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The world of raw materials 2050: Scoping future dynamics in raw materials through scenarios

Sven Schimpf[a,*], Flavius Sturm[a], Vitor Correa[b], Balazs Bodo[c], Christopher Keane[d]

[a]*Fraunhofer IAO, Nobelstr. 12, 70569 Stuttgart, Germany*
[b]*European Federation of Geologists, Rue Jenner 13, 1000 Brussels, Belgium*
[c]*La Palma Research Centre, Avenida Doctor Fleming 7, 4E, 38760 Los Llanos, La Palma, Islas Canarias, Spain*
[d]*American Geosciences Institute, 4220 King Street, Alexandria, VA 22302-1502, United States*

Abstract

The INTRAW project – European Union's International Observatory for Raw Material - is working towards a sustainable future for the European Union in terms of access to raw materials. One of the major exercises is the evaluation of potential future scenarios for 2050 to help framing economic, research, and environmental policy development. The INTRAW consortium developed three possible future scenarios that encompass defined regimes of political, economic, and technological parameters to provide simulations of impacts resulting from expected conditions for 2050.

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1. Introduction

The admission of China to the World Trade Organisation, in December 2001, started a structural change in industrial markets. China's meteoric rise had an impact on global supply chains and, today with the integration of

* Corresponding author. Tel.: +49 711 970 2457; fax:+49 711 970 2299.
E-mail address: Sven.Schimpf@iao.fraunhofer.de

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India, China and other industrialising countries (e.g. Brazil, Turkey and Mexico), into the world economy. Together these account for more than half of the world's population and are claiming an increasing share of raw materials. This means that Europe, the United States of America and Japan are now increasingly competing with other nations for a share in the global supply of mineral raw materials.

Over the last decade, the European Union (EU) has become increasingly aware that securing a reliable, fair and sustainable supply of raw materials is important for sustaining its industrial base, an essential building block of the EU's growth and competitiveness. As a result, since 2008, ensuring fair access to mineral raw materials on global markets has been one of the European Commission's priorities.

The Horizon 2020 funded project "International Cooperation on Raw Materials" (INTRAW, www.intraw.eu), runs during the period 2015-2018, with the objective of mapping best practices and boosting cooperation opportunities in relation to the entire raw materials value chain with technologically advanced non-EU reference countries (Australia, Canada, Japan, South Africa, and the United States), facing similar global challenges.

INTRAW has a long-term vision but raw materials policies, strategies and priorities are in constant state of flux in response to political and economic changes. The interconnectedness of these issues at an international level adds one more dimension to an already complex raw material supply system. This requires continuous adaptation of international cooperation frameworks to address emerging issues efficiently. This challenge is tackled by the development and establishment (by INTRAW) of the International Observatory for Raw Materials, a definitive source of raw materials intelligence, operating internationally, that will remain active after completion of INTRAW project itself.

The International Observatory for Raw Materials will advance international cooperation mechanisms on mineral raw materials, as defined in thematic Action Plans addressing research and innovation, education and outreach, industry and trade, and recycling, management and substitution of critical raw materials. These plans will convert best practices of the reference countries to the European context, having consideration of the EU framework, key success factors (for the implementation of best practices) and constraints applied by the future scenarios. Considering that actions highly depend on potential future developments, the scenario method was considered as an important baseline for not only one possible future, but a set of potential future developments in the Action Plans. The first scenario, "Sustainability Alliance," examines the dynamics of a global political and economic climate that is focused on environmental and economic sustainability, leading increasingly towards a circular raw materials economy. The "Unlimited Trade" scenario reflects a world in which free trade continues to dominate the global political and economic environment, with expectations of a growing demand for raw materials. The final scenario, "National Walls," reflects a future where nationalism and economic protectionism begins to dominate, leading to stagnating economic growth and volatility in raw materials. Within this paper, both the methodology as well as the results of the process, namely the main characteristics of each of these three scenarios, will be presented.

2. Framework and challenges

Most of the work performed in the INTRAW project related to the past and present performance of the EU and the reference countries. For instance, best-practices relate to how things are done today. The main rationale of INTRAW has been that the EU has to catch up in many aspects of the raw materials world, if it wants to be a serious competitor or collaboration partner in the future. However, it is possible that the world of raw materials will change in many ways and so will the success factors. This required the INTRAW consortium to look a bit more into the future of raw materials. For being able to recommend "future-proof" actions, the scenario technique has been chosen for identifying multiple pictures of the future in a structured manner. Between June 2016 and February 2017, scenarios for the state of raw materials management in the EU in the year 2050 have been developed within the INTRAW consortium and validated by the representatives from reference countries [1].

One of the key challenges was the consideration of a scenario scope sufficiently broad to cover the broad range of different topics used in the development of the Action Plans, namely the areas of research & innovation, education & outreach, industry & trade and recycling & substitution. At the same time, the objective was to create a basis for strategic planning on different levels for the mining sector. Based on this challenge, the scenario field to be considered was defined as shown in Table 1.