ENSURING CO$_2$ AND AFID REVIEWS GO HAND-IN-HAND

31 May 2021

May 2021
PREAMBLE

• “e-mobility uptake is linked to the availability of affordable and easily accessible charging“ (Frans Timmermans, March 19th 2021)

• It is a logical next step that a further strengthening of a fleet-regulation needs to be accompanied by a strong AFID regulation with appropriate distribution and binding roll-out plans for each Member State.

• An European wide charging and refuelling infrastructure is a mandatory precondition to achieve the CO2-targets and to support market uptake and customer acceptance of E-mobility.

• The Commission announced 1 million public charging points to be necessary in 2025 and 3 million by 2030 to achieve the actual -37.5% CO2-fleet target for passenger cars.

• A further decrease of CO2 emissions to -50% in 2030 for passenger cars requires around 6 million publicly available infrastructure points based on calculations published by the Commission.

• In addition to public charging vans will have an increased demand for semi-public or private charging to achieve higher CO2 2030 targets and beyond.

• Through AFID review in June 2021 mandatory targets for member states related to the CO2 fleet emission targets have to be established.
PROPORTIONALITY PRINCIPLE
OBJECTIVES

• Having clear split between CO2 file and AFID reviews, but ensure that proposed CO2 target are calibrated to corresponding AFID proposal.

• Ensure appropriate AFID proposal with binding infrastructure targets for member states that is aligned to an ambitious given CO2 target and earmark appropriate investment budgets within the framework of the EU recovery funds.

• Additional supportive measures to be expected within EPBD review and propose simple solution that provides also flexibilities for the member states within AFID review

• Validity both for passenger cars and to appropriate extent to vans
OBJECTIVES

- The growth of the infrastructure is not keeping pace with the rising demand for electric vehicles.

- Public, standardized infrastructure are important to enable high e-driving shares and seamless travelling across Europe.

- Ensure sufficient infrastructure for increased CO2 ambition level
BACKGROUND ASSUMPTIONS – INFRASTRUCTURE INCREASE RATIO

- Current targets for PC required around 3mil infrastructure point (IP)
- The 50% target/50% benchmark for PC requires around 6 mil. IP
- This leads to simplified ratio of 200,000CP extra needed for 1% additional CO2/benchmark ambition level
- Industry is willing to accept higher CO2 targets provided there is a sufficient number of infrastructure points available.
- AFID has to ensure binding infrastructure targets for the member states which are aligned to a given CO2 target in 2030.
BACKGROUND ASSUMPTIONS – LINKING INFRASTRUCTURE TO THE CO₂ TARGET FOR PASSENGER CARS

Public infrastructure points

50% target / benchmark

37.5% target / benchmark
3 Mio. IP in 2029
(COM assumption - baseline)

15% target / benchmark
1 Mio. IP in 2024
(COM assumption)

today
226.000 IP
(1:10)
LINKING INFRASTRUCTURE TO THE CO2-TARGET FOR THE PASSENGER CARS

Automotive industry is committed to ambitious CO2 targets which have to be ensured by a corresponding and binding AFID regulation.

Proposal of a formula ensuring calibration between binding infrastructure targets in the AFID and CO2 targets:

\[
\text{EU fleet-wide target}_{2030} = \text{EU fleet-wide target}_{2021} \cdot (1 - \text{reduction factor}_{2030} - \text{reduction factor cp2029})
\]

\[
\text{reduction factor cp2029} = \frac{\text{Public infrastructure points 2029} - 3.000.000}{200.000}
\]

Example: AFID will agree on a 5mil charging points across the EU:

\[
\text{EU fleet-wide target}_{2030} = \text{EU fleet-wide target}_{2021} \cdot (1 - 37,5 - \frac{5\ 000\ 000 - 3\ 000\ 000}{200\ 000}) = \text{overall target of 47,5\% CO2 reduction/benchmark}
\]

Advantage: Keeping split clear targets in the CO2 Regulation for OEMs and clear targets for member states in AFID.
AFID REVIEW – FIXING CORRECT AMBITION LEVEL
ESTIMATION OF THE NEEDS

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Plug-in hybrid vehicles (PHEV)</th>
<th>Battery Electric Vehicles (BEV)</th>
<th>Total PHEV + BEV</th>
<th>Number of public charging points (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>16,494</td>
<td>9,780</td>
<td>26,274</td>
<td>2,627</td>
</tr>
<tr>
<td>40%</td>
<td>21,331</td>
<td>12,256</td>
<td>33,587</td>
<td>3,359</td>
</tr>
<tr>
<td>45%_40%ZLEV</td>
<td>35,906</td>
<td>27,086</td>
<td>62,992</td>
<td>6,299</td>
</tr>
<tr>
<td>50%</td>
<td>27,584</td>
<td>15,394</td>
<td>42,978</td>
<td>4,298</td>
</tr>
<tr>
<td>50%_30%ZLEV</td>
<td>29,008</td>
<td>23,481</td>
<td>52,489</td>
<td>5,249</td>
</tr>
<tr>
<td>50%_50%ZLEV</td>
<td>10,768</td>
<td>49,499</td>
<td>60,267</td>
<td>6,027</td>
</tr>
<tr>
<td>75%</td>
<td>61,035</td>
<td>27,158</td>
<td>88,193</td>
<td>8,819</td>
</tr>
</tbody>
</table>

Table 5: 2030 Projected number of EV and number of public electric charging points

ESTIMATION OF NEEDS – OVERALL POWER NEEDED (PC)

Assumptions:

- EU average on mileage per year: **12,000 km/year**¹
- EU average consumption: **20 kWh/100km**²

• According to the COM estimates, for scenarios reaching targets of:
  - current targets (37.5% CO2 target and 35% benchmark) – will lead to cca 72 TWh needed
  - 45% CO2 target + 40% benchmark – 168 TWh needed
  - 50% CO2 target only – 113 TWh needed
  - 50% CO2 target + 50% benchmark
  - 75% target – 230 TWh needed

1) EU average (as for example used in reced BEUC study – https://www.beuc.eu/publications/electric-cars-already-cheapest-option-today-many-consumers-new-study-finds/html). Of course, values for different powertrains and member states may differ
2) Conservative estimates
3) This represents almost 5% of the overall electricity generated in the EU

144 TWh needed (60 mil vehicles x 2400 kWh/year)³

Scenario to be used

Shift to -50% CO2 target
ESTIMATION OF NEEDS – ACEA FULLY BACKS THE CALCULATIONS BY THE COMMISSION (PC)

ACEA internal calculations
Parameter (excerpt):
- yearly driving distance
- average consumption
- number of charging events per day
- average charging time
- daily energy supply
- ...
- Utilization Factor
- Public Share 36% of energy demand

German NPM Model
Parameter (excerpt):
- yearly driving distance
- average consumption
- number of charging events per day
- average charging time
- daily energy supply
- ...
- Detailed consumption calculation per vehicle
- Dynamic model-based utilization factor
- Public Share 38% of energy demand

All calculations confirm ~ 6,00 mio charging points

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Parameter (excerpt):
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- average consumption
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- average charging time
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- ...
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AFID (2014)
assumptions

Ratio 1/10
public/private

German NPM Model

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- average charging time
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- ...
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60 mio xEVs

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All calculations confirm ~ 6,00 mio charging points
Key challenges:

- More EVs will require more charging events from the public charging points as private charging points become limited (e.g. in cities).
- This would also lead to higher demand for DC charging (more convenient for customers), which could partially compensate that effect.
- These trends need to be reflected in the overall number of publicly available charging points in the future (still keeping conservative ration 1:10 between public and private charging points).
MORE EVS WILL REQUIRE HIGHER SHARE OF PUBLIC CHARGING

Change in public charging share:

- Higher EV share incorporates that all customer segments have to be covered. ~50% in EU have no access to private charger
- Additional public charging due to longer distance trips (highway) or better public usability of about 10%
- High EV market penetration and fragmented product/service offering of market players in charging & energy sector.
- Decreasing EV costs and increasing importance of home replacement charging
- Shift focus from AC to Public DC/ HPC, approach to use case "refueling"
- Strict regulation on ICEs in scope of "Green Deal" with successive withdrawal of subsidy amounts for EVs, HW, SW
- Decentralization of electricity and fluctuating power generation with high relevance of balancing methods (incentive mechanisms load shifting, energy storage and optimization).

-37.5% CO2 reduction baseline and 30 Mio. xEVs for 2030

-50% CO2 reduction and increased to 60 Mio. xEVs for 2030 for PC
EXPECTED REAL FUTURE DEMAND WILL INCREASE

- Based on higher demand of public share - 60% of 144TWh means public charge demand of 86TWh
- This influences the number of charging points needed
- Overall demand can be supplied by different structure of AC and DC charging points (e.g. through “substitution factor”)

![Graph showing #chargers over time]

<table>
<thead>
<tr>
<th>Year</th>
<th>Less high power chargers</th>
<th>Reference from the Commission</th>
<th>More high power chargers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>xxx Mio.</td>
<td>6,00 Mio.</td>
<td></td>
</tr>
<tr>
<td>2025</td>
<td>distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>distance</td>
<td></td>
<td>distance</td>
</tr>
</tbody>
</table>
EXAMPLE OF THE SUBSTITUTION FACTOR WITHIN AFID

• Substitution factor might be included (example)

<table>
<thead>
<tr>
<th>Power class¹</th>
<th>Charging current</th>
<th>1 AC CP</th>
<th>≙ 1,0 AC CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC (DC)</td>
<td>≥ 125 A</td>
<td>1 FC (DC)</td>
<td>≙ 1,5 AC CP</td>
</tr>
<tr>
<td>UFC (DC)</td>
<td>≥ 250 A</td>
<td>1 UFC (DC)</td>
<td>≙ 3,0 AC CP</td>
</tr>
<tr>
<td>HPC (DC)</td>
<td>≥ 500 A</td>
<td>1 HPC (DC)</td>
<td>≙ 6,0 AC CP</td>
</tr>
</tbody>
</table>

¹) Power class based on Position Paper/Recommendation of Charging Interface Initiative e.V., DC CCS Power Classes V, 2022/04

• This will:
  o Lower overall number of charging points needed on the national level based on higher quality
  o Gives flexibilities to the member states reflecting quality of the charging infrastructure
Required public charging points @ -50.0% CO2 reduction for PC with 60% energy demand for the public charging points

**2030**

**Scaling to 60 Mio xEVs**

**Shift to 60% public share**

Reference 30 Mio xEVs
35% public

Reference 60 Mio xEVs
35% public

Real public demand
for 60 Mio xEVs
60% public

Example for a potential bandwidth

Substitution factors for model (example)

1 AC CP $\equiv$ 1.0 AC CP
1 FC (DC) $\equiv$ 1.5 AC CP
1 UFC (DC) $\equiv$ 3.0 AC CP
1 HPC (DC) $\equiv$ 6.0 AC CP

**Public share**

35%
60%

**AC/DC share**

Medium DC share
Lower DC share
Higher DC share

Lower DC share
Higher DC share
VALUE ADDED OF THE SUBSTITUTION FACTOR

• The overall target per member state is defined as the required number of 11kW AC charging points.

• The substitution factor supports keeping baseline of 6mil charging points on EU level which corresponds to 50% CO2 Regulation ambition level.

• If member states decide to establish DC charging, the substitution factor works as a multiplier. It adjusts the number of charging points needed to meet a member state’s overall AFID infrastructure target.

• Overall the quality of infrastructure for consumers can be improved and member states which decide for high quality charging are incentivized.

• This approach should be considered as part of the AFID review proposal 2021, could be further fine-tuned for foreseen review in 2024/2025.
AFID REVIEW – OTHER ISSUES
• Regular monitoring of the CP (via Eurostat or endorsed and improved EAFO). Best on a quarterly basis – this provides clear picture about trends

• Monitoring need to follow qualitative parameters of the infrastructure points (e.g. power, accessibility)

• Binding targets for 2024 and 2029 should be accompanied by other qualitative requirements ensuring EU-wide equal distribution and quality of the infrastructure (e.g. max 50km till 2025 and max 30km till 2029 between fast charges on the key roads)

• Full and EU-wide implementation of the communication standards (especially ISO15118 mandatory for all charging points)

• The CO2 targets for vans should be treated differently because for these vehicles there will be additional needs such more need for semi-public or private charging due to different charging behaviour (e.g. within EPBD review provided that AFID focuses only on public charging points)
SUMMARY

• Several calculations confirm 6mil charging points needed for 50%/50% CO2 passenger cars targets (Commission’s figures – baseline scenario)

• Future increase in public charging share needs to be reflected

• Substitution factor can make qualitative change and increase mandatory target acceptance

• Example of substitution factor to be included
  AC charging point = 1 point
  FC (DC) charging point = 1,5 points
  UFC (DC) charging point = 3 points
  HPC (DC) charging point = 6 points
ACEA represents the 16 major Europe-based car, van, truck and bus manufacturers

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