



# 11330 - V2X Integration in Self-Consumption Energy Management

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## Introduction

Vehicle-to-X (V2X) control strategies for self-consumption energy management have been proposed to supply energy on demand, as a form of flexibility. The proposed algorithm for self-consumption energy management will be implemented in a demonstrator on the island of S. Miguel in the Azores (Portugal) to meet the region's technical, societal, and regulatory aspects.

## Algorithm design

The algorithm prioritizes the use of energy produced by PV and in low tariff periods. If the tariff is higher, the flex discharge mechanism is activated allowing the vehicle to discharge below the mobility energy requirements, only This occurs only if it is possible to charge before the next trip at a low tariff.

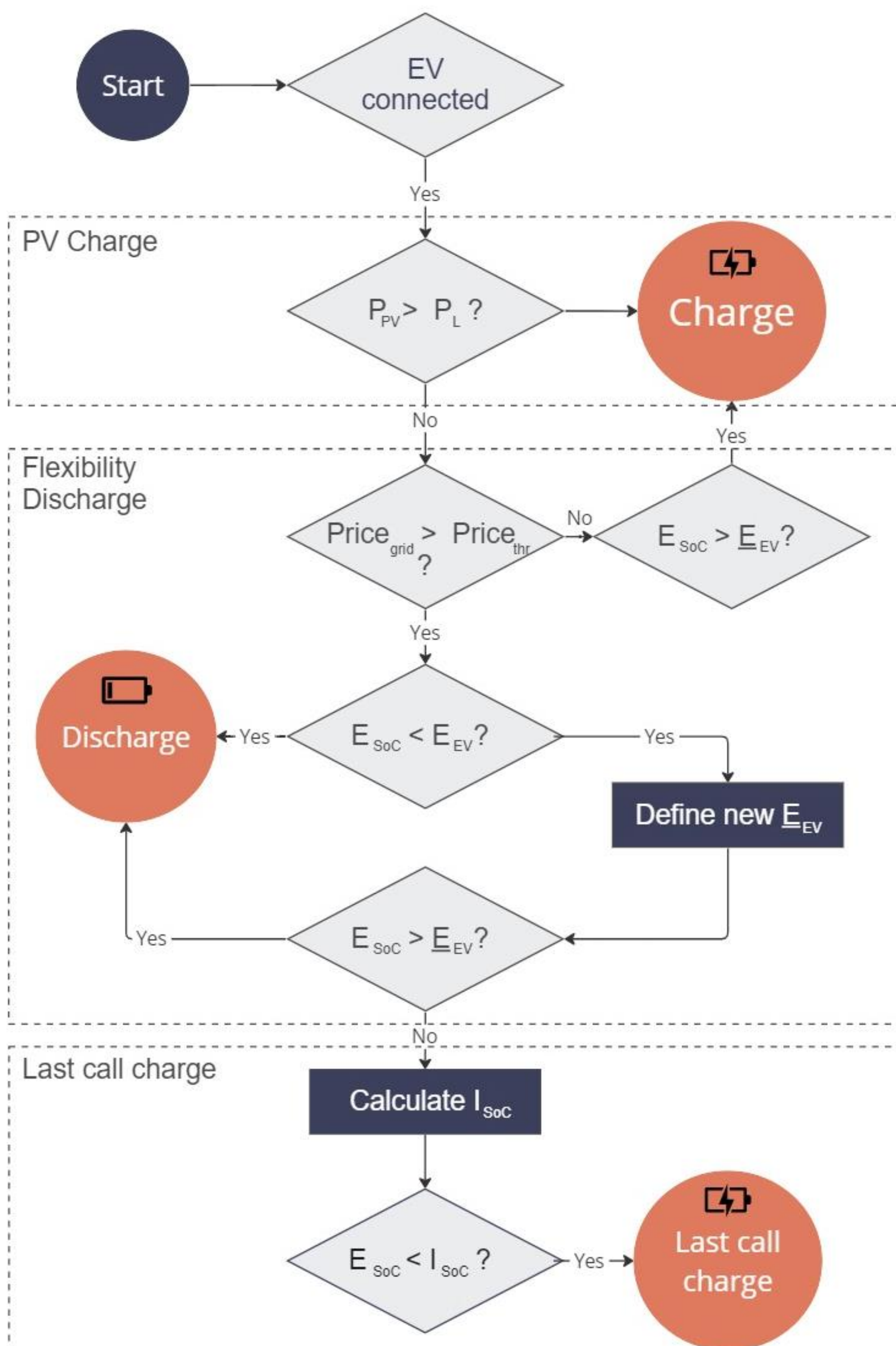


Figure 1 – Diagram for the stepwise approach explained

## Results

S. Miguel is particularly interesting because the Azorean government has been developing a green policy, focusing on the decarbonization of the economy, with a high impact on the electrical system. Plus, it's an isolated system that makes the analysis richer compared with mainland Portugal. The case study is influenced by 5 variables: (1) Demand profile; (2) PV Generation; (3) Time-of-Use Tariffs; (4) EV's and chargers characteristics; (5) Grid Services. All the variables are modelled based on real data.

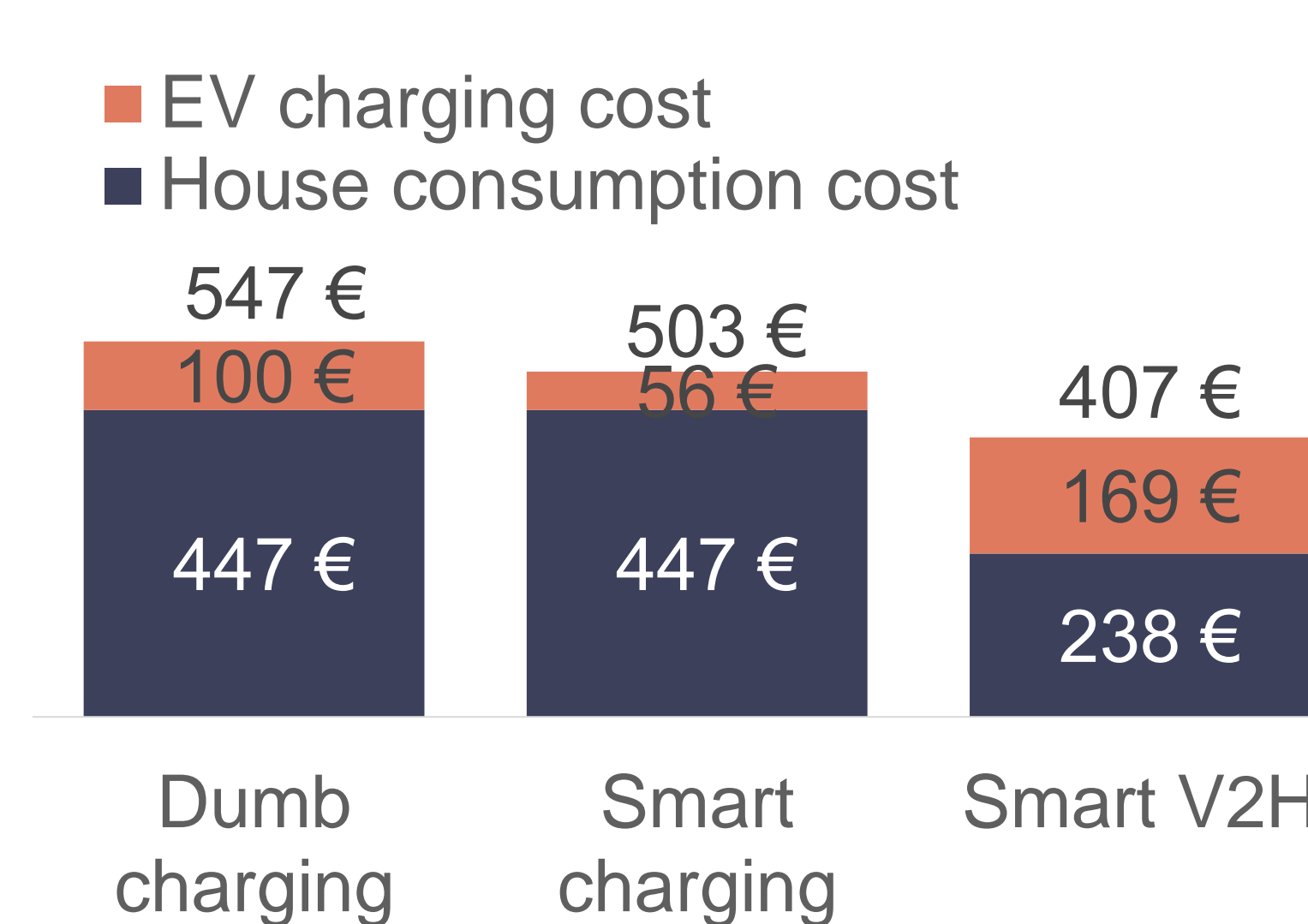


Figure 2 – V2H cost reduction

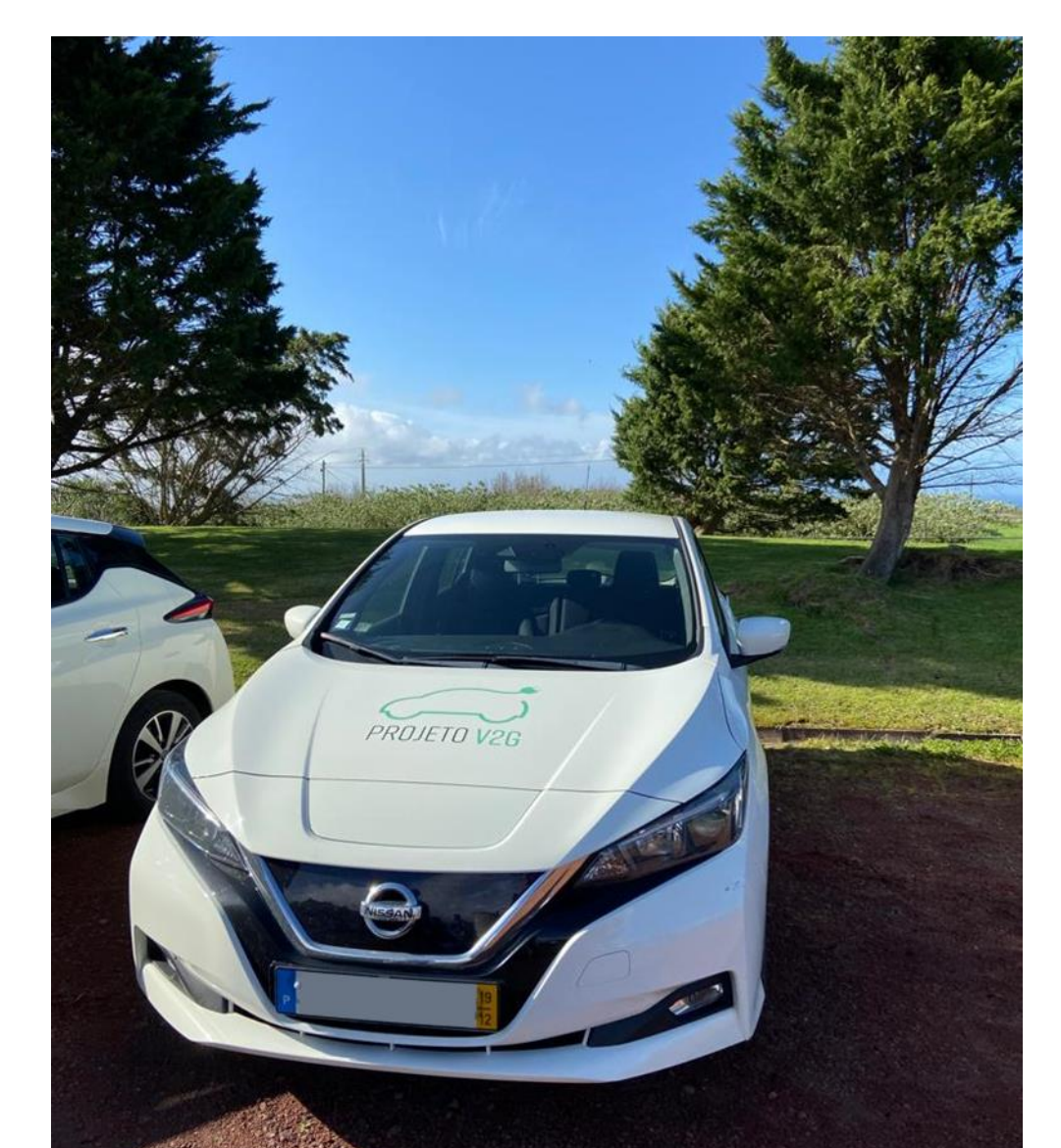


Figure 3 – Azores EV demonstrator

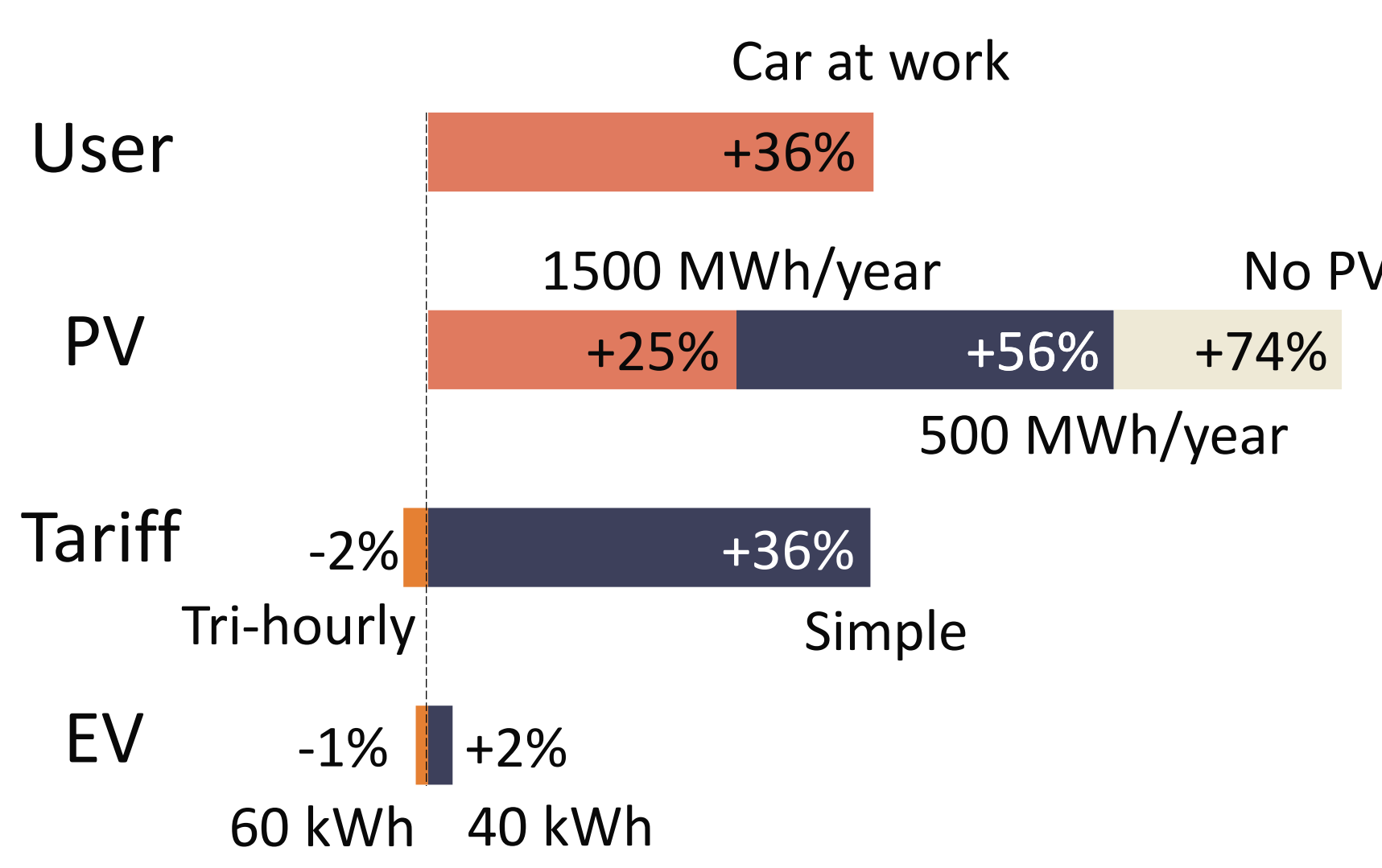


Figure 4 – V2H Cost reduction considering different variables

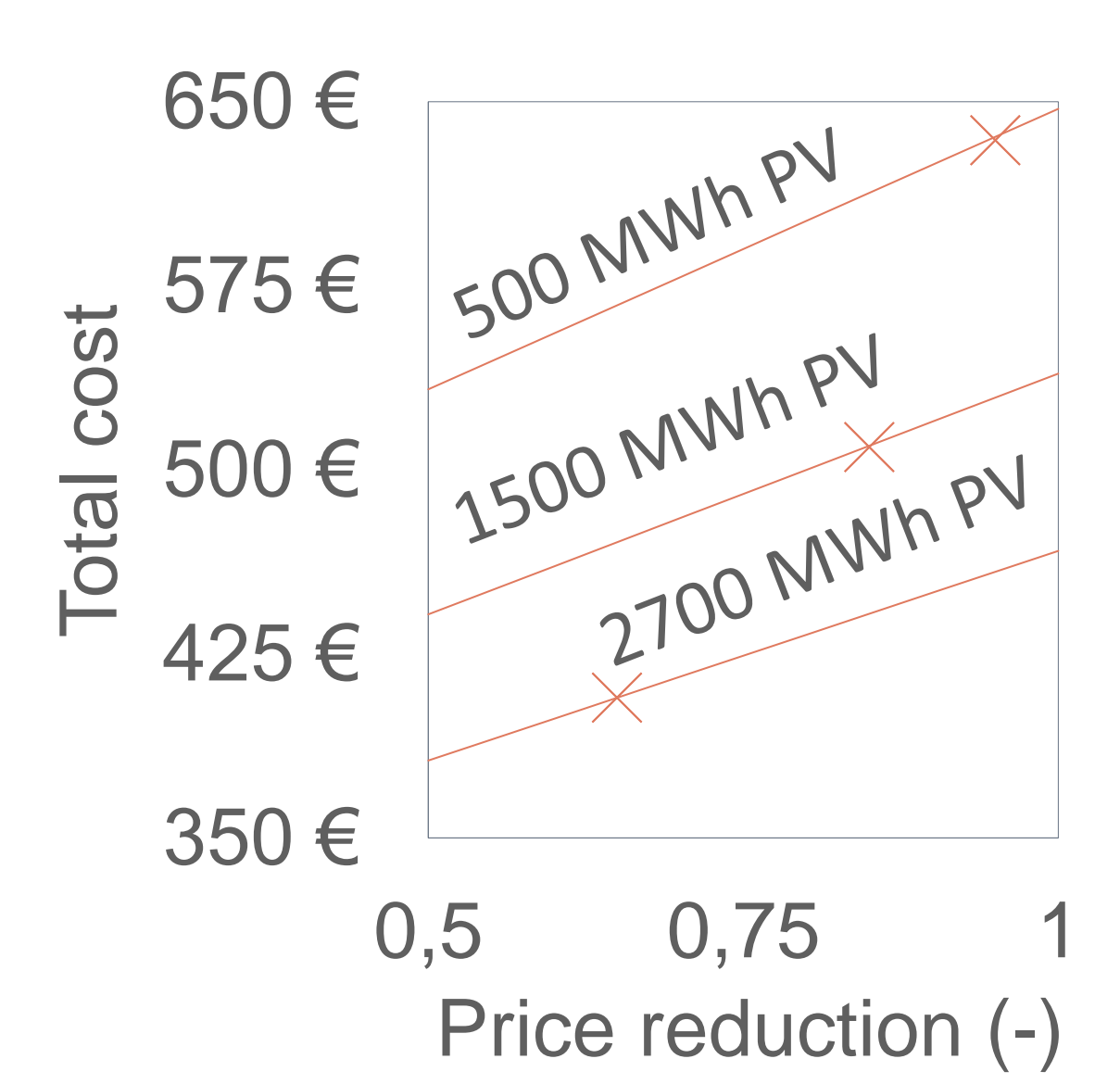


Figure 5 – Price sensitivity for green charging (grid service)

## Conclusions

The main findings are:

- More flexible charging favours equally flexible tariffs, which may mean that users are more price sensitive
- The PV system enhances the potential of V2H control strategies, especially in low mobility demand scenarios.
- Participation in grid services such as green charging may require financial incentives for users, depending on the trade-off between PV generation and consumption.



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