



INSTITUT LUXEMBOURGEOIS
DE RÉGULATION

RESULTAT

DE LA CONSULTATION PUBLIQUE DU 30 MAI 2025 AU 08 JUILLET 2025 PORTANT SUR L'ÉVALUATION DE LA CONTRIBUTION POTENTIELLE DE L'INFRASTRUCTURE DE CHARGE À LA FLEXIBILITÉ, À L'AUGMENTATION DE LA PART D'ÉLECTRICITÉ RENOUVELABLE ET À LA RÉDUCTION DES COÛTS POUR LE SYSTÈME ÉLECTRIQUE

LUXEMBOURG, LE 24 SEPTEMBRE 2025

SECTEUR ÉLECTRICITÉ

L'article 15, paragraphe (3) du règlement (UE) 2023/1804 sur le déploiement d'une infrastructure pour carburants alternatifs et abrogeant la directive 2014/94/UE (ci-après « le Règlement » ou « the regulation ») impose aux États membres d'évaluer la façon dont le déploiement et l'exploitation de points de recharge pourraient permettre aux véhicules électriques de contribuer davantage à la flexibilité du système énergétique, y compris leur participation au marché de l'équilibrage, et à une meilleure absorption de l'électricité renouvelable. Cette évaluation tient compte de tous les types de points de recharge, y compris de ceux qui proposent une recharge bidirectionnelle et intelligente, et de toutes les puissances de sortie, qu'ils soient ouverts au public ou privés. Considérant que chaque État membre peut demander à son autorité de régulation de procéder à cette évaluation, le ministère ayant l'Energie dans ses attributions a confié cette tâche à l'Institut Luxembourgeois de Régulation (ci-après « ILR »).

Le paragraphe (4) du même article impose au régulateur d'évaluer la contribution potentielle de la recharge bidirectionnelle de véhicules à la réduction des coûts du système électrique et des utilisateurs ainsi qu'à l'augmentation de la part d'électricité renouvelable dans le système électrique.

Le présent document évalue les contributions transmises dans le cadre de la consultation publique du 30 mai 2025 au 08 juillet 2025 sur une étude combinant les analyses imposées par l'article 15 précité et portant le titre « Contribution of Electric Vehicle Chargepoints to the Flexibility of the Luxembourgish Energy System and the Absorption of Renewable Energy ».

Considérant que l'étude ainsi que les contributions reçues sont rédigées en langue anglaise, l'évaluation des contributions seroient également formulée en langue anglaise.

Evaluation of responses received as part of the public consultation organized by ILR

ILR received a contribution from Creos Luxembourg S.A. (hereinafter: “Creos”) and a contribution from Enovos Luxembourg S.A. (hereinafter: “Enovos”). Both contributions will be published in full together with this consultation closing report.

Creos

Creos appreciates the comprehensive analysis performed by Cenex but emphasizes that the assumptions and results presented in this report constitute an absolute upper boundary scenario for theoretical flexibility potential. Creos argues that practically available flexibility will be considerably lower given numerous technical and practical constraints encountered in real-world applications. The main recommendations and feedback are listed below:

➤ ***Clarification that the simulation results represent optimistic upper boundary estimates of the theoretical flexibility assessment.***

Clarifications were added throughout the document, namely in the executive summary, as asked by Creos.

➤ ***Perfect foresight optimisation***

Creos welcomes that a disclaimer was included in the executive summary noting that the perfect foresight model represents an idealised assumption and that results presented are optimistic and should be viewed as a theoretical upper bound on what is possible.

They expect that technical limitations like forecasting inaccuracies and unpredictable user behaviours would significantly reduce achievable flexibility.

Further clarifications regarding the perfect foresight model as well as simplifications and technical limitations were added in chapter 3.1.

➤ ***Low demand scenario for 2030***

Creos noted that the annual peak demand forecast of 860 MW for 2030 referred to in Table 18 (page 41) seemed too low compared to the 2023 Creos Scenario Report. Creos also references the not yet published, updated version of the Scenario Report, projecting evening peak demand to range between 1484 MW (low estimate) and 1751 MW (high estimate) by 2030.

Cenex points out that they did not use the forecast peak power of 860 MW (Creos without Sotel, excluding EV charging demand) for 2030, but 1.290 MW (Creos without Sotel, including EV charging demand). Including Sotel the demand increases to 1.550 MW. This has been clarified in the report in section 4.2.4.

Cenex acknowledges the updated energy demand forecasts of the updated Creos Scenario Report 2040 and notes that they only had the 2023 version of the report available at the time of the analysis.

➤ ***Optimistic plug-in behaviour***

Creos regrets that the simulations in the executive summary rely exclusively on the highly optimistic “incentivized plug-in” scenario and that none of the alternative plug-in behaviours have been applied for the network deferral simulations.

Cenex points out that most of the results presented in this report consider the “Incentivised” plug-in behaviour in order to demonstrate the potential of what smart charging and V2G could achieve in terms of flexibility (the “art of the possible”).

However, sections 3.3.4 and 4.3.5 show a sensitivity analysis including the other two behaviours too. Simulating all plug-in behaviours for all optimisation objectives would have required a significantly more extended project scope. Recent demand-side response trials in the UK have demonstrated that plug-in frequency and duration were significantly increased via incentivisation through availability payments (increase in plug-in time was 18-26% compared to non-incentivised).

➤ ***Simplified network reinforcement deferral simulation***

Creos points out that numerous simplifications with enormous impact on the final results have been assumed in the network reinforcement deferral simulations, such as:

- Necessary grid capacity to distribute the electricity demand within the regions
- Ignoring necessary safety margins for network capacities
- Compliance with N-1 security criterion for demand
- Network operators don't have full control over EV flexibility
- Potential negative impacts on the network capacity requirements until 2050

Cenex explains that a detailed modelling of low to mid voltage networks within each of the six regions would have been a significant undertaking and that only a very high-level analysis was within the project scope.

During the meeting with Creos in January 2025 safety margins were not mentioned, perhaps because the intention of the exercise was not to carry out detailed grid modelling. However, Cenex agree that these margins should be considered in future versions of the study.

Clarifications were added in the executive summary as well as in chapter 3.1 and 4.3.3, explaining that several simplifications were made in order to not exceed the scope of the tender. Nevertheless, ILR is of the opinion that the results of the assessment form a sufficiently robust basis to be used by the government to develop appropriate measures on recharging point deployment and to be taken into account by system operators in their network development plans, in accordance with article 15 paragraph 3 of the regulation. Further iterations of the study could cover a more detailed modelling process that could facilitate electricity network forecasting and planning of grid reinforcements or upgrades.

➤ ***Charging power assumptions***

Creos states that the assumed charging power in the report (see Figure 3) is technically and practically impossible and expects that more realistic dwell times and charging power assumptions would drastically change the results in the report and advise that these assumptions should be revised for future simulations.

As highlighted throughout the document, the assumptions and simulation results represent optimistic upper boundary estimates of the theoretical flexibility assessment. As proposed by Creos, dwell times and charging power assumptions can be revised for future simulations.

➤ ***Mutual exclusiveness of cost saving results for energy market, grid services and network reinforcement deferral***

It was clarified in the executive summary and in chapter 4.3.2 that energy price optimisation and grid service provision could put additional strain on the grid under certain circumstances. These two actions could hence counteract an optimisation of EV charging for network reinforcement postponement. Therefore, although savings from energy price optimisation and grid service provision can be cumulated, they cannot be cumulated with savings from network reinforcement postponement.

Enovos made three main contributions concerning the following:

1. Assumptions taken for this study should be reassessed for a more realistic result
2. Strong potential for EV charging infrastructure to contribute to flexibility if certain barriers & challenges are overcome
3. Suggested measures to create a holistic ecosystem for buildings and mobility enabling the contribution of EV charging to system flexibility

As comments 2 and 3 mainly represent overall positions on the potential for EV charging infrastructure and existing barriers and do not directly propose amendments to the content of the report, only the first comment shall be discussed below.

Enovos considers that the assumptions taken for this study are overly optimistic and should be reviewed to consider certain practical constraints. The following examples were given:

1. Assumption that all Luxembourg residents that have access to private parking also have access to private charging stations
2. Assumption that all V2G compatible vehicles also have a V2G capable charging point
3. Assumption that batteries will charge until they are full
4. Assumption that all EV drivers will be willing and capable to engage in flexibility programs

As already highlighted in the answers to the comments from Creos, the assumptions and simulation results represent optimistic upper boundary estimates of the theoretical flexibility assessment. It is for this reason, that the assumptions from point 1, 2 and 4 were taken. As explained in the outlook (see below), a next iteration of this study could address some of the limitations of this report and provide a more realistic approach.

Cenex agrees that many drivers may not charge their EVs always up to 100%. Indeed, some manufacturers prevent this by reserving some of the capacity making it invisible to the user. The assumption of charging until full was only made for the unmanaged charging case and not for smart charging. This assumption was made to create a simple unmanaged baseline on which the other results can be compared.

Outlook

The regulation foresees that the assessments imposed by article 15 (3) and (4) must be repeated every 3 years by Member States in order to identify appropriate measures for the deployment of additional recharging points. In addition to the comments from Creos and Enovos, an outlook for a second iteration of the report was added in chapter 5.1.

This next iteration of the report could address some of the limitations caused by the simplifications and assumptions required by the present analysis, like for example:

- including technical and practical limitations
- updated electricity demand scenarios
- more detailed simulations of the Luxembourgish grid
- projections going out to 2040 or 2050
- co-optimised modelling, balancing out the often competing objectives from cost optimisation, peak power optimisation and increased absorption of renewables.