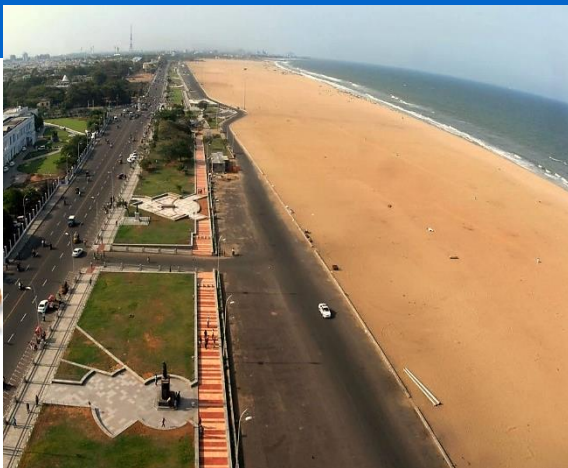


Modeling EV charging infrastructure deployment

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TU/e





About

1. **TU/e** Elaadnl

MSc Automotive Technology

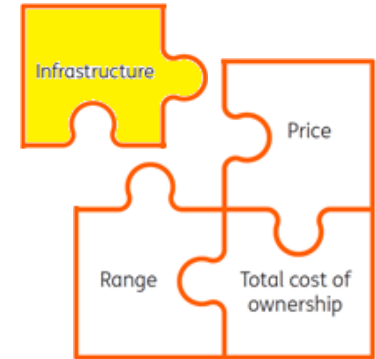
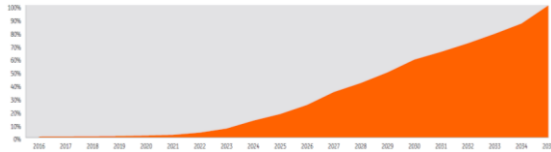
2. **SparkCity** 
predicting the future of energy and mobility from the bottom up

Researcher, SparkCity model (at TU/e)

3. **TOYOTA**

Why is (modeling) charging infrastructure needed?

- Charging infrastructure is a barrier to household adoption of EVs [1].



Source: [2]

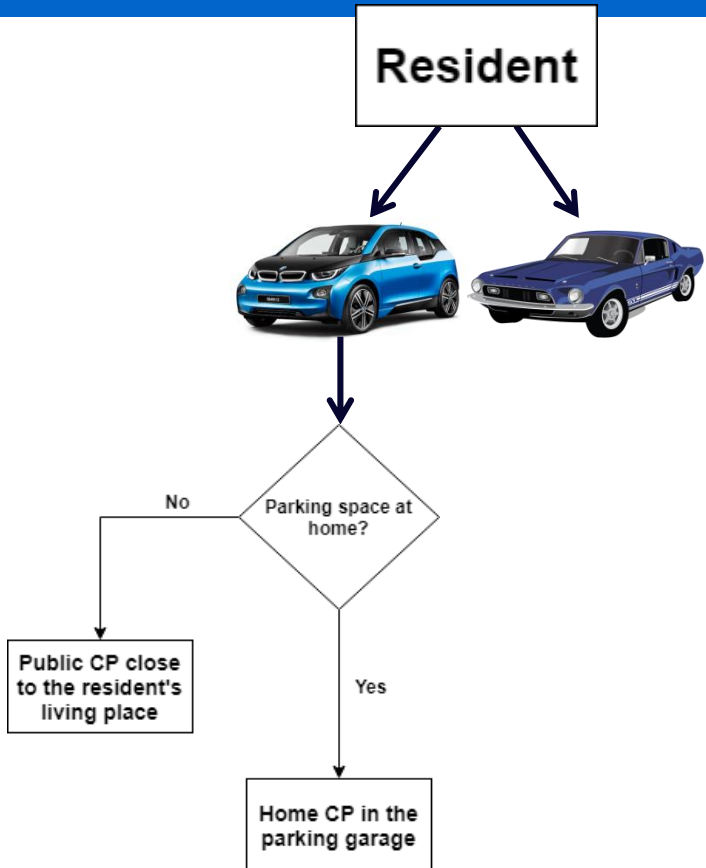
- Predicting charging infrastructure will help:
 - Grid operators, to anticipate loads on the grid.
 - Municipalities, to develop right policies for EV adoption.
 - Charge Point Operators (CPOs), to determine what the business case for Charge Points (CPs) will be.



[1] D. Klabjan *et al.*, "The Nascent Industry of Electric Vehicles," in *Wiley Encyclopedia of Operations Research and Management Science*, John Wiley & Sons, Inc., 2010.

[2] ING.com, "Electric cars will take over, threatening European car industry," *ING.com*, 13-Jul-2017.

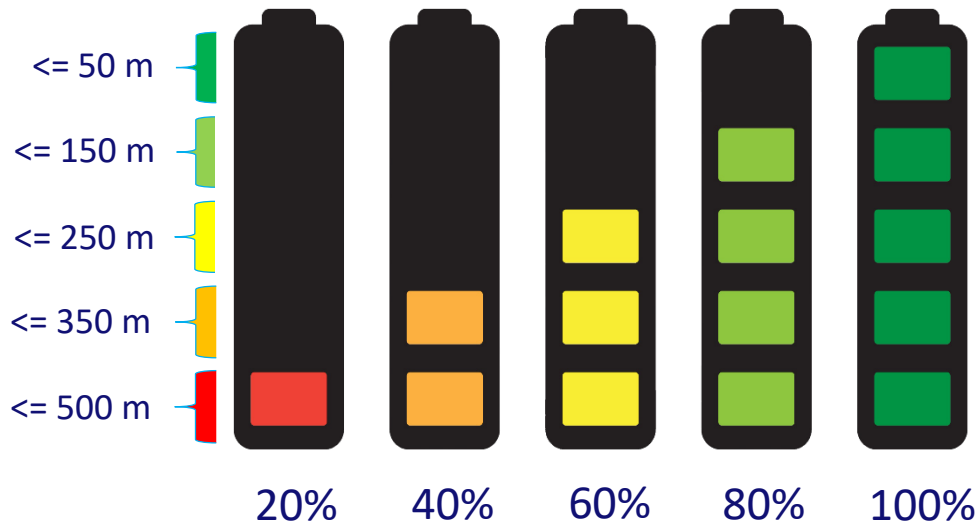
Driving patterns are important for the charging



TRIP DURATION AND DEPARTURE TIMES

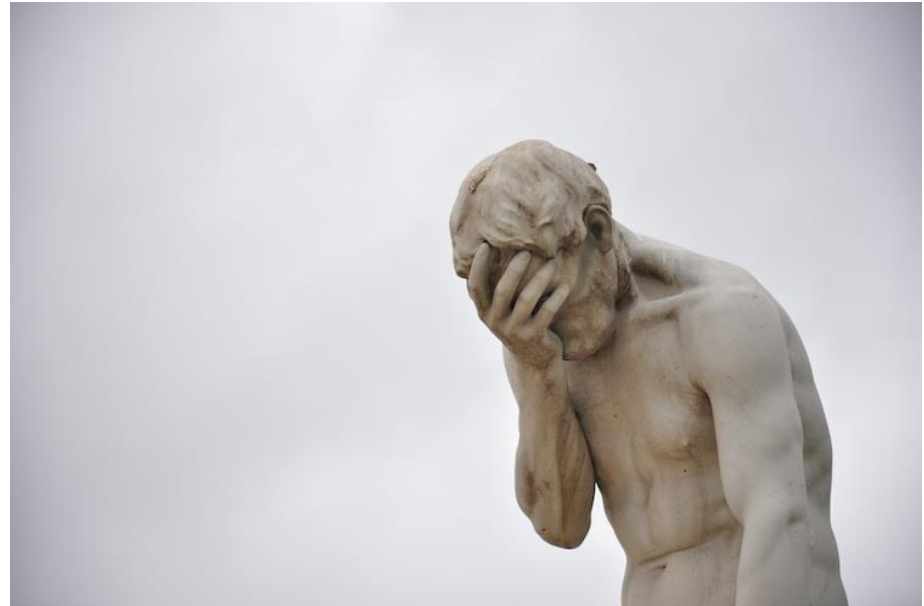
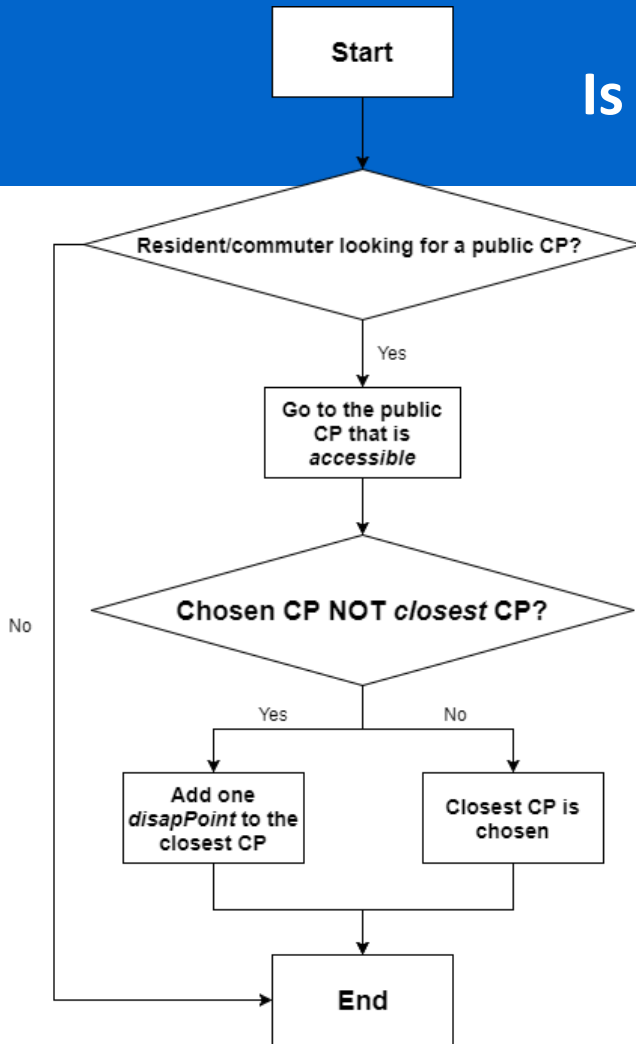
Type of trip	Time of Departure	Duration of trip
<i>Evening</i>	Between 19:00 and 21:00	Random of 3 hours
<i>Day</i>	09:00 (only for <i>non-working</i> drivers)	Random of 10 hours
<i>Weekend</i>	Between 00:00 to 13:00	Random of 24 hours

Lower the State of Charge (SoC) of the EV, higher the willingness to charge – Charging based on SoC (CSoC) approach

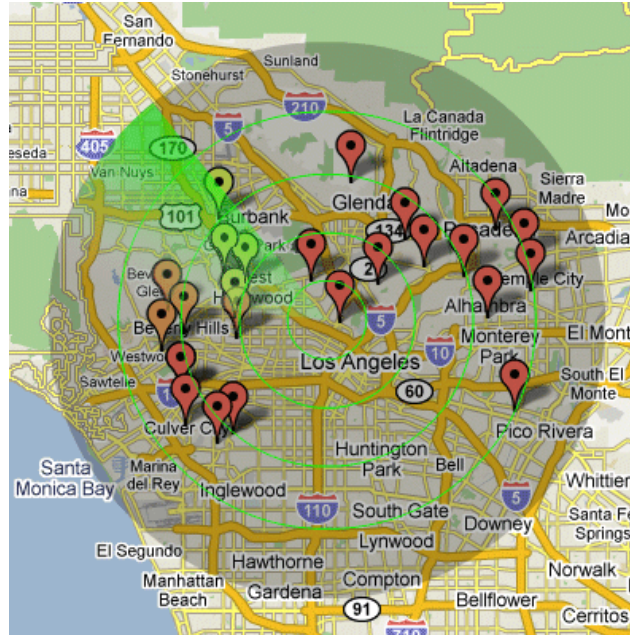
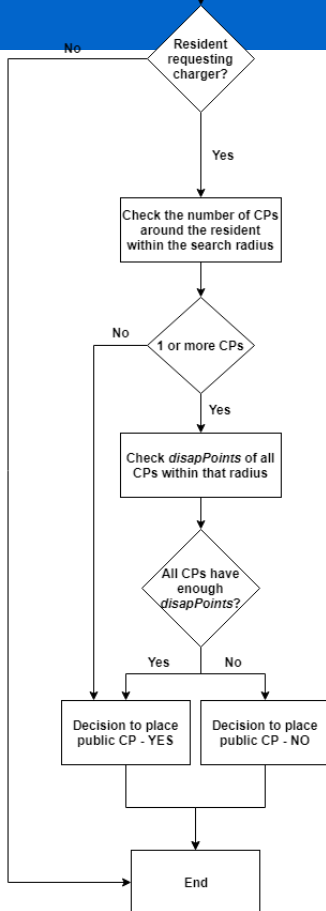


Made possible due to the use of ABM and real neighborhoods!

Is a new CP required? - *disapPoints* system

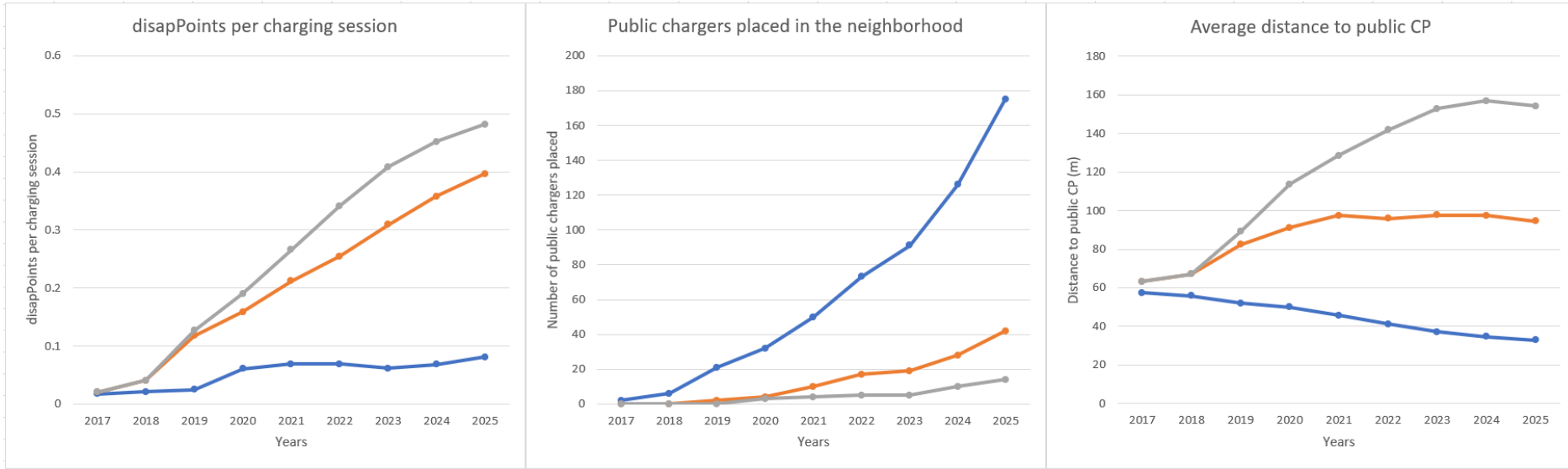


CPs placed based on *disapPoints* strategy



Municipality decisions are based on *search radius* and the *disapPoints*.

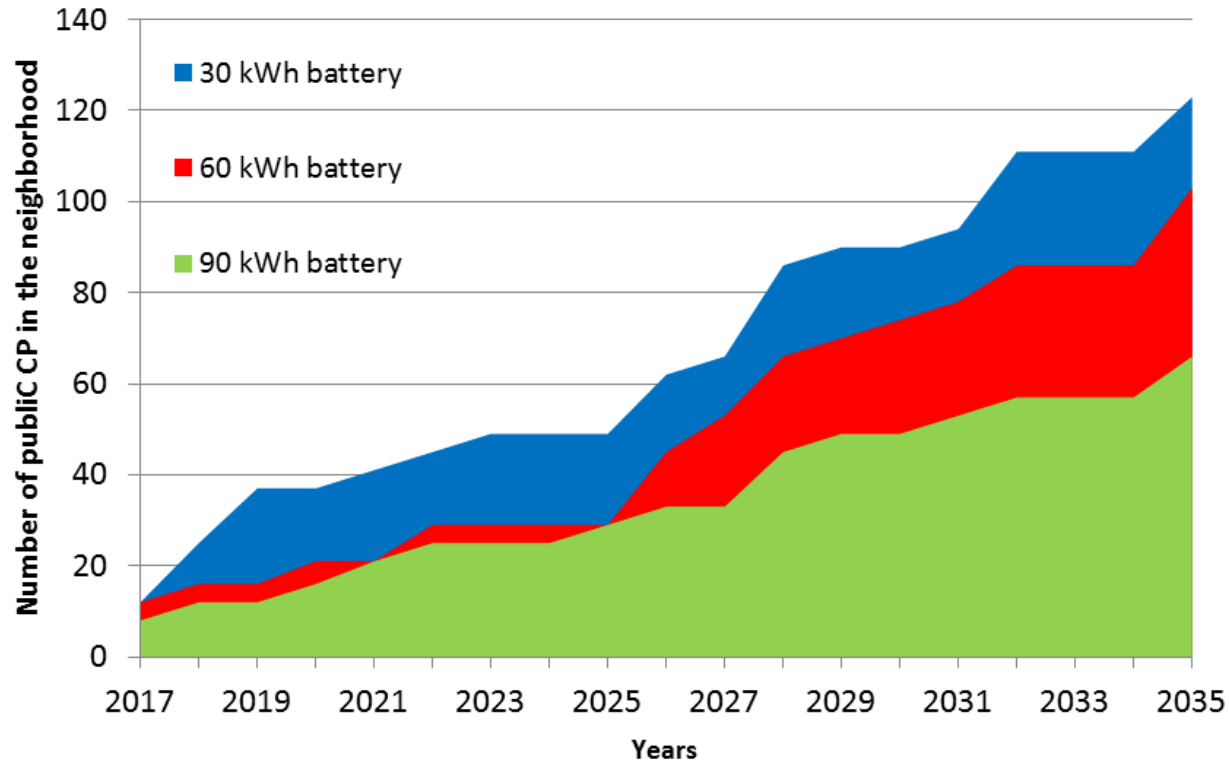
Search radius and disapPoints influence deployment



Zeelandkwartier

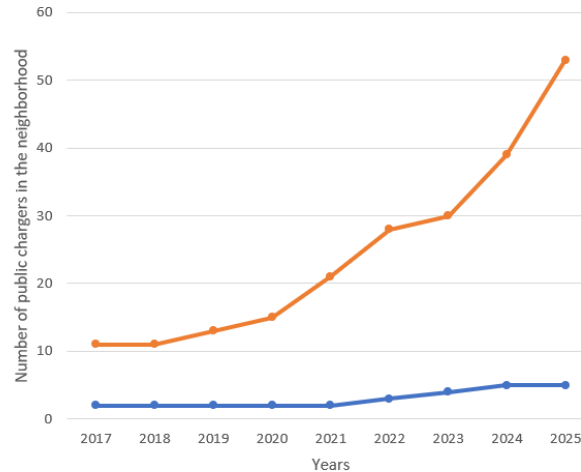
● 50m ● 250m ● 500m

Effect of EV battery size on placement of CPs

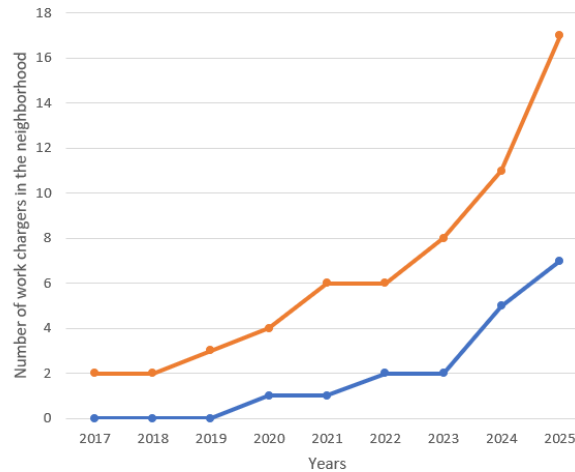


SparkCity model identifies and accommodates differences in neighborhoods

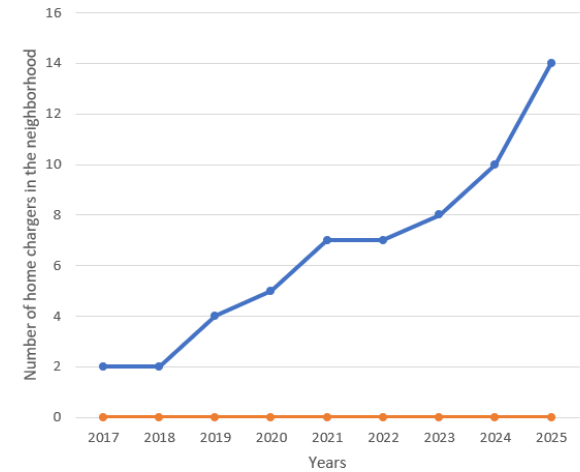
Public charging



Work charging



Home charging



Alteveer Zeelandkwartier

Next steps

1. DC fast charging
2. V2G capabilities
3. Business cases and financial POV

Thank you! Questions?

