# LESS MATERIAL PROJECT[1]

**Material Efficiency vs. Material Productivity**

*by Sedat Alataş, 8 September 2022*

What do we mean when we talk about efficiency or productivity in resource economics? Are they referring to the same thing or completely different concepts? If different, more specifically, how should we understand and interpret material efficiency and productivity?

Efficiency mainly denotes the production of the same amount of output with fewer resources or inputs. The focus of inputs in efficiency measurements varies across sectors depending on their dominant role in their production. For example, while a service company mainly focuses on labor efficiency for boosting profits with cost-cutting as it is more likely to be labor intensive, the main attention of a steel production industry might be paid to the energy or material efficiency due to either their large share in production or environmental concerns. Therefore, in general, if the same amount of output is produced with fewer resources, no matter what the industry is, it is said to be efficient. On the other hand, if more inputs are utilized to produce the same output, it is considered to be less efficient.

Another concept that might sound similar to efficiency at first is productivity. Yet, productivity refers to an increase in production per unit of input. Therefore, no matter what the industry is, the main concern here is to achieve the highest output with the given resources or inputs. If the largest amount of desirable output is produced with the use of available inputs, it is considered to be productive.

As both efficiency and productivity are desirable, all participants in economic activity, such as companies, households, or governments, encourage efficiency and productivity to achieve many different objectives. Yet, they do not refer to the same meaning, as shown above. Although they are colloquially used as synonymous, this is not technically true. For example, assume that a company employs a certain amount of materials (resources) to produce 50 goods. If the main concern is productivity, this company should find some ways to increase the number of goods per material. In this regard, if the production of goods increases per material, the



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company becomes productive. On the other hand, if the main concern is efficiency, the company should try to produce 50 goods (the same amount) with less materials. Therefore, if materials utilized in the production process decrease to produce the same output, the company becomes efficient. In short, to put it simply, while efficiency is more about doing something with less, productivity is about something doing more per unit of input.

It is equally important to note that both efficiency and productivity are two terms that are closely related to each other. For example, climate mitigation requires designing and implementing some resource policies. In this regard, material efficiency is considered one of the most important mitigation options in terms of its potential contribution to net-zero and circular economy efforts. It is not only because material efficiency might reduce material use per output, but also because material efficiency leads to productivity gains by lowering costs and increasing production yields per unit of input. As these terms are closely connected with each other, adopting both material efficiency and productivity strategies together might be able to provide many different benefits to many different stakeholders, especially for a rapid reduction of carbon emissions.

While advocates for green growth theory see economic growth as the means to tackle climate change, the degrowth proponents strongly criticize this growth-oriented green growth perspective by critically arguing the assumption of absolute decoupling of emissions from economic growth. However, no doubt that both perspectives acknowledge that emission reductions are not enough, and material efficiency might significantly contribute to the climate crisis.



## References

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