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In the quest for sustainable development and integration of renewable energy sources, electric vehicles (EVs) can play a pivotal role. EVs, however, are not primarily designed and utilized for supporting the electrical grid: it is necessary to close the gap between power system needs and cars' properties. With this in mind, the ACES (Across Continents Electric Vehicle Services) project, a Danish funded research project, was started as collaboration between DTU, Nissan, Bornholm Energi og Forsyning and NUVVE. The project investigates techno-economic system benefits of large-scale electric vehicles integration in Bornholm, augmented by real usage patterns, grid data and field-testing for across continents replicability. This abstract gives a brief overview of the mid-term results on EVs providing both system wide and local grid services. The indicated references and the project website report further details: www.aces-bornholm.eu

When looking at the system level, EVs bidding into the ancillary services market, specifically frequency control, can be very remunerative, up to 10000 DKK/y. However, the need for extra equipment such as a bidirectional charger, the cost for associated losses and need to fulfill bid requirements can drastically reduce the profit [1]. The work in [2] proves that EVs can effectively replace conventional power plants for supporting more renewables into the power system. On the other hand, at the distribution grid level, by considering pseudo-real Japanese and Danish driving and charging patterns, it is highlighted how a 100% EV penetration would determine an evening peak concurrency factor equal to 40% for a 3.7 kW charge level [3]. The average distribution grid in Denmark would be able to handle a 50% EV scenario, though safety margins are reduced. Smart charging options can, however, increase the hosting capacity and avoid grid reinforcements [5].

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