

# **Singapore and Manila**

## **March 2012**

# **Successful Deployment of Low Emission Vehicles – Industry Viewpoint**

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# Introduction

- Arup and low emission vehicles
- Environmental necessity
- Vehicle manufacturers' response
- Do consumers want them?
- Low emission vehicle sales predictions
- How do consumers use electric vehicles?
- Effect on electricity supply
- Wireless charging

# Arup and Low Emission Vehicles

**BERR** | Department for Business  
Enterprise & Regulatory Reform

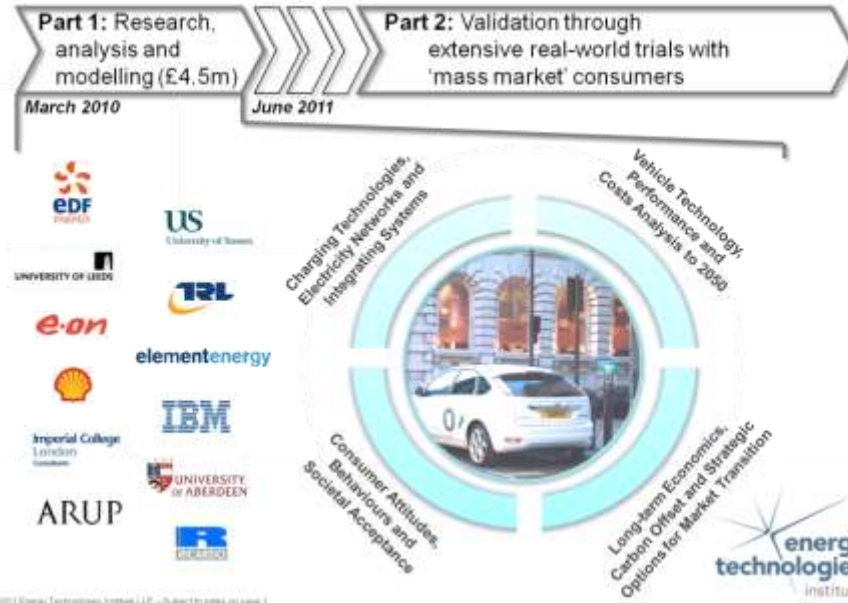
*Department for  
Transport*

**Investigation into the Scope for the Transport Sector to Switch to Electric Vehicles and Plug-in Hybrid Vehicles**

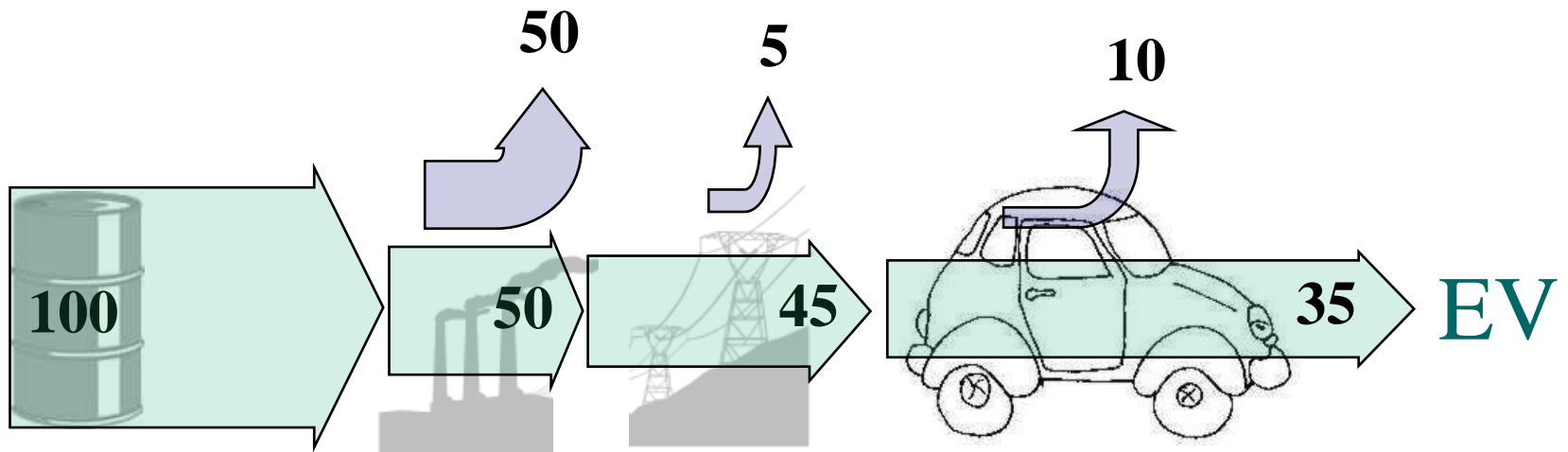
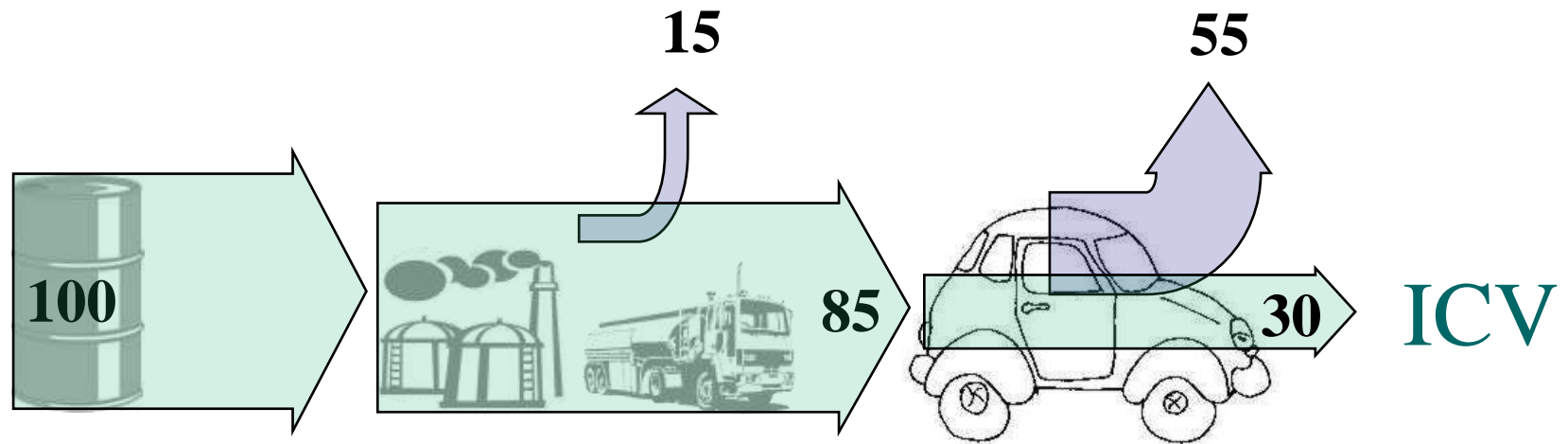
October 2008



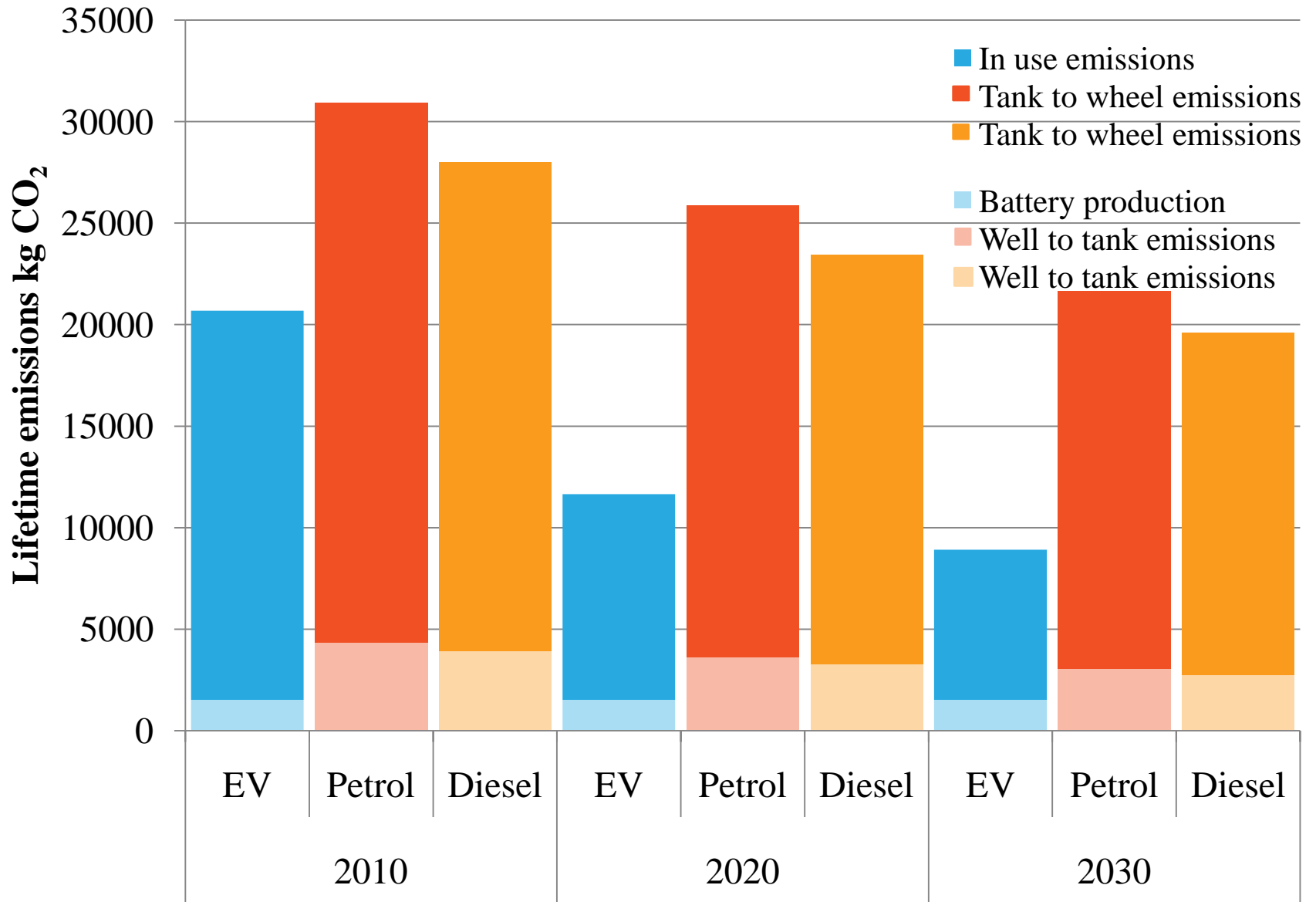
## ETI's World-class Plug-in Vehicle Programme



# Differences in Well to Wheel Energy Efficiency in 2010



# Lifetime Well to Wheel Emissions



# Urban Benefits

## ■ Noise

- 5dB reduction for a typical EV at 50kph compared to a typical petrol car
- Quieter traffic leading to reduced acoustic insulation requirements for buildings

## ■ Local air quality

- On top of CO<sub>2</sub> savings .....
- UK Government estimate £15bn is economic cost of health impacts of poor air quality in the UK
- EVs will assist in urban reduction of PM10 particulates and NOx emissions

# Incentives for Low Emission Vehicles

Incentive	UK	Germany	France	USA	Canada	Japan	China	Australia
Purchase incentive	✓	✗	✓	✓	✓	✓	✓	✗
Fuel tax	✓	✓	✓	✓	✓	✓	✓	✓
Annual vehicle usage tax	✓	✓	✗	✗	✓	✓	✓	✓
Company car tax	✓	✗	✓	✗	✗	✗	✗	✗

- ✓ Incentive for low emission vehicles
- ✗ No incentive for low emission vehicles

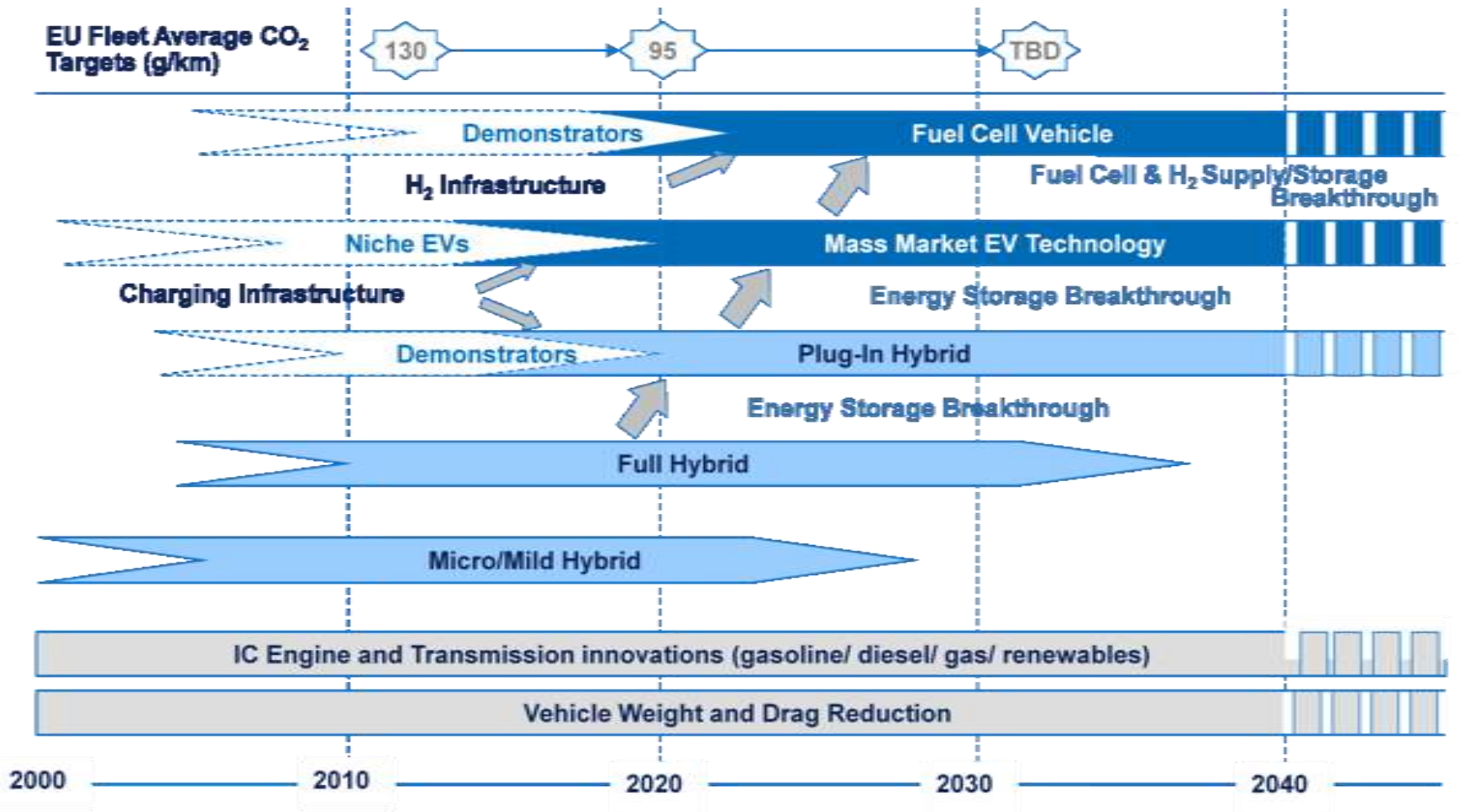
## Other local incentives

- free entry to low emissions zones
- use of high occupancy lanes
- free electricity and/or parking for recharging

## Funding for development

- batteries
- electric and hybrid drives

# Vehicle electrification roadmap



©NAIGT



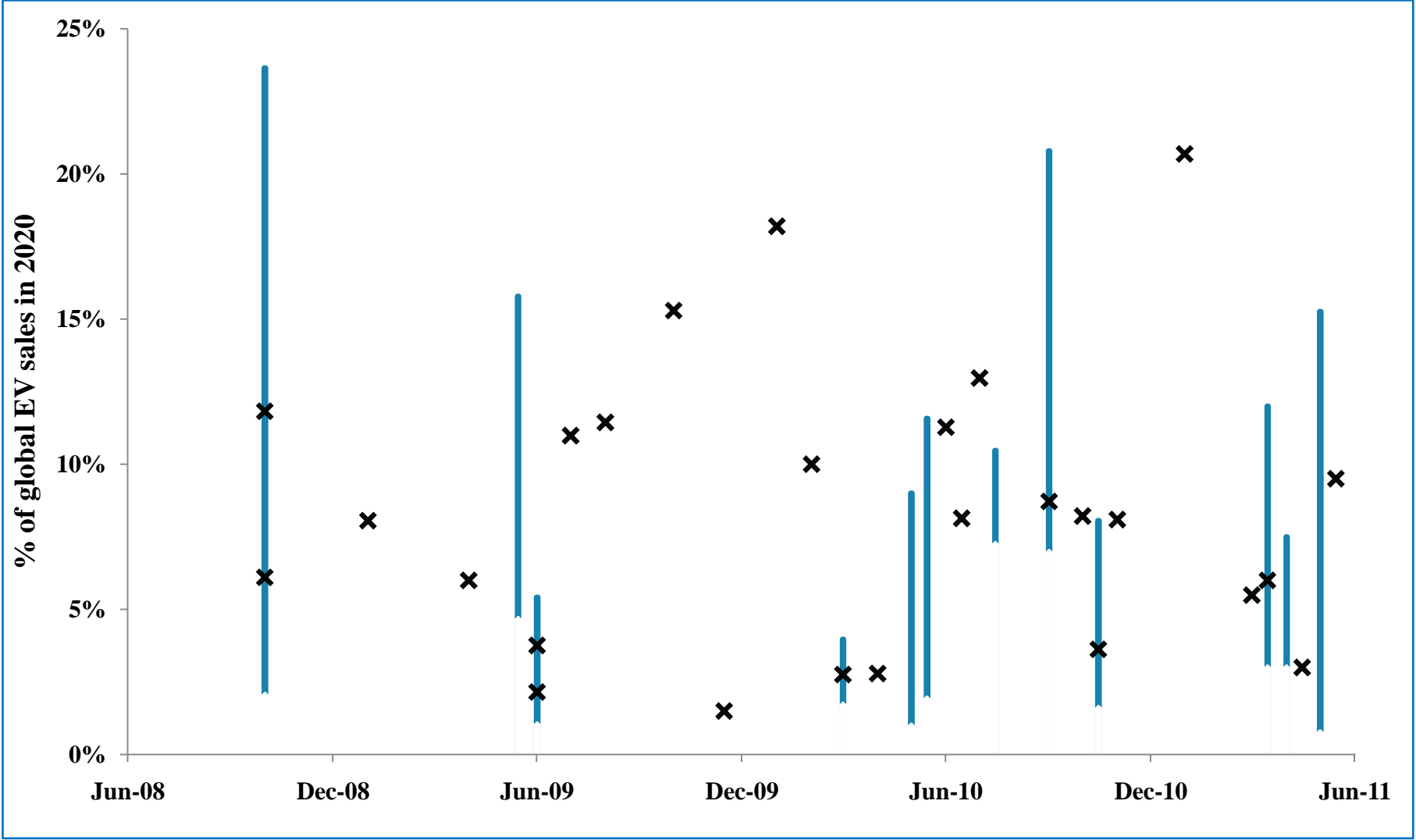
# Barriers to Market

- Purchase cost of EVs
- Range of EVs between recharging
- Availability of recharging points
- Speed of recharging
- Questions around EV green credentials
  - Energy to manufacture battery
  - Battery recycling
  - CO2 emitted by electricity generation

# Consumer Attitudes to Plug-in Vehicles

- The little published data that is available is based on surveys of consumers with little or no experience of owning or using EVs.
- This is representative of today, but attitudes are likely to change as EVs become more common.
- Data suggests that
  - Consumers will buy plug-in hybrids when they are similar cost to conventional vehicles.
  - Most consumers see full EVs as offering less capability, and will only buy when they are cheaper than conventional vehicles.
  - Running costs are lower for all EVs, and consumers need education to look at whole life costs, not just purchase price.

# EV Sales Projections for 2020



## Coventry And Birmingham Low Emission Demonstrators



Successful bid to the TSB's competition for Low Carbon Vehicle Demonstrations

### 12 month road trial

- First vehicles on roads in December 2009
- Final vehicles by March 2011

### Trial users

- Domestic rather than fleet
- Broad mix of car usage
- Ability to charge at home

### Data collection

- GPS journey data
- State of charge of battery
- Home charging – time and energy transfer



45



25



25



5



2



8



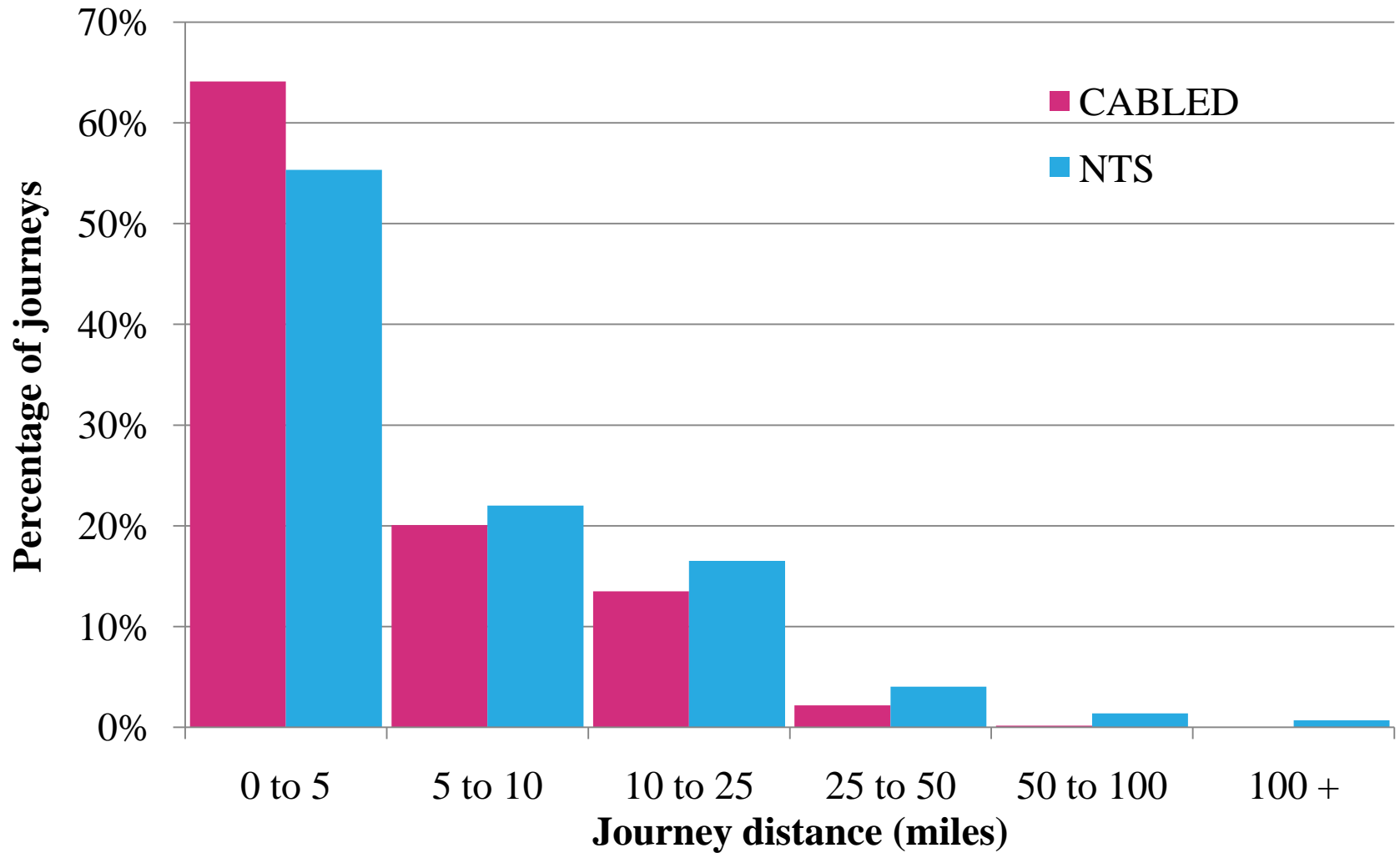


# Charging Point Installation

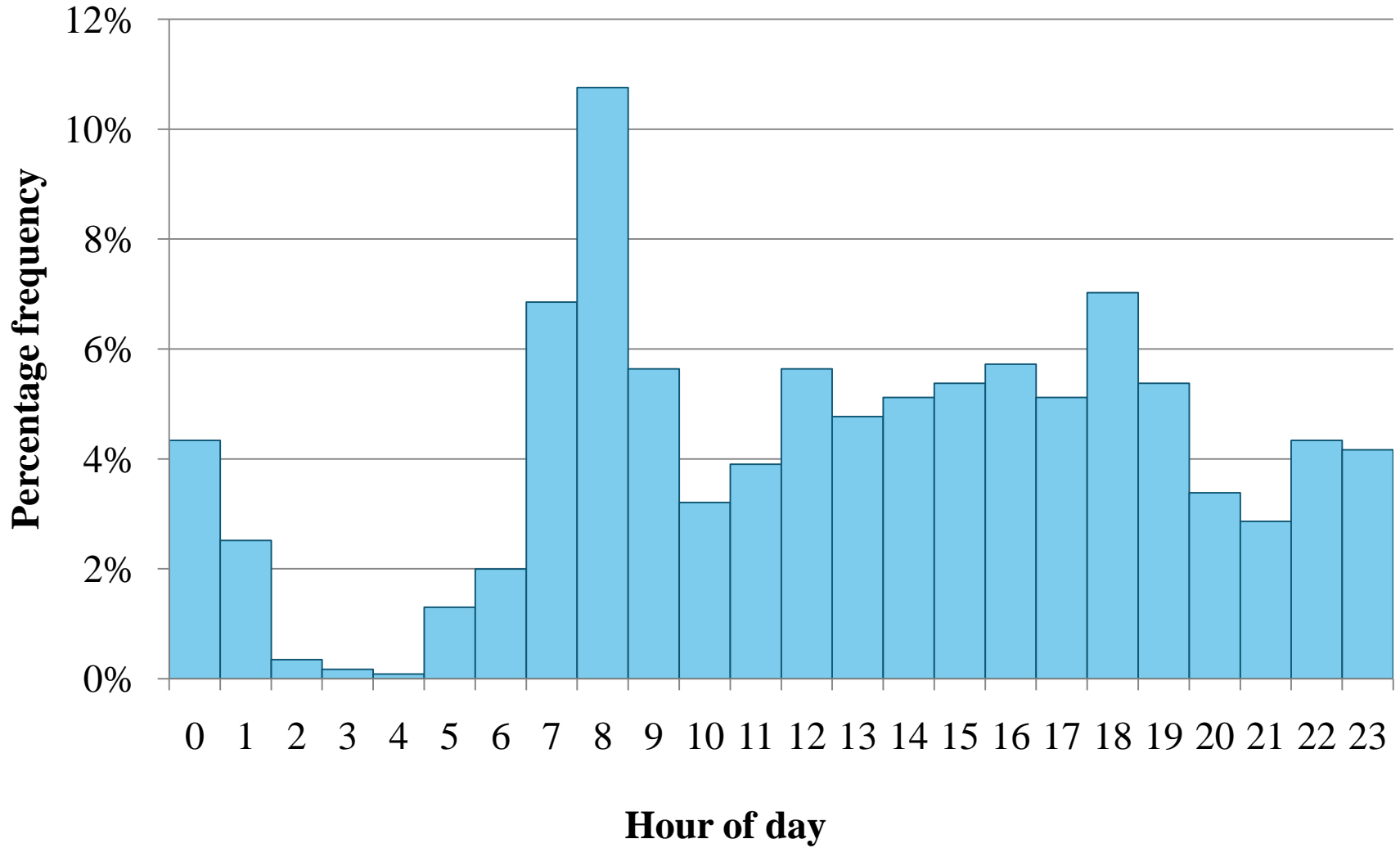
- 36 public charge points installed in Birmingham and Coventry
  - Public car parks
  - Private car parks
  - Street side
- 28 workplace charge points
- 73 domestic charge points



# Comparison of CABLED and National Travel Survey

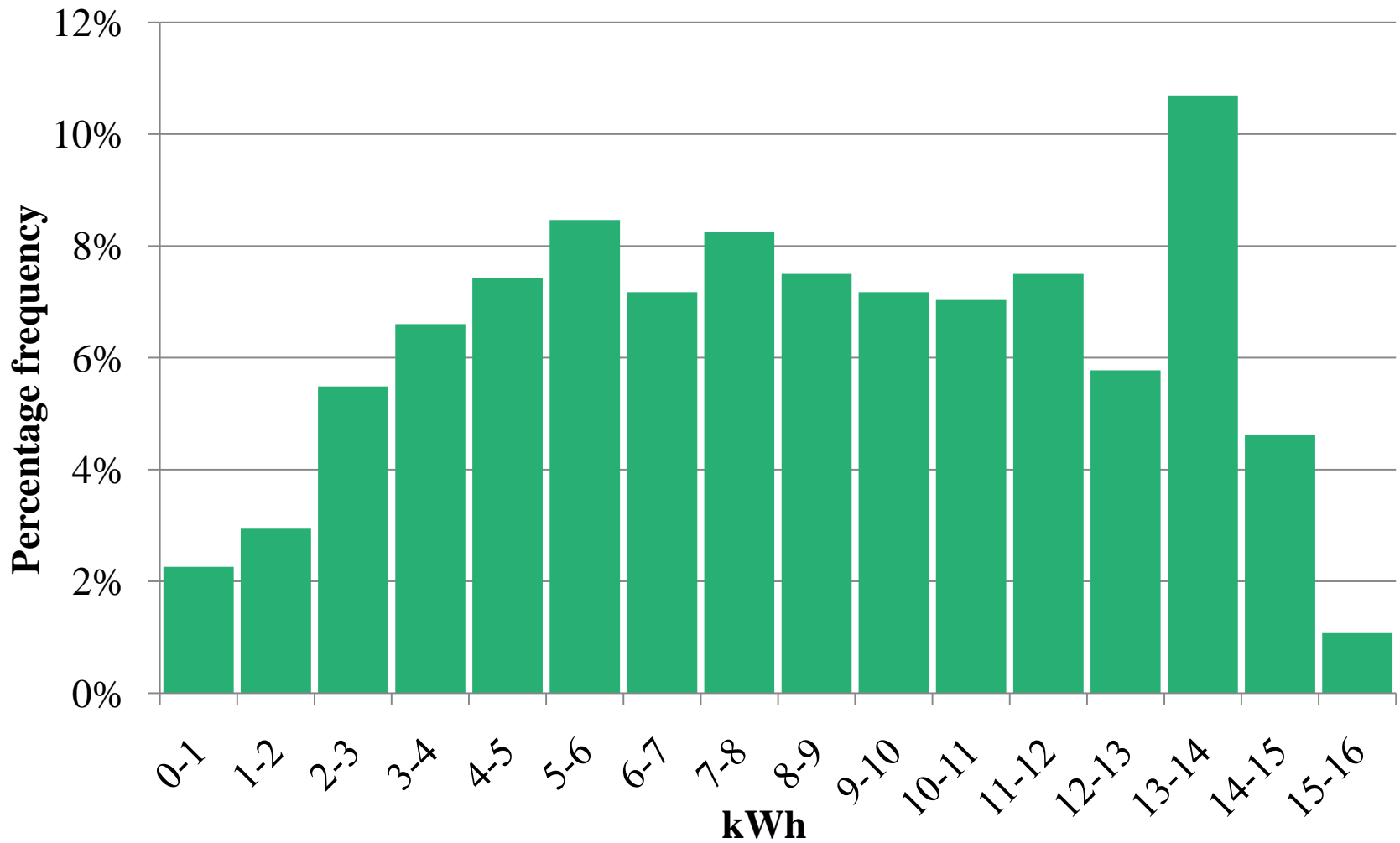


# Charge Start Time

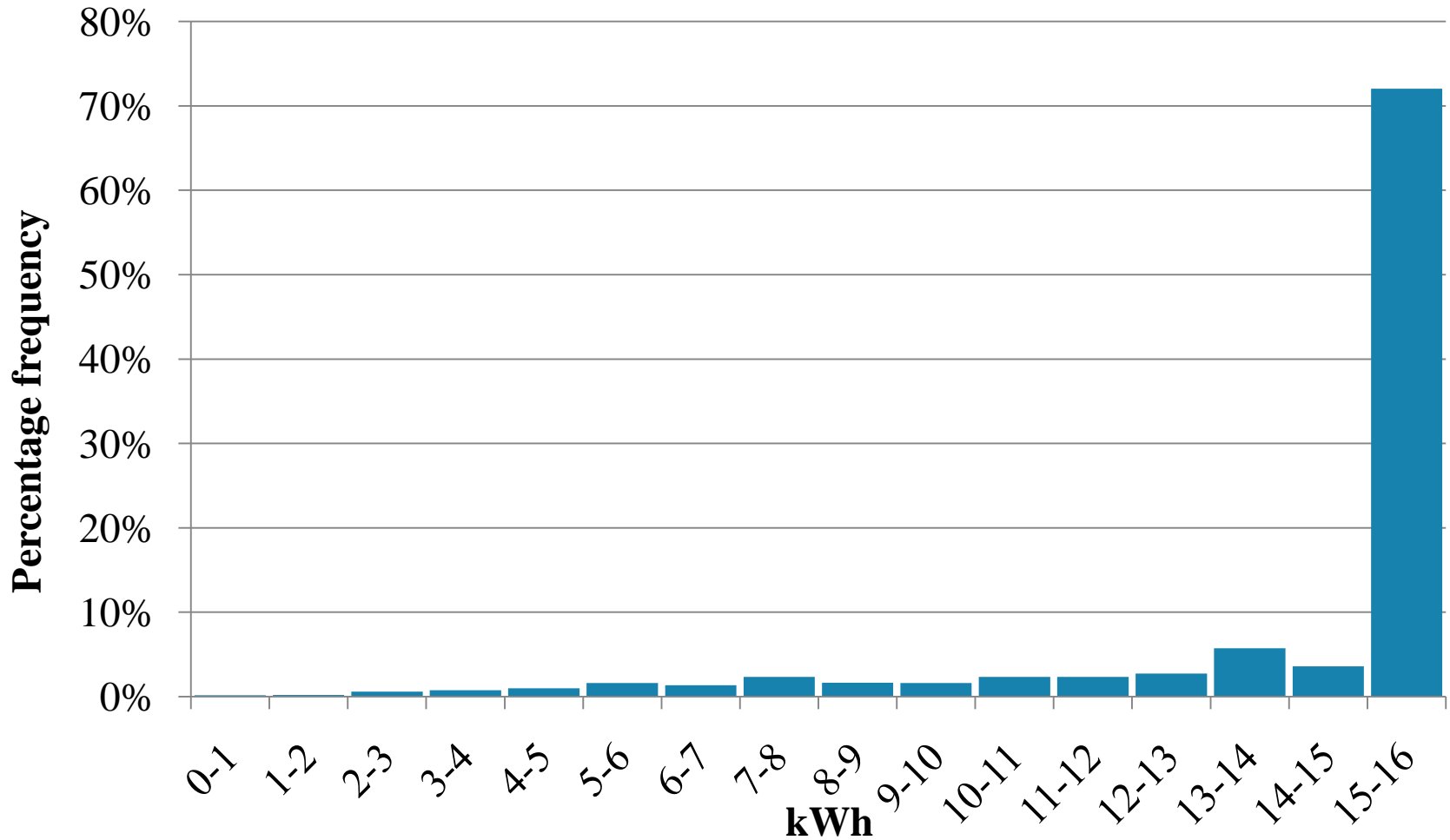




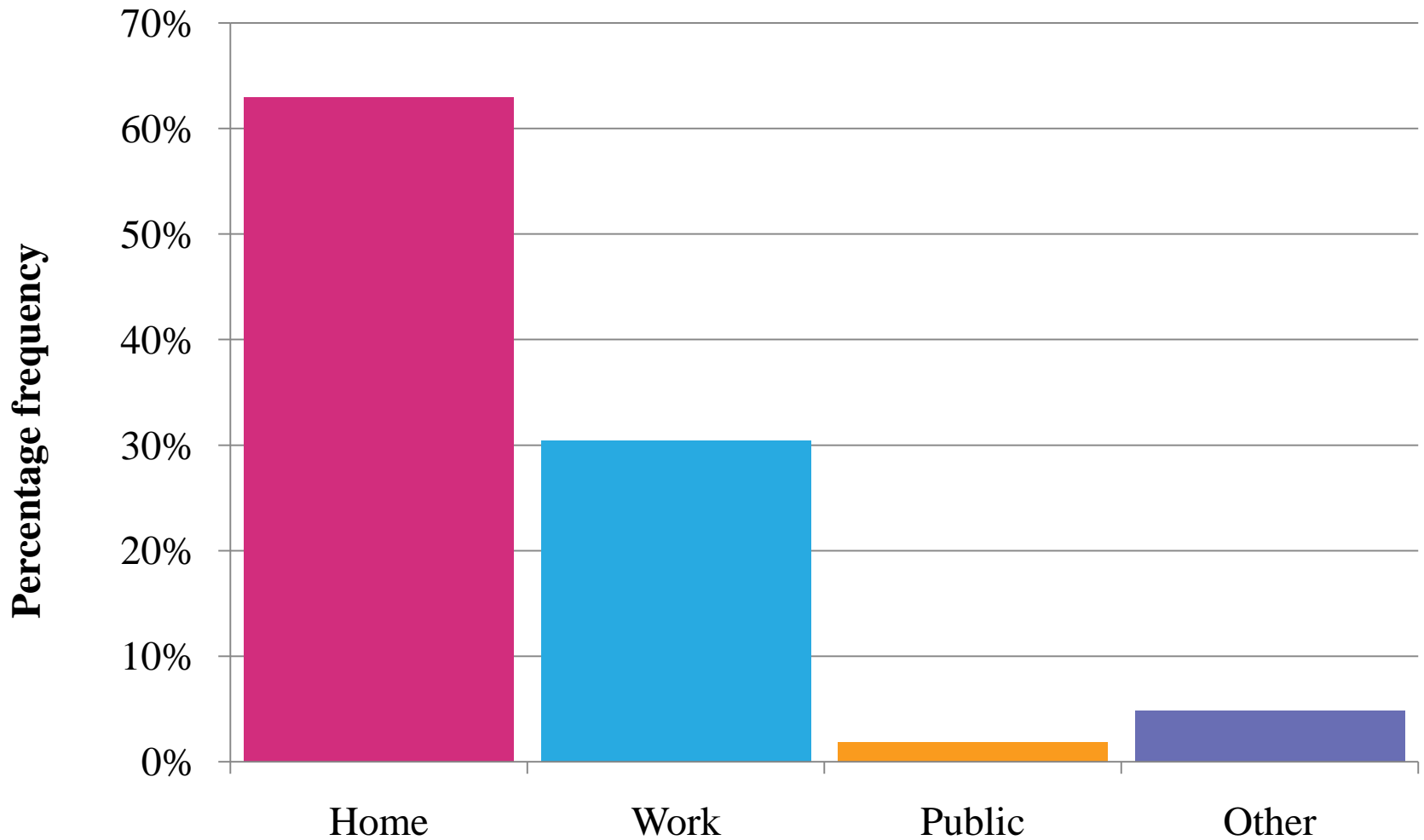
# Energy in battery at start of charge



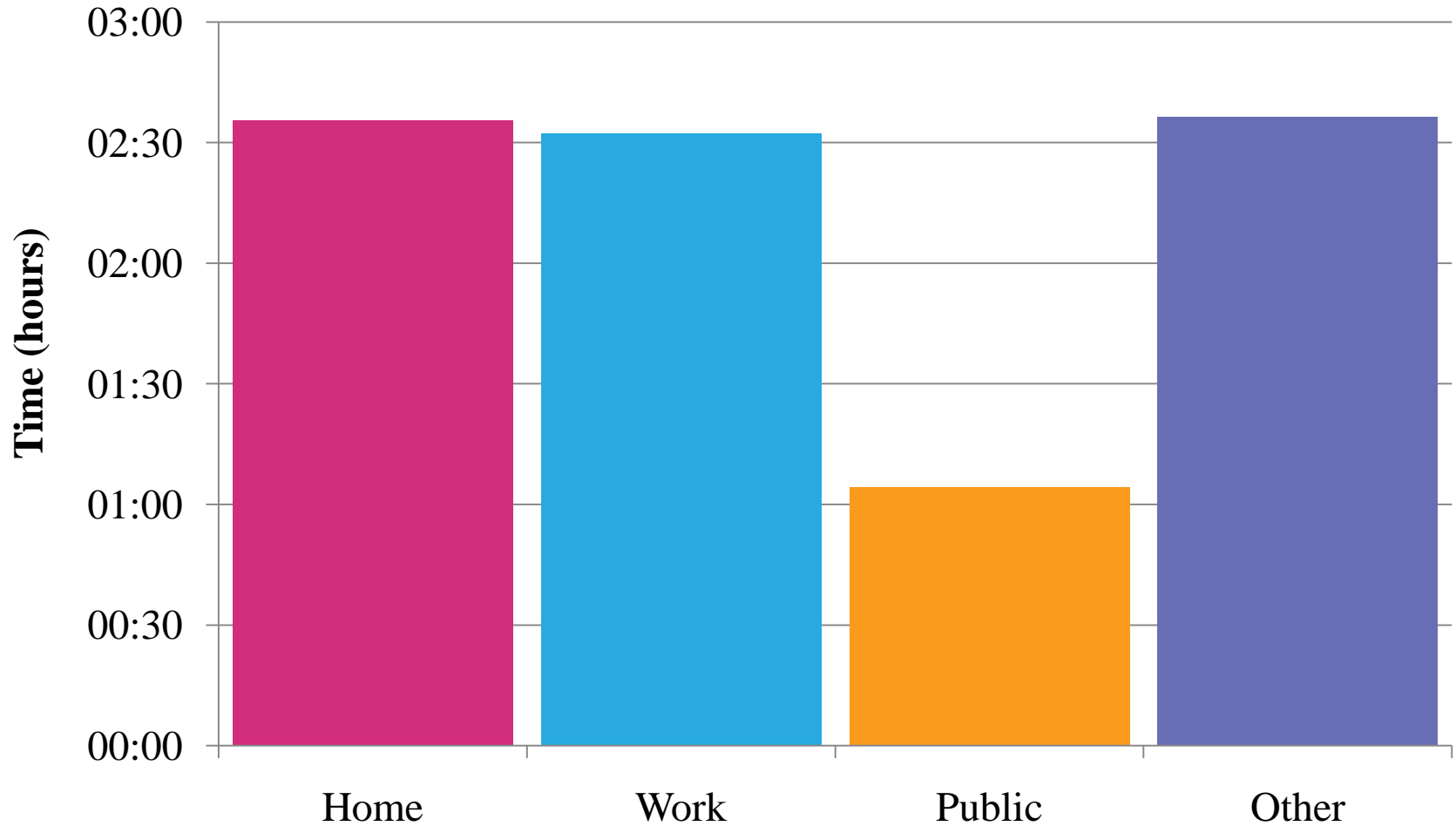
# Energy in battery at end of charge



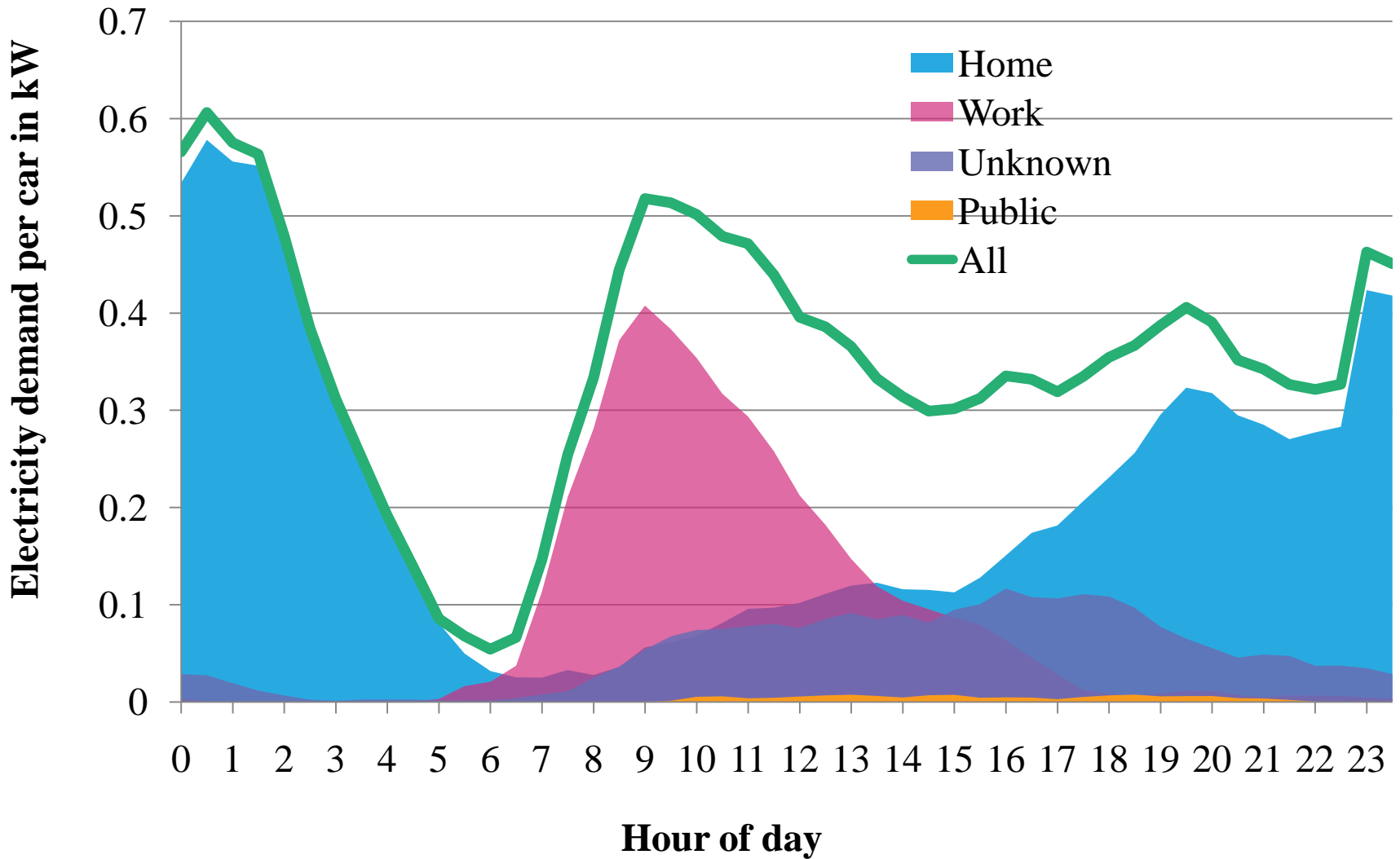
# Percentage of charges at location types



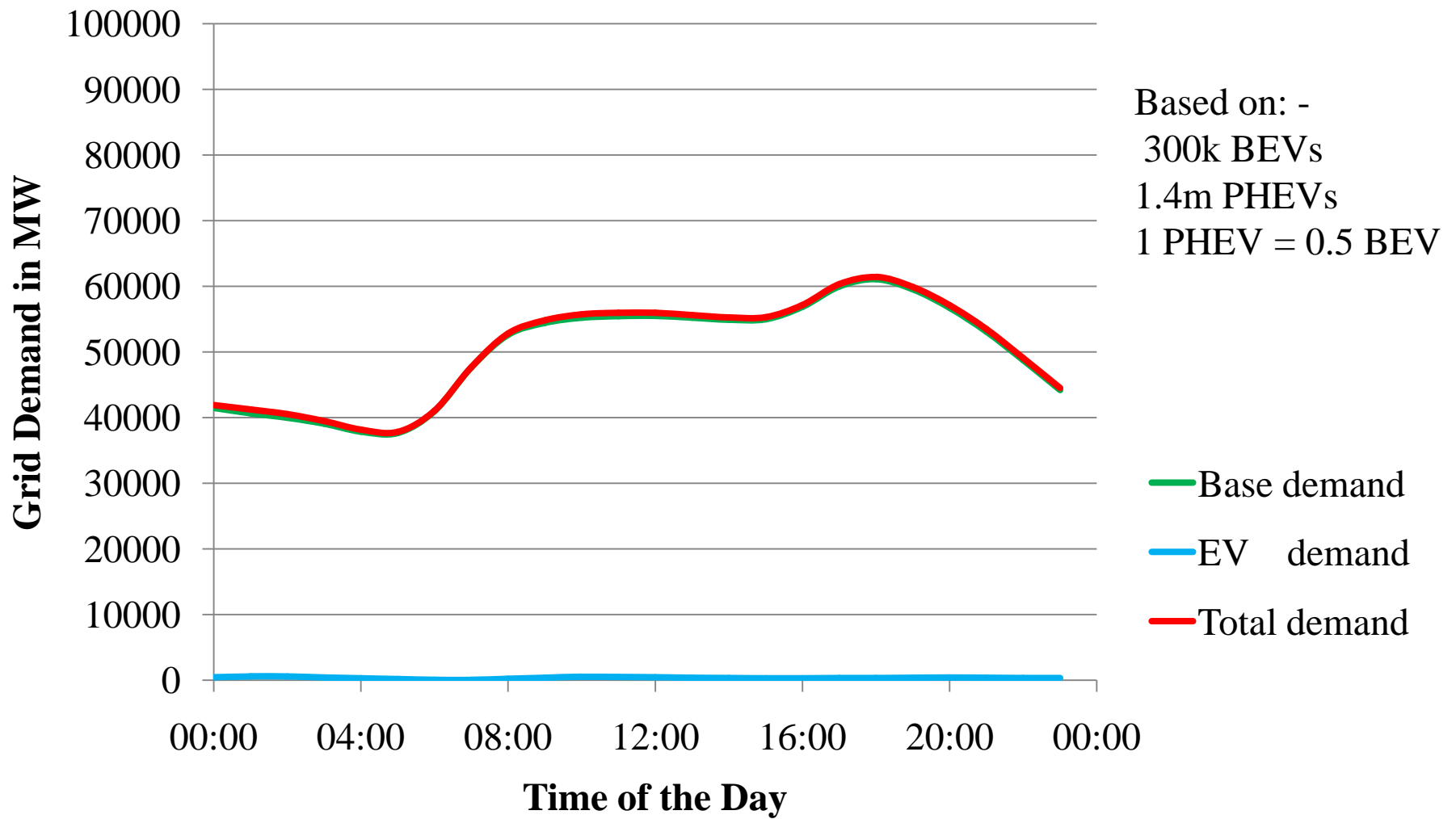
# Average charge duration at locations



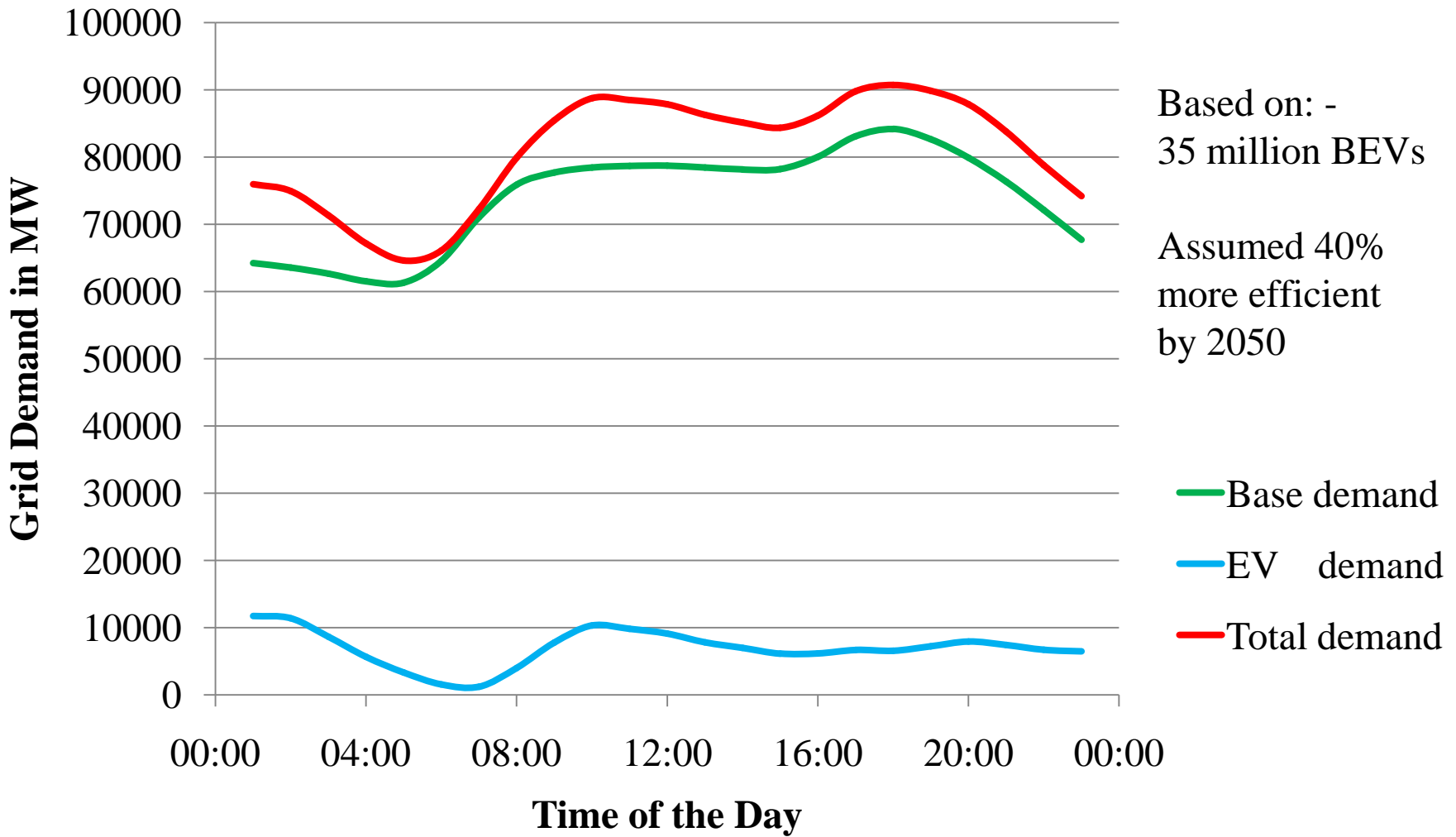
# Electricity Demand Profile



# Total UK Grid Demand in 2020



# Total UK Grid Demand in 2050

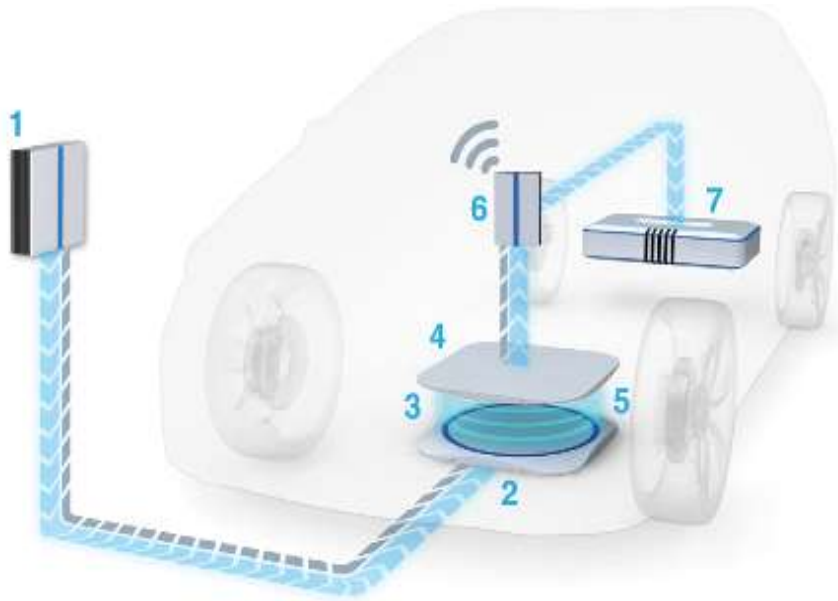


# Summary

- EVs provide an environmental benefit now and this will get bigger.
- CABLED EVs are being used in a similar manner to conventional cars.
- People start showing “range anxiety” when their batteries drop below 25% full.
- Home is the preferred choice for charging location. If work charging is available, the split is around 50% at home, and 50% at work.
- There were an insufficient number of public charging points in CABLED to learn how much people will use them in the future.
- The increase in UK electricity demand due to EVs will be small, and with overnight charging, peak demand will be almost unaffected.
- Hotspots of EV ownership are likely to require local grid reinforcement in only a few years unless staggered charging can be encouraged.



# Qualcomm - Wireless Charging Trial in London



1. Power supply
2. Transmitter
3. Magnetic Resonance Transmission
4. Receiver
5. Data Transmission
6. Controller
7. Battery

Inductive Power Transfer is an innovative system for wireless charging of batteries in an electric vehicle

To charge, a vehicle simply has to be parked over the induction pad and the charging will commence



*Any questions?*