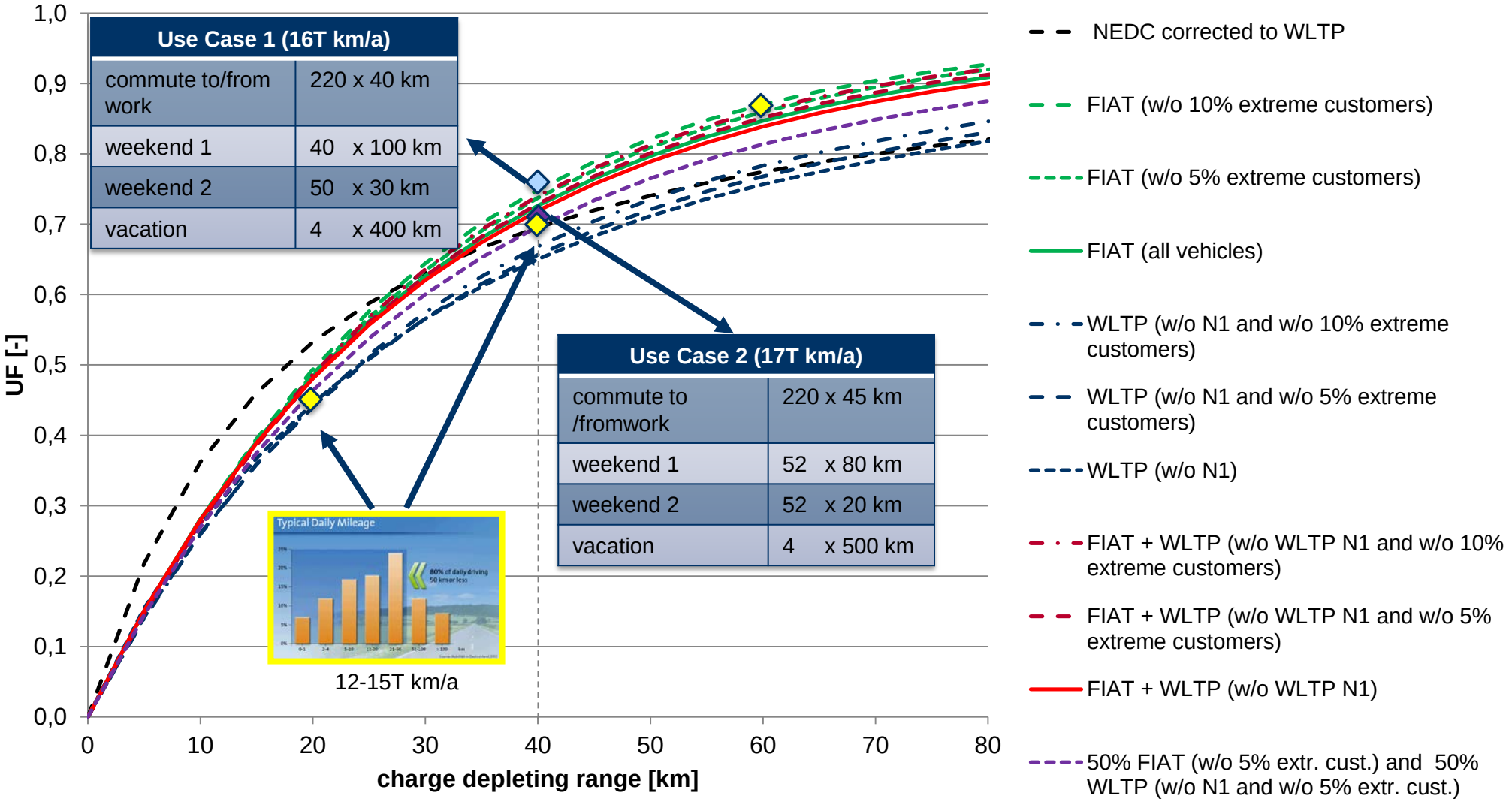
ANALYSIS OF WLTP EUROPEAN UTILITY FACTOR FOR OVC-HEVS.

Andreas Eder for the Working Group with Andre Rijnders, Iddo Riemersma, Heinz Steven, Oliver Eberhardt.

EU WLTP, Brussels, 24.6.2014

ANALYSIS OF WLTP UTILITY FACTOR.

STARTING POINT OF THE DISCUSSION AND RE- ASSESSMENT.



ANALYSIS OF WLTP UTILITY FACTOR.

SCIENTIFICALLY JUSTIFIABLE APPROACH ACCORDING TO T&E.

1. Search for **all available databases** with vehicle trips that can be used as input.

2. **Exclude** the data that **is erroneous or outside the scope** (in this case, that might include taking out data from vehicles that have an extreme high or short daily average distance).

3. **Verify** the balance in UF **relevant characteristics**, such as road types (city, rural, highway), vehicle types, share between EU member states, etc.

4. Where necessary and appropriate, apply weighting to **correct unbalance** in these characteristics.

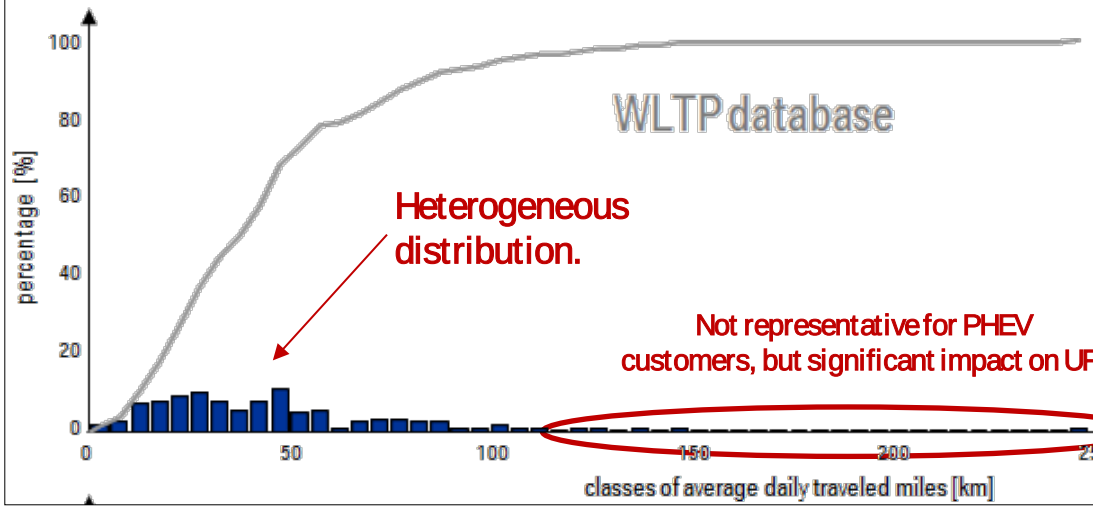
5. Develop an UF curve for the individual (weighted) databases, and explain differences through analysis.

6. Based on the analysis, decide which weight should be applied to each database in order to reach the most representative UF curve.

source:
Review of Utility Factor development
Author: Iddo Riemersma (Transport & Environment)
Date/Version: 17 April 2014/1.1

ANALYSIS OF WLTP UTILITY FACTOR.

DISTRIBUTION OF AVERAGE DAILY TRAVELED MILES.



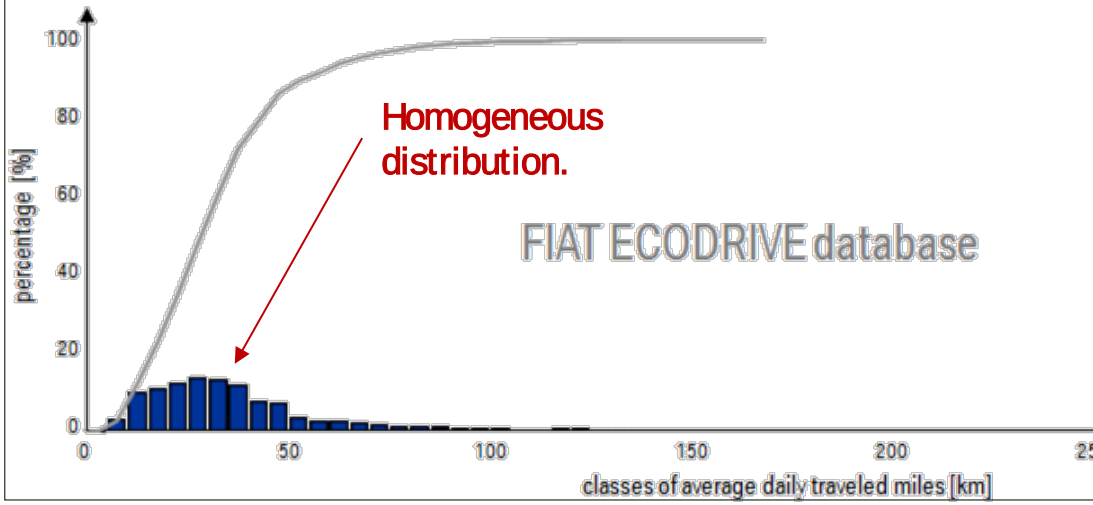
More vehicle types included.

category	amount*
Mini	7
Small	29
Lower Medium	45
Medium	27
Upper Medium	8
Van	9
SUV/Off-Road	3
Luxury	1
Others	3

More diesel than petrol.

category	amount*
Diesel	80
Petrol	46

*w/o N1



Less vehicle types included.

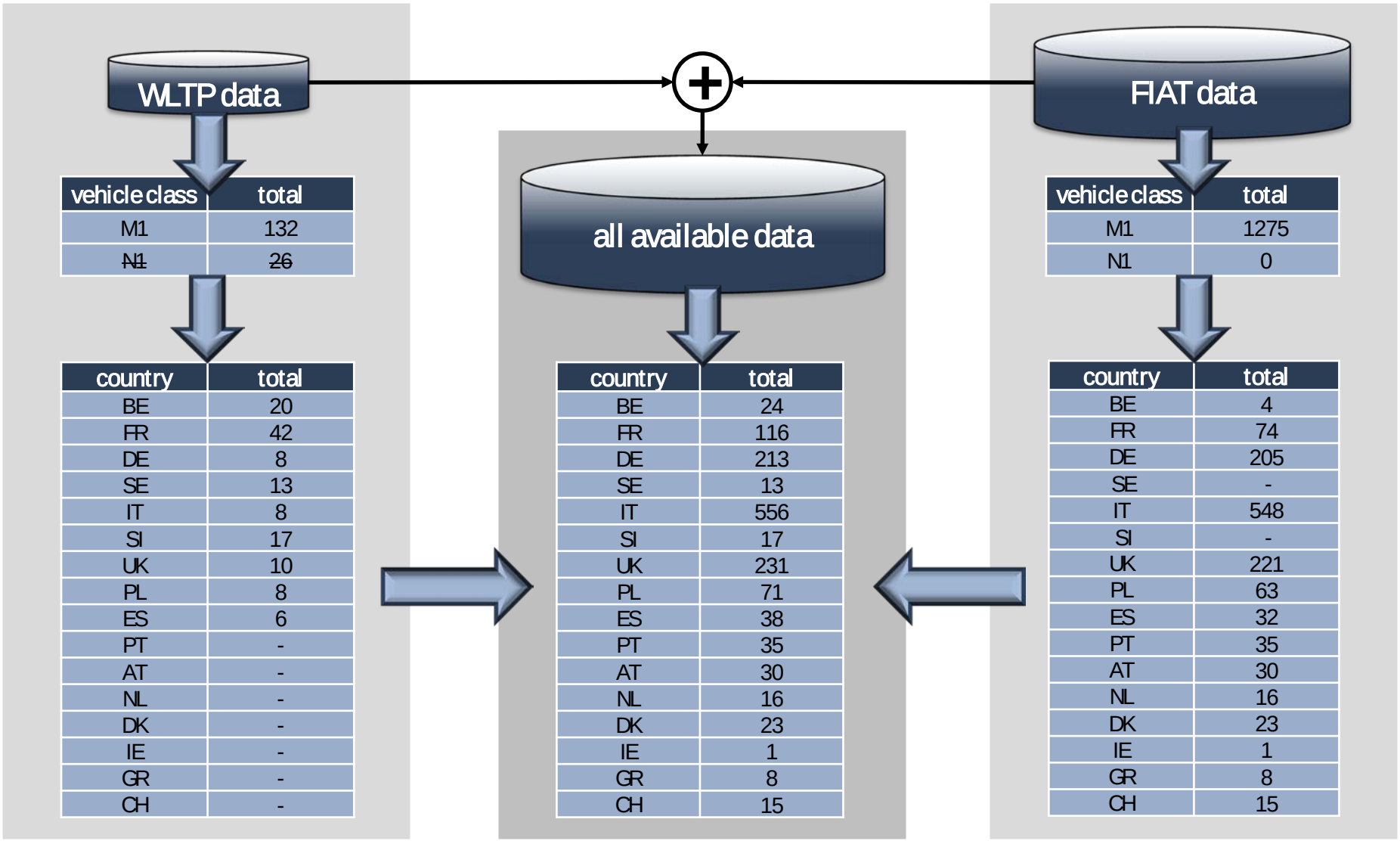
category	amount
Mini	618
Small	359
Lower Medium	251
Medium	47

More petrol than diesel.

category	amount
Diesel	407
Petrol	868

ANALYSIS OF WLTP UTILITY FACTOR.

SCIENTIFICALLY JUSTIFIABLE APPROACH.



vehicle class	total
M1	132
~~N1~~	~~26~~

country	total
BE	20
FR	42
DE	8
SE	13
IT	8
SI	17
UK	10
PL	8
ES	6
PT	-
AT	-
NL	-
DK	-
IE	-
GR	-
CH	-

country	total
BE	24
FR	116
DE	213
SE	13
IT	556
SI	17
UK	231
PL	71
ES	38
PT	35
AT	30
NL	16
DK	23
IE	1
GR	8
CH	15

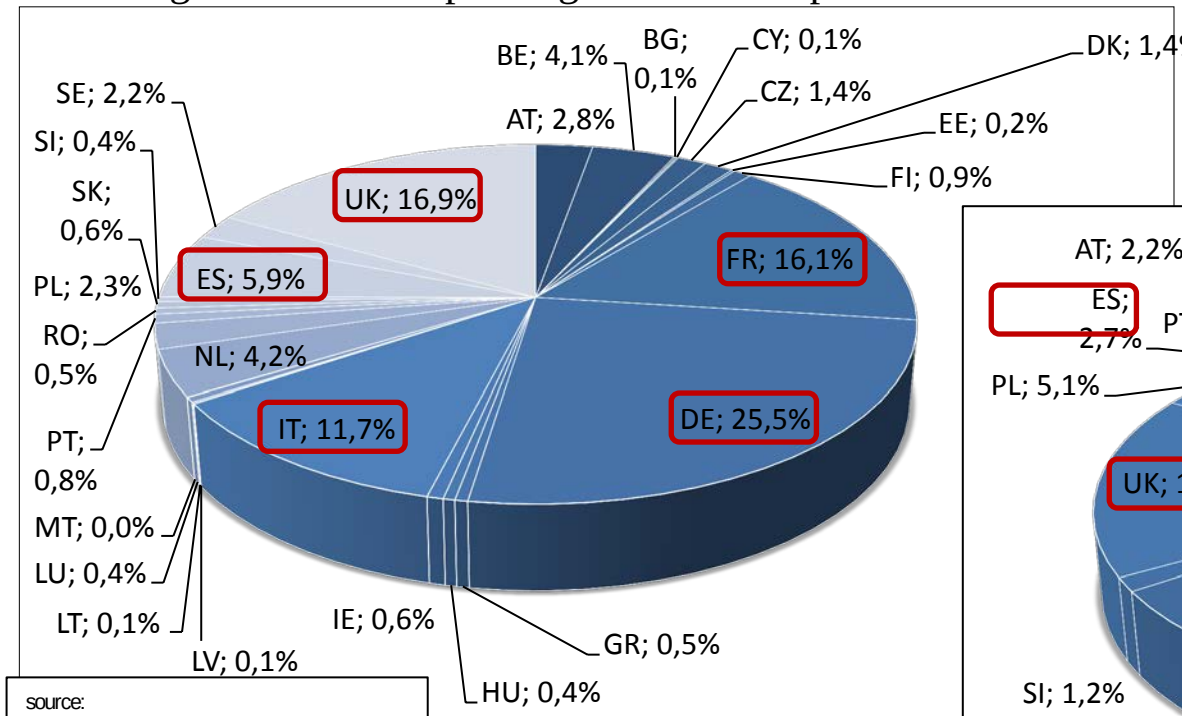
vehicle class	total
M1	1275
N1	0

country	total
BE	4
FR	74
DE	205
SE	-
IT	548
SI	-
UK	221
PL	63
ES	32
PT	35
AT	30
NL	16
DK	23
IE	1
GR	8
CH	15

ANALYSIS OF WLTP UTILITY FACTOR.

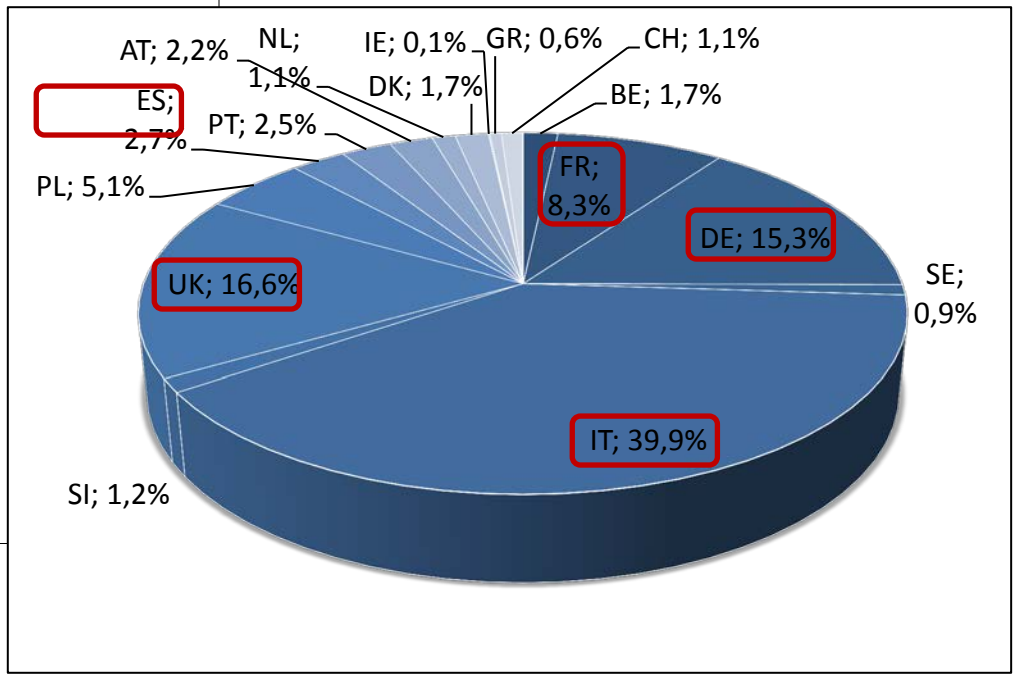
REGISTRATION OF NEW PASSENGER CARS 2012 IN EUROPE COMPARED TO THE AMOUNT OF VEHICLES IN WLTP + FIAT DATABASE.

Registration of new passenger cars in European countries.



source:
Monitoring CO2 emissions from new passenger cars in the EU: summary of data for 2013, April 2014
Author: European Environment Agency

WLTP + FIAT database.



► The percentage difference between registration of new passenger cars in Europe and vehicles in the database is not equal and has to be balanced.

ANALYSIS OF WLTP UTILITY FACTOR.

APPROACH AND PROCESS.

First step.

- Identify the intersection of countries in the database and in EU.
- Remaining countries include 95% of total new vehicle registrations.
- Normalize each country percentage to 100%.

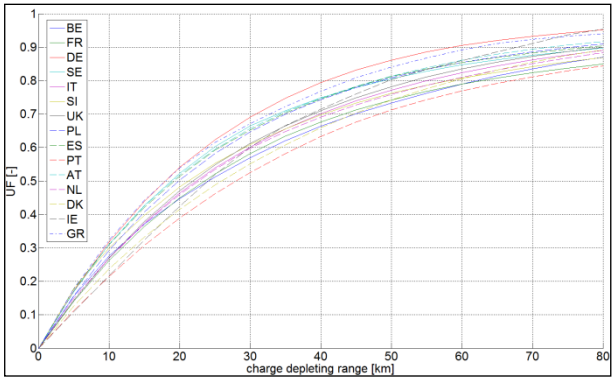
Second step.

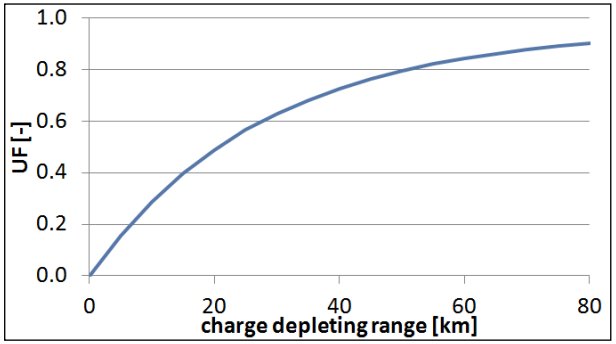
- Calculate a UF curve for each country that is available in the intersection.

Third step.

- Consolidate the country-weighted UF curves to one EU UF curve.

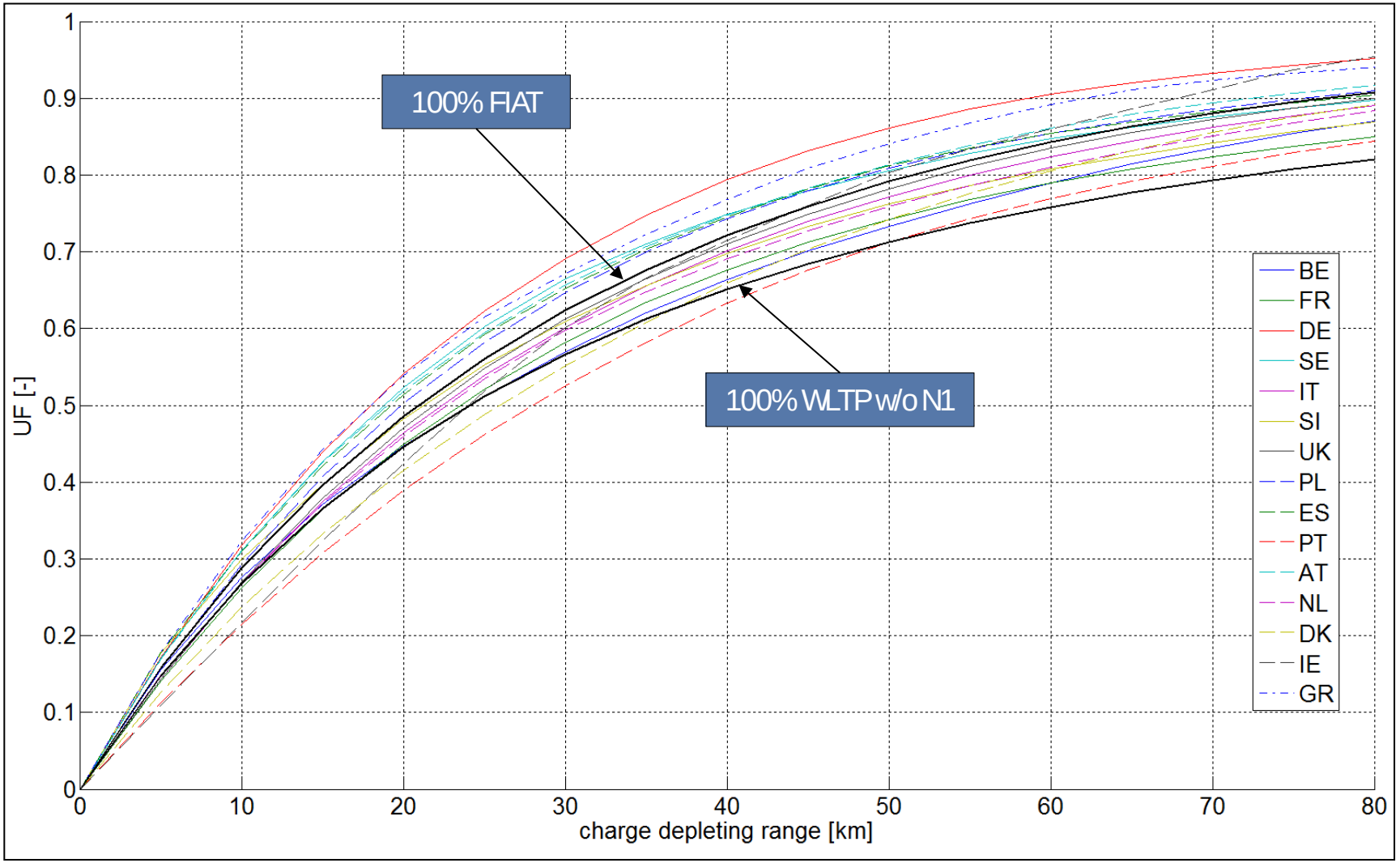
intersection of countries available in the database and EU-27 registration	total registrations (in thousands)	percentage of new registrations in EU-27	percentage of new registrations in EU-27 corrected to 100%
BE	490	4.1%	4.3%
FR	1932	16.1%	16.9%
DE	3062	25.5%	26.8%
SE	263	2.2%	2.3%
IT	1402	11.7%	12.2%
SI	50	0.4%	0.4%
UK	2036	16.9%	17.8%
PL	274	2.3%	2.4%
ES	704	5.9%	6.2%
PT	96	0.8%	0.8%
AT	335	2.8%	2.9%
NL	500	4.2%	4.4%
DK	171	1.4%	1.5%
IE	73	0.6%	0.6%
GR	57	0.5%	0.5%
		Σ 95.1%	Σ 100.0%





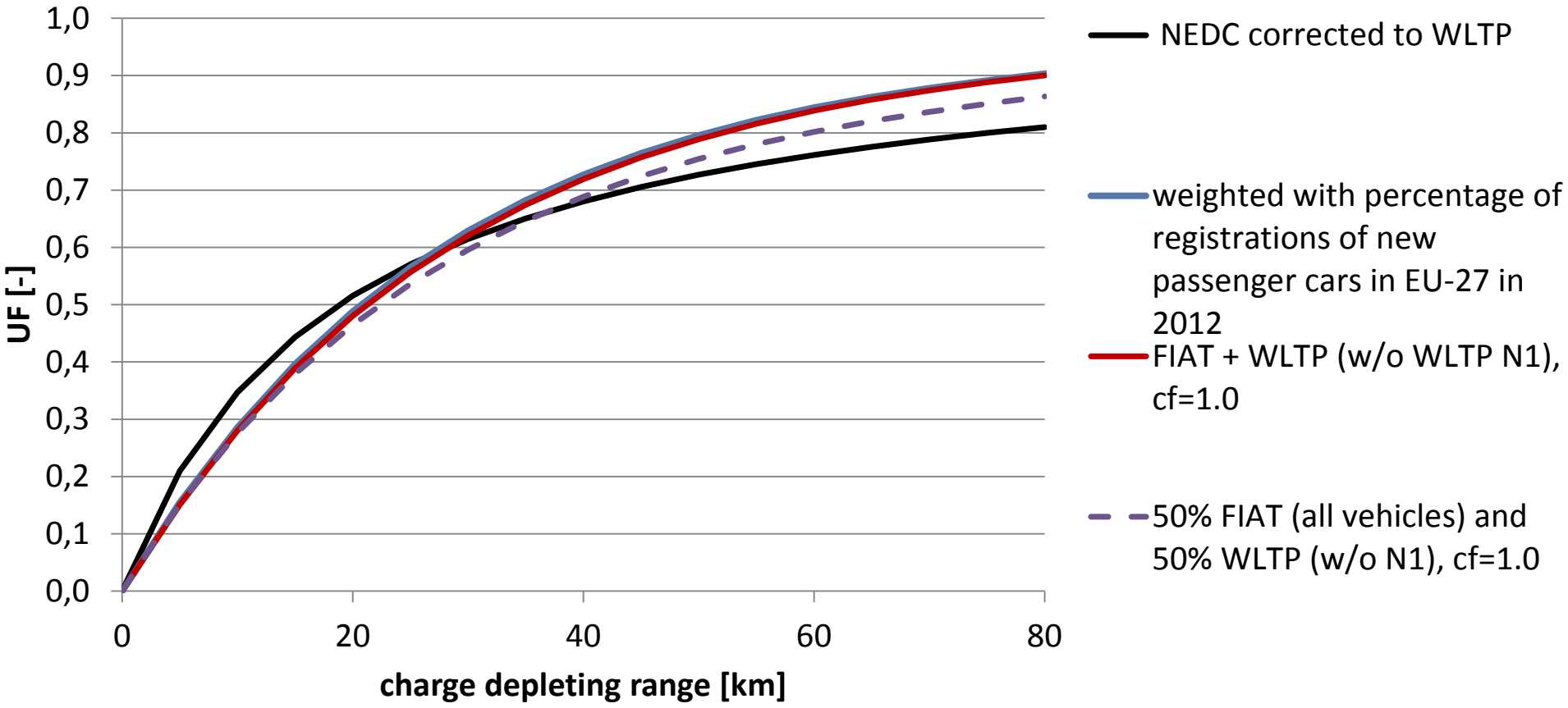
ANALYSIS OF WLTP UTILITY FACTOR.

UF CURVE OF EACH AVAILABLE COUNTRY.



ANALYSIS OF WLTP UTILITY FACTOR.

EUROPEAN REGISTRATION-WEIGHTED UF.

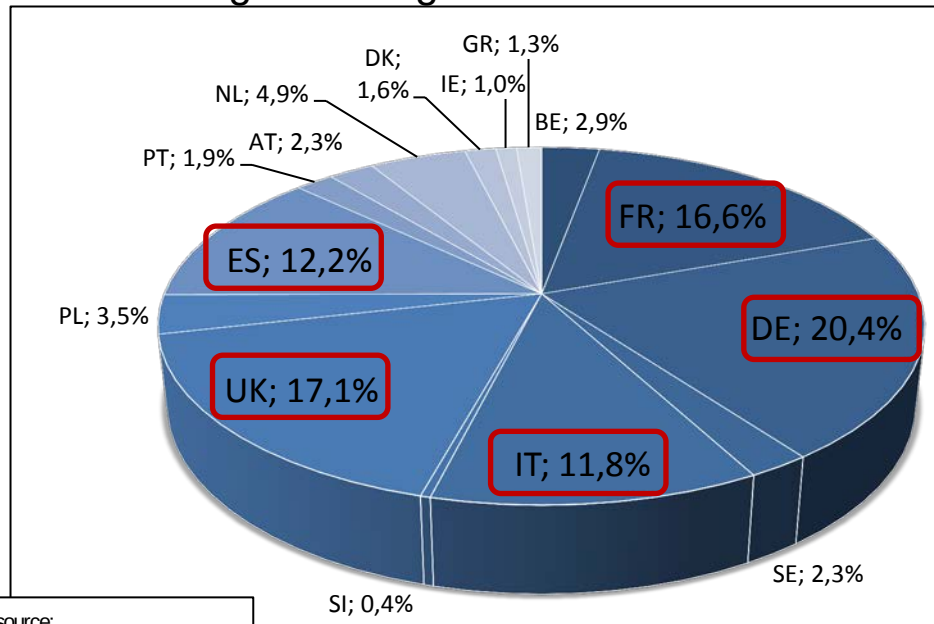


- The UF curve that is based on the weighting of new passenger car registrations is very similar to the "RED" curve.

ANALYSIS OF WLTP UTILITY FACTOR.

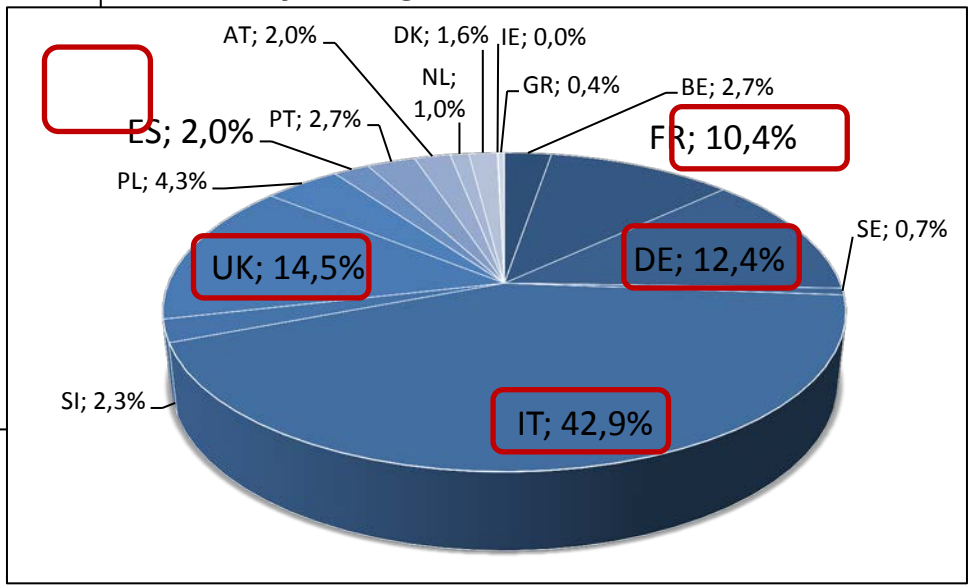
VEHICLE MILEAGE COMPARISON BETWEEN TREMOVE AND WLTP+FIAT DATABASE.

Vehicle mileage according to TREMOVE 3.3.2 Alternative 2005.



source:
TREMOVE 3.3.2 Alternative

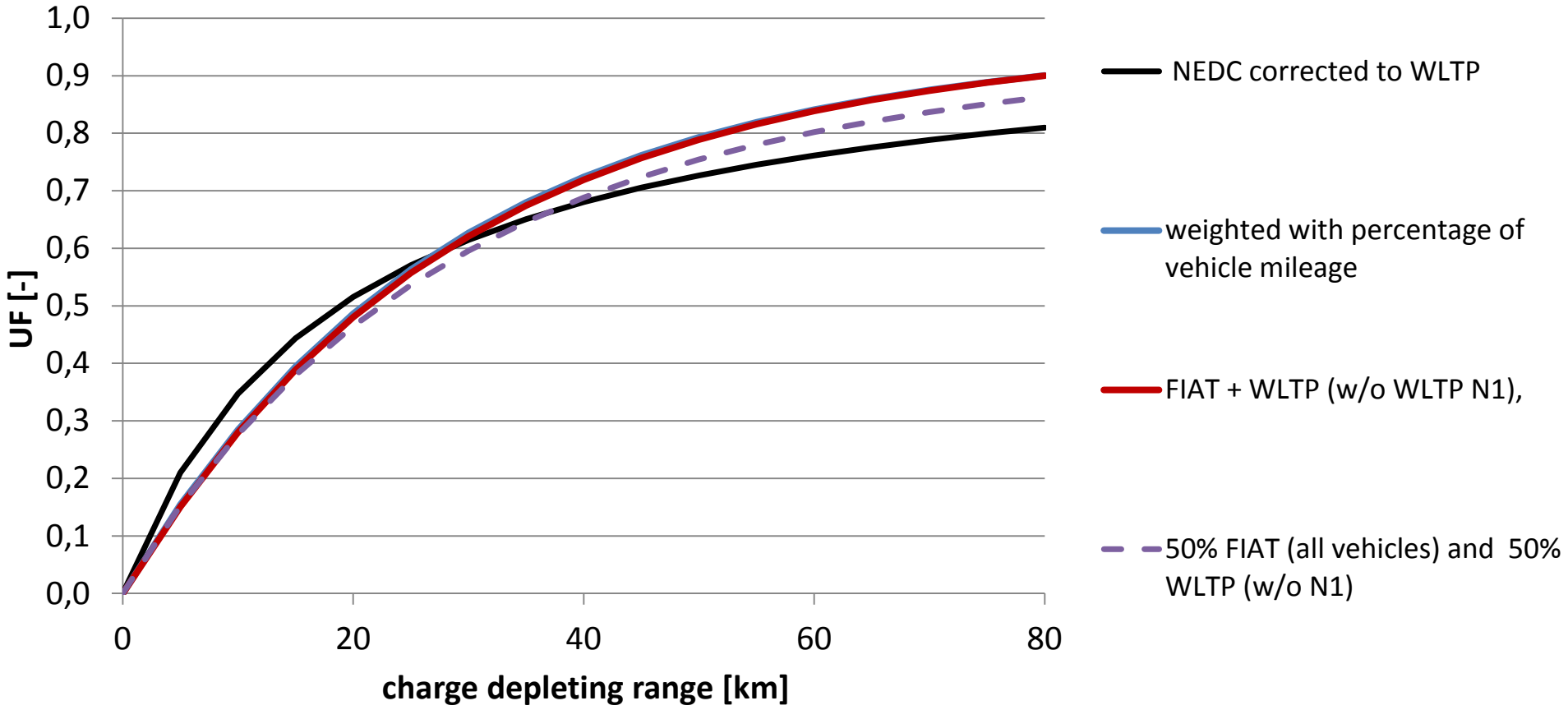
Country mileage WLTP + FIAT database.



- The difference between vehicle mileage in Europe and vehicle mileage in the database is not equal and can be balanced.

ANALYSIS OF WLTP UTILITY FACTOR.

MILEAGE-WEIGHTED APPROACH.



► The UF curve that is based on the weighting of vehicle mileage is very similar to the RED curve.

ANALYSIS OF WLTP UTILITY FACTOR.

COUNTRY-WEIGHTED APPROACH AND PROCESS INCLUDING ADDITIONAL ENGINE TYPE WEIGHTING.

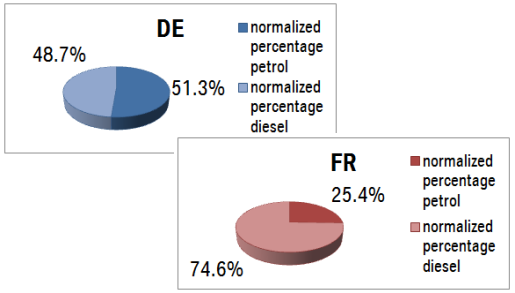
First step.
- Identify the intersection of countries in the database and in EU-27.
- Remaining countries include 95% of total new vehicle registrations in EU27.
- Normalize each country percentage to 100%.

Second step.
- Determine the percentage of diesel and petrol vehicles in each country.
- Normalize the diesel and petrol percentages to 100%.

Third step.
- Calculate a diesel and petrol UF curve for each country.

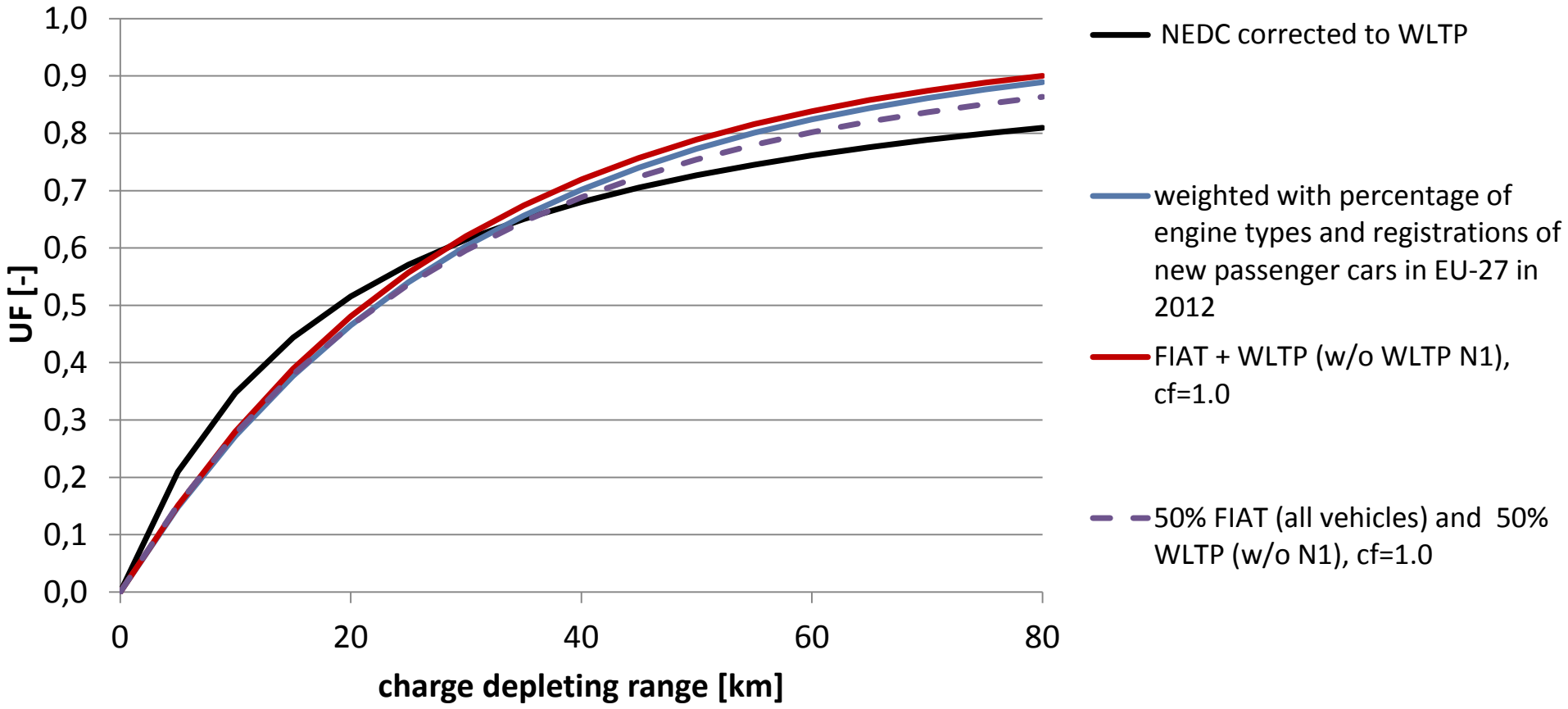
Fourth step.
- Consolidate engine type-weighted UF curves for each country.

Fifth step.
- Consolidate the **engine type- and country-weighted** UF curves to one European UF curve.



ANALYSIS OF WLTP UTILITY FACTOR.

ENGINE TYPE- AND COUNTRY-WEIGHTED APPROACH.

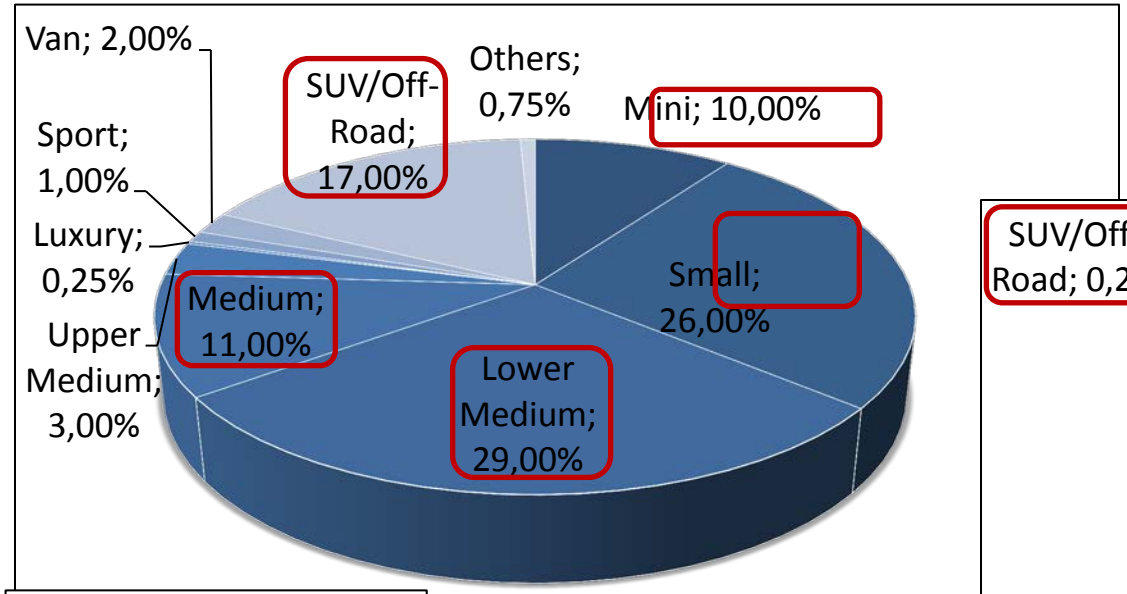


► The UF curve that is based on the weighting of engine types and new passenger car registrations is below the "RED" curve.

ANALYSIS OF WLTP UTILITY FACTOR.

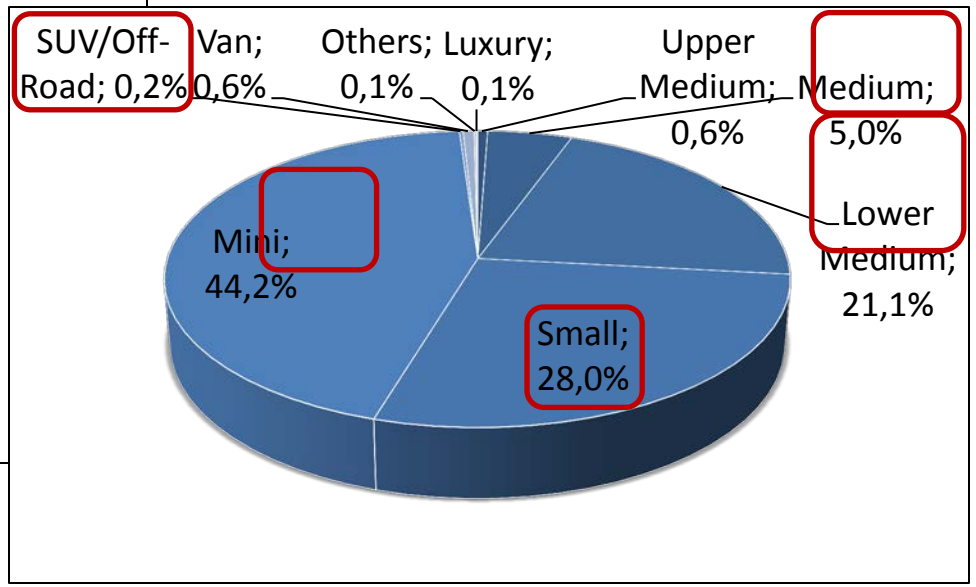
VEHICLE TYPES OF NEW PASSENGER CARS COMPARED TO WLTP AND FIAT DATABASE.

Registration of new passenger cars sorted by vehicle type in Europe.



source:
eurpean vehicle market statistics 2013, 2013
Author: ICCT
*value are estimated from figure 2-3

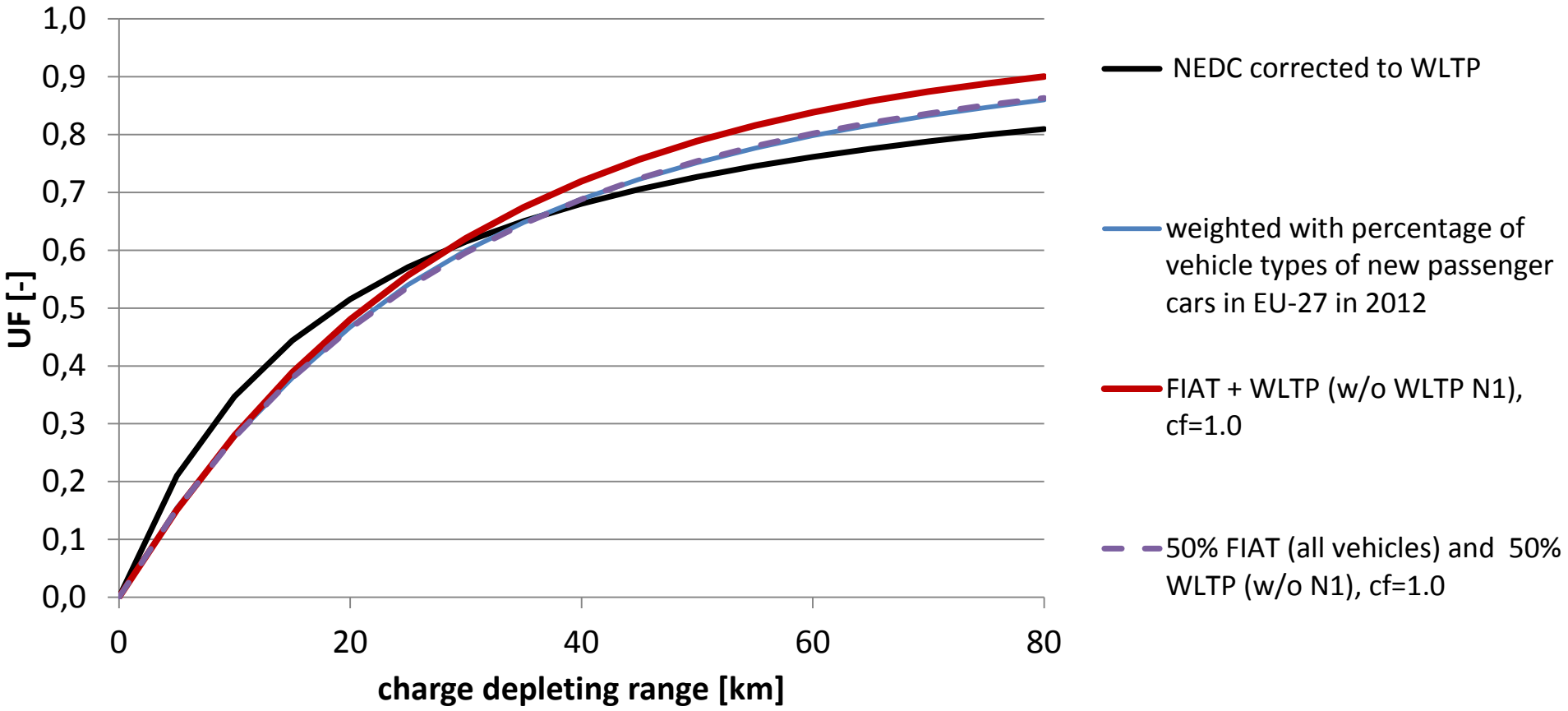
WLTP + FIAT database.



- The vehicle class percentage difference between registration of new passenger cars in Europe and vehicles in the database is not equal and has to be balanced.

ANALYSIS OF WLTP UTILITY FACTOR.

VEHICLE TYPE-WEIGHTED APPROACH.



► The UF curve that is based on the weighting of vehicle types of new passenger cars is very similar to the PURPLE curve that represents the 50% / 50% weighting of WLTP and FIAT database.

ANALYSIS OF WLTP UTILITY FACTOR.

LIMITS OF WEIGHTING.

A theoretical option is to apply a weighting for each of the previous criteria, means:

- Country of registration.
- Engine type.
- Vehicle class.
- Vehicle Mileage

BUT

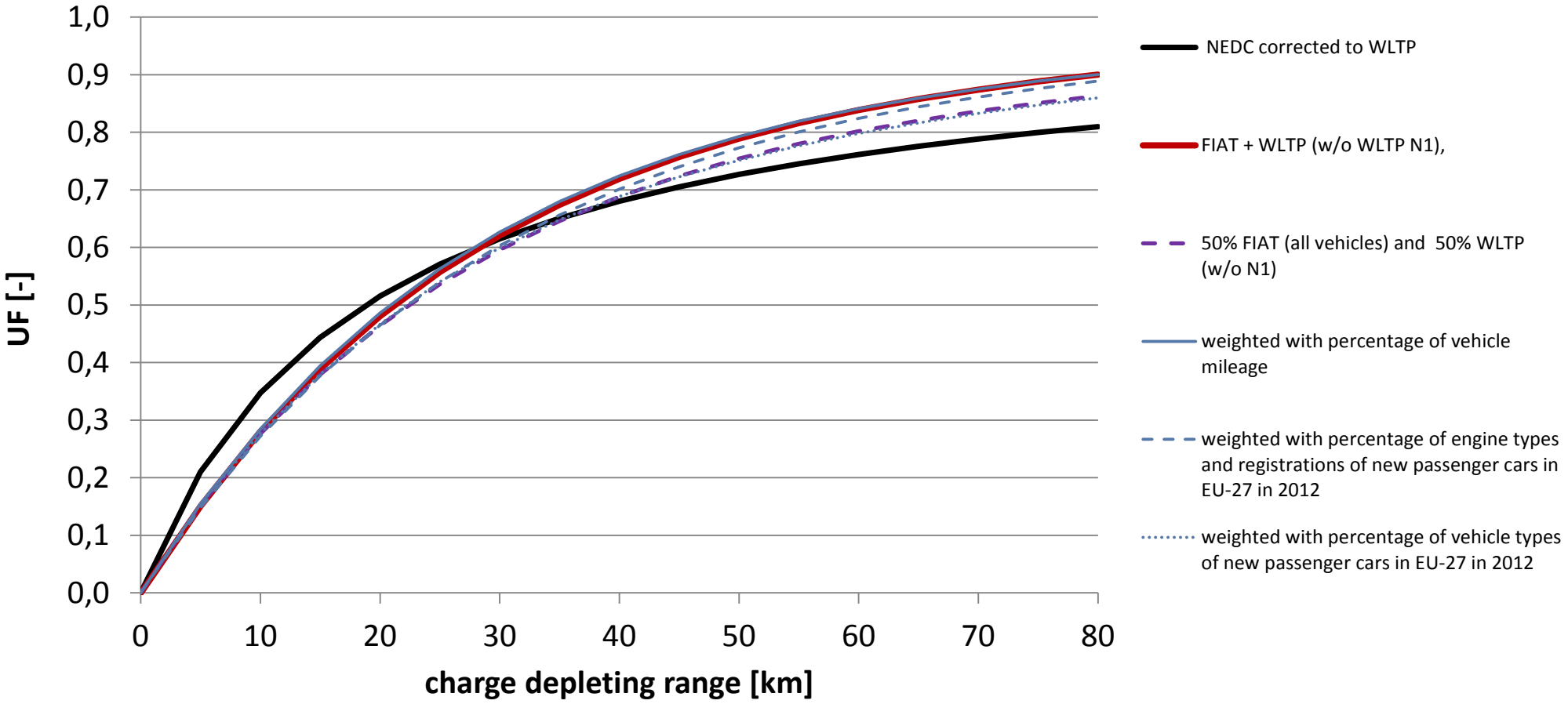
- There are not enough vehicles in the database to cover all variants (e.g. M1, DE, SUV, DIESEL – not available).
- Very high workload to normalize all percentages.
- High amount of normalization positions biases the representativeness.

		DIESEL	PETROL	SUM
DE	'MINI'	19	71	90
	'SMALL'	2	64	66
	'LOWER MEDIUM'	6	44	50
	'MEDIUM'	6	0	6
	'UPPER MEDIUM'	1	0	1
	'SUV/OFF-ROAD'	0	0	0

		DIESEL	PETROL	SUM
UK	'MINI'	27	133	160
	'SMALL'	0	51	51
	'LOWER MEDIUM'	7	7	14
	'MEDIUM'	3	0	3
	'UPPER MEDIUM'	0	0	0
	'SUV/OFF-ROAD'	0	0	0

ANALYSIS OF WLTP UTILITY FACTOR.

SUMMARY.



All new and more scientific analysis show that the „50/50“ UF curve can be justified for further use in EU until the re-assesment based on a real PHEV fleet is available.

Backup

ANALYSIS OF WLTP UTILITY FACTOR. REVIEW IN EU AGREED.

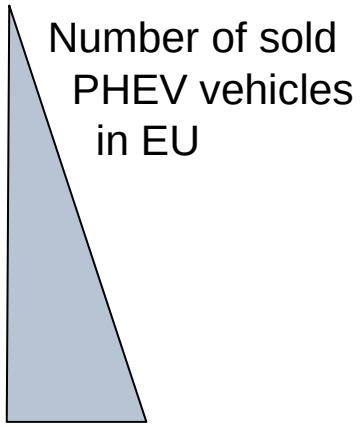
2 Step Approach for Europe:

2014

Determination of Utility Factor from heterogeneous databases and assumed use-cases;
Assumed charging frequency: 1,0

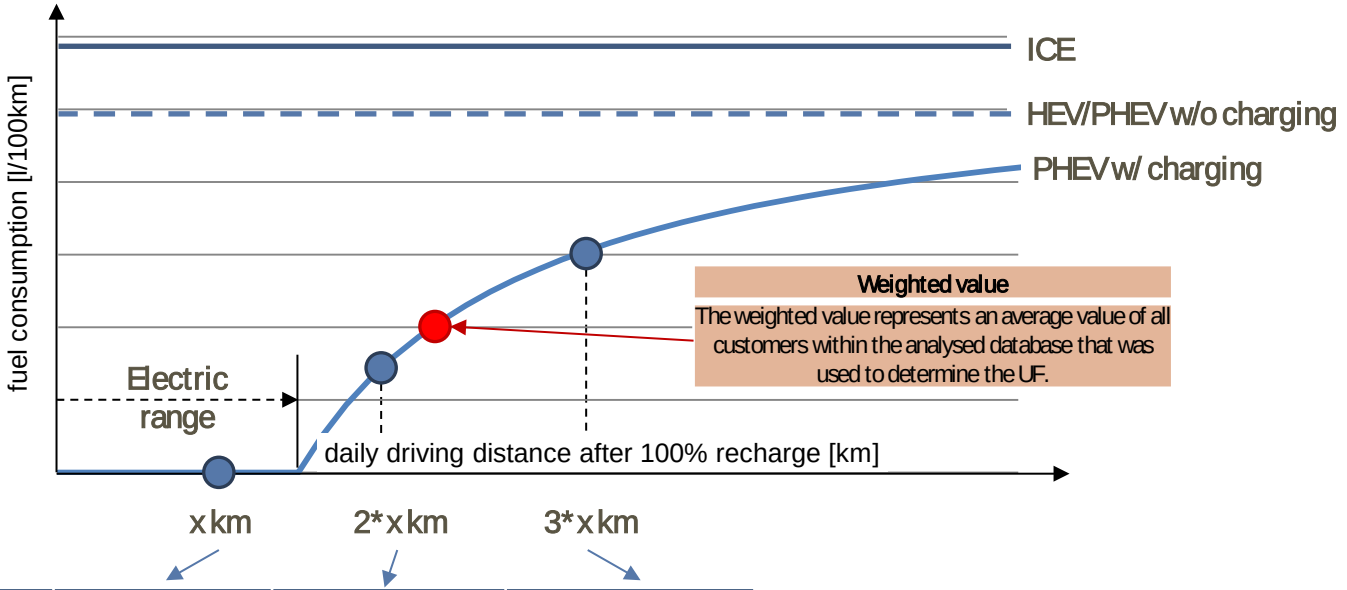
e.g. 2020

Update of Utility Factor by
PHEV customer study
with **respective charging frequency.**



ANALYSIS OF WLTP UTILITY FACTOR.

WEIGHTED VALUES ARE **OK** FOR FLEET MONITORING BUT **UNSUITABLE** FOR CUSTOMER INFORMATION.



	Customer 1	Customer 2	Customer 3
daily distance:	x km	2*x km	3*x km
fuel consumption:	0 % of label value	70 % of label value	150 % of label value
deviation:	-100 %	-30 %	+50 %

- A fully charged PHEV saves fossil fuel with the first driven kilometer.
- The figure shows the dependency from the daily driven distance of the customer concerning the fuel consumption.
- A weighted value is made to represent an average value for a fleet of vehicles that can be used as a homologation value (fleet monitoring).
- A new logic has to be developed for customer information!