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Can smart charging build communities?

Rethinking the objective function beyond grid balancing

STandUP for Energy · 2026

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My Background

- PhD in Human Computer Interaction from KTH.
- Worked with households, energy, data, and meaning making.
- Currently a postdoc in the USER group and Digital Ecologies Lab at UU

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Why should anyone care about smart charging?



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Designed to go unnoticed

THE DOMINANT FRAME

Set it and forget it.

Prices steer, an optimiser decides and the household is seen as a flexibility resource.

AI extends this: more prediction, more automation, less for anyone to see or decide.

The best smart charging is the one you never notice. So why would anyone care?

SWEDISH POLICY

Swedish policy frames households as an untapped flexibility resource, controlled automatically and motivated by price signals.[1]

SMART GRID DEVELOPMENT

Swedish smart grid development is marked by techno-economic framings; household voice and agency stay marginal.[2]

ENERGY COMMUNITIES

Even Swedish solar energy communities foreground system-optimisation values over democratisation.[3]

THE IMAGINED USER

The smart utopia is built around “Resource Man”, a data-driven energy manager few households resemble.[4]

[1] Nyström, S., Rivera, M. B., & Katzeff, C. (2024). Households as part of the solution-Examining Swedish policy expectations on demand response in households. Energy Policy, 189, 114118.
[2] Palm, J., & Reindl, K. (2026). Smart grids and energy democracy: how households are represented in Swedish energy policymaking. Journal of Environmental Policy & Planning, 1-19.
[3] Envall, F., Andersson, D., & Wangel, J. (2023). Gridlocked: Sociomaterial configurations of sustainable energy transitions in Swedish solar energy communities. Energy Research & Social Science, 102, 103200.
[4] Strengers, Y. (2013). Smart energy technologies in everyday life: Smart Utopia?. Springer.

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From optimisation to meaning

OPTIMISATION PARADIGM	ALTERNATIVE PARADIGMS
How do we get households to shift load?	**What could make smart charging worth caring about?**
The household is a flexibility resource[5]	**People have their own reasons: place, sufficiency, community, preparedness**
Good design is invisible automation	**Good design is legible, negotiable and shared**
Success is kilowatt-hours shifted	**Success could be what people understand, value and do together**

[5] Nyström, S., Katzeff, C., & Rivera, M. B. (2024). Home-personas meet energy narratives of demand response: Uncovering mismatches between Swedish stakeholder expectations and everyday life. Futures, 161, 103410.

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Four frames for the same charger

DOMINANT

Convenience

“Ready by 06:00 at the lowest price.”

THE PERSON IS

a customer

WHY CARE?

It's cheap and I don't have to think about it.

ALTERNATIVE

Community

“Community energy is scarce. You are helping power the community.”

THE PERSON IS

a member

WHY CARE?

My community members, neighbors and I share this.

ALTERNATIVE

Sufficiency

“40 km added. Enough for your next trip?”

THE PERSON IS

judging sufficiency

WHY CARE?

I take what I need, not what the battery holds.

ALTERNATIVE

Resilience

“If the grid fails tonight, what all could our cars and battery keep running?”

THE PERSON IS

a steward

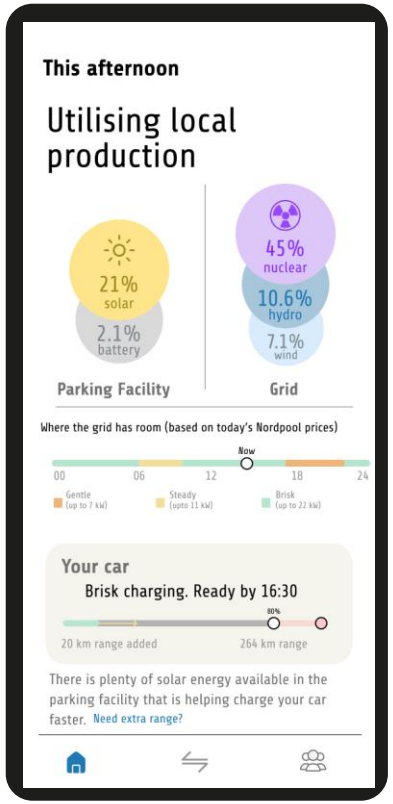
WHY CARE?

We can look after each other in a crisis.

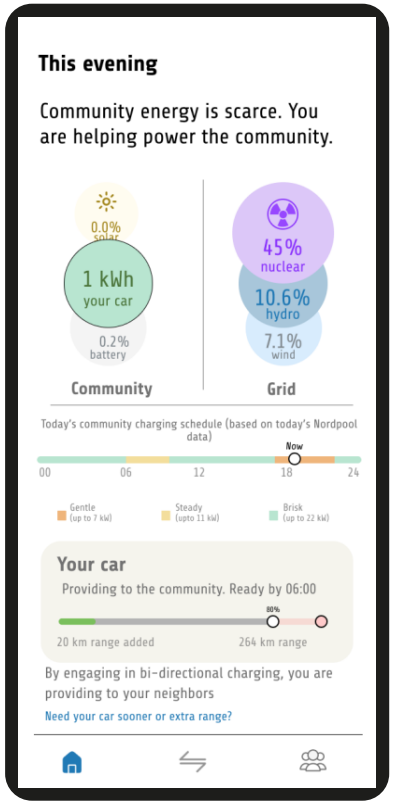
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Same data, two frames

CONVENIENCE



COMMUNITY



What these frames make visible

PLACE AND INFRASTRUCTURE

Make community infrastructure transparent and visible.

A monthly exchange in kilometres, parking hours and flexible plug-in time, not only kronor.

LOCAL COMMUNITY

Relating to particular community

Your car “providing to *this* community”, not “supporting the grid”

SUFFICIENCY

Enough as the default, more as the exception [6]

Foreground range in kilometers rather than kWh and prices

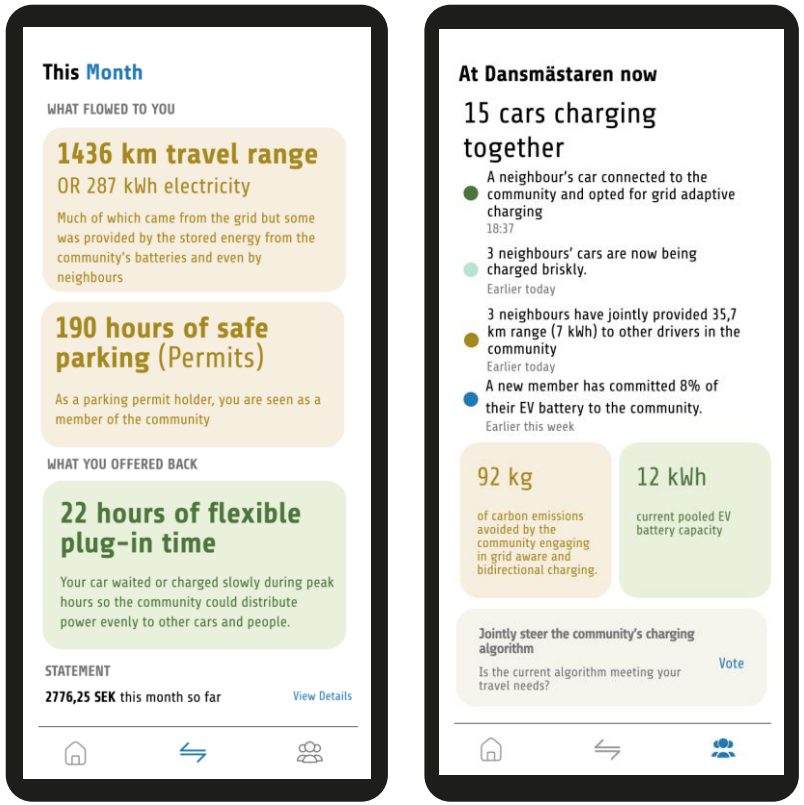
“Need extra range?” as a deliberate ask.

Design concepts for Dansmästaren, Uppsala. Figures on the screens are illustrative.

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[6] Darby, S., & Fawcett, T. (2018, November). Energy sufficiency: A concept paper for ECEEE. European

Anchoring reciprocity ,togetherness and resilience



RECIPROCITY

What flowed to you, what you offered back

A monthly exchange in kilometres, parking hours and flexible plug-in time, not only kronor.

TOGETHERNESS

What are others are engaging with in the community

A community reserve that members can see? How are other members charging, what is the algorithm prioritising?

RESILIENCE

Preparedness built into everyday charging? [7]

Part of each battery pledged for crises? Knowledge about V2H?

Probes, not nudges. Propositions for drivers and members to discuss about, live with and reflect on.

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[7] Hasselqvist, H., Renström, S., Strömberg, H., & Håkansson, M. (2022). Household energy resilience: Shifting perspectives to reveal opportunities for renewable energy futures in affluent contexts. Energy Research & Social Science, 88, 102498.

But maybe people just want to be left alone

Agreed. But being left alone is something automation has to earn.

THE IRONY OF AUTOMATION [10]

The rarer the intervention, the more it matters

The more a system is automated, the rarer and harder human interventions become. People who never touch it lack the understanding they need when it fails, runs short or is compromised.

For charging: a grid outage, a critical capacity crunch, a cyberattack.

TRUST IS EARNED AT THE EDGES

A little control makes delegation acceptable

People stayed engaged with energy agents when they could adjust how much the agent did, even when it made mistakes.[11]

Swedish EV users welcomed smart charging but were anxious about losing control.[13]

V2G acceptance hinges on a guaranteed minimum range.[12]

So automate by default, but keep it legible, adjustable and understood for the moments that matter.

[10] Bainbridge, L. (1983). Ironies of automation. In Analysis, design and evaluation of man–machine systems (pp. 129-135). Pergamon.
[11] Alan, A. T. et al. (2016). Tariff agent: Interacting with a future smart energy system at home. ACM Transactions on Computer-Human Interaction, 23(4).
[12] Geske, J., & Schumann, D. (2018). Willing to participate in vehicle-to-grid (V2G)? Why not!. Energy Policy, 120, 392-401.
[13] Libertson, F. (2022). Requesting control and flexibility. Energy Research & Social Science, 92, 102774.

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Where AI fits: optimiser, or participant?

AI IN THE OPTIMISATION FRAME

Works out of sight
Forecasts and schedules in the background; people appear as inputs and exceptions.

Success is shifted load
Cost saved and peaks cut, measured by the system for the system.

Contest by opting out
The only lever left to people is the override button.

AI IN A COMMUNITY FRAME

Making the shared situation legible
"*Why is my car charging slowly tonight?*" answered in the community's terms.

Helping a community deliberate
Drafts options for what counts as enough, and who goes first in a crisis, for members to decide.

Answerable to members [14]
Contestable by design, and learning only from data members agree to share.

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[14] Alfrink, K., Keller, I., Kortuem, G., & Doorn, N. (2023). Contestable AI by Design: Towards a Framework: K. Alfrink et al. Minds and Machines, 33(4), 613-639.

Research questions

1	**Caring**	Which frames make smart charging worth caring about, and for whom?
2	**Sufficiency**	How can designs make energy sufficiency legible and negotiable, for a driver, a household and for a building?
3	**Resilience**	How can preparedness be built into everyday charging, and rehearsed together?
4	**AI**	What roles can AI take in these frames, and how do members contest it?

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Two projects to test this

ONGOING PROJECT

EV Drivers in the Driver's Seat

Ångströmlaboratoriet
Testbed for trying out mobility offerings

Dansmästaren
Live facility for real-world deployment

Explore charging offerings with EV drivers, then test the most promising in a live deployment.

RQ1 Caring | RQ2 Sufficiency | RQ4 AI

UPCOMING PROPOSAL

Car clubs as energy communities

Partners
A car club and the municipality

Focus
Car clubs, energy communities and smart charging

Explore whether a shared fleet can anchor an energy community built around smart charging.

RQ1 Caring | RQ2 Sufficiency

How - Research through design: co-design workshops to investigate probes with EV drivers, deploy favourable probes as designs at the testbed and live facility, live with them, and reflect together.

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The question to take home

> People might not care about smart charging because it balances the grid. They might care if it helps them, and their neighbours, to have enough and be prepared.

The design question perhaps isn't how to make people flexible. Instead it could be what would make flexibility mean something.

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Questions? Discussions?

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Backup: questions

“Isn't a community frame just a nudge?”	The frames are probes for meaning, not levers for compliance. They must be truthful, agreed with members and disclosed.
“Why not just use price signals?”	Swedish research already documents the limits of price signals [11] and the marginal place of households in smart grid policy[2,3].
“Won't sufficiency cost flexibility?”	Possibly the opposite: charging to enough leaves more battery for the building. It is an empirical question our deployments can answer.
“What about people without an EV?”	A shared hub or car club gives renters and people without their own car a way in, and a stake in the building's reserve.

[1] Nyström, S., Rivera, M. B., & Katzeff, C. (2024). Households as part of the solution-Examining Swedish policy expectations on demand response in households. Energy Policy, 189, 114118.

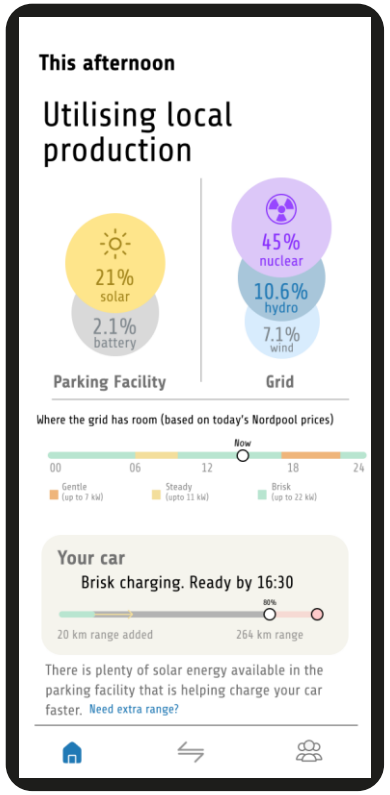
[2] Palm, J., & Reindl, K. (2026). Smart grids and energy democracy: how households are represented in Swedish energy policymaking. Journal of Environmental Policy & Planning, 1-19.

[11] El Gohary, F. (2024). Diagnosing demand flexibility: On the limitations of price signals. PhD thesis, Uppsala University.

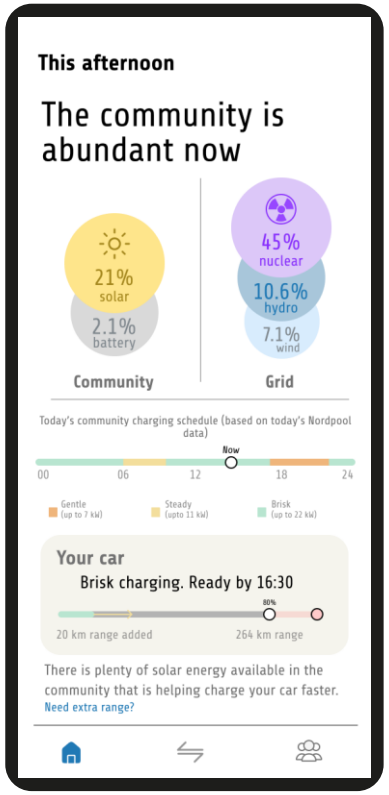
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Backup: more framing concepts

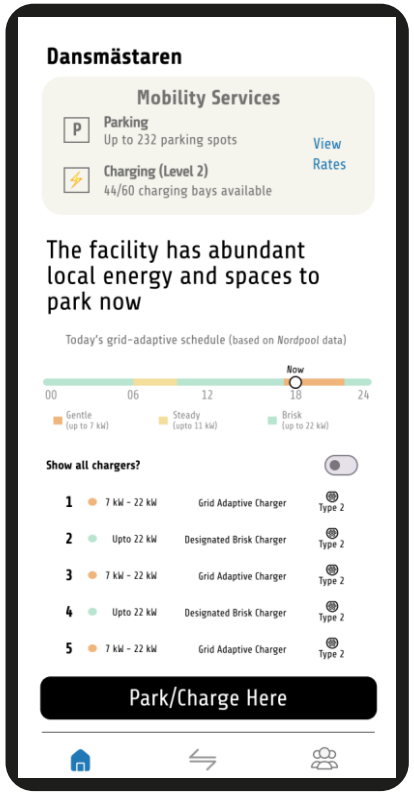
SERVICE · AFTERNOON



COMMUNITY · AFTERNOON



SERVICE · HUB



COMMUNITY · HUB



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Design concepts for Dansmästaren, Uppsala. Figures are illustrative. The hub concept also varies the mix of brisk and grid-adaptive bays.

Backup: communities of shared assets

Most energy communities form first, then invest. These start from what is already there.

1

One building

Cars charge from the building and help cut its peaks. Savings lower fees, so members see the energy value.

2

A community

Members, or their housing cooperative, form an energy community that co-owns solar and storage. The fleet is its shared battery.

Sharing across certain properties allowed from 1 Jan 2027[1]

3

A district

Several buildings and fleets are pooled into a virtual power plant that sells flexibility to the local grid.

Research focus **what moves a community to the next stage, and what breaks trust along the way.**

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[1] Sveriges riksdag (2026). Nya lagar om elsystemet, prop. 2025/26:240.

Staged pathway from the Community Car Club project.

Backup: Research through design

Co-design

Workshops with residents and the reference group

Deploy

New features and formats in the booking system and at hubs

Observe

Booking and charge logs, surveys and interviews

Refine

Adjust the design and run the next round

Built-in comparison

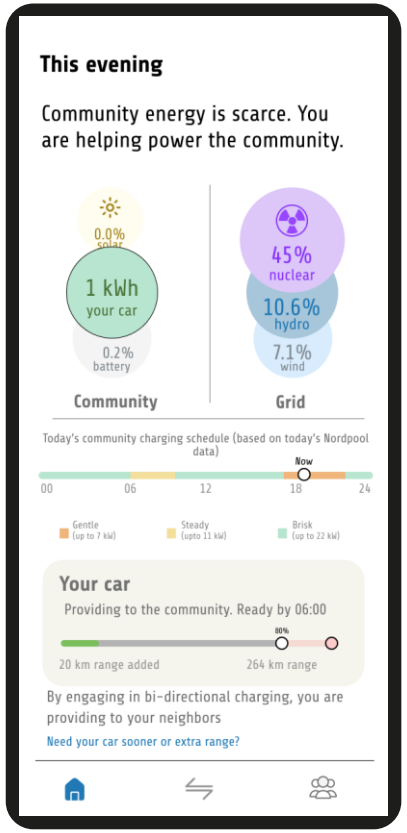
A community frame at some hubs and a convenience frame at others.

Data agreed with members

Booking data is personal, so the rules for its use are part of the community design.

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Backup: an alternative opening



It's a January evening at Dansmästaren. Your car is plugged in, and the app says it is giving a kilowatt-hour to the building.

Would you let it? What would you need to know?

Whose energy is it?

What do I get back?

Can I say no?

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Design concept for Dansmästaren, Uppsala. Figures are illustrative.

Backup: V2G changes the deal

SMART CHARGING

The system decides when your car takes energy.

Delegation is easy to accept: the worst case is a car that is less full than hoped.

BIDIRECTIONAL CHARGING

The system takes energy from your car.

Now the building draws on something people own and depend on. Consent becomes part of the system.

WHAT MEMBERS NEED TO KNOW OR DECIDE [1,2]

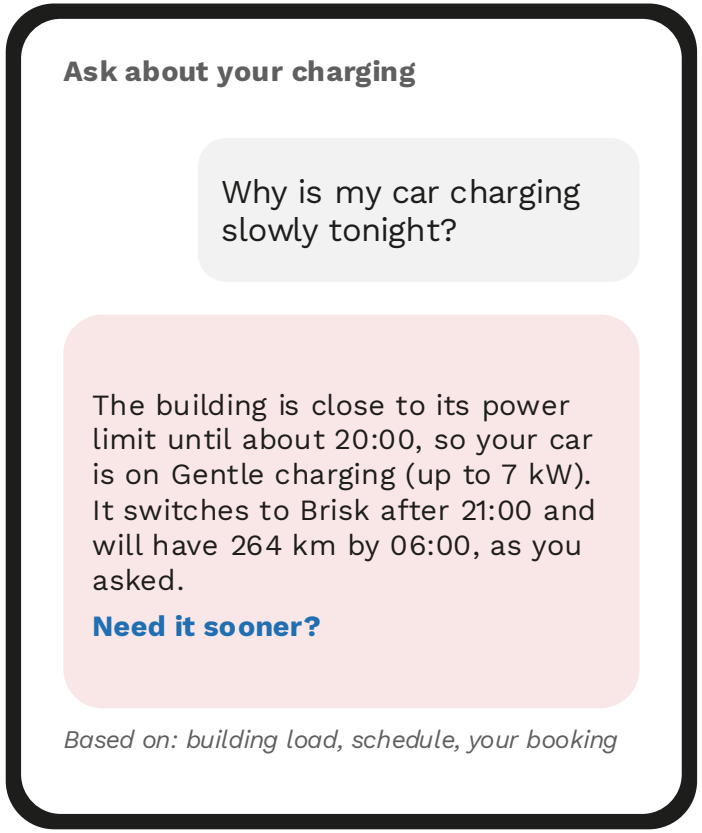
How much?	When?	What do I get back?	What's my floor?[3]	Can I stop it?

Design for consent A range floor each member sets (“always keep 120 km”), a visible exchange, and one-tap withdrawal.

[1] Libertson, F. (2022). Requesting control and flexibility: Exploring Swedish user perspectives of electric vehicle smart charging. Energy Research & Social Science, 92, 102774.
[2] Sovacool, B. K., Noel, L., Axsen, J., & Kempton, W. (2018). The neglected social dimensions to a vehicle-to-grid (V2G) transition: a critical and systematic review. Environmental Research Letters, 13(1), 013001.
[3] Geske, J., & Schumann, D. (2018). Willing to participate in vehicle-to-grid (V2G)? Why not!. Energy Policy, 120, 392-401.

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Backup: a buildable AI explainer



GROUNDED IN

Building load, battery and solar state from the energy management system

The member's own booking and “Ready by” time

The day's charging schedule and bands

GUARDRAILS

Answers only from logged system state, with its sources shown

Never invents scarcity, never reveals other members' data

Members can flag a wrong answer, which is reviewed

First experiment prototype it on Dansmästaren's energy management data.

Concept. Figures are illustrative and match the probe screens.

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Backup: “People don't want to care”

Agreed, most of the time.[1] Routine charging should stay automatic and unnoticed.

MOST OF THE TIME: AUTOMATIC AND UNNOTICED

1

Scarcity
The building is at its power limit

2

Crisis
The grid is down

3

Conflict
Someone always seems to get priority

4

Your car is used
Bidirectional charging draws on it

Design for these moments not for constant attention. Care is needed when something is scarce, shared or at stake.

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[1] Bergek, A., & Palm, J. (2024). Energy communities in Sweden: Challenging established ideas of aim, place and engagement. Energy Research & Social Science, 115, 103626.

Backup: can the building run on local power?

WHAT EXISTS

60 charging points, up to 22 kW[1]

62 kW of rooftop solar[1]

137 kWh battery, mainly for peak shaving[2]

Supercapacitors, student flats and a grocery store[3]

WHAT ISLANDING WOULD TYPICALLY NEED

Inverter capacity that can form a local grid

Protection and switching to separate safely

Bidirectional chargers, if cars are to supply the building

Permission under the grid and energy sharing rules

STEPS WE CAN TAKE NOW

Make the building's reserve visible to members

Agree which loads come first in a scenario

Rehearse with simulations and design fiction before hardware

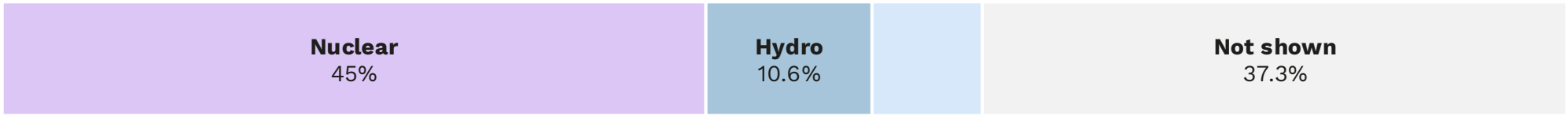
Question for the room **what would it take to make this real here?**

[1] Uppsala Parkering. Dansmästaren (web page).
[2] Energi (September 2024). Mångsidig fastighet med smart energidelning.
[3] Uppsala kommun. Dansmästaren (web page).
Islanding requirements are general engineering considerations; check specifics with the Dansmästaren team.

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Backup: the numbers behind the screens

IN THE SCREENS (PLACEHOLDERS)



Nuclear 45%, hydro 10.6% and wind 7.1% add up to only 62.7%, and hydro looks far too small for Sweden.

SWEDEN'S ELECTRICITY PRODUCTION, 2025[1]



Rounded shares of about 167 TWh: hydro 68.6, nuclear 44.8, wind 38.8, CHP 11.6 and solar 3.0 TWh.

Fix before presenting use live hourly data for the grid mix, or say out loud that every figure on the screens is illustrative.

[1] Energiföretagen Sverige (2026). Elproduktion 2025, via elen.nu.
CHP is combined heat and power. Screen figures are placeholders.

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