, 2015).

In most cases, the building of a mine requires drafting and approval of new zoning urban plans, which in their turn are subject to a strategic environmental impact assessment procedure. However, mineral deposits are not safeguarded in land use plans (General Land Use Plan, Zonal Land Use Plan, and Detailed Land Use Plan) (Tiess & Murguía, 2016). No evidence was found on the use of future mineral demand estimates by the authorities (Tiess & Murguía, 2016). Prospecting permits and exploration licences are issued by the National Agency for Mineral Resources (NAMR) and up to 5 co-authorities might be involved in the process: the National Environmental Protection Agency (NEPA) issues the environmental permit (environmental agreement, includes an appropriate assessment if the proposed project is located in protected areas or in their neighbourhood), the National Company Romanian Waters is involved when the mining works are located in the river beds and terraces below the hydrostatic level, the Ministry of Culture is responsible for any archaeological discharge, and the Ministry of Finance is involved in setting the level of taxation (European Union, 2016a).

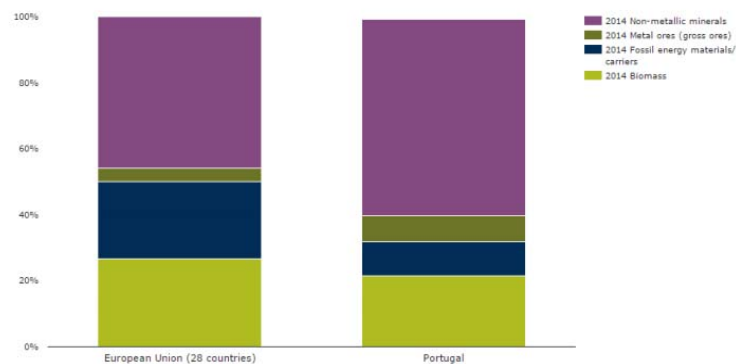
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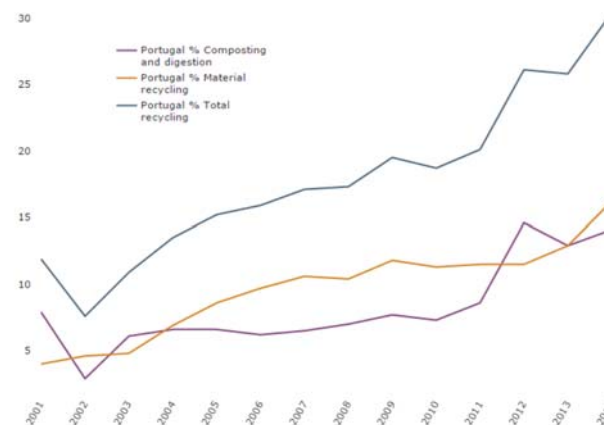
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Figure 23 Portugal: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Portugal).

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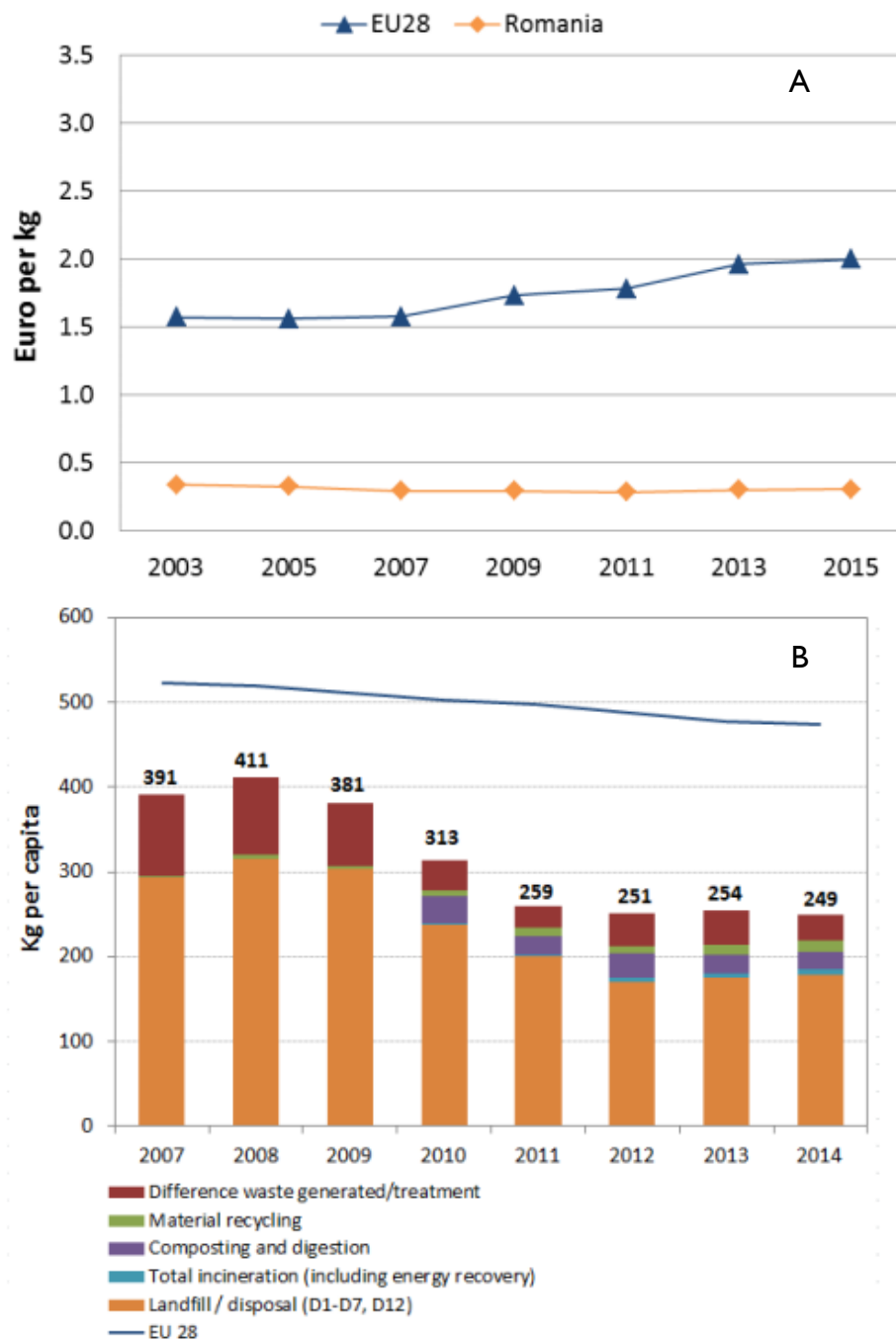


Figure 24 Romania: A) Resource productivity (GDP/DMC) for years 2003-2015; B) Municipal Waste by treatment (2007-2013) (Source: European Union, 2017 – Romania).

2.24 Slovakia

Slovakia has had a Raw Material Policy Proposal since 2004, created by the Ministry of Economy and Ministry of Environment. The proposal has specific aims over different time spans. Short-term aims relate to resource efficiency in production processes and decrease the impact of mining on

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the environment. Mid-term aims relate to increase the efficiency of materials processing and to increase utilisation of mining machines. Long-term aims relate to the removal of the mineral reserves in the time horizon to the years 2017–2018 without losses. The policy aims at resource efficiency, sustainable development, and environmental protection. In short-mid-term it aims to decrease the energetic demand, increase the production quality, resource efficiency and decrease environment impact. (European Environment Agency, 2011b).

Slovakia has, to date, no national policy approaching eco-innovation and the Circular Economy. The Waste Management Plan 2016–2020 was adopted in 2015 (European Union, 2017- Slovakia). Figure 25 is illustrating the dependence of resource productivity on DMC, DMC by category between 2000 and 2014, as well as the trend of the recycling rate in Slovakia.

The Geological survey deals with national mineral resource inventory. The country uses centralized data collation processes for mineral inventory, but harmonization procedures are not used. Exploration and mining companies are under statutory obligation to report reserves of both “reserved minerals” (belong to the state and include minerals for industrial metals production, magnesite, rock salt, potassium, boron, graphite, barites, gemstones, quartz, limestone, among others) mineral deposits and deposits of non-reserved minerals (according to the Mining Code -the SNR Act No.44/1988 Col. on mineral protection and use). Slovakia’s mineral reserves classification system differs significantly from that used in the Czech Republic and is not aligned with an internationally recognised standard code (Parker *et al.*, 2015).

Mineral resources are protected by the land use plans (Horváth *et al.*, 2016). The system is basically working similarly to Czech system of mineral deposits preservation, as the Mining law 44/1988 coll. is coming from the time of former Czechoslovakia. Land use planning policies are developed in regional (low detail) and local (high detail) levels. The land use planning includes the mineral deposit polygons - exploration areas, protected deposit areas and mining areas, as well as the basic deposit data in the text/table form – reserves, production, lifetime and environmental impacts. Minerals are treated equally to other land use planning considerations, according to the valid regulations (Tiess & Murguía, 2016).

The number of co-authorities involved in the permitting procedure varies widely for the exploration and extraction of “reserved minerals” ranging between 1 and 27. For exploration and extraction the competent authorities are the Ministry of Environment and the Regional (District) Mining Office, respectively. Besides the main authorities, the standpoints of local authorities must be consulted, encompassing the standpoints of the county and municipality offices (their number changes according to the extent of the territory covered by the exploration or mining area), as well as all subjects of nature protection, the standpoint of the State Geological Institute of Dionýz Štúr (Division of Geofond) and the standpoint of the holder(s) of the exploration area for other purposes (European Union, 2016a).

2.25 Slovenia

The geological survey deals with mineral inventory, so there is a centralised data collection. National reporting data on resource and reserves comply with a standard code which is similar to the

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“Russian classification system” and it can be transformed to UNFC codes (modified Soviet code) (Parker *et al.*, 2015).

Its National Mineral Resource Management Programme exists since 2009. It focuses on efficient mineral resource management and covers the entire mining cycle from exploration, mine development and extraction to closure and remediation. The general aims and objectives of the management programme are to the increase of sustainability of the mineral resource use. There is also a National Mining Strategy since 2011 with an extensive focus on efficient mineral resource management (European Environment Agency, 2011c).

A short study Efficient Use of Resources – Towards an Action Plan²² in Slovenia analysed the trends and potentials for a transition of Slovenia to a Circular Economy, identified general obstacles and made recommendations on which goals are necessary to achieve. The study includes an EU policy framework with regard to resource efficiency; key environmental policy instruments, including the concept of Circular Economy and cradle-to-cradle; efficient use of resources in EU Member States; waste as a resource; the newest development documents in Slovenia; and preliminary recommendations. The Operational Programme for the Implementation of the EU Cohesion Policy 2014–2020 included the measures which could facilitate a shift towards a Circular Economy: closing material loops inside enterprises and networks – industrial symbiosis; initiating more efficient production processes; waste prevention; managing waste efficiently; and other material resources (European Environment Agency, 2016 – Slovenia). No evidence was found on the use of future mineral demand estimates by the authorities (Tiess & Murguía, 2016). Figure 26A illustrates how the crisis in 2008 was conducive to a reduction of non-metallic consumption in Slovenia.

Mineral resources are included in land use plans as a requisite to allow a permit for exploitation to be granted. This addresses all mineral resources, but only energy minerals are designated as of strategic importance. All areas with a mining concession (or with mining rights) have to be included in the municipal spatial plans and designated as “mineral extraction areas”. For such plans strategic environmental assessment or at least screening is needed (Tiess & Murguía, 2016).

The competent authority for granting exploration and extraction rights for mineral resources is the Energy Directorate (within the Ministry of Infrastructure). The local municipalities are an important co-authority as they are responsible for the municipal spatial plans. (European Union, 2016a).

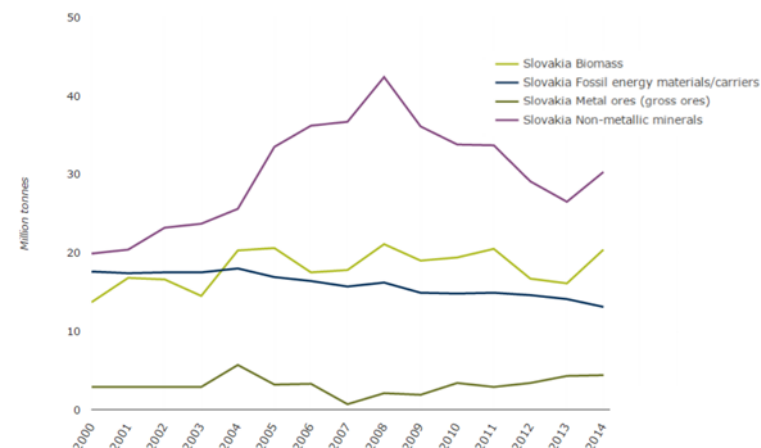
²²A translation is available at:

http://www.mkgp.gov.si/fileadmin/mkgp.gov.si/pageuploads/podrocja/odpadki/ucinkovita_raba_virov.pdf

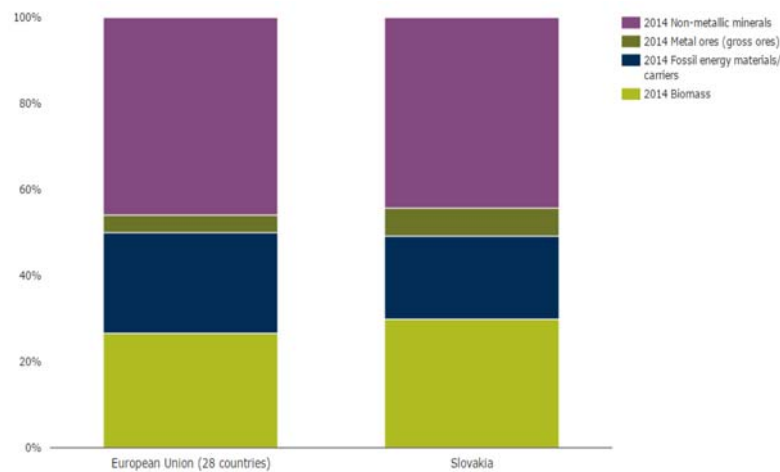
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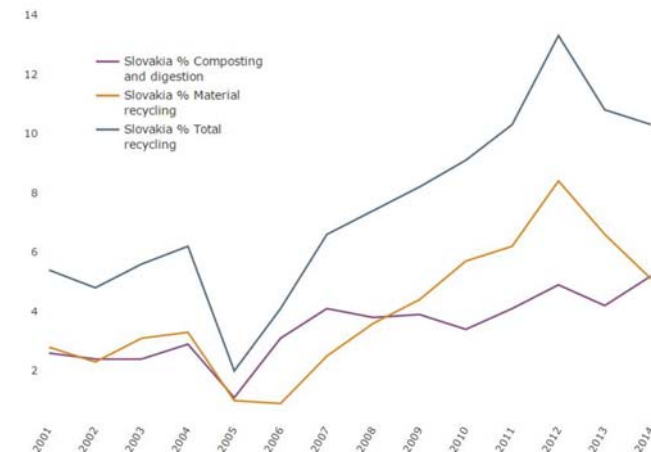
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Figure 25 A) Slovakia: GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Slovakia).

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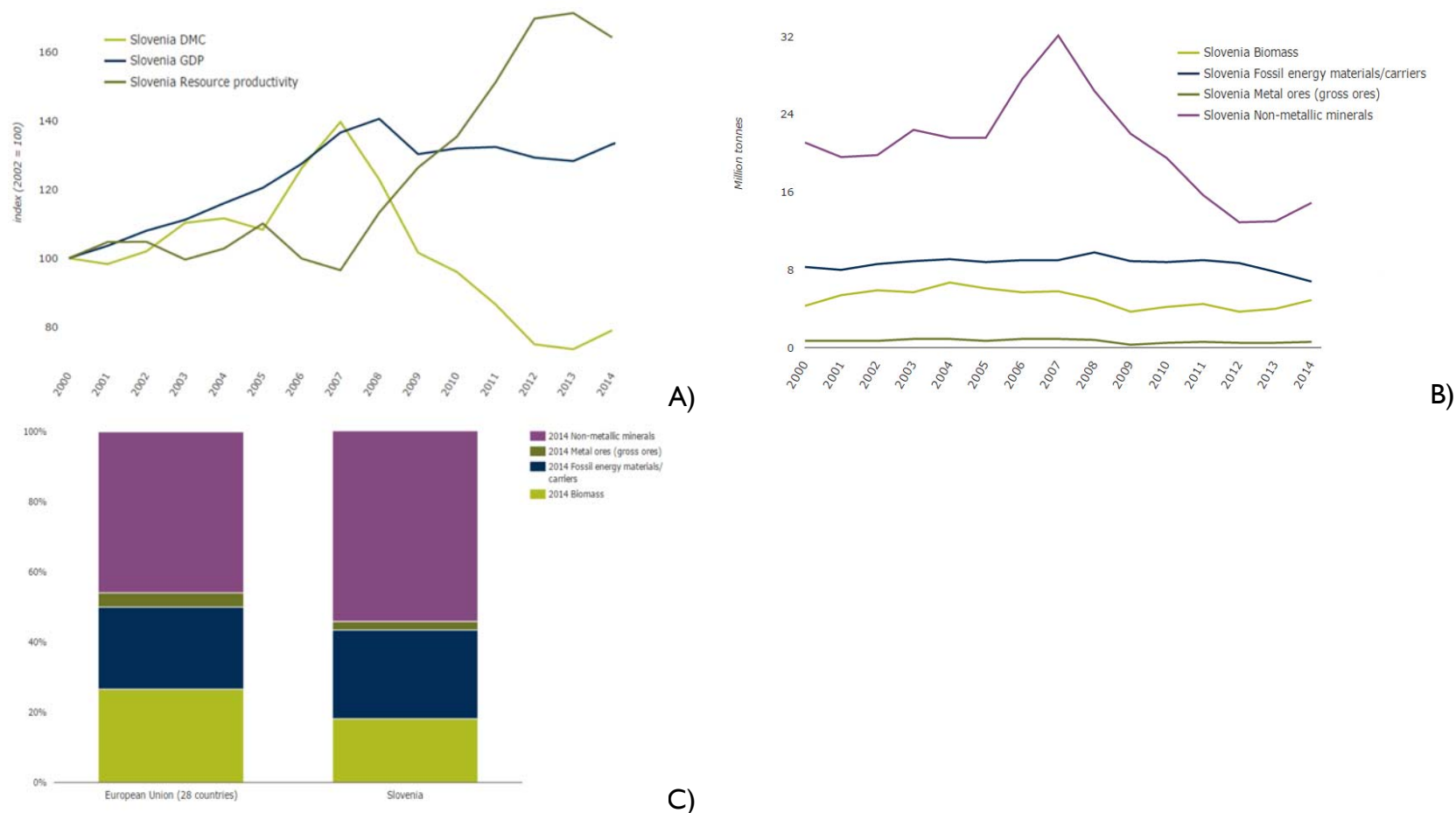


Figure 26 Slovenia: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014; (Source: European Environment Agency, 2016 – Slovenia).

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2.26 Spain

Data collection about mineral resources and reserves does not comply with an internationally recognised standard code and a national code is not used for reporting. The geological survey is responsible for the data collection on raw materials (Parker *et al.*, 2015). The competent authorities governing mineral exploration and extraction are: The General Directorate of Energy and Mines Policy (Ministry of Energy, Tourism and Digital Agenda), Ministry of Agriculture and Fisheries, Food and Environment, Ministry of Education, Culture and Sports and the Ministry of Public Works, Departments of Industry, Environment, Culture and Public Works of each of the 17 Autonomous Regions (European Union, 2016a).

At the moment, no strategy related to raw materials has been implemented by the Spanish Government. As the governance structure in Spain is decentralised, some of the competencies and policy actions might be developed at regional level. e.g.: in 2010 the Andalusian²³ Government approved the Mineral Resources Planning of Andalusia 2010–2013 (PORMIAN) in order to “*enhance the value of the mining sector and bring forward the existing potential to improve the competitiveness, the productivity and the employment with sustainability criteria*”. The PORMIAN is an opportunity to promote the industry of this sector, to make more efficient and competitive the traditional mining operations and to generate processing industry which will provide value added to the industry.

In order to design and fulfil the plan, the Geological Survey of Spain would establish the adequate links with the industry, using the existing model of the European Technology Platform on Sustainable Mineral Resources (ETPSMR) and probably creating a similar instrument in Spain, as proposed by the National Confederation of Mining and Metallurgical Enterprises (CONFEDEM 2015) (Regueiro). No evidence was found on the use of future mineral demand estimates by the authorities (Tiess & Murguía, 2016).

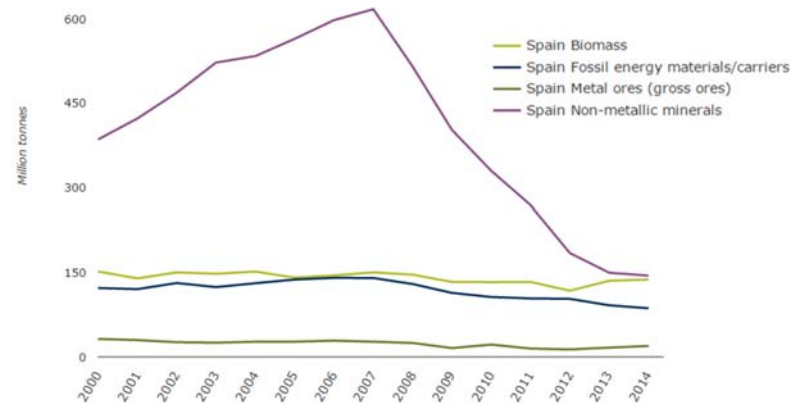
The National Framework Plan for Waste Management 2016-2022 (PEMAR), approved in November 2015 wants to promote closed-cycle management, the Circular Economy and a more sustainable resource-efficient material flow management. Strategies include separate collection of several domestic wastes such as biowaste, paper and glass, as well as the different materials that are contained in WEEE and old cars, through improving pre-treatment and recycling conditions to promote the production of high-quality recyclates, and the recovery of energy from non-recyclable waste, all the while reducing landfill of resources contained in waste. This is also a legal commitment established, for example, in Law 22/2011 on waste and the new Royal Decree on WEEE (European Union, 2017 – Spain). Spain, although being one of the European largest economies, it was strongly impacted by the crisis in 2008 not only in the DMC, especially of non-metallic minerals, moreover it got less successful in total recycling rate (**Fejl! Henvisningskilde ikke fundet.**).

²³ Andalusia is one of the most important mining regions in Spain

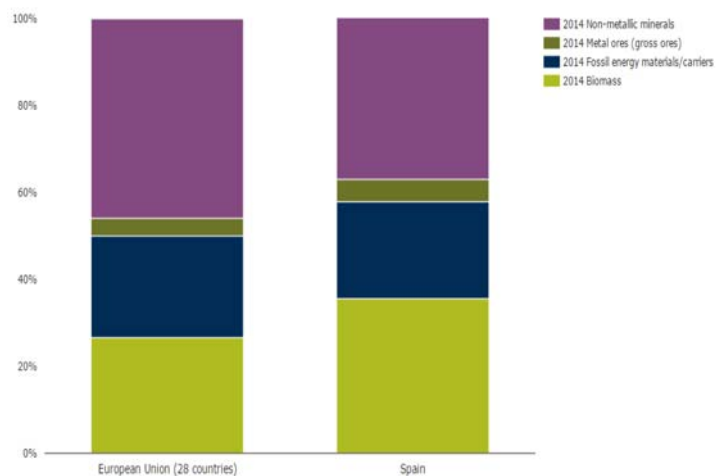
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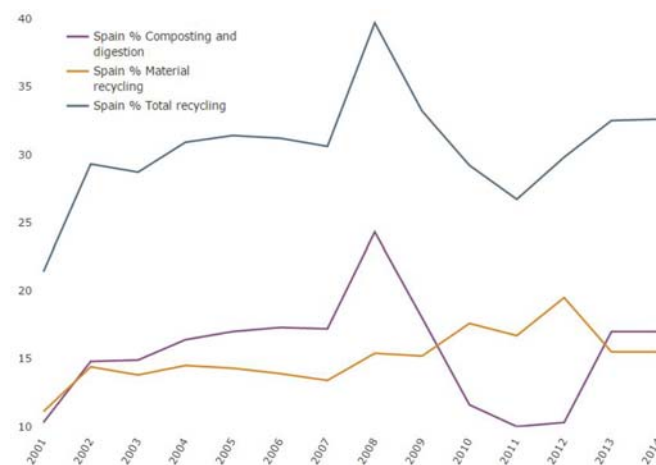
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Figure 27 Spain: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Spain).

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2.27 Sweden

Sweden is known by its active initiative within the raw materials policy issues. Following the recommendations in the EU Raw Materials Initiative (RMI), the Swedish government launched a national mineral strategy in 2013 (Regeringskansliet, 2013). In the strategy, the government identified five strategic objectives in order to increase the competitiveness of the Swedish mining and minerals industry. The strategy also states that Sweden's mineral assets are to be exploited in a long term sustainable way, with consideration for ecological, social and cultural dimensions. The Swedish minerals strategy (2013) aims at resource efficiency. The focus of the strategy is on base metals, precious metals and rare earths. National action for metallic materials (2013) is a strategic research and innovation agenda which was created under the lead of the Swedish steel producers' association (The Swedish metals-producing Industry's associations, 2013). Concurrently with the Mineral Strategy, the government also granted extra financing for production of mineral exploration related geological data in northern Sweden, and a national research programme "Strategic Research and Innovation Agenda for the Mining and Metal Producing Industry" was launched in 2013, followed by a second round for 2017-2020 launched in 2016 (Lax).

There is no requirement in national legislation or policy for the collection of data on primary raw material resources and reserves or other information. Formerly there was a separate reporting standard in use in Sweden, Norway, and Finland, managed by the Fennoscandian Review Board (FRB). In May 2017, this was formally replaced by PERC, and FRB is now one of the participant organisations within PERC (Tiess et al., 2018).

At national level there is no national strategy on resource efficiency. The lifecycle approach is comprised by the Generation goal. Use of recycled raw materials is widely present, especially in larger companies (e.g. Rönnskär smelting company). A transition to a more Circular Economy calls for the involvement of all economic sectors. Sweden welcomes a broad approach of cost-effective measures in the forthcoming proposal, which should be based on a life-cycle perspective, promoting sustainable consumption and non-toxic material cycles, and stimulating innovation and business opportunities. Waste prevention is clearly linked to policy measures such as resource efficiency and sustainable consumption and production (European Environment Agency, 2016 – Sweden). As shown in Figure 28D, the recycling rate in Sweden was approaching 50% in 2014. Yet, the DMC has been substantially increasing alongside the GDP since 2009 (Figure 28A). There is no regularly produced data on mineral demand forecasting in Sweden. However, the Swedish Minerals Strategy acknowledges the essential role of future mineral demand for the strategy to reach its objectives and vision: it posits "*The fundamental prerequisite is a continued strong demand for metals and minerals*". Some proxies (e.g. future steel demand as a function of GDP per capita) are employed to highlight an expected strong future global/international demand for minerals of interest for Sweden (i.e. metals) as well as to show expected growth in Sweden. However, neither in the Minerals Strategy nor in the "*A vision of growth for the Swedish mining industry*" document by SveMin there is a Swedish forecast of future national or regional demand of metals and other minerals of importance (Tiess & Murguía, 2016).

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The competent authority for mining is the Mining Inspectorate, headed by the Chief Mining Inspector (a government appointee), who issues permits for mineral exploration and extraction (concessions) for mineral deposits associated with the Minerals Act. In the process for exploration permits, the County Administrative Board, the municipality and the Sámi Parliament (the Parliament of the Sámi indigenous peoples) are also involved in the process and are entitled to comment on the application. Regarding the extraction concession procedure, the County Administrative Board takes part in the evaluation of land use issues connected to the location of the extraction area applied for (European Union, 2016a).

2.28 United Kingdom

The Resource Security Action Plan: Making the most of valuable materials (2012) is related to 2030²⁴. UK has its Government's national policy on minerals and planning issues under the Minerals Policy Statement series. The national mineral planning policy of the Government in England is exercised through Mineral Planning Guidance Notes and Marine Mineral Guidance Notes. There is no requirement to report to a single international reporting code. Both PERC and JORC are used. There is no national standard code (Parker et al., 2015). Some evidence has been found that the NERC (Natural Environment Research Council) supports demand forecasting to orientate policy-making (Tiess & Murguía, 2016).

Mineral deposit protection is a part of the planning process. The UK government introduced mineral safeguarding into the land use planning system in 2006 (Horváth et al., 2016). In England, Wales and Scotland, the requirement for mineral safeguarding is addressed through overarching policies set at a national level. Local mineral safeguarding policies are subsequently formulated and adopted by local planning authorities in their Development Plan. Areas of land where these policies apply are generally referred to as 'Mineral Safeguarding Areas' (MSAs) and the local safeguarding policies provide detailed instructions about how land use development within such areas is to be managed. There is no presumption that any areas within an MSA will ultimately be environmentally acceptable for mineral extraction. Areas of Search, Preferred Areas, and Specific Sites are designated for that purpose. The purpose of MSAs is not to preclude automatically other forms of development, but to make sure that mineral resources are considered in a balanced way in land-use planning decisions (Horváth et al., 2016).

²⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69511/pb13719-resource-security-action-plan.pdf

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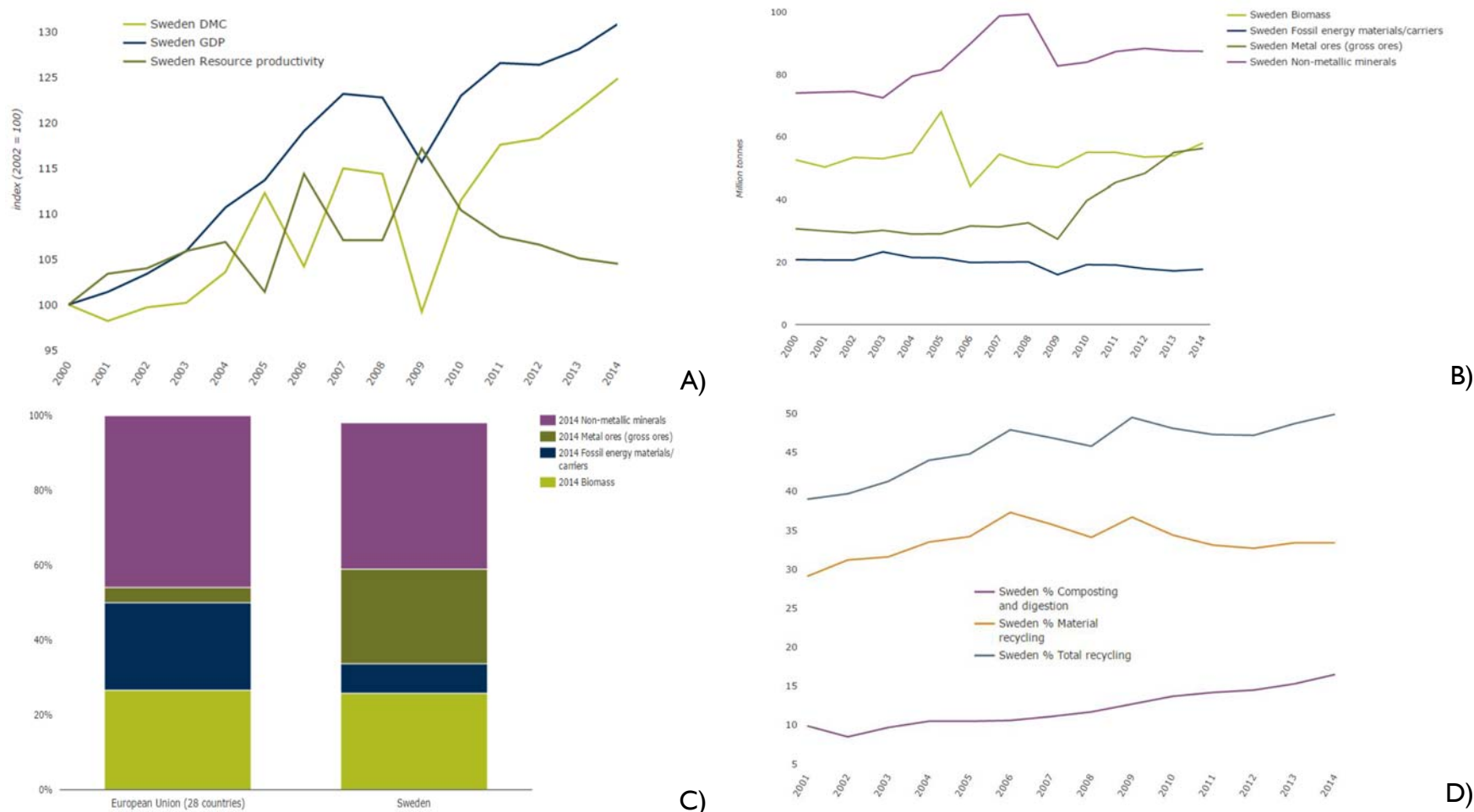


Figure 28 Sweden: GDP, DMC and resource productivity trends (2000–2014); Trends in material consumption by category (2000–2014); Domestic Material Consumption by category in 2014 and Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – Sweden).

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In 2015, the UK Government published a report entitled “Resource management: a catalyst for growth and productivity” that highlights economic and environmental benefits brought by the waste and resource management sector to the UK economy (European Union, 2017 -UK). Secondary raw materials are highly promoted and used within the UK, including especially cementitious materials, glass cullet, iron, steel and copper scrap, aluminium and lead (Mankelow, n.d.). The existence of resource efficiency policies may exist at a level of territories, i.e. The strategy of Scottish government “Safeguarding Scotland’s Resources: Blueprint For A More Resource Efficient And Circular Economy” from 2013 and new Circular Economy strategy of the Scottish government was published in 2016 (Scottish Government, 2013 and Scottish Government, 2016). Resource efficiency and development of a Circular Economy are the aim of the waste strategy in Wales: Towards a Zero Waste (Wales Government, 2017).

In the UK there is no specific Mining Authority. A permitting regime is decentralised, and powers are devolved to the local administration. However, there is no one-stop shop permitting system. The primary decision for permitting is the grant of planning permission by local authorities to use the land for minerals development, so called Mineral Planning Authorities (MPA) which are for each of the four territories (England, Scotland, Wales and Northern Ireland). The environmental and nature protection issues are governed by Environment Agencies for each of the territories the same is for Historic environment protection agencies (European Union, 2016a).

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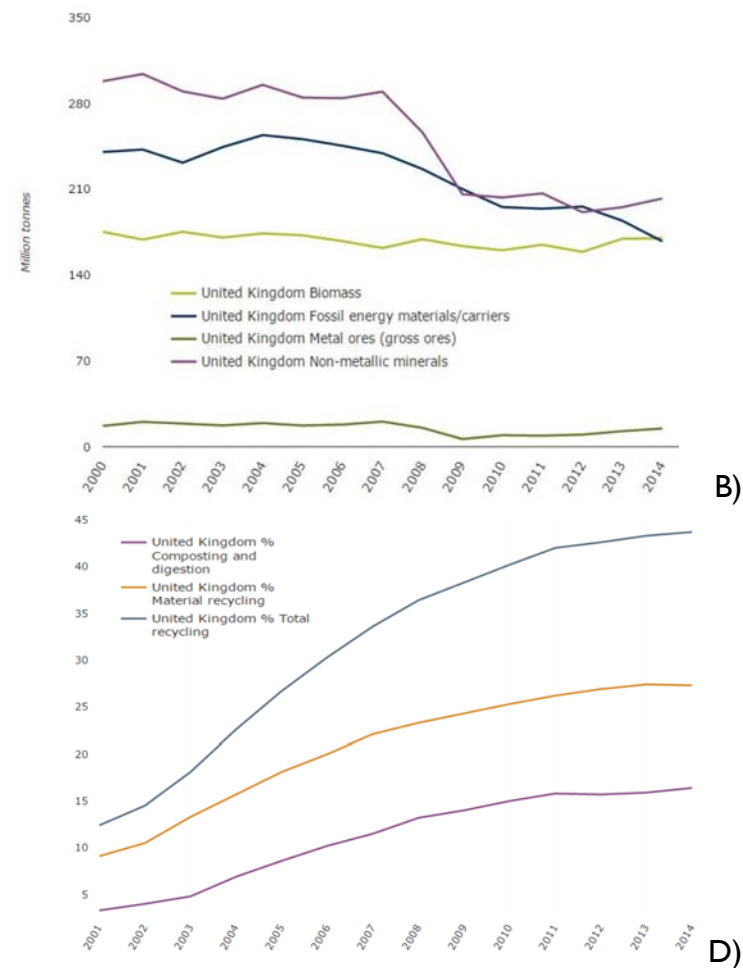
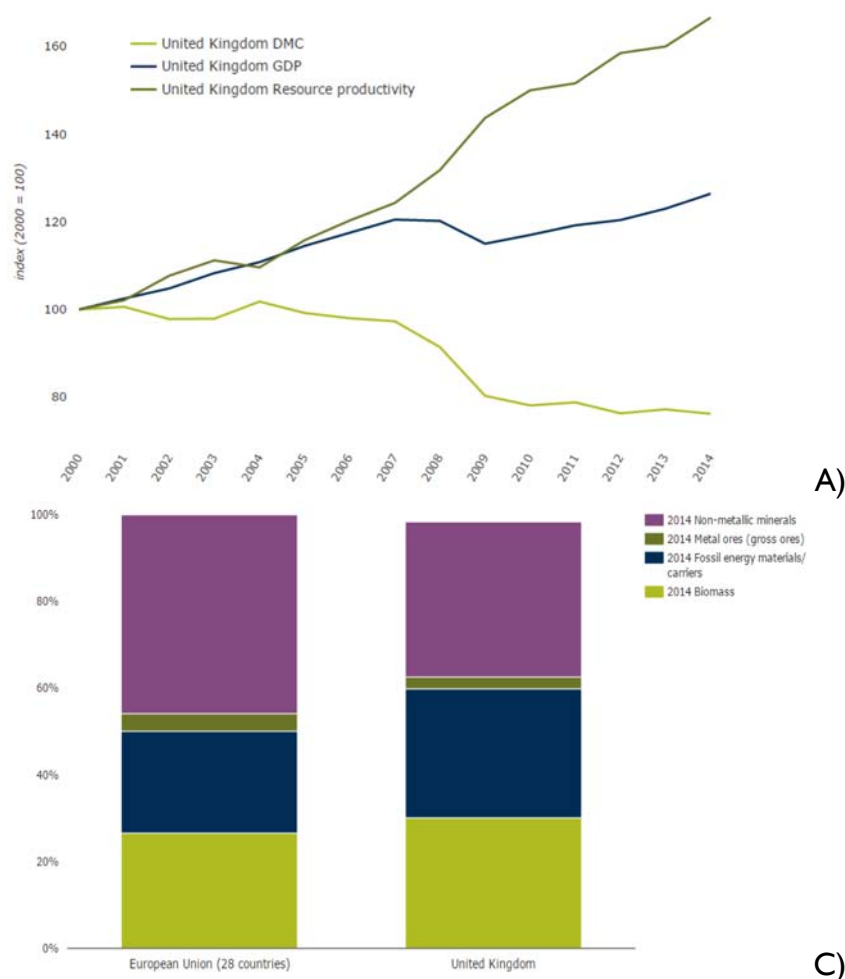






Figure 29 UK: A) GDP, DMC and resource productivity trends (2000–2014); B) Trends in material consumption by category (2000–2014); C) Domestic Material Consumption by category in 2014 and D) Recycling of municipal waste (2001–2014) (Source: European Environment Agency, 2016 – UK).

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3 RMI-MATRIX status of EU-28





Chapter 3 present the RMI-MATRIX status of EU-28 Member States based on the information compiled and presented previously in Chapter 2. The RMI-MATRIX, including the valuation per MS, is shown below in Table 2.

Table 2 RMI-M screening of EU Member States; x – the tool/parameter is implemented by the country on level of strong/medium/weak scenario; MCA - mineral consumption analysis, MFA - material flow analysis, MIA/DGD - mineral inventory analysis/digital geological database, MDoPI/LUP - mineral deposits of public importance/land use planning, Circular Economy, MC/Forecast; INA – information not available.

	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
 Austria								
Strong	x	x		x	x	x	Minerals Strategy (2012)	STRONG
Medium			x					
Weak								
 Belgium								
Strong					x			
Medium	x	x	x	x		x	No specific Mineral policy in place in Belgium at national level(only at regional)	MEDIUM
Weak								
 Bulgaria								
Strong			x				Bulgarian National Strategy for Development of Mining Industry 2030	
Medium	x					x		MEDIUM
Weak		x		x	x			
 Croatia								

²⁵It is not specified if the policy is trating only primary raw materials of both primary and secondary raw materials





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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Strong			x					
Medium		x		x	x			MEDIUM
Weak	x					x	Set of Acts for Mining Industry but not a dedicated mineral policy or strategy.	
 Cyprus								
Strong								
Medium			x				Committee for the Sustainable Development of Mineral Resources to issue recommendations on mineral resources	
Weak	x/INA	x		x	x	x		WEAK
 Czech Republic								
Strong		x	x		'Secondary raw materials policy of Czech Republic (2016)		Raw Material Policy (2017)	STRONG
Medium	x			x		x		or MEDIUM
Weak								
 Denmark								
Strong		x		x	x	x		STRONG
Medium			x				Strategy for the Arctic 2011-2020	or MEDIUM
Weak	x							
 Estonia								
Strong		x		x			Estonian mining Strategy (2017)	






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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Medium			x		x			MEDIUM
Weak	x/INA					x		
Finland								
Strong	x				x		Minerals strategy VISION 2050 and Action Plan (2010): objectives are to promote & develop solutions for global mineral chain challenges and to mitigate environmental impacts	
Medium		x	x					MEDIUM
Weak				x		x		
France								
Strong		x			x		The Strategic metals plan (2010)	
Medium				x		x		MEDIUM
Weak	x/INA		x					
Germany								
Strong		x			x		Raw materials strategy (2010)	
Medium	x			x				MEDIUM
Weak			x			x		
Greece								





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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Strong							The National Policy for the Strategic Planning and Exploitation of Mineral Resources 2012	
Medium	x	x				x		MEDIUM or
Weak			x	x	x			WEAK
 Hungary								
Strong		x						
Medium			x	x	x		mineral policy in progress	MEDIUM
Weak	x					x		
 Ireland								
Strong	x	x	x				Ireland's Minerals Exploration and Mining Policy (2015)	STRONG or
Medium				x	x	x		MEDIUM
Weak								
 Italy								
Strong	x		x			x		STRONG or
Medium		x		x	x		Currently (2017) discussion how to implement EU- RMI	MEDIUM
Weak								
 Latvia								




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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Strong		x						
Medium			x				2015 targets at sustainable use of natural resources	MEDIUM
Weak	x/INA			x	x	x		or WEAK
 Lithuania								
Strong		x	x					
Medium					x		Lithuanian State Strategy of Use of Underground Resources under preparation	MEDIUM
Weak	x/INA			x		x		
 Luxembourg								
Strong					x			
Medium								
Weak	x/INA	x/INA	x/INA	x/INA		x	x/INA	WEAK
 Malta								
Strong					x			
Medium			x	x				MEDIUM or
Weak	x	x				x	x	WEAK
 Netherlands								
Strong	x	x			x		Raw Material document ("Grondstoffennotitie") (2011)	STRONG or
Medium			x	x		x		MEDIUM
Weak								
 Poland								

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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Strong			x	x			Mining policy (2017)	STRONG or
Medium	x	x			x	x		MEDIUM
Weak								
 Portugal								
Strong				x			National Strategy for Mineral Resources (2012)	STRONG or
Medium	x	x	x		x	x		MEDIUM
Weak								
 Romania								
Strong			x				Strategy of Mining Industry 2012-2035	
Medium						x		MEDIUM or
Weak	x	x		x	x			WEAK
 Slovakia								
Strong			x					
Medium				x	x		Raw Materials Policy (2004) – the new one is under preparation	MEDIUM or
Weak	x	x				x		WEAK
 Slovenia								

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	MCA	MFA	MIA/DGD	MDoPI/LUP	Circular Economy	MC/Forecast	Mineral policies ²⁵ / strategy	Valuation
Strong			x		x		National Mineral Resource Management Programme exists from 2009 National Mining Strategy since 2011 exists with an extensive focus on efficient mineral resource management	
Medium	x	x		x				MEDIUM
Weak						x		
 Spain								
Strong								
Medium	x	x	x	Mineral Resources Planning of Andalusia 2010–2013	x			MEDIUM
Weak						x	x	
 Sweden								
Strong			x	x			National mineral strategy (2013)	STRONG or
Medium	x	x			x	x		MEDIUM
Weak								
 United Kingdom								
Strong				x	x		Resource Security Action Plan (2012)	STRONG or
Medium	x	x				x		MEDIUM
Weak			x					

4 Analysis of the RMI-MATRIX status (EU-28)

Chapter 4 discusses the RMI-MATRIX status of EU-28 by strong/medium/weak scenario according to the implementation of each key element (parameter) into its national policy framework as well as an analysis of the ‘wider context’. Importantly, the significance of the findings of the MICA project are to be taken into account from the following point of view: how will these results affect policy? How are these ideally to affect policy-decisions?

4.1 Wider context

The complexity of the minerals sector²⁶ and its interrelations to other types of policies were already discussed in detail in Deliverable D5.1 (Falck *et al.*, 2017). The influences of internal and external factors i.e. economic, natural, environmental, geopolitical, social and technological; are closely interrelated to each other (MinPol, 2017). The trade with mineral commodities is held on different levels: low-value **aggregates and construction materials** are distributed in short-distances from the extraction site, different types of **industrial minerals** are usually traded regionally according to the distribution of different industries dependent on the minerals; **metallic minerals** are part of international trade, prices of base metals and precious metals (e.g. copper or gold) are an issue of metal exchanges; on the other side the price development of some critical metals (see CRM lists of the EU²⁷) such as beryllium, gallium, niobium, ruthenium (a PGM), REE or tungsten are established by agreements between private parties like producers and refiners/users (Murguía & Tiess, 2017).

Moreover, metallic minerals are often the subject of trends and initiatives from intergovernmental organizations like the United Nations (2030 Sustainable Development Goals, Paris Agreement on Climate Change), UNEP’s International Resource Panel and OECD initiatives on Resource Efficiency and Circular Economy, World Trade Organization (10 Principles of Fair Trade, Corporate Social Responsibility) and others that aim at respecting human rights, fostering nature protection or encourage the mitigation of climate change, efficient management of natural resources and encouraging the transition to a Circular Economy (especially in developed countries which have already built their metal stocks, but not on developing ones which still need to build their own stocks, see e.g. MinFuture project²⁸).

A recent report of the FORAM project Deliverable D3.1: *Global raw materials policy context report* (MinPol, 2017) deals with trends and long-term visions of the raw materials sector. It describes well the emerging challenges and rapid changing pace of the global economy covering a wide spectrum of topics (from population growth, globalization, digitalization, industrialization of developing countries to conflict minerals, illegal mining, export restrictions, Free Trade Agreements, etc.). While the previously mentioned topics are discussed internationally among global stakeholders and the scientific community, they are based on experiences/problems or challenges faced in par-

²⁶In this report the term mineral(s) is referring to non-energy and non-agricultural mineral raw materials in the sense of the Raw Materials Initiative COM(2008) 699 and according to the scope of the MICA project

²⁷http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

²⁸<http://minfuture.eu/>

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ticular cases and in specific places/countries. There is a long path from such general discussions towards the implementation of sustainability principles (in the sense of UN 2030 SDGs) in national policy frameworks and consequently putting them in practice. It should be highlighted that a dedicated and sophisticated policy framework does not secure a smoothly working development as it is (only) the set of “playing rules”. However, such rules should provide fair, transparent and competitive environment for all players and it is the State’s mission to ensure them.

4.2 MFA vs MCA approach

Our results indicate that all EU-28 countries are applying MFA and monitoring (DMC) indicators based on EVW-MFA. Some of the countries apply these indicators for policy development. Figure 30 **Fejl! Henvisningskilde ikke fundet.** shows a comparison of EU-28 Member States and some other European countries with regards to their consumption of materials (DMC) per person in three reference years: at the beginning of the millennium in 2000, in 2007 before the global financial crisis and the year 2014. In most of the countries the peak of material consumption was in 2007 (see for comparison the DMC development per country in Chapter 2). In many countries (i.e. Finland, Czech Republic, Denmark, Ireland, Cyprus, Portugal, Luxembourg, Germany, Belgium, Slovenia, Greece, France, Netherlands, Spain, and Italy), the value of the DMC in 2014 is even lower than that one from 2000.

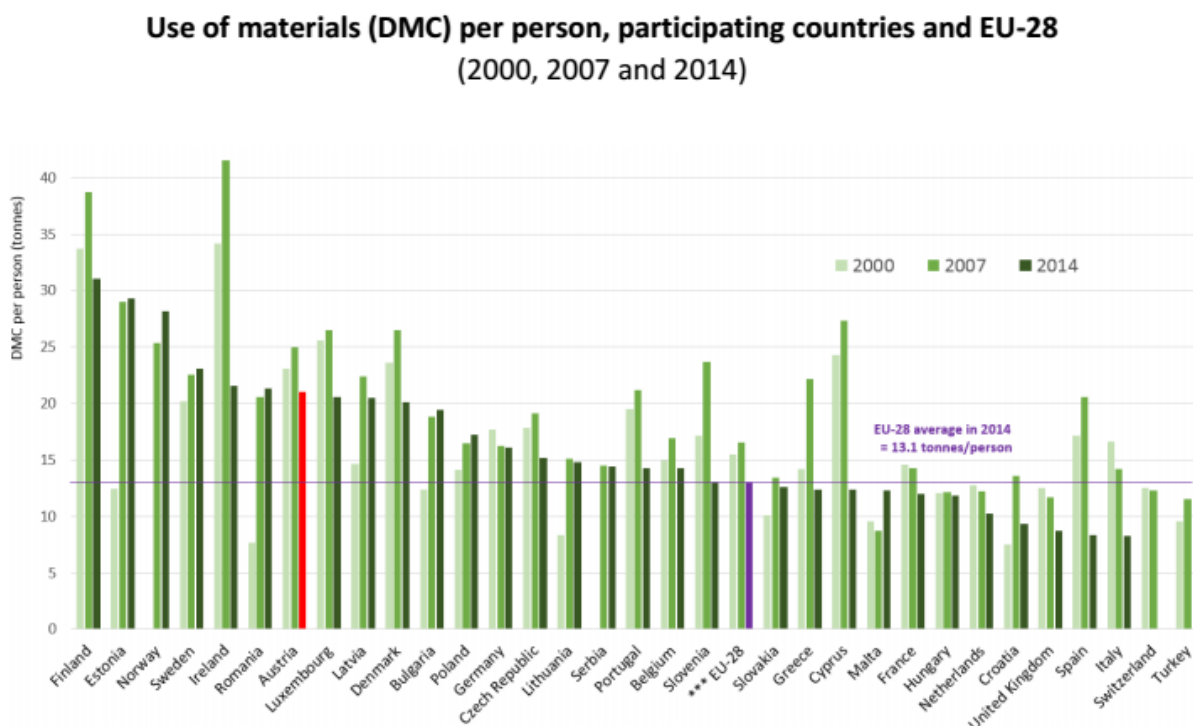


Figure 30 Use of materials (DMC) per person, selected European countries and EU-28 average according to 2015 review of material resource efficiency policies in Europe. Source: European Environmental Agency, 2016.

With some exceptions (like for instance Greece, which has been in long economic recession since 2008), the majority of the countries is performing with a strong resource efficiency. The increasing resource productivity (GDP/DMC) measured in EUR/kg (Figure 31) is in strong correlation with

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the previous figure. In other words, the ratio between economic growth and consumption of materials grew for most countries in the period 2000-2014. This could be explained (case by case) by a growing economy which is reducing its material consumption by successfully implementing resource efficiency policy measures or by economic stagnation/recession/slow growth, which has had a strong impact on significantly reducing material consumption. For individual cases see again the figures from Chapter 2.

Resource productivity (GDP/DMC), participating countries and EU-28
(2000, 2007 and 2014)

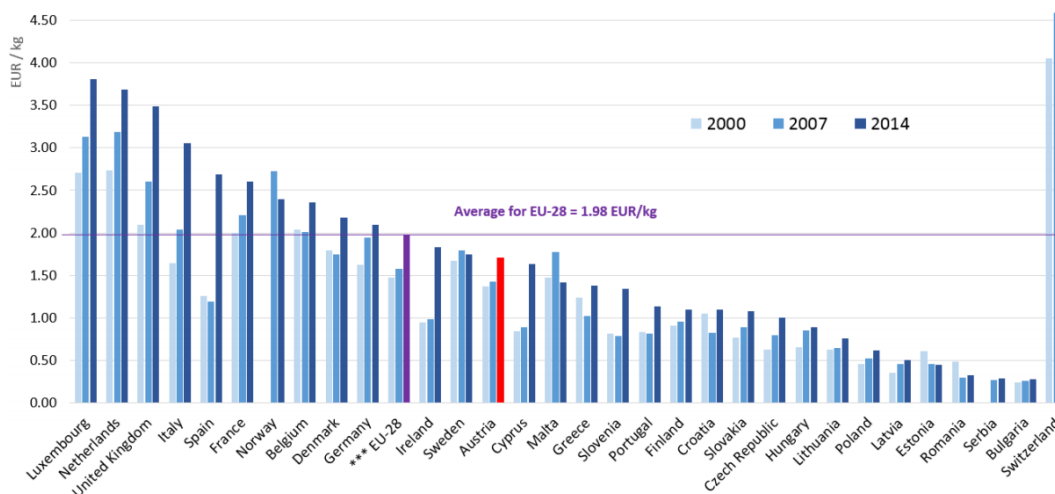


Figure 31 Resource productivity (GDP/DMC), selected European countries and EU-28 average according to 2015 review of material resource efficiency policies in Europe (Source: European Environment Agency, 2016).

Such a simple analysis of indicators based on MCA/MFA and indicators derived from EW-MFA is, thus, strongly recommended (if not yet used) to be used in policy decision-making, and for monitoring the success of resource efficiency measures. Both, DMC and MCA, are using the equation “consumption = production + imports - export (of material)”. Domestic material consumption (DMC) in focus on specific minerals would, therefore, help to analyse which materials are strategic for the national economy and take proper actions towards securing the supply of such material. From the available information studied for this deliverable, these practices are not yet common within the EU-28. In principle, no evidence was found for a detailed MCA, as discussed in D5.1 and D5.2.

In this regard, an important tool will be the (EU) **Resource Efficiency Scoreboard**: a set of indicators to monitor the use of resources and resource productivity is brought together in the Resource Efficiency Scoreboard (European Union, 2016b, pp 30-32). This tool/user interface (the scoreboard) is a compilation of key indicators produced by several European institutions and includes data for the EU as a whole and for individual Member States. Maintained by Eurostat, it contains those indicators that are currently available and will be expanded and modified as new ones emerge. It was designed to cover as many themes and subthemes as possible that were identified in the 2011 Roadmap to a Resource Efficient Europe. The Scoreboard is a three-tier system consisting of the lead resource productivity indicator, a dashboard of indicators for four key areas, and a

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set of theme-specific indicators. The lead indicator on resource productivity — the ratio of gross domestic product (GDP) to domestic material consumption (DMC) expressed as EUR per kg — was adopted to measure the principal objective of the Roadmap to improve economic performance while reducing pressure on natural resources. While no single indicator can fully achieve this goal, this provides a headline metric that monitors trends in material resource efficiency.

Cases from selected countries with respect to MFA versus mineral resources

Data is presented at the website of Statistics **Sweden** and the website of Eurostat²⁹. However, no national objectives or targets are followed up by these indicators.

The indicator domestic material consumption (DMC) shows that in 2014 Sweden's material consumption was about 23 tonnes per person. This is 10 tonnes/person higher than the EU average in 2014 (13 tonnes/person). A possible explanation is in the differences in material composition used by various countries' economies. The DMC indicator includes biomass materials such as forest and agricultural products, metals, non-metallic minerals such as sand and gravel for road construction and buildings, fossil fuels, other goods and net imports of waste. If a country has a large proportion of imports for its material consumption this is reflected by the magnitude of the indicator. For example, imported final goods weight less than the source material they are made of. Sweden has a high consumption of metal ores (gross ores), which is a result of a large mining industry and the generation of large amounts of material. Increased mining of metal ores and non-metallic minerals (sand and gravel) in Sweden has contributed to the increase in DMC between 2000 and 2013.

Material resource use in the **Netherlands** is monitored by the National Statistical Agency in the annual environmental accounts published online³⁰. Under the Environmental Assessment Agency and universities, statistical data on the use of land and natural resources (energy; food/fisheries/forestry; mining; footprints of domestic production and consumption) is published frequently in an online Compendium³¹. Important indicators included in the existing Sustainability Monitor (Chapter 4) are the efficiency of raw material consumption³² (RMC) relative to domestic consumption (RMC/DMC) 2008/2012; economic dependency on rare or critical materials and resources; transition to a bio-based economy; and the worldwide impact (footprint) of consumption and production in the Netherlands.

Reflections on **Poland's** trends in the use of materials and resource efficiency indicates that the Polish economy is continuously growing. During the last 20 years significant progress has been made in reducing pressures on the environment. Despite successes achieved, challenges regarding high material- and energy-consumption persist. Dynamics of the growing trend in final energy use

²⁹ www.scb.se/en/_/Finding-statistics/Statistics-by-subject-area/Environment/Environmental-accounts-and-sustainable-development/System-of-Environmental-and-Economic-Accounts/Aktuell-Pong/38171/Behallare-for-Press/386192/

³⁰ www.cbs.nl/NR/rdonlyres/6293456F-8E61-4821-964D-17C7D67416B8/0/environmentalaccountsofthenetherlands2013.pdf

³¹ www.compendiumvoordeleefomgeving.nl/onderwerpen/nl0042-Environmental-data-compendium.html?i=41

³² Raw material consumption (RMC) or global material footprint is result of final consumption expenditure for more information see: http://ec.europa.eu/eurostat/statistics-explained/index.php/Material_flow_accounts_statistics_-_material_footprints

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remains much lower than GDP dynamics. In comparison, domestic material consumption has been growing intensively and its dynamics are in close correlation with economic growth. This trend has been determined by growth in non-metallic material consumption and largely related to the implementation of infrastructure projects. The Action Plan for Poland's security regarding non-energy raw materials looks at raw materials more from the economic perspective (i.e. assuring raw materials access for the economy, in particular for industry, bearing in mind the importance of particular raw materials for the technologies of the future). The Assumptions of the Action Plan present five pillars with actions including exploration and knowledge base; Extraction; and Processing and raw materials recovery from waste.

It is clear that a global transition in resource use patterns of **Portugal** will play a central role in addressing the long-term, often complex and cumulative impacts that unsustainable systems of production and consumption have had and continue to have on the environment and people's health.

On the side of production, one possible and promising approach is life-cycle assessment (LCA), which looks at resource use and environmental impacts along the full life cycle of a product, from extraction to recycling or disposal. By showing where the critical instances of resource use are located, LCA is a powerful tool for increasing resource efficiency. On the side of consumption, satisfying results are much harder to obtain. Mind-sets and behaviour are not easily changed – and yet there is reason to be hopeful. Adding to a growing environmental conscience, the economic and financial crisis has had profound and hopefully long-lasting effects on consumer behaviour. Largely due to its effects, as consumers, we are reducing our carbon footprint by buying locally, recycling, repairing, reusing, sharing and so on.

In Portugal, domestic material consumption (DMC) generally increased until 2008 (with exceptions in 2002 and 2003) and has declined since then until 2013. This evolution was determined by the contraction of economic activity in Portugal and, particularly, the loss of the relative importance of industries characterised by more intensive use of materials, particularly the construction sector. However, in 2014, DMC slightly increased by 2.5% compared to 2013, probably due to a modest economic recovery, which is still to be confirmed.

Indicators to monitor the use of materials and resource efficiency in **Austria** include GDP as well as domestic material intensity³³ (DMI), DMC and raw material consumption (RMC) of biomass, metals, minerals and fossil fuels. There are annual data for DMI and DMC for the period 1960–2012 for Austria. Austria is also working on determining RMC on an annual basis. Per person DMC in Austria increased from 23.1 tonnes in 2000 to 25.0 tonnes in 2007, and then decreased to 21.0 tonnes in 2014. This development seems to be the consequence of several underlying trends: the economic growth which was strong in 2000–2007 and weak thereafter; a general trend towards increased efficiency (also seen in the increase of resource productivity in 2002–2014); a trend towards more imports of finished products instead of domestic extraction.

³³Domestic material intensity (or Material Intensity of the economy) is a ratio of Domestic Material Consumption (DMC) to Gross Domestic Product (GDP) at constant prices. The indicator provides a basis for policies to increase the efficient use of raw materials in order to conserve natural resources and reduce environment degradation resulting from primary extraction, material processing, manufacturing and waste disposal.

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The development of the Austrian per person DMC follows the same pattern as the average EU per person DMC. The level in Austria is considerably above the EU average, but very similar to the level in Nordic countries. This may be the consequence of a higher per person material demand for infrastructure to cope with the relatively cold climate and the relatively low population density.

While there are positive trends in Austria with respect to resource productivity there still seems to be considerable potential for reducing resource consumption. Such potential has already been identified for food. With respect to housing there is a trend towards single households, which increases demand. Here, solutions should be found which simultaneously enable high-energy and material efficiency as well as high recyclability and long-lasting buildings.

4.3 Back cast/Forecast/foresight of mining policies

In principle, demand forecasting is not often used by Member States and if used, only mainly for aggregates demand forecasting. In turn, however, back cast (based on DMC) is used for back cast trend check to design mining policies. There are some differences concerning the time horizon of these mining policies i.e. they are either mid- or long-term oriented:

- Austria (2012), no time limitation
- Denmark, Greenland and the Faroe Islands/ 2011– 2020
- Finland (2010) - minerals strategy VISION 2050 and action plan
- France (only metallic minerals) (2010)
- Germany (2010)
- Greece - policy and industry / mining policy (2012) /2030
- Netherlands (2010) / 2050
- Portugal (2012) 2020
- Sweden (2012) / 2050
- United Kingdom (2012) / 2030
- Bulgarian National Strategy for the Development of the Mining Industry (2015) / 2030
- Estonian Mining Strategy (2017)
- Polish Mining Strategy (2017)
- CZ mining policy (2017) / 2032

Only Finland, the Netherlands and Sweden include a 2050 vision (foresight) in their mining policies (and they also are referring to land use planning). The other countries prefer a short- to midterm perspective; at this stage it is also not known if these policies will be regularly updated. In a best way, mining policies would include both mid- and long-term.

4.4 MIA/MDoPI/LUP

Research on mineral resources inventory was completed within the MINVENTORY³⁴ project. Resulting statements about data collection are the following:

³⁴ <https://ec.europa.eu/jrc/en/scientific-tool/mininventory>

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- Countries with no centralised data collation and harmonisation processes in place: UK, Norway, France, Germany, Netherlands, Belgium, Germany, Switzerland, Portugal, Austria and Greece,
- Countries with centralised data collation processes, but no harmonisation procedures: Ireland, Belgium, Czech Republic, Slovakia, Poland, Lithuania, Romania, Moldova, Slovenia, Croatia, Bosnia and Herzegovina, Albania, Cyprus and Greenland, and
- Countries with centralised data collation and harmonisation procedures: Sweden, Finland, Ukraine, Hungary, Italy, and Bulgaria.

The geographical distribution of the presence of mineral inventory analysis (MIA) in European countries is shown in Figure 32.

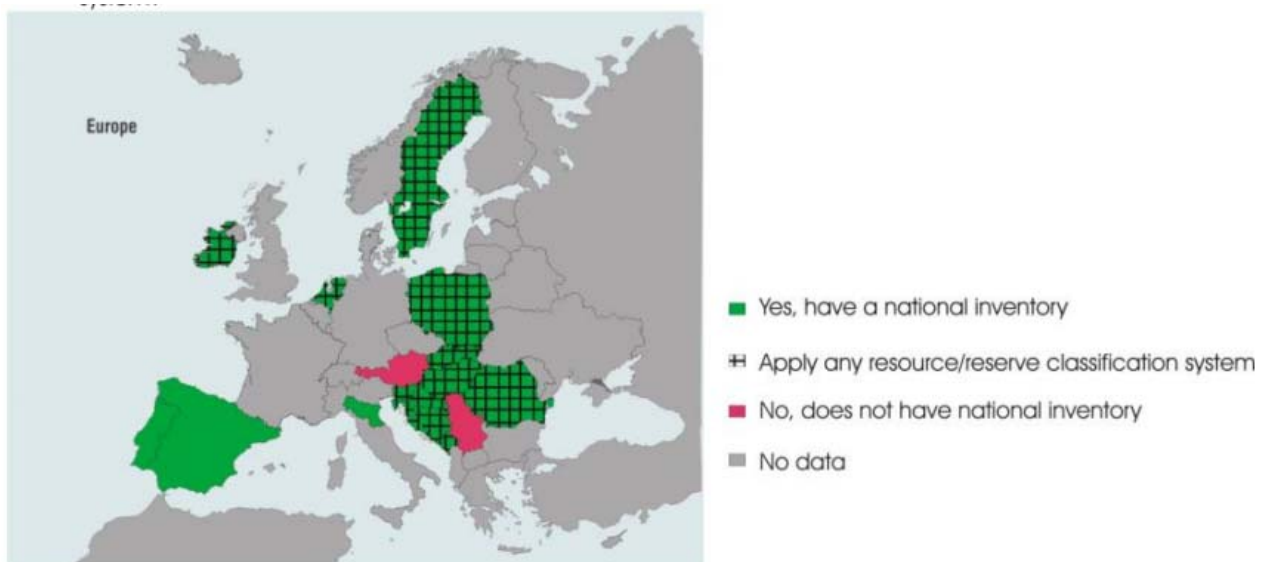


Figure 32 Mineral inventory analysis in Europe (Source: Horváth et al., 2016)

Useful findings about the identification of mineral resources as a part of exploration and exploitation permitting regimes in EU countries was provided in the study abbreviated as MINLEX (European Union, 2016a) e.g. legislation covering the permitting processes, number of authorities involved in the permitting regime, permitting success rate in MSs or centralised/decentralised governance among others.

A consequent implementation of mineral resources identified as having mineral potential into land use plans (LUP) is not always present as the Figure 33 is illustrating. There are countries which implement into LUP only active mines (Ireland, Hungary, Italy, Slovenia, Croatia, Serbia and Romania). Others have some kind of determination of mineral resources in LUP also for potential areas or resources identified by mineral exploration (e.g. Czech Republic and Slovakia).

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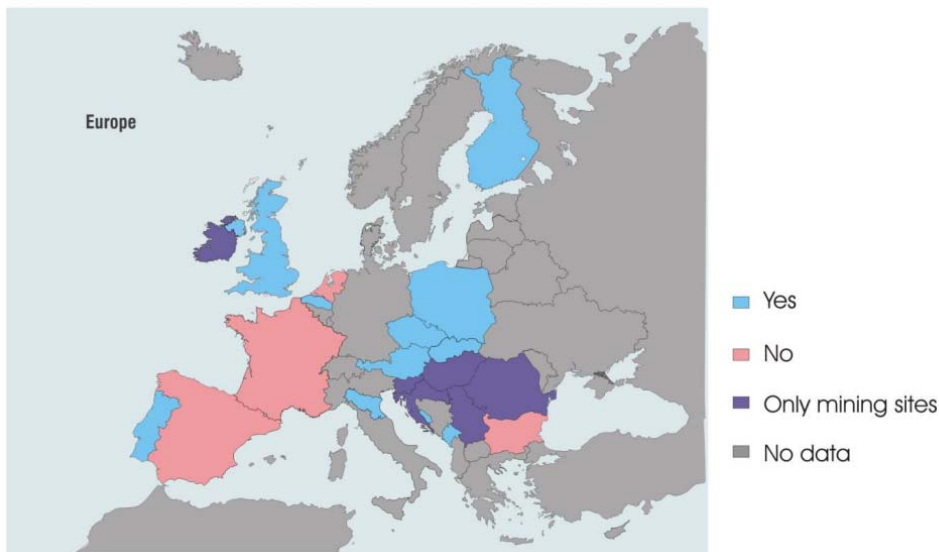


Figure 33 Land use planning policies covering mineral resources in Europe (Source: Horváth et al., 2016)

MSs are identifying their mining potential (digital geological knowledge base), however, there are not too many actions for the protection of deposits as recommended by the European Commission (European Commission, 2011) based on a digital geological knowledge base; a transparent methodology (e.g. GIS application) for identification of mineral resources (quality, quantity, local importance); long-term estimates for regional and local demand taking into account of recycled materials; identifying and safeguarding mineral resources to meet minimum demand, taking account land uses.

According to the results of the MINATURA 2020 project, 10 countries (and Emilia-Romagna Region in Italy) were identified as having some kind of concept of mineral safeguarding (Austria, Czech Republic, Denmark, Emilia-Romagna Region (Italy), Hungary, Poland, Portugal, Slovakia, Slovenia, Sweden and United Kingdom). Austria might be one of those countries having a full national (and regional / local planning approach; (planning hierarchy principle) for minerals i.e. the AUT MINPLAN which is based on GIS application. Other countries, like Sweden, Portugal, UK are also advancing (Tiess & Murguía, 2016)

4.5 Circular Economy

Targets of Circular Economy are taken into account more frequently by MSs (see also figures) which also indicates resources decoupling (as discussed in MICA D5.1: Falck et al., 2017) i.e. increasing resource efficiency, for instance Austria, France, Germany and Portugal. As reported by the EEA (European Environment Agency 2016), nine countries adopted a measurable material resource efficiency/productivity target, frequently based on the EU lead indicator relating gross domestic product (GDP) to domestic material consumption (DMC) (Austria, Estonia, France, Germany, Hungary, Latvia, Poland, Portugal, Slovenia).

At the same time, this topic is showing a large variety of ways of implementation. The evidence could be found in detail especially in two review-reports:

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- “More from less — material resource efficiency in Europe 2015 overview of policies, instruments and targets in 32 countries” report on resource efficiency in the EU member states (European Environment Agency, 2016)
- Review from the European Commission – DG Environment “EU environmental implementation review” (European Union, 2017).

Countries which have Circular Economy targets strongly in the agenda are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Luxembourg, Malta, Netherlands, Slovenia, and UK. Most of the countries are implementing some of the resource efficiency tools into their national policy framework (especially the waste management-oriented actions in form of National Waste Management Plan) or have at least identified the Circular Economy as an important topic. Such countries are, thus, resulting in medium scenario: Croatia, Estonia, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Slovakia, Spain and Sweden. The remaining countries have very poorly implemented Circular Economy and resource efficiency concepts (Bulgaria, Cyprus, Greece, Latvia and Romania).

Recycling is nowadays being considered more frequently; even including critical raw materials in some cases (cp. MICA D5.1: Falck et al., 2017); SCREEN D7.1: Murguía & Tiess, 2018), for instance the Recycling policy for secondary raw materials in the Czech Republic. Interestingly, the new Czech raw materials policy published in 2017 is highlighting the importance of both primary and secondary raw materials (policies) equally (MPO, 2017).

The method of back-casting is, also, used for designing policies for secondary raw materials. The method is taking into account the trend of last time period e.g. 10 years to conclude the desired recycling targets for a certain timeframe. Life Cycle Assessment (LCA) was mentioned as valuable tool in some EEA (2016) country profiles e.g. Portugal (but seems not to be applied so far).

4.6 Mining vs. mineral policies

The following countries are having dedicated mining/mineral/raw materials policies or strategies:

- Austria mineral strategy (2012)
- Bulgarian National Strategy for Development of Mining Industry 2030 (2015)
- Czech new Raw Materials Policy (2017)
- Denmark, Greenland and the Faroe Islands – The Kingdom of Denmark, Strategy for the Arctic 2011-2020
- Estonian Mining Strategy (2017)
- Finland – Minerals strategy VISION 2050 and Action Plan (2010)
- France – Strategic metals plan (2010)
- Germany – Raw materials strategy (2010)
- Greece – The National Policy for the Strategic Planning and Exploitation of Mineral Resources (2012)
- Ireland – Minerals Exploration and Mining Policy (2015)
- Latvia – 2015 targets at sustainable use of natural resources
- Lithuania – State Strategy of Use of Underground Resources (under preparation)

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- Netherlands – Raw Material document ("Grondstoffennotitie") (2011)
- Poland – Mining Strategy (2017)
- Portugal – National Strategy for Mineral Resources (2012)
- Romania – Strategy of Mining Industry 2012-2035
- Slovakia – Raw Materials Policy (2004)
- Slovenia – National Mineral Resource Management Programme (2009) and National Mining Strategy (2011)
- Sweden – National mineral strategy (2013)
- United Kingdom – Resource Security Action Plan (2012)

The method of back casting often used for designing of mining policies is a reverse-forecasting technique which starts with a specific future outcome and then works backwards to the present conditions, e.g. is applied by Bulgarian mining strategy 2030. Based on GDP data, 10 years mining data and detailed geological analyses of the mining potential (when framing the mining policy). GDP is in this way an essential economic indicator, expressing the increasing or decreasing of any national economy.

It might not be a surprise to see the increasing number of mining policies: based on the strong influence of EU minerals policy and the increased GDP development (after the 2008 crises) i.e. supporting/enabling the decision makers to design mining policies in order to decrease the imports and to increase the added value of its mining potential. For instance, the case of Bulgaria: *"The implementation of general and specific strategic goals of Bulgarian's mining strategy will create prerequisites and guarantees for sustainable development of the mining industry in Bulgaria in accordance with the EU raw materials initiative, and a uniform and clear government policy on mineral resources of the country. As a result of the strategy, the Balkan country could become a regional leader in the rational utilization of mineral resources by 2030"* (cf. Chapter 0)

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5 Conclusions and recommendations

There are several countries which resulted as having overall strong (strong or medium) policy framework and are implementing most of the key parameters pointed out to be most important for the positive mineral development scenario i.e. Austria, Czech Republic, Denmark, Ireland, Italy, Netherlands, Poland, Portugal, Sweden and the UK. Cyprus and Luxembourg, according to the screening, represent countries with a weak mineral policy scenario. In the case of Luxembourg, no sufficient information is available about most of the aspects of RMI, thus the statement about the policy scenario in that specific country should not be taken as a definitive. The remaining countries (16) are indicating a medium (medium or weak) scenario. It means that they are applying some of the tools to a certain extent.

A number of the EU funded Horizon 2020 or other EU funded projects are dealing with the topics related to Raw Materials Intelligence tools, such as collecting data, mapping of mineral potential in Europe, mapping of initiatives and mobilizing stakeholders, fostering the cooperation, activating stakeholders and its networking. Among others the projects include Min-GUIDE, MINATURA 2020, SCRREEN, MinFuture, MINLAND, MIREU, FORAM, MINVENTORY, MINERALS4EU. Such projects are providing a strong support to RMI development and through an intensive dissemination of its findings and recommendation improving the conditions and knowledge at European and national level. Continuing this path closer to all stakeholders (to regional and local level) would have a significant impact on the raw materials sector in Europe.

A recommendation of MICA project's Work Package 5 is to use the DMC or MFA approach much more for mineral policy discussion, and in the best case, to combine both MCA and DMC (based on EW-MFA). Certainly, mineral consumption analysis (MCA) is relevant for minerals supply security as it is considering the demand and supply of minerals. For the even more efficient design of mineral policies, it would be helpful if the mineral consumption analysis would be applicable for all kinds of minerals, but it would be closely interlinked with a more dynamic approach of material flow analysis. In other words: having a dynamic model which could deal with mineral raw materials consumption at different stages of the supply chain in time. Other concepts which are highly recommended to be implemented at national policies are related to resource efficiency and Circular Economy - how waste can become a resource (initiatives seeking to close the materials loop). In this regard, having a minerals policy based on a MCA approach would facilitate the development towards the protection of mineral resources (or of the concept of MDoPI as it was developed in the MINATURA2020 project). This conclusion is based on the observations of the increasing EU import dependency of minerals (metals and especially critical raw materials) which is connected to high supply risks. Therefore, it is crucial for the stability of any economy, especially the European, to have access to its domestic resources (see also the II. pillar of the Raw Materials Initiative – COM 699(2008).

Finally, what needs to be highlighted, is to develop and keep an open dialog with all stakeholders. The effective information flow should be working not only horizontally at EU level (scientific communities – industry - European Commission) but also vertically (EU-national-regional level). Especially in countries with decentralised system of governance (but not only), the importance of regions is crucial when it comes to access to land (in terms of mineral resources) or dialogue with the public (so discussed the *Social Licence to Operate*). The exchange of good practices and sharing of experiences is of utmost importance.

6 References

- Bide, T., Bleischwitz, R., Brown, T., Domenech, T., Flachenecker, F., Fleming, C., Kirkwood, C., van Oers, L., Petavratzi, E., Shaw, R. and van der Voet, E. (2017). *FACTSHEETS OF METHODS FOR RAW MATERIALS INTELLIGENCE*. H2020-Project MICA, D4.1: 182p., www.mica-project.eu/?page_id=99
- Department of the Environment, Community and Local Government (2012). *OUR SUSTAINABLE FUTURE' – THE FRAMEWORK FOR SUSTAINABLE DEVELOPMENT IN IRELAND*. Ministry for the Environment, Community and Local Government, Ireland.
- Departement Leefmilieu, Natuur en Energie (2011): *MILIEUBELEIDSPLAN 2011-2015*. Available online at www.vlaanderen.be/nl/publicaties/detail/milieubeleidsplan-2011-2015 (in Belgian Dutch) [Accessed December 28, 2017].
- Erdmann, L.; Eckartz, K.; Moller, B.; Tercero Espinoza, L.A.; Teufel, B.; Fuchs, M.; Machacek, E.; Thorsøe, K.; Petavratzi, E.; Brown, T.; Voet, E. van der; Falck, E.; Bisevac, V.; Hofmeister, T.; Quental, L.; Katalin, S.; Radwanek-Bak, B.; Arnbom, J.-O. (2016). *STAKEHOLDER IDENTIFICATION AND ANALYSIS*. H2020-Project MICA, D2.1: 115 p., www.mica-project.eu/?page_id=99
- European Commission, 2011. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *TACKLING THE CHALLENGES IN COMMODITY MARKETS AND ON RAW MATERIALS*. (No. COM(2011) 25 Final). Brussels
- European Environment Agency (2011a): *SURVEY OF RESOURCE EFFICIENCY POLICIES IN EEA MEMBER AND COOPERATING COUNTRIES. COUNTRY PROFILE: FRANCE*. Available online at www.eea.europa.eu/themes/economy/resource-efficiency/france-2014-resource-efficiency-policies
- European Environment Agency (2011b): *2011 SURVEY OF RESOURCE EFFICIENCY POLICIES IN EEA MEMBER AND COOPERATING COUNTRIES. COUNTRY PROFILE: SLOVAKIA*. Available online at www.eea.europa.eu/themes/economy/resource-efficiency/slovakia-2014-resource-efficiency-policies
- European Environment Agency (2011c): *2011 SURVEY OF RESOURCE EFFICIENCY POLICIES IN EEA MEMBER AND COOPERATING COUNTRIES. COUNTRY PROFILE: SLOVENIA*. Available online at www.eea.europa.eu/themes/economy/resource-efficiency/slovenia-2014-resource-efficiency-policies
- European Environment Agency, 2016. *MORE FROM LESS — MATERIAL RESOURCE EFFICIENCY IN EUROPE: 2015 OVERVIEW OF POLICIES, INSTRUMENTS AND TARGETS IN 32 COUNTRIES*, Luxembourg: European Environment Agency. Overview report together with Country reports Available at: www.eea.europa.eu/publications/more-from-less.
- European Union, (2016a). *LEGAL FRAMEWORK FOR MINERAL EXTRACTION AND PERMITTING PROCEDURES FOR EXPLORATION AND EXPLOITATION IN THE EU. FINAL REPORT - STUDY*. For the EC – Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) provided by MinPol and partners; Contract n° SI 2.717317, ISBN 978-92-79-53905-3, doi:10.2873/920344
- European Union (2016b). *RESOURCE EFFICIENCY SCOREBOARD 2015*. Resource Efficiency Scoreboard serie. [online] Available at: http://ec.europa.eu/environment/resource_efficiency/targets_indicators/scoreboard/pdf/EU%20Resource%20Efficiency%20Scoreboard%202015.pdf [Accessed 11 Jan. 2018].

Deliverable D5.6

- European Union (2017). *THE EU ENVIRONMENTAL IMPLEMENTATION REVIEW PACKAGE*. Country reports and common challenges. [online] Brussels: European Commission, Country Reports Available at: http://ec.europa.eu/environment/eir/country-reports/index2_en.htm [Accessed 29 Dec. 2017].
- Falck, W.E, G. Tiess, D. Murguía, E. Machacek, B. Domenech and B. Hamadová, (2017). MICA Deliverable D5.1: *RAW MATERIALS INTELLIGENCE TOOLS AND METHODS*. rew. by N. Keulen. Available at: www.mica-project.eu/?page_id=99
- Federal Ministry of Science, Research and Economics, 2017. *THE AUSTRIAN MINERALS STRATEGY*. Federal Ministry of Science, Research and Economics. Available at: www.en.bmwfw.gv.at/Energy/AUSTRIANMINERALSTRATEGY/Seiten/default.aspx [Accessed December 28, 2017].
- Federal Ministry of Agriculture, Forestry, Environment and Water Management, (2002). *THE AUSTRIAN STRATEGY FOR SUSTAINABLE DEVELOPMENT: AN INITIATIVE OF THE FEDERAL GOVERNMENT*, Available at: www.nachhaltigkeit.at/nstrat.
- Galos, K. (n.d.). Poland: Mineral Policy. In: G. Tiess, T. Majumder and P. Cameron, ed., *ENCYCLOPEDIA OF MINERAL AND ENERGY POLICY*. [online] Springer-Verlag Berlin Heidelberg. Available at: <https://link.springer.com/referencework/10.1007/978-3-642-40871-7/page/3> [Accessed 9 Jan. 2018].
- Given, R., 2018. Poland: Mining Law 2018. *INTERNATIONAL COMPARATIVE LEGAL GUIDES*. Available at: <https://iclg.com/practice-areas/mining-laws-and-regulations/poland> [Accessed January 19, 2018].
- Hamadová, B., Murguía D. Tiess, G. (2017). MICA Deliverable D5.2: *DEVELOPMENT AND APPLICATION OF THE RMI-MATRIX*. Available at: www.mica-project.eu/?page_id=99
- Horváth, Z., K. Sári, K. Szabó, C. Vigh and E. Hegymegi, (2016). *MULTI-SECTORAL ANALYSIS OF MINERAL POLICIES AND LAND USE POLICIES IN EU COUNTRIES: MINATURA DELIVERABLE D3.1*, project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.
- Lax, K. *SWEDEN: MINERAL POLICY*. In: G. Tiess, T. Majumder and P. Cameron, ed., *Encyclopedia of Mineral and Energy Policy*. [online] Springer-Verlag Berlin Heidelberg. Available at: <https://link.springer.com/referencework/10.1007/978-3-642-40871-7/page/3> [Accessed 9 Jan. 2018].
- Mankelov, J. M. (n.d.). *POLAND: MINERAL POLICY*. In: G. Tiess, T. Majumder and P. Cameron, ed., *Encyclopedia of Mineral and Energy Policy*. [online] Springer-Verlag Berlin Heidelberg. Available at: <https://link.springer.com/referencework/10.1007/978-3-642-40871-7/page/3> [Accessed 9 Jan. 2018].
- Macéšić, M., 2011, *MINING ACT CHANGES HELP TO RETURN CONTROL TO THE STATE*: International Law Office, September 19. Available at: <http://www.internationallawoffice.com/news-letters/detail.aspx?g=c4f5ef91-4305-4463-96ee-4c3c887b58e3>, [Accessed December 28, 2017]
- Min-guide.eu. (2018a). MIN-GUIDE. [online] Available at: www.min-guide.eu/mineral-policy/polands-mineral-security-action-plan-1565 [Accessed 9 Jan. 2018].
- Min-guide.eu. (2018b). MIN-GUIDE. [online] Available at: www.min-guide.eu/mineral-policy/national-strategy-geological-resources-mineral-resources-1652 [Accessed 9 Jan. 2018].
- Min-guide.eu. (2018c). MIN-GUIDE. [online] Available at: www.min-guide.eu/mineral-policy/mineral-industry-strategy-2012%E2%80%932035-1360 [Accessed 10 Jan. 2018].

Deliverable D5.6

- Ministry of Economy (2012): *THE STRATEGY OF THE MINING INDUSTRY 2012-2035*. Strategia Industrii Miniere 2012-2035. Available online at: www.minind.ro/resurse_minerale/Strategia_Industriei_Miniere_2012_2035.pdf
- Ministry of Finance of the Republic of Bulgaria; URL www.minfin.bg/en/869 [Accessed on: December 10, 2017]
- Ministry of Foreign Affairs (2011): Kingdom of Denmark *STRATEGY FOR THE ARCTIC 2011– 2020*. Available online at http://ec.europa.eu/enterprise/policies/raw-materials/files/docs/mss-denmark_en.pdf
- Ministry of Environment, Energy and Climate Change (2015). *NATIONAL POLICY FOR EXPLOITATION OF MINERAL RESOURCES*. Translation published by the European Commission. Available online at: <http://ec.europa.eu/DocsRoom/documents/10002/attachments/1/translations> [Accessed on: January 9, 2017]
- MIP (2005): *THE ENVIRONMENTAL & ENERGY TECHNOLOGY INNOVATION PLATFORM*. Available online at www.mipvlaanderen.be/en/webpage/123/homepage.aspx
- MPO (2017). *NEW RAW MATERIAL POLICY FOR MINERALS AND THEIR RESOURCES - MPO 2017* | Ministry of Industry and Trade. [online] Available at: www.mpo.cz/en/construction-and-raw-materials/raw-material-policy/raw-material-policy-minerals-in-the-cr/new-raw-material-policy-for-minerals-and-their-resources---mpo-2017--233052/ [Accessed 8 Jan. 2018].
- MinPol (2017). *DELIVERABLE 3.1 GLOBAL RAW MATERIALS POLICY CONTEXT REPORT*. FORAM project of the European Union's Horizon 2020 research and innovation programme under Grant Agreement n° 730127.
- Murguía D. and Tiess, G. (2017). *DELIVERABLE D7.1 REPORT ON RELEVANT BUSINESS AND POLICY ISSUES FOR EUROPE PERTINENT TO CRMS*. SCRREEN project of the European Union's Horizon 2020 research and innovation programme under Grant Agreement n° 730227.
- Parker, D., Petavratzi, E., Mankelow, J., Waugh, R., Bertrand, G. (2015). *MINVENTORY: EU RAW MATERIALS STATISTICS ON RESOURCES AND RESERVES. FINAL REPORT*. (No. EC-11 331 Minventory Final Report). Oakdene Hollins, BGS, BRGM, BGR, SNL, HGI, IGR.
- Petavratzi, E. and Brown, T. (2017). *FINAL INVENTORY OF DATA ON RAW MATERIALS*. H2020-Project MICA, D3.2: 37p., www.mica-project.eu/?page_id=99
- Prime Minister's Office Finland (2013): *FINLAND'S STRATEGY FOR THE ARCTIC REGION*. Available online at <http://vnk.fi/julkaisukansio/2013/j-14-arktinen-15-arktiska-16-arctic-17-saame/PDF/en.pdf>
- Reichl, C., Schatz, M., Zsak, G., (2017). *WORLD MINING DATA*. Welt Bergbau Daten. (No. 32). Federal Ministry of Science, Research and Economy, Vienna.
- Regeringskansliet (2013): *SWEDEN'S MINERALS STRATEGY*. Available online at www.government.se/content/1/c6/21/89/86/30eccfae.pdf
- Regueiro, M. *SPAIN: MINERAL POLICY*. In: G. Tiess, T. Majumder and P. Cameron, ed., *Encyclopedia of Mineral and Energy Policy*. [online] Springer-Verlag Berlin Heidelberg. Available at: <https://link.springer.com/referencework/10.1007/978-3-642-40871-7/page/3> [Accessed 9 Jan. 2018].
- Saeima of the Republic of Latvia (2010). *SUSTAINABLE DEVELOPMENT STRATEGY OF LATVIA UNTIL 2030*.
- Šantić, P., 2013, *CHALLENGES TO THE MINING LAW REFORM IN CROATIA*: Schonherr Attorneys at Law. [Accessed July 29, 2014], at <http://roadmap2013.schoenherr.eu/mining-law-reform-in-croatia/>

Deliverable D5.6

- Scottish Government, (2013). *SAFEGUARDING SCOTLAND'S RESOURCES: BLUEPRINT FOR A MORE RESOURCE EFFICIENT AND CIRCULAR ECONOMY* Scottish Government., Edinburgh: Crown copyright. Available at: www.gov.scot/Resource/0043/00435308.pdf.
- Scottish Government,(2016). *MAKING THINGS LAST: A CIRCULAR ECONOMY STRATEGY FOR SCOTLAND*, Edinburgh: The Scottish Government. Available at: www.gov.scot/Resource/0049/00494471.pdf.
- Service public de Wallonie. (2018). *INDICATEURS CLÉS DE L'ENVIRONNEMENT WALLON 2014* L'état de l'environnement wallon. Etat.environnement.wallonie.be [online] Available at: http://etat.environnement.wallonie.be/index.php?mact=tbe,m54ade,default,1&m54adealias=Indicateurs-de-flux-de-matieres_2&m54adereturnid=49&page=49 [Accessed 5 Jan. 2018].
- Tiess, G. (2011) *GENERAL AND INTERNATIONAL MINERAL POLICY*. Focus: Europe, 620 p., Wien: Springer, <http://rd.springer.com/book/10.1007/978-3-211-89005-9/page/1>.
- Tiess, G. & Murguía, D., 2016. *EXPLORING OPTIONS FOR A HARMONISED MAPPING FRAMEWORK: MINATURA DELIVERABLE D2.1*, project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.
- Tiess, G., Majumder, T. & Cameron, P. eds., 2017. *ENCYCLOPEDIA OF MINERAL AND ENERGY Policy*, Berlin: Springer. Available at: <https://link.springer.com/referencework/10.1007/978-3-642-40871-7> [Accessed December 28, 2017].
- Tiess, G., Murguía, D. and Hamadová, B. (2018). *MINATURA 2020 Deliverable 2.3: HARMONISED MAPPING FRAMEWORK*. MINATURA 2020 - project of the European Union's Horizon 2020 research and innovation programme under grant agreement n° 642139.
- The Danish Government (2013): Denmark without waste. Recycle more – incinerate less. Available online at http://mim.dk/media/mim/67848/Ressourcestrategi_UK_web.pdf
- The Dutch national government (2011): *GRONDSTOFFENNOTITIE*. Available online at www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2011/07/15/grondstoffennotitie.html
- The Government of Lithuania (2009): *DĖL NACIONALINĖS DARNIAUS VYSTYMOSI STRATEGIJOS PATVIRTINIMO IR ĮGYVENDINIMO*. The national sustainable development strategy. Approval and implementation. Available online at www3.lrs.lt/pls/inter3/dokpaieska.show_doc_l?p_id=354743.
- The Swedish metals-producing Industry's associations (2013): *NATIONAL ACTION FOR METALLIC MATERIALS*. Available online at www.jernkontoret.se/ladda_hem_och_bestall/publikationer/stalforskning/National_action_for_metallic_materials_webb.pdf
- U.S. Geological Survey (2015). *THE MINERAL INDUSTRY OF CROATIA*. 2013 Minerals Yearbook. [online] U.S. Department of the Interior, U.S. Geological Survey, pp.10.1-10.7. Available at: <https://minerals.usgs.gov/minerals/pubs/country/2013/myb3-2013-hr.pdf> [Accessed 29 Dec. 2017].
- Wales Government, (2017). *TOWARDS ZERO WASTE*. Welsh Government. Available at: http://gov.wales/topics/environmentcountryside/epq/waste_recycling/zerowaste/?skip=1&lang=en [Accessed December 15, 2017].