VECTO Updates | VECTO更新

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Introduction to VECTO
介绍 VECTO

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What is VECTO?
什么是VECTO？

Simulation tool to calculate both, fuel consumption and CO_2 emissions from the **whole** vehicle

用于计算**整车**燃料消耗量与CO_2排放量的仿真模拟工具

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Where to go – To Do's
# 发展方向——行动措施：

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To-Do's: CO_2 emissions certification of vehicles
行动措施：车辆的CO_2排放证书

- Buses, coaches, smaller trucks (TPMLM < 7,5 t) to be included
  须包括公共巴士、长途巴士、小型卡车（TPMLM < 7.5 t）

- Energy efficiency of (semi-)trailers to be determined
  须确定（半）拖车的能源效率

- Vehicles with electrified powertrain (pure and hybrid electric)
  电动汽车（纯电动和混合动力）

- Hydrogen HDVs (fuel cell and internal combustion engine)
  氢燃料HDV车辆（氢燃料电池和内燃机）

- Coverage of various new technologies: WHR, ADAS, automated driving, platooning, catenary,…
  各种新型技术概述：WHR、ADAS、自动驾驶、车队、接触网

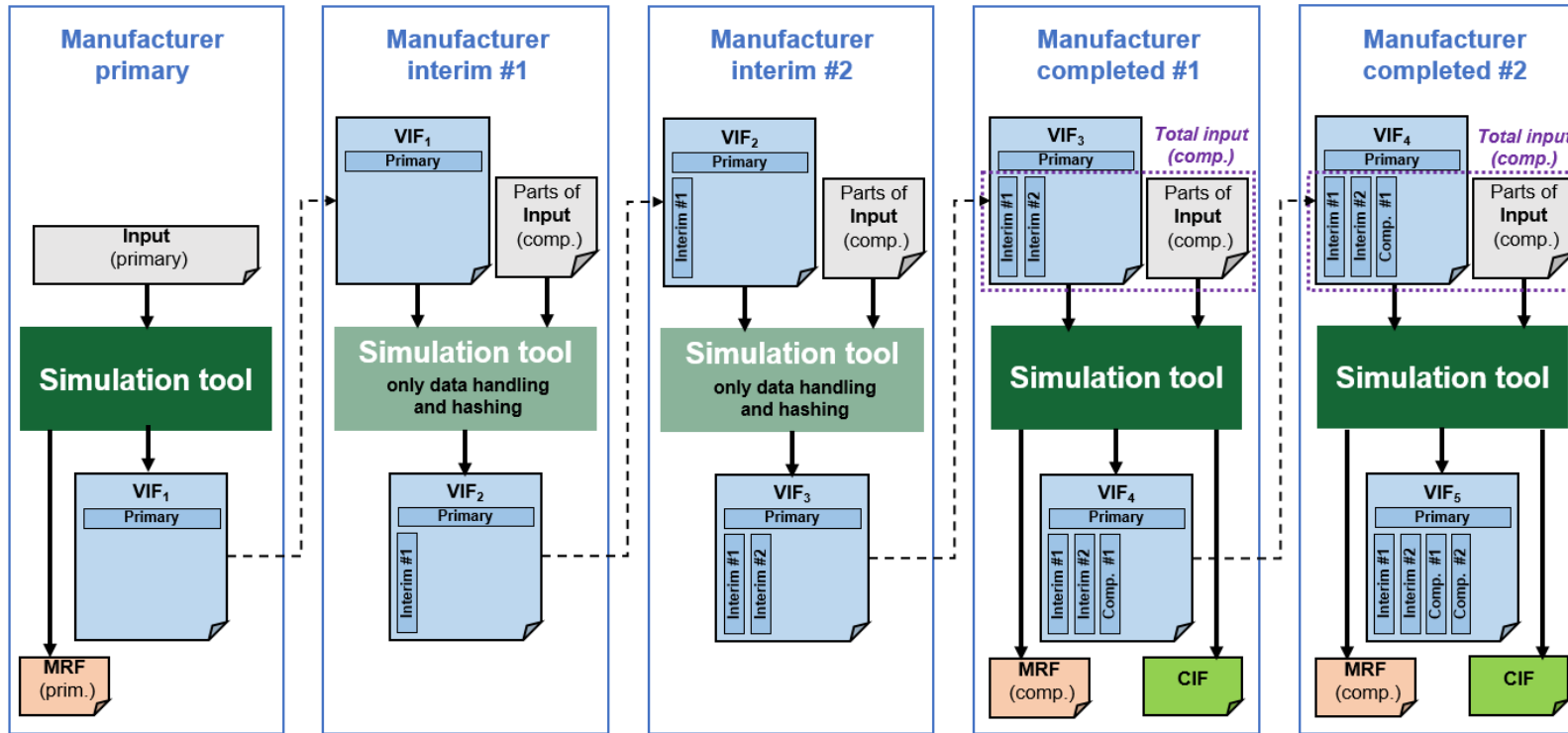European Commission

VECTO and "multi-stage" heavy buses (currently)
VECTO与"多级"重型巴士（现有）
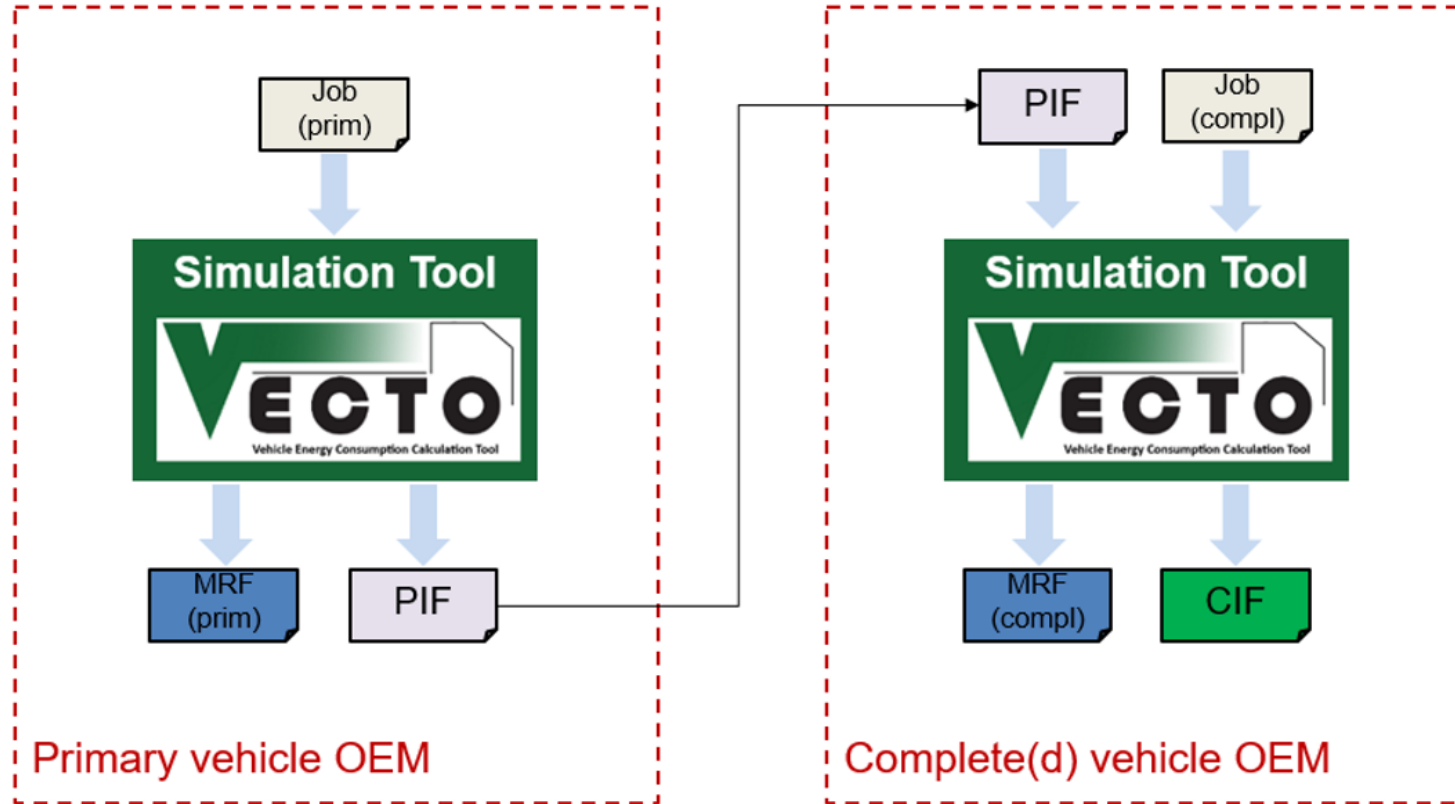
VECTO and "multi-stage" heavy buses (general)*
VECTO与"多级"重型巴士（通用）*

$$CO_{2completed} = (\text{Primary manufacturer's part}) \times (\text{Completed manufacturer's part}) = CO_{2Pi,Cs} \times (CO_{2Ps,Ci} / CO_{2Ps,Cs})$$

$$CO_{2\text{已完成}} = （主要制造商的部分） \times （已完成的的制造商部分） = CO_{2Pi,Cs} \times (CO_{2Ps,Ci} / CO_{2Ps,Cs})$$

Factor method:
因式分解法：

Pi = individual powertrain
Pi = 个别动力系统

Ps = standard powertrain
(+ some non-confidential individual data)
Ps = 标准动力系统
（+ 某些非机密性质的个别数据）

Ci = individual chassis
Ci = 个别底盘

Cs = standard chassis
Cs = 标准底盘

Manufacturer primary / **Manufacturer interim #1** / **Manufacturer interim #2** / **Manufacturer completed #1** / **Manufacturer completed #2**

* **same approach to be applied to rigid lorries when simulated with their real bodywork**
* **同样的方法也适用于整体式车架卡车的真实车身模拟**

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Primary vehicle manufacturer also interim manufacturer
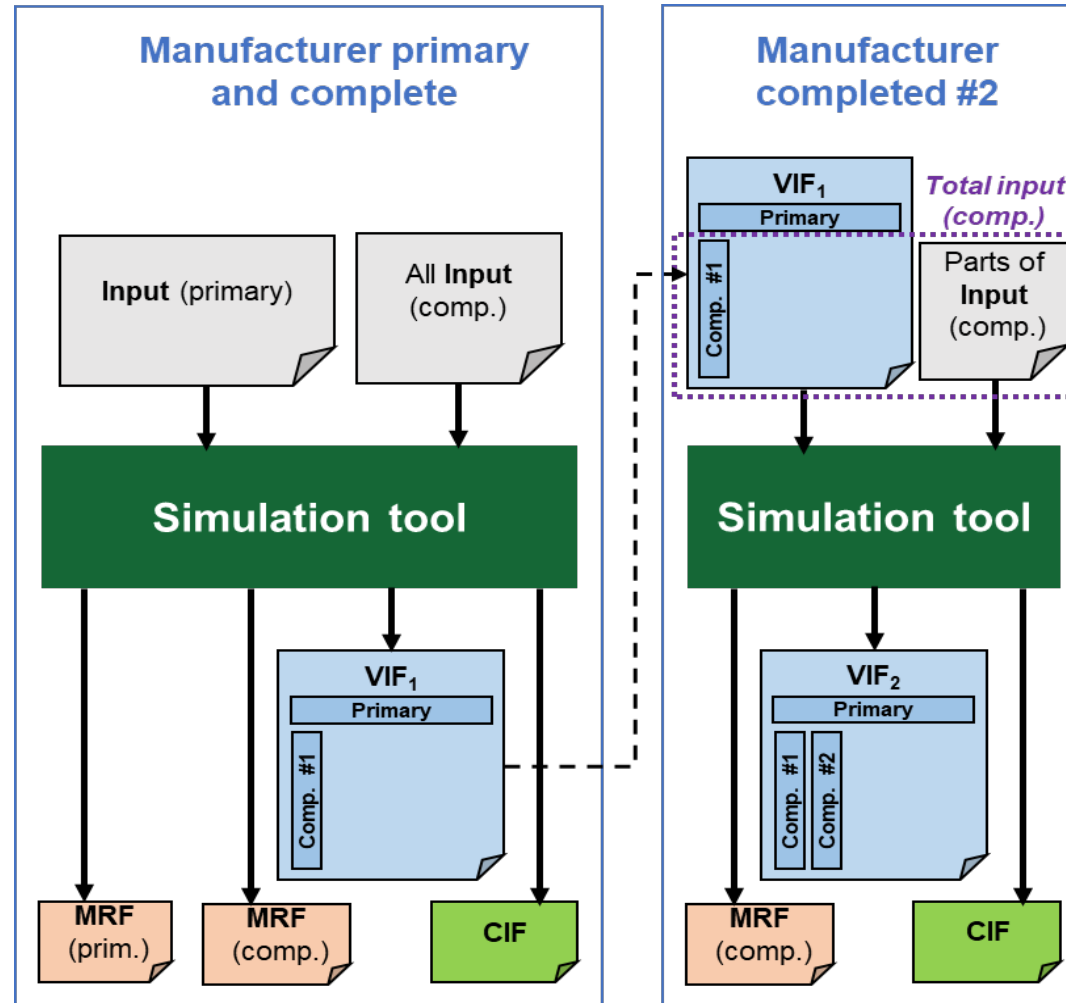**主要汽车制造商也是临时制造商**

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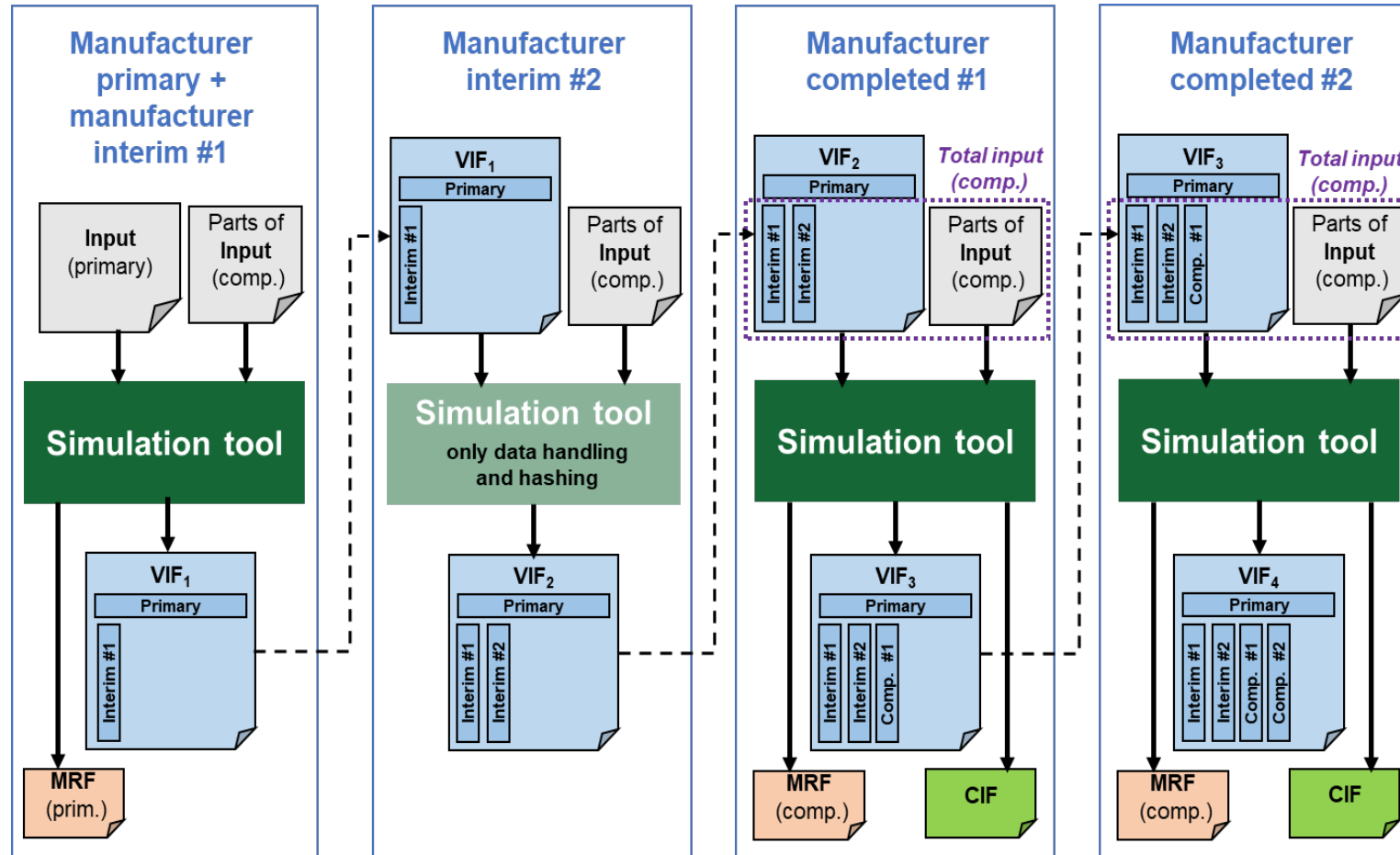
VECTO and "multi-stage" heavy buses (case 2)
VECTO与"多级"重型巴士（案例2）

Complete vehicle | 整车

VECTO and hydrogen vehicles
VECTO与氢燃料车辆

Propulsion technologies based on hydrogen fuel shall be introduced into VECTO and the component testing procedure of COM Regulation (EU) 2017/2400
基于氢燃料的推进技术应引入到VECTO和COM法规（EU）2017/2400的部件测试程序中

- Fuel cell electric vehicles (FCEV)
  燃料电池电动汽车（FCEV）

- Internal Combustion Engines (partly) operated with hydrogen fuel

  （部分）采用氢燃料运转的内燃机

ICE (partly) operated with hydrogen fuel （部分）采用氢燃料运转的内燃机

- Hydrogen internal combustion engines to be introduced into UNECE-R 49 pollutant emission type-approval (in particular PEMS test)
  氢燃料内燃机须引入到UNECE-R 49污染物排放类型审批之中（特别是PEMS测试）

- A component test procedure will be developed
  将开发一个组件测试程序

- A vehicle simulation approach for ICE operated with hydrogen fuel will be developed in VECTO
  将在VECTO开发一种仿真模拟方法，以用于（部分）采用氢燃料运转内燃机的车辆

- Validation of the above-mentioned developments will take place in order to make sure that maximum accuracy in fuel consumption and CO_2 emissions has been achieved
  将对上述开发过程进行验证，以确保燃油消耗量和CO_2排放量达到最高精度

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VECTO and Fuel cell electric vehicles (FCEV)
VECTO与燃料电池电动汽车（FCEV）

- Current fuel cell technologies (PEMFC, SOFC, HT-PEM) will be reviewed
  将对现有的燃料电池技术（PEMFC、SOFC、HT-PEM）进行审查

- A component test procedure and a correlated simulation approach in VECTO to depict energy consumption and operation behavior of fuel cell components will be developed
  将在VECTO中开发一套组件测试程序及相关的仿真模拟方法，以描述燃料电池组件的能量消耗及运行模式

- Different fuel cell powertrain configurations (fuel cell dominant, mid-size and range extender) and their respective modularity will be analysed regarding their impact on a future CO_2 legislation based on VECTO.
  将分析不同的燃料电池动力系统配置（燃料电池占主导地位、中型和增程车型）及其各自的模块性，分析其对基于VECTO的未来CO_2立法的影响。

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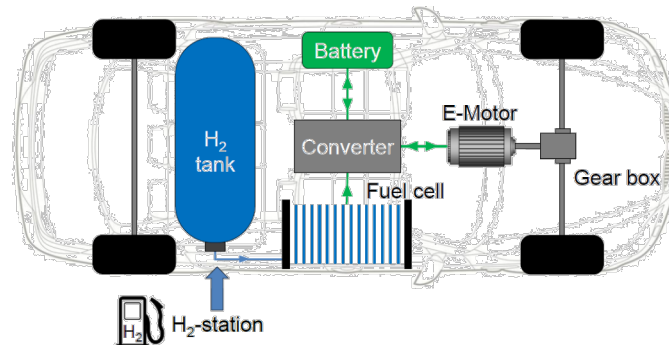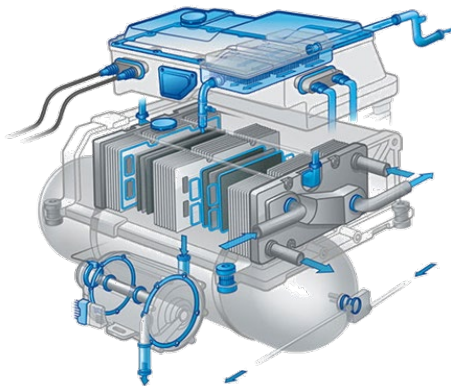
Pantograph, catenary and connector systems
受电弓、接触网和连接器系统

- VECTO shall cover all relevant topics around in-use electric charging technologies as currently already established or under development for HDV applications
  VECTO应涵盖目前已确立或正在开发的、用于HDV应用的现役充电技术的所有相关主题
- Future expected charging systems will be also considered as technological horizon for 2030
  将来预期的充电系统也将视为2030年技术范围
- A detailed review of in-use charging technologies will be performed and all necessary generic parameters will be implemented into VECTO
  将对现役充电技术进行详细审查，并且，所有必要的通用参数都将纳入VECTO中

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Platooning and automated driving
车队和自动驾驶

Investigate the most prominent technologies currently proposed by industry and set out viable paths for their future integration in VECTO
调查业界目前提出的最突出技术，并可行的路径，以便于将来将它们集成到VECTO中

- Review the state of the art of the technologies and the influence of vehicle operation
审查这些技术的现状以及对车辆运行的影响
- Analyze the environmental, economic and social impacts
分析环境、经济和社会影响
- Perform a feasibility assessment
进行可行性评估
- Explore options for implementation in VECTO
探索在VECTO中实现的各种选项

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Electrified vehicles: xEV
电动车：xEV

- Vehicles with electrified powertrain (pure and hybrid electric);
  采用电力驱动系统的车辆（纯电动和混合动力）；

- Regulatory key parameters are: CO_2 emissions, electric consumption and electric driving range;
  监管的主要参数如下：CO_2排放、电力消耗和电动续航里程；

- VECTO incorporates a limited (but expandable) set of xEV architectures (position of electric motor/(engine), parallel, serial,…);
  VECTO整合一套有限（但可扩展）的xEV架构（电机/（发动机）的位置、并联、串联…）；

- VECTO uses an operational strategy optimising 'locally' xEV energy consumption (with changes of battery SOC rated depending on the total SOC);
  VECTO使用一种优化"本地"xEV能源消耗的运行策略（电池额定SOC根据总SOC的变化而变化）；

- Technical challenges:
  技术挑战：

  - specific xEV operational strategies (the generic VECTO strategy always being only an approximation)
    特定的xEV运行策略（一般的VECTO策略始终只是一个近似的策略）

  - accomodation of innnovative xEV architectures, in particular for hybrid vehicles;
    适应创新的xEV架构，尤其是混合动力车辆；

  - Certification of 'integrated components' (often manufactuer-specific)
    "集成组件"的认证（通常针对制造商）

- Hybrid electric vehicles:
  混合动力电动车

  - charge depleting/sustaining CO_2 emissions + electric driving range + utility factor
    电量消耗/持续的CO_2排放 + 电动续航里程 + 利用系数

  - regulatory specific CO_2 emissions ⇔utility factor ⇔assumptions about charging scenarios
    监管的特定CO_2排放 ⇔ 利用系数 ⇔ 充电场景假设

  - what are reasonable charging scenarios in long-haul operation?
    长途运行过程中的合理充电场景包括哪些？

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Thank you
谢谢 ！

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