COBALT: A SOCIO-ECONOMIC ANALYSIS OF ITS CONTRIBUTIONS TO EUROPEAN ECONOMY

Executive Summary

The Cobalt Institute's (CI) new study on Socio-economic analysis of the cobalt industry in the European Economic Area (EEA), provides an overview of the socio-economic footprint attributable to the production, use, and recycling of cobalt metal and chemicals within the EEA. Cobalt's socio-economic footprint in the EEA is measured by five main metrics:

1. Value addition (the intrinsic value added through the manufacturing process)
2. Employment (the number of jobs dependent on the value chain)
3. Labour income (the wages of employees and contractors in the value chain)
4. Research & development (activities in developing new services or products)
5. Tax contributions (income for value chain host governments)

The Cobalt SEA model developed for the EEA considers the mined and refined production of cobalt, chemical conversions, and direct use of cobalt in applications (e.g. alloys, batteries, etc.), as well as end-use in manufacturing sectors and products (i.e. aerospace engines, electric vehicles, etc.). The study shows the EEA is an important producer of refined cobalt, produced from imported ores and intermediates, as well as of many cobalt-containing products, ranging from battery precursors, to catalysts, adhesion binding agents, alloys, and the end products in which these are used.

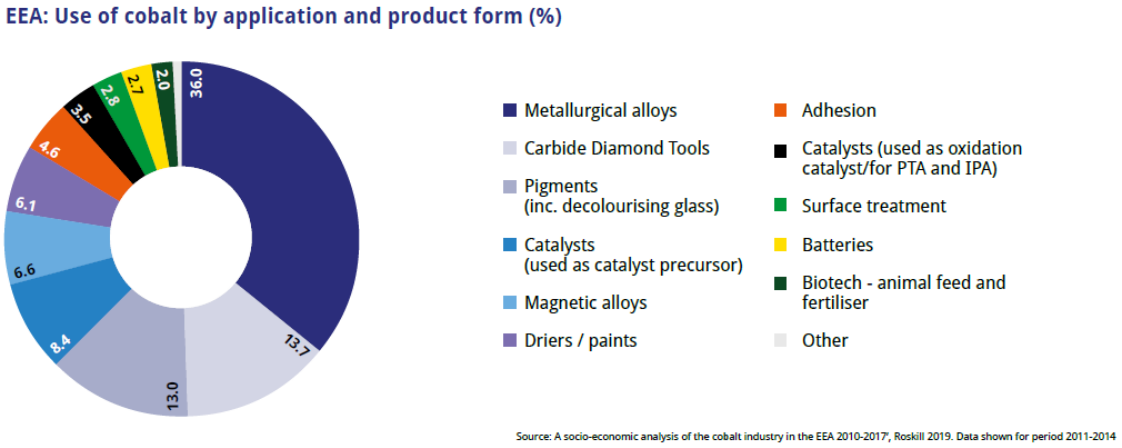
This SEA study estimates that the EEA accounted for as much as 15% of the global refined production of cobalt in 2018, and provides new estimates of the volumes (percentage) of cobalt used in a broad range of important applications in the EU (Roskill, 2019)[1].

The SEA model study assesses both the direct effects relating to the economic activities of the producing companies, as well as the indirect effects related to the downstream and supporting industries. Total employment directly attributable to cobalt in the EEA is estimated at 31,176 jobs, of which around 19% are directly employed by producers and downstream consumers of cobalt, with the remainder in roles in supporting sectors.

[1] Roskill (2019). "*A socio-economic analysis of the cobalt industry in the EEA, 2010-2017*." Summary report for the Cobalt Institute. October.

www.cobaltinstitute.org
CI@cobaltinstitute.org
Tel: + 44 1483 578877
18 Jeffries Passage, Guildford, GU1 4AP, UK

EEA: Current [2010-2017] use of Cobalt by application and product form (%)



The total amount of value addition across all parts of the value chain in the EEA is estimated at €1,886 million per year. Of this amount, €471million is directly involved in the production and usage of cobalt. A further €423 million is represented by the immediate suppliers of other process inputs to these companies, along with a further €509 million accounted for by other supporting industries, and the remainder (€483 million) is by income effects.

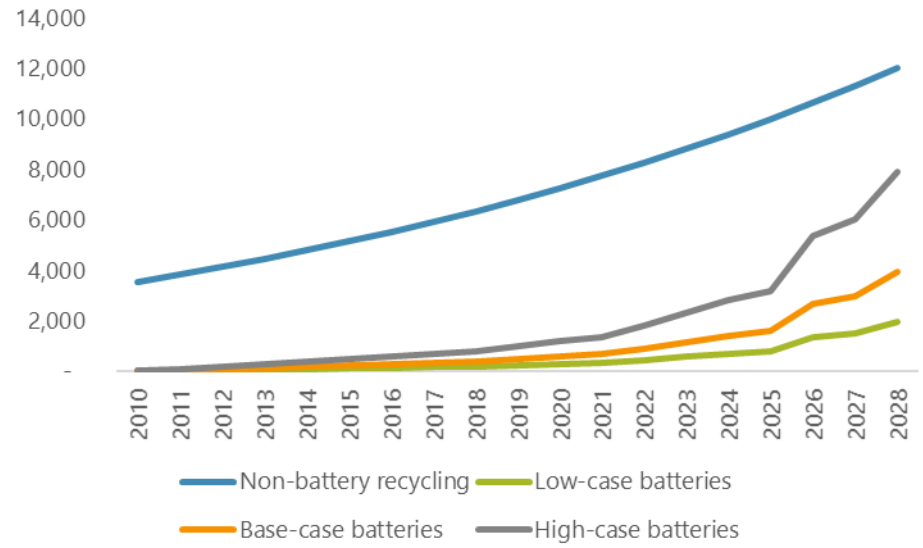
In order to develop a better understanding of the future demand situation for cobalt in the EEA, the CI and Roskill expanded the Cobalt SEA model and examined three scenarios (1 - First-use demand, 2 – Price, and 3 – Recycling), each of which are expected have a bearing on the socio-economic impact of cobalt (Roskill 2020)[2].

The scenario modelling assumes an overall cobalt recycling rate of 32% for all sectors (UNEP, 2011)[3] and considers the battery wastes and end-of-life recycling in the EEA, as well as continued growth in recovery rates of end-use product recycling. Three cases of EEA cobalt recycling volumes were developed: low (25%), base (50%) and high (100%) capture.

[2] Roskill (2020). "*A scenario-based socio-economic analysis (SEA) of the cobalt industry in the EEA, 2019-2028".* Report for the Cobalt Institute. May.

[3] UNEP (2011). "Recycling Rates of Metals: a status report", International Resource Panel.

Battery Recycling volume demand scenario [2010-2028] (t Co)



The direct use of cobalt in the EEA (in applications such as batteries, alloys, catalysts, binding agents, and others) is forecast to increase from just over 19,000t Co in 2019 to 26,500t Co in 2028 (base case demand). The value of the cobalt units contained in the direct use of cobalt in future is forecast at €1,254 million per year, compared to €672 million per year over 2010-18 (base-case price of €35.6/kg).

The use of cobalt in final end-user products manufactured in the EEA is forecast to rise from almost 20,600t Co in 2019 to over 29,100t Co in 2028. This includes the use of cobalt in products such as consumer electronics, electric vehicles, energy storage systems, aerospace engines and equipment, etc., produced within the EEA.

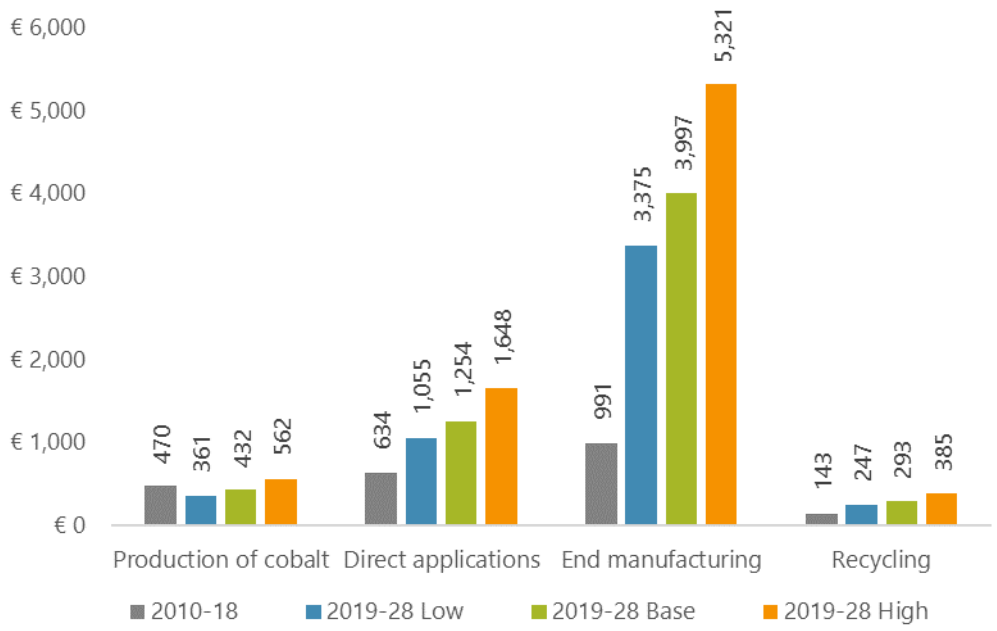
The estimated value of cobalt contained in final end-user products in future is estimated at €3,997 million per year (up from €828 million per year in 2010-17). The large jump in value addition going forward largely comes from cobalt's increasing use in Li-ion batteries for electric vehicles and the automotive industry's importance as a value-add industry for raw materials.

Cobalt Value Addition in the EEA [2019-28] versus [2010-17] (million Euros average per year)

Value addition (2010-17)	Production of cobalt	Direct applications	End manufacturing	Recycling	Total
Direct effect	45	183	241	48	516
First-round requirements	102	138	219	32	491
Industrial support	133	169	250	39	590
Income effect	108	156	265	32	561
Total	388	645	975	151	2,159

Value addition (2019-28)	Production of cobalt	Direct applications	End manufacturing	Recycling	Total
Direct effect	58	384	1,140	98	1,680
First-round requirements	122	272	889	65	1,348
Industrial support	159	322	1,024	79	1,584
Income effect	130	324	1,066	66	1,586
Total	470	1,301	4,120	309	6,199

Value of Cobalt produced and consumed in EEA [2019-28] versus [2010-18] (million Euros average per year)



The total amount of value addition across all parts of the cobalt value chain in the EEA in 2019-28 is forecast at €6,199 million per year (compared to €1,886 million per year in 2010-17). While the total employment directly attributable to cobalt in the EEA is estimated to rise to 85,069 jobs over 2019-28 (an almost three-fold increase from the 31,176 jobs in 2010-17).

Overall, the SEA studies illustrate the significant contribution that cobalt provides to value addition (manufacturing), employment (jobs), labour income (wages), tax revenues, and R&D (research and development) activities in Europe.

Globally over half of all refined cobalt is used in batteries such as those in electric vehicles, electricity storage and portable electronic devices. The SEA model EEA study shows the use of cobalt in batteries in the EU is currently low (only 3%) but could rise to 28% by 2028 (Roskill 2020).

The growth in the energy transition and green economy is expected to lead a surge in demand for cobalt for use in EV batteries and energy production/storage worldwide. The CI is now planning to conduct a global cobalt SEA model study (2020-21), and the global findings will become available next year.

For further information please contact: sustainability@cobaltinstitute.org