IEA Bioenergy

European Commission

ADVANCED MOTOR FUELS
IEA-AMF
Technology Collaboration Programme on
Advanced Motor Fuels

The Contribution of Advanced Renewable Transport Fuels to **Transport Decarbonisation** in 2030 and beyond

Country assessments on the role of biofuels

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Country Assessments – General Outline

- Specific country assessments were performed for:
  - **FINLAND** (a model case, previously executed)
  - **SWEDEN**
  - **GERMANY**
  - **USA**
  - **BRAZIL**

Country Assessments – General Outline

- First, **Each Country Expert delivered an input data file**, based on **Stated Policy**, consisting of separate sheets for:
  - **Fuel Standards** and **Sales of Different Fuel Types**
  - **Projected Vehicle Sales** per fuel type (and class)
  - **Expected Transport Work** and **Fuel Consumption**
  - **Outlook on Biofuel Production** and **Raw Materials**
  - **Data on Electricity Generation** (for the electrofuels study)

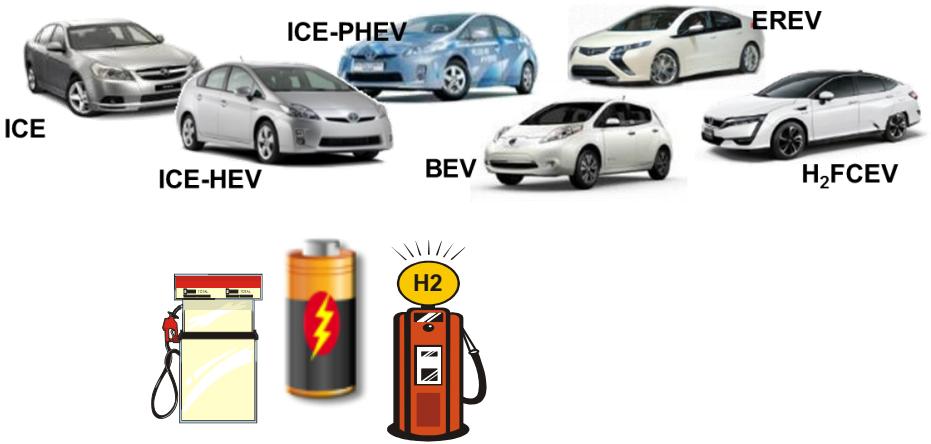



Country Assessments – General Outline

- Then, the input file **data of each country case was implemented into "ALIISA"**, a Finnish-made **model for calculating transport fuel use and the associated CO_2-emissions from road vehicles**
- **Main variables** in the input data **for each vehicle category** were:
  - **Market share** (%) **of each fuel/energy option**
  - **Annual mileages**, average or total
  - **Specific fuel/energy consumption** per vehicle category
- **Vehicle categories were:**
  - **Cars, Vans & LD Trucks, Buses, Medium & Heavy-Duty Trucks**

Country Assessments – General Outline

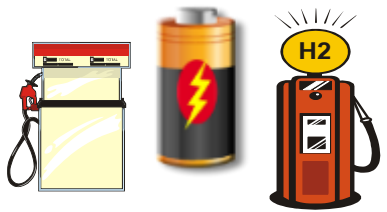
- **Vehicle powertrain/fuel options were:**
  - **Petrol (SI), FFV (E85), Diesel (CI), CNG/LNG, PHEV(SI), PHEV(CI), BEV, H_2FCVEV**
- **Fuel/energy options were:**
  - **Fossil petrol**
  - **Fossil diesel**
  - **Ethanol, in E5/E10/E85/ED95**
  - **Bio/renewable diesel fuel(s)**
  - **Electricity**
  - **Hydrogen**



- **These options were available for each vehicle category** (car, van, bus, trucks), but not necessarily used

Country Assessments – General Outline

- **The output of the process was**
  - **Vehicle park composition**
    - per vehicle category and fuel/energy option
  - **Annual mileages –** per vehicle and total **for each vehicle type**
  - **Use of fuel types**
    - **petrol, diesel, ethanol, biodiesel, methane, electricity, H_2**
      - in litres or kg's etc.
      - in ktoe
      - in PJ
      - divided per vehicle and fuel category



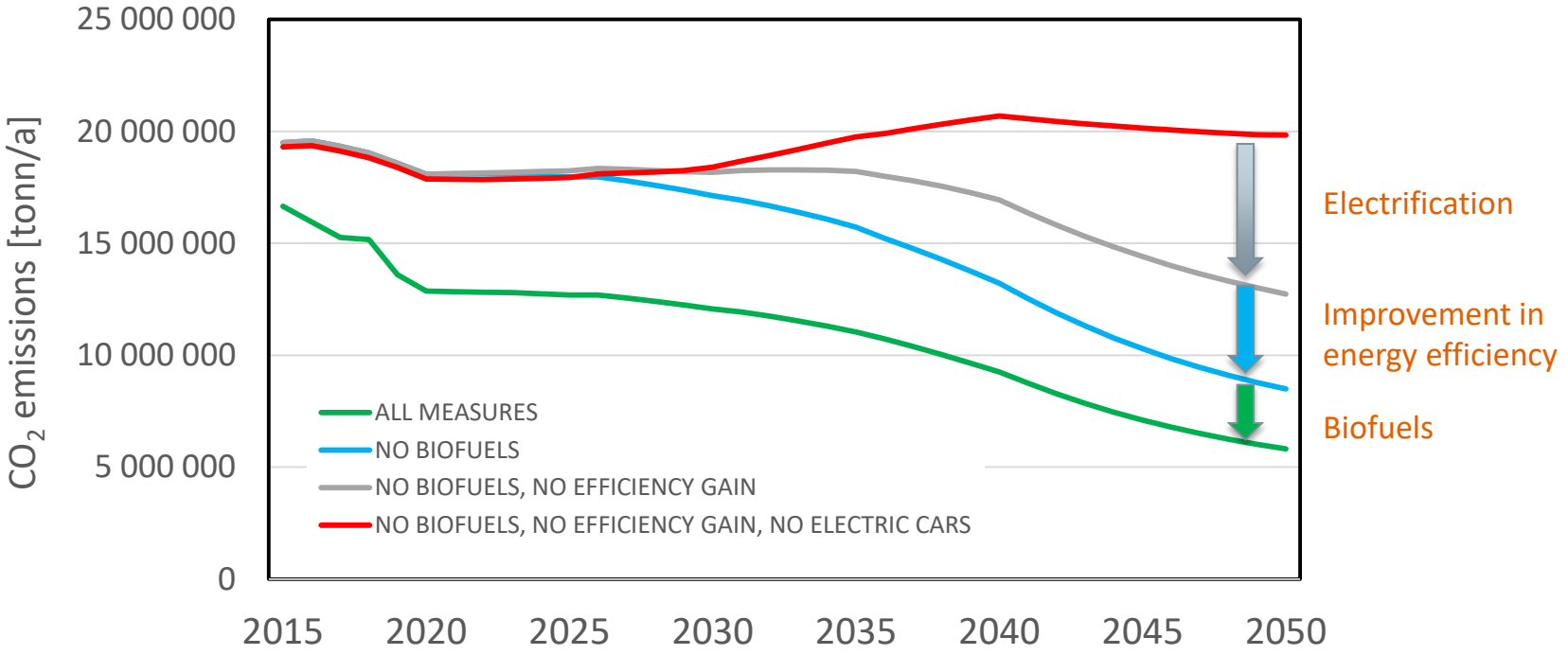
Country Assessments – General Outline

- **Based on this implementation, it is possible to calculate for each Case Country:**
  - **Progression of CO_2 emissions,**
    - in total and per vehicle category
  - **Relative and actual amounts of biofuels**
    - in total and per fuel type
  - **Biofuel "sinks", total and not in use in present scenario**
    - per fuel category

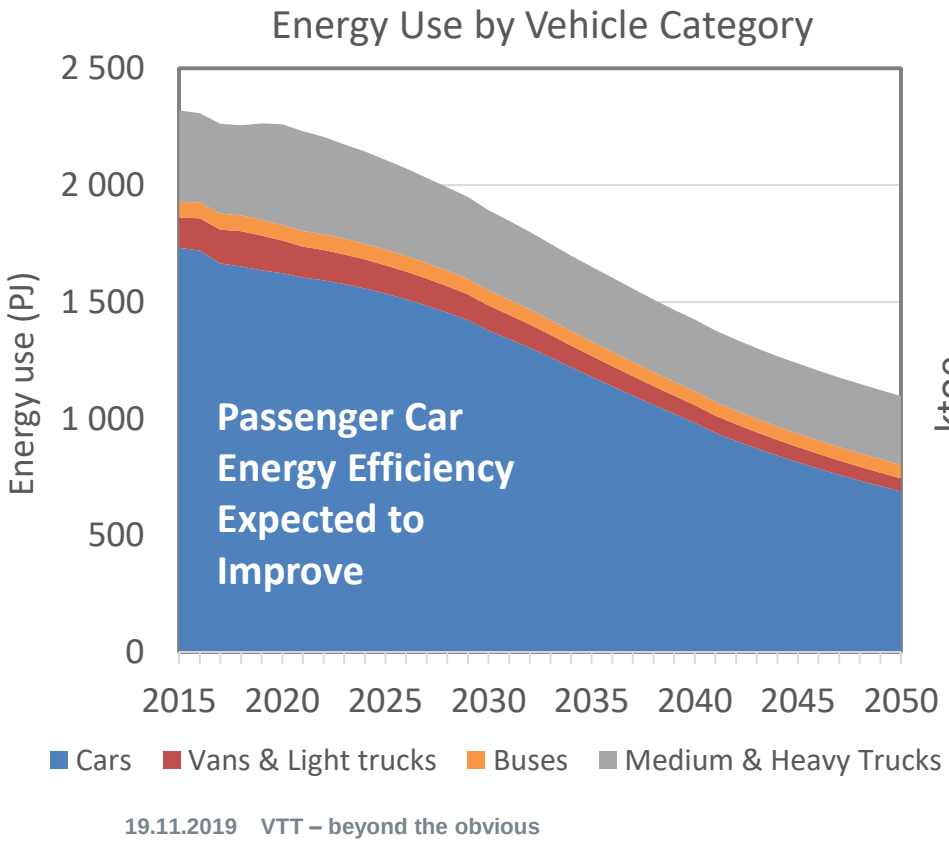
Country Assessments – General Outline

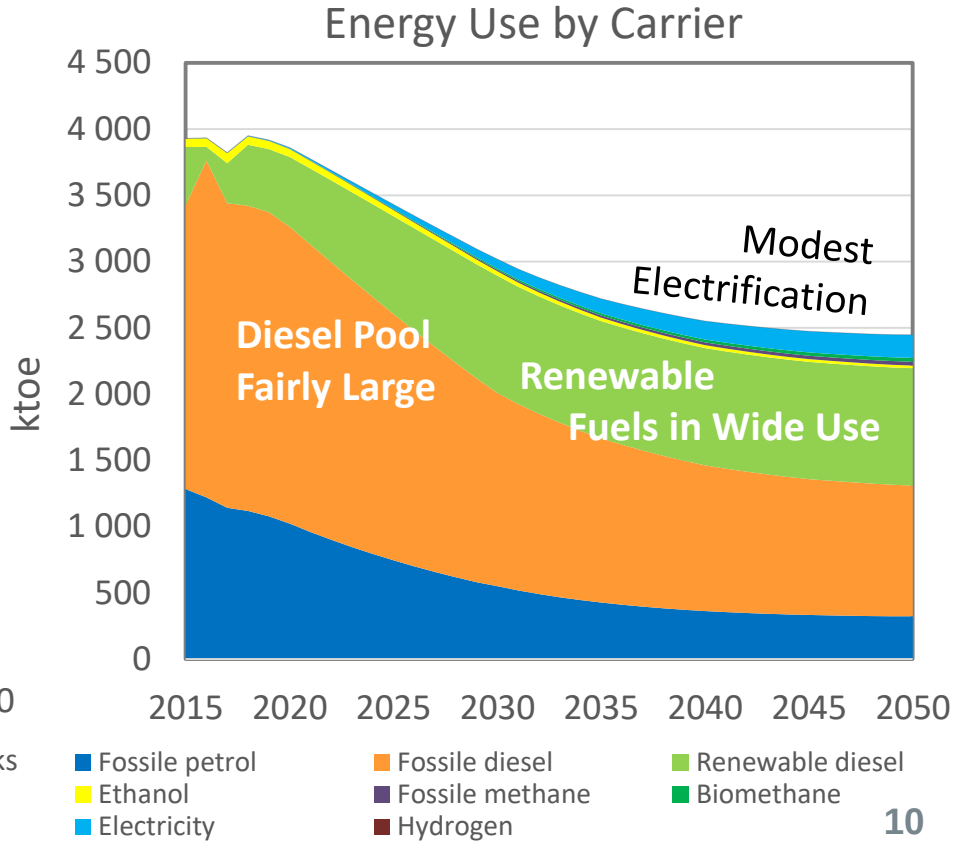
- Furthermore, for each Case Country, it s **possible to outlay separately the contributions for the CO_2 reduction by:**
  - **Electrification of transport vehicles**
  - **Improvements in energy efficiency**
  - **Biofuels**

Country Assessments – General Outline

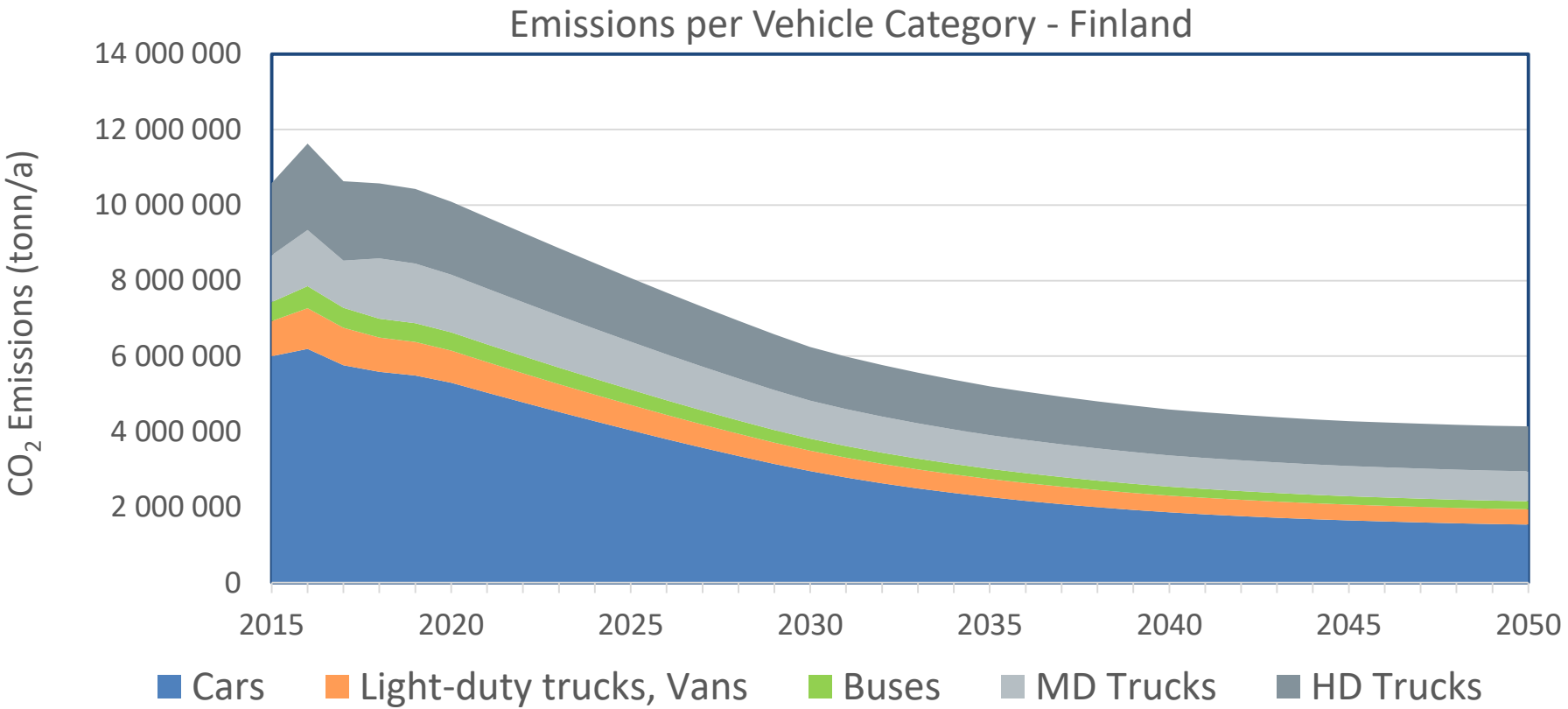


Country Assessments – CASE FINLAND

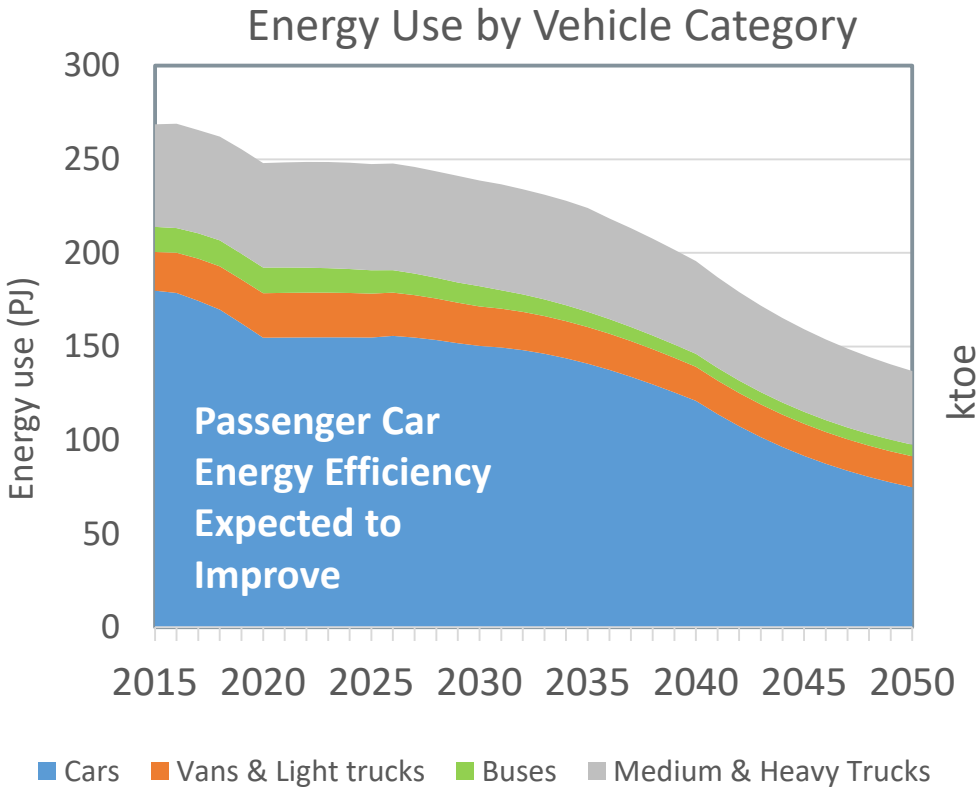


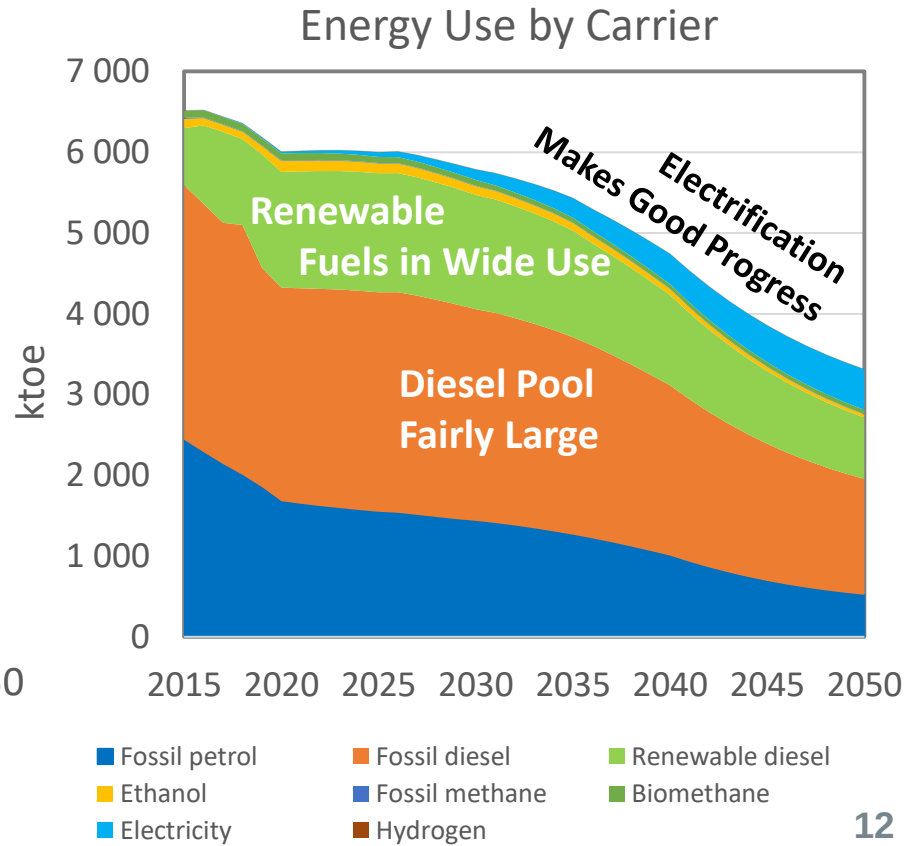


Country Assessments – CASE FINLAND

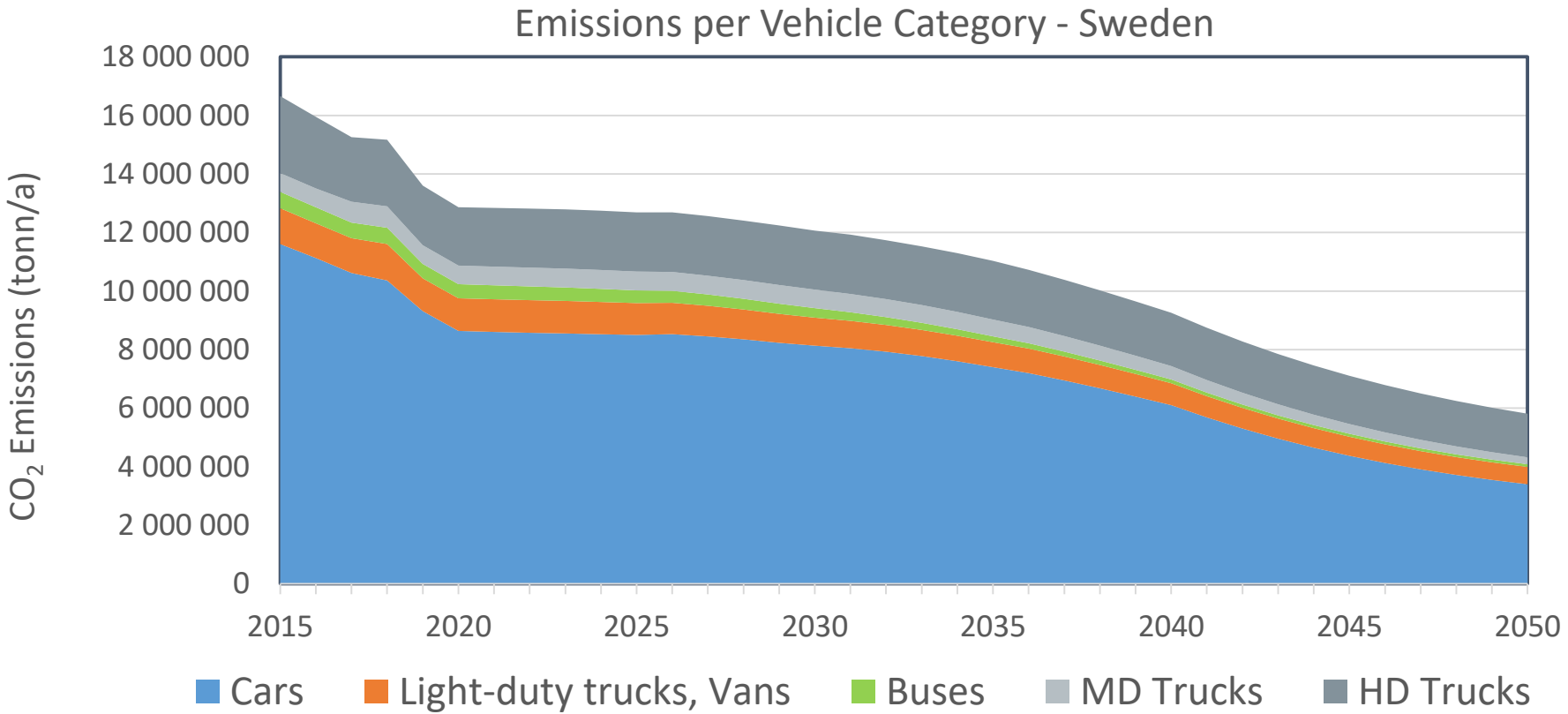


Country Assessments – CASE SWEDEN

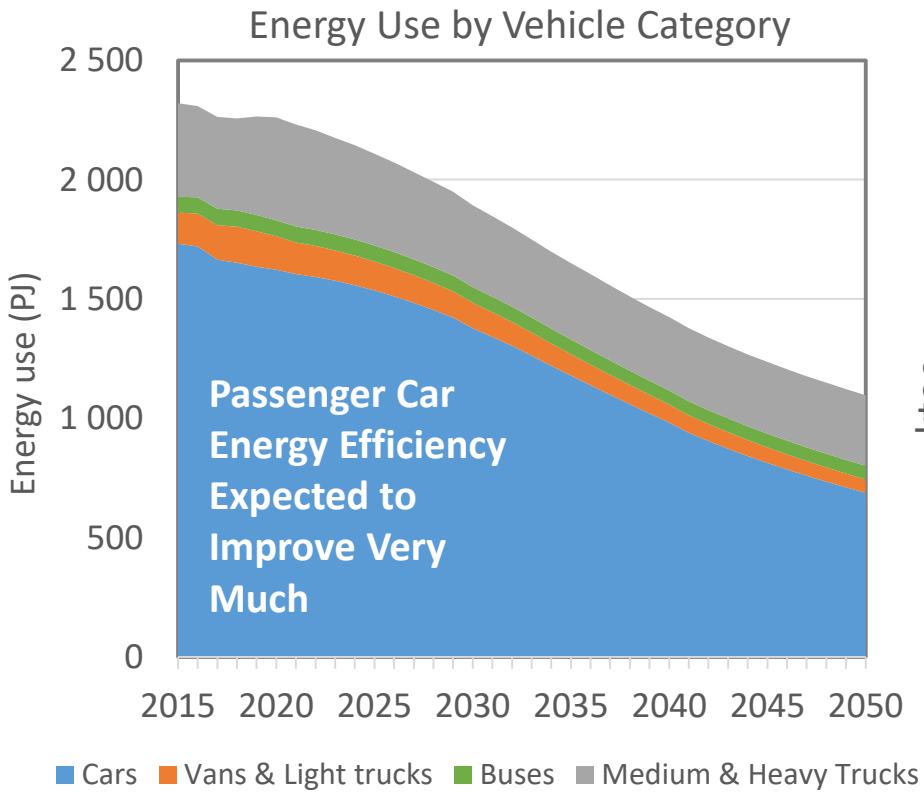


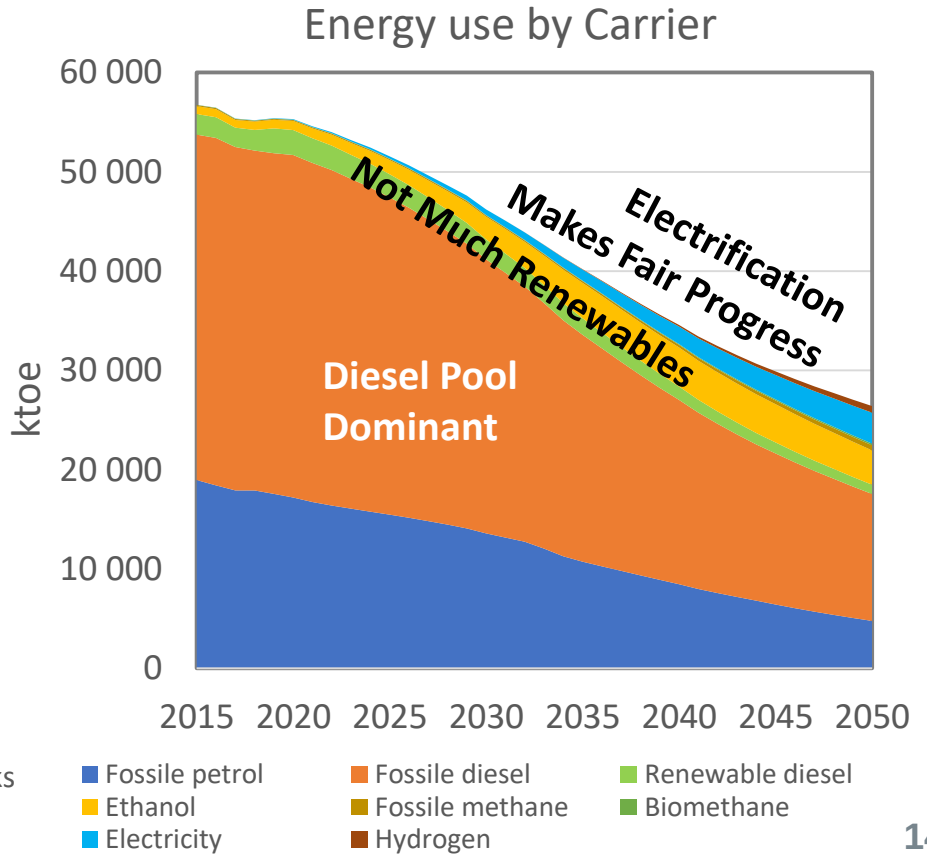


Country Assessments – CASE SWEDEN

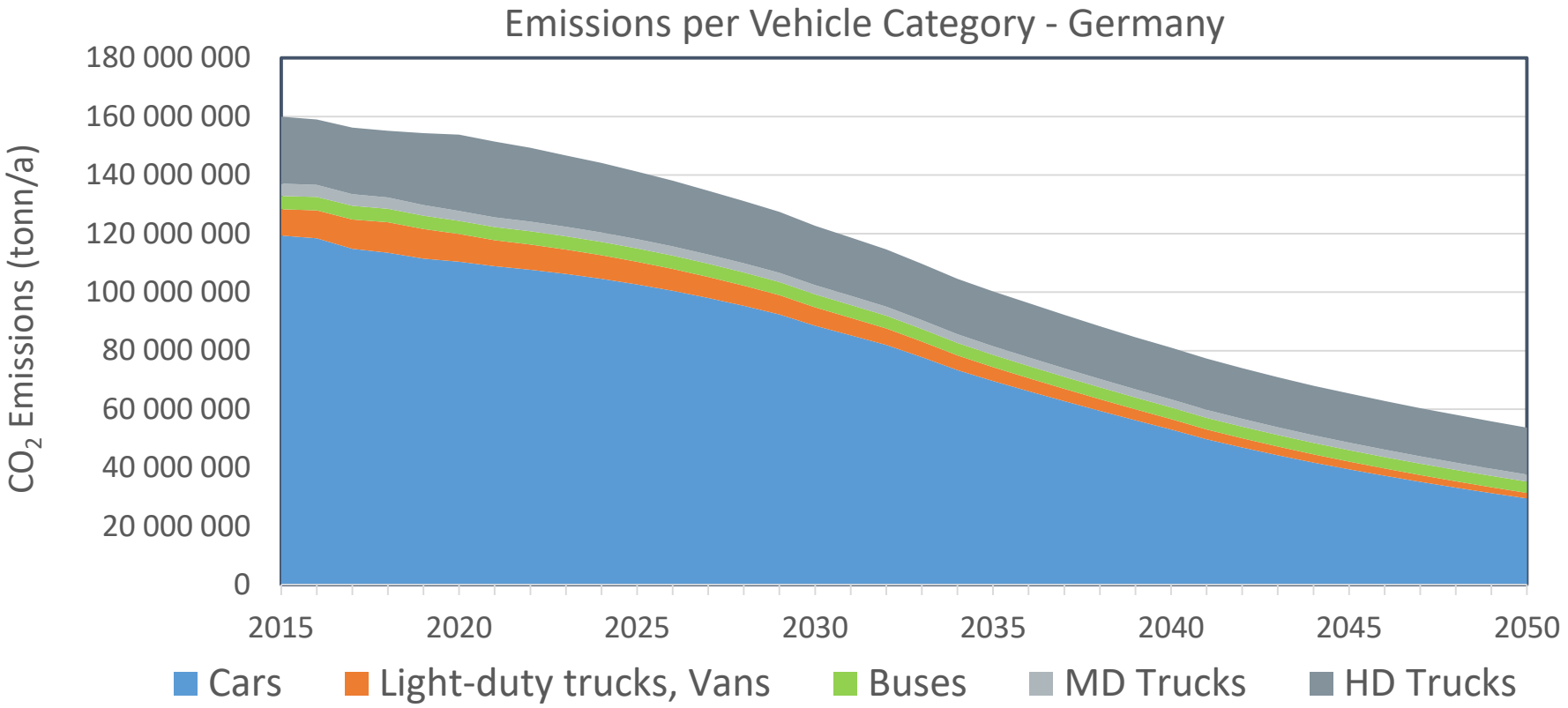


Country Assessments – CASE GERMANY

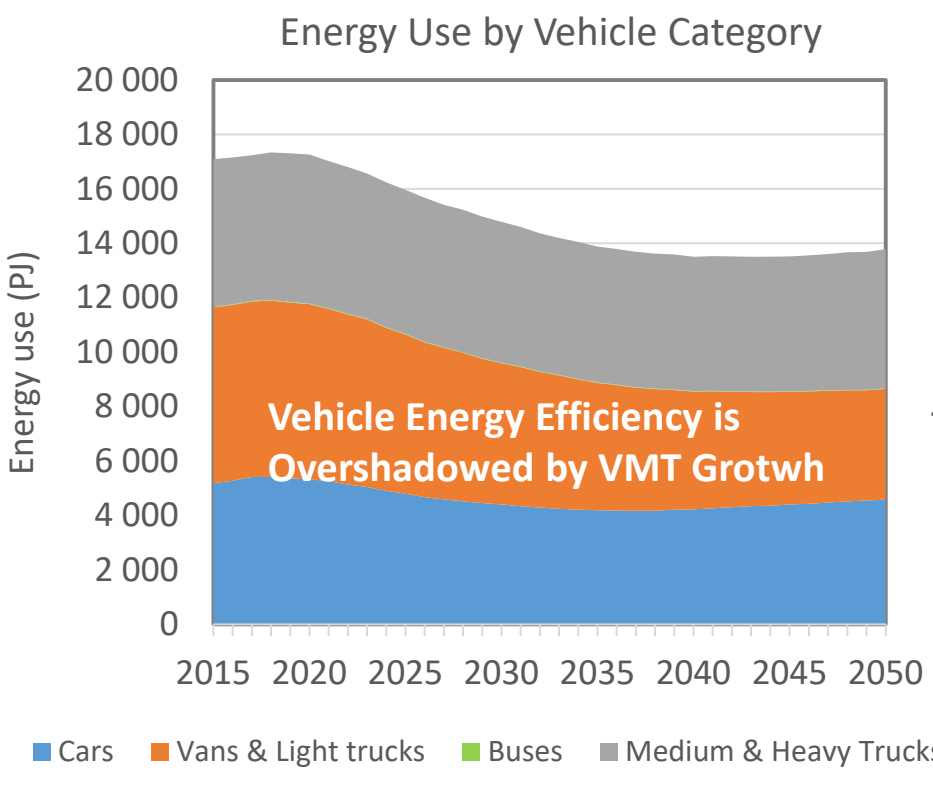


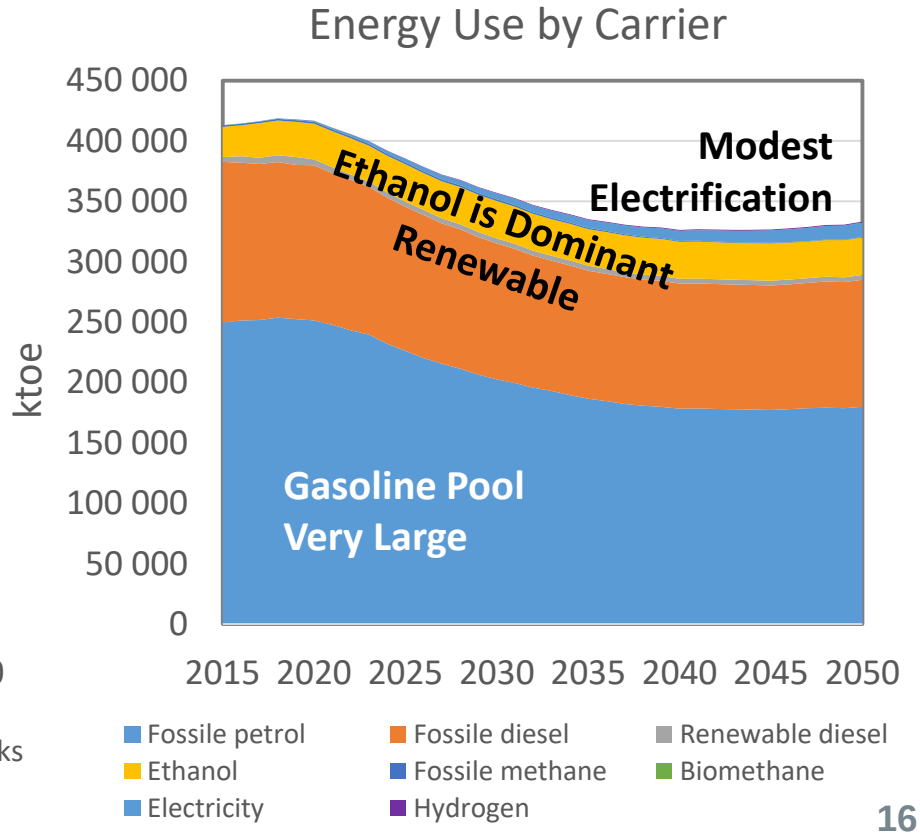


Country Assessments – CASE GERMANY



Country Assessments – CASE USA





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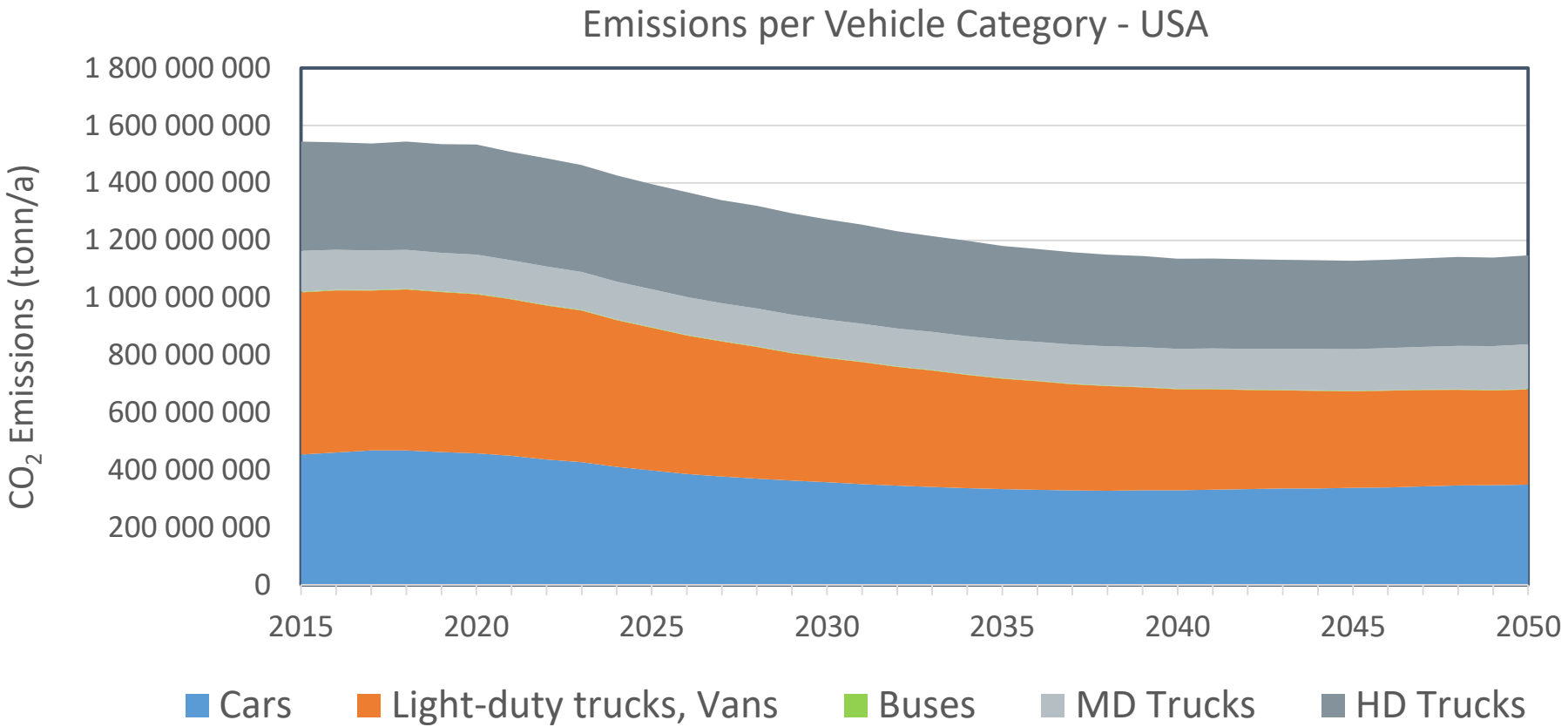
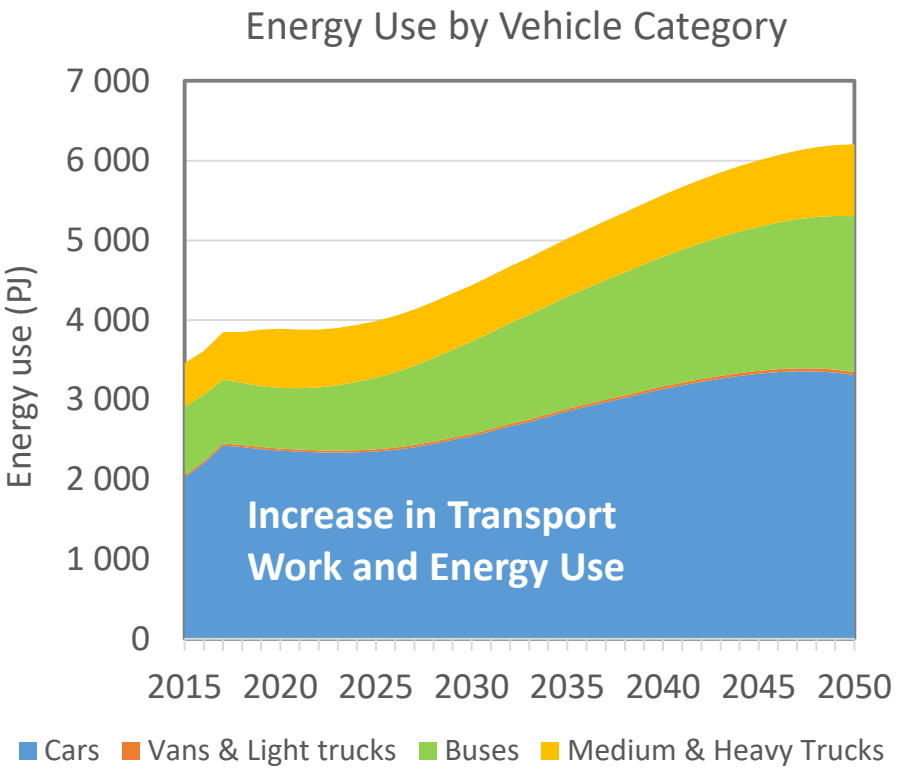
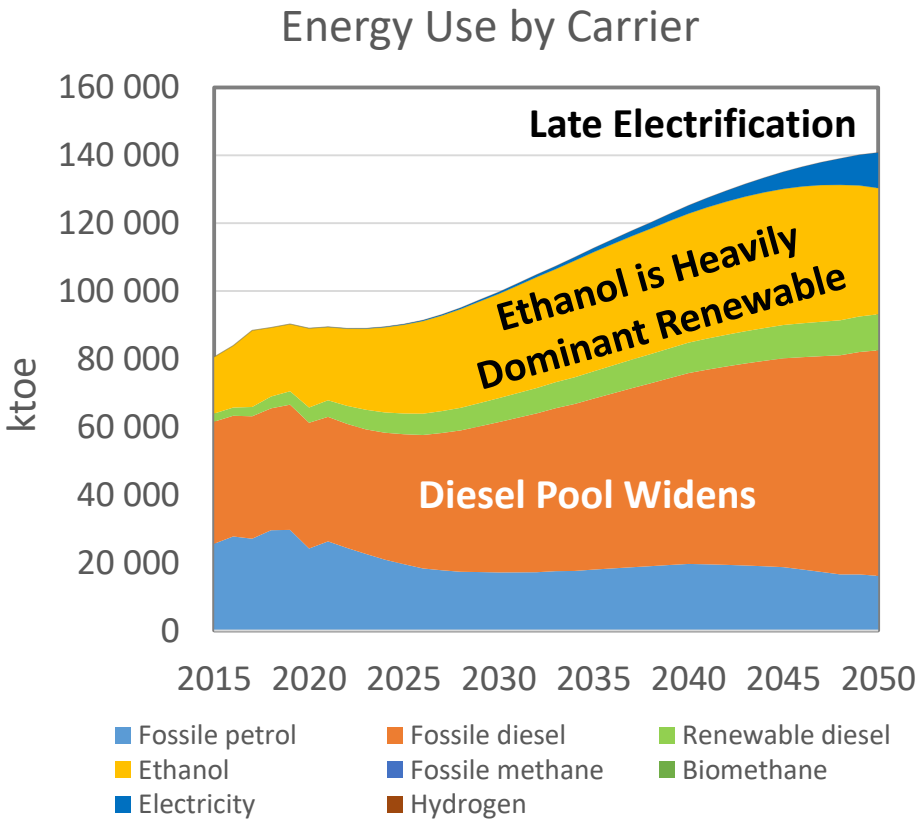
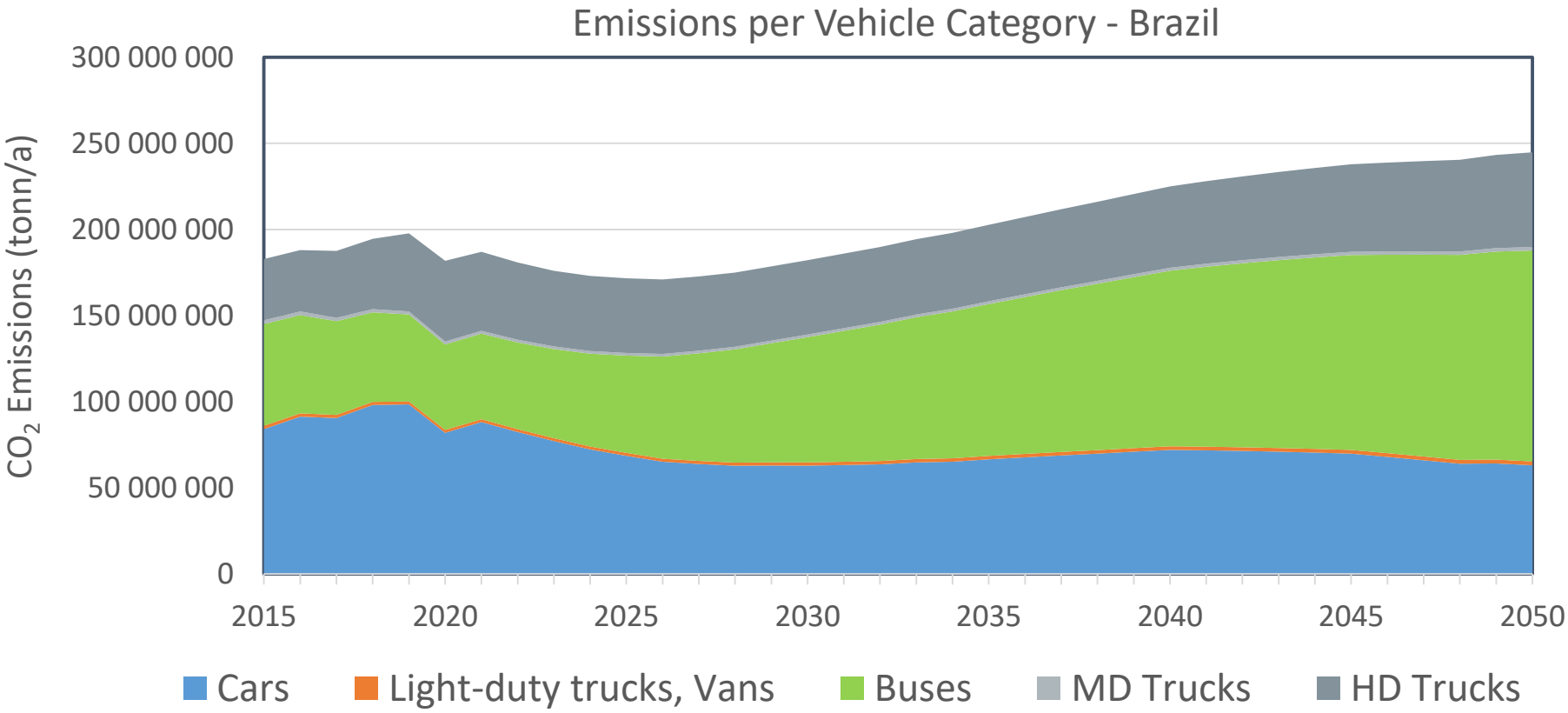


Country Assessments – CASE BRAZIL

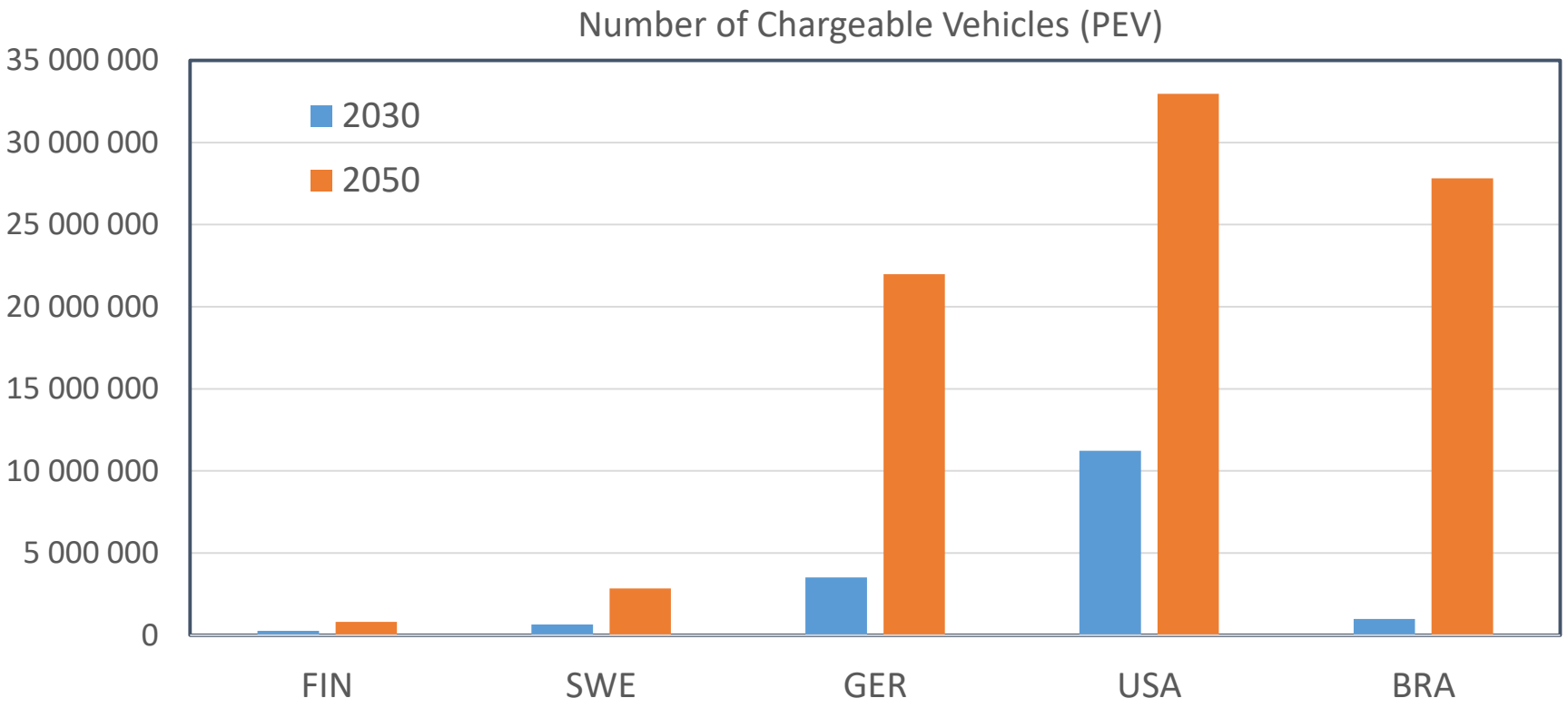




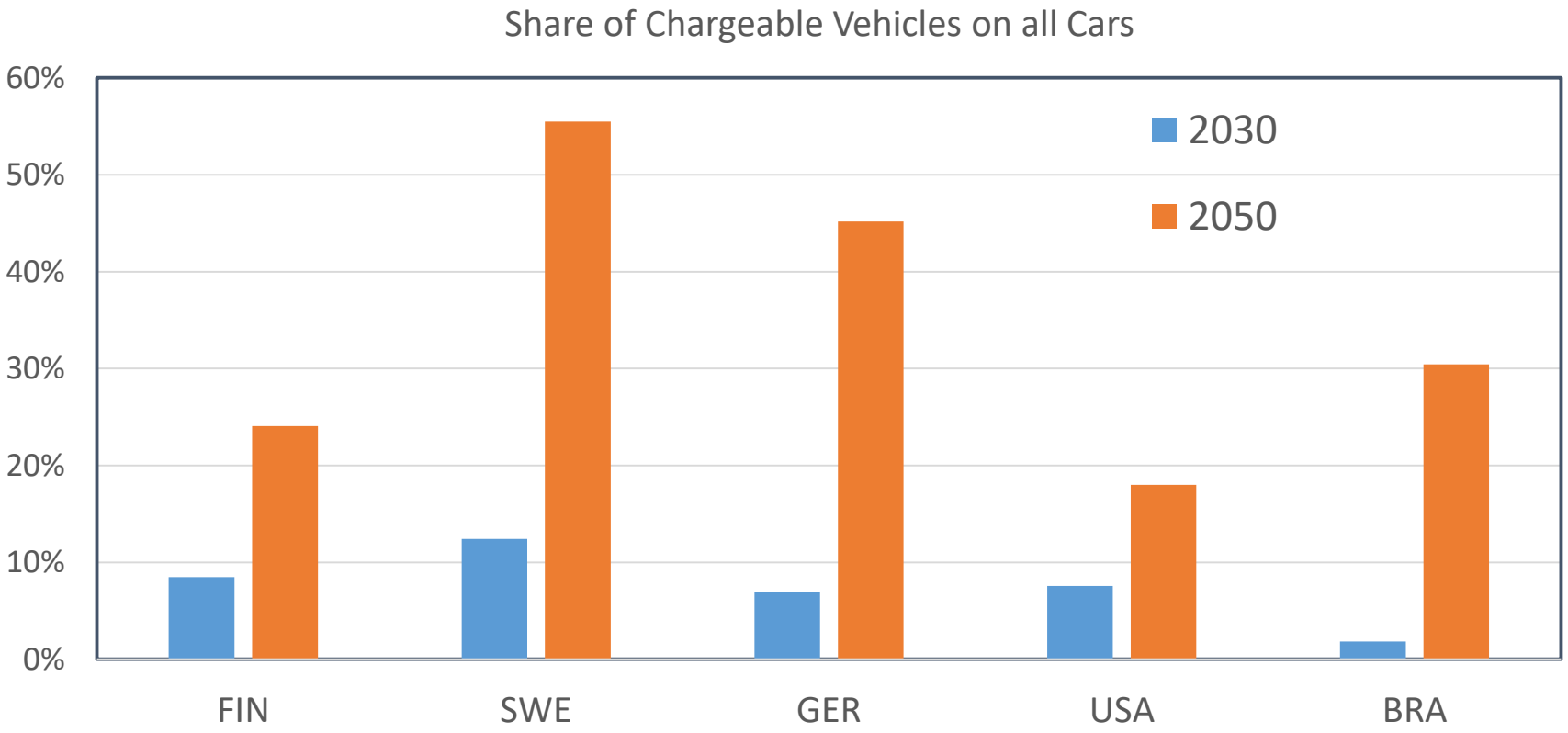
Country Assessments – CASE BRAZIL



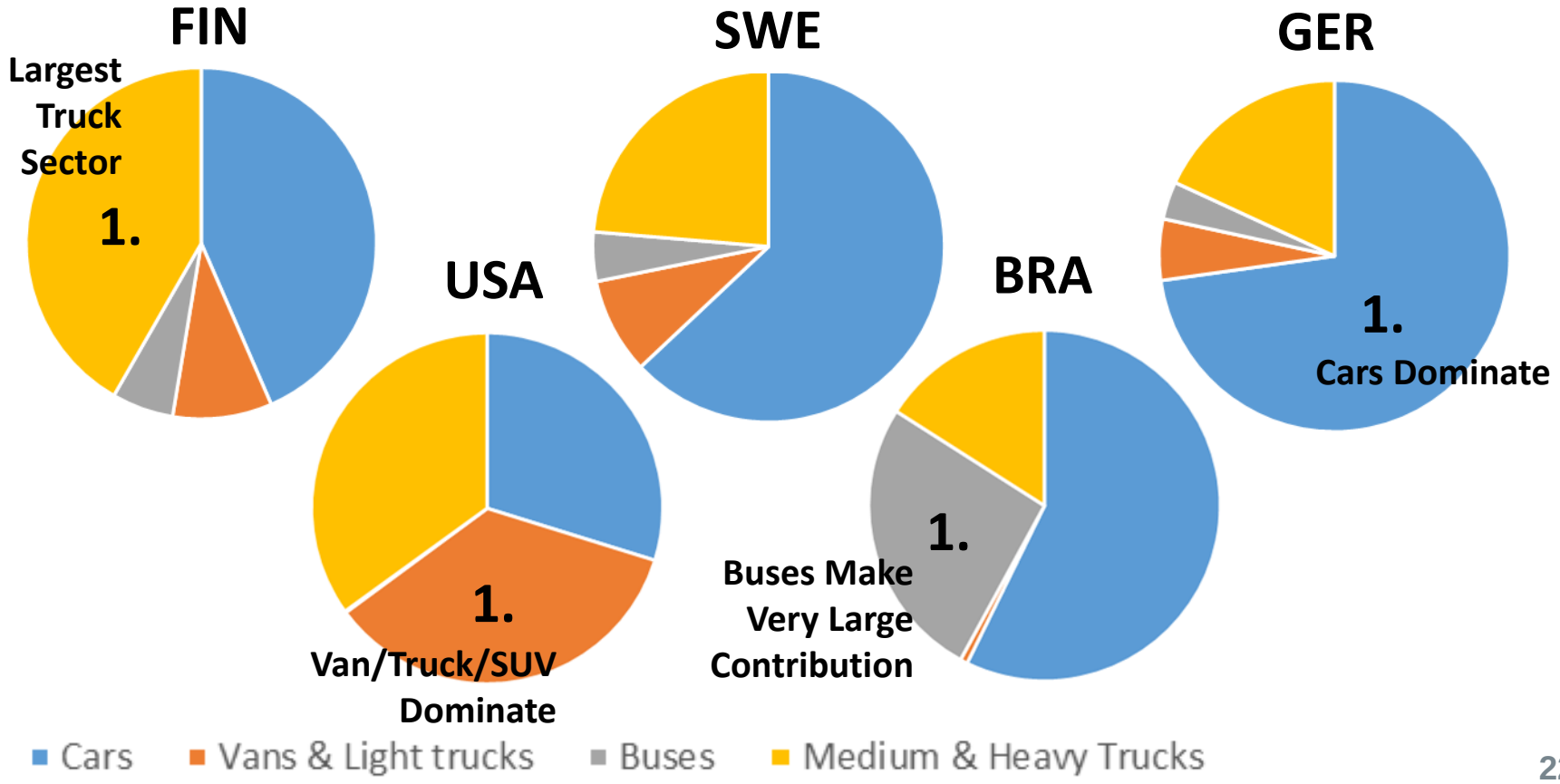
Country Assessments – Electrification



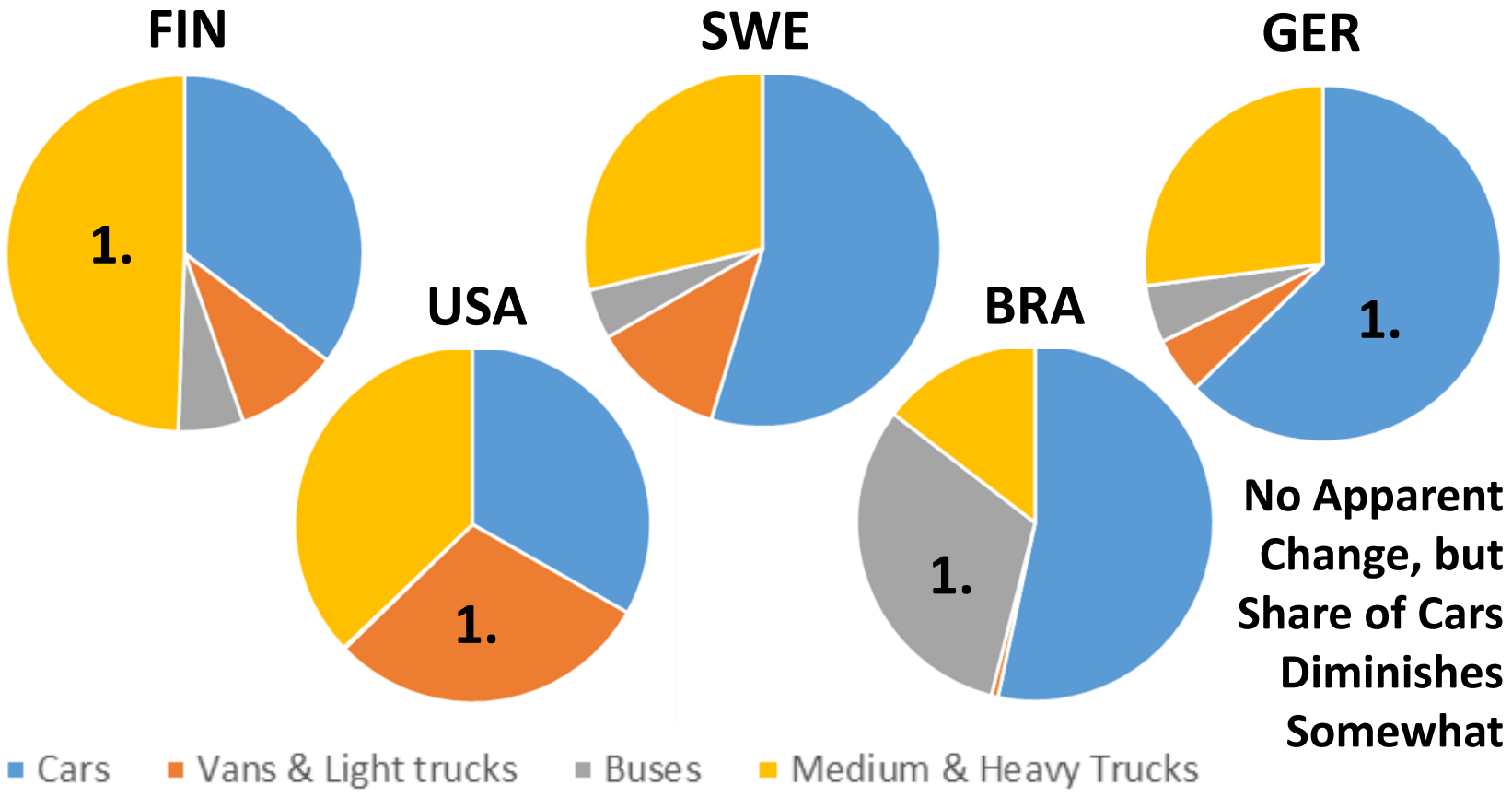
Country Assessments – Electrification



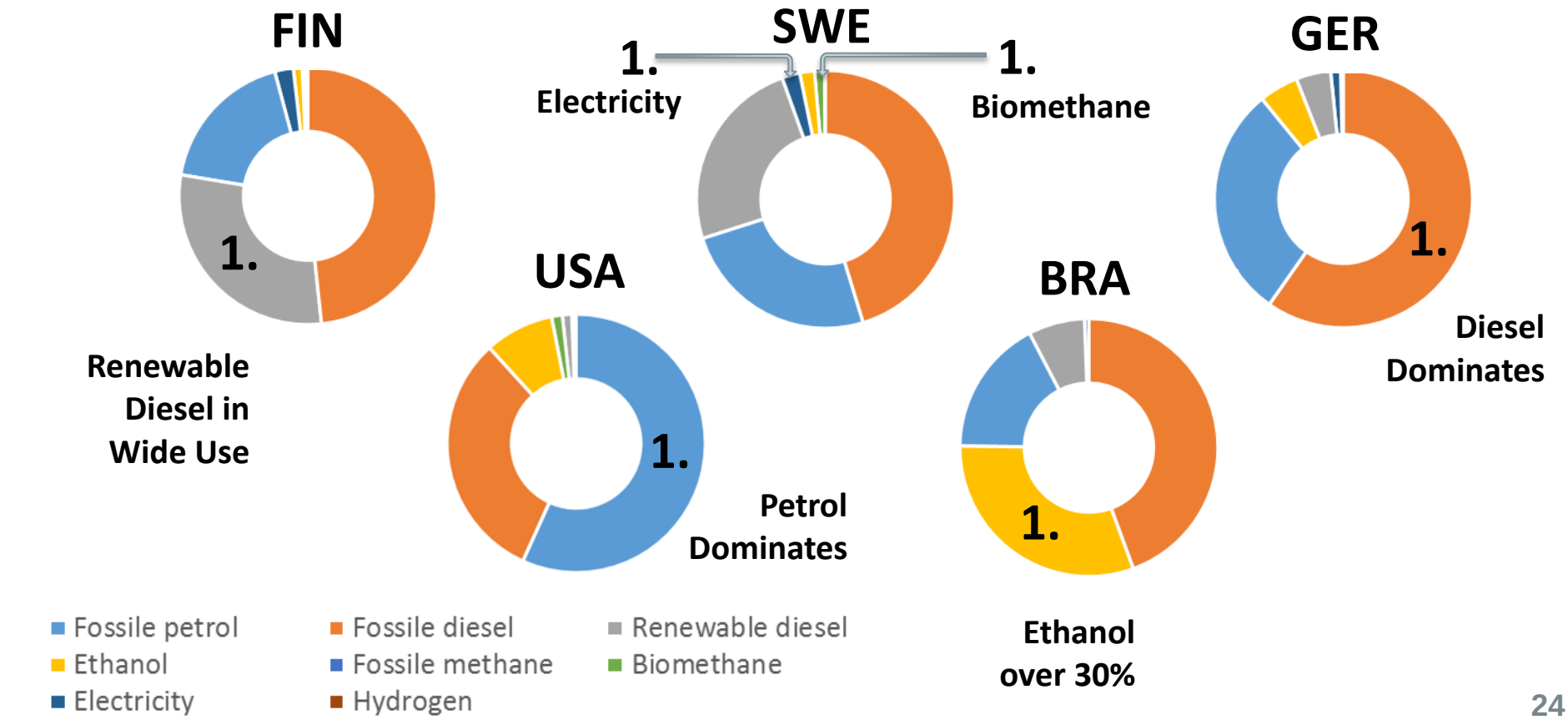
Energy Use per Vehicle Category – 2030



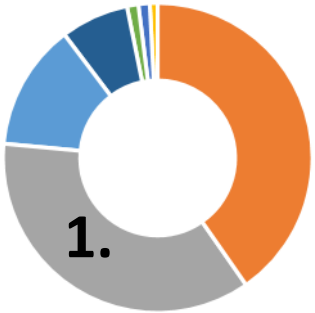
Energy Use per Vehicle Category – 2050



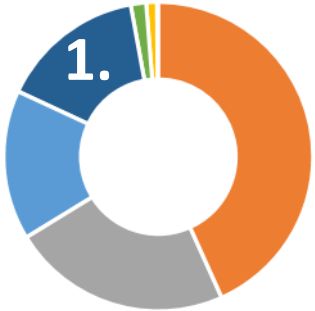
Energy Use per Carrier – 2030



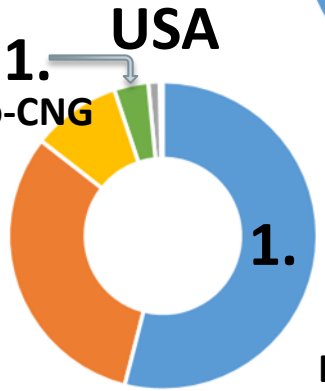
Energy Use per Carrier – 2050



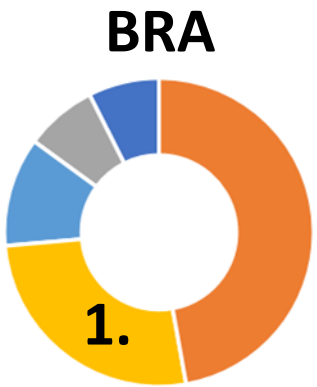
Renewable Diesel Over 40 %



Electricity Nearly Matches Petrol

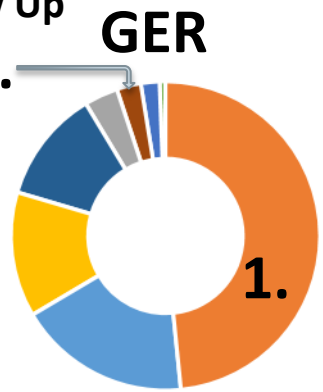


Petrol Still Dominates



Ethanol about 25%

Hydrogen Starts to Show Up



Diesel Still Dominates

Fossil petrol
Fossil diesel
Renewable diesel
Ethanol
Fossil methane
Biomethane
Electricity
Hydrogen

In Summary - Some First-Hand Findings

- **The Cases for Country Assessment were a Good Selection** because of so **Different Structure in Road Transport Vehicle Pool** Composition and **Different Usage Rate of Energy Carriers**
- **Finland, Sweden and Germany Expect Good Progress in Vehicle Energy Efficiency**, and **Energy Use is Diminishing**, with **Positive Impact on CO_2 Emissions**
- **In US, the Projected Increase in VMT Overshadows the Energy Efficiency Improvements**, and **Expected Reductions in CO_2 Emissions are Modest**
- **Brazil Remains the only Case, where CO_2 Emissions Appears to Increase** due to **Increase in Transport Work**, with the **Bus Sector as the Dominant Vehicle Category Regarding Emissions**

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More information: https://iea-amf.org/content/news/TD-WS

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