

Department of Political Science  
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RAW MATERIALS, STRATEGIC AUTONOMY  
AND EUROPEAN INDUSTRIAL POLICY

GIAN PAOLO MANZELLA

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SUPERVISOR

MARK THATCHER

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CO-SUPERVISOR

EUGENIO CONSIGLIO

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CANDIDATE  
ID No.646062

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## LIST OF ACRONYMS

- ADEME Agence de l'Environnement et de la Maîtrise de l'Énergie
- AHWG Ad Hoc Working Group
- BGS British Geological Survey
- BRGM Bureau de Recherches Géologiques et Minières
- CEA Commissariat à l'Énergie Atomique et aux énergies alternatives
- CGE Conseil général de l'Économie, de l'industrie, de l'énergie et des technologies
- CMIC Critical Mineral Intelligence Centre
- COMES Comité pour les Métaux Stratégiques
- COVID Coronavirus Disease
- CRMs Critical Raw Materials
- DG Directorate-General
- DMC Domestic Material Consumption
- DOE Department of Energy
- EBA European Battery Alliance
- EBRD European Bank for Reconstruction and Development
- ECSC European Coal and Steel Community
- EIB European Investment Bank
- EIP European Innovation Partnership
- EIT European Institute of Innovation and Technology
- ENEA Energia Nucleare Energie Alternative
- ERMA European Raw Materials Alliance
- ESG Environmental Social Governance
- EU European Union
- G8 Group of Eight
- GDP Gross Domestic Product
- HREEs Heavy Rare Earths Elements

- ICT Information and Communication Technologies
- Ifremer Institut Français de Recherche pour l'Exploitation de la Mer
- IPCEI Important Project of Common European Interest
- ISPRA Istituto Superiore per la Protezione e la Ricerca Ambientale
- IR Import Reliance
- LREEs Light Rare Earths Elements
- JRC Joint Research Centre
- NACE Nomenclature statistique des activités économiques dans la Communauté européenne
- NGOs Non Governmental Organizations
- OECD Organization for Economic Co-operation and Development
- PGMs Platinum Group Metals
- PNRR Piano Nazionale di Ripresa e Resilienza
- REEs Rare Earths Elements
- RMI Raw Materials Initiative
- RMIP Raw Materials Investment Platform
- SR Supply Risk
- UK United Kingdom
- UN United Nations
- UNCTAD United Nations Conference on Trade and Development
- UNEP United Nations Environment Programme
- US United States
- WGI World Governance Indicators
- WTO World Trade Organization

## INTRODUCTION

By many means it can be said that the European Union was founded starting from a common policy on raw materials, as its first sprout was the ECSC (European Coal and Steel Community), established by the Treaty of Paris of the 18<sup>th</sup> of April, 1951. Those raw materials were, at that time, eminently strategic for industry, economy and politics. The competition for the raw materials was considered one of the reasons for the historical rivalry between France and Germany and among the main causes of the outbreak of both the First and the Second World War. In the founder's intentions the shared management of the coal and steel market was bound to have positive effects on the economic reconstruction of Europe after the destruction of the Second World War and prevent the rise of further conflicts and clashes between France and Germany over the exploitation of those raw materials.

From this starting point, this issue has witnessed in the last twenty years an increased and renewed attention at European level. As a matter of fact, since 2008, with the first edition of the RMI document (Raw Material Initiative), the EU has officially adopted a common EU policy in this sector. This document, which has been updated every 3 years, is a detailed report on the dependencies related to materials that are considered critical for the main European industrial supply chains. The document also elaborates strategies and initiatives to be implemented in order to reduce the EU's dependence on supplies that are not considered safe.

Lately, however, international context sets the issue of raw materials at the centre of the political agenda. There are various reasons explaining these developments:

First of all, European member states and major manufacturing countries such as Japan and the US are dependent on few suppliers for critical raw materials for their main production chains: China, Russia and other emerging countries. The latter all have large reserves of these materials and a low production cost, so they have built a structured chain of extraction, refining and processing. Result being a quasi-monopoly positions as regards the supply of certain materials. This situation has become even more evident following the COVID pandemic of 2020 and the war in Ukraine of 2022. Secondly, the critical raw materials are especially relevant for the "twin transitions". To achieve the objectives of the EU green deal of 2050 and the digital transition, high tech manufacturers will need a larger amount of many materials such as lithium, silicon metal, nickel. As a consequence, there is

therefore an increasing need of these elements to secure strategic production and the relevant raw material supply chains.

As a result, the European Union has given new prominence to this issue. In the context of the Industrial strategy, relevant attention was given to the theme, new studies have been undertaken, a specific Raw Material Act is expected in the first part of 2023. In parallel, there are also initiatives of the member states.

The focus of the Thesis will be the analysis of the policies and legal instruments at EU disposal to tackle the issue raw materials supply.

In this view the first chapter will define what is meant by raw material and a first classification is proposed. It will highlight the new centrality of raw materials through the analysis of data on the huge increase in global consumption from 1970 to the present. Then it will highlight the cause of this increase: population and economic growth and technological development in extra EU countries. Finally, it will examine importance of CRMs in the value chains of industrial production, listing the most important materials in the fields of digital technologies, renewables energies, automotive, defence, lithium batteries and robotics.

Chapter Two examines the EU policy on raw materials through the history of the EU starting from the Treaty of Paris establishing the ECSC in 1951 up to the first RMI Communication of 2008 and its updated versions of 2011, 2014 and 2017.

In the third chapter the RMI Communication of 2020 is analysed in detail, starting from the last update of the CRMs list. The EU Action Plan on raw materials is then examined, outlining the 10 actions identified in the Communication. Finally, other relevant EU actions on raw materials will be analysed: the European Institute of Innovation and Technology (EIT) Raw Materials, the European Innovation Partnership on Raw Materials (EIP), the European Raw Materials Alliance (ERMA) and the Circular economy action plan.

The fourth chapter will focus on specific national experiences of the UK, the US, Italy and France. The fifth chapter deals with the future Raw Material Act whose legislative process will start in March 2023, and will present indications for new industrial policy tools for a common European policy on raw materials are presented.

The conclusions will resume the overall research.

# CHAPTER ONE

## THE RAW MATERIALS

### 1.1 Raw and critical materials: definition and classification

Technological progress achieved over the centuries has involved the use of increasing quantities and variety of raw materials, as essential elements in industrial production, for technological progress and for economic growth<sup>1</sup>.

Raw materials are divided into two broad categories:

- renewable raw materials, specifically of plant and animal origin (wood, agricultural products, solar energy etc.).
- non-renewable raw materials (oil, natural gas, metals etc.).

In addition to that, the so-called secondary raw materials include materials consisting of waste from the processing of primary raw materials or materials resulting from the process of recovery and recycling of waste. Among the raw materials a narrower category of materials is identified: so called critical raw materials, having a strategic importance for the industrial economic system.

In this respect, the EU has drawn up a list contained in the document Raw material initiative (RMI) 30 raw materials considered critical, on the basis of their relevance for some industrial sectors such as digital technologies, renewable energy, electric mobility, healthcare, defence, and aerospace<sup>2</sup>.

### 1.2 The new centrality of raw materials

EU manufacturing countries are historically large importers of raw materials as they typically do not have reserves of raw materials on their territory. As a matter of fact their production chains depend heavily on imports from other countries and the EU's trade deficit in raw materials currently stands at 31 billion Euros<sup>3</sup>. From 1970 to 2017, the extraction of natural resources on a global scale increased

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<sup>1</sup>“Materie prime, Treccani enciclopedia on line”. <https://www.treccani.it/enciclopedia/materie-prime>

<sup>2</sup>“Critical raw materials in EU external policies - Improving access and raising global standards”, European Parliament, 12,05,2021. p.2 [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS\\_BRI\(2021\)690606\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS_BRI(2021)690606_EN.pdf)

<sup>3</sup>Ibidem [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS\\_BRI\(2021\)690606\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS_BRI(2021)690606_EN.pdf)



from 27.1 billion tons to 92.1 billion tons per year, and consumption increased from 7.4 to 12.2 tons per capita per year<sup>4</sup>.

In the same period, the extraction of metals, such as iron, aluminium, copper and other non-ferrous metals has increased by 2.7% per year, from 9.5% to 10% of total extractions. Such materials are used in the construction and construction of transport infrastructure. The demand of iron ore has grown by 3.5% per year compared to non-ferrous minerals, which grew by 2.3% per year.

As regards the non-metallic minerals, from 1970 to 2017, this category has increased from 9 to 44 billion tonnes<sup>5</sup>. In addition, non-metallic minerals have increased their share of total extraction from 34% to 48% of the total. About a third of these materials come from China, followed by 7.6% in India and 7.1% in the US<sup>6</sup>.

In the same period, the extraction of fossil fuels, oil, coal and natural gas grew about 2% a year, from 6 to 15 billion tons, though decreasing their share on the total of extractions of natural resources, passing from 23% to 16%<sup>7</sup>. The largest lap occurred in the consumption of natural gas, with a growth of 2.8% a year due to the increase in gas-fired power plants, the demand for coal raised to 2.1% while oil grew by 1.3% on an annual basis. However, new green energy production technologies have significantly reduced coal consumption in recent years<sup>8</sup>.

Biomass extraction, namely crops, crop residues, timber and fish, increased from 9 to 24 billion tonnes from 1970 to 2017<sup>9</sup>. Despite this increase, equivalent to about 2% per year, the total share of biomass consumption has gone from about one third of total extraction to just over a quarter, so it has grown proportionately less than the demand for other types of materials.

This is in line with the fact that many countries are emerging from poverty and gradually entering a more advanced stage of development in which the economy requires more minerals, metals and energy raw materials that are typical of industrialized systems<sup>10</sup>.

Finally, the increase in raw material consumption is expected to accelerate further in the future. The World Bank estimates that, by 2050, the only energy sector, going towards decarbonisation, will require a supply of nickel, that will be higher than 100%, vanadium higher than 200%, indium of almost 250%, cobalt, graphite and lithium about 500% higher<sup>11</sup>.

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<sup>4</sup>“Global resources outlook 2019 - natural resources for the future we want”, United Nations Environment Programme, 2019, p.39. <https://www.resourcepanel.org/reports/global-resources-outlook>

<sup>5</sup>Ivi, p.13.

<sup>6</sup>Ivi, p.44.

<sup>7</sup>Ivi, p.13.

<sup>8</sup>Ivi, p.43

<sup>9</sup>Ivi, p.43

<sup>10</sup>Ibidem

<sup>11</sup>“Minerals for Climate Action - The Mineral Intensity of the Clean Energy Transition”, The World Bank, 2020. <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>

### **1.3 The causes of the growth in consumption of raw materials**

The huge increase in the consumption of raw materials is due to several reasons, demographic growth, economic growth in developing countries and finally technological development. In fact, over the last five decades, the world's population has doubled, and global Gross domestic product (GDP) has quadrupled<sup>12</sup>. Both phenomena mainly affected developing countries in Asia and Africa.

#### **1.3.1 Population growth and economic development in developing countries**

The outlook report on global resources published by the United Nations (UN) estimates that the consumption of natural resources by middle-income countries has risen from 33% of the total to 56% of the total and that in 2012 it exceeded the consumption share of high-income countries, while the share of consumption in high-income countries fell from 52% to 22%<sup>13</sup>.

Looking at the value of Domestic material consumption (DMC), that is a measure of the amount of raw materials consumed in a country, it is confirmed that there is an increase in the consumption of raw materials in emerging countries. In fact, in 1970 the consumption of raw materials in the Asia-Pacific region amounted to 27 billion tons corresponding to about 25% of the world total, a figure more or less similar to that of Europe and North America, which consumed respectively 24% and 22% of the total. In 2017, Asia Pacific consumption amounted to about 60%, while Europe and North America together did not reach 18%. Similarly, the percentage of DMC in high-income countries has risen from 52% to 22%.

We can say that the growth in the consumption of raw materials occurred not so much because of the increase in demand of industrialized countries such as the US, Japan or the European countries<sup>14</sup>, but because of the enormous growth in demand from China and other developing countries<sup>15</sup>.

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<sup>12</sup>“Global resources outlook 2019 - natural resources for the future we want-summary for policymakers”, United Nations Environment Programme, 2019, p.13. <https://www.resourcepanel.org/reports/global-resources-outlook>

<sup>13</sup>Ibidem

<sup>14</sup>“Critical raw materials in EU external policies - Improving access and raising global standards”, European Parliament, 12,05,2021. p.2 [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS\\_BRI\(2021\)690606\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS_BRI(2021)690606_EN.pdf)

<sup>15</sup>Dittrich Monika, Giljum Stefan, Lutter Stephan, Polzin Christine, “Green economies around the world? Implications of resource use for development and the environment”, 2012. [https://www.boell.de/sites/default/files/201207\\_green\\_economies\\_around\\_the\\_world.pdf](https://www.boell.de/sites/default/files/201207_green_economies_around_the_world.pdf)

### **1.3.2 Technological development**

Production of renewable and digital energy technologies will increase significantly in the coming decades. These new technologies require raw materials for a large part of their components, especially many critical materials such as non-metallic minerals and rare earths. In particular, in the near future, there will be a huge increase in the production of batteries, chips, ecological engines and other equipment for which rare earths, metals and other minerals are essential. As a result, the demand for these materials will increase exponentially. According to a report published by the World Bank, to meet the demand for energy storage technologies, graphite, lithium, and cobalt production could increase by 450% by 2050 compared to 2018 levels<sup>16</sup>.

In this context, the EU is one of the global actors that is most pushing for technological innovation strategies and programmes. The European green deal and the EU's digital strategy to transform the economy will lead the EU to achieve climate neutrality by 2050. Many raw materials, as well as being strategic for the future dual transition, are already crucial for many strategic EU industrial sectors. As part of the new European industrial strategy of 2020, updated in 2021, raw materials have a central weight as they are essential to build a new production system that can allow the achievement of climate neutrality objectives by 2050. In addition to the management of the dual transition, through the new industrial strategy, the EU aims to strengthen strategic autonomy, a geopolitical objective which we will discuss later.

### **1.4 The major supplier countries**

China is the biggest global supplier of critical raw materials, accounting for 66% of individual critical raw materials. 86% of supplies of heavy and light rare earths are provided by China. These data in particular those regarding rare earths don't correspond to the estimated amount of global reserves<sup>17</sup>. China's estimated deposits accounts for 44,000,000 tons of rare earths which corresponds to 33,8% of world reserves that are estimated in 13,000,000 tons. Brazil's reserves are estimated in 21,000,000 tons, Vietnam 22,000,000, India 6,900,000, Australia 4,200,000. These data show that the creation

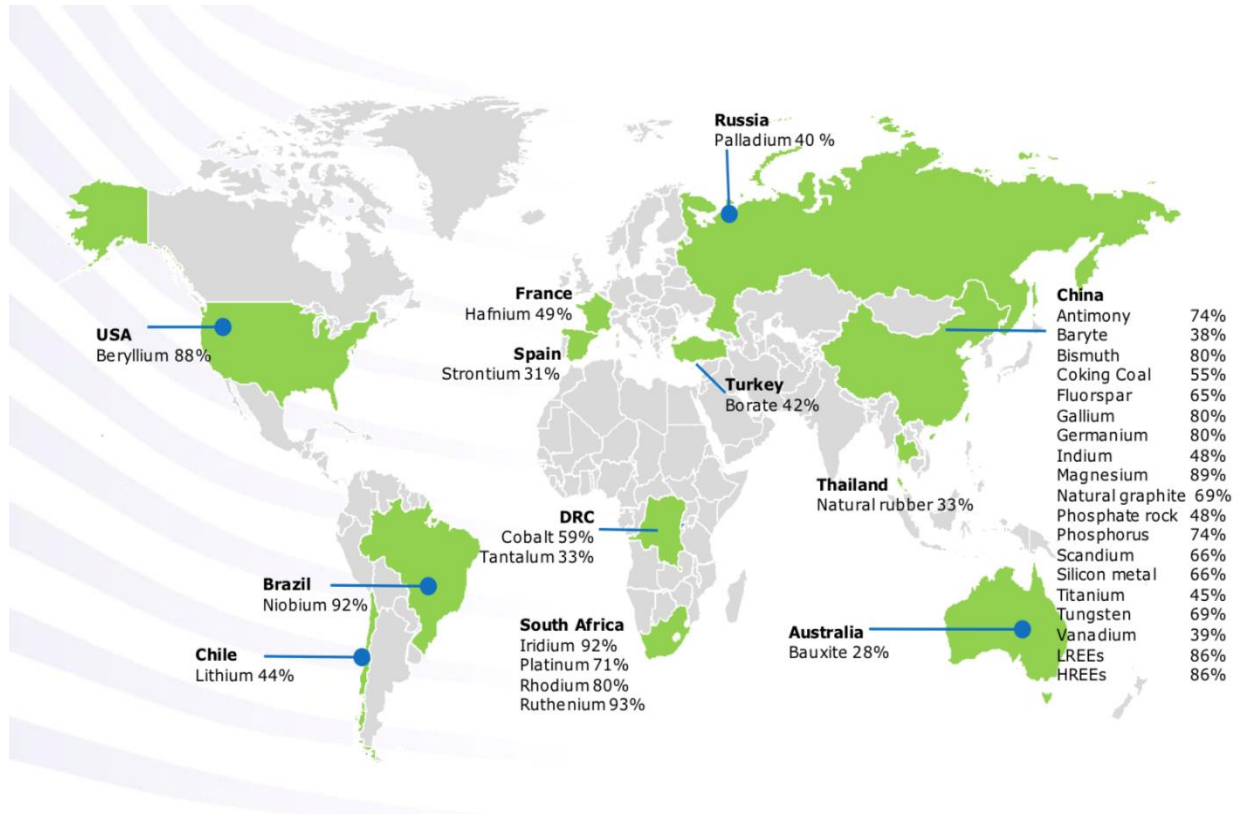
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<sup>16</sup>“Minerals for Climate Action - The Mineral Intensity of the Clean Energy Transition”, The World Bank, 2020, p.11. <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>, p.11.

<sup>17</sup>“Study on the EU's list of Critical Raw Materials - Final Report”, 2020, p.6. <https://op.europa.eu/en/publication-detail/-/publication/c0d5292a-ee54-11ea-991b-01aa75ed71a1/language-en>

partnerships for new supplies with other countries to be more independent from China is necessary and possible<sup>18</sup>.

**Figure 1: Countries with the largest share of global supply of CRMs**



**Source:** Study on the EU's list of Critical Raw Materials (2020) Final Report, EU Commission, 2020.

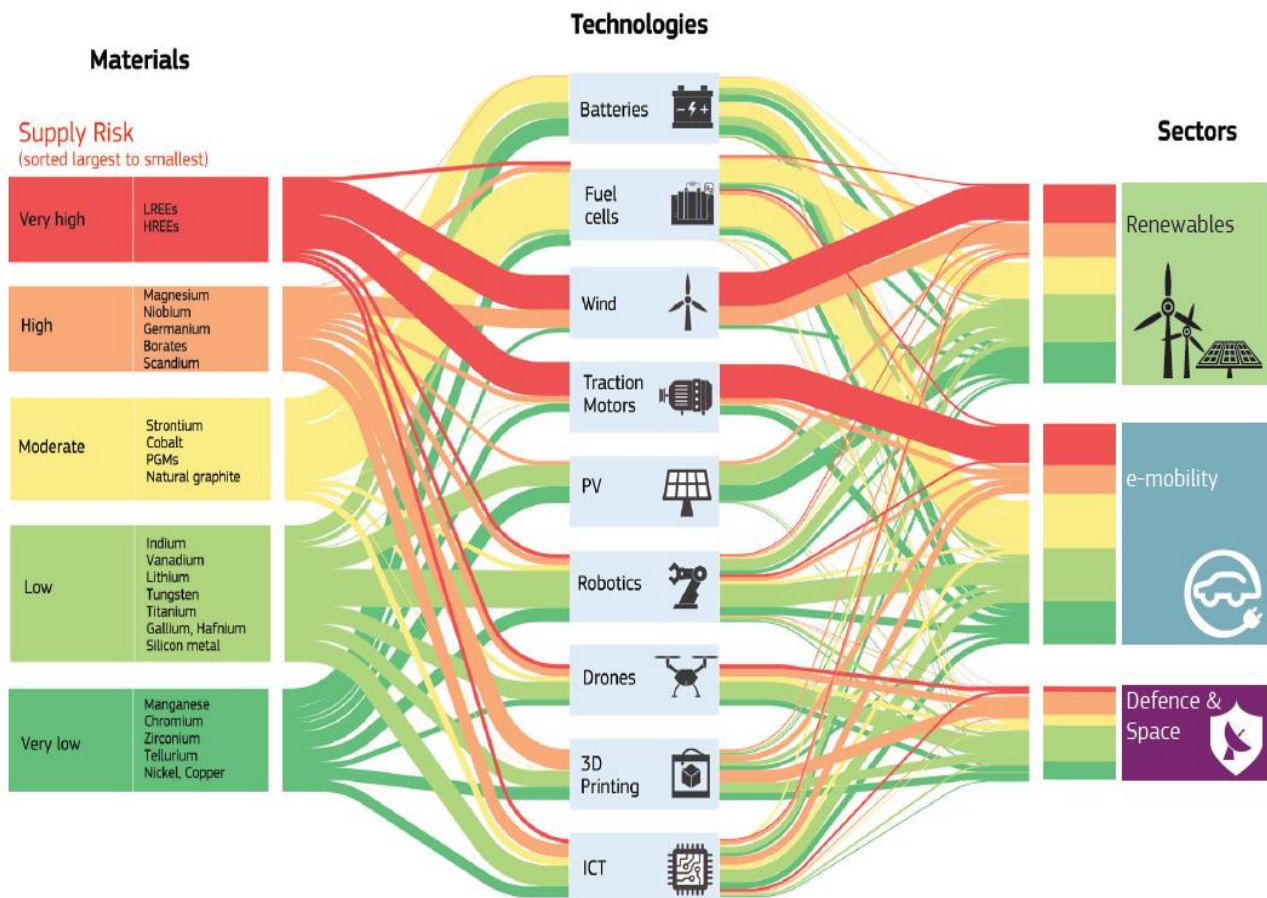
### 1.5 Importance of raw materials in the value chains of industrial production

Raw materials are increasingly important for industrial production, particularly for technological innovations linked to the twin transition, (digital and green).

The document "Critical Raw Materials for Strategic Technologies and Sectors in the EU, A Foresight Study", published by the European Commission in 2020, analyses the strategic sectors in which critical raw materials are used.

<sup>18</sup>"Mineral Commodity Summaries – rare earths", U.S. Geological Survey, January 2023.  
<https://pubs.usgs.gov/periodicals/mcs2023/mcs2023-rare-earths.pdf>

**Figure 2: Flows representing the uses of critical raw materials, labelled for their supply risk, in strategic technologies and sectors.**



**Source:** *Critical Raw Materials for Strategic Technologies and Sectors in the EU, A Foresight Study*, EU Commission, 2020.

### 1.5.1 Digital technologies

New and digital technologies have a very strong impact on our society and our way of life. They have revolutionized communication, industry and more generally the way we work. Technologies such as the Internet of things, blockchain, 3D printers, artificial intelligence and robotics, autonomous vehicles, and virtual reality will be at the heart of the value chains of the future.<sup>19</sup>

As regards the supply of raw materials linked to this sector, we find that optical fibres and other electronic equipment require rare earth, tantalum, and palladium; chips need elements with magnetic properties, helium is used for semiconductors, neodymium for data storage technologies. Neodymium and dysprosium are used to produce permanent magnets. It is estimated that for ICT technologies (Information and Communication Technologies) used materials, namely palladium, gallium, dysprosium, neodymium will see an increase in demand even if not as pronounced as in other cases.

<sup>19</sup>"Critical materials for strategic technologies and sectors in the EU - a foresight study", EU Commission, 2020, p.55. [https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)

The development of electronic display technologies such as flat screens and touch screens has led to increased demand for indium in the form of indium-thin tin oxide films. The main use of gallium is in semiconductors for integrated circuits. Various types of semiconductors use boron, gallium and germanium and graphene for conductive material.

### **1.5.2 Renewables energies**

The green transition towards a de-carbonized economy, started by green deal of the EU should target the achievement, by 2050, of a 50% satisfied energy requirement from electricity, of which 80% is obtained from renewable sources<sup>20</sup>.

Solar and wind technologies will be used in large part to achieve these goals. Wind and photovoltaic energies are among the green technologies, those destined to expand more in the coming decades. In 2016 wind energy accounted for 11.4% of the total electricity produced in Europe, while solar energy amounted to about 4% and is expected to reach 7% in 2030 and 11% in 2050.

These technologies use wind turbines and solar panels to convert renewable sources like sunlight or wind into electricity.

Other technologies, such as rechargeable batteries serve to store this energy while others like robotics and digital technologies, respectively improve the production processes and the conversion and transmission of electricity.

Given the intermittent nature of natural energy sources such as the sun and wind, lithium-ion batteries and fuel cells, which allow energy storage for later use, become fundamental.

Other important technologies for a rapid and robust transition to renewable energy are digital and robotics.

Digitization is important for improving the security, sustainability, productivity, accessibility of energy systems, facilitating the management and operation of the network.

Robotics and automation increase their share in the production of renewable energy generators, saving industry time, increasing productivity and optimizing performance. Robotics is also already used in the production of technologies related to photovoltaic and wind power, for the production of silicon components in photovoltaic panels, and in the components related to the production of wind turbines<sup>21</sup>.

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<sup>20</sup> "Critical materials for strategic technologies and sectors in the EU - a foresight study", EU Commission, 2020, p.60. [https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)

<sup>21</sup> "Study on the EU's list of Critical Raw Materials - Final Report", 2020, p.60. <https://op.europa.eu/en/publication-detail/-/publication/c0d5292a-ee54-11ea-991b-01aa75ed71a1/language-en>



The large use of rare earth to produce wind turbines makes the supply chain of this production very vulnerable. Demand for rare earths is increasing sharply and the main supplier is China, which already in 2010 blew up supplies of rare earths to Japan, creating major problems for many industrial sectors. Regarding the materials used in these productions, we find that critical rare earths such as neodymium, dysprosium and praseodymium, are essential materials for the production of permanent magnets used in high-performance wind turbines.

In the production chain of wind turbines, the evaluation of possible bottlenecks shows that the risk for the supply of raw materials is the highest, while it decreases to a degree of medium risk for the supplying of worked materials and becomes almost zero for the assemblies. In fact the EU it produces 1% the raw materials, 12% of processed materials, 18% of components, and 58% of assemblies<sup>22</sup>.

A share of 95% of the global production of solar panels consists of crystalline silicon solar panels. Borate, gallium, germanium, indium and silicon metal, which are CRMs are needed in solar photovoltaics, robotics and digital technologies. Platinum is used in digital applications, such as hard drives. In the production of photovoltaic panels, a high risk for the supply of raw materials is identified, while an average risk level is estimated for the supply of materials and processed components<sup>23</sup>. Overall, the EU contributes 6% of the total supplies needed in this sector.

Globally, in the sector of the renewable energies the supply risk for raw materials is considered medium as there are many countries that have raw materials. The risk for processed materials is also considered medium. The phase of the supply of assembled components is the one with the highest risk because China dominates the market with about 89% of the offer<sup>24</sup>.

### **1.5.3 Automotive sector**

In the production of components for both traditional, hybrid or electric motor, critical raw materials are used.

The increase in electric mobility in the coming years will lead to greater demand for cobalt, graphite and rare earth but also lithium for batteries. However, the speed of replacing electric vehicles with traditional ones will is not yet quantifiable, since it is not known what will be the timeline and the objectives to achieve for electric mobility<sup>25</sup>.

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<sup>22</sup>"Critical materials for strategic technologies and sectors in the EU - a foresight study", EU Commission, 2020, p.30.[https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)

<sup>23</sup>Ivi, p.39.

<sup>24</sup> Ivi, p.62

<sup>25</sup> Ivi, p.65

Graphite is used in brake linings, exhaust systems, engines, and batteries. Palladium, platinum and rhodium are present in car catalysis and particulate filters. Niobium is used as a binding agent in high-strength steel and nickel alloys used in the structure of the bodywork, engine of other components<sup>26</sup>. Demand for rare earths such as neodymium, praseodymium and, to a lesser extent, dysprosium, all of which are used in large quantities for high-performance neodymium-iron-boron magnets in electric and hybrid motors is expected to increase.

These materials, used in the production of permanent magnets, are made through the use of significant quantities of these rare earths, for which the European Union is very dependent on China.

The supply risk for dysprosium, neodymium and praseodymium are the highest of all materials evaluated in the CRMs 2020 list, with almost the 100% of foreign dependence. In addition, other industries such as wind power and automotive need a high supply of them. Currently China dominates the production of permanent magnets on '85-90% while 10% is produced in Japan<sup>27</sup>.

In addition, the increase in electronic components such as sensors, displays, circuits, will lead to a surge in demand for gallium, germanium and indium. Chromium, tungsten and vanadium are other elements that are required by almost all technologies<sup>28</sup>.

#### **1.5.4 Defence industries**

Critical raw materials are used in defence industry productions, many of which are irreplaceable, as other ones do not allow the same performance.

Niobium, vanadium and molybdenum are used for the production of high-performance alloys used in aircraft fuselages. Titanium is critical for its anti-corrosion properties and because it weighs less than steel and nickel-based super alloys. Beryllium is six times lighter and stronger than steel. Carbon fibres are used because of the low coefficient of thermal expansion, high rigidity and high abrasion resistance. Rare earth elements (REEs) are used in unmanned aerial systems, precision guidance ammunition, laser targeting and satellite communications<sup>29</sup>.

A list of 39 raw materials which are extremely important for defence-related production has been identified. Of these, 22 are considered critical raw materials following the evaluation of the 2020 RMI document<sup>30</sup>.

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<sup>26</sup>Report on Critical Raw Materials in the Circular Economy”, EU Commission 2018, p.48-

50.[https://weee4future.eitrawmaterials.eu/wp-content/uploads/2020/09/09\\_report-of-CRM-and-CE.pdf](https://weee4future.eitrawmaterials.eu/wp-content/uploads/2020/09/09_report-of-CRM-and-CE.pdf)

<sup>27</sup> Critical materials for strategic technologies and sectors in the EU - a foresight study”, EU Commission 2020, p.35.[https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)

<sup>28</sup>Ivi, p.65-66

<sup>29</sup>Ivi, p.69.

<sup>30</sup>Ivi, p.70.



The European Union is totally dependent on foreign imports of 13 of these 39 raw materials: boron, dysprosium, gold, magnesium, molybdenum, neodymium, niobium, praseodymium, samarium, tantalum, titanium, yttrium and other rare earths. Overall, for more than two-thirds of critical raw materials necessary for this sector, the share of imports exceeds 50%<sup>31</sup>.

Among these 39 raw materials, the EU is the world's largest supplier of hafnium only. In total, the EU produces on average about 3% of the raw materials needed for production in the sector, without considering digital technologies. Most of these materials come from China which is the world's leading producer of 58% of raw materials in this sector. Chile and South Africa are also important suppliers, providing the EU with around 8 % of the raw materials needed<sup>32</sup>.

Like the renewable energy and mobility sectors, the most critical steps in the defence industry's supply chain concerns the supply of raw materials and final assemblies.

### **1.5.5 Lithium batteries**

Lithium-ion battery technology is essential for energy storage but is increasingly used in different sectors, from defence, electronics and electric mobility. These sectors have grown tremendously over the last decade and are expected to grow exponentially in the near future. In 2018, the EU produced only 3 % of the cells for lithium-ion batteries, China produced about 60% while Japan, Korea and other Asian countries accounted for almost 20%. The EU is expected to become the second largest producer by 2024 with around 14 % of world production<sup>33</sup>.

The production of these batteries requires metals such as nickel, cobalt, aluminium and manganese. The latest developments in research to improve efficiency have led to increased demand for lithium metal, silicon metal, titanium and niobium which are useful in improving efficiency. Other materials used are cobalt and natural graphite. The European Union supplies only 1 % of the raw materials used in the production of lithium batteries. To meet of mobility and energy storage needs, the EU will need a 7 to 18 times larger amount of lithium by 2030, 2 to 5 times more cobalt by 2030, 16 to 57 times more lithium by 2050 and 3 to 15 times more cobalt by 2050<sup>34</sup>.

A share of 58% of the world's cobalt extraction comes from the Democratic Republic of Congo, 8% from China, 6% from Canada, 5% from New Caledonia and 4% from Australia. The production of refined cobalt comes to 46% from China, 13% from Finland, and 6% from Canada and Belgium. As

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<sup>31</sup> Ivi, p.69-70.

<sup>32</sup> Ivi, p.75.

<sup>33</sup> "In-depth reviews of strategic areas for Europe's interests", EU Commission. [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy/depth-reviews-strategic-areas-europes-interests\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy/depth-reviews-strategic-areas-europes-interests_en)

<sup>34</sup> Ivi

for lithium, Chile provides 40% of the extraction of lithium, Australia 29% and Argentina 16%, refined lithium is produced by 45% in China, 32% in Chile and 20% in Argentina<sup>35</sup>.

### 1.5.6 The robotics

Robotics is a new technology that is used in many sectors such as industry, agriculture, medicine, transportation, mining, space exploration and submarine operations.

Raw materials that are relevant for the productions related to robotics are 44. Among these the European Union is completely dependent from abroad for the supply of 33 materials. China again appears to be a fundamental country as it supplies 52% of these materials, smaller shares come from South Africa and Russia. The EU produces only 2% of its raw materials. Finally 19 of the 44 raw materials are classified as critical: tantalum, tungsten, phosphorus, fluorite, ruthenium, rhodium, gallium, indium, borates, palladium, platinum, REE, bismuth, antimony, vanadium, magnesium, natural graphite, metallic silicon and cobalt. The risk for the supply of raw materials and components is therefore considered high, the risk related to the supply of processed materials and assemblies is medium<sup>36</sup>.

This increase, in turn, has led to increasing geopolitical tensions linked to the fact that producers (producers of raw materials are countries such as China, Russia, India, Middle Eastern countries). This dependency causes thus a strong risk for supply chains as these countries are important economic and trade partners but are not European allies.

This increased dependency poses an increasing danger of sudden reductions and, in extreme circumstances, interruptions in supply chains<sup>37</sup>. The high supply risk is also caused by the limited number of supplier countries due to the concentration of the deposits and sources, to the presence of extraction chains, of refining processing and in general because of lower production costs of these countries<sup>38</sup>.

It is therefore essential to guarantee a secure access to large quantities of raw materials for the production systems of European countries.

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<sup>35</sup>"Critical materials for strategic technologies and sectors in the EU - a foresight study", EU Commission 2020, p.19-20. [https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)  
[https://rmis.jrc.ec.europa.eu/uploads/CRMs\\_for\\_Strategic\\_Technologies\\_and\\_Sectors\\_in\\_the\\_EU\\_2020.pdf](https://rmis.jrc.ec.europa.eu/uploads/CRMs_for_Strategic_Technologies_and_Sectors_in_the_EU_2020.pdf)

<sup>36</sup>Ivi, p.44.

<sup>37</sup>"Critical raw materials in EU external policies - Improving access and raising global standards", European Parliament, 12,05,2021. p.2 [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS\\_BRI\(2021\)690606\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690606/EPRS_BRI(2021)690606_EN.pdf)

<sup>38</sup>ibidem

In this framework EU appears to have a very high dependence on China that provides an elevated share of supplies of many materials being the major global supplier of 66% of the critical raw materials<sup>39</sup>. China provides the European Union with 98% of the supply of rare earth elements (REE), Turkey provides 98% of the EU's borate supply and South Africa accounts for 71% of the EU's needs for platinum and an even higher share of the platinum group metals iridium, rhodium and ruthenium<sup>40</sup>. As a result the policy related to raw materials has gained increasing importance at the EU level.

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<sup>39</sup>“Study on the EU's list of Critical Raw Materials - Final Report”, EU Commission, 2020, p.6. <https://op.europa.eu/en/publication-detail/-/publication/c0d5292a-ee54-11ea-991b-01aa75ed71a1/language-en>

<sup>40</sup>“Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the committee of the regions - Critical Raw Materials L: Charting a Path towards greater Security and Sustainability, COM 474 final”, EU Commission, 2020, p.3. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0474&from=EN>

## CHAPTER TWO

# THE RAW MATERIALS INITIATIVE FROM 2008 TO 2017

### 2.1 Raw materials in EU's history

Since the Treaty of Paris of the 18<sup>th</sup> of April 1951, establishing the ECSC (European Coal and Steel Community), the issue of raw materials' supplies has always been at the heart of the industrial policies of both the EU and of the single member states. In the following decades, the need to strengthen EU's common industrial policies was reaffirmed in several occasions.

In the "Memorandum on the Community's industrial policy" of the 18<sup>th</sup> March, 1970, the document the Commissioner for Industry Colonna di Paliano underlined that the issue of raw material is among the «problems that are of vital importance for the development of Community's industry will not be solved satisfactorily if Member States fail to acknowledge the need for and organize solidarity in these fields»<sup>41</sup> and that «The need for regular and reliable supplies of raw materials and of fuels raises, in respect of some products, problems which can be solved at national level only at the risk of jeopardizing the common market in case of crisis»<sup>42</sup>.

The attention continued in the following years. Altiero Spinelli, who succeeded Colonna di Paliano as Commissioner for Industry reaffirmed of the Commission to the theme in the course of the Venice Conference of 1972. When defining the European action for an industrial development harmonised with the protection of the environment and attentive to technological changes, he stressed the need to «explore and conserve Europe's potential resources, and to develop new materials and recycling technologies»<sup>43</sup>.

In the following decades, the management of issues related to raw materials was left mainly to the member states. In the second half of the first decade of the 2000s, the increasing global competition to secure supplies of raw materials put this theme at the top of the EU agenda. This was mainly due to the change of international balances and the soaring demand for "high-tech" metals needed for

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<sup>41</sup>“The Community's industrial policy Commission, Memorandum to the Council - Principles and general datelines of an industrial policy for the Community, COM (70) 100”, Commission of the European - Secretariat, 18, 03, 1970, p.24.

<http://aei.pitt.edu/5598/1/5598.pdf>

<sup>42</sup>Ibidem

<sup>43</sup>“Introductory speech by A. Spinelli member of the Commission of the European Communities, Conference Industry and Society in the European Community”, Commission of the European Communities, 20, 04, 1972, p.4.

[http://aei.pitt.edu/39275/1/Spinelli\\_Venice\\_1072.pdf](http://aei.pitt.edu/39275/1/Spinelli_Venice_1072.pdf)

technological innovation, for green and digital transition and to the widening of the markets subsequent to the strong increase in demand of the emergent economies, and of China in particular. In view of this context, the EU which was increasingly dependent from extra UE countries, and in particular from China, for the supply of key raw materials required by its industry, returned its attention to the theme<sup>44</sup>.

## 2.2 The Raw Materials Initiative 2008

On the 25<sup>th</sup> of May, 2007 the Council requested the Commission to develop a coherent political approach with regard to raw materials supplies for industry, including all relevant areas of policy (foreign affairs, trade, environmental, development and research and innovation policy). The Council invited also to identify appropriate measures for cost-effective, reliable and environmentally friendly access to raw materials and for exploitation of natural resources, secondary raw materials and recyclable waste, especially concerning third-country markets<sup>45</sup>. Therefore, following the request of the Council, the Commission decided to elaborate the Raw Materials Initiative (RMI). In the first communication (COM (2008) 699 final 4.11.2008), the Commission defined a strategy to manage, plan and reconfigure the future structure of industrial production and the supply of raw materials. The objective of the Communication was to define a framework ensuring and securing an affordable access for European countries to raw materials, in particular non-energy minerals, avoiding market distortions, like the exponential increase of the prices and sudden interruptions of the supply chains<sup>46</sup>. The RMI is a policy document not a binding act. Through this document the European Commission sets objectives and provides policy indications, fostering best practices that Member States should translate into concrete actions<sup>47</sup>.

This 2008 document underlined the need to draw up an analysis on single materials that can be considered of critical importance. The outcome of the analysis is the CRMs list that is presented in the 2011 document.

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<sup>44</sup> Küblböck Karin, "The EU Raw Materials Initiative: Scope and critical assessment", ÖFSE Briefing Paper, No. 8, Austrian Foundation for Development Research (ÖFSE), 2013, p.6. <https://www.econstor.eu/bitstream/10419/99057/1/790899264.pdf>

<sup>45</sup>"Outcome of proceedings of the Council (Competitiveness) 21-22, 05, 2007 - Industrial Policy, 10032/07", 25 May 2007, p.6. <https://data.consilium.europa.eu/doc/document/ST-10032-2007-INIT/en/pdf>

<sup>46</sup> Küblböck Karin, "The EU Raw Materials Initiative: Scope and critical assessment", ÖFSE Briefing Paper, No. 8, Austrian Foundation for Development Research (ÖFSE), 2013, p.3. <https://www.econstor.eu/bitstream/10419/99057/1/790899264.pdf>

The 2008 document elaborates a strategy based on 3 key pillars that indicates which are the critical issues to be solved to ensure the EU access to the raw materials needed<sup>48</sup>:

- (i) Ensure access to raw materials from international markets under the same conditions as other industrial competitors.
- (ii) Set the right framework conditions within the EU in order to foster sustainable supply of raw materials from European sources.
- (iii) Boost overall resource efficiency and promote recycling to reduce the EU's consumption of primary raw materials and decrease the relative import needs.

### 2.2.1 The first pillar

The communication indicated that the distortions of the supply chains were due to the strong dependence from supplying countries in which a very high percentage of the production of a determined material is concentrated. This created a situation that altered the dynamics of competition market.

In this view the RMI reaffirmed that the EU should equip itself with “raw material diplomacy” through the strengthening of relations between the EU countries and extra EU countries, but also through the reinforcing of its action in international fora such as G8, OECD, UNCTAD, UNEP by negotiating trade policies on CRMs<sup>49</sup>. In particular, it was maintained the need to reduce or eliminate external barriers to the supplies and to ensure a level playing field for companies wishing to have access to raw materials<sup>50</sup>.

A set of indications were defined according to the different countries:

- a) In the case of highly dependent countries, due to high-level of the manufacturing industry, such as the US and Japan, it was important to promote common positions and strategies to be more effective in international fora<sup>51</sup>.
- b) Relations with countries rich in raw materials such as China and Russia, required to strengthen the dialogue to avoid the growth of barriers and other elements that may have distorted competition.

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<sup>48</sup>“Communication from the Commission to the European Parliament and the Council - The Raw Materials Initiative — meeting our critical needs for growth and jobs in Europe, COM (2008) 699 final”, 04, 11, 2008, p.5-6. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0699:FIN:en:PDF>

<sup>49</sup>Küblböck Karin, “The EU Raw Materials Initiative: Scope and critical assessment”, ÖFSE Briefing Paper, No. 8, Austrian Foundation for Development Research (ÖFSE), 2013, p.7. <https://www.ecostor.eu/bitstream/10419/99057/1/790899264.pdf>

<sup>50</sup>“Communication from the Commission to the European Parliament and the Council - The Raw Materials Initiative — meeting our critical needs for growth and jobs in Europe, COM (2008) 699 final”, 04, 11, 2008, p.9. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0699:FIN:en:PDF>

<sup>51</sup>Ivi, p.6. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0699:FIN:en:PDF>

- c) It was maintained that relations with Africa were strategically important. The EU should have strengthened actions for extracting, and for the management of supplies of raw materials in this continent. It was thus necessary to reconcile the interests of EU countries to access to raw materials without any distortions with the necessity of Africa to have an effective growth and a sustainable and inclusive development based on exploitation of its resources. This could have been reached through trade policy combined with financial development policy instruments such the European Investment Bank (EIB), which could support strategic industrial projects.

### **2.2.2 The second pillar:**

The goal of this pillar was to facilitate supply from the EU mines, which was difficult due to regulatory processes. To this end, the 2008 document indicated a series of priorities:

- (i) Enforce a process of legislative modernization, simplification of the regulatory framework and acceleration of the authorization processes to enhance exploration and extraction activities.
- (ii) Foster investments to promote raw material extraction and processing technologies to improve the knowledge on locations of EU mineral deposits, also with the use of Cohesion Funds.
- (iii) Encourage partnerships among universities, geological services, and industrial associations with the aim to promote a platform that can bring together best practices to be shared among states<sup>52</sup>.

### **2.2.3 The third pillar**

The communication stressed the fact that the reduction in the dependence of the European industry on raw materials should have been achieved together with the transition to a green and sustainable economy. A path that had to be implemented through the efficiency of resources and the promotion of a greater use of raw materials from secondary sources (i.e. recycling). In the document it was evidenced that the legislative framework in this matter too often prevent the circulation of the scraps

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<sup>52</sup>Ivi, p.9.

for disposal within EU. In fact, the scraps were frequently shipped outside the EU, with consequent loss of raw materials<sup>53</sup>.

The 2008 document also reaffirmed the importance of research projects on new green products that can substitute existing technologies with more efficient ones that can reduce consumptions.

It is underlined that the application of the legislation on the use of renewable raw materials should establish a common framework for recycling that sets uniform standards for all EU countries<sup>54</sup>.

### **2.3 The 2011 Communication**

After only few years, the Commission returned to the topic with a second communication, COM (2011) 25 final, published on the 2<sup>nd</sup> of November 2011<sup>55</sup>.

Despite the significant progress made, the 2011 document reaffirms the necessity to further improve the implementation of the RMI.

The 2011 Report confirms the strategic objectives outlined in the 3 pillars of the previous Communication of 2008 (access to raw materials on world markets at undistorted conditions, foster sustainable supply of raw materials from European sources, reduce the EU's consumption of primary raw materials).

As regards the first pillar, it is underlined the necessity to continue with the construction of new strategic partnerships with resources-rich countries and other importers countries. These agreements should foster policies for sustainable supply of raw materials, building a transparent governance for inclusive growth and sustainable development in resource-rich countries and strengthen financial support for the extractive industry.

To reach the goal of the second pillar it is necessary to develop harmonised national mining policies in Member States, to further strengthen the knowledge in the sector by increasing synergies geological institutes of EU countries and share information.

As regards the third pillar, to encourage resource efficiency and promote recycling it is important to support research, promote eco-design, and new rules for new projects to improve the competitiveness of recycling industries to prevent waste from going abroad for disposal.

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<sup>53</sup>Ivi, p.11.

<sup>54</sup>Küblböck Karin, "The EU Raw Materials Initiative: Scope and critical assessment", ÖFSE Briefing Paper, No. 8, Austrian Foundation for Development Research (ÖFSE), 2013, p.6. <https://www.econstor.eu/bitstream/10419/99057/1/790899264.pdf>

<sup>55</sup>"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, COM 25 final", EU Commission, 02, 02, 2011.

[https://www.europarl.europa.eu/meetdocs/2009\\_2014/documents/com/com\\_com\(2011\)0025\\_/com\\_com\(2011\)0025\\_en.pdf](https://www.europarl.europa.eu/meetdocs/2009_2014/documents/com/com_com(2011)0025_/com_com(2011)0025_en.pdf)



The most important contribution of this document is the presence of the first list of 14 critical raw materials, defined starting from a selection of 41 of them.

**Figure 3: List of Critical Raw materials 2011**

2011 Critical Raw Materials		
Antimony	Germanium	Platinum Group Metals
Beryllium	Graphite	Rare earths
Cobalt	Indium	Tantalum
Fluorspar	Magnesium	Tungsten
Gallium	Niobium	

**Source:** “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, COM 25 final”, EU Commission, 02,02,2011.

The selection followed the criteria of supply risk and economic importance of materials for the production chain.

The economic importance «is measured by breaking down its main uses and attributing to each of them the value added of the economic sector that has this raw material as input»<sup>56</sup>.

As to the supply risk, it was evaluated on the assessment of the political and economic stability of the producing countries, the level of concentration of production, the substitution potential and the recycling rate<sup>57</sup>.

In this update is present a focus on the activities of Monitoring of essential raw materials together with Member States and stakeholders to identify key priority actions to carry out. Moreover, the Commission pays particular attention to the theme of Innovation along all the entire value chain (extraction, design transformation, recycling).

<sup>56</sup>“Critical raw materials for the EU, Report of the Ad-hoc Working Group on defining critical raw materials”, European Commission, 05, 2010, p.24. <https://www.euromines.org/files/what-we-do/sustainable-development-issues/2010-report-critical-raw-materials-eu.pdf>

<sup>57</sup>“Critical raw materials for the EU, Report of the Ad-hoc Working Group on defining critical raw materials”, European Commission, 05, 2010, p.27. <https://www.euromines.org/files/what-we-do/sustainable-development-issues/2010-report-critical-raw-materials-eu.pdf>

## 2.4 The 2014 Communication

The document COM (2014) 297 final, published on the 26<sup>th</sup> of May, 2014, follows the 2013 “report on the implementation of the Raw Materials Initiative, COM (2013) 442 final”<sup>58</sup>, which describes the implementation of the actions for each of the three pillars.

The main purpose of the 2014 document was to review the work carried out in 2011 and to produce an updated list of critical raw materials for the EU. This document is also elaborated to strengthen competitiveness of the EU economy, fostering the Commission’s goal to raise industry’s contribution to 20% by 2020 of EU GDP by 2020.

Alongside there is the “Report on raw materials for the EU”. This document, elaborated by the ad hoc Working Group (AHWG) on defining critical raw materials sets up a scenario with a first analysis of global supplies and a focus on EU dependencies. The results put in evidence that EU supplies are dominated by non-EU countries. None of the 28 EU countries is in the top ten producers. It is also underlined how China was the major supplier of 14 of the 20 elements, accounting for the 49% of the supply of the 20 CRMs, 90% of the supplies comes from the 20 biggest suppliers<sup>59</sup>. The EU imported 99% of heavy rare earths and 87% of light rare earths from China. EU productions of raw materials accounts for 9%, for CRMs the productions is estimated to be inferior to 3%. EU produces mainly magnesite, gallium, silicon metal and germanium.

A medium and long-term forecast for the demand and supply including further analysis on supply chain risks and issues is also carried out for each of the critical raw material. The results showed risk market deficit is forecasted for some elements such as heavy rare earths, platinum group Metals and gallium.

There were also some new elements concerning:

- More comprehensive and detailed analysis of critical raw materials
- Use of higher quality data and increased transparency in evaluation.

In this update, the assessment was carried out on a list of 54 candidate materials. In comparison with the 2011 document, new abiotic materials were added, and biotic materials were evaluated for the first time<sup>60</sup>. The methodology used for the assessment was the same as in 2011, combining the economic importance and the supply risk. Rare earths, previously considered as a single group are divide in heavy rare earths, light rare earths and scandium<sup>61</sup>.

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<sup>58</sup>“Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions On the implementation of the Raw Materials Initiative, COM(2013) 442 final” EU Commission, 24, 06, 2013. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0442&from=EN>

<sup>59</sup>“Report on critical raw materials for the EU, Report of the Ad hoc Working Group on defining critical raw materials”, EU Commission, 05, 2014, p.19. <https://ec.europa.eu/docsroom/documents/10010/>

<sup>60</sup>Ivi, p.15.

<sup>61</sup>Ivi, p.17.

The resulting final list was composed of 20 elements: All materials present in the 2011 are listed, with the exception of tantalum, as its supply risk has decreased.

**Figure 4: List of Critical Raw materials 2014**

2014 Critical Raw Materials		
Antimony	Gallium	Platinum Group Metals
Beryllium	Germanium	Phosphate Rocks
Borates	Indium	Heavy Rare Earth Elements
Chromium	Magnesite	Light Rare Earth Elements
Cobalt	Magnesium	Silicon
Coking Coal	Natural Graphite	Tungsten
Fluorspar	Niobium	

**Source:** “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the review of the list of critical raw materials for the EU and the implementation of the Raw Materials Initiative, COM 297 final”, EU Commission, 2014.

Finally, the AHWG presented some recommendations for the following update communication:

- Carry out specific actions to ensure undistorted and reliable access to critical raw material data of their economic importance and supply risk.
- Promote the outcome of the study across the EU Institution and the Member States in order to implement policies and initiatives, but also among relevant stakeholders, (manufacturers, designers and waste processor)<sup>62</sup>.
- To update the list every three years.

## 2.5 The 2017 Communication

In 2017, in the context of RMI, following the indication of the Communication of the 2014, the EU Commission updated the previous CRMs list with a new Communication “on the 2017 list of Critical Raw Materials for the EU COM (2017) 490 final”<sup>63</sup>.

This update, considering developments in production, market, and technology, reaffirmed the importance of essential raw materials for the EU through the:

- link with industrial production along all the stages of the supply chain.

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<sup>63</sup>“Communication from the Commission to the European Parliament and the Council the European Economic and Social Committee and the Committee of Regions on the 2017 list of Critical Raw Materials for the EU, COM 490 final”, EU Commission, 2017  
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0490&from=IT>

- development of modern technologies: technological progress and quality of life depend on access to an increasing number of raw materials.
- environment and green economy and raw materials are irreplaceable in the production of clean technologies (solar panels, wind turbines, electric vehicles).

In addition to the 3 pillars in the previous Communications, two new policy actions are established necessary for a successful implementation:

- Identifying raw materials that are fundamental for the European economy; and
- Have accurate information on the flows of such materials in the EU.

Together with this updated Communication there is the “Study on the review of the list of Critical Raw Materials” elaborating a critical assessment of the list, the methodology and commenting the the elaboration and results of the analysis. This document was prepared by the ad hoc working group (AHWG) involving the British Geological Survey (BGS), *Bureau de Recherches Géologiques et Minières* (BRGM), and other scientific experts and consultants.

This report aims to analyse the current production, key trends, trade flows and barriers of the raw materials to produce datasets and qualitative factsheets for all the raw materials that are assessed.

The screening for the CRMs list was expanded to a set of 78 candidate of which 61 are individual materials and 3 are groups (heavy rare earths, light rare earths, platinum metal group ). Within these elements, 27 were identified as "critical" while in the previous assessment this group was composed of 20 materials.

The 2017 CRMs list included 17 out of the 20 materials present in 2014 list, while chromium, coking coal and magnesite, that were present in 2014, were not anymore included. Nine additional raw materials have been identified as critical and enter the 2017 CRMs list: baryte, natural rubber, scandium, tantalum, vanadium, hafnium, bismuth, helium and phosphorus<sup>64</sup>.

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<sup>64</sup>“Study on the review of the list of Critical Raw Materials, Criticality Assessments”, EU Commission, 06, 2017, p.13. <https://op.europa.eu/en/publication-detail/-/publication/08fdab5f-9766-11e7-b92d-01aa75ed71a1/language-en>

**Figure 5: List of Critical Raw materials 2017**

2017 Critical Raw Materials		
Antimony	Germanium	Niobium
Baryte	Hafnium	PGMs
Beryllium	Helium	Phosphate rock
Bismuth	HREEs	Phosphorus
Borate	Indium	Scandium
Cobalt	LREEs	Silicon metal
Coking Coal	Magnesium	Tantalum
Fluorspar	Natural graphite	Tungsten
Gallium	Natural Rubber	Vanadium

**Source:** “Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the 2017 list of Critical Raw Materials for the EU, COM 490 final”, EU Commission 2017.

The analysis of supplies reaffirmed that China was still the larger global supplier for 17 of the 27 CRMs. Other relevant suppliers are Russia and South Africa for PGMs, Brazil for Niobium.

This review, defined in cooperation with the DG Joint Research Centre (DG JRC) was carried out with a new "Criticality" assessment methodology. More detailed statistical data allowed to elaborate a more precise methodology for both calculating the supply risk and for assessing the economic importance of the materials<sup>65</sup>.

The use of mega sectors, aggregating economic sectors in the assessment of economic importance of individual elements was replaced by using more detailed data for each individual material<sup>66</sup>. These new detailed data come from the use of data from NACE (Statistical Classification of Economic Activities in the European Community) sectors<sup>67</sup>.

Substitution was included in the calculations of the economic importance, while the previous assessments was used only in the SR calculations. Import Reliance (IR) parameter is also included to evaluate the supply risk.

<sup>65</sup>Ivi, p.26.

<sup>66</sup>Hagelüken Christian, Løvik Amund N., Christian Hagelüken, Wäger Patrick, “Improving supply security of critical metals: Current developments and research in the EU”, Sustainable Materials and Technologies, Vol.15, 2018, p.11. [https://www.sciencedirect.com/science/article/pii/S2214993717300908?casa\\_token=PAUcFxgp2oYAAAAA:FPnL5tlYjh4R0YdpZgIFiasqIopwtbjGuSljXwXEQQ6bflgewoh8fPf4XfhuKqTciADoAwsu](https://www.sciencedirect.com/science/article/pii/S2214993717300908?casa_token=PAUcFxgp2oYAAAAA:FPnL5tlYjh4R0YdpZgIFiasqIopwtbjGuSljXwXEQQ6bflgewoh8fPf4XfhuKqTciADoAwsu)

<sup>67</sup> Blagoeva Darina, Blengini Gian Andrea, Ciupagea Costantin, Dewulf Jo, Grohol Milan, Latunussa Cynthia, Mancini Lucia, Nita Viorel, Nuss Philip, Pellegrini Mattia, Pennington David, Talens Peirò, Solar Salvko, “EU methodology for critical raw materials assessment: Policy needs and proposed solutions for incremental improvements”, Resources Policy, Vol. 53, 09 2017, p.14. <https://www.sciencedirect.com/science/article/pii/S0301420717300223>

The calculation of supply concentration for assessing supply risk is measured by the World Governance Indicators (WGI). Data from the last 5 years were used in calculations, while in the previous criticality assessments, only the last available year were used<sup>68</sup>.

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<sup>68</sup>“Methodology for establishing the EU list of critical raw materials – Guidelines”, EU Commission, 2017, p.5.  
<https://op.europa.eu/en/publication-detail/-/publication/2d43b7e2-66ac-11e7-b2f2-01aa75ed71a1>

## CHAPTER THREE

# THE CURRENT STAGE: THE RMI COMMUNICATION OF 2020 AND OTHER ACTIONS

### 3.1 The 2020 Communication of the Commission on Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability

The last 2020 RMI Communication updates the European strategy to secure access to supply of raw materials and enlarges the CRMs list. The 2020 act is supported by a foresight document, with forecast and future trends related to critical materials and the sectors where they are used.

The methodology that is used for the revision of the CRMs list is the same of the 2017 edition, based on the economic importance and on the supply risk. This time 83 materials are screened and a final list of 30 critical materials is drawn up, 3 more than in the 2017 list. Among them 26 materials remain from the old list, helium is removed, while bauxite, lithium, titanium and strontium are added<sup>69</sup>. All in all, the list is composed as follows:

**Figure 6: Figure 3: List of Critical Raw materials 2020**

2020 Critical Raw Materials		
Antimony	Germanium	PGMs
Baryte	Hafnium	Phosphate rock
Bauxite	HREEs	Phosphorus
Beryllium	Lithium	Scandium
Bismuth	LREEs	Silicon metal
Borate	Indium	Strontium
Cobalt	Magnesium	Tantalum
Coking Coal	Natural graphite	Titanium
Fluorspar	Natural Rubber	Tungsten
Gallium	Niobium	Vanadium

**Source:** Study on the EU's list of Critical Raw Materials (2020) Final Report, EU Commission, 2020. The following table reports the main applications for which CRMs are used.

<sup>69</sup>“Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability”, EU Commission, 2020, p.3. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0474&from=EN>

**Figure 7: Applications of 2020 CRMs list**

Critical Raw Materials	Applications
Antimony	Flame retardants, Lead-acid batteries, Lead alloys, Plastics (catalysts and stabilisers), Glass and ceramics
Baryte	Weighting agent in oil and gas well drilling fluids or “muds”, Filler in rubbers, plastics, paints & paper, Chemical industry
Bauxite	Refining to alumina, Refractories, Cement, Abrasives, Chemicals
Beryllium	Electronic and telecommunications equipments, Transport and Defence (Vehicle electronics, auto components, Aerospace components), Energy application, Industrial components (moulds, metal), Others
Bismuth	Chemicals, Low-melting alloys, Metallurgical additives
Borates	Glass, Frits and Ceramics, Fertilisers, Chemicals manufacture, Construction materials (flame retardants, plasters, wood preservatives), Metals, others
Cobalt	Superalloys, hardfacing/HSS and other alloys, Hard materials (carbides and diamond tools), Pigments and Inks, Catalysts, Tyre adhesives and paint dryers, Magnets, Other – Biotech, Surface Treatment, etc, Battery
Coking Coal	Coke for steel production and other application, Other uses (tar, benzole, electricity and heat)
Fluorspar	Steel and iron making, Refrigeration and air conditioning, Aluminium making and other metallurgy, Solid fluoropolymers for cookware coating and cable insulation, Fluorochemicals, UF6 in nuclear uranium fuel, HF in alkylation process for oil refining
Gallium	Integrated circuits, Lighting, CIGS solar cells
Germanium	Infrared optics, Optical fibres, Satellite solar cells, Others
Hafnium	Superalloy, Catalyst precursor, Plasma cutting tips, Nuclear control rod, Oxide for Optical, Semiconductors, Others
HREEs *	Magnets, Glass - Optical applications, Lighting, Metal (excl. Batteries), Magnetic Resonance Imaging - MRI, Ceramics, Alloys, Other
Indium	Flat panel displays, Solders, PV cells, Thermal interface material, Batteries, Alloys/compounds, Semiconductors & LEDs, Other
Lithium	Glass and ceramics, Lubricating greases, Cement production, Steel casting, Pharmaceutical products, Rubber and plastics production, Al-Li alloys, Batteries and products containing batteries
LREEs **	Autocatalysts, Glass&Ceramics, Polishing powders, Fluid Cracking Catalysts, Metal (excl. Batteries) , Batteries, Lighting, Magnets, Lasers, Medical and optical application, Others
Magnesium	Packaging, Desulfurisation agent, Construction, Transportation (Air, Marine, Train), Other applications
Natural Graphite	Graphite shapes, Batteries, Lubricants, Recarburising, Pencils, Friction products,
Natural Rubber	Automotive, Other transport equipment, Machinery and offshore, Furniture, Packaging, Household appliances, Sportswear
Niobium	Automotive (Steel), Construction (Steel), Stainless Steel, Oil & Gas, Special Steel
PGMs ***	Electrochemicals, Electronics, Chemical, Autocatalyst, Dental, Jewellery, Investment, Medical and Biomedical, Petroleum, Glass, Other,
Phosphate rock	Mineral fertilizer, Animal feed, Detergents, chemicals, food additives
Phosphorus	Chemicals, Metals, Electronics, Agrochemicals
Scandium	Solid Oxide Fuel Cells (SOFCs), Al-Sc alloys, Others
Silicon Metal	Chemical applications, Aluminium alloys, Solar applications, Electronic applications
Strontium	Drilling fluids, Pyrotechnics and signals, Magnets, Master alloys, Pigments and fillers, Zinc production, Glass
Tantalum	Capacitors, Sputtering targets, Superalloys, Chemicals, Carbides, Mill products
Titanium	Paints, Polymers, Aerospace, Medical equipment, Automotive, Hand held objects, Alloys, Various
Tungsten	Mill and cutting tools, Mining and construction tools, Other wear tools, Catalysts and pigments, Lighting and electronic uses, High speed steels application, Aeronautics and energy uses, others
Vanadium	High-strength low-alloy steels (HSLA), Special steel, Super alloys for high-end use, Chemicals, Cast Iron for rigid structures, Stainless steel, Energy storage

HREE \* Dysprosium, Erbium, Europium, Gadolinium, Ho, Tm, Lu, Yb, Terbium, Yttrium

LREEs \*\* Cerium, Lanthanum, Neodymium Praseodymium Samarium

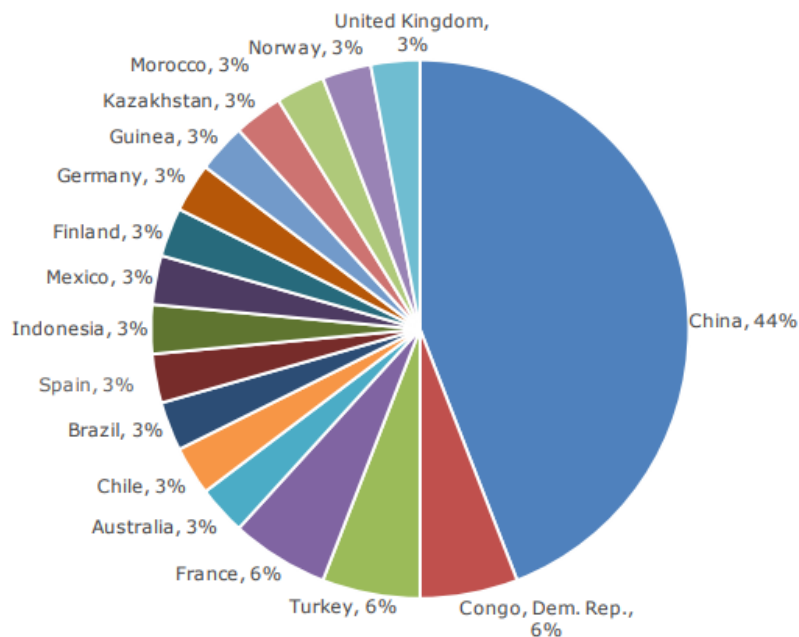
PGMs \*\*\* Iridium, Palladium, Platinum, Rhodium, Ruthenium

**Source:** Study on the EU's list of Critical Raw Materials - Final Report, 2020



This Communication provides a detailed overview of which countries are the biggest EU suppliers. The analysis shows that China is still the biggest supplier accounting for 44% of materials. China provides the 98% of supplies of heavy rare earths and for 99% of light rare earths<sup>70</sup>.

**Figure 8: Major EU suppliers of CRMs (based on number of CRMs supplied), average from 2012- 2016 (REEs 2016-2018)**



**Source:** Study on the EU's list of Critical Raw Materials - Final Report”, 2020. p.9.

The act comprises also the definition of an Action Plan to tackle the issues arising for the industrial supplies and for the strengthening of Europe’s open strategic autonomy towards the green and digital transitions.

Four fundamental objectives are traced<sup>71</sup>:

- (i) Develop resilient value chains for the EU industrial ecosystems.
- (ii) Reduce dependency on primary critical raw materials through circular use of resources, sustainable products and innovation.
- (iii) Strengthen the sustainable and responsible domestic sourcing and processing of raw materials in the European Union.

<sup>70</sup>“Study on the EU's list of Critical Raw Materials - Final Report”, 2020, p.9. <https://op.europa.eu/en/publication-detail/-/publication/c0d5292a-ee54-11ea-991b-01aa75ed71a1/language-en>

<sup>71</sup>“Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability”, EU Commission, 2020, p.6. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0474&from=EN>

- (iv) Diversify supply with sustainable and responsible sourcing from third countries, strengthening rules-based open trade in raw materials and removing distortions in international trade.

These objectives are pursued with 10 actions defined in the Communication. In order to tackle the EU countries' deficit in their capacity in extracting, processing, recycling, refining, and separating raw materials the Commission indicated the need to:

1. Launch a European Raw Materials Alliance: The Commission's proposal was to launch an industry-driven European Raw Materials Alliance initially to build resilience and open strategic autonomy for the rare earths and magnets value chain, before extending to other raw material areas (industry, Commission, investors, European Investment Bank, stakeholders, Member States, regions). The organisation of this industrial alliance presented should be open, transparent, inclusive and should have an agile governance.
2. Ensure sustainability: In this respect the EU sustainable finance taxonomy will direct investments towards sustainable exploration, extraction and processing projects and the need to develop sustainable financing criteria for the mining, extractive and processing sectors in delegated acts on taxonomy (Platform on Sustainable Finance, Commission).
3. Foster circular economy: The European Green Deal's Circular Economy Action Plan is pushing through an economy that could be decoupled from an increasing consumption of resources. As a matter of fact, the EU has a high use of secondary raw materials but in the case of iron, zinc or platinum, while for rare earths, gallium or indium, the supply from recycling is low. The quantity of waste potentially rich in raw materials that is shipped abroad for disposal is still too high. A thorough analysis of the possibilities of extracting raw materials from waste and scrap is necessary. It is also important to study the possible use of non-critical materials as an alternative to those that are critical<sup>72</sup>. The recycle of products, the increase of product life-time, the sustainable product design and the use of secondary raw materials will be essential to satisfy the demand of raw materials<sup>73</sup>.

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<sup>72</sup> Ivi, p.9-10-11.

<sup>73</sup> Ivi, p.8-9.

4. Map the supply of scraps: It is necessary to address the problems associated with the availability of secondary raw materials. New European regulations on products' cycle, from design and manufacturing to consumption, repair, reuse and recycling could help in identifying waste streams and the availability of collection and recycling technologies.
5. Increase EU domestic production: This is possible as there is a high untapped potential<sup>74</sup>. Europe could develop mining activities for the extraction of lithium, nickel, cobalt, graphite and manganese. New R&D programmes should be carried out. Moreover, the EU countries developed a good legislative framework to ensure that these activities are environmentally and socially friendly. However, with regard to many other fundamental Critical Raw Materials, Europe lacks production chains. The EU should tackle the causes of this untapped potential. The EU should tackle the causes of this untapped potential: It should speed up projects related to CRMs that are implemented too slowly elaborating new simplified procedures and reducing the costs of these activities. The EU should foster investments in explorations and simplify mining authorization procedures that are complex and slow. Finally, the EU should increase public acceptance of European citizens for mining activities as this is also another factor that can impede or slow down the projects<sup>75</sup>.
6. Promote technological developments in the mining sector: Mining and processing of critical raw materials are sectors experiencing an innovative technological revolution encompassing new solutions in automation and digitalisation that are changing the sector. Europe has a well-established mining tradition. Some countries still have a developed extractive industry for some metals such as copper and zinc.
7. Deploy Earth observation programmes for resource exploration.
8. Promote activities in the coal regions: Many of the raw material resources necessary for producing EU batteries can be found in the coal mining regions. In addition, waste from mining is rich in raw materials. It would therefore be possible in many cases to start the extraction of critical materials in sites where mines are already active. In coal mining regions like the south of Poland, the Just Transition Mechanism is involved in projects to convert mining activities, alleviating the economic impact of the transition to a decarbonised

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<sup>74</sup> Ivi, p.12.

<sup>75</sup> Ivi, p.14.

economy. Therefore, within these projects, it would be possible to use mining and engineering skills for new CRMs extraction activities<sup>76</sup>.

9. Develop strategic international partnerships: It is important that the EU continue to diversify international actions, negotiating free trade agreements on CRMs to allow European industries to equally compete with companies of other countries and so protecting the commercial interests of the EU. In the medium and in the long-term Europe can't satisfy the demand for primary critical raw materials. Hence, in order to protect strategic autonomy, Europe will continue to import. For these reasons imports of raw materials should be well diversified and undistorted. Trade policy tools like free trade agreements and enhanced enforcement efforts will be fundamental to strengthen the resilience for critical raw materials supply. The EU should work with international organisations to reinforce trade and investments. It is important that the EU continues negotiating free trade agreements on CRMs to allow European industries to equally compete with companies of other countries and so protecting the commercial interests of the Union. The EU should shift payments from other international currencies to euros to reduce price volatility.
  
10. Work for sustainability: Critical raw materials and sustainability partnerships like annual EU-US-Japan Trilateral on Critical Raw Materials, the United Nations, the WTO and bilateral with China are important. Strategic partnerships with resource-rich countries (Canada and Australia, several developing countries in Africa and Latin America and countries close to the EU like Norway, Ukraine and the Western Balkans) are fundamental to ensure supplies. Strategic partnerships involving extraction, processing and refining are also very important for developing countries and this represent also an opportunity for the Union. The EU should use these partnerships for its own benefit but bearing in mind that this is a great opportunity for these countries to achieve a sustainable economic growth without imbalances and granting good conditions for workers and generating social development.

### **3.2 Other European initiatives**

To implement the 10 actions outlined in the plan, the Commission works with the support of some organisations set up for this task and involving a strong private-public partnership.

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<sup>76</sup>Ivi, p.13.

More specifically, the following organisations are central for a complete framework:

- The European Institute of Innovation and Technology (EIT) Raw Materials.
- The European Innovation Partnership on Raw Materials (EIP).
- The industrial Alliance on raw materials (ERMA)<sup>77</sup>.

### 3.2.1 EIT raw materials

EIT raw materials is an innovation community within the EIT (European Institute of Innovation and Technology)<sup>78</sup>, an independent EU body whose aim is to increase Europe's ability to innovate supporting entrepreneurial talent and new ideas<sup>79</sup>. More specifically, the EIT Raw Materials is a consortium, established in 2015, that provides a collaborative environment for disruptive and breakthrough innovations. It connects more than 300 partners from industry, academia and research and its goal is to foster sustainable competitiveness and the innovation of the entire European value chain of minerals, metals, and other raw materials.

EIT helps funding new projects, encourages new entrepreneurs to develop innovative ideas for new business opportunities for raw materials and the Circular Economy<sup>80</sup>. It sustains start-ups securing raw materials supply, designing material solutions or closing materials loops.

The main innovation sectors are exploration, mining, processing, recycling, substitution, and circular economy.

The actions of EIT follow three guiding strategic frameworks called Lighthouses<sup>81</sup>:

- (i) Responsible Sourcing for securing raw materials supply.
- (ii) Sustainable Materials for designing materials solutions.
- (iii) Circular Societies for closing materials loops.

These are innovation areas that are helpful to prioritise investment areas, optimise their partnership interaction, and collaborate with other European and global stakeholders. They provide guidelines to the three strategic objectives of EIT Raw Materials.

Lighthouses are used for<sup>82</sup>:

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<sup>77</sup> Ivi, p.6

<sup>78</sup>“EIT Raw Materials, Connecting matters”, website, 2023. <https://eitrawmaterials.eu/about-us/>

<sup>79</sup>“EIT, European Institute of Innovation and Technology”, website, 2023. <https://eit.europa.eu/>

<sup>80</sup>De Oliveira Daniel P. S., Giosuè Chiara, Girtan Mihaela, Grilli Maria Luisa, Ruello Maria Letizia, Wittember Antje, “The Critical Raw Materials Issue between Scarcity, Supply Risk, and Unique Properties”, *Materials*, Vol. 14, 07,04, 2021. <https://www.mdpi.com/1996-1944/14/8/1826#B10-materials-14-01826>

<sup>81</sup>“EIT Raw Materials Lighthouses: Responsible Sourcing, Sustainable Materials, Circular Societies, Initiation Document for the EIT Raw Materials Partner Interaction and Debate at the Expert Forum”, website, 2022, p.2. <https://eitrawmaterials.eu/wp-content/uploads/2022/05/EIT-RawMaterials-Lighthouses-2022.pdf>

<sup>82</sup>Ibidem

- Align on identified innovation and education targets for the community.
- Identify clusters or focuses of partner interests and projects.
- Identify pressing industry topics for the Innovation Community's calls for proposals using EIT funding.
- Forge significant connections with the EIT Raw Materials partner network.
- Funnel EIT Raw Materials' funded activities to investors, particularly via the Raw Materials Investment Platform of the European Raw Materials Alliance (ERMA).

### 3.2.2 European innovation partnership (EIP Raw Materials)

The European Innovation Partnership (EIP) on Raw Materials, launched in 2012, is a partnership that has a central role in the EU's raw materials policy framework. It is one of five European strategic partnerships, (others are focused on Active and Health Aging, Agricultural Productivity and Sustainability, Water and Smart Cities and Communities)<sup>83</sup>. EIPs are EU's initiatives that bring together all relevant actors in the public and private sectors to foster research and innovation in many strategic sectors, they coordinate investments to build new actions where necessary.

EIP raw material translates strategic policies into concrete targets, priorities, and actions<sup>84</sup>. It involves, around a common platform, stakeholder such as representatives from industry, public services, academia, and non-governmental organizations (NGOs).

The EIP works to develop common strategies for the European Commission, EU countries, and private actors, using joint resources to ensure the development and the implementation of innovative solutions for the entire value chain of raw materials. It works also on the strengthening the EU's raw materials regulatory framework.<sup>85</sup>

The two objectives of the partnership are:

- (i) The implementation of new actions to promote production and to reduce EU's dependency on critical raw materials that are strategic for the industrial sector.

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<sup>83</sup>“RMIS, Raw Materials Information System, European Innovation Partnership on Raw Materials”, website, 2023. <https://rmis.jrc.ec.europa.eu/?page=european-innovation-partnership-on-raw-materials-3ed6b0>

<sup>84</sup> Ibidem

<sup>85</sup>De Oliveira Daniel P. S., Giosuè Chiara, Girtan Mihaela, Grilli Maria Luisa, Ruello Maria Letizia, Wittember Antje, “The Critical Raw Materials Issue between Scarcity, Supply Risk, and Unique Properties”, *Materials*, Vol. 14, 07,04, 2021. <https://www.mdpi.com/1996-1944/14/8/1826#B10-materials-14-01826>

- (ii) Make Europe a leader in exploration, extraction, processing, recycling and substitution, and reduce environmental, social and health impacts. It focuses on finding funds for research and innovation (R&I) activities<sup>86</sup>.

The implementation plan of EIP raw materials defines 95 actions which are structured in 24 action areas and 7 priority areas.

The priority areas are the following<sup>87</sup>:

- Research and innovation coordination
- Technologies for primary and secondary RM production
- Substitution of raw materials
- Improving Europe's raw materials framework conditions
- Improving Europe's waste management framework conditions and excellence
- Knowledge, skills and raw materials flows
- International cooperation

### 3.2.3 European Raw Materials Alliance (ERMA)

In addition to these bodies, the European Raw Materials Alliance (ERMA), which is part of the first action above mentioned, is an Industrial Alliance launched by the EU Commission in September 2020. Industrial Alliances are essential tools in current European industrial policy, other Industrial Alliances were set up in the sector of batteries (EBA); circular plastics (CPA); Clean Hydrogen<sup>88</sup>. More specifically, Industrial Alliances are open platforms bringing together a wide range of partners, both private and public, in a specific industrial sector.

The ERMA, managed by (EIT) Raw Materials, plays an important role to achieve key EU policy goals through joint actions carried out by interested partners. In concrete terms ERMA invests in innovation and technology, to diversify supplies, to build a resilient European value chain in the rare earths and magnets sectors, to achieve open strategic autonomy. In the future it will expand its scope to other critical raw material and base metals.

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<sup>86</sup>“The European innovation partnership (EIP) on raw materials”, EU Commission, website.

[https://single-market-economy.ec.europa.eu/sectors/raw-materials/eip\\_en](https://single-market-economy.ec.europa.eu/sectors/raw-materials/eip_en)

<sup>87</sup>“Strategic implementation plan (SIP)”EU Commission, website.

[https://single-market-economy.ec.europa.eu/sectors/raw-materials/eip/strategic-implementation-plan-sip\\_en](https://single-market-economy.ec.europa.eu/sectors/raw-materials/eip/strategic-implementation-plan-sip_en)

<sup>88</sup>“Commission staff working document Strategic dependencies and capacities Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery SWD(2021) 352 final”, EU Commission, 2021, p.57.[https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities\\_en.pdf](https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities_en.pdf)

Its main tasks are to identify barriers, opportunities and investments that can be useful to build capacities at all stages of the raw materials value chain, from mining to waste recovery and to tackle issues related to sustainability and social impact<sup>89</sup>.

The ERMA works through an agile and inclusive consultation processes to assess regulatory bottlenecks, to identify current and future demand for Rare Earths and decide which actions should be taken in order to secure supply.

It sets up a Raw Materials Investment Platform (RMIP) where it involves relevant stakeholders of the value chains such as industrial actors, but also Member States and regions, trade unions, civil society, research and technology organisations, investors, and NGOs. In this way it facilitates investments to develop innovative and cutting-edge technology solution.

The ERMA's activities are divided in "clusters" defined around specific sectors.

- The first cluster concerns rare earths magnets and motors that are critical for many EU industrial ecosystems such as automotive, wind turbine manufacture, defence, and aerospace. Rare earths are essential for these productions. As in Europe so far there is no primary production of rare earths, and less than 1% of rare earth elements are recycled, ERMA identified investments of €1.7 billion. In case the related projects will be realised, in 2030 20% of Europe's rare earth magnet necessity could be sourced from the EU itself, which means 15 times more than today<sup>90</sup>. In 2021, ERMA identified 14 industrial projects to secure rare earth mining and urban mining with projects from all over Europe. These projects could potentially cover 20% of Europe's rare earth magnet needs by 2030<sup>91</sup>.

ERMA identified the need for investments of 1.7 billion euros for the rare earth magnets value chains and 9 billion euros for other raw materials projects, mainly critical. Restoring production capacity of magnesium metal in the EU will need an estimated investment of 1-2 billion euros to restart smelting activity in Europe by 2025 with the potential of covering at least 15% of EU needs of magnesium metal by 2030.

- The second cluster, not yet defined, will focus on raw and advanced materials for energy storage and conversion.

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<sup>89</sup>"Action plan on Raw Materials" EU Commission, factsheet

final. <https://ec.europa.eu/docsroom/documents/42852/attachments/2/translations/en/renditions/native>

<sup>90</sup>"Rare Earth Magnets and Motors: A European Call for Action A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliance", ERMA, 2021, p.7. <https://eitrawmaterials.eu/wp-content/uploads/2021/09/ERMA-Action-Plan-2021-A-European-Call-for-Action.pdf>

<sup>91</sup>"Commission staff working document EU strategic dependencies and capacities: second stage of in-depth reviews, SWD(2022) 41 final ", EU Commission, 22,02,2022. p.29. [DocsRoom - European Commission \(europa.eu\)](https://ec.europa.eu/docsroom/documents/42852/attachments/2/translations/en/renditions/native)



The necessary conditions to build clusters within ERMA are sustainability (social, economic, and environmental), digitalization, circularity, and capacity building.<sup>92</sup>

ERMA's actions are carried out through two workstreams:

1. Value chain-specific consultation processes.
2. A channel for investments in raw material projects.

The first workstream identifies regulatory bottlenecks in industrial ecosystems through the open consultation process. It responds providing tailored solutions.<sup>93</sup>

The second workstream is focused on the individuation of the needs of the industry partners and on selection and support of investment cases. It sets out the investments platform that is fundamental to select and prioritize investment cases to secure European industrial ecosystems, define case-specific financing strategies and mechanisms<sup>94</sup>. Finally, EU funding opportunities and financing sources for investment opportunities inside and outside Europe are assessed<sup>95</sup>.

### 3.2.4 Circular economy action plan

The Circular Economy Action Plan establishes a series of Actions and Thematic Programs regarding this fundamental theme<sup>96</sup>.

One of these is the Waste Framework Directive provides a general framework setting out the following priority objectives for waste policy in the EU.

- Reduce the amount of waste produced.
- maximizing recycling and re-use.
- limit incineration to non-recyclable materials.
- phasing out landfills of non-recyclable and non-recoverable waste.
- Ensure full implementation of waste policy objectives in all Member States.

Another important instrument that supports the financing of circular economy is Circular Economy Finance Support Platform. The platform brings together the Commission, the EIB, financial market participants and businesses to improve the uptake of circular economy projects by investors.

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<sup>92</sup>Gasparon Massimo, Schäfer Bernard, Storm Per, "European Raw Materials Alliance—a new initiative to increase raw material resilience for a greener Europe", Mineral Economics, 23, 10, 2020, p.415-416. <https://link.springer.com/content/pdf/10.1007/s13563-020-00241-4.pdf?pdf=button>,

<sup>93</sup>Ibidem

<sup>94</sup>Ibidem

<sup>95</sup>"Rare Earth Magnets and Motors: A European Call for Action A report by the Rare Earth Magnets and Motors Cluster of the European Raw Materials Alliance", ERMA, 2021, p.7. <https://eitrawmaterials.eu/wp-content/uploads/2021/09/ERMA-Action-Plan-2021-A-European-Call-for-Action.pdf>

<sup>96</sup>"Report on critical raw materials and the circular economy" EU Commission, 2018, p.13-14. <https://op.europa.eu/en/publication-detail/-/publication/d1be1b43-e18f-11e8-b690-01aa75ed71a1>

Finally, Horizon 2020 fund is an important tool used to invest in circular economy projects. It invests in R&I actions developing sustainable production of primary and secondary raw materials.

## CHAPTER FOUR

# THE NATIONAL EXPERIENCES OF US, UK, ITALY AND FRANCE

### 4.1 The context

In a context of increasing geopolitical tensions and strong growth in demand for CRMs, the need to secure the supply chains of raw materials has become a global issue that is affecting different systems. Outside the EU other industrialised countries are moving to implement strategies to address and resolve the issue of CRMs supplies. Documents of analysis and actions plans have been elaborated to estimate the dependencies tied to the future dynamics of markets and the technological trends that will determine the necessities of the industrial chains in the near future. It is possible to divide countries into two categories according to the type of strategies that they set up.

- Countries with large reserves and which also have a production chain of extraction, refining and processing, have adopted political strategies to make the most of the potential of the resources they possess.
- Countries without deposits or with limited resources but with a high demand for raw materials, that have implemented policies to increase the consumption of domestic resources, for example through the use of alternative sources, recycling, or strategies to diversify supplies.

Despite these differences it is possible to identify five types of actions implemented by all countries in relation to this theme:

- 1) increase in extraction capacity and the creation of industrial supply chains for the processing.
- 2) recycling.
- 3) use of alternative materials.
- 4) development of new technologies for the creation of new mining capacities not currently available.
- 5) diversification of supply chains through new trade agreements.

Four cases will be analysed: two extra Europeans and two Europeans.

As to the extra European cases, the ones of the USA and United Kingdom will be analysed. These countries, like the European Union, have highly developed manufactures and, therefore, a huge demand for raw materials but are heavily dependent on imports, in particular from China.

On the European side the national case of Italy and France, will be also presented.

## 4.2 The US

Over the past 15 years, the United States has adopted a series of regulations aimed at increasing the strength of its domestic supply chain of critical materials and reducing the demand for imports. In this context, the US Raw Materials Strategy was launched in 2010 on guidelines similar to those of the EU's RMI. As a matter of fact, the document drawn up by the Department of Energy (DOE)<sup>97</sup> focuses on the materials used for the following four green technologies:

- permanent magnets, used in wind turbines and electric vehicles,
- advanced batteries, used in electric vehicles,
- thin-film semiconductors, used in photovoltaic power systems,
- and phosphors, used in high-efficiency lighting systems.

In addition to that, a list of 14 critical elements is drawn up: Lanthanum, Cerium, Praseodymium, Neodymium, Samarium, Europium, Terbium, Dysprosium, Yttrium, Indium, Gallium, Tellurium, Cobalt and Lithium.

A distinction is also made between materials that have a risk in the supply to Short-Term (0-5 years) and those that have it in the Medium-Term (5-15 years).

The strategy developed by the DOE is based on three guidelines:

- diversification of global and domestic supply chains. To this end, measures should be taken to facilitate extraction, refining and production in the United States, as well as the increase of diversification of supplies around the world.
- increase in the possibility of using substitute materials to meet the needs of the clean energy economy.

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<sup>97</sup>“Critical Materials Strategy”, US Department of Energy, 12 , 2010.<https://www.energy.gov/sites/prod/files/edg/news/documents/criticalmaterialsstrategy.pdf>

- Support to recycling, reuse and a more efficient use of resources for the reduction of the global demand for critical materials. Here, too, the focus is on research into new recycling processes to make recycling economically feasible over time<sup>98</sup>.

Moreover, the two most important acts were the “Executive Order 13953” of the 30<sup>th</sup> of September, 2020 “addressing the threat to the domestic supply chain from reliance on critical minerals from foreign adversaries and supporting the domestic mining and processing industries”<sup>99</sup>, approved by the Trump administration and the “Executive Order” 14017 of the 24<sup>th</sup> of February, 2021 on “securing America’s supply chains” approved by the Biden administration<sup>100</sup>.

Following the Executive Order 13953 of the 30<sup>th</sup> of September, 2020, the Department of Energy (DOE) has prepared this document to address the shortages in supplies related to minerals and critical materials<sup>101</sup>. The document stresses the need to ensure a supply of minerals and to reduce the dependence of the country on critical materials, as supplies from foreign competitors like China pose a threat to US independence and economic stability. The United States in 2020 imported 80% of rare earths directly from China, down from 95% in 2010<sup>102</sup>.

This document is based on three fundamental pillars: the diversification of supply, the development of substitutes and better recycling and the need to establish strong international partnerships on the subject with Canada, Australia, the European Union, and Japan<sup>103</sup>.

The strategy outlined in the document consists of four main goals<sup>104</sup>:

- The first is the promotion of scientific innovation and the development of technologies that can ensure the resilience and security of industrial supply chains. It is thus fostered public-private partnerships and international partners for research and development activities.
- The second focuses on the need to support private sector capacities in the field of sustainable critical mineral supply chains through the involvement and support of key stakeholders.

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<sup>98</sup>“Critical Materials Strategy, Summary”, US Department of Energy, 12, 2010,

p.3[https://www.energy.gov/sites/default/files/10\\_Critical\\_Materials\\_Strategy\\_Exec\\_Summary\\_final.pdf](https://www.energy.gov/sites/default/files/10_Critical_Materials_Strategy_Exec_Summary_final.pdf)

<sup>99</sup>“Executive Order 13953 Addressing the Threat to the Domestic Supply Chain From Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries”, Federal register, 30,09,2020.

<https://www.federalregister.gov/documents/2020/10/05/2020-22064/addressing-the-threat-to-the-domestic-supply-chain-from-reliance-on-critical-minerals-from-foreign>

<sup>100</sup>“Executive Order 14017 on America’s Supply Chains, The White House, 24, 02, 2021. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/>

<sup>101</sup>“Investigation of U.S. Foreign Reliance on Critical Minerals, U.S. Geological Survey Technical Input Document in Response to Executive Order No. 13953” U.S. Department of the Interior, U.S. Geological Survey, 30, 09, 2020.

<https://pubs.usgs.gov/of/2020/1127/ofr20201127.pdf>

<sup>102</sup>“Mineral Commodity Summaries, rare earths”, U.S. Geological Survey, January 2023.

<https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-rare-earth.pdf>

<sup>103</sup>“Critical Minerals and Materials: U.S. Department of Energy’s Strategy to Support Domestic Critical Mineral and Material Supply Chains”, U.S. Department of Energy, 2021, p.i.

[https://www.energy.gov/sites/default/files/2021/01/f82/DOE%20Critical%20Minerals%20and%20Materials%20Strategy\\_0.pdf](https://www.energy.gov/sites/default/files/2021/01/f82/DOE%20Critical%20Minerals%20and%20Materials%20Strategy_0.pdf)

<sup>104</sup>Ivi p.7.

[https://www.energy.gov/sites/default/files/2021/01/f82/DOE%20Critical%20Minerals%20and%20Materials%20Strategy\\_0.pdf](https://www.energy.gov/sites/default/files/2021/01/f82/DOE%20Critical%20Minerals%20and%20Materials%20Strategy_0.pdf)

- The third concerns the construction of a long-term materials ecosystem, through new capabilities to address future challenges regarding supply chains of minerals and critical materials. To achieve this goal, a solid analysis of structural criticalities such as the improvement of the mapping of the deposits of minerals and critical materials and the promotion of a training programme of the skills of the workforce is planned.
- The fourth goal is the necessity to strengthen new agreements with international partners and allies to diversify the global supply chains, to establish global industry standards and ensure the adoption of best practices for sustainable mining and processing.

Finally, the Biden administration’s Executive Order 14017 of the 24<sup>th</sup> of February, 2021 on securing America’s supply chains focuses on 3 actions to protect raw materials supply chains:

Increasing mineral extraction and processing capacity, promoting recycling and recovery of minerals from waste and strengthening cooperation with allies and partners to develop, diversify and improve extraction and processing activities of critical minerals.

### 4.3 The UK

In July 2022, the UK launched its first “Critical Minerals Strategy”<sup>105</sup> in order to tackle the issue of CRM supply. This document sets out three main objectives aimed at securing the provision of critical materials to the UK industry:

- (i) accelerate the growth of the United Kingdom’s internal capacities and of its circular economy;
- (ii) collaborate with international partners;
- (iii) enhance international markets to make them more responsive, transparent and responsible<sup>106</sup>;
- (i) The first goal is to increase national CRMs production, respecting the necessities of producers, communities and of the natural environment. This is to be achieved reducing barriers to domestic exploration and extraction of critical minerals. To reach these goals it necessary to rebuild and strengthen the skills in mining and support the new generation of engineers, miners and geologists. The document also reiterates its support for research and development to find cutting-edge solutions to solve challenges in critical mineral supply chains. The promotion of a circular economy of critical minerals in the United

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<sup>105</sup>“Resilience for the Future: The UK’s critical mineral strategy, Policy Paper”, website, UK Department for Business, Energy & Industrial Strategy, 22, 07, 2022. <https://www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy>

<sup>106</sup>Sancho Calvino Ana Elena, “What policies have governments adopted to secure critical materials?”, The Global Trade Alert reports, zeitgeist series briefing 6, 30, 10, 2022. <https://www.globaltradealert.org/reports/download/103>

Kingdom is also stressed as being of primary importance. Increasing recovery, reuse and recycling rates and resource efficiency is key to reduce the demand for supplies to raw materials of primary origin. UK will boost financial support to accelerate the development of a circular economy, carrying out a simplification of rules to promote recycling.

- (ii) The second objective aims to diversify the supplies so that they become more resilient. To this end, UK intends to support British companies working abroad to consolidate diversified, responsible and transparent supply chains. United Kingdom has to strengthen diplomatic, commercial and economic relations to improve the resilience of supply in the United Kingdom. This will be done carrying out multilateral partnerships to tackle global issues and joint collaboration with supplier countries towards new solutions to global issues in critical mineral value chains.
- (iii) The third goal is focused on boosting global environmental, social and governance performance (ESG), reduce vulnerability to disruption and promote a playing field in order to provide a well-functioning and transparent market for responsible businesses. Moreover it is intended to support London as the world capital of responsible finance for critical minerals.

This document also defines a list of critical minerals. The assessment is carried out annually by the Critical Minerals Intelligence Centre (CMIC), in collaboration with the British Geological Survey (BGS). The assessment is mad through an evidence-based process, the methodology is agreed with the Department for Business, Energy and Industrial Strategy and is based on the economic vulnerability and supply risk. These materials are: Antimony, Bismuth, Cobalt, Gallium, Graphite, Indium, Lithium, Magnesium, Niobium, Palladium, Platinum, Rare Earth Elements, Silicon, Tantalum, Tellurium, Tin, Tungsten and Vanadium<sup>107</sup>.

#### 4.4 Italy

In recent years, the launch of the PNRR (*Piano Nazionale di Ripresa e Resilienza*) and the significant investments needed for the ecological and digital transition has prioritized the issue of raw material supply. In this respect, the Italian *Ministero delle imprese e del Made in Italy* (Mimit) has launched, in 2021, the *Tavolo Tecnico per le Materie Prime*, a technical board with the aim of identifying the needs of critical raw materials and define a strategy for secure and sustainable supply and foster the

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<sup>107</sup>“Resilience for the Future: The UK’s critical mineral strategy, Policy Paper”, website, UK Department for Business, Energy & Industrial Strategy, 22, 07, 2022, <https://www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy>

circularity and the recycling. The initiative also aims creating an Italian system dedicated to this theme that can strengthen national coordination for shared solutions on critical raw materials. creation of new regulatory conditions. The board is open to the participation of institutions, research centres, industry consortia and trade associations. Four main areas of interest were identified in 2022, together with related working groups<sup>108</sup>.

- "Requirements Analysis" Coordinated by *Confindustria*, it aims to estimate current needs and future evolution and allows the planning of activities. It analyses the gap between supply and demand to allow adequate planning of solutions to carry out in case of critical moments.
- "Mining" Coordinated by Department for the Geological Service of Italy of ISPRA (*Istituto superiore per la protezione e la ricerca ambientale*), (Department for the Geological Service of Italy), aims to identify the potential for primary and secondary extractive activities (recovery from extractive waste). It is charged to evaluate the possibilities of sustainable extraction in Italy including the recovery of raw materials from previously abandoned sites and mining waste. This working group includes a large part of the national scientific and technical community in the field of mining.
- "Ecodesign" Coordinated by ENEA (*Energia Nucleare Energie Alternative*), it tests the potential of eco-design in reducing the demand for critical raw materials. It foster projects for a correct design of products it promotes strategies to enhance the reuse and recovery of components and materials at the end of life.
- "Urban mining" Coordinated by ENEA, its main objective is the estimation of the potential of materials recovery and recycling activities (rare earths in particular). This working group also analyses global and European best practices and has the task of drafting legislative proposals for the recovery of materials.

## 4.5 France

For over 20 years, the issue of raw material supply has been high on the agenda of the French government. The rise of prices in the mineral resources markets and the difficulties in securing

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<sup>108</sup>"Materie prime critiche", website, Ministero delle Imprese e del Made in Italy, last update: 14, 12, 2022. <https://www.mise.gov.it/index.php/it/impresa/competitivita-e-nuove-impres/materie-prime-critiche/materie-prime-critiche#:~:text=Il%2017%20gennaio%202022%20si,loro%20coordinatori%20e%20la%20governance>



supplies have imposed to the public decision-maker a series of participations in order to limit the risks and to guarantee the access to the indispensable resources.

The French intervention on the theme of raw materials was divided into three main directions:

- (i) Awareness of the risks (geopolitical, environmental, and economic) of raw materials and sharing of knowledge on raw materials markets with industrial actors.
- (ii) Development of primary and secondary resources of the territory.
- (iii) Trade diplomacy.

It should be noted that in France the initiatives of the authorities have provided for close cooperation among public and private institutions.

In 2011, the public authorities set up COMES (Comité pour les métaux stratégiques)<sup>109</sup> together with other private actors; a body of consultation between French actors: ministries, public institutions, industry and professional federations representing industry<sup>110</sup>. COMES is an institution with the task of assisting the government in the development and implementation of strategic metal management policy. Other public and private actors are involved in the development of strategies and the management of activities related to the supply of raw materials:

- Conseil général de l'Économie, de l'industrie, de l'énergie et des technologies (CGE)
- Public agencies: BRGM (Bureau de Recherches Géologiques et Minières), Ifremer (Institut Français de Recherche pour l'Exploitation de la Mer) ADEME (Agence de l'Environnement et de la Maîtrise de l'Énergie), et CEA (Commissariat à l'Énergie Atomique et aux énergies alternatives)
- Fédérations et comités professionnels dans le domaine des Ressources Minérales

As we can see, this is a very complex organisational framework and action which requires a high degree of political control and coordination.

In recent years, following the events of 2020 the French Government<sup>111</sup>, entrusted Philip Varin with the task to elaborate an action plan to improve the supply of critical raw materials essential for the

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<sup>109</sup>“Mineral info, le portail français des ressources minérales non énergétiques, Les acteurs” website, 2023.

<https://www.mineralinfo.fr/fr/acteurs>

<sup>110</sup>“Décret n° 2011-100 du 24 janvier 2011 portant création du comité pour les métaux stratégiques (COMES) ”, Journal officiel "Lois et Décrets", Légifrance, JORF n° 0021 du 26,01, 2011. <https://www.legifrance.gouv.fr/jorf/jo/2011/01/26/0021>

<sup>111</sup>“Investir dans la France de 2030 : remise au gouvernement du rapport Varin sur la sécurisation de l’approvisionnement en matières premières minérales et ouverture d’un appel à projets dédié”, Ministère de la transition écologique et de la Cohésion des territoires, Ministère de la Transition énergétique, website 10, 01, 2022. <https://www.ecologie.gouv.fr/investir-dans-france-2030-remise-au-gouvernement-du-rapport-varin-sur-securisation>

development of priority sectors in the green and digital transition. The main objectives of the "Varin's Plan" are<sup>112</sup>:

- Assess the level of safety of metal supplies.
- Define the needs.
- Propose a board to improve the resilience of production chains for critical metals.

Following the study, the team coordinated by Varin proposed the following recommendations:

- Creation of an investment fund in strategic metals for the energy transition.
- Establishment of a critical metal observatory.
- Ensure the supply of strategic metals, closely involving industrialists and administrations.
- Design of a metal technology roadmap for the next generation of batteries.
- Regulatory definition of "responsible extraction", consistent with the European regulation on batteries.

The French government has announced "a financing of one billion euros", 500 million in State aid, grants and repayable advances and 500 million to establish an investment fund, intended to "strengthen the resilience of the industrial fabric on metal supply chains".

Another important action is the setting, in December 2022, of an inter-ministerial task force for strategic minerals and metals procurement (*délégation interministérielle aux approvisionnements en minerais et métaux stratégiques*) coordinated by the Prime Minister<sup>113</sup>. This task force involves the Minister for Economy and Finance, Minister for Industrial and Digital Sovereignty, Minister for Europe and Foreign Affairs, Minister for Ecological Transition and Territorial Cohesion and Minister for Energy Transition and coordinates the State's action in securing the supply of strategic minerals and metals through the following actions:

- Identifying vulnerabilities related to the supplies.
- Ensuring the implementation of supply security actions.
- Monitoring the implementation of projects.
- Helping to strengthen coherence between public policies.

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<sup>112</sup>“Mineral info, le portail français des ressources minérales non énergétiques, France 2030 : Le rapport Varin sur la sécurisation de l’approvisionnement en matières premières minérales remis au Gouvernement” website, 11, 10, 2022.

<https://www.gouvernement.fr/investir-dans-la-france-de-2030-remise-au-gouvernement-du-rapport-varin-sur-la-securisation-de-l>

<sup>113</sup>“Décret n° 2022-1550 du 10 décembre 2022 relatif à la délégation interministérielle aux approvisionnements en minerais et métaux stratégiques”, Légifrance, Journal officiel "Lois et Décrets JORF n° 0287, 11, 12, 2022.

<https://www.legifrance.gouv.fr/jorf/jo/2022/12/11/0287>

- Contributing to the development of the national strategy for transition to the circular economy.
- Participating in international negotiations on issues related to strategic mineral and metal supplies.

## CHAPTER FIVE

# THE RAW MATERIAL ACT AND THE INDUSTRIAL POLICY TOOLS TO TACKLE THE RAW MATERIAL ISSUE

### 5.1 Introduction and scenario

In the future decades, the realisation of the green deal and the digital transition of the EU economy will require an enormous increase in consumption of raw materials for many applications in sector such as renewables, e-mobility, defence and space.

The numbers and the projections are, in this respect, clear. To cover the additional material consumption for batteries, fuel cells, wind turbines and photovoltaics in renewables and e-mobility, the EU will need, by 2030, almost 20 times more lithium, almost 5 times more graphite, 5 times more cobalt, 5 times more dysprosium, 2 times more neodymium, 1 time more nickel and 1 time more praseodymium, compared to current EU consumption of the material in all applications. By 2050 the EU will need 60 times the amount of lithium, almost 15 of graphite, 15 of cobalt, almost 12 of dysprosium, 4 of neodymium, almost 4 times of nickel and 5 of praseodymium<sup>114</sup>.

This situation has been highlighted by the COVID pandemic which led to serious material and product shortages in areas where the EU countries are heavily dependent from abroad, causing a sharp slowdown in the EU economy (-6.3% of GDP in 2020) and serious damage to the production chains<sup>115</sup>. The pandemic revealed the vulnerability of the global integrated market and the interdependence of global value chains, strengthening the trend towards deglobalisation and accelerating ecological and digital transitions for a more competitive and resilient Europe<sup>116</sup>.

In this new context, the need of an EU strategy in the matter has surged in the agenda together with a renewed integrated approach for managing raw materials supply chains. What is at stake is maintaining in the future the leadership of the European industry in key strategic areas. In this light

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<sup>114</sup>“Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions, Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe’s recovery, COM 350 final”, EU Commission, 2021. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52021DC0350>

<sup>115</sup>Bontempi Elza, Cornelio Antonella, Zanoletti Alessandra, “A post-pandemic sustainable scenario: What actions can be pursued to increase the raw materials availability?” p.6. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9749895/>

<sup>116</sup>“Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe’s recovery, COM 350 final”, EU Commission, 2021. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52021DC0350>

the European institutions re-updated the list of priorities, placing raw materials supply, at the top of their agenda.

## 5.2 The EU towards the Raw Material Act

The Critical Raw Materials Act announced for March 2023, is thus the result of a convergence between different institutional actors: the Council, the Commission, some Member States and the Parliament.

As to the Council, in its conclusions of the 13<sup>th</sup> of November, 2020, it affirmed the need to reduce dependencies and to increase the resilience of strategic industrial sectors such as health, defence industry, space, digital technologies and energy to protect strategic autonomy. This may also include actions to secure critical raw materials supplies such as diversifying supply chains, ensuring strategic stockpiling, fostering and attracting investments and production in Europe, exploring alternative solutions and circular models, and promoting broad industrial cooperation across Member States<sup>117</sup>.

As to the Commission, in May 2021, in the aftermath of COVID 19 pandemic, it decided to update the European industrial strategy. In this document, green and digital transition are set as top priorities for the Union. The importance for the EU to be at the forefront and to lead these changes, defend its sovereignty and strategic interests is underlined. Therefore, it is strongly recalled the necessity to strengthen an open strategic autonomy and the need to ensure it through an analysis of strategic dependencies.

Finally, on this topic, the European Parliament has moved in the same direction, approving, on the 24<sup>th</sup> of November, 2021, a resolution on a European common strategy for critical materials (2021/2011(INI))<sup>118</sup>. In this document the Parliament called on the Commission to carefully review the criticality assessment methodology by 2023 in view of the publication of the next list of CRMs. It also requested to draw up an Important Project of Common European interest (IPCEI) on raw materials.

The Parliament underlined the importance of developing a resilient European value chain for rare earths and permanent magnets and identifies 3 priorities to diversify supply chains for both primary and secondary sources:

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<sup>117</sup>Van den Abeele Éric “Towards a new paradigm in open strategic autonomy?”, ETUI, working paper 03, 2021

[https://www.etui.org/sites/default/files/2021-](https://www.etui.org/sites/default/files/2021-06/Towards%20a%20new%20paradigm%20in%20open%20strategic%20autonomy_2021.pdf)

[06/Towards%20a%20new%20paradigm%20in%20open%20strategic%20autonomy\\_2021.pdf](https://www.etui.org/sites/default/files/2021-06/Towards%20a%20new%20paradigm%20in%20open%20strategic%20autonomy_2021.pdf) , p17

<sup>118</sup>“A European strategy for critical raw materials European Parliament resolution on a European strategy for critical raw materials (2021/2011(INI))”, EU Parliament, 24,11,2021.[https://www.europarl.europa.eu/doceo/document/TA-9-2021-0468\\_EN.pdf](https://www.europarl.europa.eu/doceo/document/TA-9-2021-0468_EN.pdf)

1. Closing material loops and exploiting the potential of recycling projects through significant public and private investments and simplification of procedures.
2. Increasing sourcing from the EU, through investments in research for new sustainable mining activities respecting high environmental standards and working conditions.
3. Diversifying supplies through new partnerships with resources-rich countries to ensure supplies.

This translates into the need for greater protection of strategic industrial sectors and reduction of the dependence of productions related to critical material supplies from other actors-competitors to increase safety and resilience<sup>119</sup>.

Thereafter in the Versailles Declaration of the 10<sup>th</sup> and 11<sup>th</sup> of March, 2022 the heads of state and government of EU countries reaffirmed the same priorities to reduce strategic dependencies. New regulations, financial instruments, and industrial policies are proposed possible tools to reach these objectives<sup>120</sup>.

These indications were fully endorsed at the Commission's level. First in the Competitiveness Council of the 9<sup>th</sup> and 10<sup>th</sup> of June, 2022, the European Commission announced the preparation of a legislative proposal on raw materials following the previously stated indications<sup>121</sup>. Then in the 2022's State of the Union address, the President of the European Commission Ursula Von der Leyen underlined the centrality of raw materials for the twin transitions, pointing out that Lithium and rare earths are already replacing gas and oil at the heart of EU economy<sup>122</sup>. The aim of this new act is to provide the European legal system with a binding act that updates and goes beyond the policy indications present in the various editions of the RMI.

In the following months of 2022, the President of the Commission Ursula Von der Leyen and the Industry Commissioner Thierry Breton in the State of the Union address of the 14<sup>th</sup> of September<sup>123</sup> and the Vice President Maroš Šefčovič in the Conference on Raw material security of Europe<sup>124</sup>, spoke of the urgency of facing the issue of raw materials through a legislative act.

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120 "Informal meeting of the Heads of State or Government Versailles Declaration 10 and 11 March 2022", Versailles, 11 March 2022 <https://www.consilium.europa.eu/media/54773/20220311-versailles-declaration-en.pdf>

121 "Competitiveness Council, 9-10 June 2022 Main results", Council of the EU, 9,6,2022. <https://www.consilium.europa.eu/en/meetings/compet/2022/06/09-10/>

122 "State of the Union address 2022 by Ursula von der Leyen President of the European Commission", 2022. [https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU\\_2022\\_Address\\_EN.pdf](https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU_2022_Address_EN.pdf)

<sup>123</sup> Ibidem

<sup>124</sup> "Keynote speech by Vice-President Maroš Šefčovič at the Raw Materials Security of Europe Conference", EU Commission. 12, 9, 2022. [https://ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_22\\_5484](https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_5484)

In their statements, taking up the resolution of the Parliament and anticipating the contents that the future Critical Raw Material Act will contain, they outlined the challenges and the goals that the future legislative act should tackle and presented proposals and guidelines for possible actions to set up.

All the statements pointed out that raw materials will be necessary for the twin transitions and that without secure and sustainable access to the necessary raw materials EU can't reach its target to become the first climate neutral continent. Furthermore, it was underlined that market rules alone can't manage efficiently the growing demand for raw material.

It was also stressed the necessity to negotiate further international agreements with likeminded partners for securing new supplies and coordinating production and trade of raw materials. It was also suggested that even if diplomatic actions to increase and diversify supplies were not sufficient it would be necessary to set up further actions in other directions. In this respect it was made reference to the future establishment of a network of European agencies with new instruments to secure the supply by boosting market monitoring and stockpiling actions.

Finally, it was reaffirmed, in order to build new European supply chains for secondary and primary raw materials, that it is essential to identify, sustain and speed up new green strategic projects all along the supply chains through streamlined procedures and an easier access to financing. Alongside these actions, the provision of a strong and sustainable level playing field is another essential condition to foster competition among companies in this sector.

### **5.3 The Franco-German position**

In parallel to the Commission's activity, also France and Germany published, in September 2022, a joint document to give a contribution to the Commission's work for the future Raw Materials act. This common Franco-German proposal was submitted to the European Commission and to the European Member States at the Competitiveness Council of the 29<sup>th</sup> of September, 2022<sup>125</sup>. This document indicated many actions, tools and specific solutions to strengthen EU autonomy for the supply of CRMs<sup>126</sup>.

The franco-German position is articulated around three pillars:

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<sup>125</sup>“Franco-German position on an EU Critical Raw Materials Act”, Gemeinsame Pressemitteilung -Europäische Wirtschaftspolitik, Bundesministerium für Wirtschaft und Klimaschutz, Ministère chargé de l'Industrie 29,9,2022 <https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2022/09/20220929-franco-german-position-on-an-eu-critical-raw-materials-act.html>

<sup>126</sup>“Franco German Non-Paper on a Critical Raw Materials Act” Agence Europe, 2022. <https://aeur.eu/f/3cx>

1. Strengthen crisis management of CRMs supplies through the establishment of an early warning system.
2. Use existing financing instruments to support investments for projects in raw material supply chains.
3. Ensure a global level-playing field, fair-trade and sustainable market framework based on high ESG Standards.

The two countries finally underlined the necessity to support strategic projects along the supply chain in mining, processing, recycling, especially actions helping “closing the loop” of the circular economy by 2050<sup>127</sup>.

#### **5.4 The prospectives for European Critical Raw Materials Act**

In the autumn of 2022, DG Grow elaborated a document containing guidelines for the future Raw Material act, formalising the indications previously outlined by the Commissioners in their declarations.

It was maintained that the act could be an essential tool to adequately address the problem of lack of coordination of actions carried out by Member States. A coordinated and synergic approach of EU-level measures, such as monitoring or supporting strategic projects, it is more efficient than fragmented measures carried out by Member States alone. This could also help preventing overlaps and foster value chains in the entire EU.

The Commission proposal for a Raw Material Act is expected to be published by the first quarter of 2023. However, the call for evidence for an impact assessment document, presented by the Commission to receive feedback from stakeholders, outlines the guidelines and the problems that the initiative aims to tackle and possible actions to undertake.

On the basis of this documents is possible to say that, the aim of the Raw Material Act is to address the EU issues and weaknesses in the following areas<sup>128</sup>:

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<sup>127</sup>“Franco-German position on an EU Critical Raw Materials Act”, Gemeinsame Pressemitteilung -Europäische Wirtschaftspolitik, Bundesministerium für Wirtschaft und Klimaschutz, Ministère chargé de l’Industrie 29,9,2022  
<https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2022/09/20220929-franco-german-position-on-an-eu-critical-raw-materials-act.html>

<sup>128</sup>“European Critical Raw Materials Act”, EU Commission, 2022.[https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act_en)



- EU low diversification of supply with third countries. The EU depends on a few third countries and in some cases, it is penalized by unfair competition of third countries.
- The potential of the EU production of CRMs is undermined by the lack of investments in mining explorations, the limited public acceptance and the difficult access to financing.
- The administrative burden due to the complexity of procedures for extraction, refining and recycling, impedes or slows down new projects. Financing and regulatory frameworks are also insufficient to support circular economy projects.
- Weak monitoring and risk management capacity increase EU vulnerability undermining the possibility to anticipate and prevent unexpected crisis such as supply disruptions, shortages, and sudden price hikes of critical raw materials.
- Research and innovation (R&I) in the EU are insufficient to face competition resource-rich third countries for innovative solutions, causing a further outflow of know-how and skills out of the EU.

The regulatory dimension could be built around four main pillars:

1. Defining priorities for EU actions: The elaboration of a list of strategic objectives to guide national and EU projects is essential together with the publication of a new critical raw materials list based on criteria including economic importance, supply concentration, demand substitution, strategic applications and forecasted supply gaps.
2. Improving the EU's monitoring, risk management and governance: This could be done through the creation of a network that include Member States agencies for sharing information. This network could develop early warning mechanisms, conduct stress tests on critical supply chains, map strategic mineral resources and provide strategic projects lists.
3. Strengthening EU critical raw materials value chain for mining, refining, processing and recycling activities: This could be reached through the identification of strategic projects with strong environmental and social standards. It would be essential to provide them a better access to funding and a streamlined legislation.
4. Creating a sustainable level playing field across the Single Market: This objective could be reached ensuring the availability of sufficient European and international technical standards, supporting innovation, high ESG standards in order to create a level playing field on the Single Market and internationally. This action could also be useful to enhance transparency, availability, and coordination of strategic reserves of critical raw materials.

## **5.5 Indications for new industrial policy tools for a common European policy on raw materials**

The main industrial policy actions that the EU can use in the near future to secure supply of raw materials to strengthen strategic autonomy, protect its industrial system and reach the goals of the green and digital transition can be summarised in four main action lines:

- Domestic production
- Strengthening circular economy
- International partnerships
- Agency network

These guidelines emerge from the examination of the 2020 RMI document, from the update of the industrial strategy of 2021 and finally from the preparatory works to the new Raw material act.

### **5.5.1 Strengthening domestic production through new projects along all the value chain of raw materials in the EU**

The EU has a significant potential in mining activities as it has reserves of industrial minerals and base metals such as copper and zinc<sup>129</sup>. The recent discovery of the largest European rare earth deposit in Lapland, Sweden, beyond the Arctic Circle, is essential for the European Union and shows how funding for the search of new deposits in the EU is undoubtedly a strategy to be pursued and strengthened<sup>130</sup>. Given this situation the following guidelines can be expected in order to facilitate and increase new strategic projects in mining activities with targeted investments in extraction, refining and processing which are crucial to reverse the investment deficit:

- Financial instruments should promote specialized enterprises, beginning with start-ups often able to offer innovative solutions. These enterprises need a better access to finance to have an easier and quicker start of projects. In this direction the role of the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD) are

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<sup>129</sup>“Commission staff working document Strategic dependencies and capacities Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe’s recovery SWD(2021) 352 final”, EU Commission, 2021, p.56.[https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities\\_en.pdf](https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities_en.pdf)

<sup>130</sup>Fleming Sam, “Sweden discovers biggest rare earths deposit in EU”, Financial Times, 12, 01, 2023.<https://www.ft.com/content/78706a10-7ea6-445e-835c-ad8dd51b6a34> The Swedish state-owned mining company LKAB that made the discovery, estimates that the deposit contains more than 1 million tonnes of rare earths. The Lapland mine would even help to strongly reduce the dependence of the European industry from China for the supply of raw materials crucial to strategic productions and green transition.

fundamental<sup>131</sup>. The EU could use a mix of all existing funding instruments such as Horizon Europe, Next Generation EU, EIB and structural funds.

- To mobilise the new investment, the EU could increase its financial participation to IPCEI and create a new European Sovereign Fund. New financing mechanism like the one used in "Chips Act" targeted directly to set up strategic productions could be an example to repeat<sup>132</sup>.
- Accelerate national permitting procedures through the improvement and the simplification of the regulatory framework as time for starting extractive activities are too long. Streamlined procedures are in fact essential to speed up new projects. Harmonisation of rules among the EU countries is also needed as the diversity of national permitting procedures can slow down projects. New legislation could include objectives to reach, such as targets of quota of supply that must originate from the EU by a given year, through internal production or recycling activities<sup>133</sup>.
- Compliance with high environmental and working standards for new projects is essential to protect the environment and reach the objectives of the green deal, reduce costs, emissions and consumption of energy<sup>134</sup>. In this direction it is fundamental that new investments to finance projects comply with high sustainability standards. It is also essential to invest in research and strengthen a common normative European framework for environmental standards and working conditions.
- It is important to increase the acceptance of citizens, making them more aware of the necessity to carry out these projects and that high environmental standards are respected. Ensuring that raw materials are sourced and processed with high standards of sustainability can help increasing public acceptance for raw material mining activities<sup>135</sup>. Strengthen actions for transparent dialogue with local communities on the importance and benefits of raw material mining to contrast global warming and to protect biodiversity could be another important instrument<sup>136</sup>.

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<sup>131</sup>"Keynote speech by Vice-President Maroš Šefčovič at the Raw Materials Security of Europe Conference, press corner", 12, 09 , 2022.[https://ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_22\\_5484](https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_5484)

<sup>132</sup>"Franco German Non-Paper on a Critical Raw Materials Act" Agence Europe, 2022. <https://aeur.eu/f/3cx>

<sup>133</sup>"European Commission, Statement

Critical Raw Materials Act: securing the new gas & oil at the heart of our economy I Blog of Commissioner Thierry Breton", EU Commission, 14, 09, 2022. [https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT\\_22\\_5523](https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5523)

<sup>134</sup>Bontempi Elza, Cornelio Antonella, Zanoletti Alessandra, "A post-pandemic sustainable scenario: What actions can be pursued to increase the raw materials availability?" p.9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9749895/>

<sup>135</sup>"Keynote speech by Vice-President Maroš Šefčovič at the Raw Materials Security of Europe Conference, press corner", 12, 09 , 2022.[https://ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_22\\_5484](https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_5484)

<sup>136</sup>"Commission staff working document, Strategic dependencies and capacities Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery, SWD(2021) 352 final", EU Commission, 05,05,2021 p.59.[https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities\\_en.pdf](https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities_en.pdf)

- It is of key importance to exploit the potential of the extraction and processing of rare earths from former mining activities, for example in existing coal mines in Poland but also in other mining regions<sup>137</sup>. This could be done using just transition mechanism-fund projects destined to these regions. This fund aims to improve the skills of workers in those regions, transform existing mines and guide these mining activities towards a reconversion in green ones.

### **5.5.2 Strengthening circular economy policies. Recycling, urban mining, use of alternative materials and reduction of CRMs consumption**

In the EU's economy the Circular economy sector has a very high potential that has not been fully exploited. Exploiting this potential is essential. As a matter of fact, while a huge amount of CRMs can be obtained recycling products and processing waste, in the European industry only 12% of raw materials originate from recycling. This rate goes down to below 1% for rare earths<sup>138</sup>. Moreover, extraction activities are very energy intensive, so it essential to focus on recycling to cover the future supply necessities without furtherly increase emissions<sup>139</sup>. The following are the policy indications that are needed to strengthen circular economy policies for raw materials.

- Research and innovation on waste processing should be furtherly supported by the EU. It is essential to improve research for new technologies in circular economy, the study of techniques for a lower consumption of these materials and the use of alternative non-critic materials as substitutes. EU research and innovation should focus also on end-of-life products and on safe, efficient, and sustainable recovery and processing of waste.
- The EU should exploit the potential of recycling projects through significant public and private investments and facilitate the use of instruments to finance circular economy projects. Possible financial instruments could be Horizon Europe, the European Regional Development Fund, EIB, structural funds and national R&I programmes<sup>140</sup>.

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<sup>137</sup>“Commission staff working document EU strategic dependencies and capacities: second stage of in-depth reviews, 22.2.2022 SWD (2022) 41 final”, EU Commission, 22, 02, 2022, p.30. <https://ec.europa.eu/docsroom/documents/48878>

<sup>138</sup>Ibidem

<sup>139</sup>Bontempi Elza, Cornelio Antonella, Zanoletti Alessandra, “A post-pandemic sustainable scenario: What actions can be pursued to increase the raw materials availability?” p.9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9749895/>

<sup>140</sup>“Commission staff working document Strategic dependencies and capacities Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery SWD(2021) 352 final”,

- The EU needs new effective rules to set standards and guidelines that can foster the circular economy sector. This can be done through new updated rules for the design of products containing raw materials aiming to increase their ease of dismantling and recycling and the length of product life. These requirements may relate to eco-design, design for sustainability and design for circularity following guidelines based on criteria such as durability, reusability, repairability and recyclability. The new regulation could also concern the increase of collection rates for waste containing critical raw materials. It would be useful to introduce a legislation to make producers responsible for recycling the products they make<sup>141</sup>. Simplification of procedures to faster licensing to exploit the potential of recycling projects is also crucial.

### **5.5.3 New international partnerships with similar countries for common strategies for governing the sector. New agreements for new supplies and mining activities in resource-rich countries**

An additional element which will be probably part of the European strategy refers to the so-called Raw Materials' Diplomacy. In this respect:

- The EU should provide better access to funding and facilitate the use of instruments such as credits and loans to finance strategic projects in the circular economy and for new mining activities outside the EU. New agreements could be structured to foster investments in infrastructure and technology provided by the EU in exchange for permissions to establish activities to extract and import raw material.<sup>142</sup>
- It is fundamental to build a new EU-Africa strategy to ensure fair and sustainable exploitation of critical raw materials in that continent. The EU must commit itself in bringing together the interests of the EU countries in new supplies and new mining projects, with the interests of resource-rich countries in exploiting their deposits through sustainable extraction policies that respect the environment and the workers' rights.

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EU Commission, 2021, p.58. [https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities\\_en.pdf](https://commission.europa.eu/system/files/2021-05/swd-strategic-dependencies-capacities_en.pdf)  
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<sup>141</sup>Bontempi Elza, Cornelio Antonella, Zanoletti Alessandra, "A post-pandemic sustainable scenario: What actions can be pursued to increase the raw materials availability?" p.9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9749895/>

<sup>142</sup>"Positioning on a European Strategic Raw Materials Act Federation of German Industries e.V.", 2022.

- New partnerships for securing supplies should be built with “like-minded” partners. The EU should cooperate with these partners on sourcing, and processing to overcome the existing dependencies<sup>143</sup>. It is essential to act collectively to diversify from single suppliers, strengthening trade agreements with resource-rich allies such as Ukraine or Canada or the Western Balkans countries<sup>144</sup>. These partnerships should be built around common interests and should focus on common shared pillars such as the integration of raw materials value chains among countries, new projects for common research and innovation and the setting of common approach towards resources-rich countries. It is also important to cooperate around common values, for example promoting high environmental and social standards such as the protection of the workers’ rights. In this direction the Commission proposed the ratification of the agreements with Chile, Mexico and New Zealand, and negotiations with key partners like Australia and India<sup>145</sup>.

#### **5.5.4 Establishing a new European network of raw materials agencies to strengthen crisis management**

- This network should set up a strategic and systemic approach through common research field that anticipates future trends and forecasts risks of disruptions, price hikes or shortages.
- Supply dependencies and other vulnerabilities would be screened and monitored through a mechanism of exchange of information among Member States agencies. Secondly this network would set up a common European reaction that could strengthen diversification, investment decisions<sup>146</sup> and actions for stockpiling of strategic reserves where supply is at risk<sup>147</sup>. It could provide a list of priorities and strategic projects in order to support other projects<sup>148</sup>.

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143“Special Address by President von der Leyen at the World Economic Forum” Press Corner, 17, 01, 2023. [https://ec.europa.eu/commission/presscorner/detail/en/speech\\_23\\_232](https://ec.europa.eu/commission/presscorner/detail/en/speech_23_232)

144Ibidem

145“State of the Union address 2022”, EU Commission, 14, 09, 2022 [https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU\\_2022\\_Address\\_EN.pdf](https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU_2022_Address_EN.pdf)

146“European Commission – Statement Critical Raw Materials Act: securing the new gas & oil at the heart of our economy I Blog of Commissioner Thierry Breton” EU Commission, 14, 09, 2022. [https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU\\_2022\\_Address\\_EN.pdf](https://state-of-the-union.ec.europa.eu/system/files/2022-09/SOTEU_2022_Address_EN.pdf)

147“Keynote speech by Vice-President Maroš Šefčovič at the Raw Materials Security of Europe Conference”, EU Commission. 12, 9, 2022. [https://ec.europa.eu/commission/presscorner/detail/en/SPEECH\\_22\\_5484](https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_5484)

148“European Critical Raw Materials Act”,EU Commission, website.[https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13597-European-Critical-Raw-Materials-Act_en)

- The EU should establish a strong and sustainable level playing field through Single Market tools, such as standards. It would be thus possible to ensure fair-trade competition, avoid fragmented implementation, attract private investment and make raw materials activities in the EU internationally competitive<sup>149</sup>.

These are the possible future developments of this policy. It is anticipated it will become an increasingly important one both at the European and national one. Immediate action should be taken at the European level and on the internal one. Especially in countries which have a strongly transformative economy.

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<sup>149</sup>“European Commission – Statement Critical Raw Materials Act: securing the new gas & oil at the heart of our economy, Blog of Commissioner Thierry Breton” EU Commission, 14, 09, 2022.

# CONCLUSIONS

The European Union started to tackle the issue of supplies of raw materials in 2008. The first 2008 Communication of the RMI then evolved in a second Communication in 2011 where a first list of critical materials was formulated. Gradually, with the following Communications of 2014 and 2017, the list was expanded and the analysis of reasons for criticality became more and more thorough on each individual material.

In this itinerary, the 2020 Communication on raw material marked a quantum leap. As a matter of fact, for the first time in addition to the list of CRMs it contains a 10-points Action Plan.

From being an EU strategy to providing a harmonised framework with indications of policies and guidelines that could be used by Member States, the EU initiative on raw materials is moving towards a more stringent legislative framework.

In this direction, the 2021 update of the 2020 Industrial strategy, has put the twin transition at the top of the EU strategic priorities. As a result, it became fundamental to decrease dependencies and guarantee a free and sure access to raw materials for these two transitions.

In September 2022 the President of the Commission in her State of Union address anticipated that the Commission was working on a legislative act on raw materials.

The new Raw Material Act will replace the RMI and open up a new face in raw materials regulation at the EU level. It will be axed on four main guidelines:

1. Strengthening domestic production through new extraction projects in the EU.
2. Strengthening circular economy policies: recycling, urban mining, use of alternative materials and reduction of CRMs consumption.
3. Promoting new international partnerships with similar countries for new common strategies to govern the sector. New agreements for new supplies and mining activities in resource-rich countries.
4. Establishing a new European network of raw materials agencies to strengthen crisis management.



These four priorities as evidenced by the exam of other national experiences are common to different legal orders. The US and the UK as a matter of fact are also addressing this issue by implementing strategies and actions similar to those developed by the EU. These are the elaboration of lists defining critical raw materials and the definition of Action Plans to secure supplies of CRMs.

Also, the European experiences are modelled around the same principles.

The increasing attention of the EU and the cruciality of the economic relevance of critical raw materials will raise the attention to the matter.

A strong administrative attention is needed at the national level.

In this respect it can be foreseen that EU Member States will progressively need to introduce specific administrative structures.

The elaboration of the Raw material Act is a necessary step for a coordinated European action with a common framework of binding guidelines.

These actions are necessary to adequately address the challenges relating to this specific area of industrial policy. Especially in countries which have a strongly transformative economy.

It is essential to act quickly. This is an increasingly crucial area for the future of the EU, and it involves a plurality of political and administrative aspects that need to be coordinated with each other at EU level and also by the Member States.

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## **ABSTRACT**

Raw materials, and particularly critical raw materials (CRMs), are increasingly crucial for industrial productions.

The technologies related to digital and green transitions require a huge use of CRMs, and this trend is going to increase in the future to achieve the objectives of the EU green deal of 2050.

EU countries and major manufacturing economies such as Japan and the USA are highly dependent on supplies of CRMs for their main production chains. The EU does not have sufficient reserves and domestic production to meet demand. For these reasons the EU has become increasingly dependent from China and other countries for the supplies.

The exponential growth of global consumption of these materials will increase the level of supply risk and could represent a problem for the European productive system and could undermine the plans of the EU to strengthen the so-called strategic autonomy.

In 2008 the EU has officially adopted a common EU policy on raw materials: the Raw Materials Initiative (RMI). In that year the Commission elaborated a communication, which has been updated every 3 years: in 2011, 2014, 2017 and in 2020. This Communication was a detailed report on the dependencies related to materials that are considered critical for the main European industrial supply chains. From the 2011 communication the Commission presented, within this report, a list of critical raw materials selected based on their economic importance for the industrial sectors and the supply risk. The 2020 update also elaborates an Action Plan containing strategies and initiatives to be implemented to reduce the EU's dependence on supplies that are not considered safe, increase domestic production of CRMs and foster circular economy.

The issue of supplies of CRMs has become even more evident following the COVID pandemic of 2020 and the war in Ukraine of 2022.

In September 2022, to address these issues, the President Von der Leyen announced the adoption of the European Critical Raw Materials Act, scheduled for March 2023. This new act is an essential step towards a greater political integration in management of raw materials issues. In fact, this new act

will be a binding legislative instrument whereas the previous RMI was a strategy providing a non-binding framework of policy indications for Member States and stakeholders.

From the analysis of these documents and from the guidelines of the future act it is possible to draw up the main industrial policy actions that the EU can use to secure supplies of CRMs:

- Increase and reinforce domestic production through new extraction projects in the EU.
- Strengthen circular economy policies: recycling, urban mining, use of alternative materials and reduction of CRMs consumption.
- Promote new international partnerships with similar countries for new common strategies to govern the sector. New agreements for new supplies and mining activities in resource-rich countries.
- Establish a new European network of raw materials agencies to strengthen crisis management.