

# LESS MATERIAL PROJECT<sup>1</sup>

## An Overview of the Country Profile of Türkiye for Materials and a World Comparison

by Sedat Alataş, 17 June 2023

Over the centuries, there have been some major shifts in the way energy is produced. For example, while the 18th century is largely dominated by wood, water power, mills, or steam engines, the 19th and 20th centuries are predominantly characterized by power plants and fossil fuels, such as coal and oil [1]. Although the demand for fossil fuels still remains high in the 21st century, a considerable decrease in the use of fossil fuels is urgently needed to prevent serious adverse effects of climate change [2]. Therefore, green transition requires advancing some low-carbon technologies, such as solar panels, wind turbines, or electric vehicles. As these technological advances are material-intensive, this significantly increases the world's dependence on materials, such as copper, lithium, cobalt, and rare earth elements (REEs), which are projected to further rise in the decades to come [3].

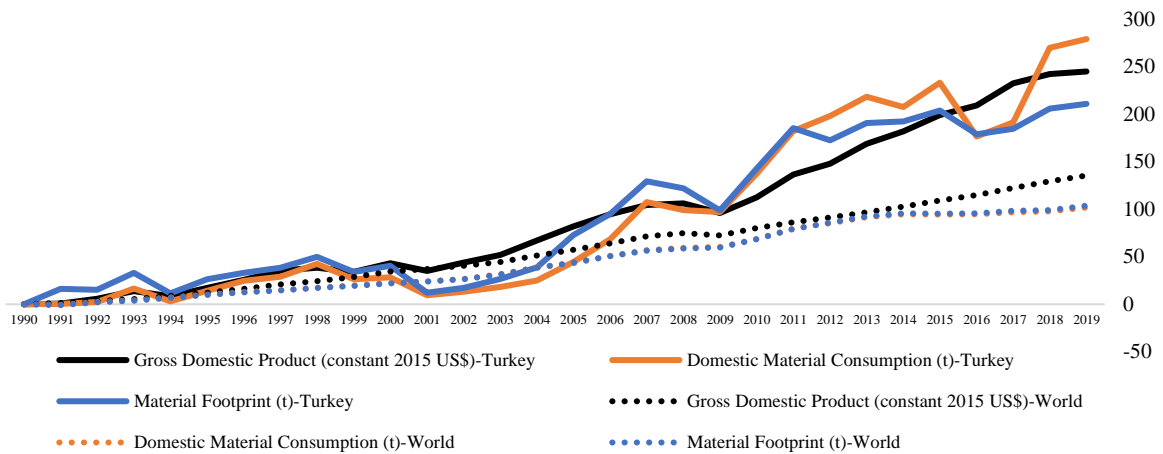
Figure 1 compares the global trend in domestic material consumption, material footprint, and income with Türkiye. As can be observed, there has been an upward pattern in global material use over time, nearly doubling between 1990 and 2019 in terms of both domestic material consumption and material footprint. Türkiye confirms the same trend, albeit with a steeper pattern, showing a 279% growth in domestic material consumption and a 211% increase in material footprint during the same time period. Besides, as the global outcome grows higher than the two other material consumption indicators (compared to 1990), we confirm the relative decoupling of economic development from material consumption at the global level. However, (albeit we fully aware that it significantly differs depending on the time period considered), this finding is only supported by the material footprint indicator (for the 1990-2019 period) in Türkiye as there exists a significant increase in domestic material consumption, particularly after 2017.<sup>2</sup>

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<sup>2</sup> This result should be approached with caution. It is because, as an emerging economy, it would be a more expected result that Türkiye achieves a relative decoupling in terms of domestic material consumption rather than material footprint or in both. As noted in the main text, this finding is based on a simple and straightforward calculation: if the percentage change of material footprint or domestic material consumption from 1990 to 2019

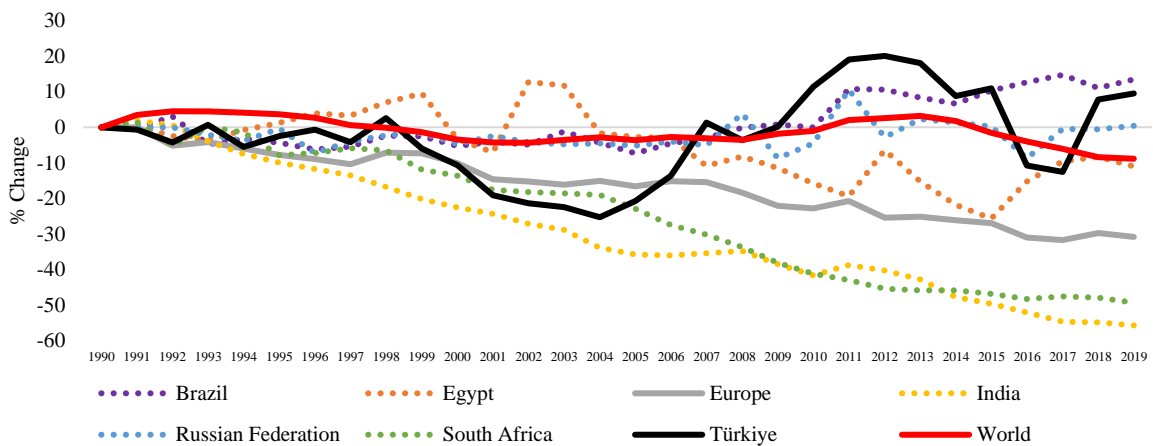
**Figure 1** Materials and Gross Domestic Product



Source: [4] and [5]

In 2019, 12.37 tonnes of materials have been consumed globally per person. With 22.09 tonnes, Turkey uses more materials than the global average. The next five economies, which use more materials per person than Turkey, are Sweden, China, Israel, the United States of America, and the United Arab Emirates. On other hand, Poland with 19.03, South Korea, Hungary, Russia, and Germany with around 17-15, the UK and Portugal with about 11 tonnes per capita use less materials than Türkiye [4].

**Figure 2** Material intensity



Source: [4]

(growth formulation) is higher than in gross domestic product, it refers to the relative decoupling. In order to broaden our knowledge on this issue, further analysis or even empirical tests are required.

The worrying trend for materials in Turkey is further supported by the material intensity indicator, which is measured by the ratio of domestic material consumption to gross domestic product (kg/USD). Figure 2 displays the material intensity performance for some selected countries from 1990 to 2019. As can be seen, the material intensity performance of Türkiye is highly fluctuating over the years. There has been a declining trend from 1999 to 2006, which suggests improved material efficiency. Yet, this favorable outcome is eroding after 2006 and material intensity is beginning to increase by 2019. Although on average Turkey does better than some emerging economies, such as Russia, South Africa, Brazil, India, or Egypt (Türkiye's average material intensity is lower than that of these countries from 1990 to 2019), it turns out that Turkey performs poorly, especially when compared to Europe and the long-term success of India and South Africa.

## References

- [1] Bridge, G., Bouzarovski, S., Bradshaw, M., & Eyre, N. (2013). Geographies of energy transition: Space, place and the low-carbon economy. *Energy policy*, 53, 331-340.
- [2] Jones, G. A., & Warner, K. J. (2016). The 21st century population-energy-climate nexus. *Energy Policy*, 93, 206-212.
- [3] Gielen, D. (2021). Critical minerals for the energy transition. International Renewable Energy Agency: Abu Dhabi, United Arab Emirates.
- [4] United Nations Environment Programme International Resource Panel. (2022). Global Material Flows Database. <https://www.resourcepanel.org/global-material-flows-database>
- [5] The World Bank. (2023). The World Bank Development Indicators Database. <https://databank.worldbank.org/source/world-development-indicators>