Addressing Europe's Supply and Demand: Logistics

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- Within the EU, logistics represented a market volume of nearly € 878 bn in 2012. It accounts for about 7% of EU GDP and 5% of total employment in the EU.
- Logistics is an enabler for both global trade and local economies. Efficient and sustainable logistics play a vital role in the smooth functioning of many other services and activities in the economy.
- For instance, 18% of the wholesale and retail trade sectors' added value originates with logistics services.
- COVID-19 and the measures taken to control its spread have created unprecedented conditions for nations' and the world's transportation and supply chain networks.

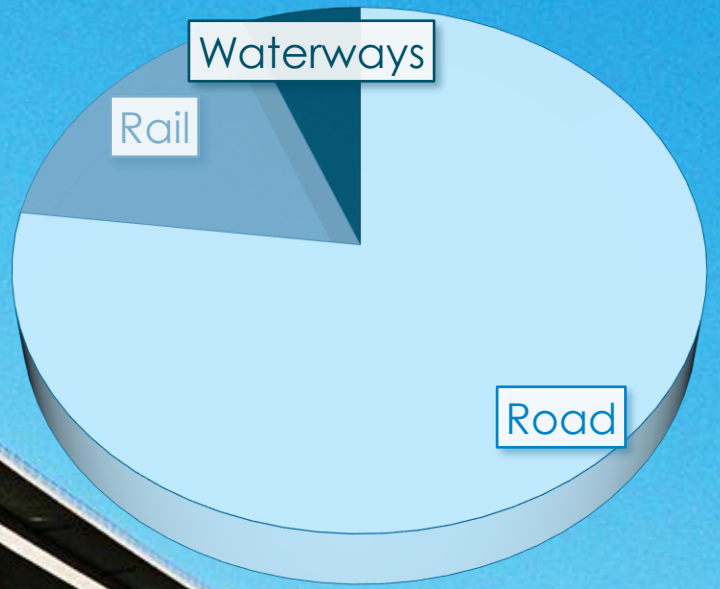
The logistics industry currently plays and will continue to play a substantial role within the overall economy

- Quickly moving medical supplies and essential goods to where they are needed is straining existing networks.
- Disruptions in ocean shipping, air cargo and manufacturing in other countries threaten the timely availability of critical supplies.
- The transport sector has a crucial role to play in the supply of goods, in particular medicines, medical devices, food and other essential commodities needed to overcome this crisis.
- The transport sector also proves to be a vital instrument in these times where many European citizens are restricted in their mobility.

Addressing future logistics

- The share of EU inland freight transported by road (76.7 %) was more than four times as high as the share transported by rail (17.3 %) in 2017.
- The remainder (6.0 %) of the freight transported in the EU was carried on inland waterways.

INTRA - EU TRANSPORT IN 2017 (SOURCE: EUROSTAT)



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Supporting the sector through smart integration of climate change, infrastructure, innovation

Reducing emissions from transport and logistics:

- The sustainability of urban logistics is a challenge for rapidly growing cities in Europe but also worldwide. Investing in innovative urban logistics solutions, such as cooperative ITS solutions, autonomous mobility and unmanned aerial vehicles (drones), can play a vital part in reducing negative environmental impact, improving logistics efficiency and increasing customer value.

Supporting the sector through smart integration of climate change, infrastructure, innovation

Reducing emissions from transport and logistics:

- Allowing high capacity vehicles (HCVs), designed to carry more cargo than standard trucks, could thus provide a highly effective solution. The HCVs have the potential to reduce costs and offer higher productivity than regular heavy goods vehicles, as they can consolidate freight from smaller trucks, consume less fuel and produce fewer emissions per unit of cargo transported. For example, two or three HCVs may carry as much cargo as three to five standard vehicles. It has also been estimated that HCVs can reduce carbon emissions per unit of freight by15-40%, depending on the vehicle configuration and use. As a result, this makes HCVs more cost-effective and environmentally friendly than regular vehicle combinations.

- Sustainable alternative fuels and refuelling infrastructure.

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Upgrading the logistics infrastructure

- Due to increasing demand for freight transport, existing infrastructure needs to be modernised, and new infrastructure must be built. The different modes of transport require better connections, and broader access to infrastructure must be guaranteed.

- In the rail sector, to upgrade, renew and build last-mile infrastructure connecting the railways to production and distributions, around an additional €10 billion is needed. (Study on Design Features for Support Programmes for Investments in Last-Mile Infrastructure, European Commission, 2016).

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The need for construction materials

- Primary road infrastructure elements include pavements and bridges. Pavement strength and durability are affected by many factors, which vary along any given section of road. Climate conditions (temperature, water, snow, ice) and ground motion are amongst these factors.

- Bridges are also exposed to a range of conditions that affect their response to traffic loads, such as wind (for long span bridges), earthquakes, climate conditions, and material ageing (resulting in shrinkage, chemical reactions, corrosion, etc.). Infrastructure is designed to serve for longer periods than vehicles.

The need for construction materials

- Typically, a pavement surface is renovated every ten to fifteen years, the pavement structure lasts for 25 years and bridges are designed to last for 50 to 100 years, but some of them operate for much longer. Therefore, HCVs should be adapted to the stock of existing infrastructures, some of them having lower capacity than originally designed because of ageing. In some cases, reinforcement should be considered.

- 400,000 safe and secure parking spaces are needed in the EU per night. Currently, there is a shortfall of 100,000 extra spaces and only 7,000 are certified as safe and secure. (Study on Safe and Secure Parking Places for Trucks - Final Report, European Commission, 2019).

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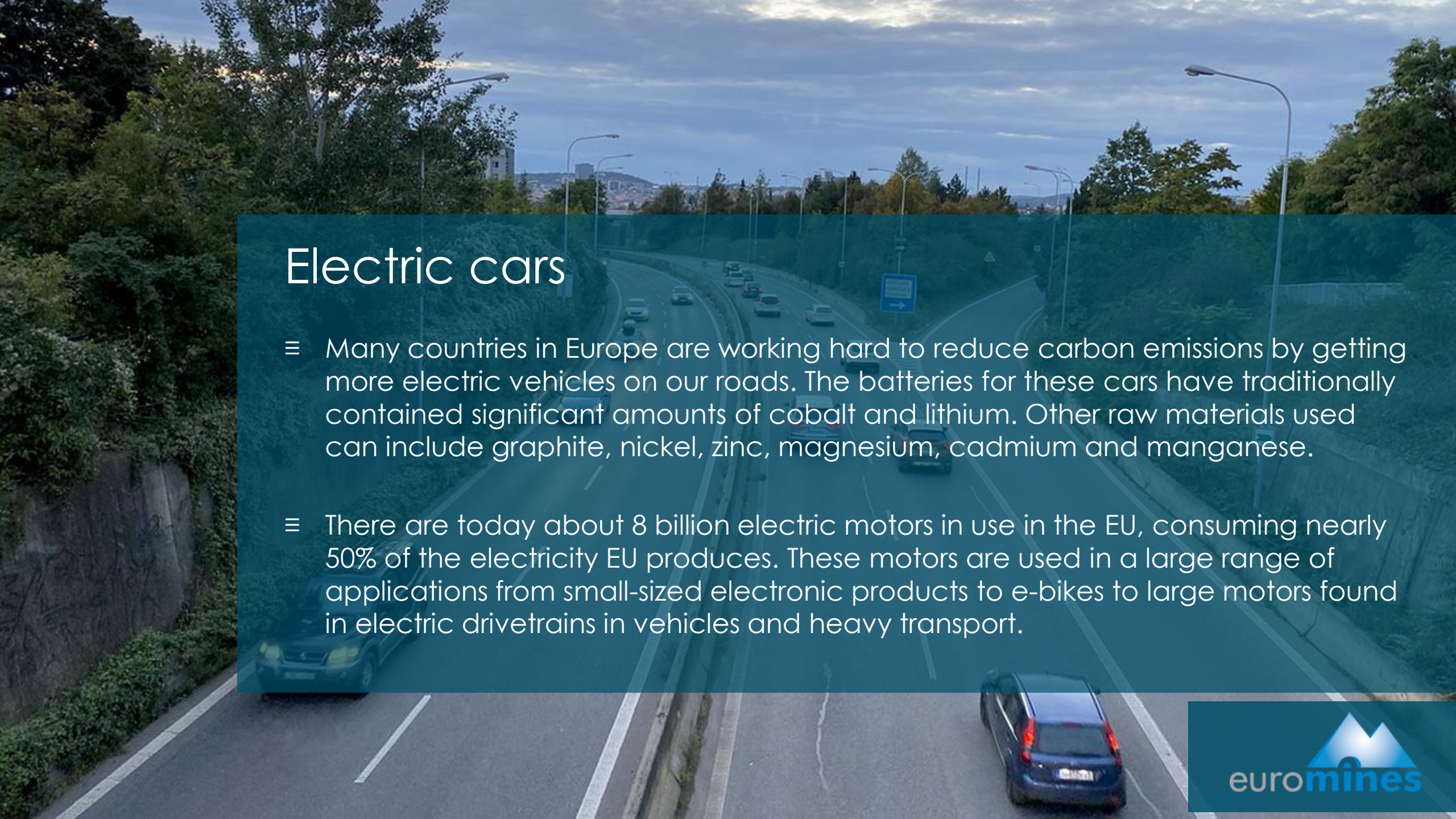

Electric cars

- Many countries in Europe are working hard to reduce carbon emissions by getting more electric vehicles on our roads. The batteries for these cars have traditionally contained significant amounts of cobalt and lithium. Other raw materials used can include graphite, nickel, zinc, magnesium, cadmium and manganese.

- There are today about 8 billion electric motors in use in the EU, consuming nearly 50% of the electricity EU produces. These motors are used in a large range of applications from small-sized electronic products to e-bikes to large motors found in electric drivetrains in vehicles and heavy transport.

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Fleet of vehicles using electric motors according to the three explored scenarios.

HDS High-Demand Scenario
MDS Medium-Demand Scenario
LDS Low-Demand Scenario

Source: Critical Raw Materials for Strategic Technologies and Sectors in the EU - A Foresight Study, European Union, 2020

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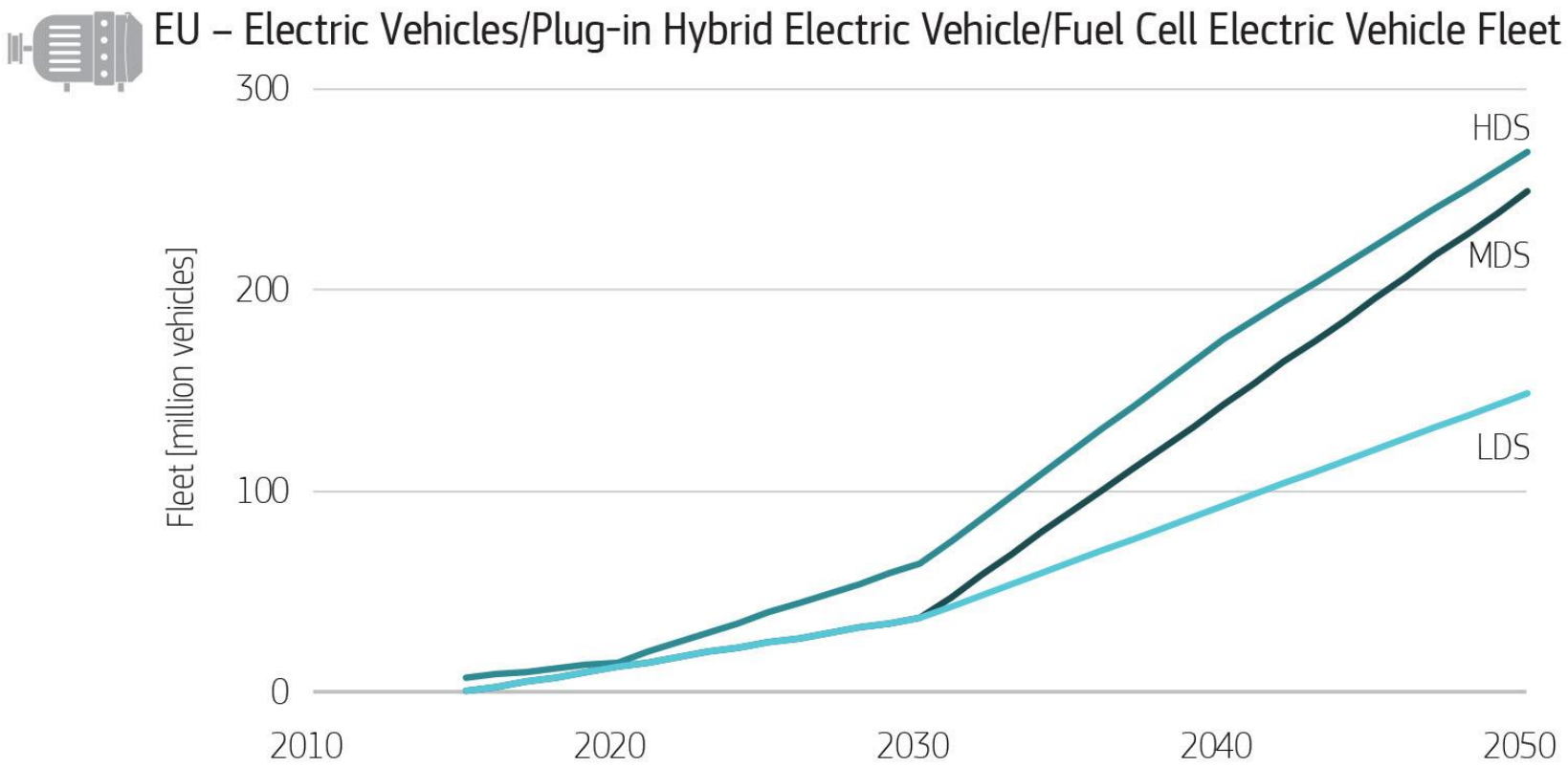
Fleet of vehicles using electric motors according to the three explored scenarios.



EU annual material demand for traction motors in 2030 and 2050

Source: Critical Raw Materials for Strategic Technologies and Sectors in the EU - A Foresight Study, European Union, 2020

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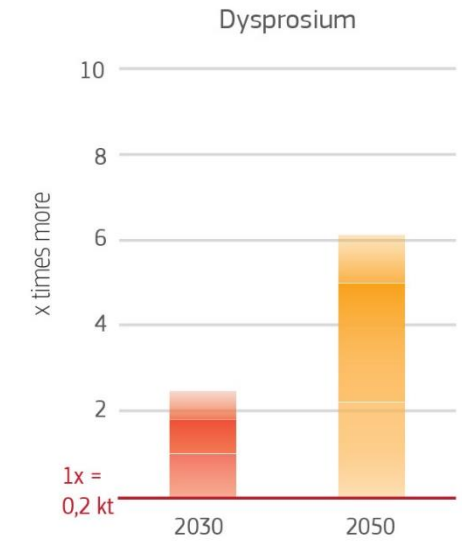
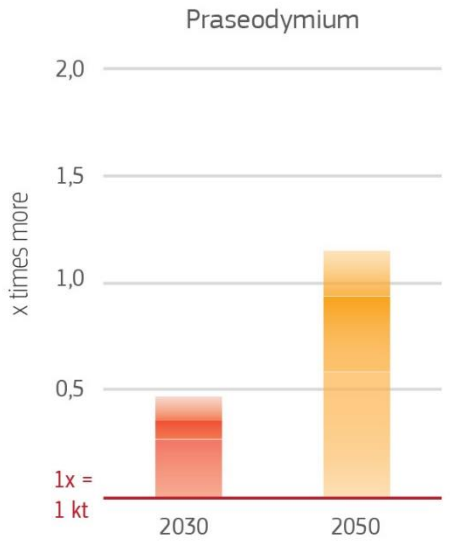
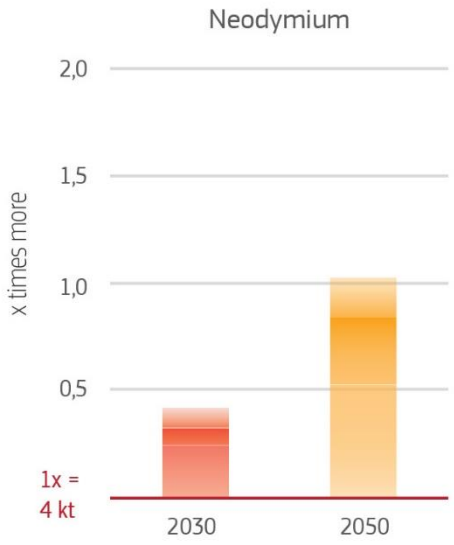
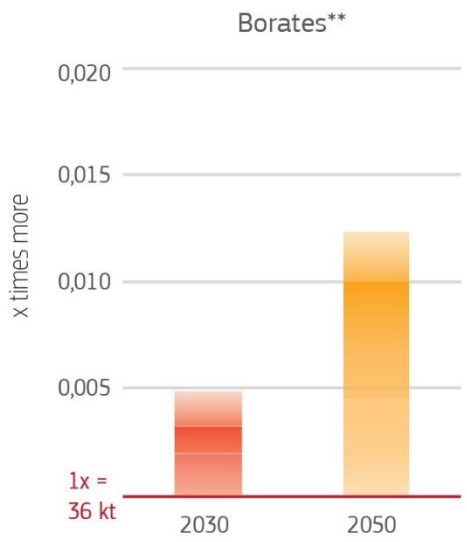
Additional material consumption for traction motors in **e-mobility only** in 2030/2050 compared to current EU consumption* of the material in **all applications**









* See the methodological notes in Annex 1 and all data in Annex 2
** of refined supply (Stage II) instead of ore supply (Stage I)
Aluminium, copper, silicon metal and steel have a negligible additional demand (< 1%) compared to the current EU share of global supply

Trains and Railways

- The European Union contains over 200,000 kilometres of rail lines. The rails are made from steel, which is largely iron, but by adding perfect proportions of carbon and manganese, railways are not only strong, but safe and durable.
- Train and tram cars contain metals such as steel, aluminium and zinc.
- Maintaining the railway ballast by replacing rock aggregate is a must in the annual maintenance plan of the national railways of the whole Europe.

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Airplanes

- Just one plane can contain 2.65 million parts.
- The materials used must withstand high temperatures and be extremely strong while also being light enough to enable flight.
- Aluminium is a popular choice to planes for these reasons, while also having good thermal and electric conductivity and high corrosion resistance.
- Steel is heavy but can withstand high heat, so it is often used in landing gear.
- Titanium is extremely strong and lightweight, as well as having high temperature resistance and high corrosion resistance. It is typically used in panel and swivel wing assemblies, hydraulic systems among other parts.

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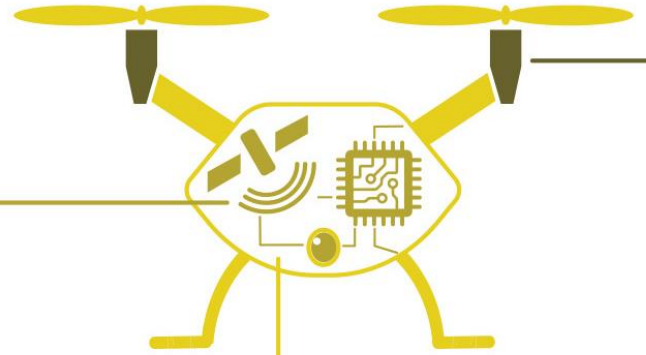
Drones

Drones are used for various civil and commercial applications.

In the logistic sector they are used for transport of goods, for example parcels in the logistics sector.



Be **Beryllium**: in alloys, communication equipment and integrated wire networks, electro-optical systems, landing gears

Cu **Copper**: alloying element in super-alloys and CuBe alloys, communication equipment

Ga **Gallium**: for communication and identification systems (GaAs and GaN, 5N), also in electro-optical systems

Ge **Germanium**: on-board electronics, inertial navigation systems (5N) and combat identification equipment

In **Indium**: in compounds for electro-optical systems

REE **Rare Earth Elements**: Nd, Pr and Dy are used in (small) electric motors with electronic speed control (ESC)

Ni **Nickel**: for Ni and NiTi alloys (Hastelloy series), ductile and corrosion resistant, in turbine and engine parts

Nb **Niobium**: ferroniobium used for microalloying in high strength structural steel

Sc **Scandium**: in AlSc alloys for lightweight - high strength non-structural parts and fittings

Ti **Titanium**: main alloys family, lighter than Al-Mg alloys, high strength, for armour, airframes and wings, fans & compressors

Al **Aluminium**: lightweight and high-performance alloys used for airframes, gear bodies, avionics

Hf **Hafnium**: Ni-based super-alloys, high strength-high temperature applications

Fe **Iron**: used in special steels in structural and engine parts

Mg **Magnesium**: in high-performance Al-Mg alloys

UVs additionally include ICT, batteries and 3D printed components and the materials used in robotics

● Critical Raw Material

Source: Critical Raw Materials for Strategic Technologies and Sectors in the EU - A Foresight Study, European Union, 2020

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