Representative Vehicle

Eurogas webinar

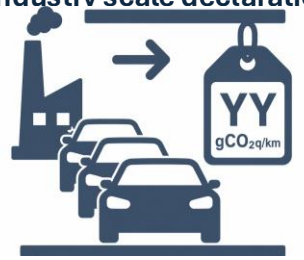
16 June 2026

Why industry scale declaration of ‘vehicle carbon footprint’ is important ?

Present
Scientific assessment

Need a bridge between both for an effective application

Future
Industry scale declaration



Methodology

- Electricity Modeling
- Primary data share
- Secondary data set
- End of life modeling

Declaration

- **Representative vehicle**
- Reporting rules
- Verification process

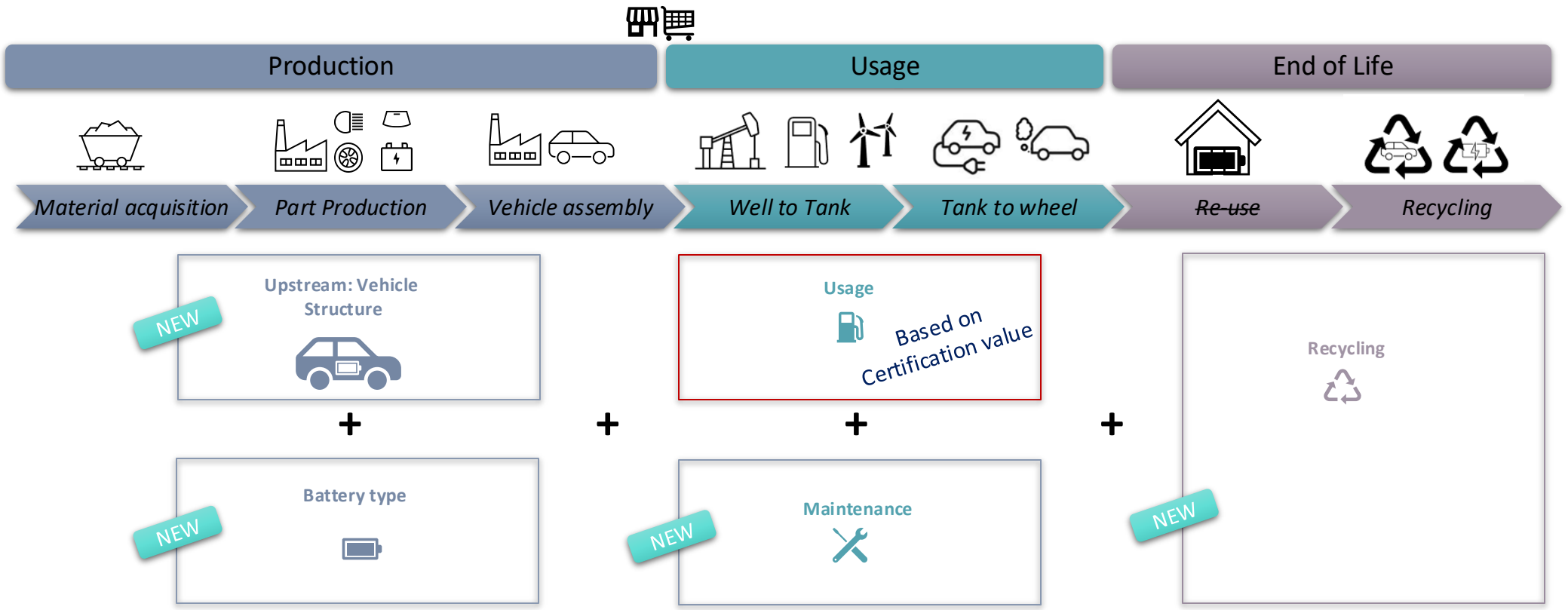
Application

- Labelling
- Green public procurement
- Incentive
- …

NOT in SCOPE of GUIDELINE

- **Enables potential use** of carbon footprint declarations across various applications
- This approach is **independent of the methodology** used
- **Comparability** between vehicle is a key challenge

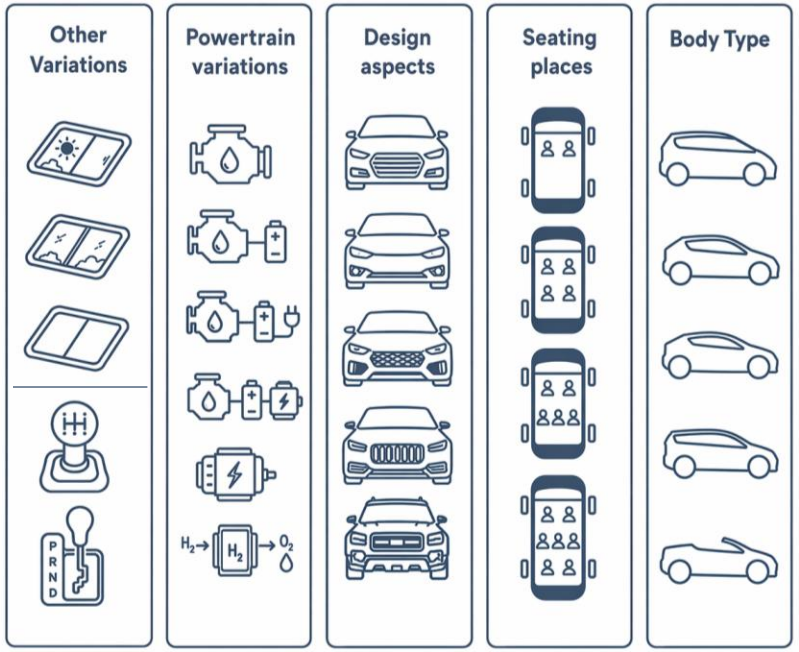
What is Modular Approach ?



- Modular approach: Carbon footprint is calculated per stage and then aggregated into a single vehicle value.
- Use-stage carbon footprint is available via CoC; battery footprint is calculated per battery type; **remaining major contribution comes from vehicle production** (excluding battery).

Why it is difficult to declare exact vehicle carbon footprint ?

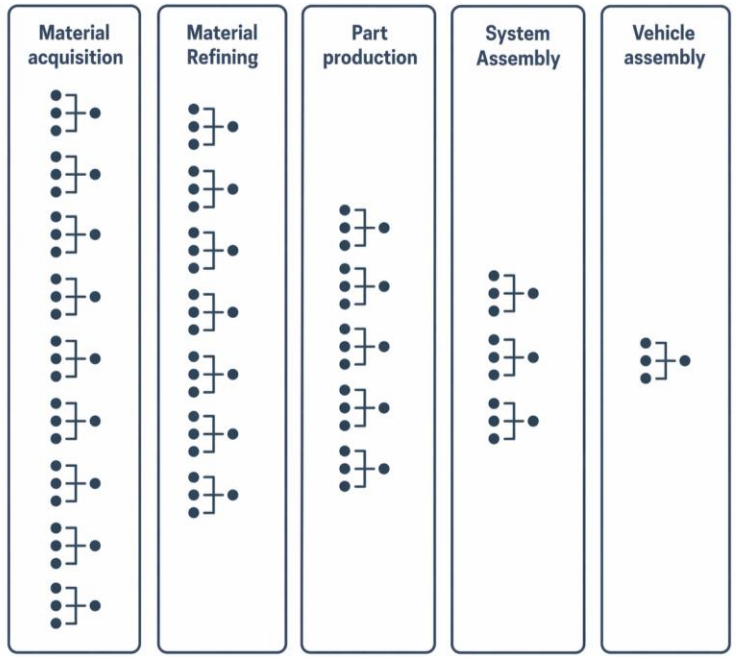
1. Huge number of combinations



- Many configurations with limited added value from full calculation
- Need simplified assumptions to balance effort and benefit
- Upstream carbon footprint mainly driven by material production

- **Assumption**: Consistent material composition enables correlation between vehicle mass and carbon footprint (excluding hotspot effects)

2. Complex supply chain



- Thousands of parts and multi-tier suppliers → extremely complex
- Assembly plant provides a clear, single aggregation point

- **Assumption:** IWG proposes an assembly plant–based approach ensuring clear boundaries, controlled data, and standardized factors with limited complexity.

Approach : Initial granularity trade-off, then continuous improvement from feedback

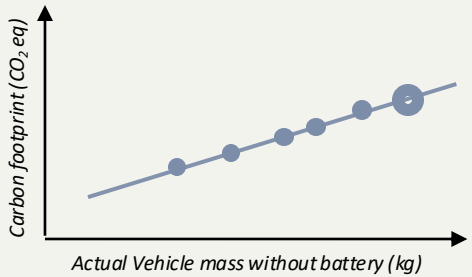
Representative Vehicle: Criteria for upstream emission

Work in Progress

Upstream: Vehicle Structure

Approach:

- Group vehicles into families; select a representative vehicle (highest technical mass, full configurations)
- Calculate its production carbon footprint and derive a "carbon footprint-to-mass" ratio
- Apply the ratio to all vehicles in the family, ensuring grouping criteria maintain linearity

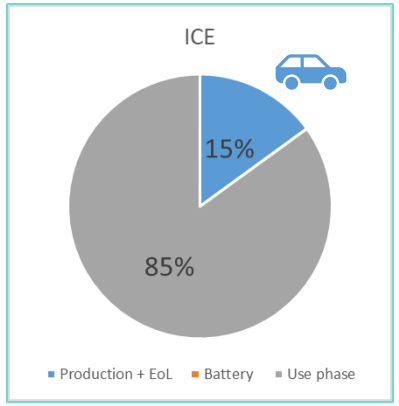


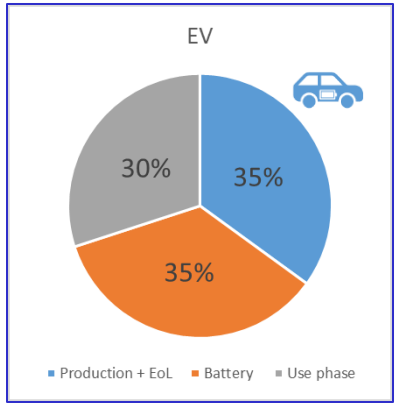
Concern	Grouping Criteria	Justification
Material composition is not always consistent between different vehicle	Vehicle structure family	We limit potential deviation due to extrapolation by : ▪ Limiting to specific mass range ▪ Material composition of 'body in white'
None-ICE vehicles have some hot spots (fuel cell etc.) which may not clearly identify at this stage	Powertrain	Further reduction of error margin by: ▪ Separating EV, FCV and hybrids from ICE
Traction batteries are known to be hotspots and does not ensure linearity	Traction Battery	Ensure linearity by: ▪ separately 'traction battery' carbon footprint will ensure linearity
Supply chain is a key to vehicle footprint and should be reflected in the calculation	Region of vehicle assembly	Reflect supply chain impact by: ▪ Assembly plant reflects regional supply chain; similar supply chains within a region ▪ For multi-region production, define separate LCA groups and specify CKD/SKD/CBU

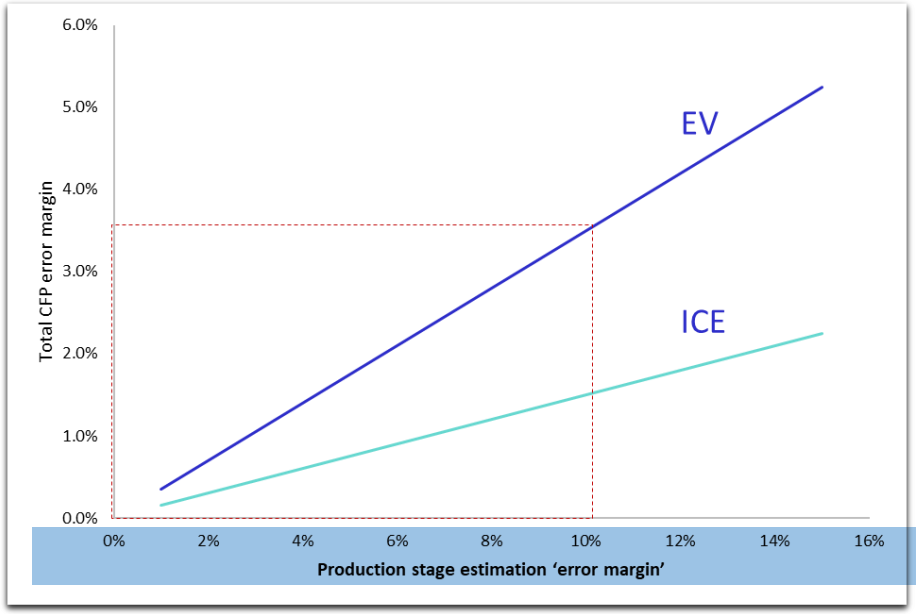
Continuous improvement of family criteria from feedback is the only way to go forward

What is the expected tradeoff ? (expected error margin)

- Example: Consider 2 extreme examples







At present, Upstream LCA maturity (harmonization, data base , primary data share, IT infrastructure etc.) limits accuracy

Estimation error vs individual calculation error → no significant gain from full calculation

For this given example of ICE and EV, and RV estimation **error margin of 10% will result in an error margin of less than 4% of the over all carbon footprint**

To reduce further the error margin, a review of the criteria can be done in next phase of the guideline

Representative vehicle: How can be implemented in serial life?

LCA Practitioner

Choice of
- Vehicle type
- Powertrain type
- Vehicle sourcing
- Region of usage
- Options etc.

Upstream group
- LCA Group 1
- *LCA Group 2*
- LCA Group 3
- LCA Group …

Battery Type
- Battery model 1
- Battery model 2
- Battery model …

Powertrain Family
- Powertrain Family 1
- Powertrain Family 2
- Powertrain Family 4
- Powertrain Family …

EoL group
- EoL Group 1
- EoL Group 2
- EoL Group 3
- LCA Group …

Upstream emission

Actual Vehicle mass with installed options *without battery*

> *Emission factor upstream = 5 kg CO_{2e}/kg*

> *mass w/o battery = 1398 kg*

=> *5 * 1398* = **6990 kg CO_{2e}**

Traction Battery

> *Battery carbon footprint* **6350** *kg CO_{2e}*

Use Phase emission *Certification value*

Powertrain family => family 4

> *energy consumption real life (WTW)=* **9412** *kg CO_{2e}*

Maintenance

Powertrain family => family 4

> *maintenance factor =* **148** *kg CO_{2e}*

EoL emission

Actual Vehicle mass with installed options *without battery*

> *Emission factor EoL = 0.15 kg CO_{2e}/kg*

> *mass w/o battery = 1398 kg*

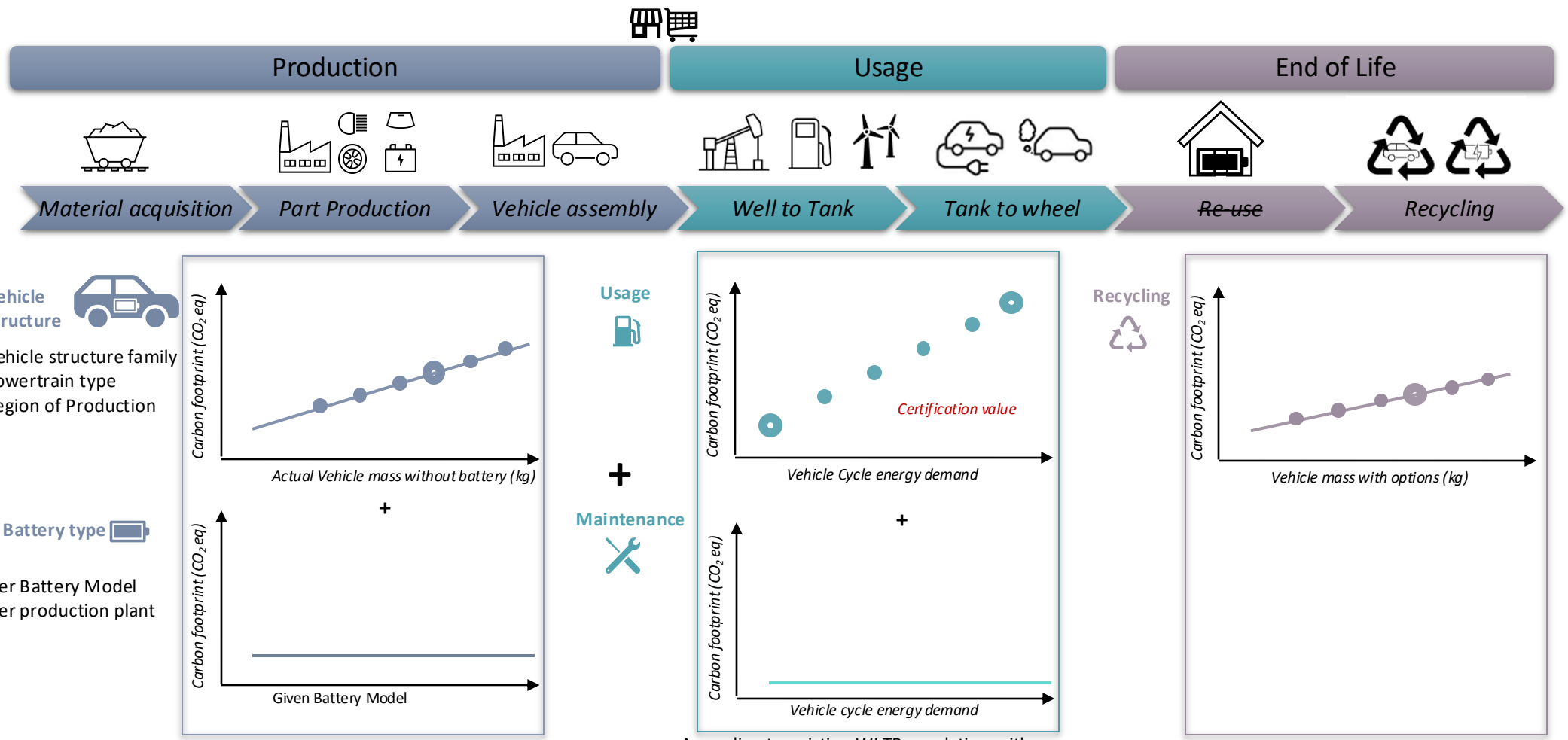
=> *0.15 * 1398* **= 209.7 kg CO_{2e}**

Total CFP
23 110 kg CO_{2e}


Thank you

Vehicle Carbon footprint : Modular Approach

Reminder



According to existing WLTP regulation with additional co-efficient on 'well-to-tank' and 'real- life usage'

- A modular approach is best suited for vehicle life cycle carbon footprint