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V4Grid

Economic viability and business models for V2X

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V4Grid examines how bidirectional electric vehicle charging can create value in Hungary, Slovakia, the Czech Republic and Poland. The assessment identifies vehicle-to-building applications as the most promising initial deployment route under its assumptions. Household applications are more attractive as upgrades to existing energy systems, while grid services require dependable aggregated capacity and suitable commercial arrangements.

The findings are scenario-based projections. No pilot operating data was available for this economic assessment, so the results do not demonstrate realised savings, revenues or investment returns.

Scope and assessment method

The report compares vehicle-to-home (V2H), vehicle-to-building (V2B) and vehicle-to-grid (V2G). It combines equipment and operating cost categories with potential value from greater use of local solar electricity, lower building demand peaks, changes in the timing of energy purchases and participation in grid flexibility services.

The assessment distinguishes published external information, industry inputs and project assumptions. It compares the full cost of an installation with the additional cost of bidirectional capability where ordinary charging infrastructure would already be installed. This distinction helps decision-makers identify which costs and benefits are attributable to V2X. Sensitivity analysis explores how changes in key assumptions affect the conclusions.

Main findings by application

Vehicle to building. Commercial sites offer the strongest near-term case in the model where vehicles are connected during periods of high building demand and tariffs reward peak reduction. Suitable sites should be selected using actual load patterns, connection arrangements and fleet schedules. The projected advantage is conditional on these local characteristics.

Vehicle to home. The assessment finds a weaker case for a complete new installation justified solely by energy savings. Adding bidirectional capability to a home with existing solar generation and energy management can improve the economics. Value still depends on when the vehicle is available and how much additional solar energy can be used locally.

Vehicle to grid. Grid-facing services depend on reliable availability, market eligibility and the costs of coordination. Aggregation can provide a route to market and spread service costs, but fleet size alone does not establish profitability. Commercial terms and delivery obligations must be assessed alongside the energy opportunity.

Conditions for viable deployment

The V4 countries cannot be treated as one commercial setting. Tariff structures, connection conditions and market-access arrangements influence the value of each application. The assessment framework can transfer across countries, but local inputs and permissions need confirmation before investment. Potential regulatory improvements should be treated as scenarios rather than guaranteed benefits.

Gross revenue and avoided electricity expenditure must be assessed against installation, integration, maintenance, conversion losses, battery use and service-provider costs. Combining revenue streams requires checking that the same capacity is not committed to incompatible services. Vehicle mobility requirements and equipment limits constrain the flexibility that can be offered.

Business models and participant responsibilities

Vehicle and fleet owners provide flexibility within agreed mobility requirements. Building operators coordinate site demand and infrastructure. Charging and energy-management providers operate the technical service, while aggregators or other market intermediaries can support access to external energy and flexibility markets.

Commercial agreements should define availability, required departure energy, operational responsibilities, payment arrangements and the treatment of missed delivery. Transparent allocation of value and costs is necessary for a service that is acceptable to vehicle users as well as site operators and market partners.

Recommended next steps

Prioritise V2B assessments at sites already planning charging infrastructure, particularly where parking patterns overlap with building demand peaks. Compare the bidirectional upgrade with an appropriate charging baseline and confirm the site-specific costs before committing to deployment.

Evaluate household opportunities as upgrades where existing infrastructure supports the use case. Develop grid-service participation in stages, with market partners confirming eligibility, commercial terms and the capacity that participating vehicles can reliably deliver.

Replace key assumptions with operating evidence. The priority measurements are vehicle connection patterns during relevant demand periods, additional household solar self-consumption and actual availability and response for grid services. Update the economic assessment as these observations and commercial quotations become available, including less favourable scenarios.

Evidence limits and public disclosure

The report supports screening and investment preparation; it does not establish profitability for a particular site. Its scenarios depend on vehicle behaviour, equipment compatibility, energy prices and commercial conditions. Further operating evidence is needed to validate the business cases.

This public summary retains the assessment methods, qualitative findings and recommendations. It omits site identities and configurations, supplier quotations, detailed financial inputs and outputs, contractual assumptions and proprietary model calculations.

Source: V4Grid D3.1.1 Evaluation of economic viability and business models, revised 21 September 2026.

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