

22. Water

Key points:

- Water use is an essential aspect of the sustainability of the raw materials sector; however, it is difficult to monitor due to the complexity of the factors involved.
- Many raw materials sectors in the EU have reduced the volume of water they use, due to lower production volume and improvements in water efficiency.

Overview and context

Water is an essential input to the economy. Safeguarding its quality and preserving the resource is crucial for citizens and the health of ecosystems. Water is also an essential input for the raw materials extractive and manufacturing industries: it is used in ore processing, dust suppression, cooling processes and as a material input for most industrial processes.

Facilities for raw materials extraction, processing and manufacturing may consume relatively little water as compared with agriculture or electricity generation, for example²⁵⁸. However, and despite the fact that water can be reused multiple times at the facilities, some raw materials industries can be water-intensive and can have an impact on water availability at local level. The extraction of precious metals and the manufacturing of iron, steel and paper are typically water-intensive, while the manufacturing of wood and non-metallic minerals usually demand less water.

Water use also varies across countries and regions, with diverse water availability conditions and regulatory frameworks. This heterogeneity is a challenge for the robust and comprehensive monitoring of water use by industry and hinders the comparison of water performance across countries and sectors.

In addition to aspects relating to water volume, discharges from the raw materials industry can affect the quality of water bodies and soils. These industries can release nutrients (e.g. nitrogen, phosphorous), metals and heavy metals to water²⁵⁹. While processing industries might find it easier to control wastewater discharges, this can be more challenging for mining operations, where physical boundaries with nature are less defined²⁶⁰.

In this framework, the EU's water and sectoral regulation, including the Water Framework Directive (WFD)²⁶¹, the Industrial Emissions

Directive (IED)²⁶² and the Extractive Waste Directive²⁶³, aim to improve water management and quality across the EU. The deployment of these and other policies has already led to significant improvements in terms of water re-use and the control of wastewater discharges. Simultaneously, it has also led to limitations of e.g. some mining activities, since a site cannot be displaced to other location when local water-related complications arise.

Facts and figures

Figure 22.1 presents water use for three raw materials sectors between 2000 and 2015 for a set of EU countries. Water use refers to the actual volume of water used by an activity and is calculated as water abstraction minus returned water²⁶⁴. Data reporting varies across countries and covers a limited number of years and economic sectors²⁶⁵. The figure covers the sectors and countries for which data are available.

The figure shows that the manufacture of basic metals used the highest volumes of water over the period, followed by the production of paper and paper products, and mining and quarrying activities. (Water use for mining also covers the extraction of energy carriers such as oil and gas).

The figure also highlights the overall decreasing trends in water use by mining and quarrying, and basic metals manufacturing. Trends became more stable overall from the mid-2000s on, probably due to the production boost from the development of the construction sector in some countries. Water use by the paper industry was quite stable for most countries throughout the period. All these trends seem to be closely linked to production volumes, but also to improvements in water efficiency in some sectors,

²⁵⁸ Based on JRC calculations processing water use data from Member States' national offices.

²⁵⁹ Van den Roovart, J., van Duijnhoven, N., Fribourg-Blanc, B., Siauue, S., Prchalova, H., 2017. 'ETC/ICM Technical Report 3/2017: Emissions of pollutants to Europe's waters — sources, pathway and trends'.

²⁶⁰ For instance, water resources might be affected by acid mine drainage from sulphide minerals. This applies to active, but also to non-operating or even abandoned, mining sites, where water management systems are usually less advanced.

²⁶¹ Directive 2000/60/EC establishing a framework for the Community action in the field of water policy. The WFD establishes water bodies' quality objectives by river basin.

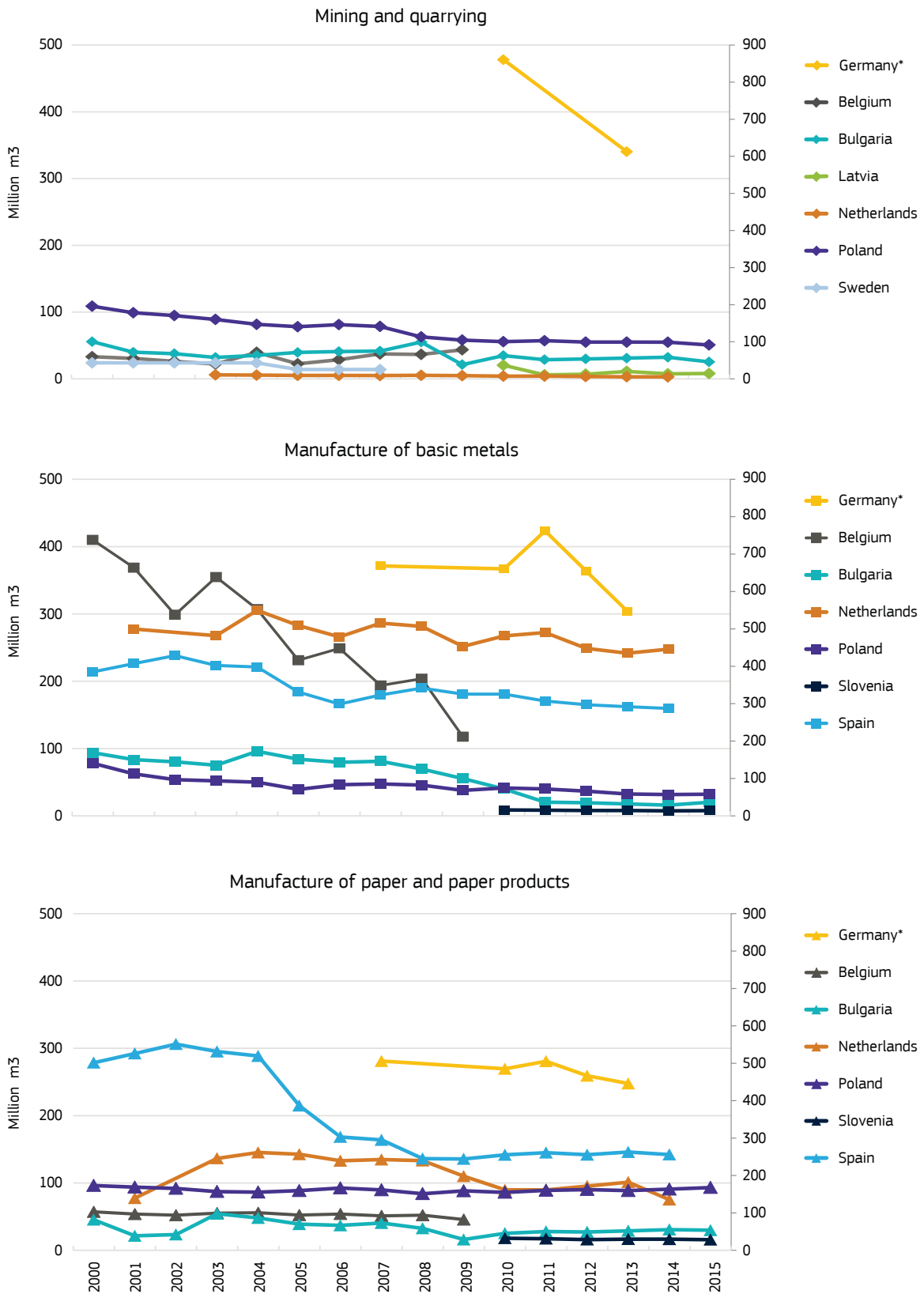
²⁶² Directive 2010/75/EU of the European Parliament and the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control). The IED requires the adoption of the 'Best Available Techniques' (BATs) to the industrial facilities, which provide standards on water use and wastewater discharges.

²⁶³ Directive 2006/21/EC on the management of waste from extractive industries. See also indicator 21 on extractive waste.

²⁶⁴ See methodological notes.

²⁶⁵ See the section on 'The search for suitable data' and the methodological notes for more detail.

Figure 22.1: Water use trends by raw materials sector (selection of EU countries, 2000-2015)²⁶⁶.



* See right-hand axis.

266 Source: JRC, based on Eurostat data retrieved in November 2017 (see methodological notes).

for instance the increasing rates of water re-use and recycling. This reflects improved water use in the sector, which is particularly relevant for areas under frequent water stress²⁶⁷.

Conclusion

The EU raw materials sector has made significant improvements in water use (through e.g. increasing water re-use) and the control of water discharges, thanks partly to the implementation of EU water and sectoral regulation. However, the comprehensive monitoring of water use by the sector is rendered more difficult

by the complexity and heterogeneity of the factors involved, and by the limitations of the available datasets.

As stated in the Circular Economy action plan, water scarcity has worsened in some parts of the EU in recent decades and the Commission will be taking a series of measures to boost water re-use and recycling. In addition, the ongoing fitness check of the WFD (the Commission's report is expected by late 2019) will assess the relevance, effectiveness, efficiency, coherence and EU added value of the Directive.

The search for suitable data...

After an assessment of other potential data sources²⁶⁸, Eurostat was found to be the only data source that allowed for harmonised monitoring of water use by the raw materials sector over time and across EU countries. Although these data provide a first general overview, there is a high level of data aggregation and results should be interpreted with caution. For instance, water use trends for the different activities in the sectors considered here might vary strongly. In addition, these figures do not consider water use associated with the production of energy in off-site facilities. Time coverage is limited and data gaps prevent from assessing water-use trends before 2000.

A robust, comprehensive assessment of water use by the raw materials sector should provide insights into additional aspects such as water efficiency and the impacts of pollutant releases on water quality. The analysis should also take account of local water framework conditions.



²⁶⁷ See water-intensity calculations based on water-withdrawal data taken directly from Member States' statistical offices in Vidal-Legaz, B., Torres de Matos, C., Latunussa, C., Bernhard, J., 2018, 'Non-energy, non-agriculture raw materials' production: data to monitor the sector's water use and emissions to water', JRC113206.

²⁶⁸ 'Water-withdrawal data taken directly from Member States' statistical offices (based on Reynaud et al., 2016, 'Use and value of water by industries in Europe: a cross-country analysis'); European Pollutant Release and Transfer Register (E-PRTR), environmentally extended input-output tables (EE-IO), industry reporting and Life Cycle Assessment (LCA). See the details of the data assessment in Vidal-Legaz et al., 2018.

Methodological notes

Eurostat data on water use

Data come from [Eurostat water statistics](#), which are based on Member States' (voluntary) responses to the Eurostat/OECD joint questionnaire on inland waters. They include indicators on water abstraction, water use and water discharges, with various degrees of data completeness. Water-use data were chosen since they account for the internal re-use of water at facilities and cover some raw materials manufacturing sectors.

Datasets by economic sector and country coverage

Data for the manufacture of paper and paper products (C17) and the manufacture of basic metals (C24) belong to the 'water use in the manufacturing industry by activity and supply category' dataset (code env_wat_ind).

Data for the mining and quarrying sector (B) belong to the 'water use by supply category and economical sector' dataset (code, env_wat_cat).

Data are displayed for a set of countries only, as complete data are not available. For visibility reasons, countries for which water use values were below 5 million m³ are not shown in the final data display. These include Cyprus, Malta and Lithuania for the three graphs and Slovenia for the figure on mining and quarrying. Countries for which only one data point was available are not displayed; this applies to Sweden for the 'manufacture of basic metals' and 'manufacture of paper and paper products' datasets.

Definitions

In contrast to 'water supply' (i.e. the delivery of water to final users, including abstraction for own final use), 'water use' refers to water that is actually used by end users for a specific purpose within a territory, such as for domestic use, irrigation or industrial processing. It excludes returned water.

'Returned water' is water abstracted from any freshwater source and discharged into freshwaters without or before use. This occurs primarily in the course of mining and construction activities, for example, or in connection with spring overflows. Discharges to the sea are excluded.