



Empowering  
the next level  
of e-mobility

CharIN – Charging Interface Initiative e. V.

34th GC ESC meeting

Julian Treichel (Porsche) - 27<sup>th</sup> June 2024, Brussels



# CharIN evaluation of ACER reactions on CharIN comments in public consultation

NC DC



NC DC/RfG	Priority	Content of ACER recommendation	Initial CharIN comment + ACER reaction	CharIN proposal
DC (+RfG)	Highest	<p><b>Article XX(3): LFSM-UC</b></p> <p>Charging power reduction required when grid frequency drops below threshold.</p> <ul style="list-style-type: none"> <li>• Reaction time: <b>0.5s</b> for up to 100% charging power</li> <li>• <b>Different frequency thresholds (49.8 Hz vs. 49.5 Hz) for Ireland and Nordic (RfG: only Ireland!)</b></li> </ul>	<p><u>CharIN</u> proposed to increase reaction time to <b>10s</b> as it is specified in EVSE communication standards.</p> <p><u>ACER</u> replied: Due to <b>system stability</b> reasons, ACER declined to change the reaction time. They require the <b>EV onboard charger</b> to implement the function without EVSE communication.</p>	<p>The EV onboard charger can only implement the LFSM-UC function if parameters are the same throughout whole Europe. Thus, the <b>frequency threshold must be 49.8 Hz in whole Europe</b>. Furthermore, due to technical limits, the reaction time shall be extended to <b>2 seconds</b> to align with NC RfG's LFSM-O-EV reaction time. The same change (2 seconds reaction time) shall apply for NC RfG's LFSM-U-EV. The frequency thresholds of NC RfG's LFSM-U-EV and NC DC's LFSM-UC shall be all aligned and the same.</p>
DC	High	<p><b>Article XX+2: Equipment certificates</b></p> <p>V1G electric vehicles and associated V1G electric vehicle supply equipment connected at a voltage level of or below 1000 V shall possess equipment certificates.</p>	<p><u>CharIN</u> asked <b>how moving vehicles shall present the certificate to the system operator</b>.</p> <p><u>ACER</u> stated that there is <b>no need</b> for the system operator to <b>check</b> EV's equipment <b>certificate</b>, if the EV is connected <b>&lt;1000V</b>.</p>	<p>Add: "The system operator <b>does not have to check the equipment certificate</b> of the V1G electric vehicle connected at a voltage level of or <b>below 1000 V</b>."</p>
DC + RfG	High	<p><b>NC DC Table (1)X.1.1 + NC RfG Table (4) x.1.1 : Under-voltage ride-through</b></p> <p>During a voltage drop, the EV+EVSE must stay connected for 0.15s if the grid voltage is still above <math>U_{ret}</math></p>	<p><u>CharIN</u> member Porsche commented that <b>state-of-the-art EV onboard-chargers can ride-through 0.35 pu</b>.</p> <p><u>ACER</u> saw technical possibilities for future EV onboard-chargers and even decreased the value from 0.15 pu to <b>0.05 pu</b> upon request by ENTSO-E and Terna Spa.</p>	<p>Change Under-voltage ride-through threshold <math>U_{ret}</math> back to <b>0,15 pu</b>.</p>

# CharIN evaluation of ACER reactions on CharIN comments in public consultation

NC RfG



NC DC/RfG	Priority	Content of ACER recommendation	Initial CharIN comment + ACER reaction	CharIN proposal
RfG	High	<p><b>Article 42(5) Compliance testing</b>                      The compliance of V2G electric vehicle and V2G electric vehicle supply equipment, shall be based on individual type-test certificates issued according to <b>Regulation (EC) No 765/2008</b> regarding the V2G electric vehicle supply equipment on one side and the <b>V2G electric vehicle homologated platform</b> [...]</p>	<p><u>CharIN</u> asked: Does this mean that the EV will also have to have a CE mark? CharIN comments: "V2G electric vehicle homologated platform": Here, an in-vehicle charging system, which can be used in different electric vehicle platforms, is meant.  <u>ACER</u>: The V2G electric vehicle should be certified attesting that the on-board converter is compliant [...]</p>	<ol style="list-style-type: none"> <li>1. Replace wording: V2G electric vehicle homologated platform → V2G electric vehicle <b>on-board converter</b></li> <li>2. Add: "The type-test certificate of the V2G electric vehicle <b>on-board converter</b> is referenced via vehicle homologation according to Regulation <b>(EU) 2018/858.</b>"</li> </ol>
RfG	Normal	<p><b>Article 13a(6) LFSM-O-EV + Article 13a(5) LFSM-U-EV:</b>                      In an overfrequency event, the EV+EVSE shall increase the active <b>power consumption</b> according to the LFSM-O characteristic.                      [...] from the current active power <b>input/output</b> automatically up to the maximum capacity [...]</p>	<p><u>CharIN</u> comment: RfG also includes <b>requirements for charging</b> within LFSM-O-EV and LFSM-U-EV for V2G EV+EVSE. Other requirements in RfG only refer to discharging (power injection).  <u>ACER</u> sees EV+EVSE as <b>energy storage</b>, thus charging requirements are included.</p>	<p>Accepting ACER's feedback, the technical <b>definition of <math>P_{ref}</math> is wrong</b>, since the definition only considers either power input (charging) or output (injection), not both. They need to be extended as follows:                      LFSM-U: "<math>P_{ref}</math> is the actual active power at the moment the LFSM-U threshold is reached. <b>If consuming active power, <math>P_{ref}</math> is added with the actual maximum power injection capability.</b>"</p>

NC RfG Article 13a 5. LFSM-U-EV:

(c) The frequency threshold shall be 49,8 Hz inclusive, except for synchronous area **IE** where the frequency threshold shall be 49,5 Hz inclusive;

NC DC Article XX 3. LFSM-UC:

(c) The frequency threshold shall be 49,8 Hz, except for synchronous areas **IE and Nordic** where the frequency threshold shall be 49,5 Hz.

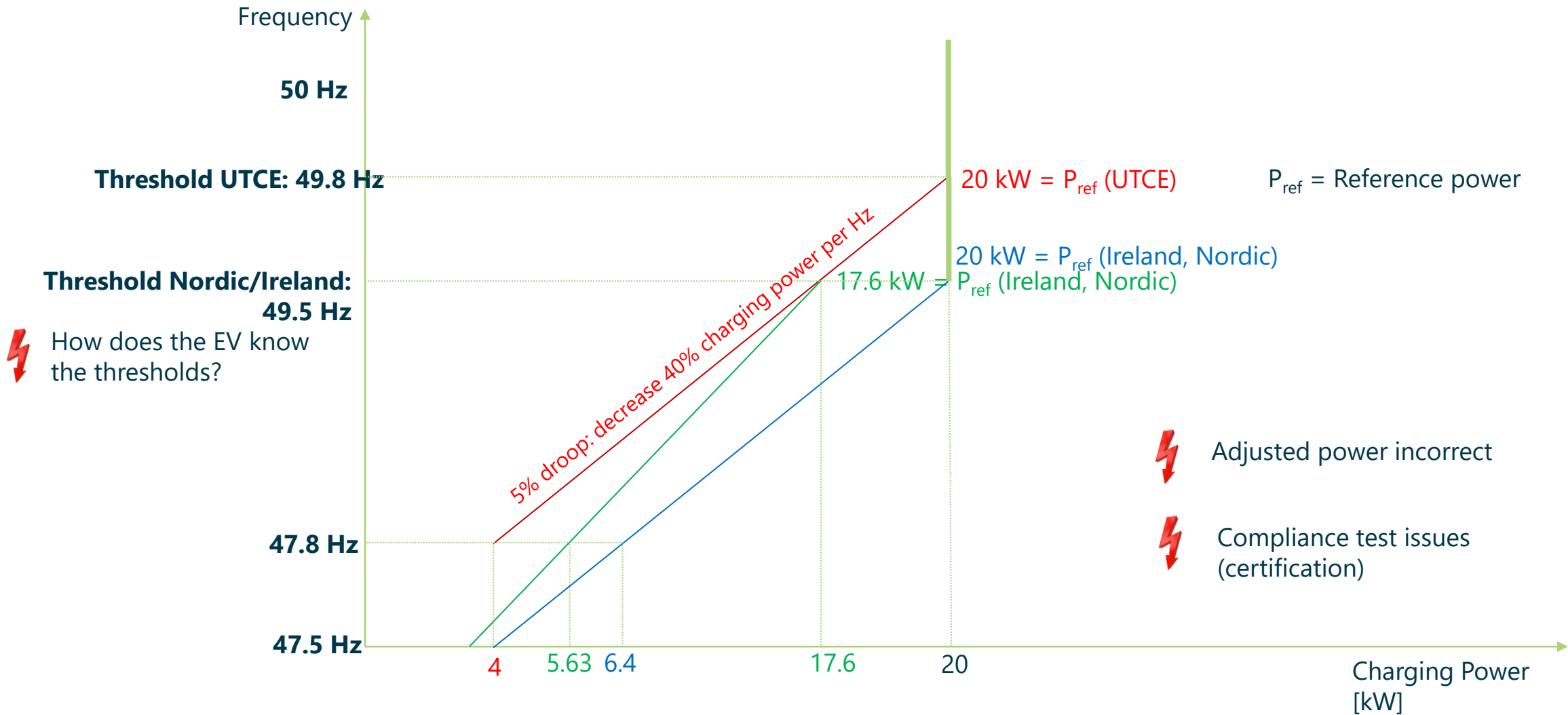
**Why was synchronous area Nordic included in NC DC for 49.5 Hz threshold in NC DC, but not in NC RfG?**

**Different thresholds are difficult to handle for moving EVs!**

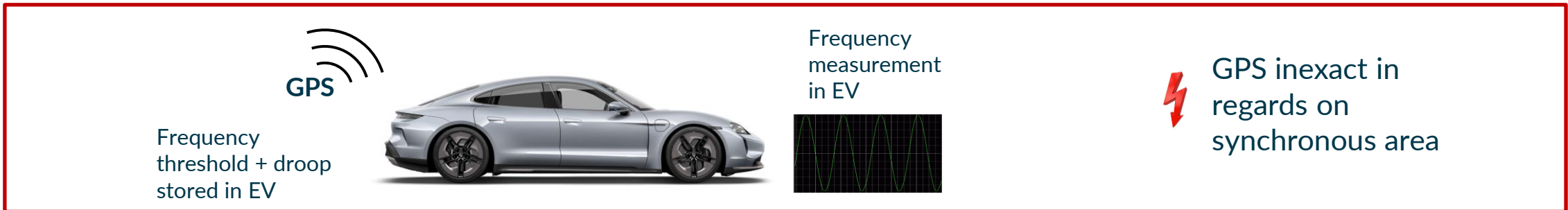
**Proposal to harmonize threshold to 49.8 Hz only in whole Europe for NC DC and NC RfG!**

# LFSM-UC: Limited Frequency Sensitive Mode — Underfrequency Consumption

Example for 20kW AC charging



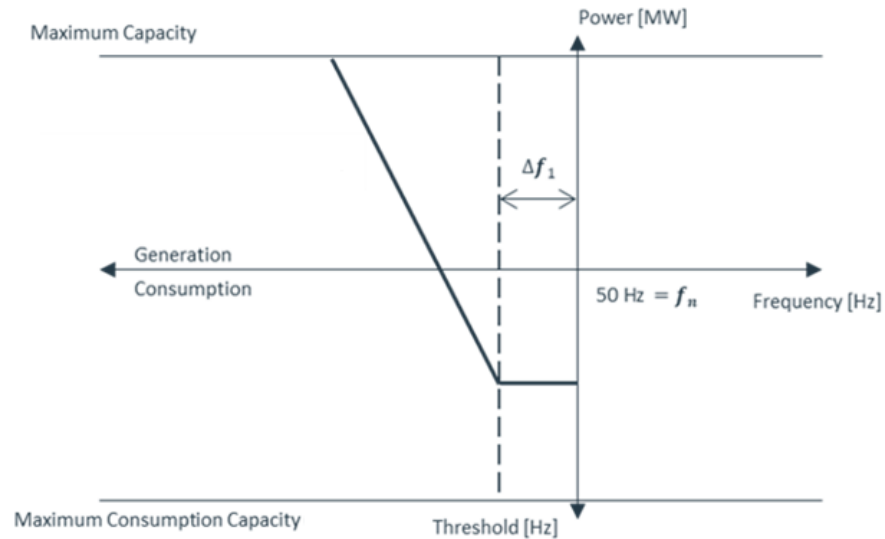
# LFSM-UC: Possible ways of implementation for AC charging – considering mobile EVSE



→ Harmonize thresholds!

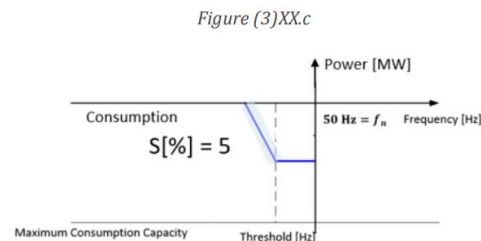
PWM: pulse-width modulation, VAS: value added services, GPS: Global Positioning System

Is this definition correct (NC RfG)?



P<sub>ref</sub> is the **actual active power** at the moment the LFSM-U threshold is reached.

... compared to NC DC:



P<sub>ref</sub> is the actual active power at the moment the LFSM-UC threshold is reached.

Definition of „new“ – what about existing EV and EVSE?

The meaning of “new” derives clearly from Articles 3, 4 and 71a of the NC RfG and Articles 3, 4 and 58a of the NC DC so as to avoid retroactive application.

Existing modules/equipment are defined as:

- already connected at entry into force of regulation
- purchase contract within **two years after entry into force**

Regulation applies **3 years after entry into force**.

How to understand this? And what about combinations of „old“ EVSE with „new“ EV? Or „new“ EVSE with old „EV“?

# Stricter accuracy requirements of frequency measurement compared to heat pumps

LFSM-UC for EV+EVSE:

(g) Requirements for frequency measurement:

- (i) Maximum measuring time window: 100 ms
- (ii) Accuracy:  $\pm 30$  mHz

LFSM-UC for heat pumps:

capable of a rapid detection and response to changes in system frequency. The total reaction time including frequency measurement shall be as fast as technically feasible but not higher than 300ms. An **offset** in the steady state measurement of frequency shall be **acceptable up to 0,05 Hz**.



- Is the understanding for existing and new EVSE and EV correct?
- Timeline:
  - Publish and enforcement in 2025 → 3 years transition → mandatory for sales after 2028
  - To do in this time range:
    - EG on EV certification
    - Adaption of EN 50549?
    - ISO (EV) and IEC (EVSE) standardization
    - OEM development and certification
  - Which additional transition periods does the EC plan for EV and EVSE?
- Is geofencing really necessary for LFSM-UC for EVs or could different thresholds be ignored?
- How to participate in „Have your say“ survey?

# Thank you for your kind attention!

## Any questions?

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