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► **To cite this version:**

Stéphanie Muller, Frédéric Lai, Baptiste Boitier, Jacques Villeneuve. Assessment of the French metals demand induced by national consumption and its associated environmental footprint. SETAC Europe 29th Annual Meeting, May 2019, Helsinki, Finland. , 2019. hal-02076471

**HAL Id: hal-02076471**

**<https://brgm.hal.science/hal-02076471>**

Submitted on 22 Mar 2019

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# Assessment of the French metals demand induced by national consumption and its associated environmental footprint

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Two main characteristics of the circular economy (CE), as defined in the French strategy of energy transition towards a CE, are a resource efficient economy and a low carbon economy. To assess strategies to be implemented towards a CE, both of these characteristics have to be simultaneously assessed to avoid burden shifting. The aim of this work is to show how environmentally extended multiregional input output approaches (EEMRIO) can be used to do so.

EEMRIO databases were developed to take into account the environmental impacts of international trades; they consist in the coupling of two tables respectively describing the industries interdependencies in a given region along with the interregional interdependencies and the environmental interventions related to each industry. In this work, the EEMRIO databases WIOD and EXIOBASE v3 are used to determine both the metal and carbon footprints due to metal extraction and production (namely the “metal carbon”) induced by the French domestic consumption. Given their characteristics and their mathematical handling, the EEMRIO allow to access different types of results: the metal footprint and the metal carbon content of the products and services consumed domestically by France and the metal footprint and the metal carbon content of the economic activities induced by French domestic consumption.

Following these indicators with WIOD, from 1995 to 2009, the total metal footprint of the French domestic consumption raised from 101 megatons to 143 megatons while the metal carbon footprint decreased from 38.6 megatons  $\text{CO}_{2\text{eq}}$  to 32.9 megatons  $\text{CO}_{2\text{eq}}$ . Moreover, most  $\text{CO}_2$  due to metal processing is emitted in France (the similar assessment performed with EXIOBASE v3 shows that this is due to iron and steel industries) while metals are no longer extracted in the French territory. As it is a bit more disaggregated, EXIOBASE v3 allows a more specific assessment of the metal sectors and its impacts, for example construction related products that contributes the most both to the metal footprint and to the metal carbon content.

EEMRIO permits the environmental assessment of the consumption flux in a national or regional level. Here the assessment was made on metals, but studies on material and carbon footprints can also be made on other products or services. One of the main drawback of EEMRIO, that has to be kept in mind when assessing consumption scenarios, is the age of the data available in publicly available databases.