



# Clean energy and smart grids for electric vehicles

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<https://tfl.gov.uk>



# Introduction

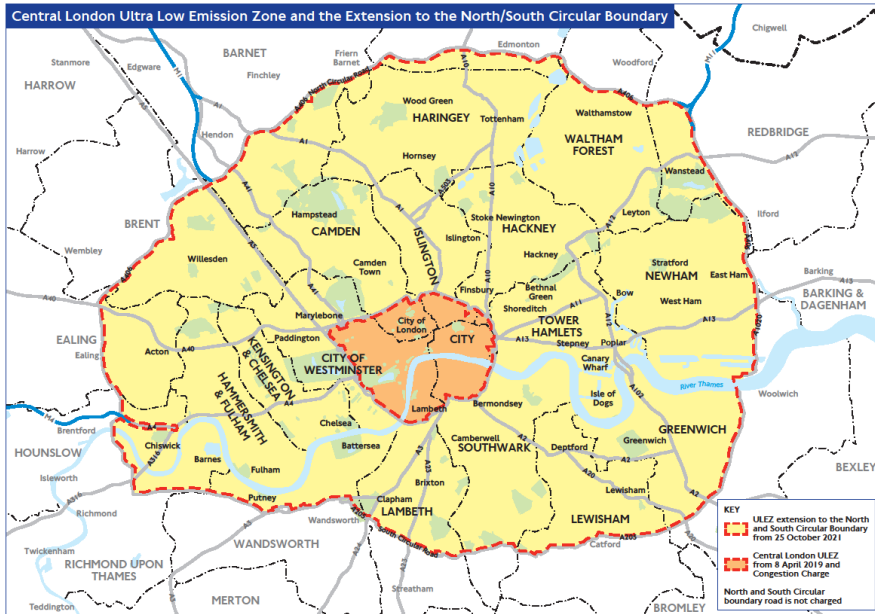
- City Policy
  - ReVeAL
- Scale of the challenge
  - Buses, taxis, freight, cars
- Research Projects
  - Eliptic
  - CleanMobilEnergy
  - E-Flex
  - WiCET
  - GreenSKIES



# City Policy

- Emissions control
- Fleets TfL control
- ULEZ Impacts

[https://www.london.gov.uk/sites/default/files/ulez\\_six\\_month\\_evaluation\\_report\\_final\\_oct.pdf](https://www.london.gov.uk/sites/default/files/ulez_six_month_evaluation_report_final_oct.pdf)



Zero Emission Capable (ZEC) licencing requirements from 2018 (Black Cab) and 2020 (PHV), achieving a fully ZEC fleet by 2033



All single deck buses will be zero emission in the ULEZ in 2020; the whole fleet will be fully zero emission by 2037

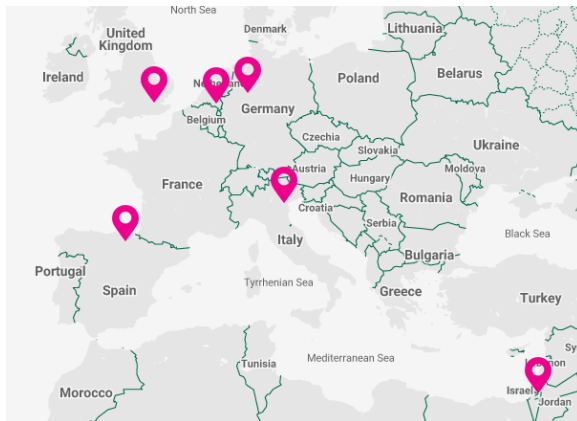


# ReVeAL



<https://civitas-reveal.eu>

- ZEC Enforcement Database
- Geofencing
- Signage and Logos
- Knowledge sharing and scale up

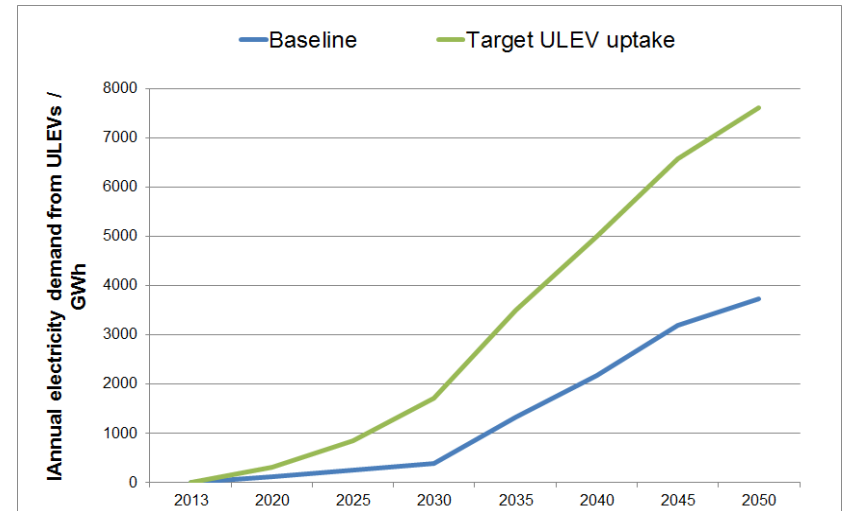


- Bielefeld
- Helmond
- London
- Padua
- Jerusalem
- Vittoria Garcia



# The Challenge of Electrifying Road Transport

- Moving to a zero emission vehicle fleet has implications for London's energy supply
- At higher levels of ULEV uptake, demand of 7-8 TWh p.a. is possible



Mode of transport	Estimated ENERGY consumption p.a.	Max POWER consumption
London Underground	1.1 TWh	~ 250 MW
London Buses	<b>750 GWh – 1 TWh</b>	<b>~ 250 MW</b>
Taxis	<b>~2 TWh</b>	<b>~ 500 MW</b>
Other road transport	<b>-3-4 TWh</b>	<b>~ 1GW</b>



# Eliptic

- Use of TfL grid for EV charging
- Complex interplay of supply and demand
- High reliability and redundancy but dirty power
- Very tightly constrained operating rules

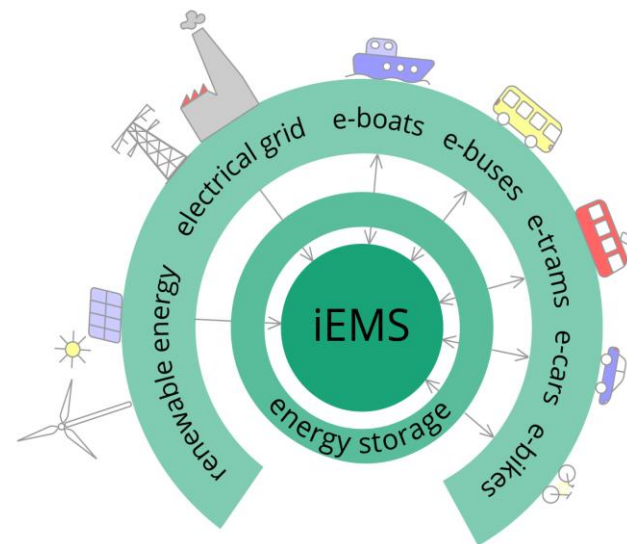


<https://www.eliptic-project.eu>



# CleanMobilEnergy

- Integrate small scale renewable energy production into the transport energy mix.
- Reduce GHG emissions by coordinating:
  - Renewable energy sources (RES)
  - Energy storage
  - EV charging
- Develop an interoperable energy management system (iEMS) to merge the gap between RES supply & energy demand



<https://www.nweurope.eu/projects/project-search/cleanmobileenergy-clean-mobility-and-energy-for-cities>



# E-Flex

- **Large scale demonstration of V2G**
- **Commercial fleets**
- **Connected to the TfL grid**
- **Create market mechanisms**
- **Building the fleet operations business cases**

<https://www.e-flex.co.uk>



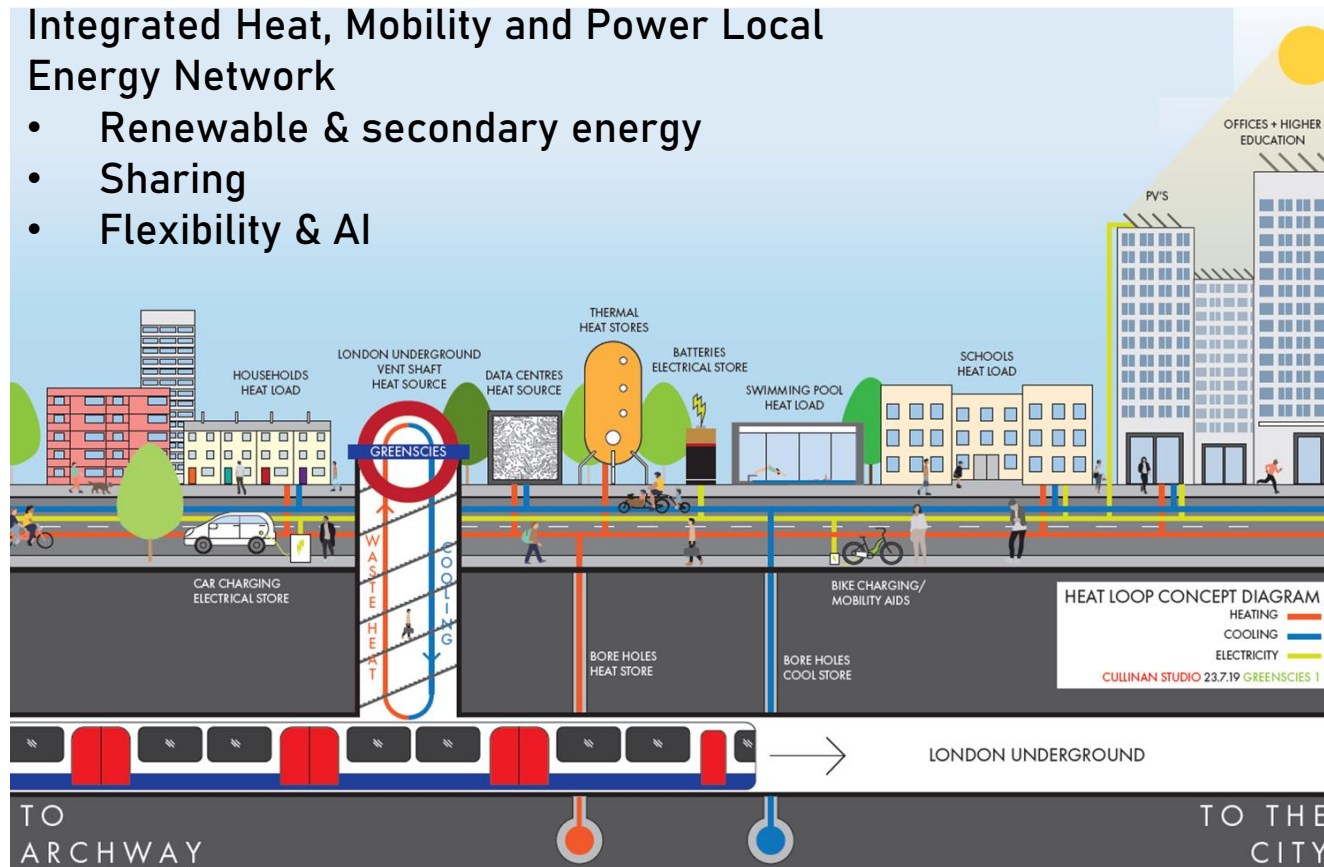


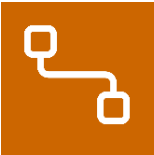
# GreenSCIES



## Integrated Heat, Mobility and Power Local Energy Network

- Renewable & secondary energy
- Sharing
- Flexibility & AI





Links new and existing energy networks



Serves >44,000 residents



Connects to >78 businesses



Results >£8 million revenue savings



Addresses fuel poverty >6,600 residents



Saves >32,000 tonnes of CO2e p.a.

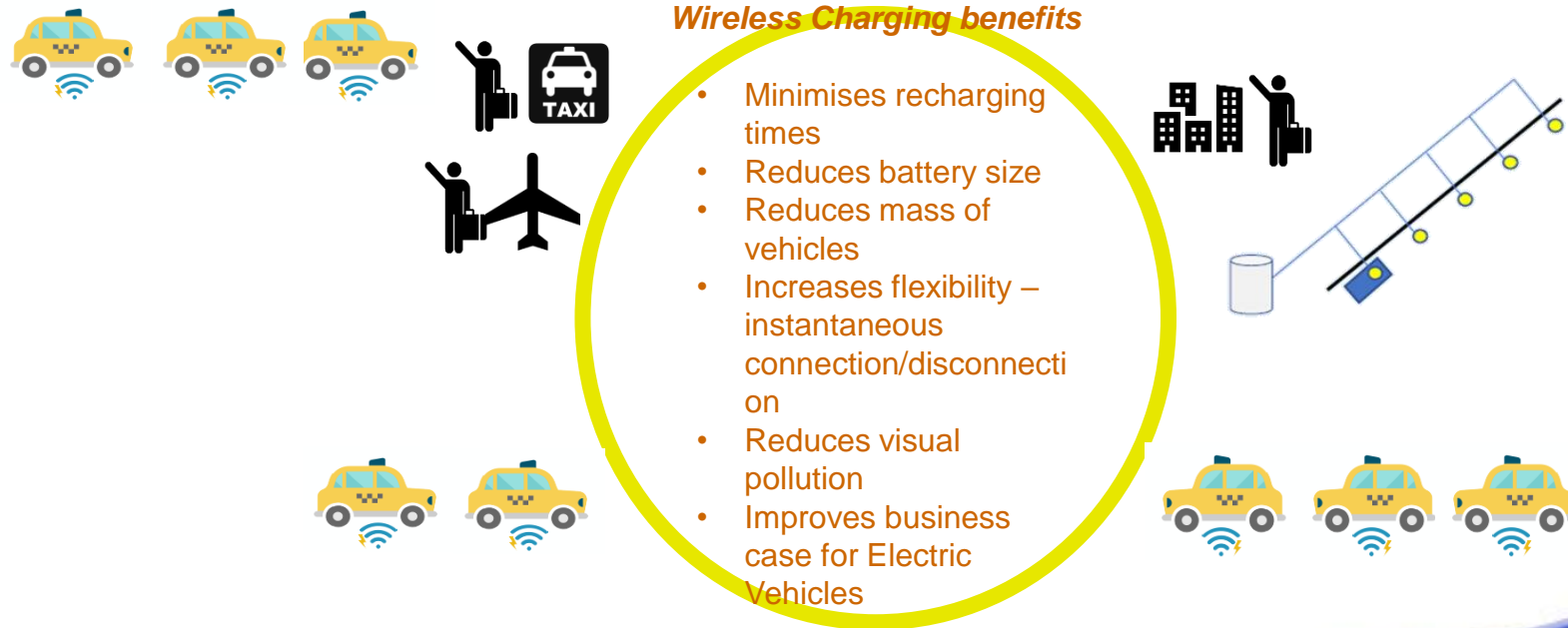


Improves air quality by at least 18%



# WiCET

- Inductive charging feasibility study.
- In London focused on Black Cabs
- Technical, legal, operational, regulatory, human factors and safety aspects



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