Deviation between real-world and type-approval fuel and electricity consumption

Summary of ICCT studies

UNECE GRPE IWG on Automotive Life Cycle Assessment
6th Session of Subgroup 4 (Use phase)
December 12, 2023

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Overview

- **Internal combustion engine vehicles (ICEVs) fuel consumption**
  - Europe: WLTP and NEDC
  - China: NEDC
  - Japan: JC08
  - U.S.: EPA (3-cycle and 5-cycle)
- **Plug-in hybrid vehicles (PHEVs) fuel consumption**
  - Europe: WLTP and NEDC
  - U.S.: EPA (5-cycle)
  - China: NEDC
- **Battery electric vehicles (BEVs) electricity consumption**
  - China: China electric LDV test cycle

Internal combustion engine vehicles

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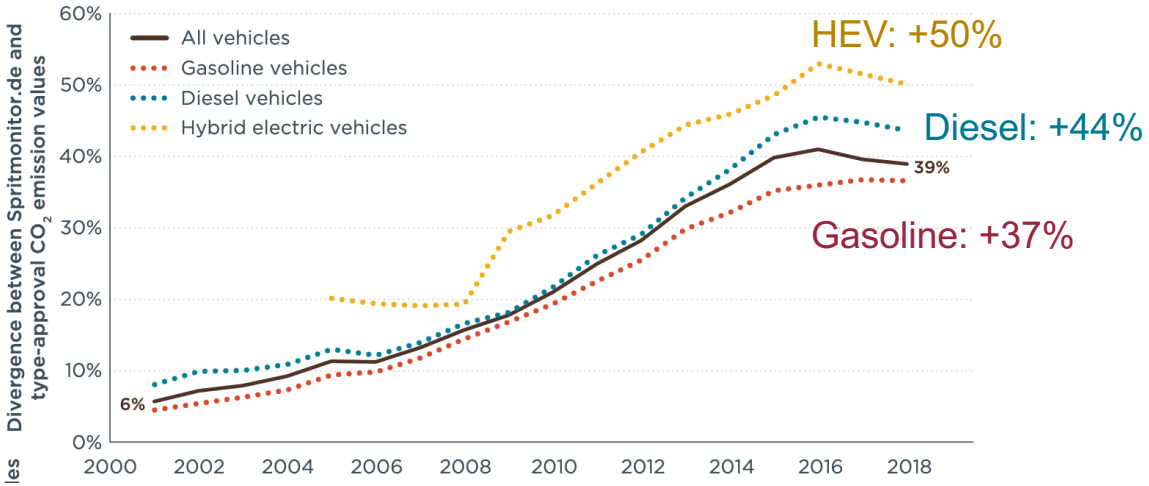
Europe (NEDC)

Source:

- Spritmonitor.de
- 210,000 vehicles

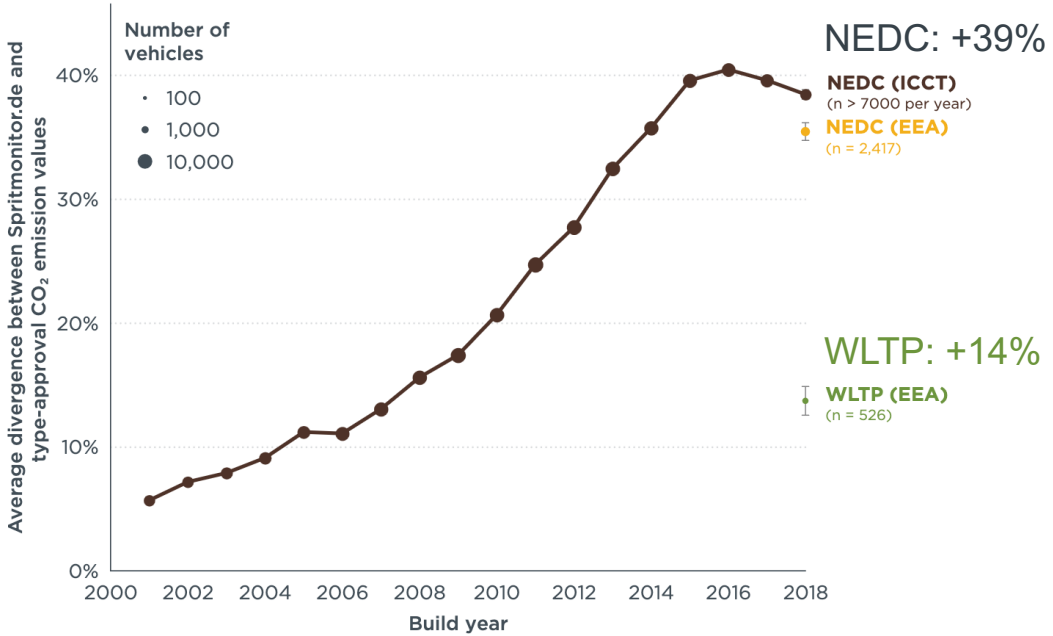


Dornoff, Tietge, Mock (2020). On the way to “real-world” CO2 values: The European passenger car market in its first year after introducing the WLTP.

Europe (WLTP, preliminary)

Source:

- Spritmonitor.de
- NEDC: 210,000 vehicles
- WLTP: 500 vehicles



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Dornoff, Tietge, Mock (2020). On the way to “real-world” CO2 values: The European passenger car market in its first year after introducing the WLTP.

Europe (WLTP, OBFCM)

Source:

- European Commission
- 2.3 mio. vehicles registered in 2021

ICEVs + HEVs	
Gasoline ICEV + HEV	+20%
Diesel ICEV	+17%

PHEV	+250%

Confirm ICCT numbers for ICEVs and PHEVs.

European Commission (2023). Real-world monitoring of CO_2 emissions and fuel consumption, 2021. Presentation at the March 21, 2023, meeting of the Expert Group for policy developments and implementation of the Regulations on CO_2 emissions from road vehicles.

European Commission (2023). Real-world monitoring: 2023 reporting - first findings. Presentation at the November 9, 2023, meeting of the Expert Group for policy developments and implementation of the Regulations on CO_2 emissions from road vehicles.

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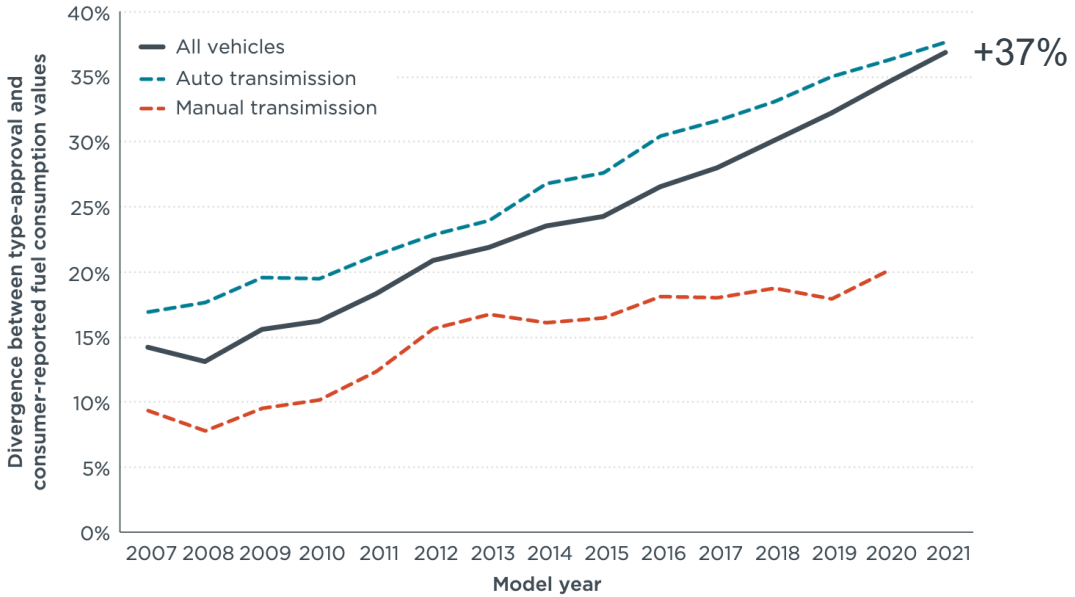
China (NEDC)

Source:

- XiaoXiongYouHao.com
- 2.1 mio. vehicles

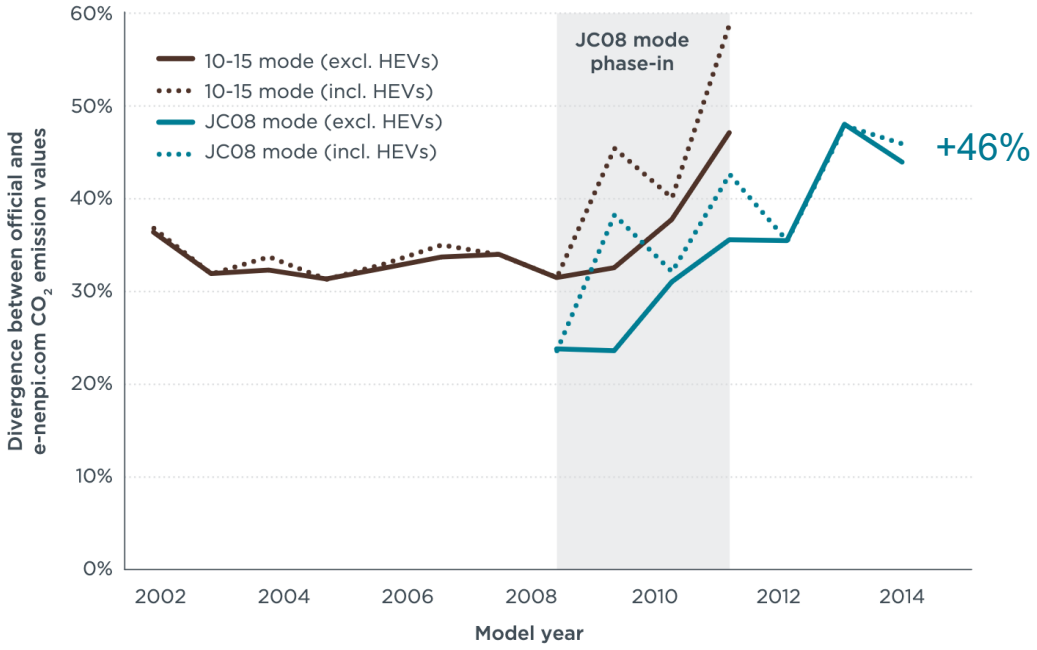


Wu, Yang, Chen, Yang (2021). Evaluation of real-world fuel consumption of light-duty vehicles in China: A 2021 update.

Japan (JC08)

Source:

- e-nenpi.com
- 47,000 vehicles

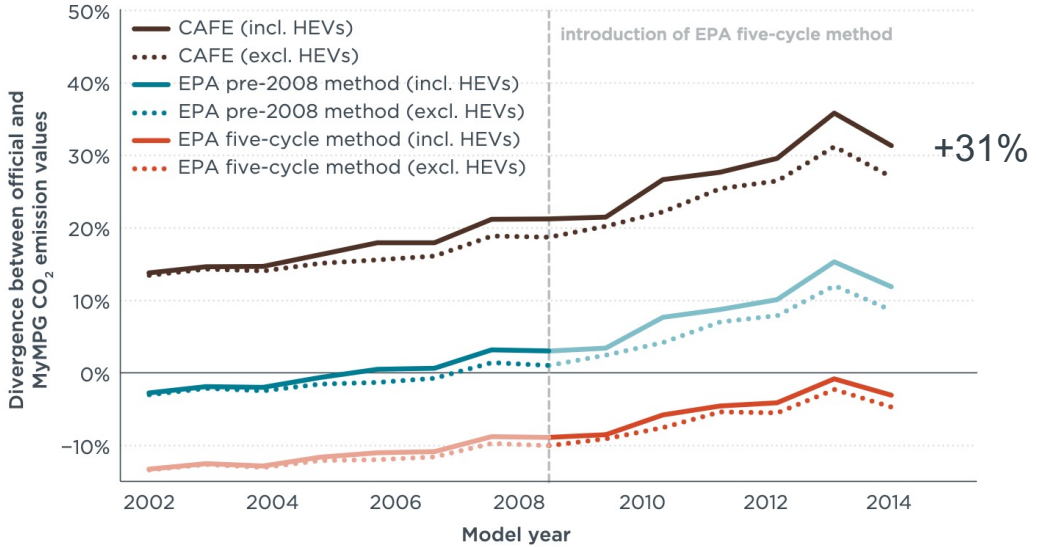


Tietge, Díaz, Yang, Mock (2017). From Laboratory to Road International.

United States (CAFE)

Source:

- MyMPG
- 43,000 vehicles



Tietge, Díaz, Yang, Mock (2017). From Laboratory to Road International.

Plug-in hybrids

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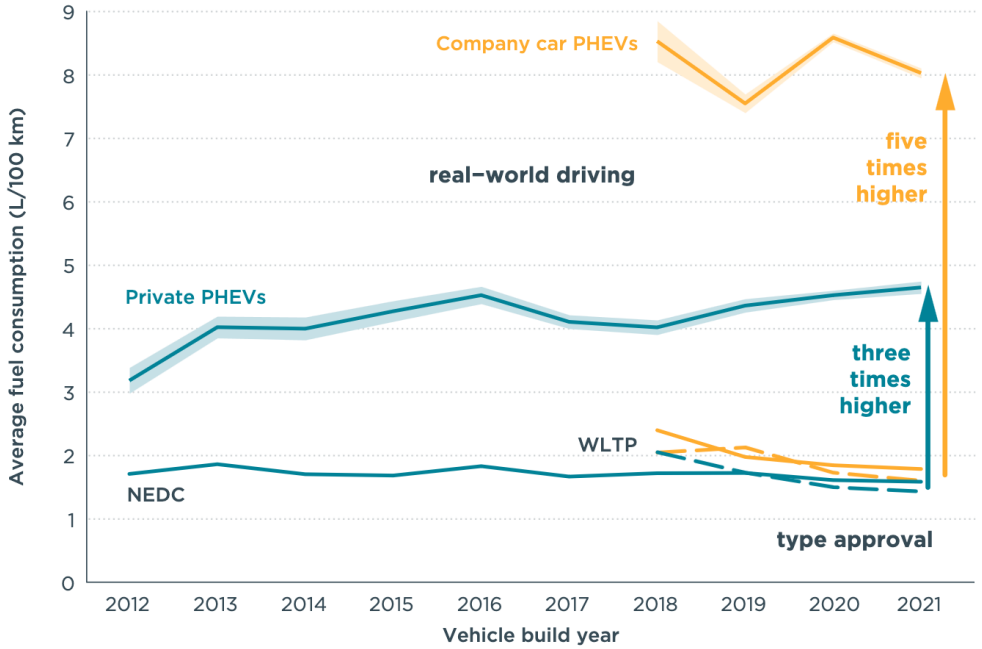
Europe (WLTP)

Sources:

- Spritmonitor.de, ICCT/Fraunhofer survey data, German Aerospace Center, HonestJohn.co.uk, Fiches-Auto.fr, Carbuyer, and MILE21.eu
- 9,000 vehicles

Preliminary OBFCM data by European Commission (2023): **+250%** for MY2020/2021 PHEVs



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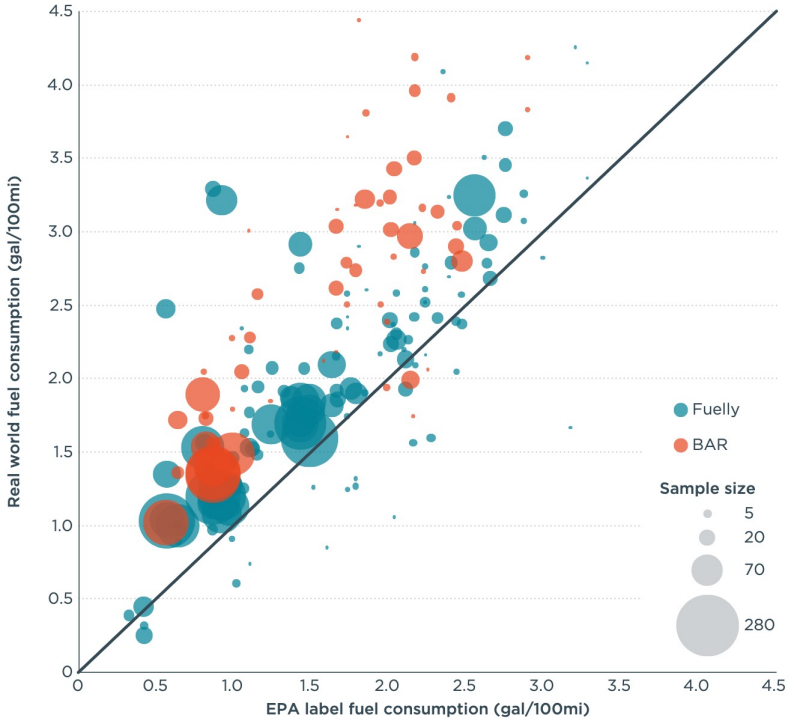
Plötz, Link, Ringelschwender, Keller, Moll, Bieker, Dornoff, Mock (2022). Real-world usage of plug-in hybrid vehicles in Europe.

United States (EPA label, 5-cycle)

Sources:

- Fuelly.com, California's Bureau of Automotive Repair
- 5,400 vehicles



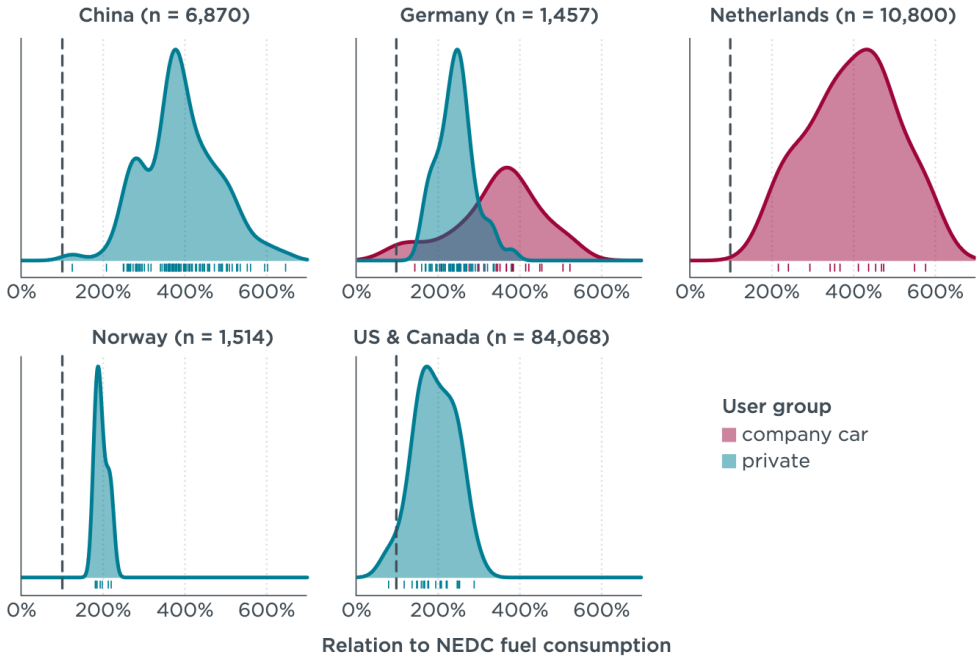
Isenstadt, Yang, Searle, German (2022).
Real-world usage of plug-in hybrid vehicles in the United States.

China (NEDC)

Source:

- XiaoXiongYouHao.com
- 7,000 vehicles

+300%



Plötz, Moll, Bieker, Mock, Li (2020). Real-world usage of plug-in hybrid electric vehicles.

Battery electric vehicles

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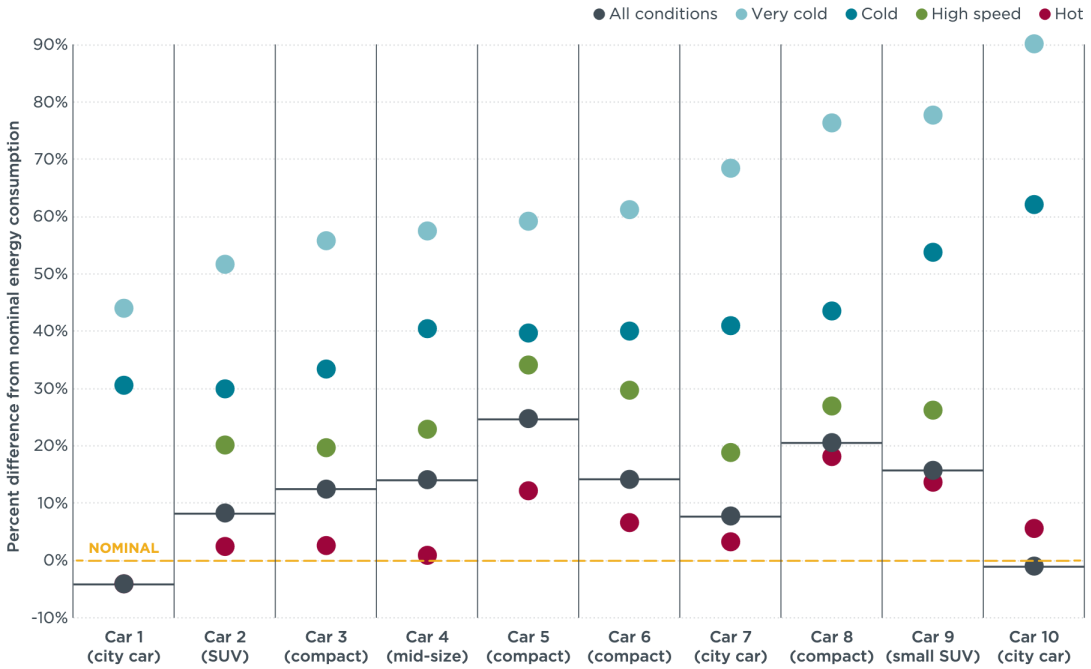
China (electric light-duty vehicles test cycle)

Source:

- National Big Data Alliance of New Energy Vehicles (NDANEV)
- 10 best-selling model selected: 142,000 vehicles

+15% on average
(all conditions)



Jin, Wang, He (2023). Real-world performance of battery electric passenger cars in China.

Conclusions

Conclusions

- Consumer self-reported fuel consumption values are significantly higher than type-approval values, across major vehicle markets.
- Fleet-wide collected OBFCM data confirms gap observed in self-reported fuel consumption figures.
- Real-world gap varies by power train.

- **In vehicle LCA**, type-approval fuel and electricity consumption mean:
  - Non-representative results
  - Distortion when comparing power train types: usage phase emission savings of BEVs underestimated, relative importance of production phase emissions inflated

Real-world correction factors, power train type- and type-approval test-specific,

- Allow realistic values and comparison between power train types
- Maintain differences between models of the same power train type
- **Applicable for all vehicle models** (in contrast, test data would only be available for selected models, model-specific OBFCM data only for new vehicle models)

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Thank you!

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