

# Workplace EV Charging Scheduling through Bi-objective Optimization and Predictive EV User Behavior



Mahla Shariatzadeh<sup>1</sup>

mahlashariatzadeh@efs.uc.pt

Supervisors: Carlos Henggeler Antunes<sup>1,2</sup>, Marta Lopes<sup>1,3</sup>

1. INESC Coimbra, Department of Electrical and Computer Engineering, University of Coimbra
2. Department of Electrical and Computer Engineering, University of Coimbra
3. Polytechnic Institute of Coimbra, Coimbra Agriculture School

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## Context

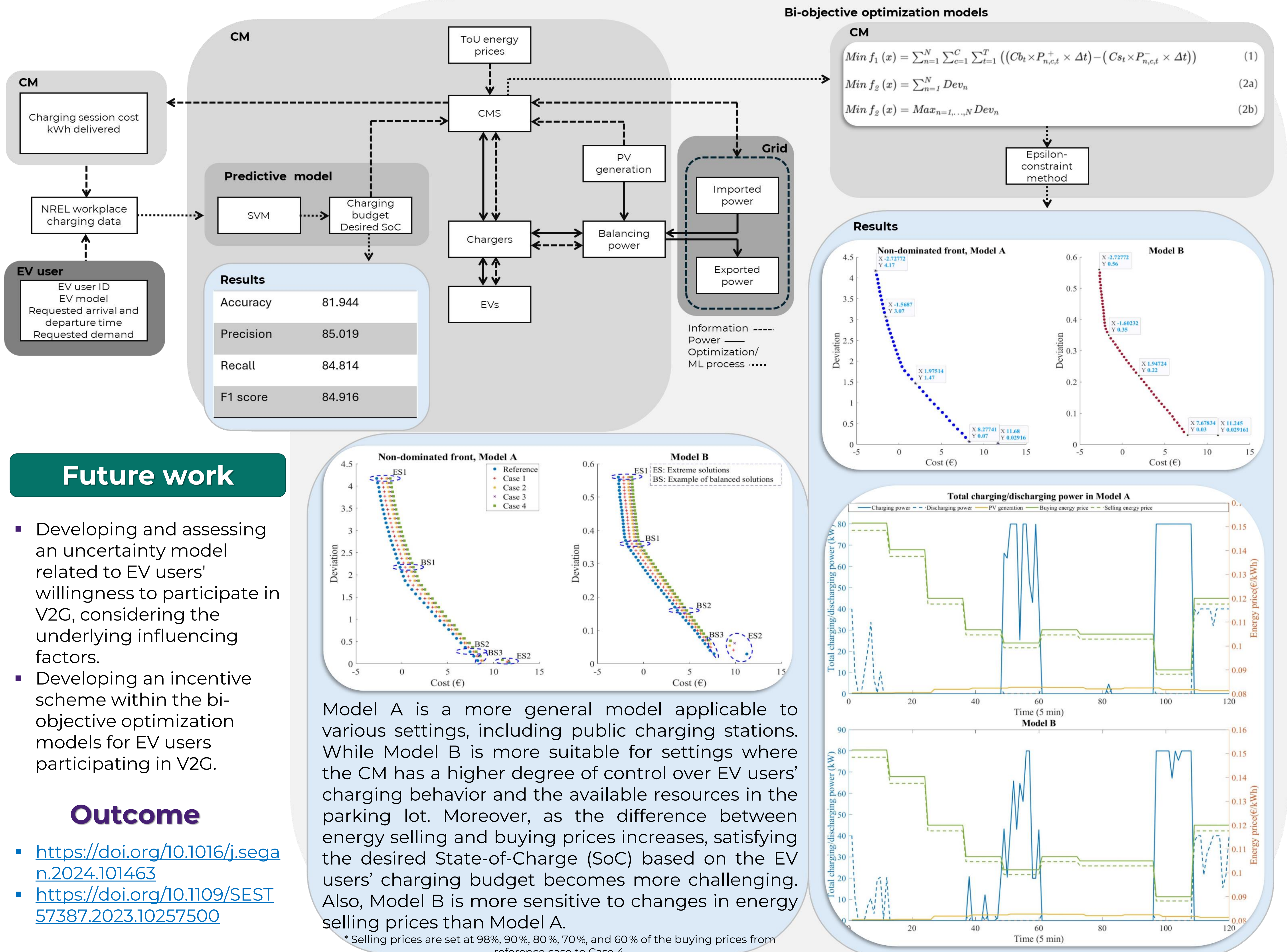
- Electric Vehicle (EV) batteries can act as bidirectional energy sources, and by implementing **smart charging** to regulate energy delivery in real-time, they enhance grid resilience and support the integration of **renewable energy**.
- Workplace EV charging**, with longer parking times and more predictable **charging behavior**, can reduce peak loads, provide low-cost charging services, and the capability to provide ancillary services.
- These benefits can only be fully exploited by modeling EV users' charging behavior and effectively developing smart charging strategies to maximize their potential.

## Objectives

- Assisting the Charging Manager (CM) in decision-making by considering both EV users' charging preferences and technical constraints, while preventing parking lot overloads and providing flexibility potential to the grid.
- Addressing uncertainties related to EV users' charging behavior.
- Investigating the impact of changes in energy selling prices in Vehicle-to-Grid (V2G) mode on charging scheduling to effectively accommodate EV users' charging preferences.

Developing and comparing two bi-objective optimization models to minimize charging cost and minimize the discomfort of unmet the EV users' charging preferences: Model A minimizes charging cost (1) and the sum of deviations (2a) while Model B minimizes charging cost (1) and the worst deviation (2b).

\*CMS (Charging Management System) & ML (Machine Learning)



Methodology and Results Overview

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