



# Demand Response opportunities of electric vehicle charge points

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ECODESIGN SMART APPLIANCES STAKEHOLDER MEETING  
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# Agenda

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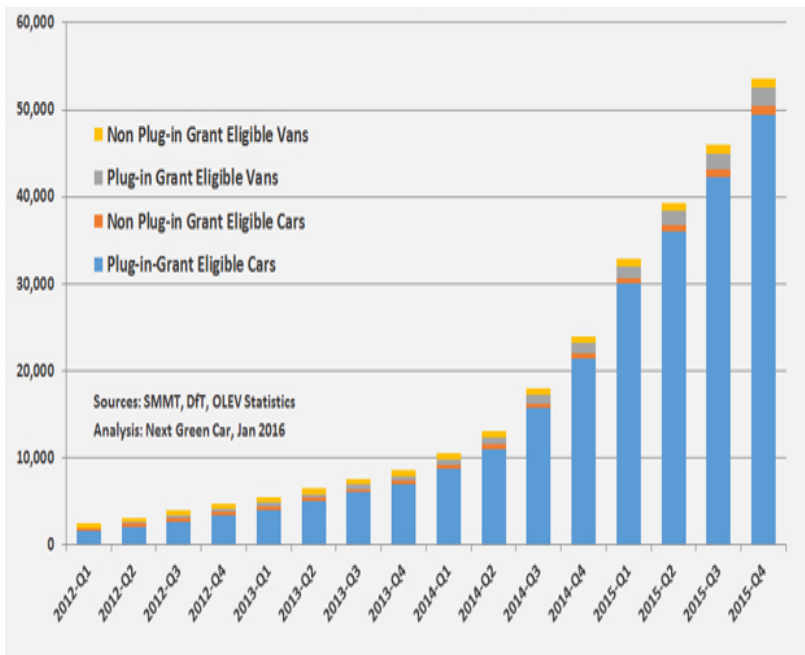


- **Market growth of electric vehicles (and charge points)**
- **Electric vehicle charging**
- **Load shift potential**
- **Summary**

# Electric Vehicles are selling well in the UK

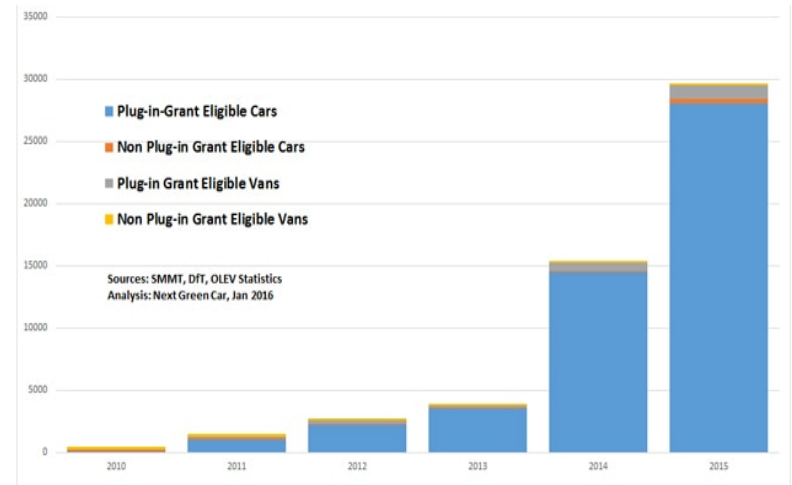
....and many EU nations have significant and growing EV sales

Cumulative UK EV registrations 2012-2015



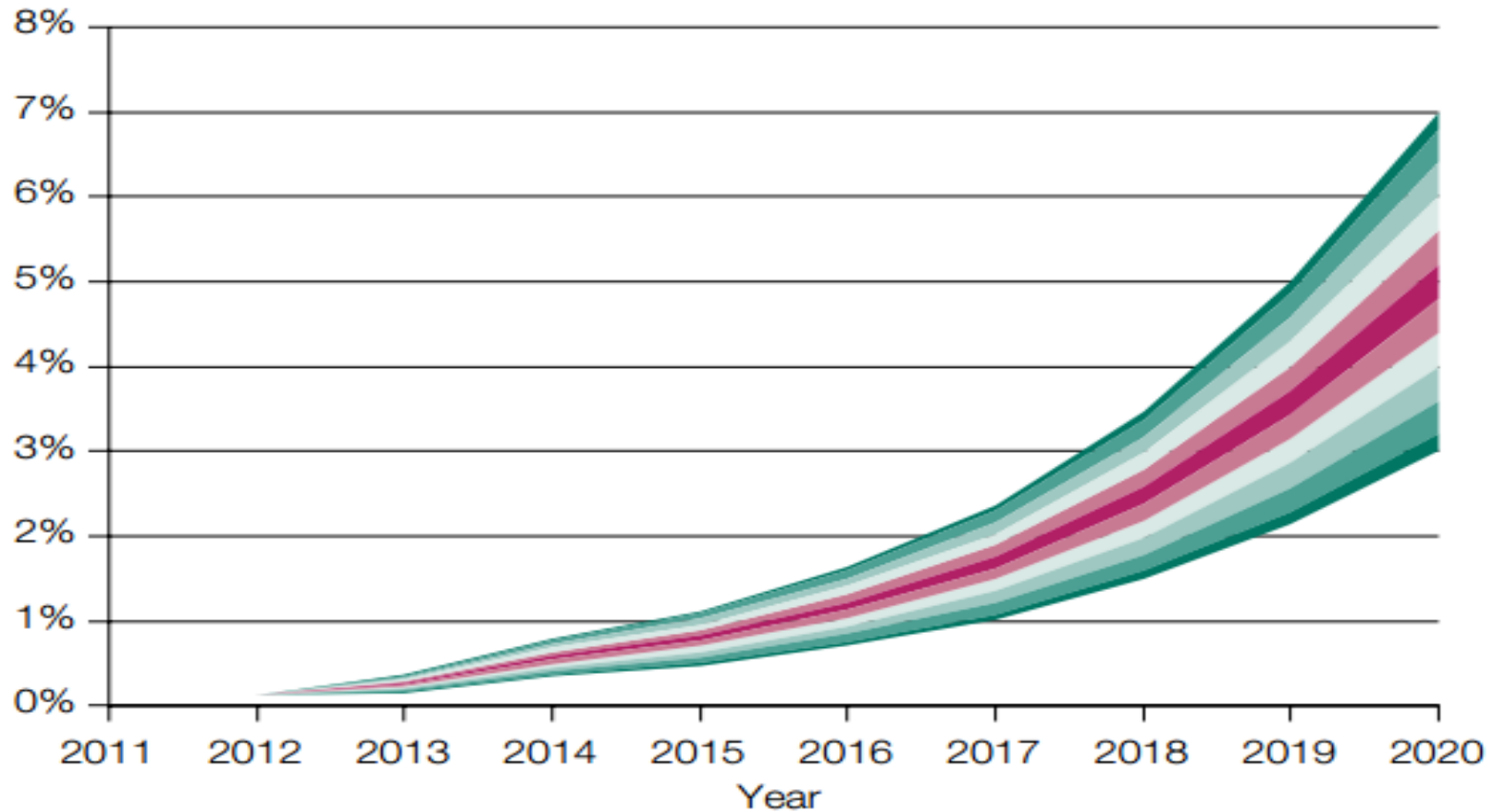
Source: Next Green Car

Annual UK EV sales 2010-2015



# Their popularity is expected to increase

Projected EV car sales as % of all car sales 2011-2020



Source: Department for Transport modelling

# Governments are helping



## Financial incentives for EV purchase and charging infrastructure

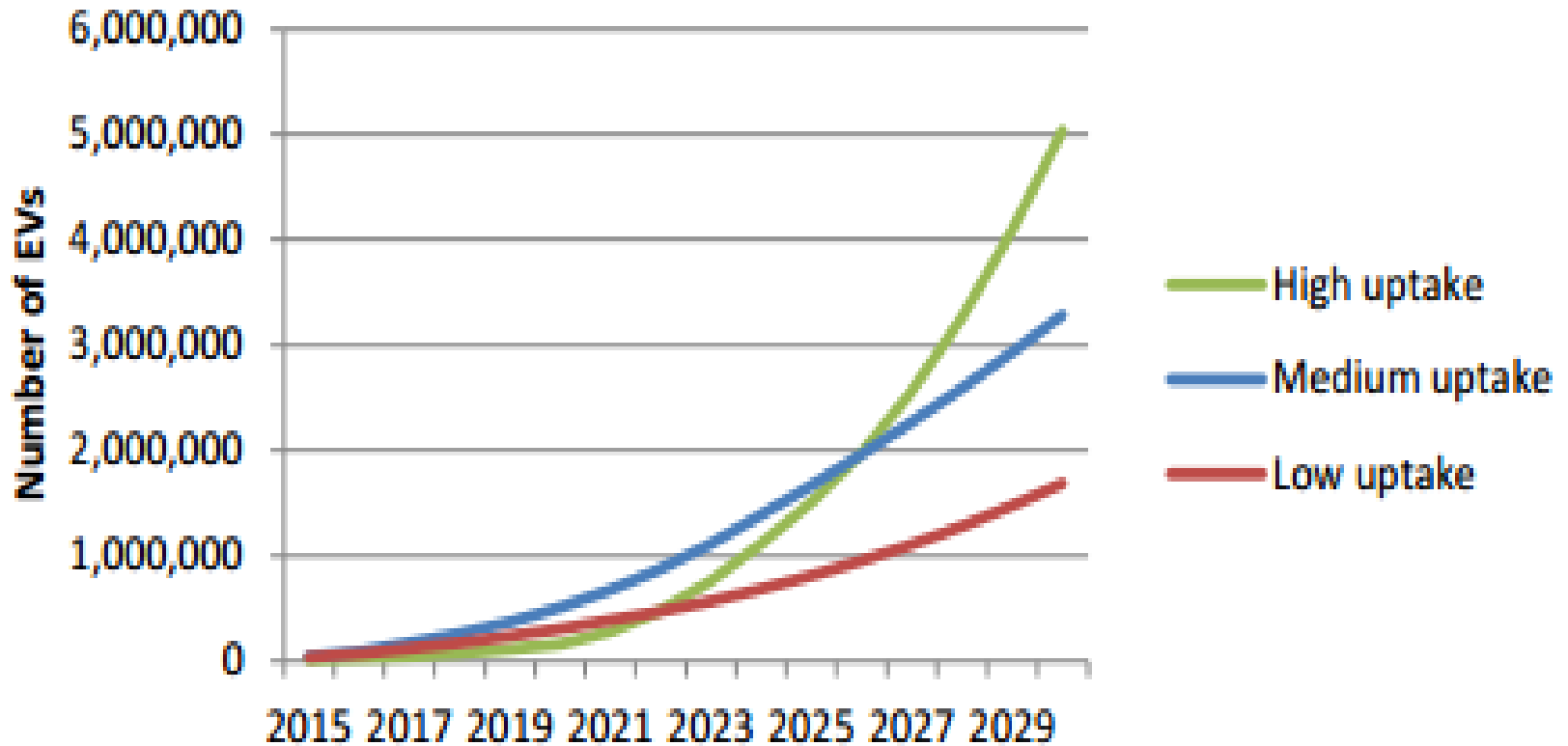
	Norway	Netherlands	Japan	United States	Sweden	Denmark	France	Ireland	Germany	UK
Capital cost incentives <sup>75</sup> (either grant or tax break)	£12,200 (BEVs only)	£4,200 – £6,800 for private purchase	Up to £6,700	£1,590 - £4,770 Federal tax credit	£3,900	Up to £35,000 depending on segment (BEVs only)	£5,900	£5,650	Up to £8,500 (corporate purchase only)	Up to £5,000 for cars, £8,000 for vans
Running cost incentives	Annual tax exemption, Free parking, Exempt from road tolls.	Annual tax exemption, Exempt from income tax for lease vehicles, Some free parking.		State – specific incentives inc. insurance and parking charge exemptions	Annual tax exemption, Free parking in places, exempt from congestion charge in Stockholm	Annual tax exemption, Free parking	Annual tax exemption, Free parking in some places		Annual tax exemption	Reduced annual tax, Exemption from congestion charge in London
Charging infrastructure*	c. 4,000 public CP, and 127 fast chargers	c. 4,500 public and semi-public CP, and 89 fast chargers	Emphasis on fast charging, with 1,400 fast CP and c.4,000 slow CP	c. 14,000 slow CP and 200 fast CPs	c. 280 slow CP (although most people have access at home or work)	c. 1,080 slow CPs and c. 100 fast CPs	c. 1,600 slow CPs and 100 fast CPs	640 slow CPs	c. 2,000 slow CPs	C 8,500 public CP, <100 50kW chargers
2012 EV sales, %	3.28%	1.02%	0.47%	0.36%	0.34%	0.31%	0.30%	0.17%	0.12%	0.11%

# 20-25 million EV cars are expected in UK by 2050



Projected UK EV quantity to 2030

Source: Element Energy, National Grid



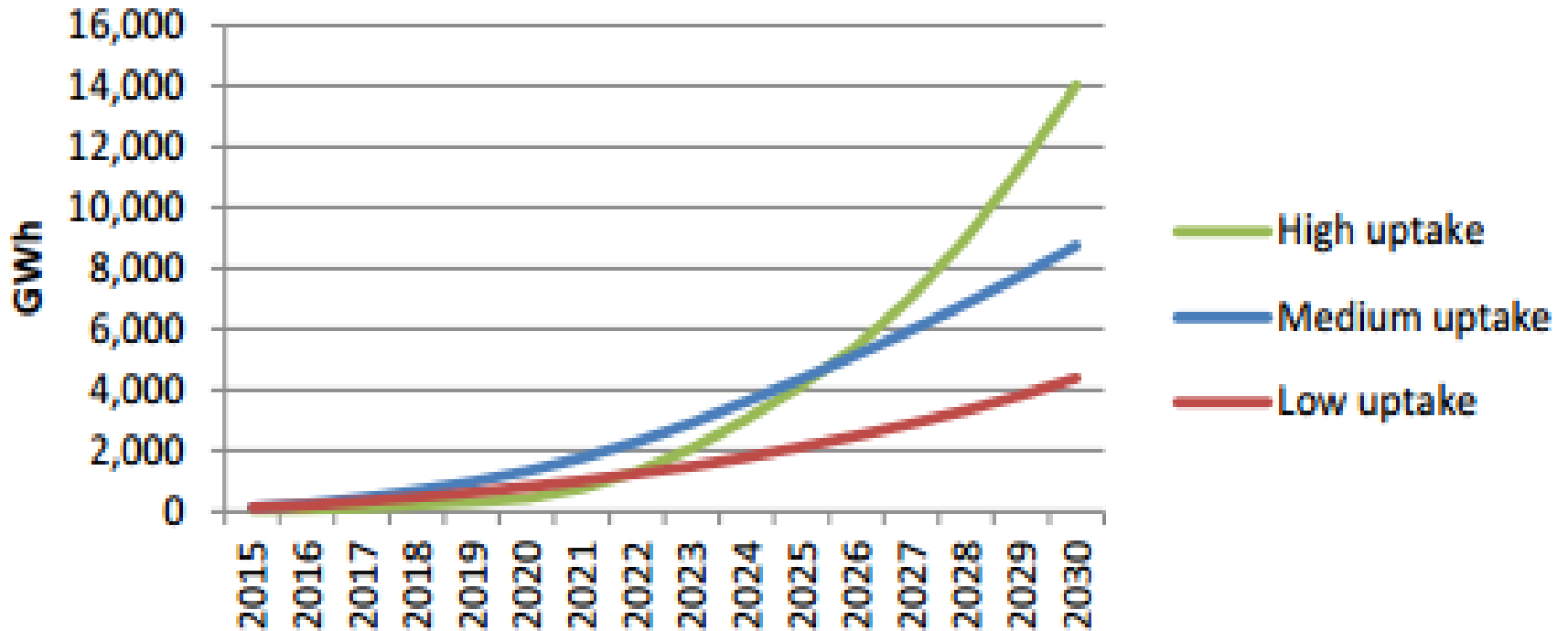
- 2015: 50,000 *Electricity Infrastructure Roadmap*

# 10-15 million charge points by 2050 (UK)



Projected electricity demand for EV charging by 2030

Source: Element Energy, National Grid

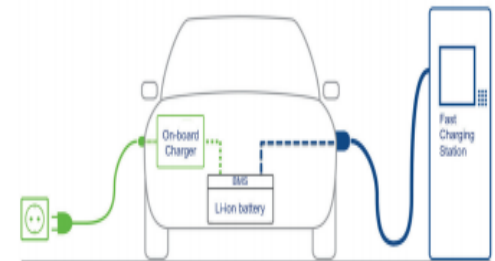


- 2015: 60,000 *Electricity Infrastructure Roadmap*

# Charge points

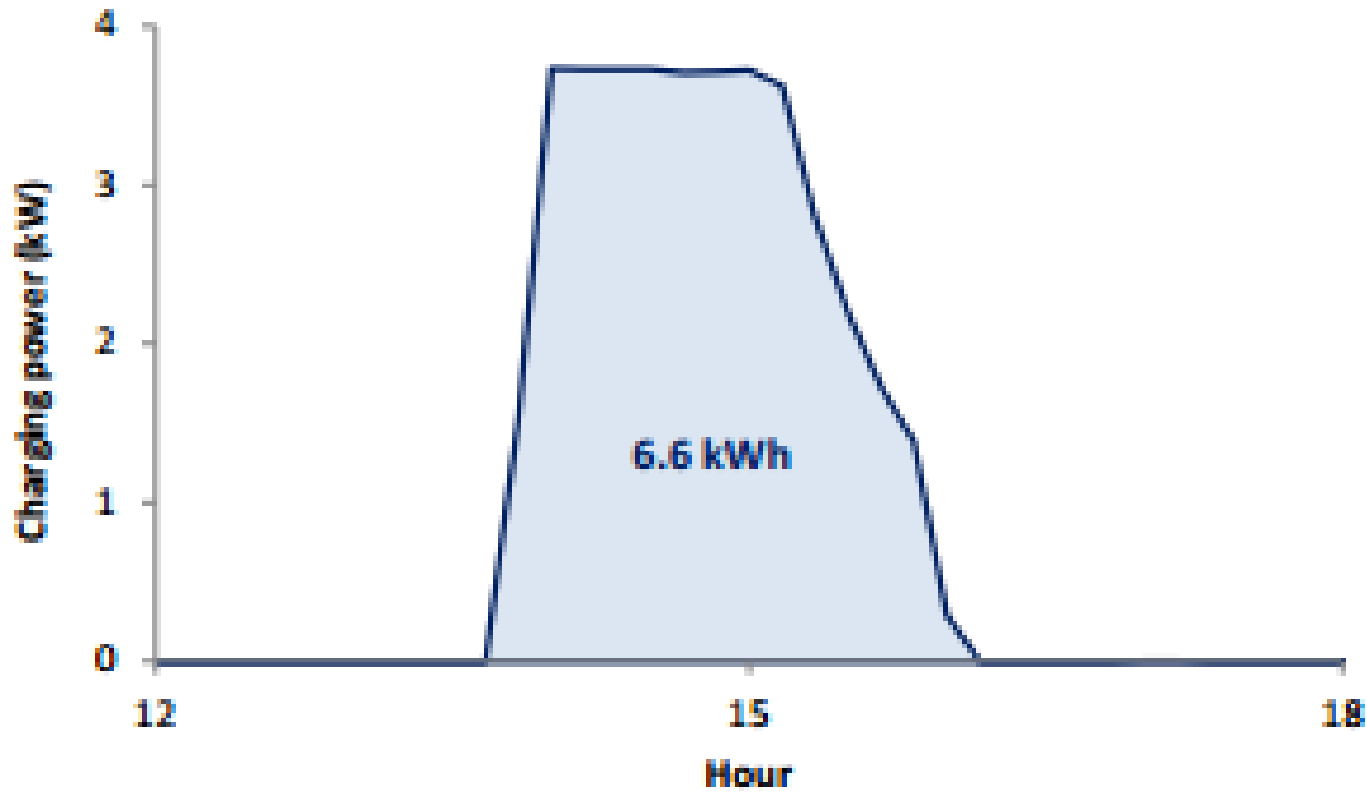
**80% of electricity for transport could be via residential charge points** *Electricity Infrastructure Roadmap*

Market Segments	Equipment		Charge Time / Service Capability
<b>Office/Home</b> (Work/Sleep & Charge)		AC Wallbox	4 - 8 hours 1 - 2 vehicles/day
<b>Public</b> (e.g., Parking Lot)		AC Charge Post	4 - 8 hours 1 - 2 vehicles/day
<b>Commercial/Office</b> (Park & Charge)		Convenient Fast Charger DC 20 kW AC 22 kW	30 - 120 minutes 10 - 15 vehicles/day
<b>Highway</b> (Charge & Go)		Fast Charger DC 50 kW AC 43 kW	15 - 30 minutes 12 - 24 vehicles/day



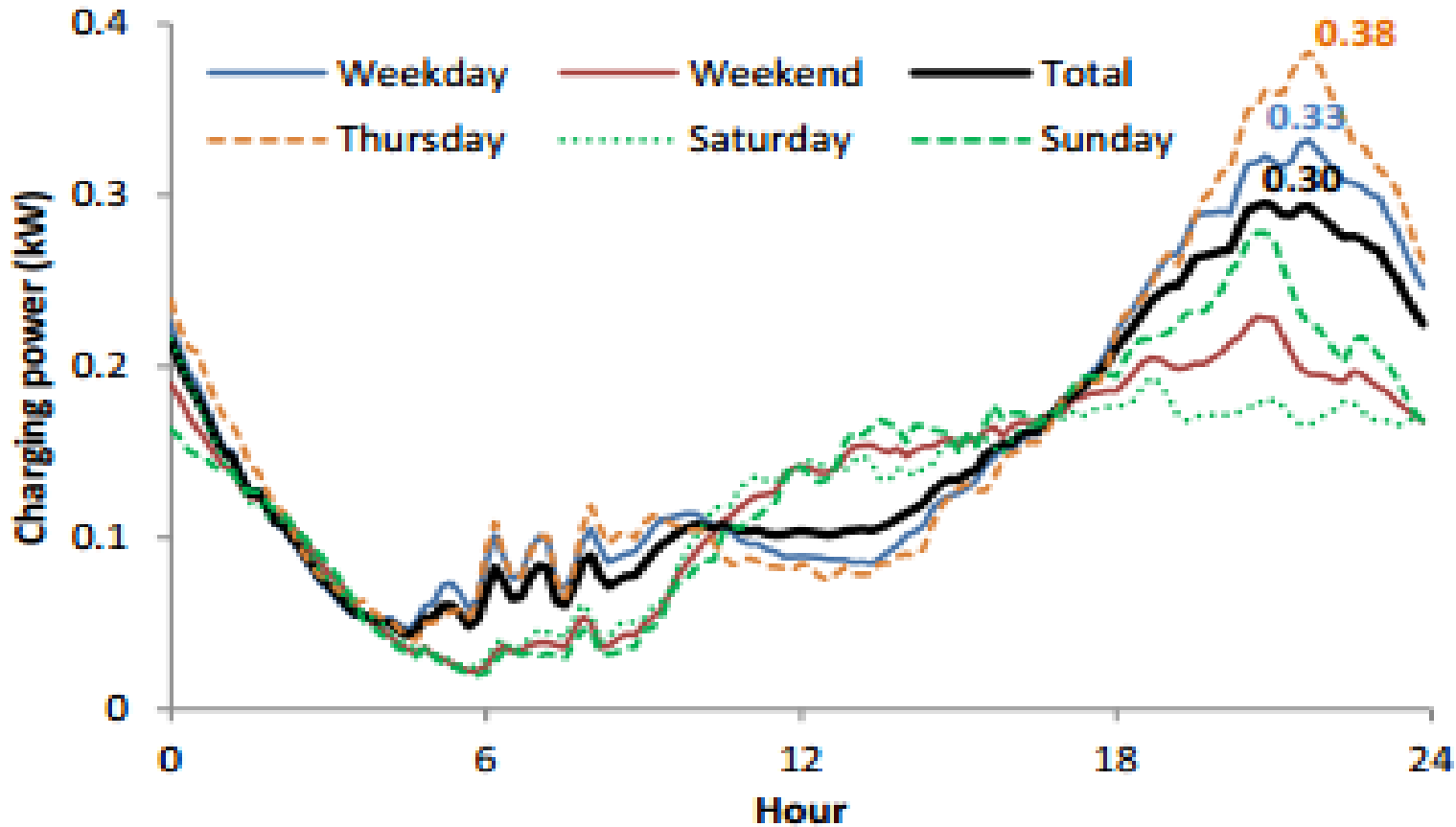


# Typical charge profile



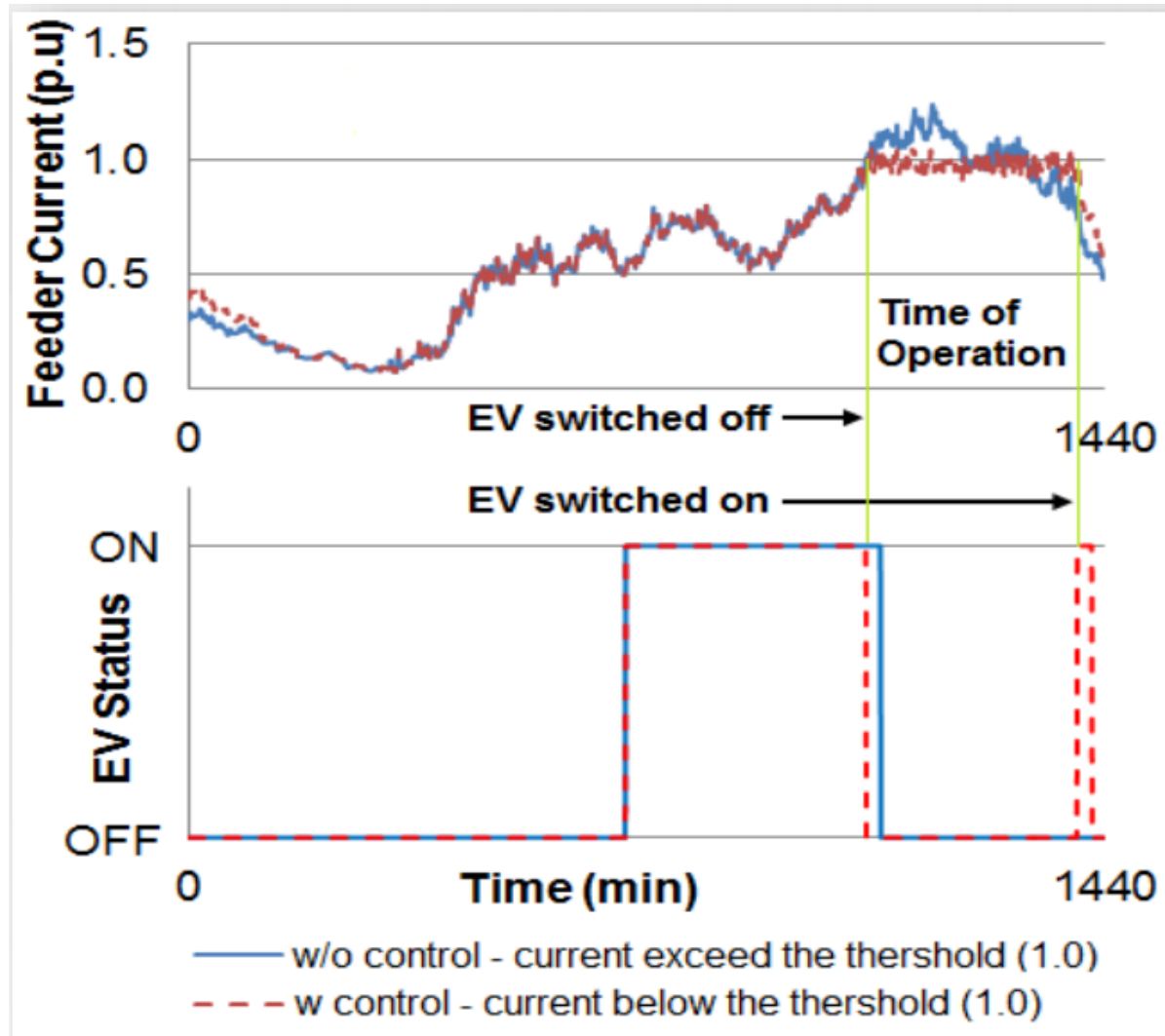
Source: LCL trials, report B1

# Typical charge profile



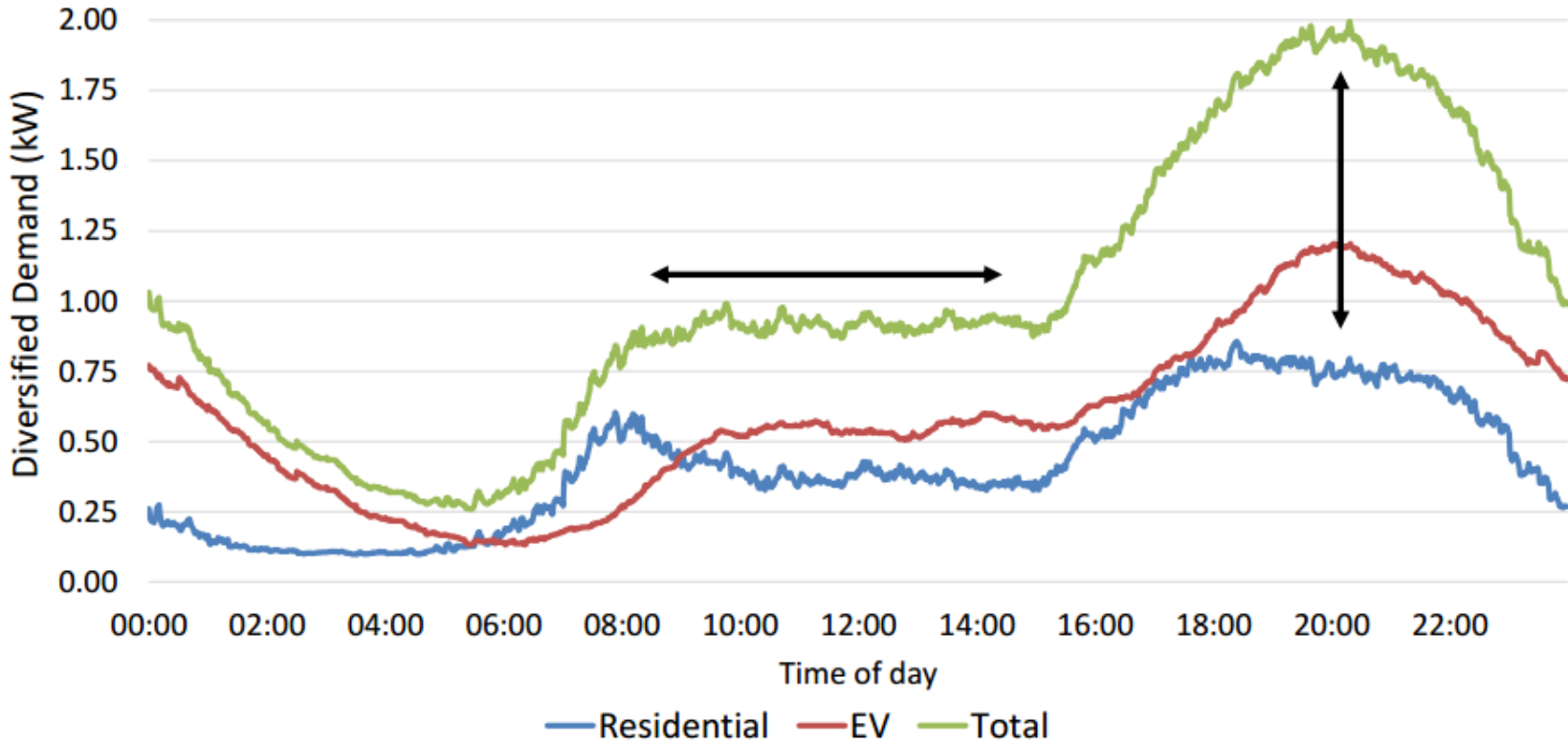
Source: LCL trials, report B1

# Load shifting potential – curtailment technology



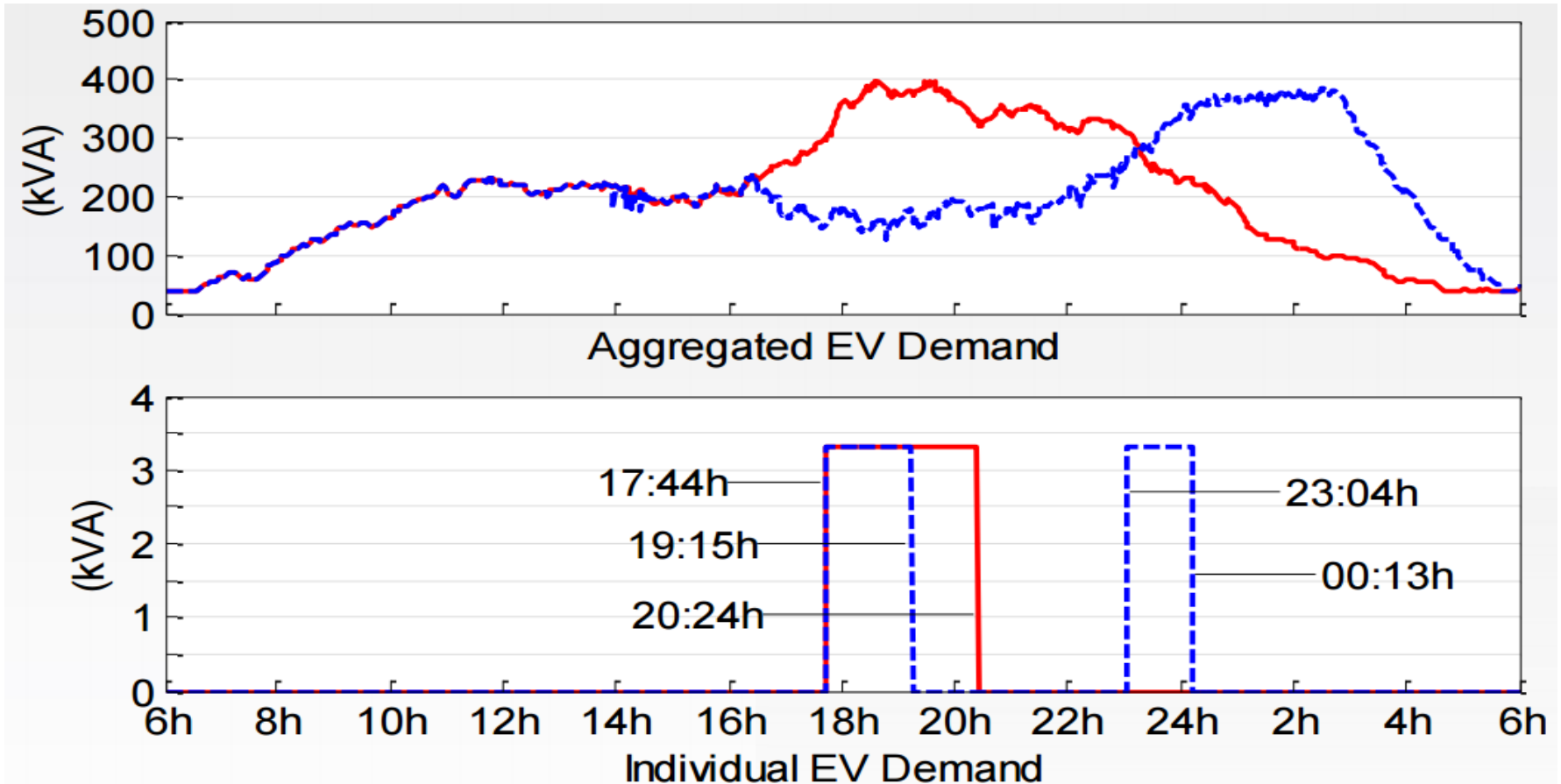
Source My Electric Avenue

# Maximum demand with and without EV uptake



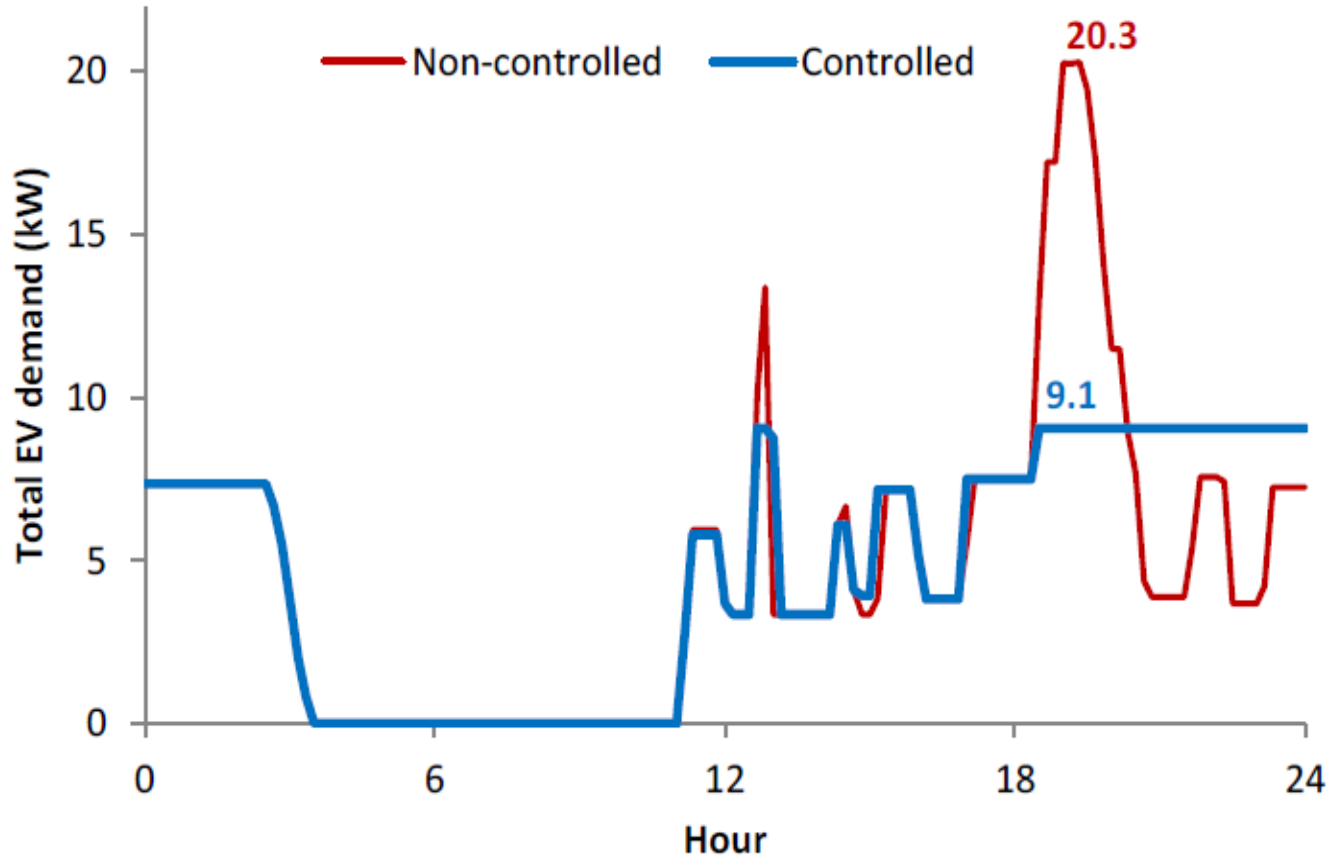
Source My Electric Avenue

# Demand from EV charger with load shift control



Source My Electric Avenue

# Aggregated demand for 22 EVs



Source Low Carbon London trials

## Summary

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- The number of electric vehicles on European roads is growing fast
- Each EV charger requires considerable energy for a sustained period
- The load on the network at peak times will rapidly become very significant
- Increasing peak load would require considerable expenditure on upgrading electricity networks, which could be avoided with demand response
- The load shifting potential is potentially very large
- The average maximal shifting period is also relatively large (several hours)
- Inclusion of EV chargers as a 'smart appliance' would enable potential Ecodesign measures **to realise the technical capability for load shifting**
- The anticipated market growth implies it might be better to take the current opportunity to encourage load shifting capability, rather than wait for a review

# Thank you for your attention



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