‘Taking charge’

Measuring electric vehicle users’ propensity to adopt smart charging processes at the workplace

iDODDLE — Studying the Impacts of Digitalised Daily Life on Climate Change

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Agenda

01	**Introduction** Presenting my area of research by outlining key research questions and former work
02	**Deep Dive PhD Paper 3** Assessing EV users' propensity to adopt smart charging strategies in the workplace context
2.1	**Problem statement** Workplace commuters' responses to different EV charging strategies remain largely unclear
2.2	**Literature review: prior research** Identification of common attributes and levels in DCEs on smart charging
2.3	**Research design (work-in-progress)** Hybrid choice model
03	**Discussion** incl Q&A

Roll-out of extensive EV charging infrastructure on employee car park

Case study: Context-relevant information

RQ1 What are the benefits of coordinated EV workplace charging for firms?

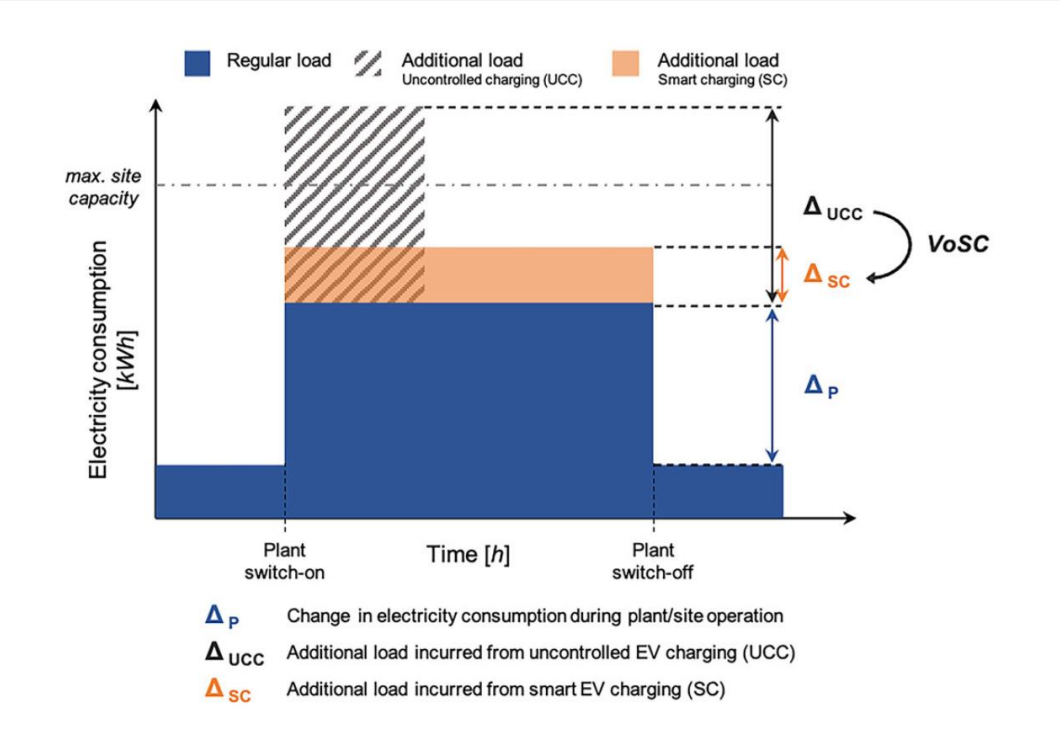
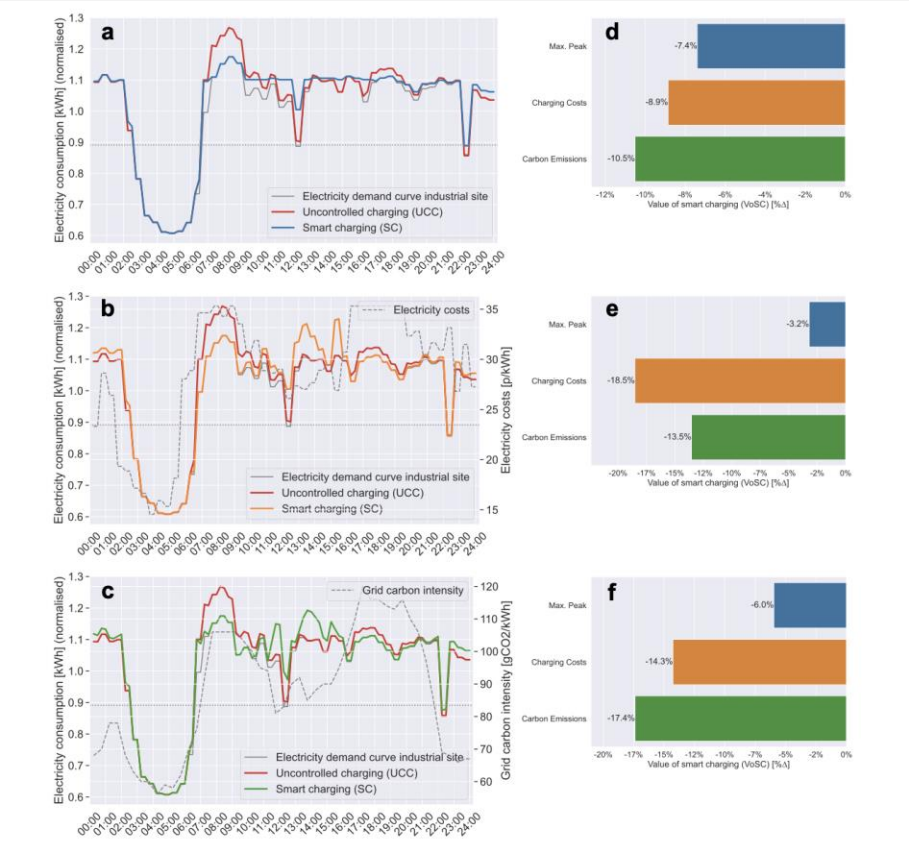


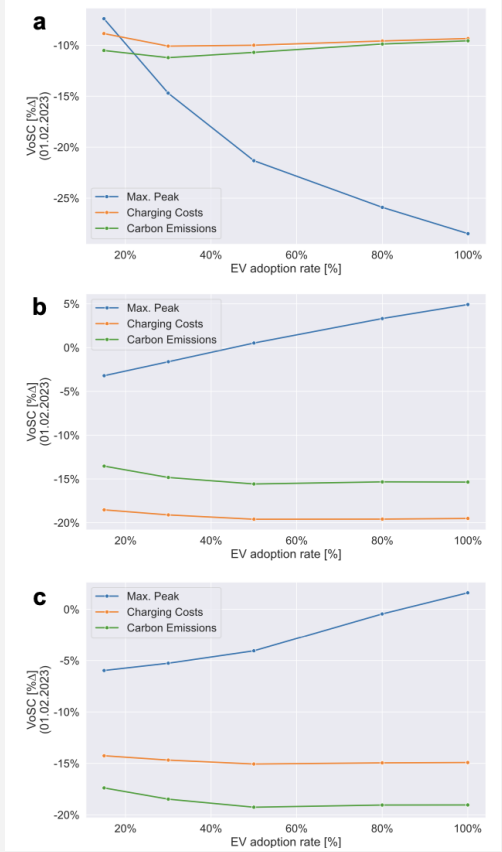
Fig. 1 | Schematic electricity consumption profile of industrial site.

Fig. 2 | Aerial image of employee car park.

SC strategies yield 28% lower peak loads while reducing charging costs by 9%

Overview of key results





npj | sustainable mobility and transport **Article**

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Firm level optimisation strategies for sustainable and cost effective electric vehicle workplace charging

Check for updates

Marcel Seger[1], Christian Brand[1,2], Christoph Clement[3], James Dixon[4] & Charlie Wilson[1,5]

Expanding electric vehicle (EV) charging infrastructure is essential for transitioning to an electrified mobility system. With rising EV adoption rates, firms face increasing regulatory pressure to build up workplace charging facilities for their employees. However, the impact of EV charging loads on businesses' specific electricity consumption profiles remains largely unknown. Our study addresses this challenge by presenting a mathematical optimisation model, available via an open-source web application, that empowers business executives to manage energy consumption effectively, enabling them to assess peak loads, charging costs and carbon emissions specific to their power profiles and employee needs. Using real-world data from a global car manufacturer in South East England, UK, we demonstrate that smart charging strategies can reduce peak loads by 28% and decrease charging costs and emissions by 9% compared to convenience charging. Our methodology is widely applicable across industries and geographies, offering data-driven insights for planning EV workplace charging infrastructure.

Full publication available here:
https://www.nature.com/articles/s44333-025-00032-w

Fig. 3 | Charging profiles differentiated by model type and different EV adoption rates

Developing a digital artefact as decision support tool for practitioners

Design science research with iterative design cycles

RQ2 How can business executives make more informed decisions in the process of installing and operating EV workplace charging infrastructure?

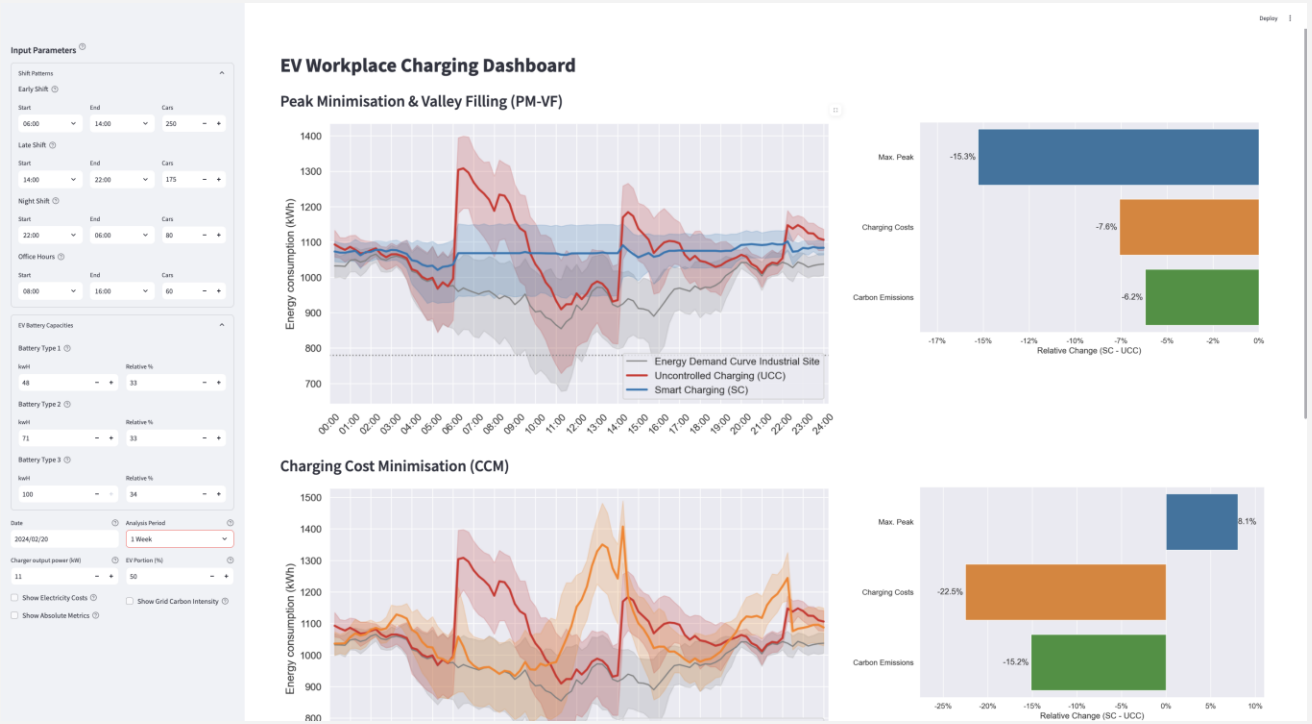


Fig. 4 | Screenshot of open-source web application (Version 2)

Title:

"A Design Science Research Approach to Making the Invisible Count: Predictive Modelling of Electric Vehicle Workplace Charging Loads"

Methodological approach:

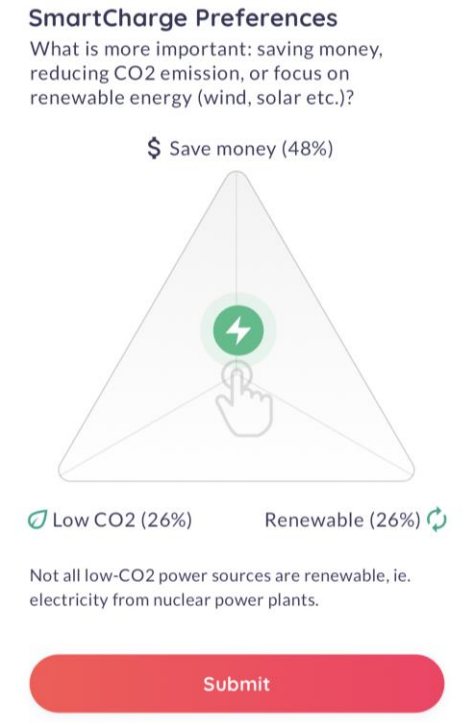
Design Science Research (Peffers et al., 2007)

Openly accessible here:
https://ev-workplace-charging.streamlit.app/

Workplace commuters' responses to diff charging strategies remain unclear

Enforcement of new regulations and its effects

RQ3 In how far are EV users willing to adopt different workplace charging strategies?



Regulatory context:

- Enforcement of recent EU laws add regulatory pressure for firms
  - Corporate Sustainability Reporting Directive (CSRD): more stringent reporting of Scope 3 emissions, including employees' commute practices to the workplace
  - Energy performance of buildings (EPBD): legal requirement to provide min. 1x charging station on business car parks w/ >20 parking spots ('GEIG' in Germany – in effect since 01.01.2025)

Real-world implementation / Problem context:

- Businesses start investing into the build-out of EV workplace charging infrastructure
- However, the management of charging loads, especially as EV adoption rates grow, tends to be overlook
- Firms are facing complex trade-off space to choose suitable charging strategy, weighing off between peak-, charging cost-, and carbon emission minimisation
- Employees' responses and willingness to adopt various charging strategies specifically in the workplace context remains unknown → motivation for our study
- Growth start-ups MONTA, an EV charge points operator, is eliciting consumers' preferences for smart charging (in a home charging setting) through their app (cf. **Fig 5**).

Fig. 5 | Screenshot of Monta's EV charging app (Monta, 2024)

Extensive prior research on EV characteristics and EV charging strategies

State of (academic) literature

RQ3 In how far are EV users willing to adopt different workplace charging strategies?

- Approach: Structured literature review across Scopus and Web of Science using search string:
  - **"TITLE-ABS-KEY** (("electric vehicle" *OR* "ev" OR "plug-in hybrid" *OR* "phev" *OR* "pev") *AND* ("charging" *OR* " smart charging" *OR* "vehicle-to-grid" *OR* "v2g") *AND* ("consumer preference" *OR* "user preference" *OR* "charging choice" *OR* "willingness to accept" *OR* "willingness to pay" *OR* "demand side flexibility" *OR* "financial compensation"))
  - Yield: **717** unique publications; currently evaluating its fit based on title and abstract
- Extensive research on consumer preferences for EVs / alternative fuel vehicles in early 2010s using Discrete Choice Experiments (Hidrue et al., 2011; Jensen et al., 2013; Hackbarth and Madlener, 2013)
  - Common attributes:
    - **Car specific**: Driving range, fuel cost saving, pollution reduction, performance, purchase price, battery lifetime, acceleration (Jensen et al., 2013)
    - **Charging specific**: Charging time, CO2 emissions, charging cost / monthly electricity bill, availability of charging information, availability of charging service, station accessibility, % of green electricity, source of green electricity, guaranteed minimum charge, program type (Time-of-Use, smart charging, V2G), override functionality (Moon et al., 2018; Wen et al., 2025) ; for Vehicle-to-Grid (V2G) specifically: Guaranteed minimum driving range, average length of required plug in time per day (Parsons et al., 2014)
    - **Other**: EV user experience, policy incentives, contribution to local environmental ambitions (Hackbarth and Madlener, 2013; Noel et al., 2019; Wen et al., 2025)
- **Identified research gap:**
  - Focus on **workplace commuters** (EV users (early adopters) vs. soon-to-be adopters (early majority)); measuring impact of **digital skills** and **competencies** as intermediary constructs to predicts users' charging choices

Augmenting TAM constructs by wider digital skills & competencies variables

Preliminary hybrid model framework (*work-in-progress*)

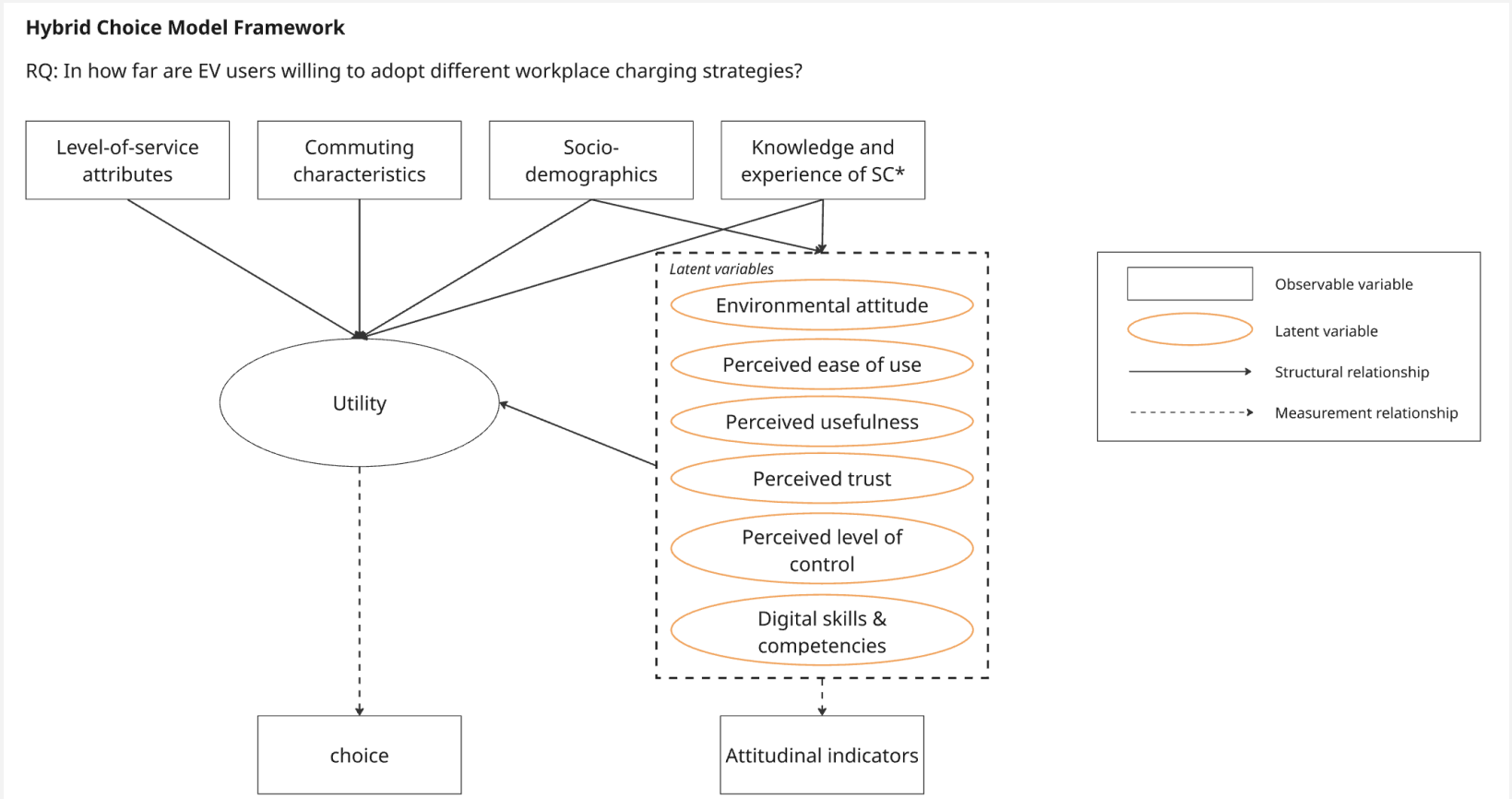


Fig. 6 | Preliminary model framework

Sample

- current EV owners/leasers and prospective ones (intentions to switch to EV within next five years)
- Workplace commuters (by car)
- Residents in UK or Germany
- Aim: 1,000 participants in total

Focus on workplace charging to assesses EV users' willingness to accept

Overview of choice task (V1)

	Attributes / Charging strategy (›)	**Option A** [Uncontrolled charging]	**Option B** [Time-of-use]	**Option C** [Smart charging]	**Option D** [V2G]
Context info (›)	Charging start time	Immediate upon plug-in	Scheduled by user	Controlled by algorithm	Controlled by algorithm
	Contribution towards firm's sustainability goals	None	Through emissions reductions (**low**)	Through emissions reductions (**medium**)	Through emissions- and electricity peak load reductions (**high**)
	Departure battery level (% SoC)	70%	80%	60%	50%
	Monthly charging costs [£/€] (for 1,000 km)	70 £/€	48 £/€	30 £/€	10 £/€
	Carbon emissions reduction	0%	10%	30%	50%
	Tracking functionalities via smartphone app	Not available	Not available	Real-time tracking available	Real-time tracking available
	Override option	Not allowed	Limited per month	Always allowed	Limited per month
	Fee per override	/	3 £/€	6 £/€	4.5 £/€
	Choice	O	O	O	O

Tab. 1 | Preliminary design of choice task

Thank you!

Any Questions?

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Overview

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