Lightweight materials are a key strategy to address emerging environmental challenges

Product Watch: Lightweight materials

Lightweight materials have a comparatively high strength to weight ratio over conventional materials and can be divided into three main categories:

- Lightweight metals and alloys (e.g. high strength steel, aluminium, magnesium, titanium)
- Polymer composites (e.g. carbon-fibre reinforced plastics (CFRP), glass-fibre reinforced plastic (GFRP))
- Polymers (e.g. polycarbonate, polypropylene)

The use of lightweight materials leads to weight reduction, which in certain applications reduces fuel consumption, lowering emission of greenhouse gasses

Application areas for Lightweight Materials and construction solutions

Automotive. This segment has the largest market share of lightweight materials in terms of revenue. The use of lightweight materials has the potential to reduce the CO_2 emissions up to 20% in the car industry.

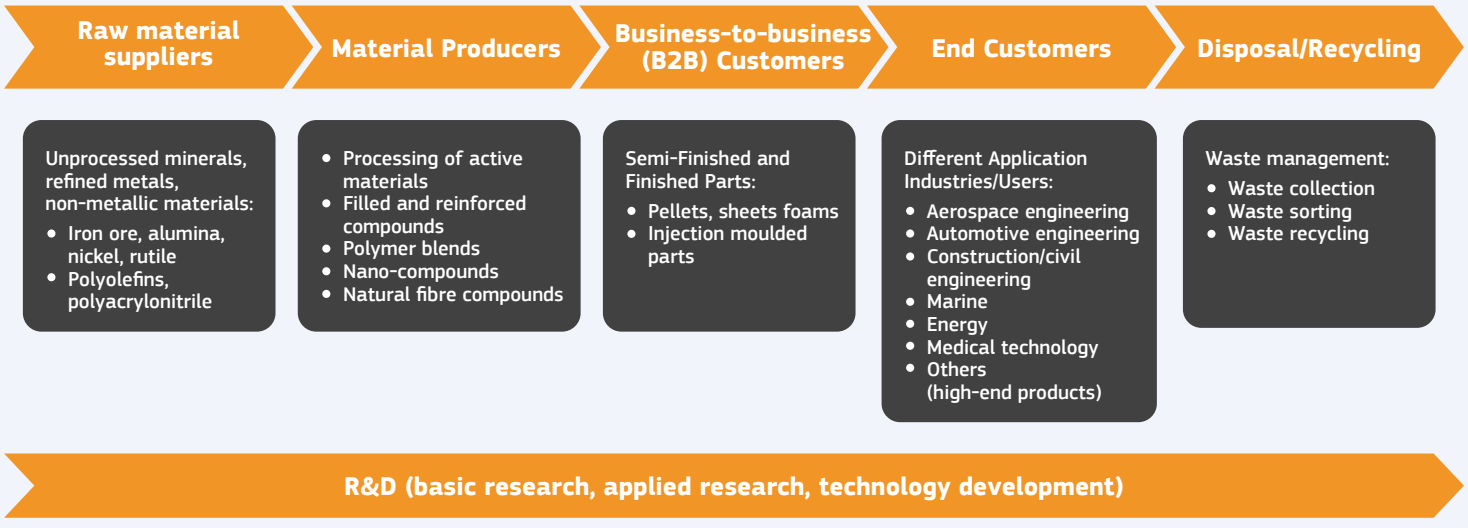
Aviation. This segment is the second dominant, and mainly uses aluminium, composites and polymers. The main drivers are cost related, being reducing fuel consumption and increasing passenger/cargo load per flight.

Wind energy production. In this segment, glass fibre reinforced polymer is currently used for blade production. The increase in wind energy installations can augment the demand for these materials.

Research & Development (R&D) play a crucial role to compete with steel due to cost-efficiency, proven methods and a well-established supply chain

The lightweight materials industry is competitive and consolidated. The industry has a high growth potential over the next years due to the regulations on emission reductions and the increasing number of renewable energy projects

Figure: General value chain structure of the sector, which may differ in the case of specific lightweight material groups.



For more information, read the full Product Watch report on Lightweight Materials here:
https://ati.ec.europa.eu/reports/product-watch/lightweight-materials

EU competitive positioning for lightweight materials

Overall, Europe features a solid economic base with respect to lightweight materials as a number of key companies from the value chain are headquartered in the EU. However, lightweight materials still suffer from some key technological challenges and cost related issues. Lightweight materials could help overcome the limitations of other non-lightweight solutions to the profit of the whole society, environment and the EU economy.

Strengths

- Scientific basis
- Strong technological competences
- Superior material qualities

Opportunities

- New application areas
- Material innovation in aviation industry
- Growth in wind project installations
- Stringent regulation

Weaknesses

- High cost of lightweight materials
- Safety and technological constraints

Threats

- International competition
- Price volatility in raw materials such as rutile and iron ore

Lightweight materials are key in increasing sustainability and achieving climate targets

Conclusions

Lightweight material helps increasing sustainability and achieving climate targets. The actors along the value chain will need to collaborate to meet the regulations. Gaining the interest of consumers is a challenge, and further research is crucial.

Outlook

Lightweight materials have a potential to contribute to a sustainability transition of the European mobility and energy system. The EU has the potential to become a hub for lightweight materials especially in the area of R&D.

Impact of COVID-19

The lightweight materials market ruptures are expected to result in a temporary drop in overall production of key industries and hence, demand for lightweight materials.

About the Advanced Technologies for Industry (ATI) project

The ATI project – funded by the European Commission – supports the **implementation** of Europe's new growth strategy with a systematic monitoring of **technological trends** and reliable, **up-to-date data** on advanced technologies.

The **Product Watch** analyses novel products that are based on advanced technologies for the development of goods and services - enhancing their overall commercial and social value. It supports cluster organisations and S3 partnerships, providing intelligence on innovation areas where European regions could team up and invest together.

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