

Data analysis and local policy for smart decision making

29 March 2017

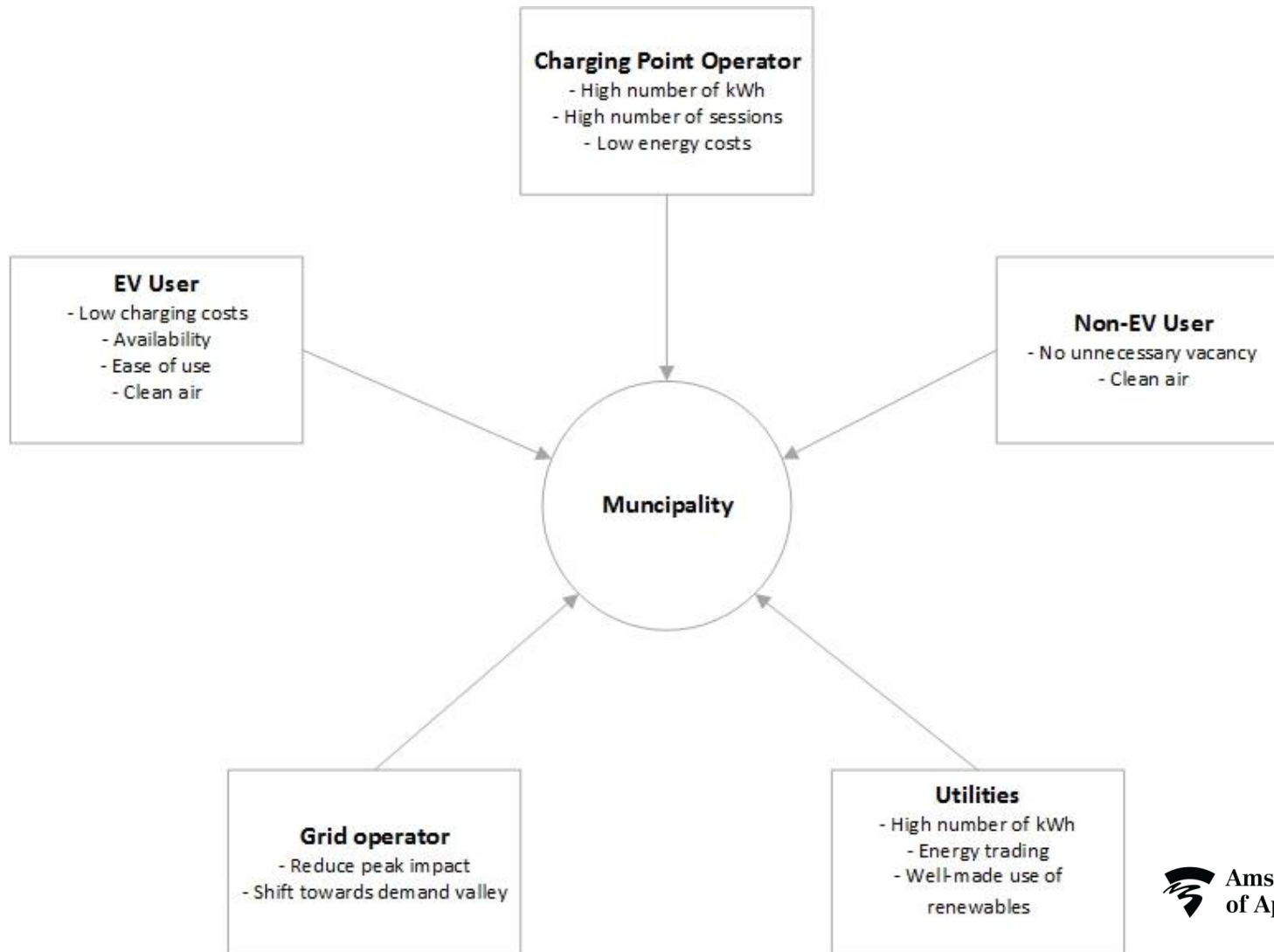
Kick-off Conference EV Energy

Rick Wolbertus

IDO-laad



Managing charging behaviour using smart decisions



Charging behaviour

Charging behaviour is about choices

3 Choices:

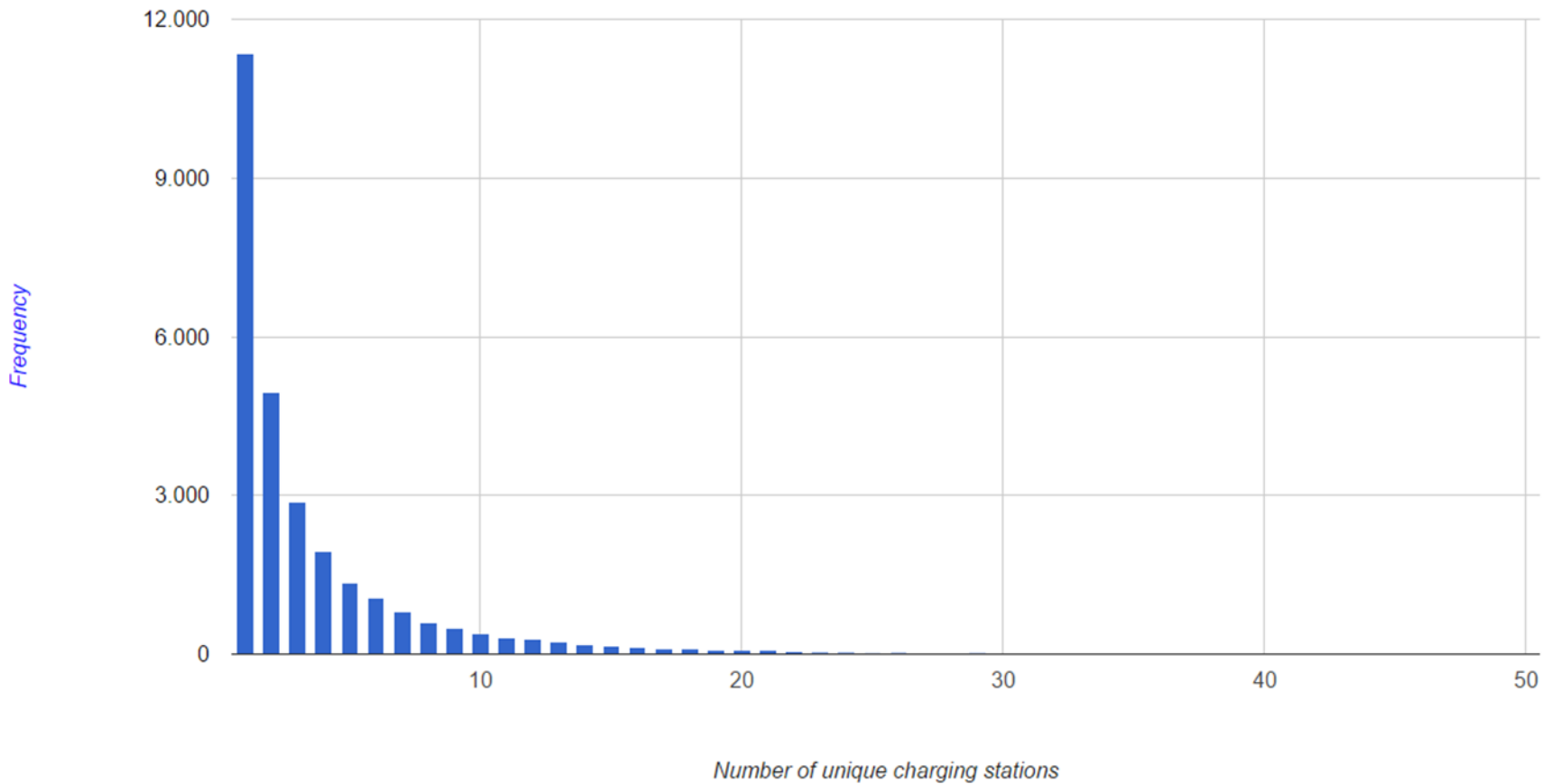
- **Location**
- **Time of Day**
- **Duration**

Smart Charging/V2G

Adding a fourth: Allowing flexibility

Location choice

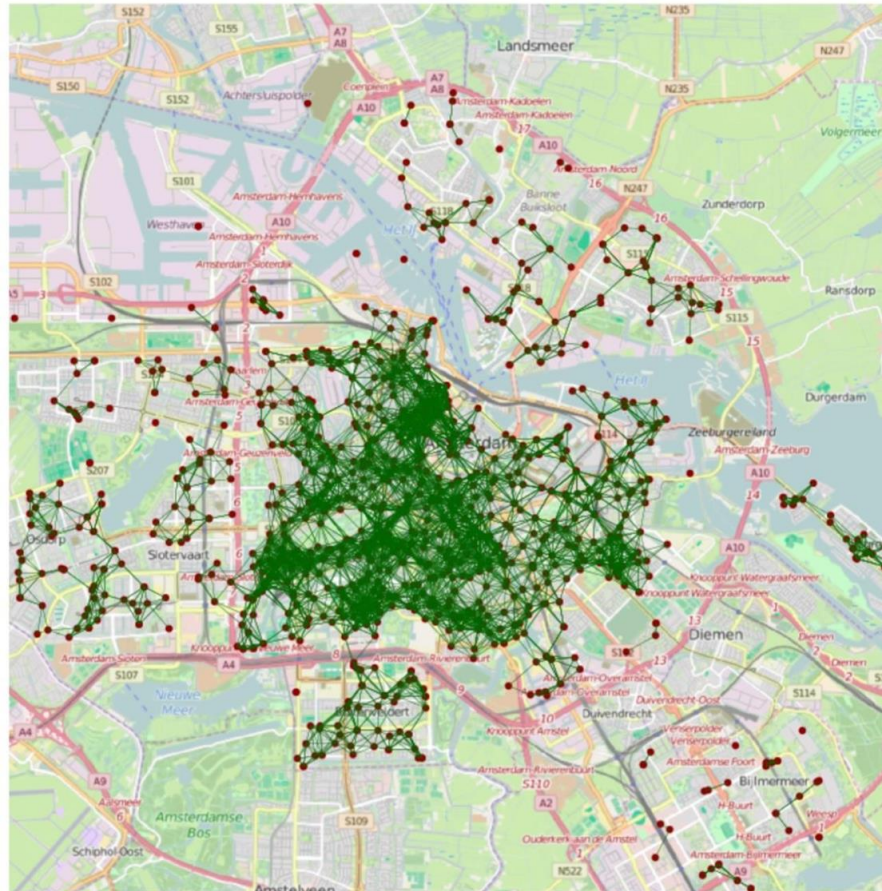
Habits



Data: Amsterdam, 2016

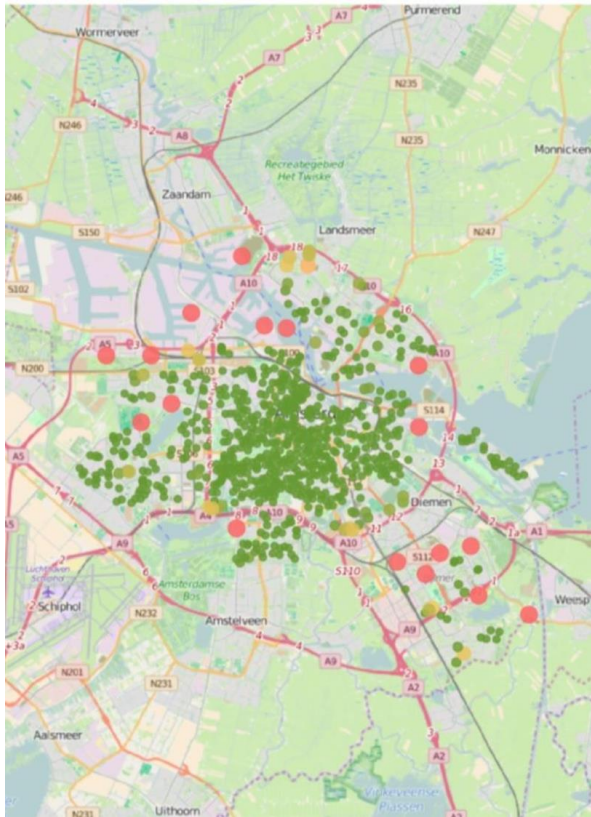
Location Choice:

But what if we have to choose an alternative
network effects In planning EV infrastructure

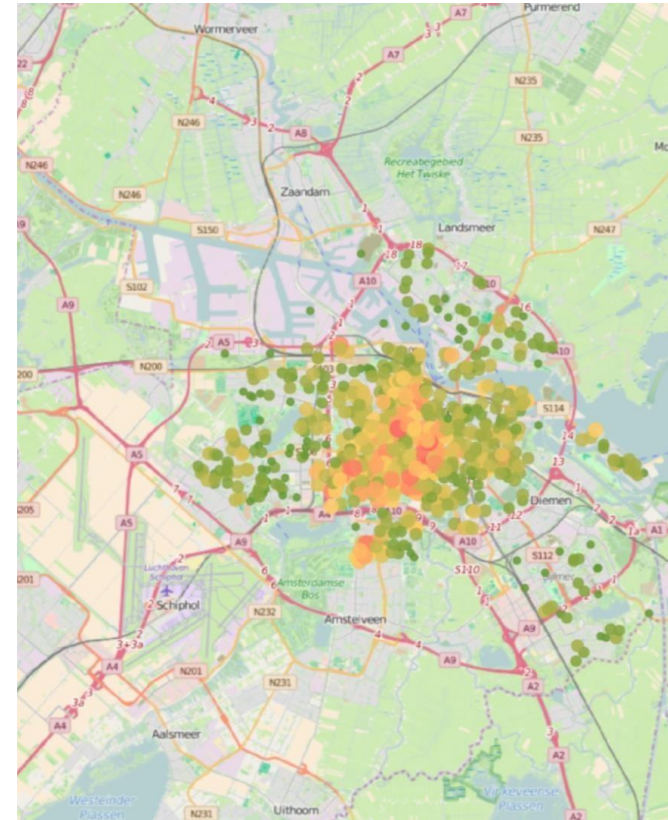


Location choice

Service vulnerability

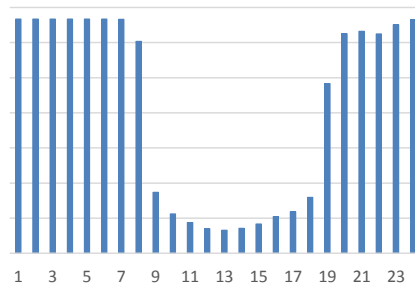


Inconvenience vulnerability

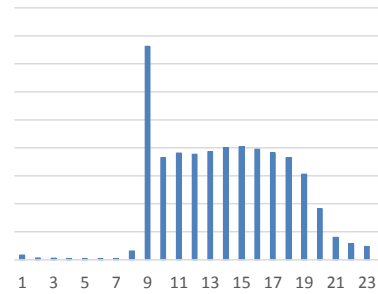


Time of Day: charging profiles

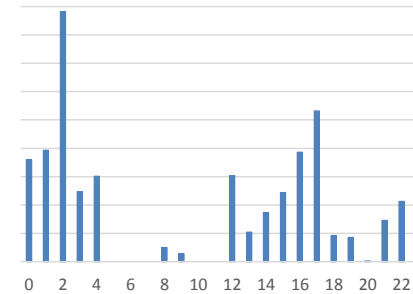
early pillow charger



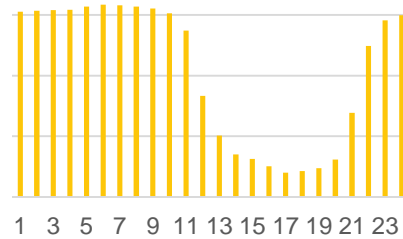
commuter



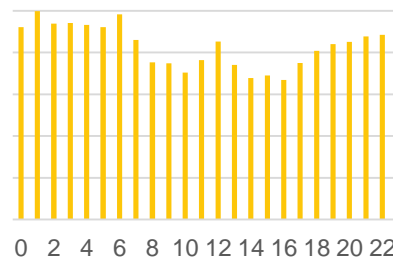
taxi



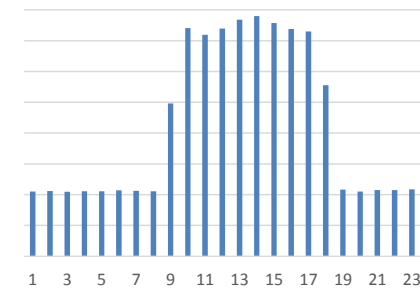
late pillow charger



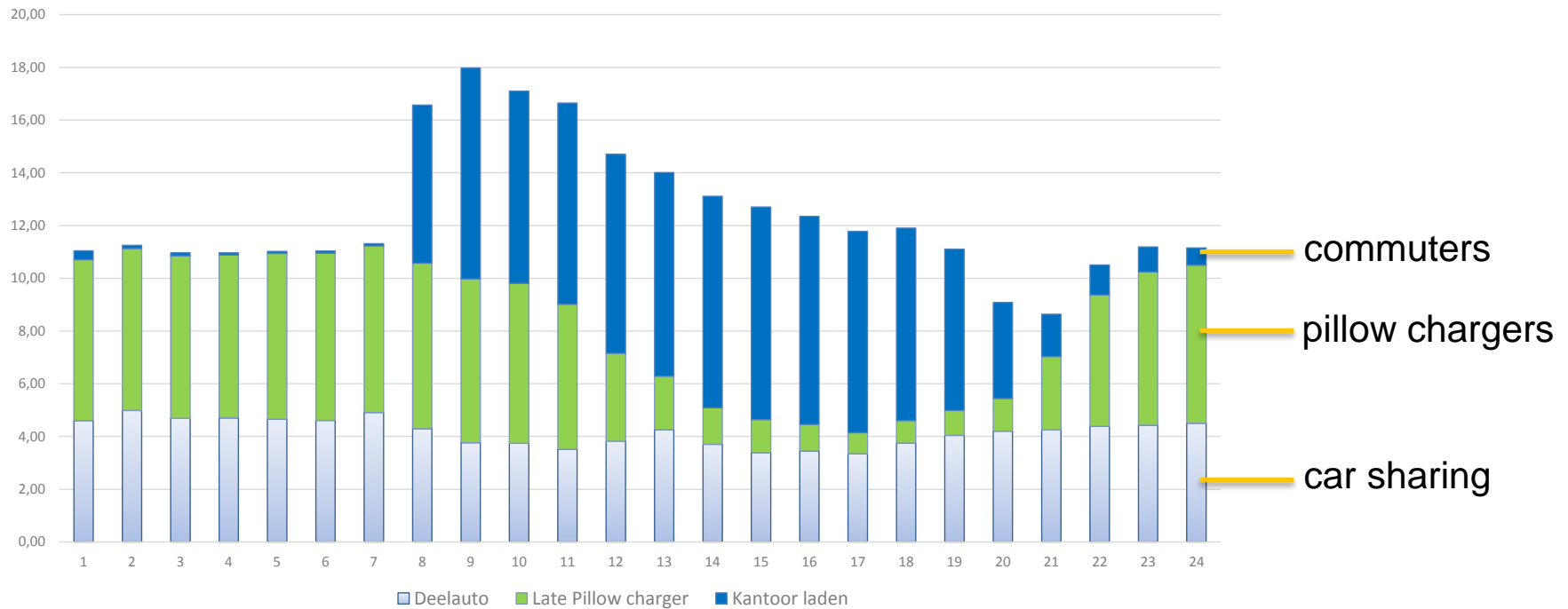
free floating car sharing scheme



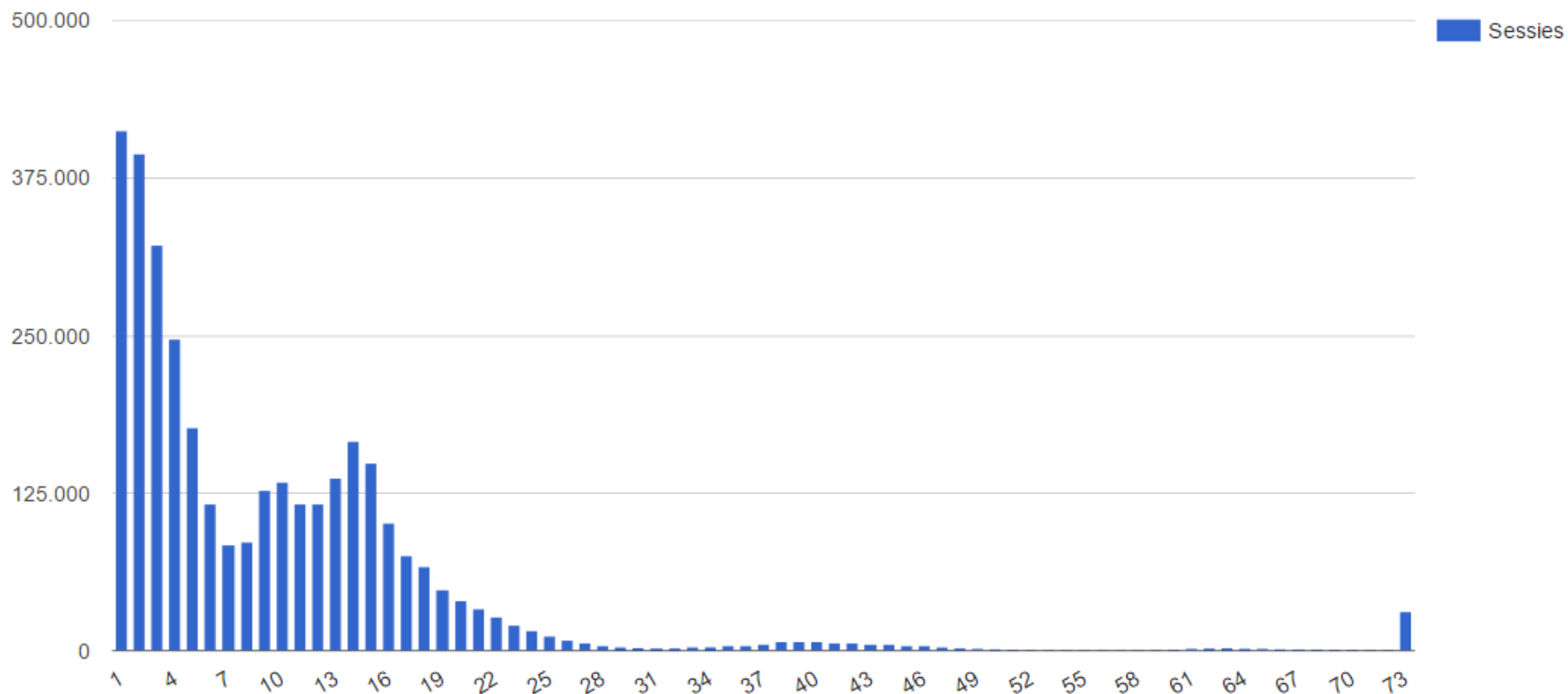
visitor



Smart roll-out strategies

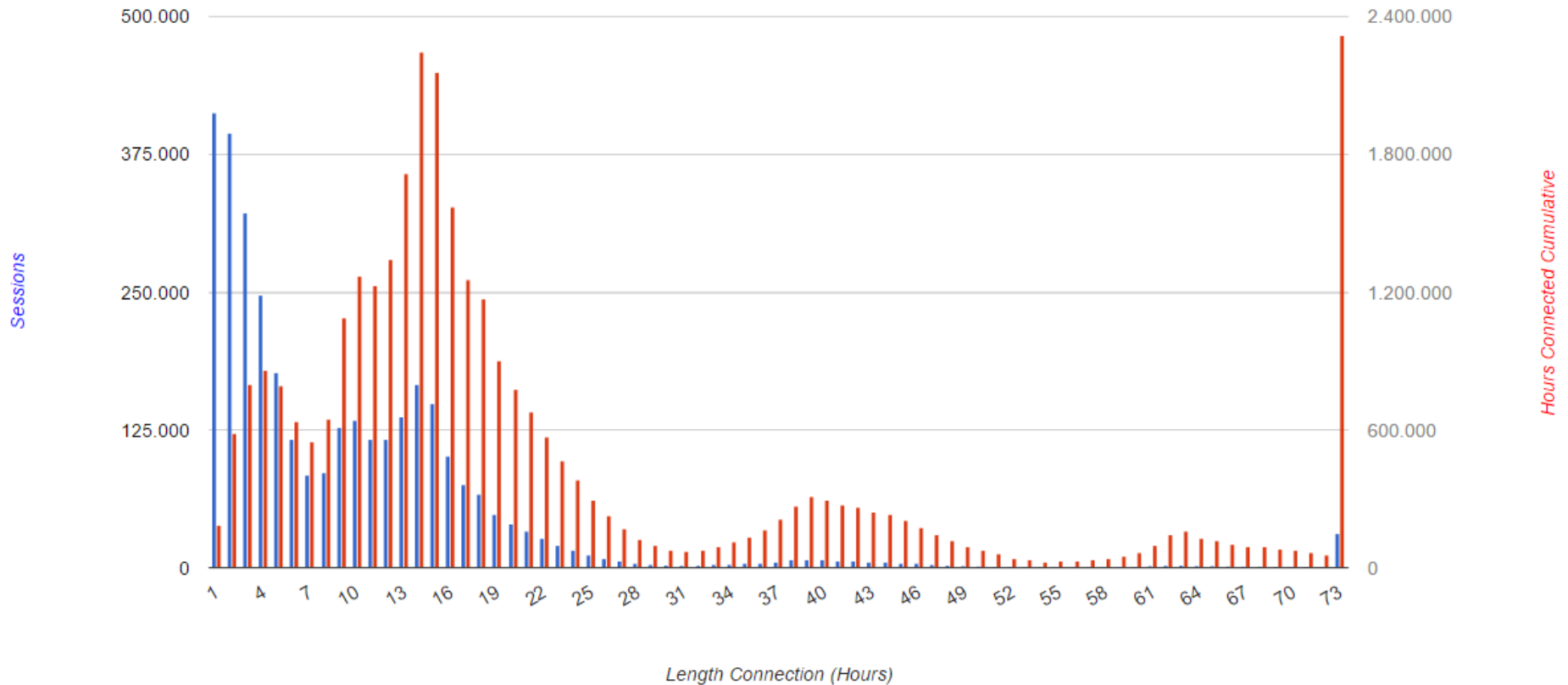


Duration



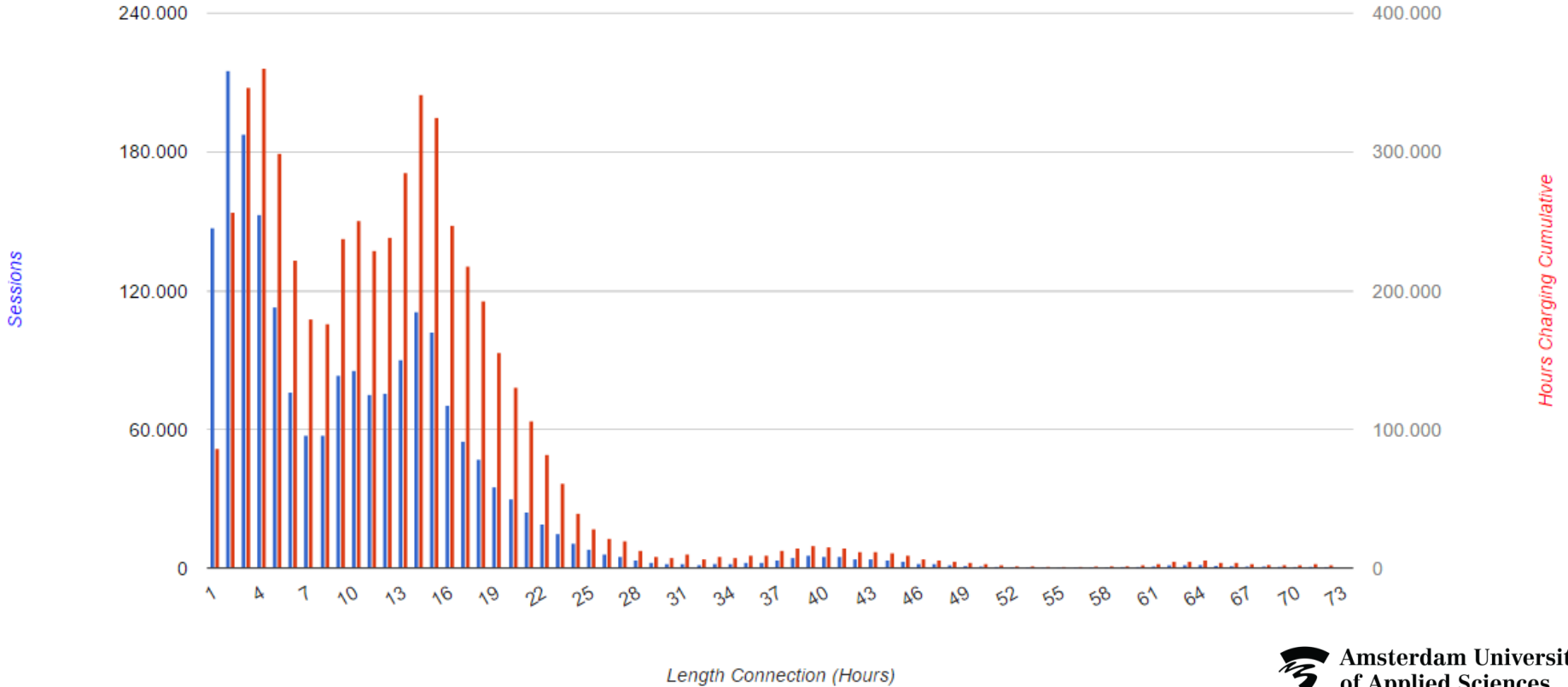
Duration

Hours connected



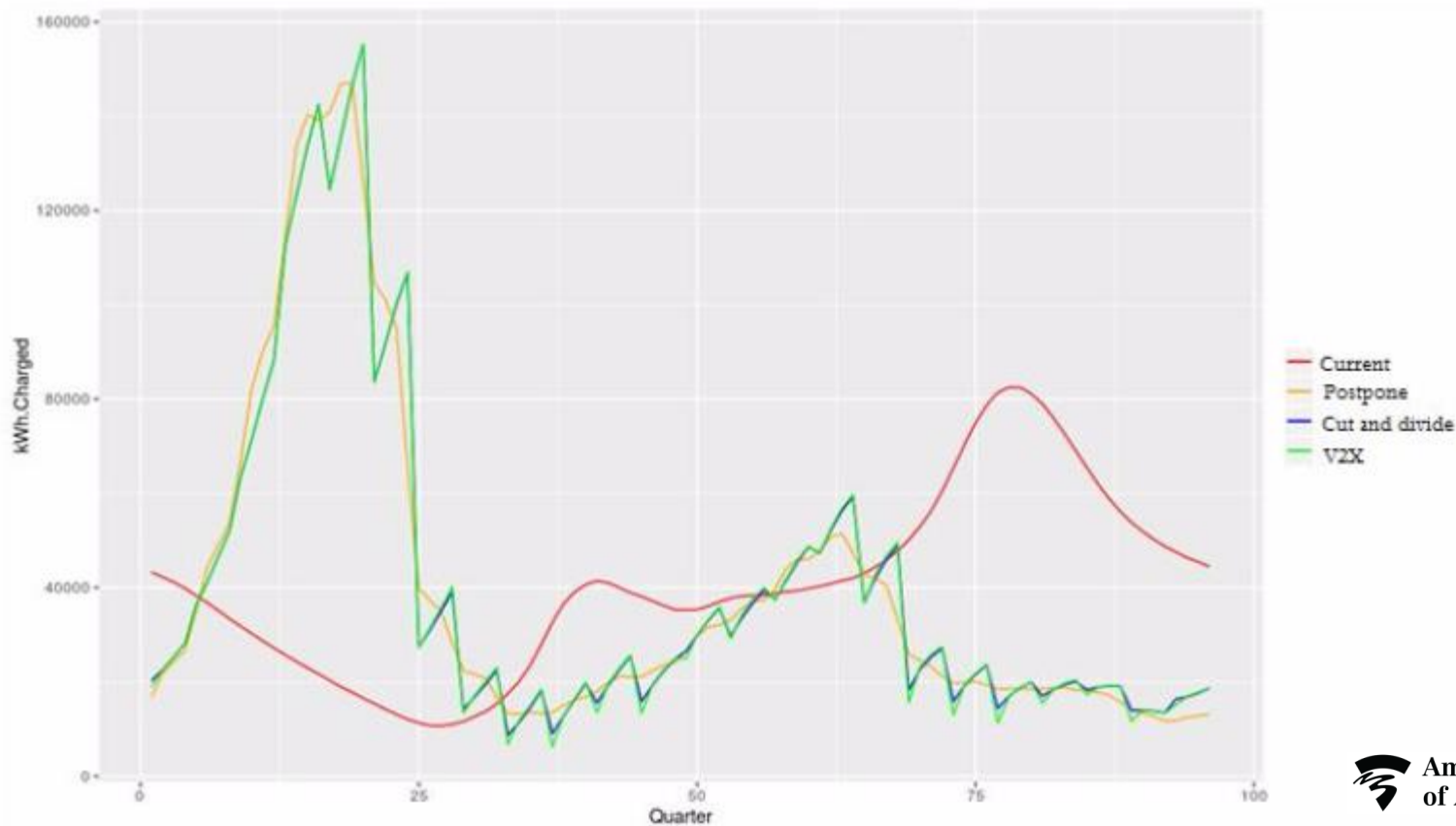
Duration

Hours charging



The fourth variable: flexibility

The potential:

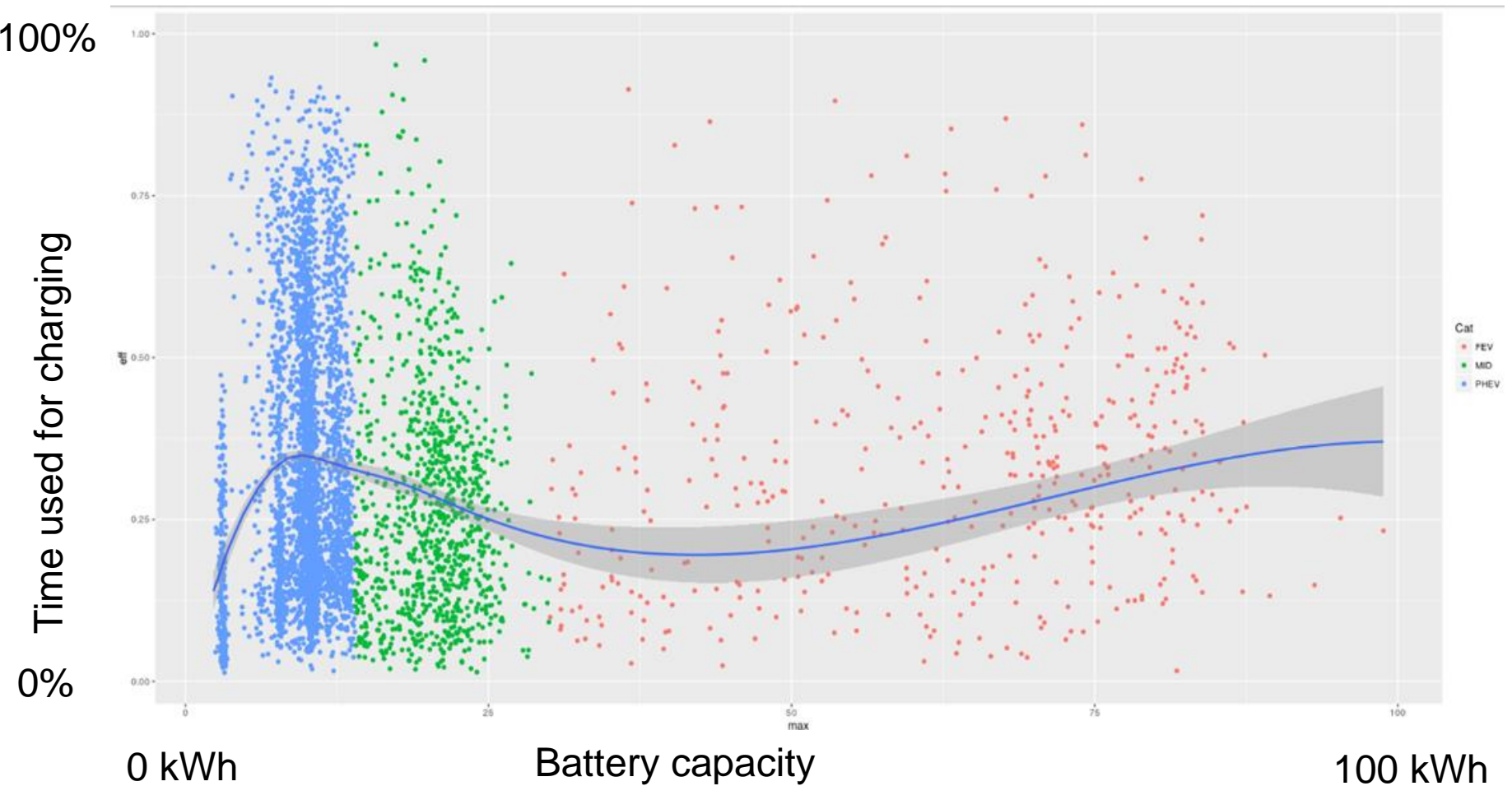


Flexibility: Cost reduction potential

Differences in APX electricity price

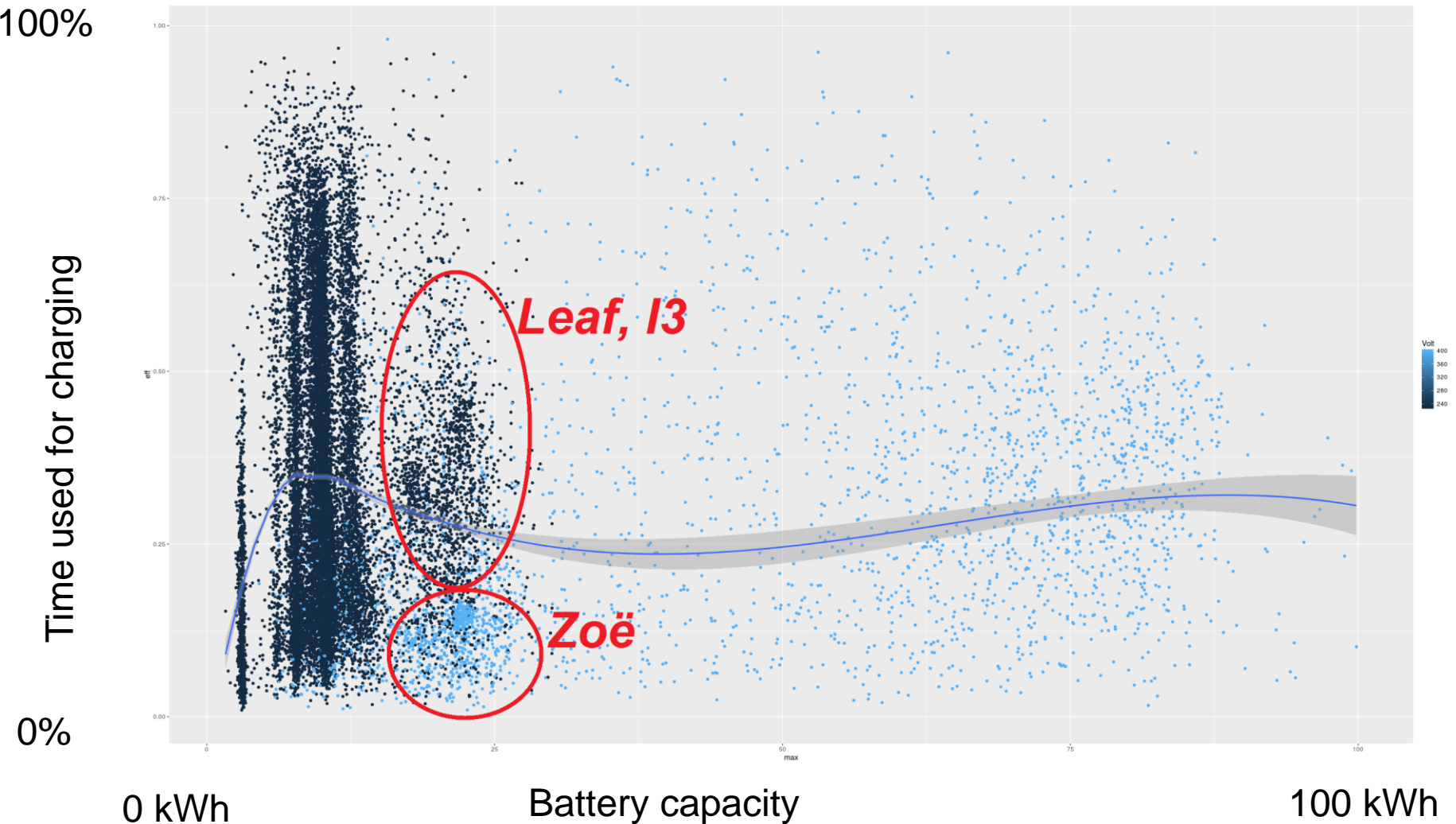
Situation	Average cost per session	% savings relative to current situation
Current situation	0.4488	0.0 %
Postpone	0.3603	19.7%
Cut and divide	0.3557	20.8%
V2X	0.3534	21.3%

Flexibility: Targeting users by Battery capacity

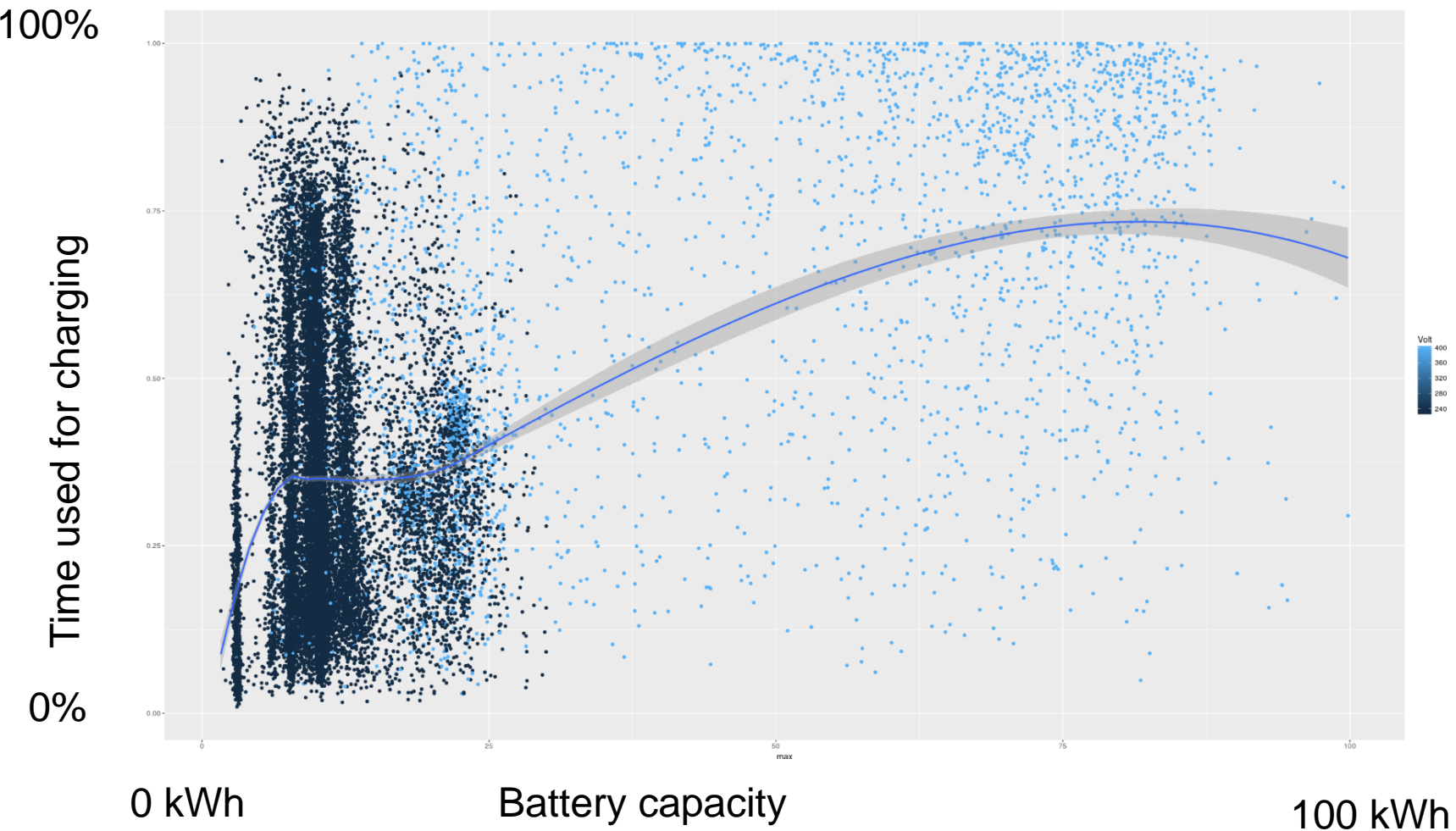


Important differences

1 (Darkblue) and 3 (Lightblue) phase charging



Understanding Battery capacity: a 1-phase version



(New) FEV (2017-2018)

Car	Battery capacity	Charging speed	Empty to full
Tesla Model S-X	60-100 kWh	3 Phase (11 kW)	5,5-9 hours
Nissan Leaf	30 kWh	1 Phase (3.7 kW)	8 hours
Renault Zoe R90	41 kWh	3 Phase (11 kW)	4 hours
Hyundai IONIQ	28 kWh	1 Phase (3.7 kW)	7,5 hours
Volkswagen E-golf	36 kWh	1 Phase (3.7 kW)	10 hours
Opel Ampera-E	60 kWh	1 Phase (3.7 kW)	16 hours
Tesla Model 3	58 kWh	3 Phase (11 kW)	5 hours
BMW i3	33 kWh	3 Phase (11 kW) *	3 hours

*BMW i3 22 kWh is 1 phase

Source: www.ev-database.nl

Local policy implications

- **Managing charging behaviour is complex**
- **Difficult to satisfy all stakeholders**
- **Encourage municipalities to experiment with policies – The Netherlands as living lab**
- **Potential for flexibility is big**
- **Look for easy ways to to nudge behaviour**

Thank you for listening



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