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## **RAW MATERIALS FUTURES 2050: a review of recent and ongoing foresight exercises in Europe**

Bodo, B.<sup>1</sup>, Correia, V.<sup>2</sup>, and Hartai, E.<sup>3</sup>

<sup>1</sup>La Palma Research S.L. (LPRC), La Palma, Canarias, Spain, [research@lapalmacentre.eu](mailto:research@lapalmacentre.eu)

<sup>2</sup>European Federation of Geologists (EFG), Belgium

<sup>3</sup>Miskolc University (MU), Hungary

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Securing sustainable resources is one of the challenges Europe has to deal in the medium (2020) and long term (2050), alongside with an ageing population, improving healthcare and adapting to climate change. This explains why the European Union (EU) pioneered the development of a strategy on raw materials based on three pillars: (1) ensuring the fair and sustainable supply of raw materials from international markets, through the promotion of international cooperation with developed and developing countries; (2) fostering the sustainable supply of raw materials from European sources, and (3) reducing consumption of primary raw materials by increasing resource efficiency and promoting recycling. In this framework, the Horizon 2020 research and innovation program is financing projects aligned with these pillars that have the potential to boost technological leaps forward.

Foresight exercises are systematic attempts to look into the longer-term future of specific societal/technological fields with a view to identify potential future scenarios. Their purpose (among many others) could be to define recommendations for present-day policies and research strategies to bring about a desired future. Foresight studies are, however, not a coherent field of study. Instead, a multiplicity of methods having different advantages and disadvantages exist. In addition, often foresight studies do not employ only a single method, but instead employ multiple methods. Commonly used methods include the Delphi Method, scenario building techniques, expert panels and simulation and gaming exercises, but there are several more used either in isolation or combination.

Forward looking activities related to raw materials are scattered, dispersed, fragmented and heterogeneous. There is a need to provide a synthesis of recent work that develops longer-term strategies that do not only address immediate problems such as emerging material shortages but to explore diverse pathways into a long term future which may look very different from now. This paper aims to review and structure ongoing activities and recent findings of European foresight studies (technology foresights, strategic foresight studies, policy-related forward-looking studies) related to raw materials. The paper will cover past investigations (such as EXTRACT-IT, FARHORIZON, MINERALS4EU, etc) as well as ongoing activities with a strong foresight component (VAMOS, UNEXMIN, CHPM2030, MICA, INTRAW, etc) resulting in a comprehensive comparative review of the deployed methodologies and the actual/planned outcomes of the foresight exercises.

