Tariff design for smart charging

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Overview

1. What benefits EVs can bring to the grid
2. Tariff design is key: Examples from the EU
3. Summary and conclusions
1. EV grid benefits

- Provide flexibility
- Integrate renewables
- Decarbonise transport and power
- Reduce cost
Strategies for smart EV integration

Smart pricing

Smart technology

Smart infrastructure
2. Why tariff design is key

- Time-varying tariffs direct charging to “cheaper” hours
- Use existing assets, avoid unnecessary investments
- Deliver wider benefits for all electricity users
Simple time-of-use tariffs

Iberdrola EV-dedicated tariff

Source: Based on Iberdrola. Electric vehicle plan.
Dynamic tariffs

Electric vehicle owners' charging habits change on time-of-use tariff

Design effects

GreenFlux — Managed Weekday Group Demand — Comparing Trial 3 (TOU) with Winter Trial 1 (no TOU)

Source: Electric Nation Trial.
TOU-based network tariffs

Source: Based on Radius. Tarifler og netabonnement [Tariffs and network subscriptions].

Source: Denmark (Radius), TOU network tariff for households (winter season)
Tariff design and public fast charging

- Capacity-based network tariffs create high costs for fast charging service providers
- Problem will increase with heavy-duty vehicle charging
- Temporary exemption or gradual phase-in can support commercial operation

| Table 1. Network tariffs per EV per year at 50-kW fast charger connected to low-voltage grid |
|-----------------------------------------------|-----|-----|-----|-----|
|                                 | 10 EVs | 100 EVs | 1,000 EVs | 10,000 EVs |
| Urban (Berlin)                  | €29.91  | €3.90   | €1.30    | €0.85     |
| Dense (Westnetz)                | €63.20  | €7.13   | €1.53    | €0.85     |
| Rural (Edis)                    | €219.20 | €22.78  | €3.14    | €1.11     |

Smart technology

- Control and optimise energy consumption
- Simple or automatic
- Load management
3. Summary and conclusions

- Time-varying energy and network tariffs encourage smart charging behavior
- Options are needed for network tariffs with regard to developing a market for public fast charging
- Pilots for dynamic EV tariffs help to gain knowledge about consumer acceptance
THANK YOU FOR YOUR ATTENTION!

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About RAP

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RAP Resources

• **Start with Smart. Promising practices for integrating EVs into the grid**
• **Beneficial electrification of transportation**
• **Treasure Hiding in Plain Sight. Launching electric transport with the grid we already have**
• **Cleaner, Smarter, Cheaper: Network tariff design for a smart future**
• **Building a market for EV charging infrastructure: A clear path for policymakers and planners**