

Government Support for Primary and Secondary Metal Production

 **RE-CIRCLE**
Resource Efficiency & Circular Economy Project

POLICY HIGHLIGHTS



Government Support for Primary and Secondary Metal Production: Towards a More Level Playing Field

Concerns over the environmental consequences of resource extraction, processing, and disposal and the emergence of material supply risks have increased interest in how to move towards a more circular economy.

A circular economy is an economy in which the extraction and use of natural resources, and the resulting generation of waste, is minimised through activities such as material recovery and recycling, product reuse or repair, or the sharing of already existing assets.

Metals are a key material in the transition to a circular economy. Not only are they highly recyclable, but the recycled output is an excellent substitute for metal produced from virgin mineral resources.

Governments provide significant support for the metals industry. Support, to the extent that it flows to support the extraction of metals (the primary metals sector), can reduce the competitiveness of recycled and re-used metals (the secondary metals sector). This is inconsistent with the Sustainable Development Goals as well as resource efficiency targets adopted by many countries.

Support for the metals industry has received limited attention relative to the environmentally harmful subsidies provided to other sectors. The OECD has developed the Environment Working Paper “Mapping Support for Primary and Secondary Metal Production”, to address that knowledge gap.

This summary brochure distils the key findings of that report and outlines:

- the likely effects of support in the metals industry
- the most common forms of support for primary and secondary metal production
- a set of key policy messages and recommendations for future work.

Support for the metals industry is significant and can harm the environment

There are two sources of metal available to society. Virgin mineral ores represent the traditional source of feedstock used in metal production. Ores are mined, beneficiated, traded, and then processed, either domestically or elsewhere, to produce a range of finished metals and alloys.

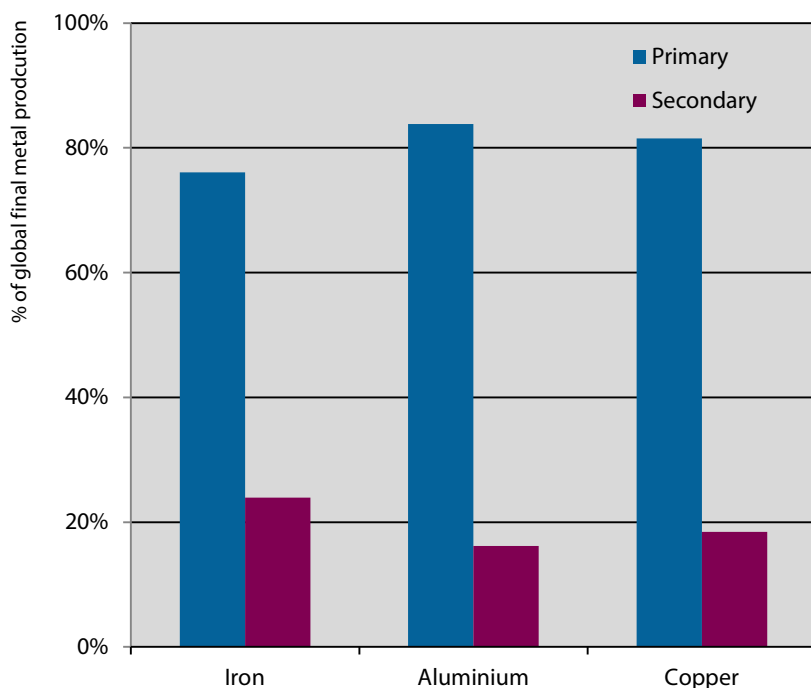
Ongoing extraction of metals from virgin mineral resources, and their subsequent use in the production of various goods, has led to a steadily growing above ground stock of metals. These anthropogenic metal resources are heavily concentrated in urban areas, either in the form of long-lived capital goods such as buildings, infrastructure, and machinery, short-lived consumer goods such as personal electronics, or end-of-life goods that have been disposed of in landfills.

The flow of scrap metal emerging from in-use stocks is the key source of feedstock for secondary metal production.

The share of secondary production could be significantly increased for most metals.

Primary and secondary metal production processes produce finished metal products that are perfect, or near perfect substitutes for each other. Today, the proportion of global metal output produced using the secondary process (i.e. production from metal scrap) is around 20% for most widely recycled metals (steel, aluminium, and copper), but less than 1% for many other important metals (Figure 1). The share of secondary production in total finished metal output has generally increased over time, although the share of secondary steel and aluminium production has declined significantly since 2000.

Figure 1. Final metal production by process



Box 1. **Metals and the economy**

Metals are a key input in many economic activities. Steel is used extensively in construction, aluminium is vital in the transport sector, while copper allows the efficient transmission of energy over long distances. Copper, tin, and precious metals such as gold, silver and palladium are common inputs in a vast array of electronic products. Even relatively simple mobile phones can contain more than 40 elements (UNEP, 2013). Many emerging low-carbon technologies rely heavily on less common metals. The group of rare earth elements (REEs) are central to the production of new generation batteries, wind turbines, catalytic converters and efficient lighting products.

Support for metals extraction and processing is significant and accrues mostly to primary production.

Despite widespread documentation of environmentally harmful subsidies in other sectors – agriculture, fossil fuels, and fisheries – little systematic work has been undertaken on the metals sector. The handful of existing studies find that support for the metals sector:

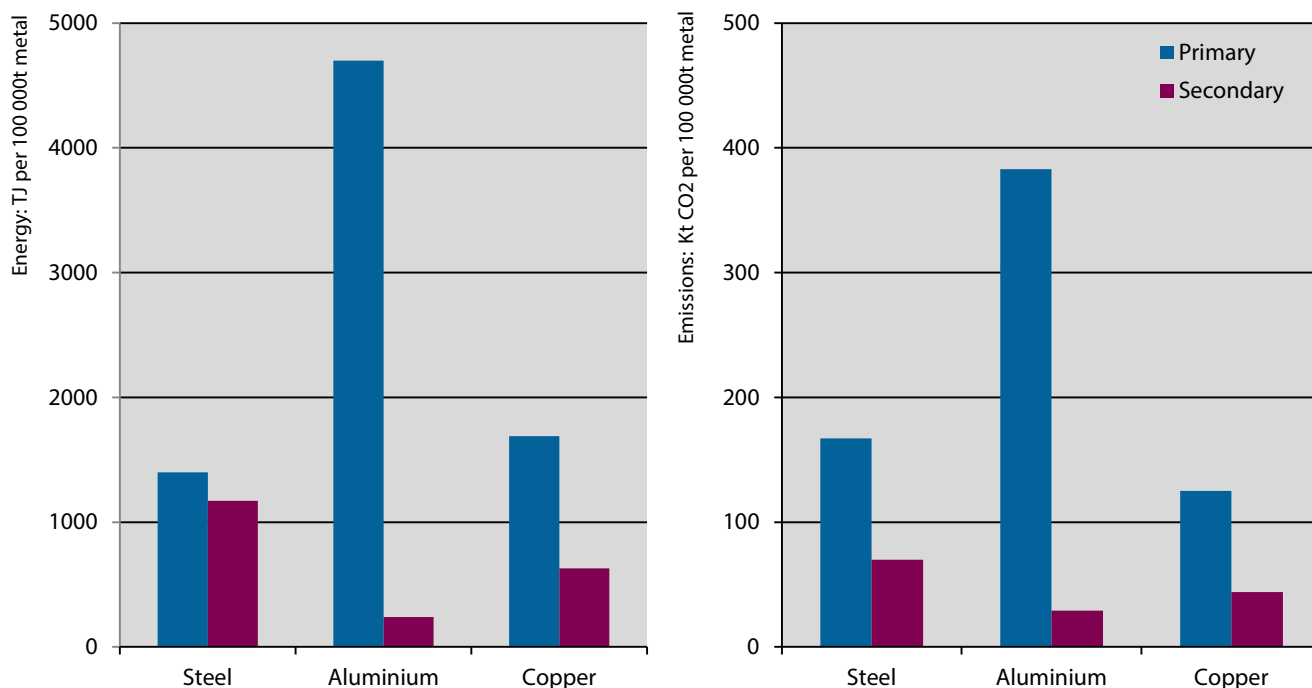
- extends into the billions of dollars in some countries (OECD, 2015);
- typically accrues disproportionately, in both absolute and per-unit of output terms, to the primary sector (Johansson et al. 2014).

Support is potentially harming the environment.

In this context, the question arises as to what extent support for primary and secondary material production is consistent with resource efficiency and other environmental objectives. To the extent that it reduces costs for firms operating in the primary metal sector, support can serve to decrease the competitiveness of metal scrap processing and recycling firms and, ultimately, reduce the proportion of secondary production in global metal supply.

This tends to have negative consequences for overall environmental quality; primary metal production generates a broader range of polluting by-products than its secondary equivalent. For example, producing metal from scrap generates considerably less greenhouse gas emissions than doing so from mineral ores (Figure 2). This is significant given that mining and metal production consumed around 7.5% of global energy supply in 2014 (IEA, 2016).

Figure 2. **Energy input and emission by process**



2 What measures of support are provided to the metals industry?

Support is provided by different levels of government; that for the primary sector usually originates at the national level, while that for the secondary sector is more often from state or provincial governments. Support is mostly received directly by producers; the consumption subsidies that have been documented in other sectors (e.g. fossil fuels) are largely unknown.

In many cases, support is non-targeted; it is available for both primary and secondary metal producers. That said, measures that serve to reduce the cost of energy and capital may disproportionately accrue to primary metal producers due to their relatively intensive use of these inputs. The most common forms of support are presented below.

Support for primary metal production

- **Tax related support** measures that increase firm income or reduce the cost of capital, energy, or mineral resources are very common in the primary sector. Common examples include target reductions in corporate income tax rates, tax holidays, extended loss carry-forward provisions, accelerated-depreciation provisions, and targeted reductions in fuel or electricity tax rates.
- The **public provision of investment finance on concessionary terms** is also a common form of support within the primary metal sector. Publicly capitalised development banks and export-credit agencies frequently invest large sums in upstream mining projects, while partially or fully state-owned mining companies may not be required to earn the same rates of return on capital as their private counterparts.
- **Export restrictions** on mineral ores and their derivatives are common. These can confer support for domestic downstream processing firms by placing downward pressure on domestic feedstock prices.

Support for secondary metal production

- The **public provision of investment finance on concessionary terms** is common in the secondary sector. Public investment finance is channelled through a variety of national and multi-lateral lenders in order to support environmental objectives. The pool of potential investment finance available for recycling projects has increased in recent years with the rapid expansion of green bonds.
- Many of the other measures available to the secondary metals sector represent **induced transfers**, whereby a particular regulation results in a transfer from agents elsewhere in the economy to recipient firms. Landfill taxes and bans, the public provision of separated recycling collection, and product take-back legislation all serve to increase the quality and availability of scrap feedstock. This can translate into lower production costs for material sorting and recycling firms.

Box 2: Support estimates at the OECD

The OECD has published support estimates for agriculture since the mid-1980s and for fisheries since the late-1990s. More recently, a series of reports have focused on so called environmentally harmful subsidies (EHS) and their consequences for sustainable development (OECD 2015). This body of work assessed, and in some cases quantified, support for the agriculture, energy, fisheries, forestry and transport sectors in OECD countries. Since 2011, the OECD has been publishing estimates of support for the production or consumption of fossil fuels (OECD, 2015).

The definition of support used here follows that used more widely within the OECD. The scope of what is considered support is deliberately broad, and is broader than some conceptions of “subsidy”. It includes both direct budgetary transfers and tax expenditures that in some way provide a benefit or preference for metal production or consumption relative to alternatives. It also includes foregone revenues not resulting from the tax system (e.g. underpricing of a government good or service) and the assumption of project risk by the government (e.g. loan guarantees). Finally, policies that can induce changes in the relative prices of mineral ores, metal scraps, or finished metal products are also considered.



Support for the metals industry differs significantly across countries

The incidence of support, and the mechanisms through which it is provided, varies according to a country's development status and mineral endowment. Support for primary metal production appears to be most widespread in emerging economies endowed with domestic mineral resources. Mining and mineral processing operations in these jurisdictions are often, at least partially, state-owned, and may not be subject to the same commercial realities as privately owned competitors. Export restrictions on unprocessed mineral ores and tax holidays designed to stimulate investment in downstream processing capacity are also well documented.

Support for primary metal production is also available in more advanced economies. For example, in developed countries with domestic mineral resources, support is often provided via the tax system, but also through the public provision of services (e.g. geoscientific information) at below cost recovery.

Even in developed economies lacking domestic resources, support has been documented. One example relates to the energy tax exemptions that are available for metal smelters that operate using imported primary ores or concentrates.

Support for secondary metal production is most widespread in advanced economies. Developed countries, including those with and without domestic mineral resources, often provide support for domestic recyclers and re-processors through targeted investment schemes – non-repayable grants, concessionary debt financing, and loan guarantees have all been documented.

Similarly, waste management policies – landfill taxes, Extended Producer Responsibility (EPR) schemes, and the public provision of separated recycling collection – can induce transfers to the secondary sector, albeit without any direct financial outlay for governments. Export restrictions on scrap metal and end of life goods containing metals also induce transfers to the secondary sector, and seem to be more prevalent in developed countries lacking domestic resources.

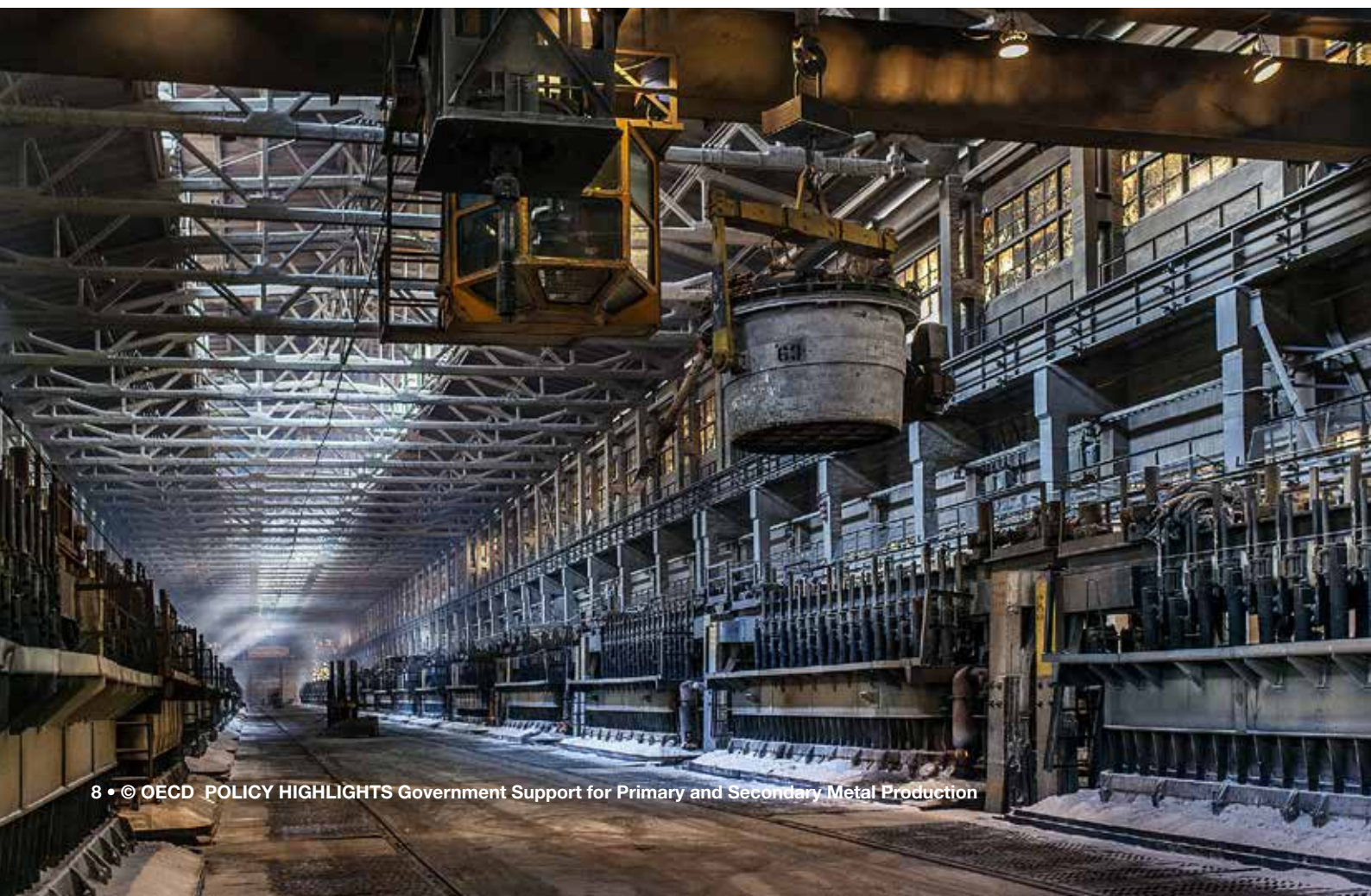


Table 1: **Energy Input and Emission by Process**

Transfer mechanism	SUPPORT EXAMPLES			INCIDENCE OF SUPPORT	
	Policy example	Specific mechanism	Sector targeted	Incidence in value chain	Formal incidence
Budgetary transfers	Capital grant for recycling facilities	Grant	Secondary	Upgrade and process	Capital
	R&D grants	Grant	Horizontal	All	Knowledge
	Public mining finance	Concessionary finance	Primary	All	Capital
Foregone tax revenue	Extending tax holidays for processing facilities	Reduced tax rate	Horizontal	Process	Capital
	Accelerated depreciation	Tax deduction	Horizontal	Process	Capital
	Exploration tax credits	Tax credit	Primary	Mining	Knowledge
	Fuel excise tax exemptions	Tax exemption	Horizontal	Mining	Intermediate input
Other foregone revenue	Concessionary provision of electricity through SOE's	Foregone revenue	Horizontal	Upgrade and process	Intermediate input
	Sub-optimal royalty rate	Foregone revenue	Primary	Mining	Natural resources
Transfer of risk to government	Public green investment	Risk transfer	Secondary	All	Capital
Induced transfers	Export tax on metal scrap	Export restriction	Secondary	Upgrade and process	Intermediate inputs
	Landfill tax	Green taxation	Secondary	Mining	Intermediate inputs



3 Key policy messages and possible way forward

For most metals, removing support for primary extraction and processing could help stimulate secondary production.

There is considerable variability in current metal recycling rates. However, for the vast majority of metals, recycling rates remain below 25% and, in the case of most of the rare earth elements, negligible. In this case, it is the marginal economic viability of metal recovery and processing that limits secondary production. Policy could play a key role here by addressing the factors that hinder the competitiveness of secondary materials. Reforming support for primary production would be an obvious place where governments could start to address the issue. Such reform would be consistent with the resource efficiency objectives and circular economy policies stated and developed by many countries.

Other obstacles also hinder secondary production

Support for primary production is not the only obstacle to increasing metal recycling rates. Un-regulated and un-priced environmental externalities, biases in the magnitude of labour, capital and resource taxes, and misalignment of design and material recovery incentives are some other prominent issues that governments could address.

For some widely used metals such as steel and aluminium, recovery and recycling rates may be approaching 75%. The key constraint on increased secondary production is the finite amount of scrap which emerges in waste streams each year. The flow of scrap from in-use metal stocks is expected to increase as the decommissioning of long-lived capital goods proceeds in the near to medium term. In this case, there is little that policy could, or should, do to speed this process.

More needs to be done to improve the knowledge base on support for metals and other materials.

There is a clear knowledge gap concerning the types and value of support available for metal production and consumption. Although there are some instructive publications on the subject, the scope of these is generally restricted to a particular country, sector or type of support measure.

In contrast to several other potentially environmentally harmful sectors (e.g., agriculture, fossil fuels, fisheries), there is no comprehensive cross-country database of government support that covers a broad set of measures and commodities. This is surprising given preliminary indications of the magnitude of support for primary metal production, and the relevance of minerals and metals to a circular economy transition.

There are two main reasons why developing a cross-country assessment of support to the metals sector would be worthwhile.

First, it would increase transparency on the various mechanisms that governments use to provide support to metals firms. Questions such as, what is the relative magnitude of support provided across countries, which support measures are most important, and to what extent the secondary sector also benefits, could be better addressed.

Second, the data created during such an assessment would facilitate analyses of the economic impacts of support. Questions such as, how responsive is metal output to the provision of support, could potentially be addressed. There are three possible options for advancing the current stock of knowledge on support for the metals sector.

From lesser to greater levels of ambition, these are:

- individual country case studies
- a qualitative cross-country inventory
- a quantitative cross-country inventory.

If the main intention is to raise awareness around the magnitude of support for primary metal production, then a series of case studies in important metal producing countries may suffice. More detailed data collection would be worthwhile if the database was expected to become the basis for an empirical analysis on the effects of support. In that case, additional temporal coverage and disaggregation of the value of support measures by recipient metal would be recommended.

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RE-CIRCLE is an OECD project providing policy guidance on resource efficiency and the transition to a circular economy.

The aim of the RE-CIRCLE project is to identify and quantify the impact of policies which increase resource efficiency and further the transition to a circular economy.



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For further reading on government support for primary and secondary metal production see the OECD Environment Working Paper on which these Policy Highlights are based:

McCarthy, A. and P. Börkey (2018), “Mapping support for primary and secondary metals production”, OECD Environment Working Papers, OECD Publishing, Paris, <http://dx.doi.org/10.1787/19970900>

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