Life cycle of EV's and recycling of batteries

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Content

- LCA of EV’s and batteries
- Environmental impacts
- Current and future legislation

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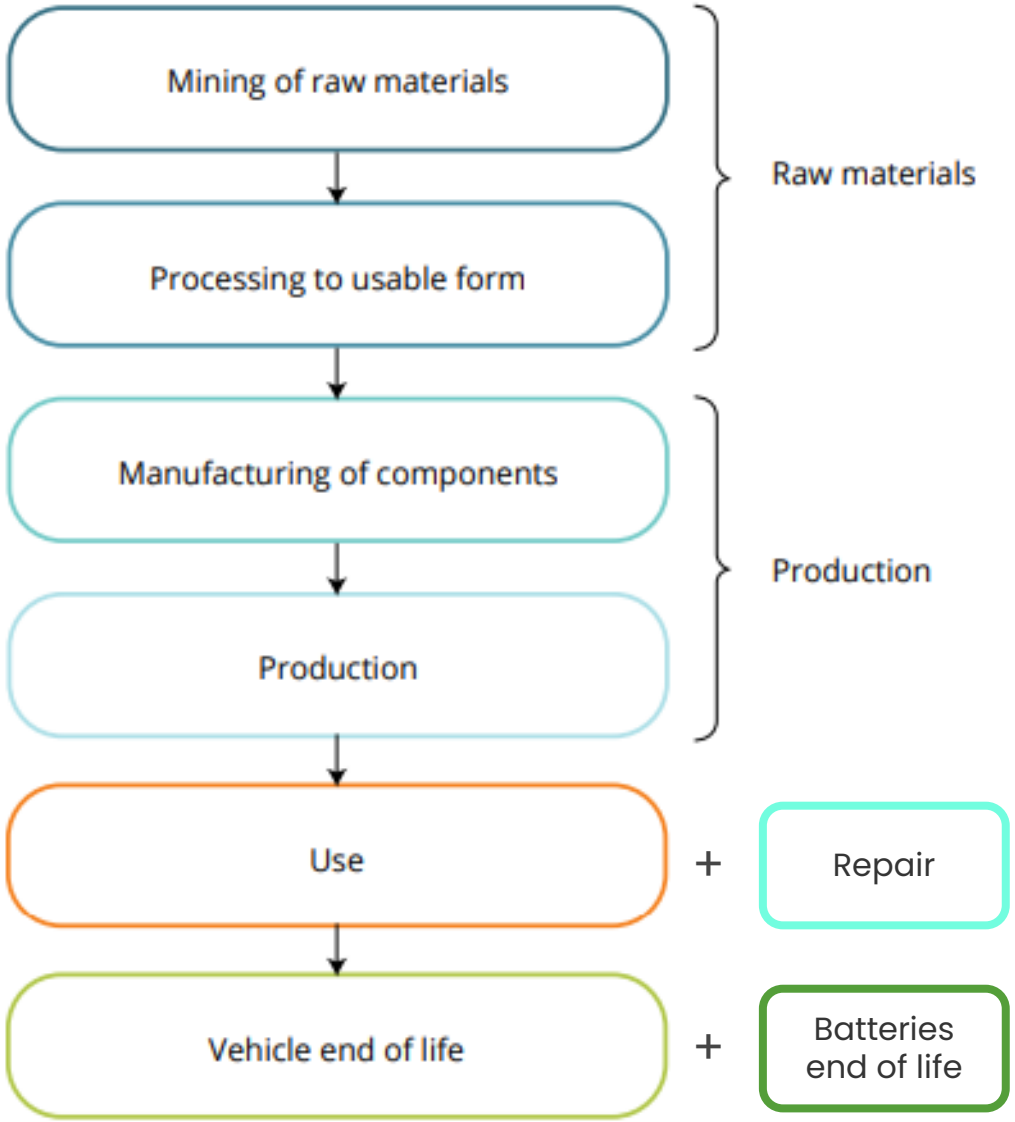
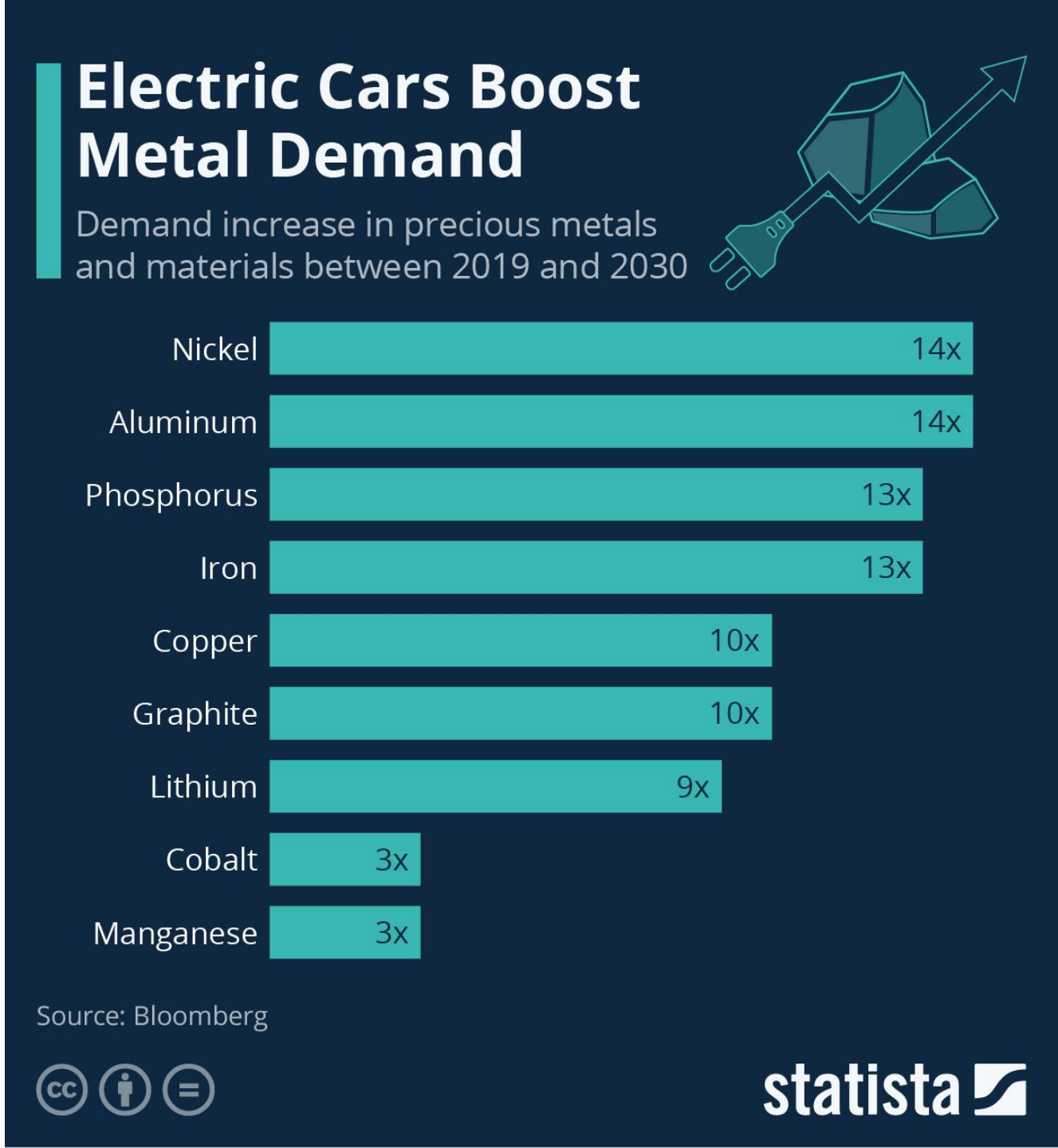
LCA of EV's and batteries



Automotive industry

- Europe's automotive sector is responsible for:
  - 19% of demand for the EU's steel industry (over 7 million tonnes/year)
  - 10% of overall consumption of plastics (6 million tonnes/year)
  - a significant share of the demand for aluminium (around 2 million tonnes/year)
  - copper (6% for automotive parts)
  - rubber (65% of the production of general rubber goods)
  - glass (1.5 million tonnes of flat glass produced in the EU).
- As the automotive sector shifts to zero-emission mobility, and vehicles increasingly integrate electronics, there will be an increase in demand for many metals



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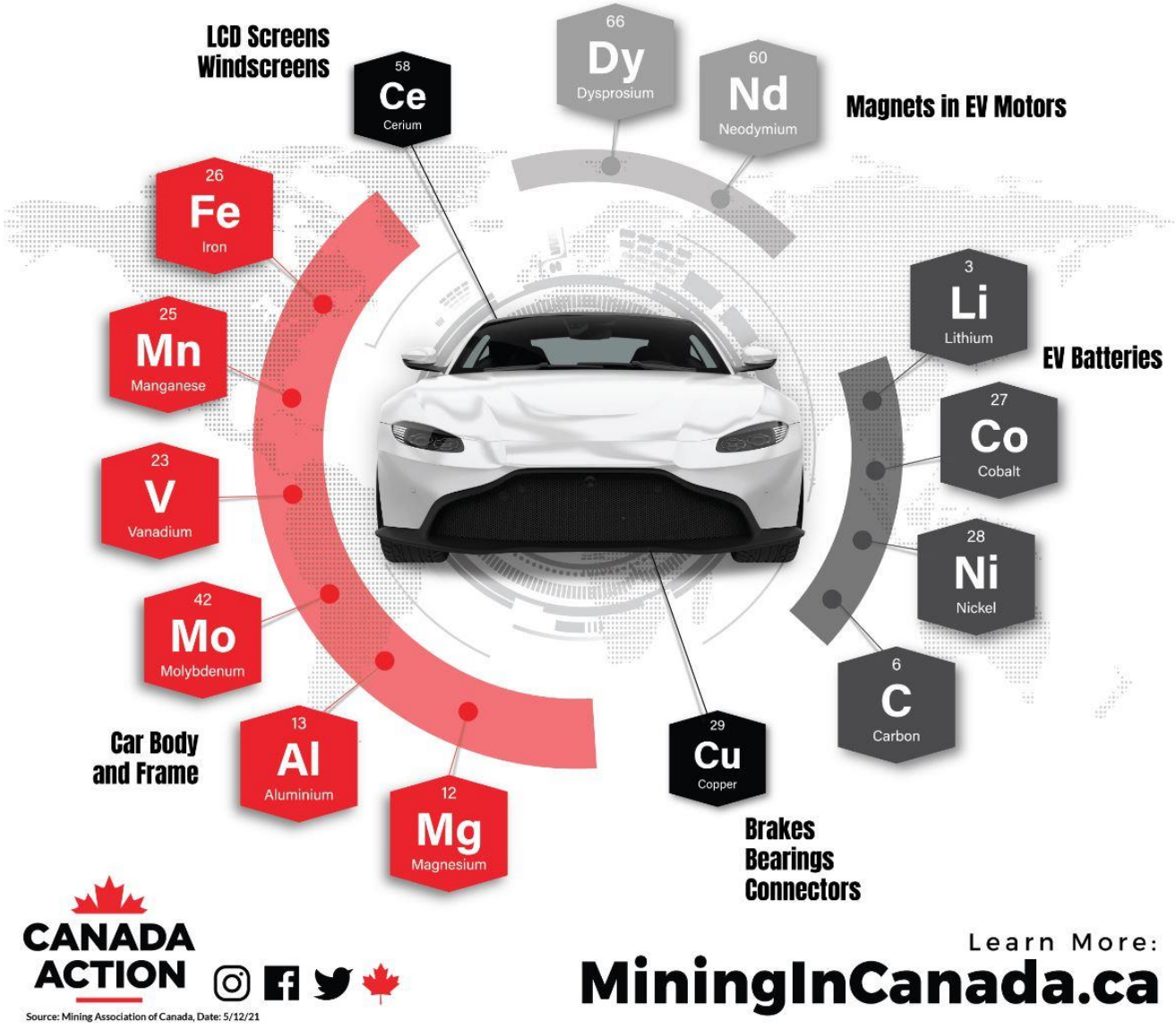
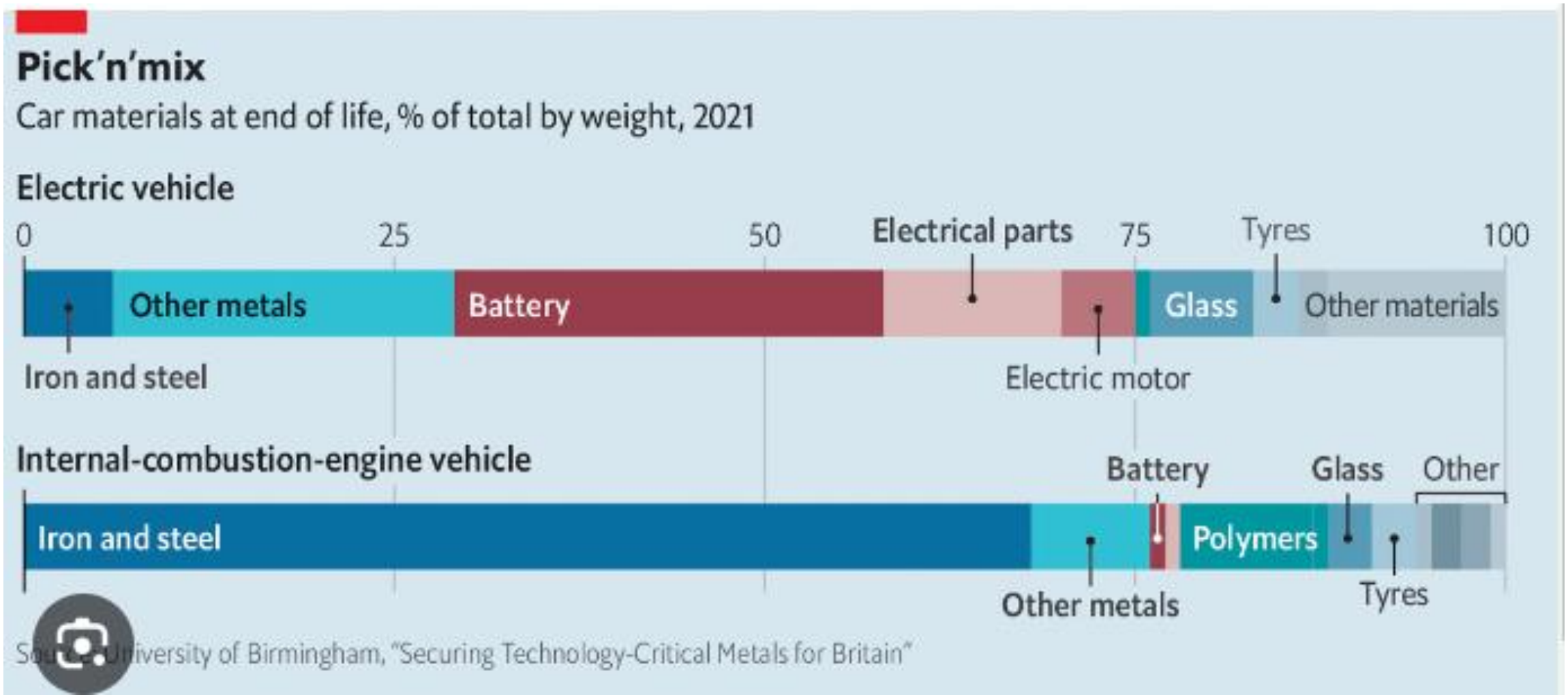
What are ELECTRIC VEHICLES Made Out Of?



https://www.canadaaction.ca/canada-electric-vehicle-tech-minerals-opportunity

Pick'n'mix

Car materials at end of life, % of total by weight, 2021



Source: University of Birmingham, "Securing Technology-Critical Metals for Britain"

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STUDY

Requested by the TRAN Committee

European Parliament

Environmental challenges through the life cycle of battery electric vehicles

Study

Transport and Tourism

Policy Department for Structural and Cohesion Policies
Directorate-General for Internal Policies
PE 733.112 - March 2023

EN

This study provides an up-to-date expert assessment and comparison between the life cycle's carbon footprint of battery electric and internal combustion engine passenger cars.

An extensive literature review and harmonisation effort was carried out on ICEV and BEV LCAs, comprising industry and independent reports and scientific papers.

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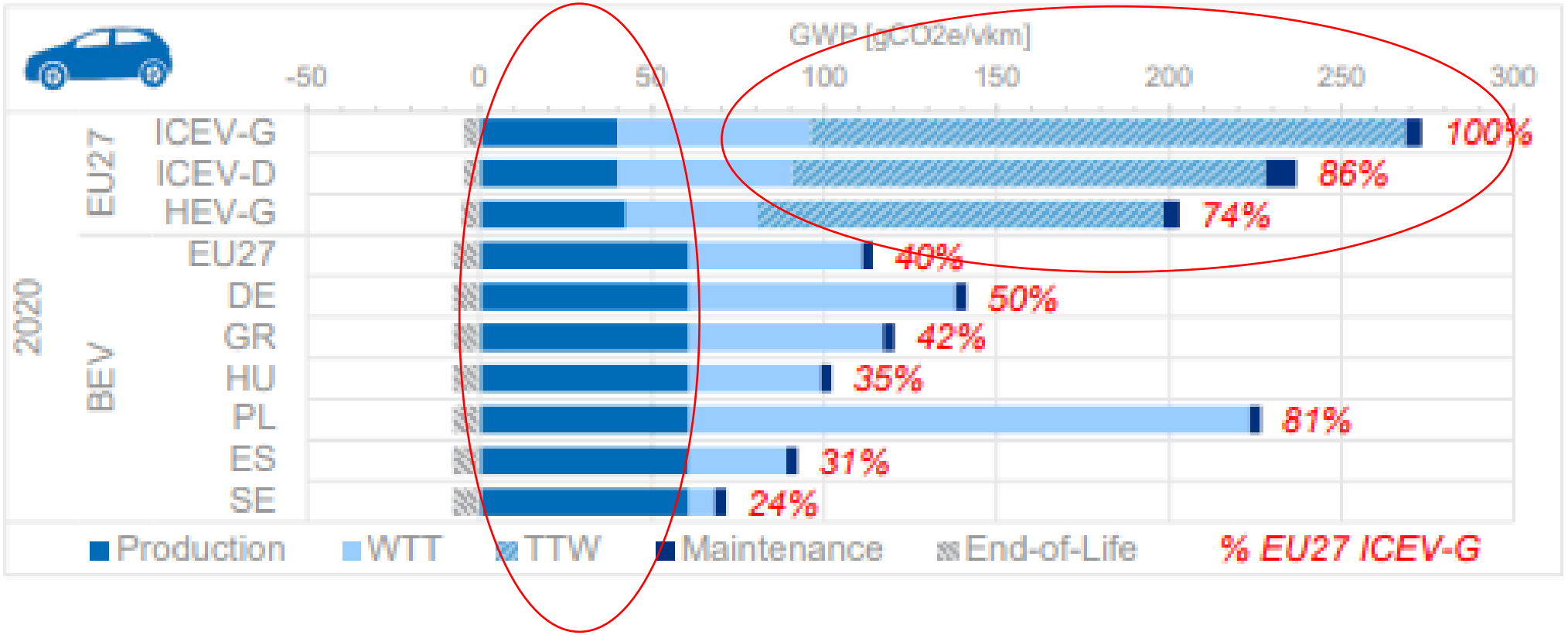
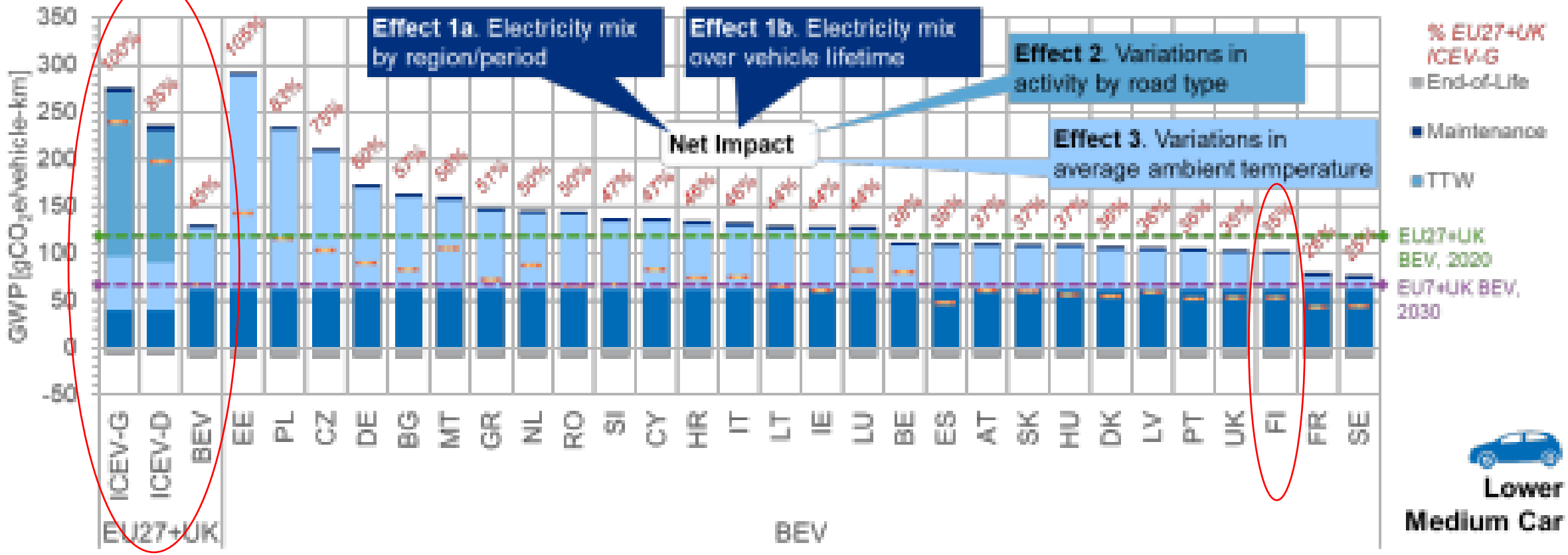
Figure ES2: Regional variations in life cycle GHG impacts for a Lower Medium Car (i.e. C-segment; VW Golf or similar), 2020, EU27, selected EU countries



ICEV-G/D = gasoline/diesel internal combustion engine vehicle, HEV-G = gasoline hybrid electric vehicle. Production = production of raw materials, manufacturing of components and vehicle assembly; WTT = fuel/electricity production cycle; TTW = impacts due to vehicle operation emissions; Maintenance = impacts from replacement parts/consumables; End-of-Life = impacts/credits from collection, recycling, energy recovery and disposal. GWP = Global Warming Potential. DE=Germany, GR=Greece, HU=Hungary, PL=Poland, ES=Spain, SE=Sweden

Figure 3-5: Effect of electricity grid mix and other regional effects on use phase GHG impacts of passenger vehicles, with country-specific results for BEVs, across all the member countries of the EU, plus the UK



Source: Ricardo modified from (Hill, et al., 2020)

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Results

- The GHG results indicated that:
  - BEVs are characterised by higher GHG impacts during the production phase, largely due to the battery packs.
  - However, this initial disadvantage is then significantly overcompensated by lower GHG emissions during the use phase.
- Other environmental aspects are related to the increased demand for critical raw materials (CRMs) for the electric power trains (vs the conventional ICEs), and more specifically for battery metals such as lithium, cobalt, and nickel.

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End-of-life vehicles (ELV) legislation

- The ELV Directive was adopted in 2000 and it was the first harmonised EU framework designed to ensure that vehicles reaching the end of their life and considered as waste are treated in an environmentally sound manner. The Directive sets out provisions on the collection and depollution of ELVs, it restricts hazardous substances in new vehicles and sets targets on reuse and recycling (85%) and on reuse and recovery (95%)
- The impact assessment of ELV directive 2000/53/EC identified four problem areas to tackle at EU level:
  - 1. There is a lack of integration of circularity in vehicle design and production leading to high dependencies for primary raw materials;
  - 2. The quality of treatment of vehicles at the end of their life is suboptimal compared to the potential to retain more environmental and economic value;
  - 3. An important share of 'missing vehicles' subject to the ELV Directive are not collected to be treated under proper environmental conditions and a large volume of non-roadworthy and polluting used vehicles are exported from the EU every year;
  - 4. There is unexploited circularity potential of vehicles currently outside the scope of the ELV Directive.

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End-of-life vehicles (ELV) legislation is changing

- To address each of these problems, specific policy options are proposed in new ELV regulation COM(2023) 451 final:
  - 1. ‘Design circular’: make design and production circular;
  - 2. ‘Use recycled content’:
    - increase the recycled content in new vehicles: targets on recycled content of plastic, steel, neodymium, dysprosium, praseodymium, terbium, samarium, boron used in permanent magnets as well as for aluminium and its alloys, or magnesium and its alloys
  - 3. ‘Treat better’: improve the treatment of ELVs;
  - 4. ‘Collect more’: collect more ELVs in the EU and improve quality of exported used vehicles;
  - 5. ‘EPR: provide the right incentives to increase the collection of ELVs and improve waste treatment through extended producer responsibility schemes;
  - 6. ‘Cover more vehicles’: extend the scope of the legislation to additional vehicle categories.

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Lisää alatunniste

#BatteryRegulation: The parliament adopted the new Battery Regulation on 14 June 2023—what next?

#BatteryRegulation: The application of the EU Battery Regulation begins on 18 February 2024 –

#BatteryRegulation: The content of the upcoming Batteries Regulation has been published—specifications regarding producer responsibility incoming

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New Battery Regulation

- Will change the way batteries are manufactured, used, collected, reused and recycled
- Clearer provisions regarding the **reuse, remanufacturing and repurposing** of batteries
- Mandatory **carbon footprint declaration and label** for EV and LMT batteries as well as rechargeable industrial batteries with a capacity of more than 2 kWh
- Requirement to design battery-powered devices so that the **battery can be removed and replaced easily**
- **Digital Battery Passport** for LMT batteries, industrial batteries with a capacity of more than 2 kWh and EV batteries
- **Due diligence** policy for processing social and environmental risks

New Battery Regulation

- Stricter battery **collection targets**: collection rate of 45% by 2023, 63% by 2027 and 73% by 2030 regarding portable batteries.
- Recycling shall achieve at least the following targets for **recycling efficiency**:
  - recycling of 75 % by average weight of lead-acid batteries (now 65 %)
  - recycling of 65 % by average weight of lithium-based batteries; (now 50 %)
  - recycling of 80 % by average weight of nickel-cadmium batteries; (now 75 %)
  - recycling of 50 % by average weight of other waste batteries. (now 50 %)
- **Specific recycling targets** for the materials of the batteries:
  - lithium 50% by 2027 and 80% by 2031,
  - cobalt, copper, lead and nickel 90% by 2027 and 95% by 2031
- **Blending obligation**, i.e. the requirement to use recycled raw materials in new batteries will enter into force eight years from the entry into force of the regulation. After this, new batteries must include the following amounts of recycled raw materials: 16% for cobalt, 85% for lead, 6% for lithium and 6% for nickel.

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Akkukierrätys Pb recser

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