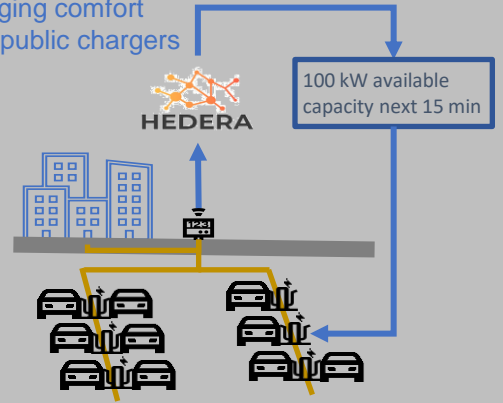


SUCCESS CASE 9.2024

Grid Aware Charging

EMPOWERING GRID FLEXIBILITY WITH DYNAMIC CHARGING SOLUTIONS

- 95% charging comfort
- 3 times # public chargers



THE CHALLENGE

In the pursuit of a more sustainable mobility system, the **electrification of transportation** poses challenges to grid stability. Rising electric vehicle (EV) usage leads to increased electricity demand characterised by large peaks. These charging peaks add a significant strain on **grid congestion**, especially in low voltage (LV) grids. Additionally, the reliability of public EV charging represents an important societal value but poses the challenge of scaling up public charging infrastructure with adequate charging speed while safeguarding the grid constraints.

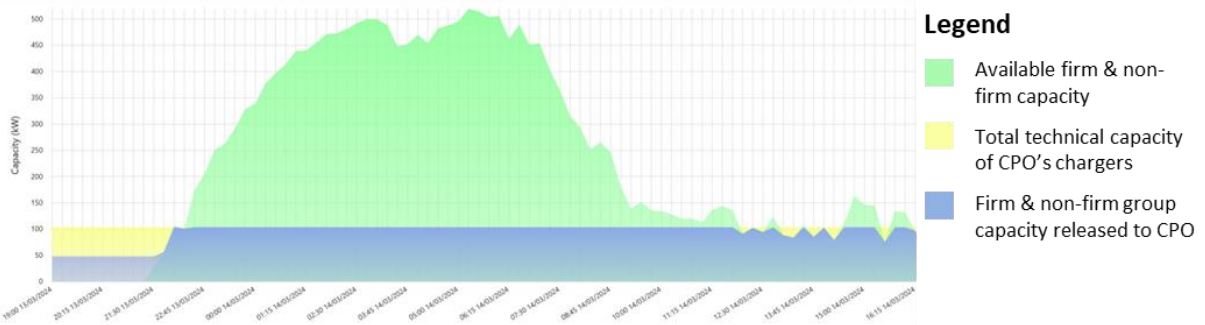
THE SOLUTION

For a given LV grid connected to a given MV/LV transformer, Alliander offers a **group contract** to a single Charging Point Operator (CPO). This contract is characterised by a **firm group capacity** for all the CPO charging points connected to this LV grid. This firm capacity is guaranteed 85% of the time and released on the day ahead. The CPO is then left free to allocate this firm capacity dynamically and in real-time to the various charging points based on user requests, comfort and own contractual conditions. The firm group capacity is significantly smaller than the sum of the technical charging capacity of each charging point so more public chargers can be connected to the LV grid without overload risks. Additionally to the firm group capacity and according to the current grid status, Alliander can release **near real-time additional non-firm capacity** which the CPO is allowed to use for free.

To assign the group capacity to the CPO, Alliander developed the **HEDERA** (*Hub for Energy Distribution and Excess Resource Allocation*) application in system operations. HEDERA addresses the critical challenge of managing grid congestion and optimising energy distribution across various applications, also taking into account the requirements of CPOs for EV charging. Essentially, HEDERA calculates operational constraints within the grid and **effectively**



communicates the available firm and non-firm capacity to the involved market participants. HEDERA ensures reliable charging experiences while safeguarding grid stability. The iterative process of calculation, communication, and adjustment orchestrated by HEDERA allows mitigating congestion and preventing overloads in the grid. This enables CPOs to dynamically adjust the charging capacities of EV charging stations in response to near-real-time grid conditions.



Example of HEDERA capacity allocation to the CPO based on available grid capacity. The extra non-firm capacity released at night (in green) and the dynamic limitation of allocated capacity during day and evening hours are clearly visible.

MAIN ACHIEVEMENTS

- The combination of the group capacity approach and the extra near-real-time release of non-firm capacity allows offering a **charging comfort above 95%**, meaning that over 95% of the individual charging sessions conclude with the same state of charge as they would have with an uncontrolled 11 kW capacity.
- This grid-friendly charging approach enables the **installation of extra public charging points in the existing LV grid up to a factor of three** while complying with grid constraints and providing acceptable charging comfort levels.

KEY SUCCESS FACTORS

- **Adaptive Grid Integration:** Alliander’s adaptive grid integration capabilities enable seamless coordination between EV charging and grid operations. These ensure reliable and efficient charging experiences for EV owners while future-proofing the grid against evolving demand patterns.
- **Collaborative Ecosystem:** Through collaboration in driving the adoption of grid-aware charging solutions through strategic partnerships with industry leaders and government agencies, Alliander fosters knowledge exchange, innovation, and standardisation in the EV charging ecosystem.

WAY FORWARD

Alliander and the other Dutch DSOs are working together with municipalities to make grid-aware charging the **national standard for public charging**. Municipalities are incorporating this in their public charging tenders as an obligation towards the CPOs. The drafting of a national standard on contracts, technology and communication between the DSO and the CPO is in its initial phase.