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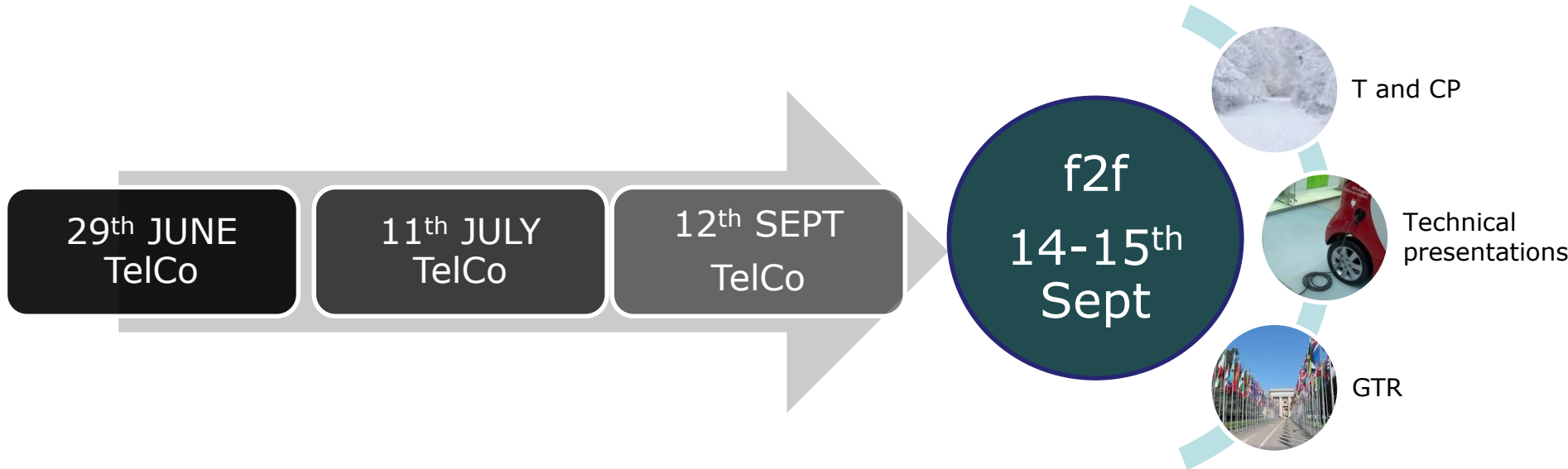
Progress Report

Low and Realistic Winter Temperature TF WLTP 20th - September 2017

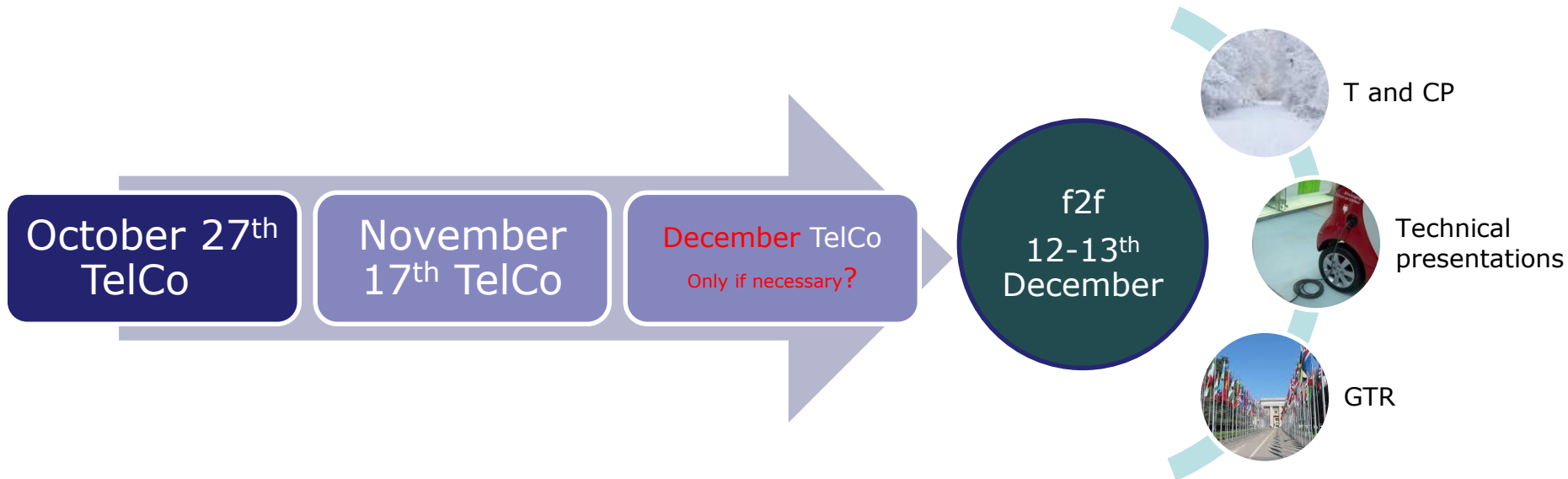
C. Astorga



CALENDAR OF MEETINGS AND TELCO SINCE last WLTP in JUNE - Geneva



CALENDAR OF MEETINGS AND TELCO After WLTP 20th until – Geneva2018



**AGENDA
MAIN SCOPE
& ISSUES**

**face-to-face meeting 14-15th
September (JRC – Ispra)**

Low Temp Task force: 13th face-to-face meeting

Low Temp Task force Agenda	
Date	<i>September 2017</i> Thursday 14 th & Friday 15 th
Informal Document	<i>Agenda doc Low Temp TF 2017-13-01 (Doc TF LowT 13-01)</i>
Room link	https://ecwacs.webex.com/meet/mastorga-llorens

Face-to-face meeting- 14th September; JRC- Ispra; Room 2- building 36

Time	Agenda item	Lead/ contributions	Working Document
11:00	Welcome and introduction Presentation of Agenda Minutes of the last telco 7 th of September, lecture and approval	Coordinator / All	Agenda TF LowT 13-01 <i>(document attached mail 12 September)</i> Minutes TF LowT 12-02
11:30	Main discussion on concrete test procedure and Temperature proposals: CP proposals	Coordinator Representatives of the CP	



Low Temperature Proposal *Switzerland's Position*

- Experienced temperatures well below 0°C (based on area-mean temperature data)
- Close to the temperature under question of -7°C in some areas for winter months
- Based on these temperature data, as well as EMPA data presented at the 6th F-2-F Meeting in Ispra (13.-14.03.2017):

*Cold ambient temperature of -7°C can be seen as a **worst case scenario** → ensures proper cold temperature emission performance at winter temperatures of around 0°C (area-mean for October to March)*



Switzerland is open for discussion

EC-DG GROW position

Having been asked for a position on the preferred T for the low and realistic winter temperature procedure, DG GROW has answered in a way that should help to shape the new procedure for testing vehicles at low T (which, in EU shall replace the existing one - Type VI – still referred to NEDC)

In the past months we have already provided you with several inputs, like the need to include the diesel vehicles in the scope of the Low-T test, the addition of other pollutants (ex. NOx and PN). We would like now to complete the description of our position on this matter.

NOx and
PN = OK

We would like now to complete the description of our position on this matter. It is necessary to distinguish the issue of regulated pollutants from the one covering CO₂, fuel consumption and electrical range.

CO₂, fuel consumption and electrical range

Concerning regulated pollutants (THC, NOx, CO, PM-PN), in addition to what we have already stated in the past months, we clarify here that we don't have any element to modify the test temperature of -7 °C,

T = -7C

Test for pollutant emissions

Vehicles	ICE, NOVC-HEV and OVC-HEV
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Temperature	-7 ° C
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Cycle	WLTP
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Pollutants (and CO₂)	THC, CO, NO _x , PN and CO ₂
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R/L	Determined at -7 ° C or 10% reduction of coast-down time
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Auxiliary devices	heating, defrost and lights ON
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Regarding CO₂, fuel consumption and electrical range, we are in principle more open to discussion. As the current European legislation concerning CO₂ monitoring is related to the Type 1 test, the reason to introduce a test at low temperature for CO₂ and range measurement would be essentially linked to consumer information. Concerning the electrical range of PEV we believe that it is essential to find a methodology that provides an accurate estimation at low temperatures. The reference temperature for such estimation could be discussed. However, in the light of test burden and complexity, both for the manufacturers and the type approval authorities, max attention should be given in our opinion to the possibility to use the test at -7 °C (which is in any case carried out for the measurement of pollutant emissions) also for assessing CO₂, fuel consumption and electrical range, possibly with the aid of shortened tests and modelling, provided that these supporting methods are demonstrated to be equally representative as the complete test.

- **While DG-GROW suggested that they would be opened to use a different temperature for the electric range if JAPAN will not agree on using -7 C, JAPAN highlighted their intention of using the same temperature for all the parameters under study (namely, criteria pollutants, CO₂, FC and electric range)**

To the question raised by vehicle manufacturers on what is the priority between pollutants and range, DG-GROW stated that their priority is the pollutants.

Table: summary of the current legislation Low Temperature (Worldwide)

	T C °	Cycle	Road-Load	Vehicles	Pollutants
	-7.0 ±3	UDC	Determined at -7 C or 10% reduction of coast-down time	S.I. including hybrids + information regarding NOx after-treatment for C.I.	HC, CO
	-7.0 ±3	UDC	"	"	THC, CO
	-7.0 ±1.7	FTP	Performing coast-down tests and calculating road-load coefficients	Otto-cycle and diesel including multi-fueled, alternative fueled, hybrid electric, and zero emission vehicles	NMHC, CO, CO ₂ *
	-6.7	CVS-75		Gasoline + information regarding NOx after-treatment for C.I.	CO
	-7.0 ±3	Low+ Medium of WLTC	Determined at -7 C or 10% reduction of coast-down time	S.I.; C.I.; hybrids	THC, CO, NOx

* CO₂ is analysed and results used for the determination of the vehicle fuel economy. Cold temperature standards apply for CO and NMHC emissions.

Summary CPs and LowT

Both EU and CH would be favorable to continue with the -7 C for vehicle testing with the scope of measuring criteria pollutant emissions (THC, CH₄, CO, NO_x, PN, PM) and CO₂.

Open to discussion for a harmonized Temperature and procedure

Japan requested more time to consider the proposed temperature and they will provide their proposal to the TF asap:

Japan will present a position on the temperature on the next WLTP meeting and the scope of how to use the test result in the next TF meeting in December.

Technical Session

14:00	Temperature influence on fuel consumption of conventional and hybrids vehicles	Th. Bütler (EMPA/CH)
14:30	LowT effect on hybrids & some considerations about auxiliary devices	Suarez Bertoa (JRC)
15:00	Battery Thermal management system & Cabin comfort thermal system	Christophe Petitjean / Valeo - CLEPA

Temperature influence on energy demand of conventional, hybrid and battery electric vehicles

Low Temp Task force, 13th meeting
JRC Ispra, 14.+15. of September 2017

Thomas Büttler
Empa Dübendorf, Switzerland
Automotive Powertrain Technologies Laboratory

- Conventional drive trains
 - Low temperatures have the highest impact during the first cycle section
 - Similar behaviour for Diesel and Gasoline engines

- Alternative drive trains
 - Behave similar to the conventional vehicles
 - Engine runtime at cold conditions defines the additional energy demand

- BEV
 - Drive train efficiency lower at cold temperatures, but not as significant as for conventional or hybrid vehicles
 - Thermal management of the battery system has a significant impact on the low temperature energy demand
 - Use of auxiliaries (heating) has the highest impact on the low temperature energy demand

- **Results from experimental testing performed by EMPA on Euro 5 vehicles showed the effect of the temperature (and temperature related issues) on energy demand from a series of vehicles.**

It was showed that 10-20% increase on energy demand was observed for conventional vehicles when tested at -7C compared to 23 C. A ~10% increase was also observed when HEV (NOVC-HEV) and PHEV (OVC-HEV) were tested at 0 C compared to 23 C. The temperature effect on CNG fuelled vehicles was lower.

Thermal management of the battery has a significant impact on the low temperature energy demand. Moreover, the use of auxiliaries (heating) has the highest impact on the low temperature energy demand.

Battery power demand is very well correlated to mean positive wheel power for different vehicles at different temperatures.

EMPA indicated that in light of their experience and the obtained results, vehicle electric range could be modelled. The needed input is data (battery power and total battery charged from the grid) from additional vehicles at different temperatures as many vehicles as possible.



C L E P A

*European Association of
Automotive Suppliers*

Contribution to Low & Realistic Temperature Task Force activities

Clepa ENER CT @ Ispra meeting
14-15September2017

Conclusion and Potential next steps



Conclusion:

Thermal Systems for Cabin Comfort and Battery management have significant impact on range and durability so that they must be considered to properly define a Test Procedure for low & realistic temperature

Note: even not in the mandate of the Low & Realistic Temperature Task Force, it must be noted that similar impacts occurred with A/C system for cabin comfort and Battery Thermal Management System for higher range of temperature than the current 23°C being used in WLTP as of today.

Potential Next Steps within L&R Temperature Task Force:

- Collect the point of view of UN Contracting Parties
- Further deeper technical discussions must obviously occurred with WLTP e-Lab and EVE together with JRC as Technical Reference body to confirm initial concerns as presented here.
- Understand how then Thermal System must appear as one parameter with the new Test Procedure under development (as new GTR).
- Identify is some testing campaign will be needed to get an experimental assessment of the proposed Test Procedure.



Low T effect



Suarez Bertoa

DG Joint Research Centre

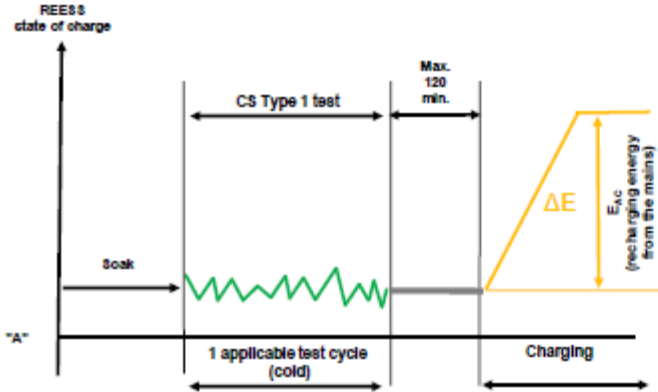
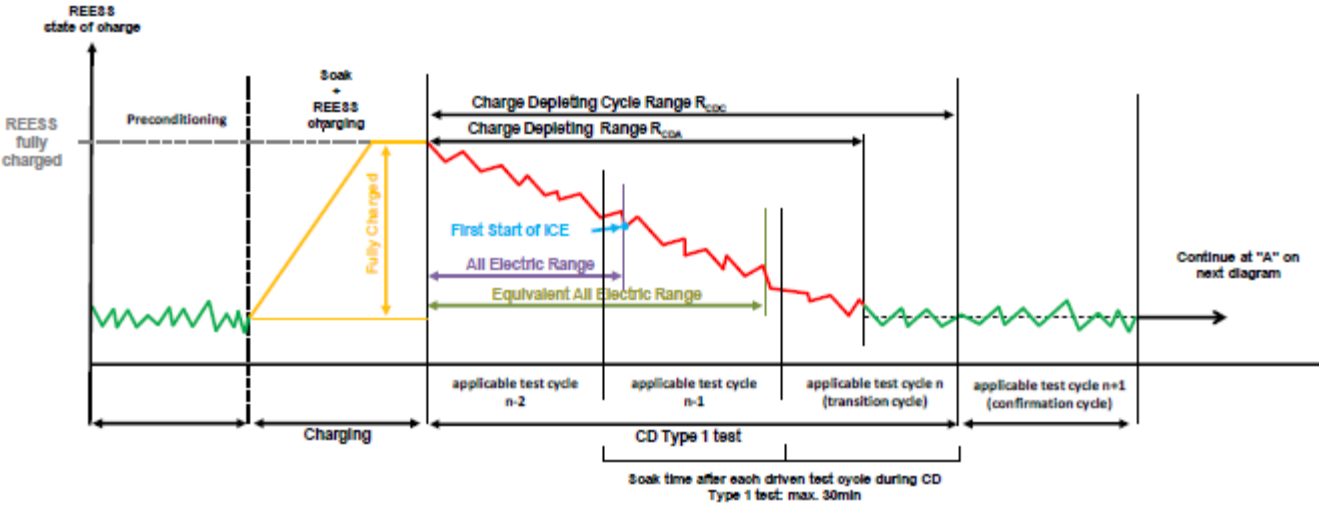
Directorate for Energy, Transport & Climate

Sustainable Transport Unit

Ispra, September 14th 2017

Test procedure used

OVC-HEVs, charge-depleting type 1 test with subsequent charge-sustaining Type 1 test



Conclusions

- Emissions from tested vehicles were strongly and negatively affected by cold ambient temperatures
- High emissions were observed during both CD and CS tests

Higher at -7°C than at 23°C

- Use of heating system further increased vehicle emissions

Issues that need to be addressed for OVC-HEV

- Are emissions affected at cold temperature? **Yes**
- Is CS test enough to fully address OVC-HEV emissions? **No, CD test also needed**
- Is there a negative impact on emissions if heating system is used? **Yes**
- Is it possible to follow Type 1 procedure for OVC-HEVs at -7 C? **Yes**

Summary of the current state of the winter reference fuels

So far, Gasoline/petrol references are those present in Reg 83. Moreover, two of the reference gasolines present in the GTR-15 differentiate between summer and winter properties.

Regarding winter diesel, JCR showed that EN590 (which indicates diesel properties in EU) listed different possible commercial winter diesel blends. These blends are used in winter season across Europe.

The Cold Filter Plug-in Point (CFPP) is the only parameter that is different between them.

Since a winter diesel with a CFPP -20 C meets the needs for a -7 C test and it is the most common in Europe, the JRC summarized the parameters that such winter diesel would have and asked the TF members if they would consider such fuel suitable for the cold temperature test.

Vehicle manufactures will ask to their experts and give feedback in the next meeting.

It was indicated that other fuels such as CNG and ethanol blends should also be included in the list of reference winter fuels.

Technical Session

16:30	Contribution of EV group & Questions	Coordinator/ EV group	
17:00	Test and/or model for the analysis of OVC-HEV and PEV	Coordinator/ EV group (to be confirmed)	
17:30	Fuels: update	Suarez Bertoa (JRC)	



WLTP Subgroup EV to Supplemental Test Task Force

SG EV contribution Supplemental Test TF meeting

WLTP Low Temperature Values

Supplemental Test TF Meeting, 14./15.09.2017

DRAFT

WLTP: Low Temperature Values

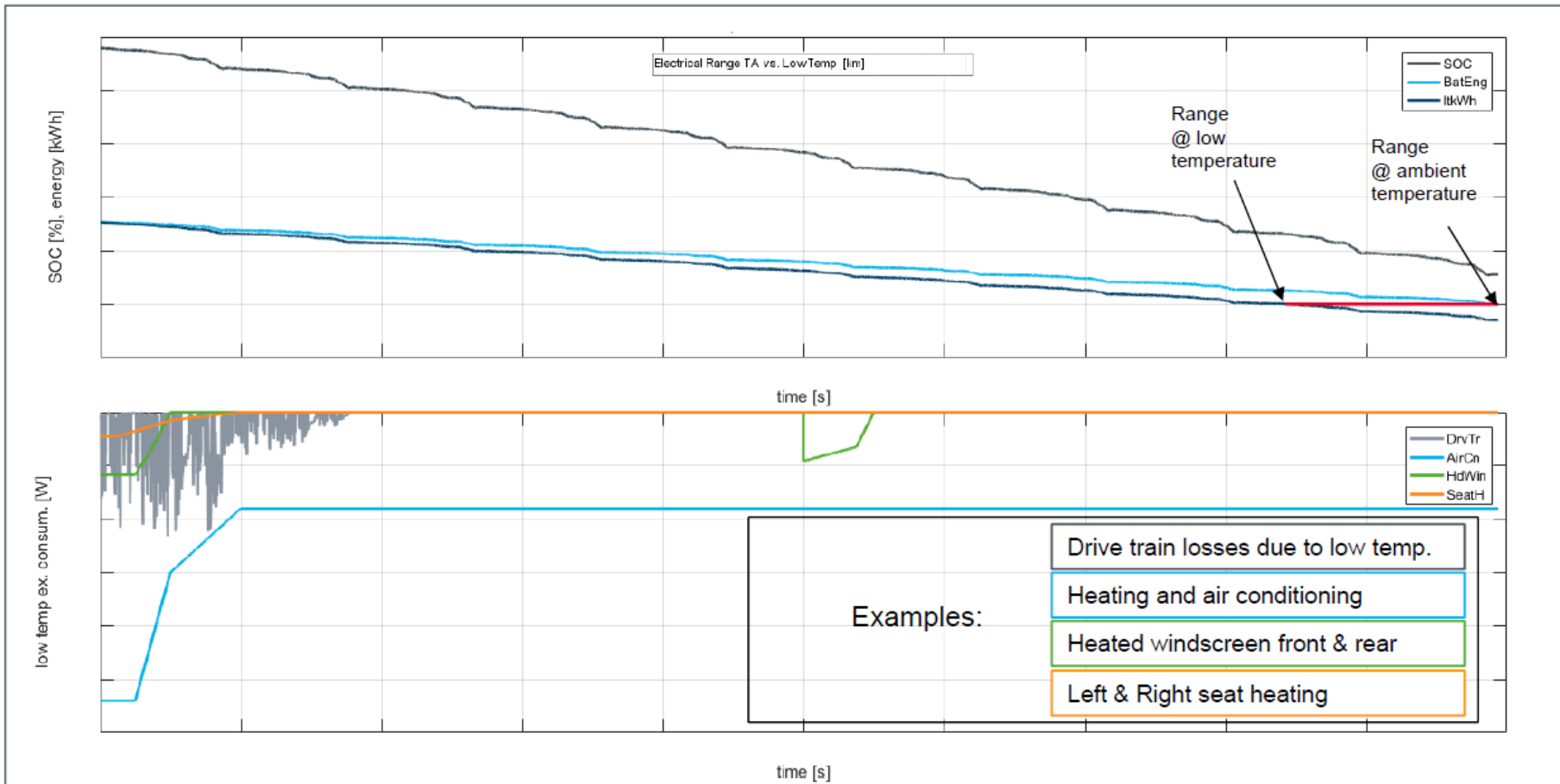
Possible scenario for PEVs – empiric simulation approach

- Proposal:
 - Type 1 Test Results are the basis for the empiric approach
 - Electric consumption of auxiliary devices has to be reflected in a simplified way and has to be based on component data sheets; functionalities of the considered auxiliary devices has to be reflected in a proper way (has to be communicated to the technical service but not to the other OEMs and to the public)
 - Electric consumption and the functionalities of the auxiliary devices will not reflect the best case for the manufacturer but also not the worst case; but values/functionalities have to be on a reasonable/realistic level
 - Manufacturer has always the option to perform a physical test instead of using this empiric approach if manufacturer has the opinion that vehicle is better than the empiric approach

DRAFT

WLTP: Low Temperature Values

Possible scenario for PEVs – empiric simulation approach



DRAFT

WLTP: Low Temperature Values

Possible scenario for PEVs and OVC-HEVs – de-rating factor of Type 1 values

- Proposal:

- Type 1 Test Results are the basis
- De-rating factors (which may have to be developed) are being applied on the Type 1 test results
- Manufacturer has always the option to perform a physical test instead of using the de-rating factors if manufacturer is convinced that the vehicle is better than the de-rated values

Questions from WLTP Subgroup EV to Supplemental Test Task Force OVC-HEV values

TF Terms of Reference wording concerning “range”

Terms of reference only talks about range

But which range?

- In case of PEV, there are 3 ranges:
cycle range (PER), city cycle range (PER_{city}) and phase specific ranges (PER_p)
- In case of OVC-HEVs, there are 8 ranges:
cycle ranges (AER and EAER), city cycle ranges (AER_{city} and $EAER_{city}$) and phase specific range ($EAER_p$)

DRAFT

Questions from WLTP Subgroup EV to Supplemental Test Task Force

OVC-HEV values

TF Terms of Reference wording concerning “CO₂”

Terms of reference only talks about CO₂

But which CO₂ value?

- In case of OVC-HEVs, there are 3 CO₂ values:
Charge-Depleting CO₂ value ($M_{CO_2,CD}$), Charge-Sustaining CO₂ value ($M_{CO_2,CS}$) and Weighted CO₂ values ($M_{CO_2,weighted}$)

GTR drafting process

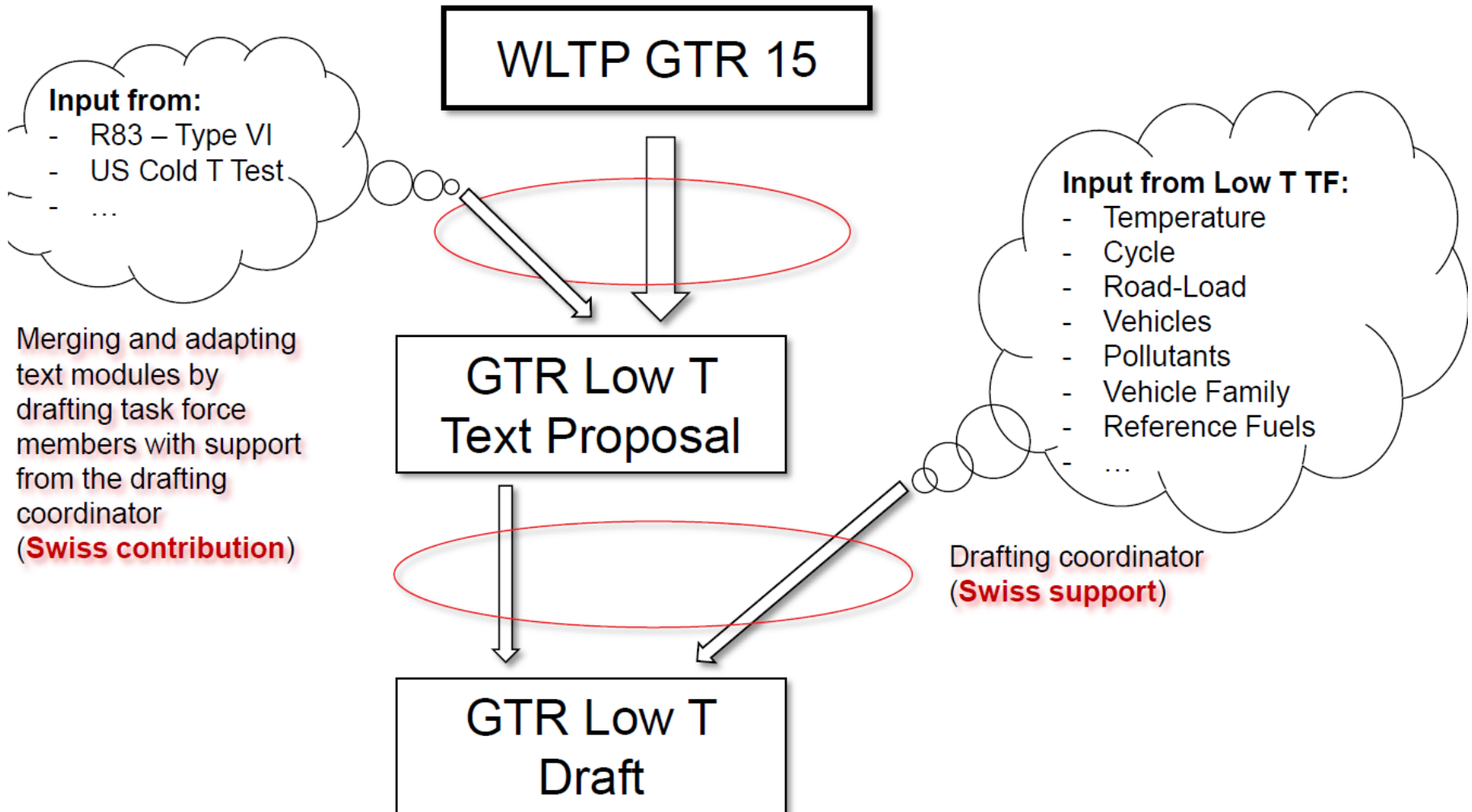
**Small group to deal with the
drafting process in the TF
(6-7 persons)**

**Drafting group will use GTR 15th as
reference**



Structural Approach

Test Procedure – Part for ICE Vehicles



Low and realistic Temperature Task Force:

Need for an extension

Ispra, September 14th 2017

COVA ASTORGA

DG Joint Research Centre

Directorate for Energy, Transport & Climate

Sustainable Transport Unit

