




E-Bus depot
incl. opportunity
charging


Gas stations &
truck stops


Enterprises
& retailers


Operating center


City & town
street parking


Logistics depot
charging


Parking garage
& commercial real estate


Residential-home
& multi-home

Highway transit
charging

Electrification & Intelligent Mobility

Chris Beadsworth March 2019

Siemens Overview

Market Drivers, Challenges



Smart EV Charging for Cities.

London Roll- Out

- Solutions
- Capabilities
- Lessons Learnt

Smart Infrastructure – End to End Capability

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Distribution Systems



- Power distribution & Storage solutions
- EV Charging systems
- Distribution transformers
- Air- and gas-insulated medium-voltage switchgear
- Busbar-trunking systems

Digital Grid



- Smart metering and communications
- Grid protection, automation and power quality
- IT/OT integration and data analytics
- Grid consulting

Building Technologies



- Building automation
- Fire safety
- Security systems
- Heating
- Ventilation and air conditioning (HVAC)
- Energy Management

Low Voltage & Control Products



- Low-voltage protection & switching devices
- Low-voltage measuring, and monitoring devices
- Low-voltage distribution boards and systems



Smart Infrastructure



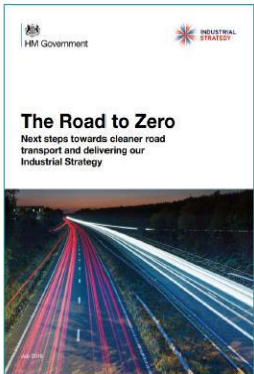
Revenue
~€14bn
Employees
~71,000

Network electrification, automation & digitalisation



Drivers for Change ~ Clean Air Zones

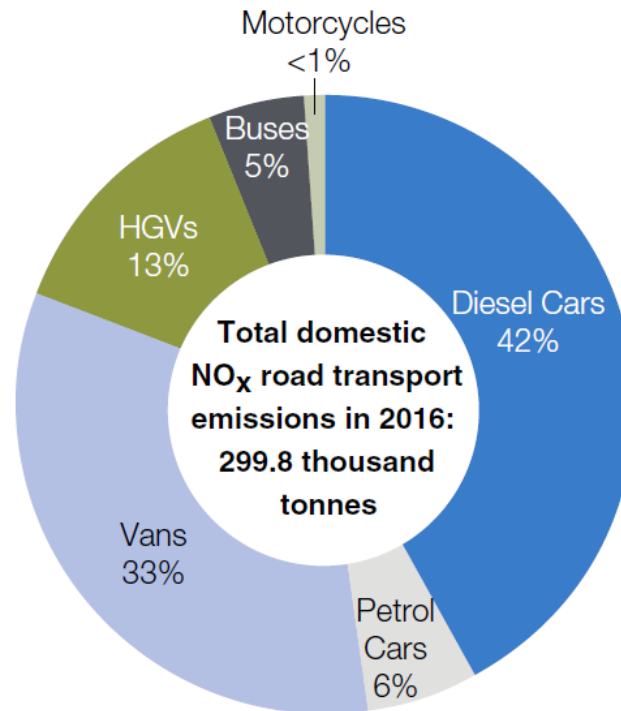
- Improving Air Quality
 - Reducing greenhouse gas emissions
 - Cleaner, quieter cities



“To put the UK at the forefront of the design and manufacturing of zero emission vehicles...”

...and for all new cars and vans to be effectively zero emission by 2040”

Prime Minister, May 2018



London (ULEZ from April 2019)

- London introducing an Ultra Low Emissions Zone (ULEZ) affecting all vehicles entering central London.
- The area covered by the ULEZ is the same area as the Congestion Charging Zone
- The ULEZ will operate 24 hours a day, every day of the year, including weekends and public holidays.
- Charges: £12.50 for cars, vans and motorcycles; £100 for buses, lorries and coaches.

Multiple surveys on EV Growth Potential

195,000
Plug-in Cars
Reg. UK Feb 2019
(Approx)

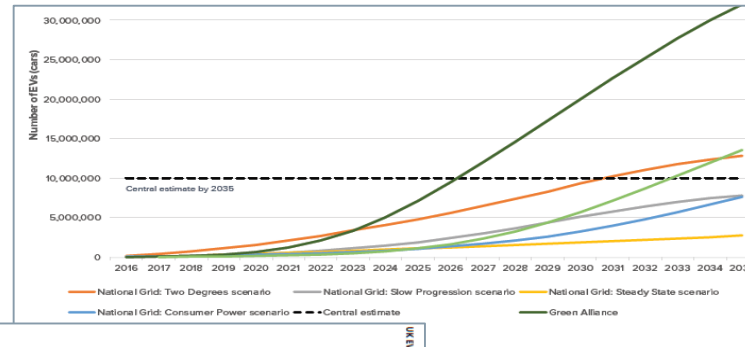
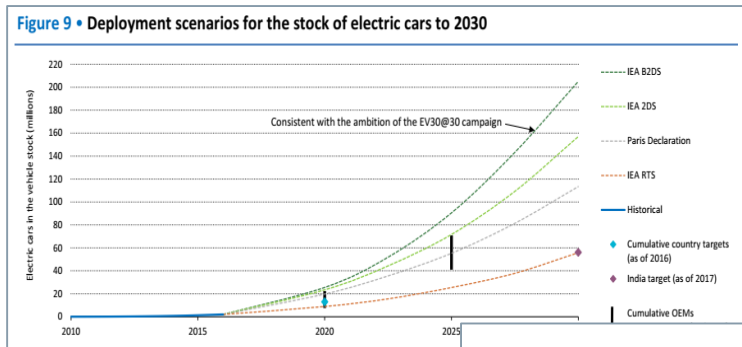
8,500
Plug-in Vans
Reg. UK Feb 2019
(Approx)

120
Plug-in Models
Available Feb 2019
(Plus variants)

19,375
UK Charge Pts
Feb 2019
(Zap-Map)

200,000
Light Duty electric
Fleet in operation 2018

300 Electric buses
In London by 2020



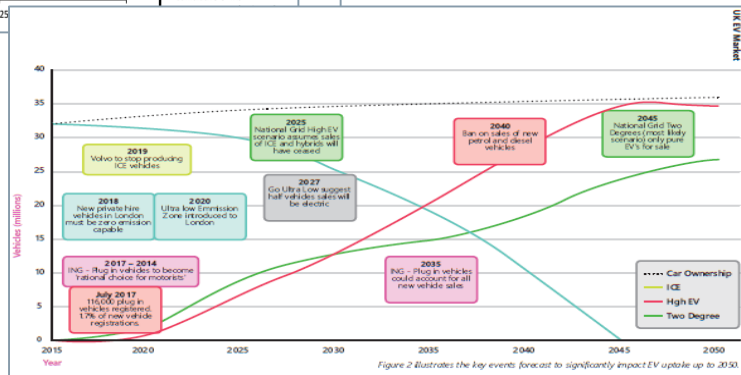
£400'm for EV infrastructure announced

Additional £100'm for plug-in car grants to 2020

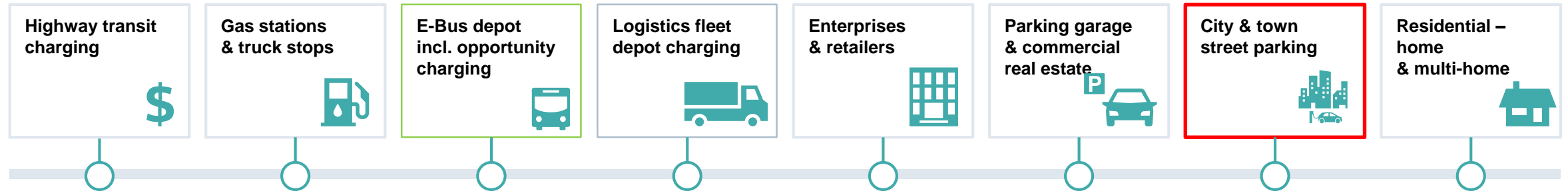
Target Growth of 13M e-Cars & e-Vans by 2035 and 35M all vehicles in 2040

The Scale & Rate of change is Increasing, we need to adapt to changing market needs

References:
Vincii, NG Scenarios, REGEN, Zap-Map
UK Elec networks for EV – Catapult,
The UK Electrical Vehicle Industry Statistics



eCharging Challenges



Mobility Charging Ecosystem



E-vehicle charging (incl. aircraft & fleet); systems and integration – Equipment, scheduling, space



Dedicated Technical expert center skills capability at high voltage

Distributed energy systems: Storage and micro grids, Dynamic network management



New business models and mobility offerings – Flexibility / cost /

Grid connection & integration in existing power supply architecture – network limitations



Connected services / remote diagnostics / Opex optimisation

Energy Management System



E-Car Operation Center »managed infrastructure«

Consulting & financing



Planning & simulation, engineering, network design



Project management, ordering & delivery, installation & commissioning



Operation & digital enabled services





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“Once or twice a week, while we sleep, the car is charged right outside our home”

Adam

Working together to deliver smart EV charging infrastructure for cities – ‘The London Roll Out’

Transport for London

On street EV charging using street lamps



Bernard Magee (Siemens), Knut Hechtfisher (CEO Ubitricity, Germany), Chris Beadsworth (Siemens) and James Everley (Ubitricity UK)

Siemens is one of eight organisations to be awarded a place on a London-wide framework contract hosted by TfL, London Councils and Greater London Authority to provide innovative on street electric vehicle charging solutions to the capital's busy streets, and one of four suppliers using the electricity from street lights.

Siemens and ubitricity electrifying London
... using existing street light infrastructure

~900 lamp column EV charge points¹

1 Planned to be installed by end of March

- OLEV continues to support On-Street Residential Charge point Scheme with £2.5m funding available to councils 2019/2020
- Go-ultra Low City Scheme Framework contract provides £3.7 million to help deliver charging points across London boroughs
- Existing street light infrastructure (230v, single phase, 5.8 Kw), Plug standard Type 2
- 900 Chargepoints installed by March'19; 1500 charge points to be delivered by 2020.

EXPERIENCE

3+ years of real world experience in EV Charging deployment with proven technology.

- Leading technology, ELEXON approved since 2017.
- Over 300 EV chargers Deployed across London.
- Software Technology platforms that address full spectrum of applications

SCALE

Complete engineering technology and asset service offerings delivered across GB&I.

- Accredited Install suppliers with asset data base tracking
- Delivery & integration of major infrastructure projects
- Comprehensive services including financing

THE RIGHT PARTNER

Deep understanding of modern energy markets, customer needs, & local market challenges

- Collaborate with customers to solve their energy challenges
- Avoid pitfalls of inexperienced integrators
- Strong financial backing and industry staying power
- Technology & Brands your Residents can trust.

The London Roll Out

‘Our Journey so far..... Introducing technology & residential street light charging

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- › **First Proof of Concept** installation was in the London Borough of Hounslow 3 year ago
- › It is easy to overlook the last three years with 300 pilot installations rapid prototyping each improvement
 - › Getting regulatory approval (Ofgem / ELEXON / DNOs)
 - › Developing a method to account for the energy used, street lights themselves are not metered...
 - › Continuous product improvement / development – getting ever smaller and higher power to fit even smaller lighting columns
 - › Developing solutions for columns you simply cannot (or are not allowed to) work with, i.e. old listed converted gas lights, columns at the back of the footway = NAL Bollard plug & play, passive safe, self-righting, plug & play.
 - › Desire for upgradeable technology, no stranded assets, flexible choice of solutions , pricing and choice of energy suppliers.



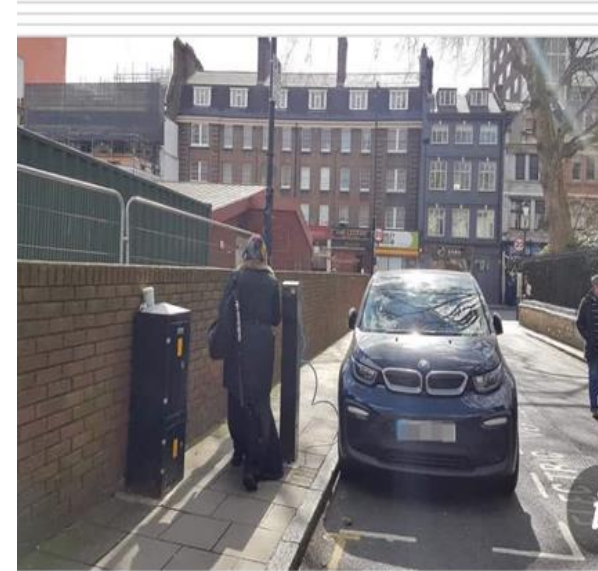
Robust &
Scalable
Product
Deployment

The London Roll Out

‘Our Journey so far..... Local Knowledge

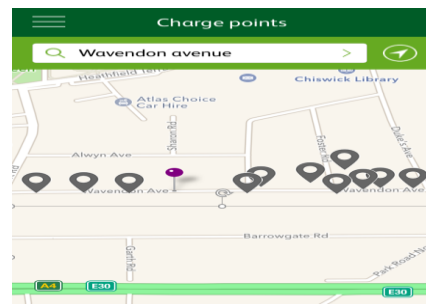


- **Every council has a slightly different approach**, permits for on-street work, resident engagement, waiting lists (residents requesting on-street charging), internal staff resource, legacy equipment, Funding Requirements (PFI schemes)
- **Numerous Stakeholders** : Councilor's (Borough, County, Government); Parking team, lamppost team, Sustainability officers, Residents, Resident associations, Internal Procurement, management & finance,
- **Borough EV Strategy & Approach is vitally important** : local area knowledge, Current and future EV residential demands, Google mapping of enquiries across the borough, available funding Vs demands, parking permit zones location, EV only parking spaces not really favoured.
- **Site surveys are key**, Approx 25% of sites initially identified are not suitable : Narrow pavements, additional street furniture block pedestrian routes, Lamp columns not always appropriate, (doors, back of pavement, near BT control boxes, double yellow lines, one way streets



Walking the city

**Highly charged:
complaints as electric
car points block city
pavements**



The London Roll Out

'Our Journey so far..... Installation, the things we now know about lamp-posts

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- **Technical Obsolescence / Updates to latest specifications** Earthing Regulations 200 (Ohms); new 18th Edition BS7671 Wiring
- **Boroughs** arranging / paying for section 50 licenses / electronic permits for any civil works required.
- **Supplier understanding of HSE requirements** (HERS Accreditation, G39 network permits, TMOs, TTRO's) acting in the role of PD/PC under CDM. Avoid any significant civils works in the footway where ever possible
- **Lamp Columns:** access non standard, internal electrical network connections all different, many columns getting replaced, many different incumbent contractors
- **Supplier Accreditation** through a digital based asset management system (Risk assessments, HSE, Install, commissioning & maintenance data)



Don't just take our word for it, listen to actual residents...

ubitricity

“Would recommend to every EV owner”
Anthony, Kensington & Chelsea resident

“It's been brilliant!” Kathryn,
Lambeth resident

“It is amazingly
convenient and
cheap” Babak,
Lambeth resident



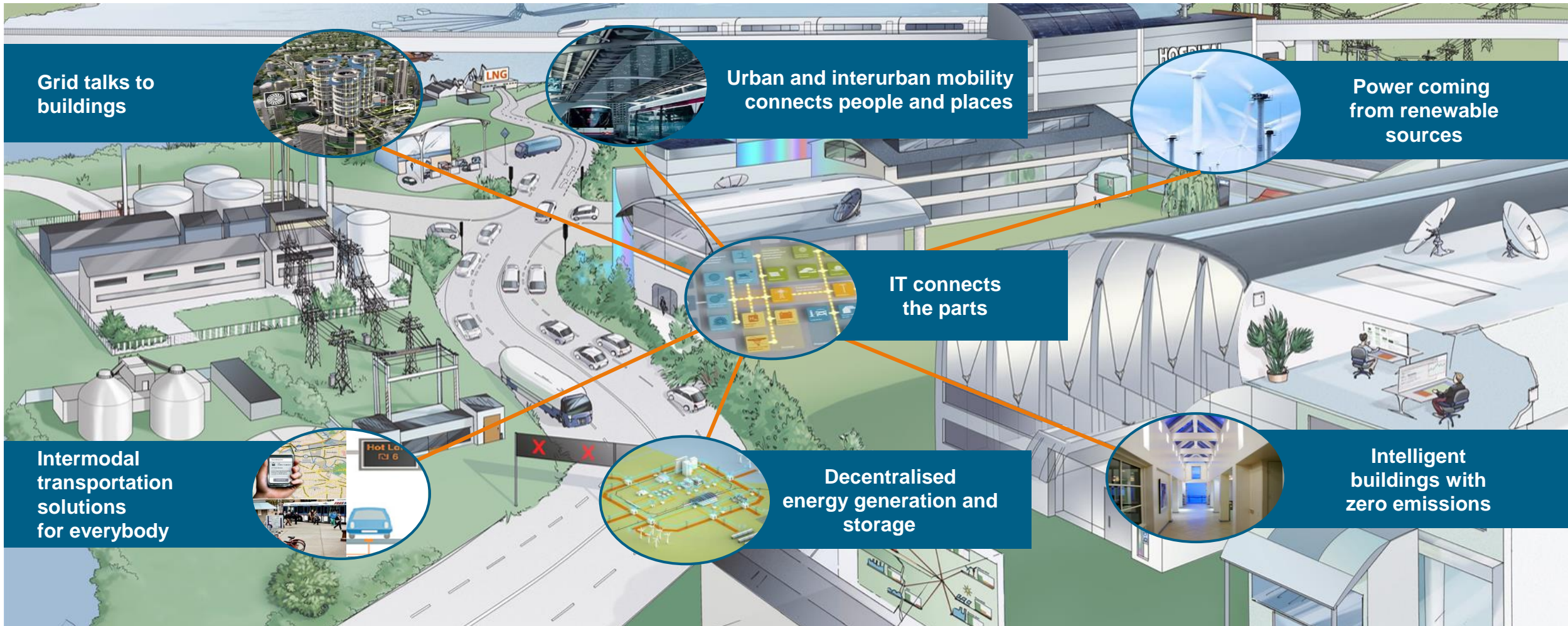
“I was incredibly excited when
I saw the charging points going
in to the lamp posts here and
that inspired me to order an
electric vehicle” Hugo,
Lambeth resident

“I can fully charge my Tesla overnight. I would not
have bought my car without being able to charge
it” Patrick, Kensington & Chelsea resident

“Excellent and would recommend to
all EV drivers..., easy to use, would be
willing to pay more for the service”
Ray & Jacque, Westminster

We are working on the community of tomorrow

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The future...

– Smart Cities need Smart Charging

Smart Cities will need residents to charge smarter. The SmartCable can already deliver:

- › Demand responsive charging – can be remotely controlled if constraints on the grid: stop charging, reduce power, etc...
- › Charge cheaper – can control when to charge utilising cheapest or greenest times to charge
- › Vehicle to Grid (V2G) – SmartCable is ready for an car that can provide energy back onto the grid via AC
- › SimpleSocket network – can link to smart parking sensors that detect if a space next to the SimpleSocket is vacant or not



Delivering Keele's Smart Campus of the future



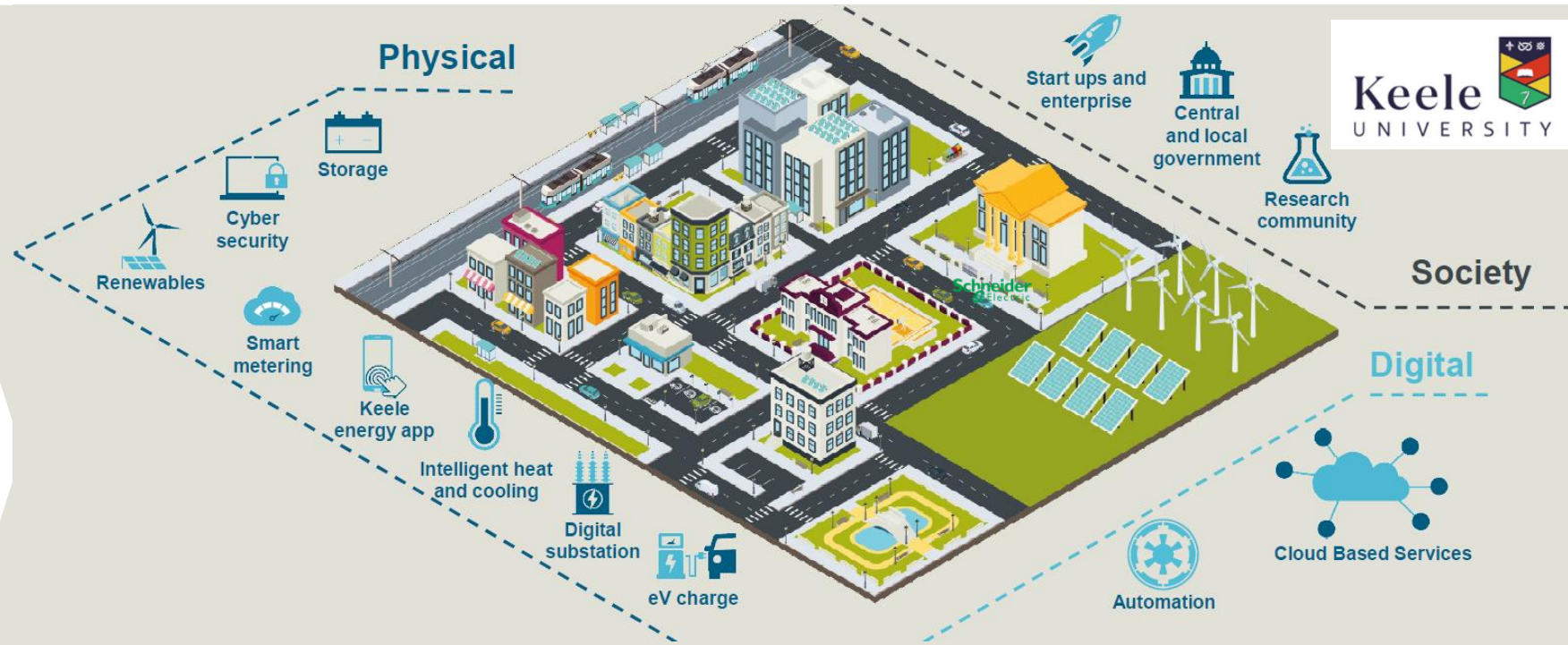
Scope:

- 24 Digitisation of substations
- 1500 Smart Meters
- 500 Home Controllers
- 20 EV Chargers (V2G)
- Consumer interaction via smart energy apps
- Digital data layer, accessible for Research and Start-up community

▶ **Build out of a large scale living lab for energy networks of the future**

Customer benefit:

- ✓ Enablement for reduction of 3,000 tCO₂ per year
- ✓ Cost reduction through optimised network mgmt
- ✓ Living lab to attract energy research and students



The university will reduce its GHG emissions by 62% against its 1990 baseline

62% reduction
in emissions

First time Siemens has deployed its Smart Grid Compass methodology in the UK

**1st UK Smart Grid
Compass study**

Saving more than 8,000 tonnes of CO₂ from being released into the atmosphere each year

8,047 tonnes
of CO₂

The SEND will generate more than £80m of Gross Value Added (GVA) in the Stoke region over next 20 years.

£4m per year GVA

Key Take Aways



The EV Industry is not waiting....

Tough challenges to overcome....

Opportunities to innovate, Partner & create solutions.....

Let's shape the energy world together.

Thank you