



ZERO CARBON FUTURES



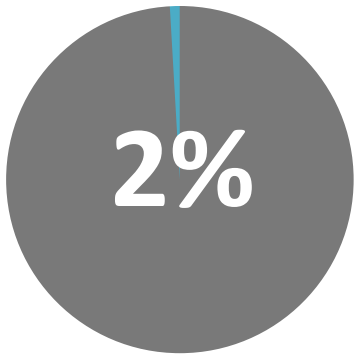
GATESHEAD COLLEGE

# Carbon Vehicles, trends impact on society and training needs

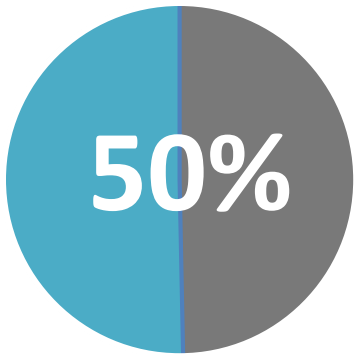
Dr Colin Herron, Managing Director, Zero Carbon Futures  
Professor of Practice Newcastle University

Mr James Sampson, Training Manager, Zero Carbon Futures

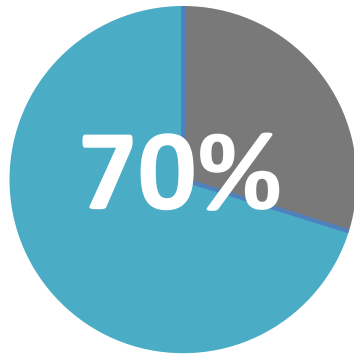
# BY 2025 CITIES WILL EQUAL...



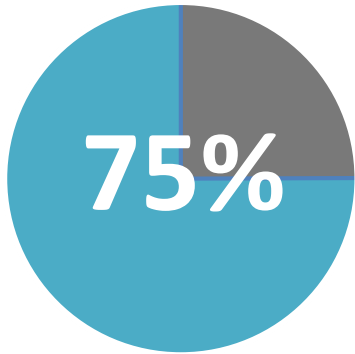
TERRITORY



PEOPLE



GDP



ENERGY

# CONSEQUENCES

Air quality / Health

Public transport

Traffic

Energy

Waste

Parking



# BEIJING MARATHON



© AP Photo/Andy Wong



WE CANNOT HIDE

**Daily Mail** MONDAY, APRIL 8, 2013 60p **£10,000 LOTTERY JACKPOT**

# PARIS POLLUTION CRISIS



**Air pollution in Paris so bad, car driving is BANNED on alternate days**

- Worst pollution event since 2007
- Pollution 180 microgrammes of PM10 per cubic metre
- Only vehicles with numberplates ending in uneven roads on alternate days

By PETER ALLEN

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Capital coverage 24/7 standard.co.uk

# London Evening Standard

Wednesday 8 May 2013 **FREE** READ BY 1.62 MILLION LONDONERS EVERY DAY

## LONDON'S INVISIBLE KILLER



WEST END FINAL  
Work to start in weeks on £3bn Chelsea Barracks Page 4  
Homes: Property Our New Homes Awards winners 25 PAGES INSIDE TODAY

Capital coverage 24/7 standard.co.uk

# London Evening Standard

Wednesday 8 May 2013 **FREE** READ BY 1.62 MILLION LONDONERS EVERY DAY

## London pollution charge: Drivers face paying £12.50 on top of congestion charge

Boris aims to create the world's first 'ultra low emission zone'. Clean air levy will apply 24/7 ... on top of C-charge



## La pollution aux particules fines menace la santé des Parisiens

JOEL COSSARDEAUX / CHEF DE SERVICE ADJOINT | LE 24/11 À 11.52, MIS À JOUR LE 25/11 À 14.48



Les Parisiens inhalent environ 200.000 particules fines par litre d'air au cours d'une journée standard. - 1/1

AFP

Le pic de pollution de décembre 2013 est jugé comparable au tabagisme passif. La Ville de Paris prépare des « zones à basses émissions » excluant les véhicules diesel.

29 RÉAGIR

**POUVOIR TRAVAILLER EN TOUTE SIMPLICITÉ C'EST SMART**

## COST OF DOING NOTHING

According to World Health Organisation (WHO) report in 2015, the UK is estimated to suffer \$83 billion (**c.£54 billion**) **annually in economic costs associated with premature deaths caused by air pollution**

This represents:

- 3.7% UK GDP
- 29,000 people dying prematurely per year

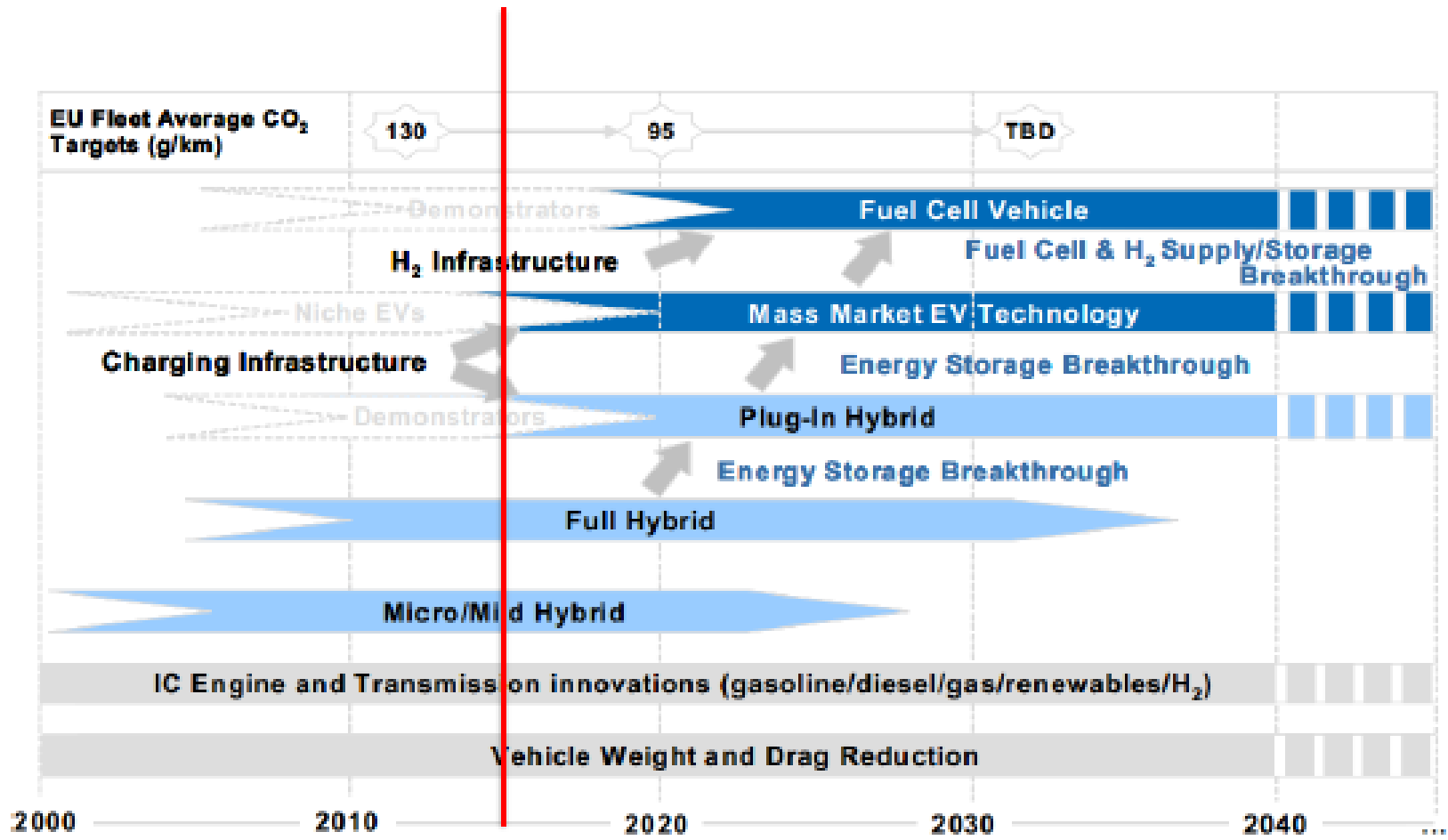
**Also facing FINES:**

The UK faces fines of £300m per year for exceeding air quality targets.

The targets set by the EU in legislation are for 2015 the new car fleet must be on average of 130g CO<sub>2</sub>/km and by 2021 95g CO<sub>2</sub>/km. the 2015 target has been achieved in the UK (reference lecture and SMMT figures) however the 2021 figures are challenging as this this will require most vehicle to be ultra low carbon vehicles – evidence from Newcastle suggest that an EV can deliver 80-85g CO<sub>2</sub>/km.

For an average fleet 130g CO<sub>2</sub>/km is achievable for 2015. Bringing the figure down to 95g will require a significant change in car ownership and although the number of ULCV and in particular full electric vehicles are increasing rapidly (numbers doubled in 2014) – there is a significant gap to achieve this.

## UK Automotive Council Roadmap for Low Carbon Vehicle Technology





# EV EVOLUTION



NOT ATTRACTIVE ?



# WHAT NEXT?



# ALTERNATIVE FUEL TECHNOLOGIES

- **LPG**
- **CNG**
- **Biodiesel fuels**
- **Hydrogen** – fuel cells or direct hydrogen conversion
- **Electric** - wholly driven by an electric motor
  - Full EV / Pure / 100% / Battery Electric Vehicle (BEV)
  - powered by a battery that can be plugged into mains.
  - No combustion engine.
  - Only fuel = electricity, so ZERO tailpipe emissions.

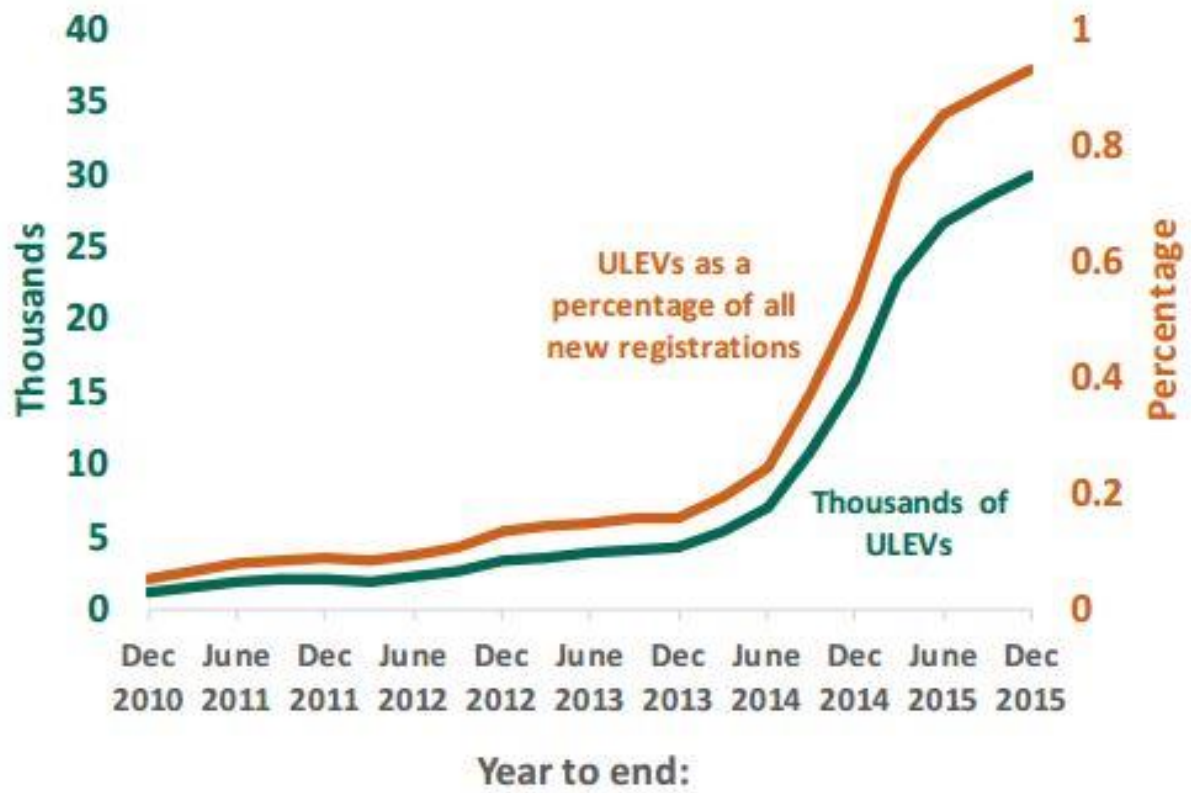
# DIY LPG CONVERSION



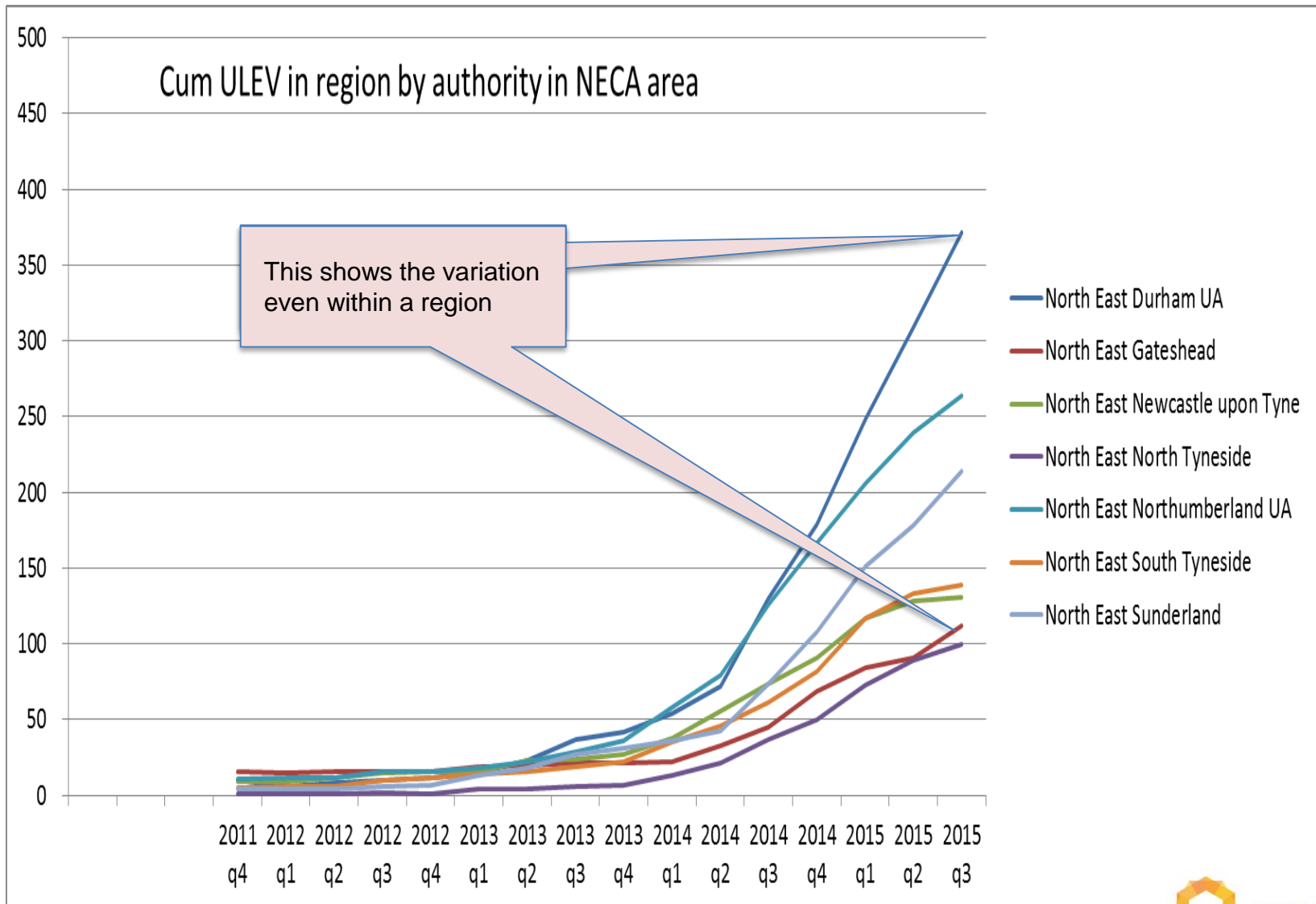


# UK ULEV SALES TO DATE

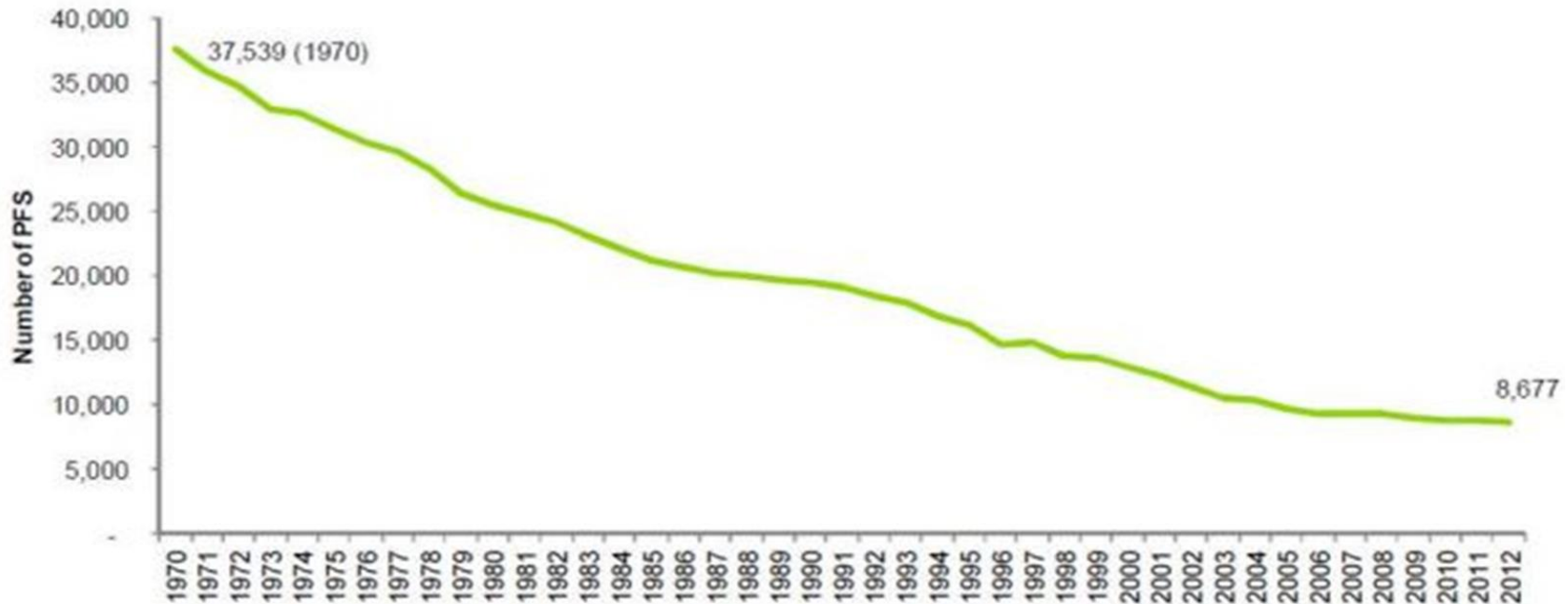
## New Ultra Low Emission Vehicle registrations, UK: 2010 - q4 2015



- Almost 30k ULEV newly registered in 2015
- Increased 89% from 2014
- But still only 0.9% of total new registrations.



## Population decline of Petrol Filling stations in the UK



# WHO IS USING WHAT?



## CHAdeMO



Nissan LEAF



Mitsubishi eMiev  
Peugeot iOn  
Citroen C Zero



Nissan eNV200



TATA

## AC



Renault ZOE



Smart ED



Kia Soul

## Combo2



BMW i3  
Preview



BMW i8  
Preview



VW e-Up



VW Golf Blue  
e-Motion



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# THE SOLUTION

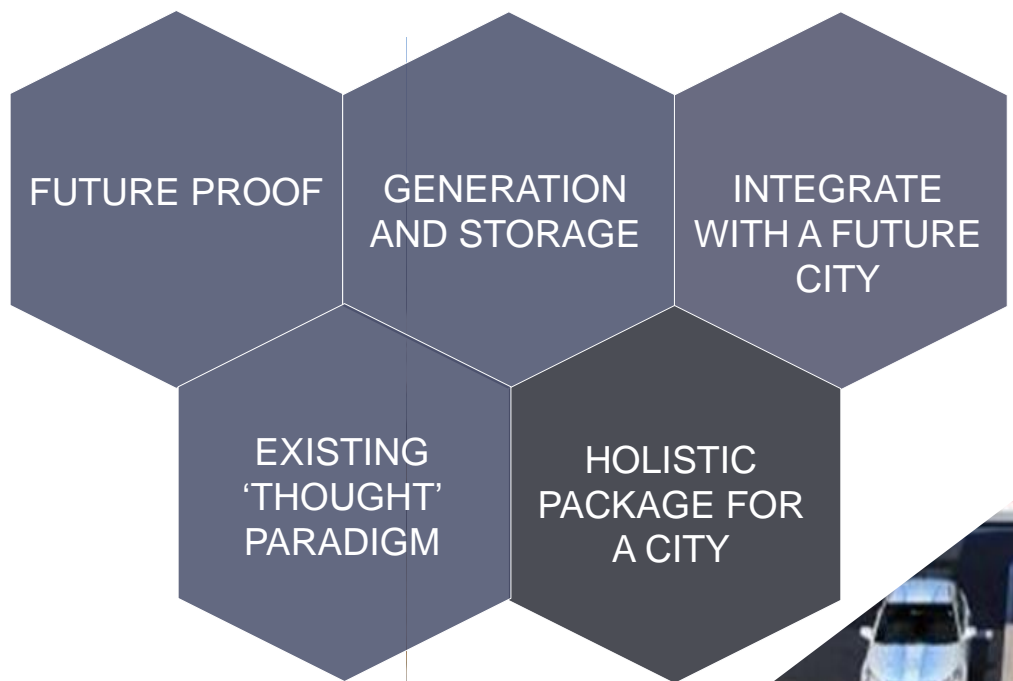
## MULTI-STANDARD CHARGERS

Multiple plugs =  
NOT what EV OEM's OR customers really want





DRIVERS WANT 'CERTAINTY OF CHARGE AND ACCESSABILITY'



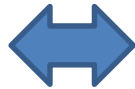
WHERE  
WILL THIS  
GO?

The creation  
of a desirable city  
where people want  
to live and work  
and

A Future City which  
can be marketed  
and presented for  
private and public  
investment.



**Low Carbon Buildings**

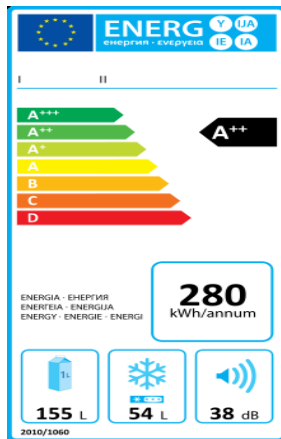


**Low Carbon Transport**



**Low Carbon Power**

IN PLACE



APPLIANCE

IN PLACE



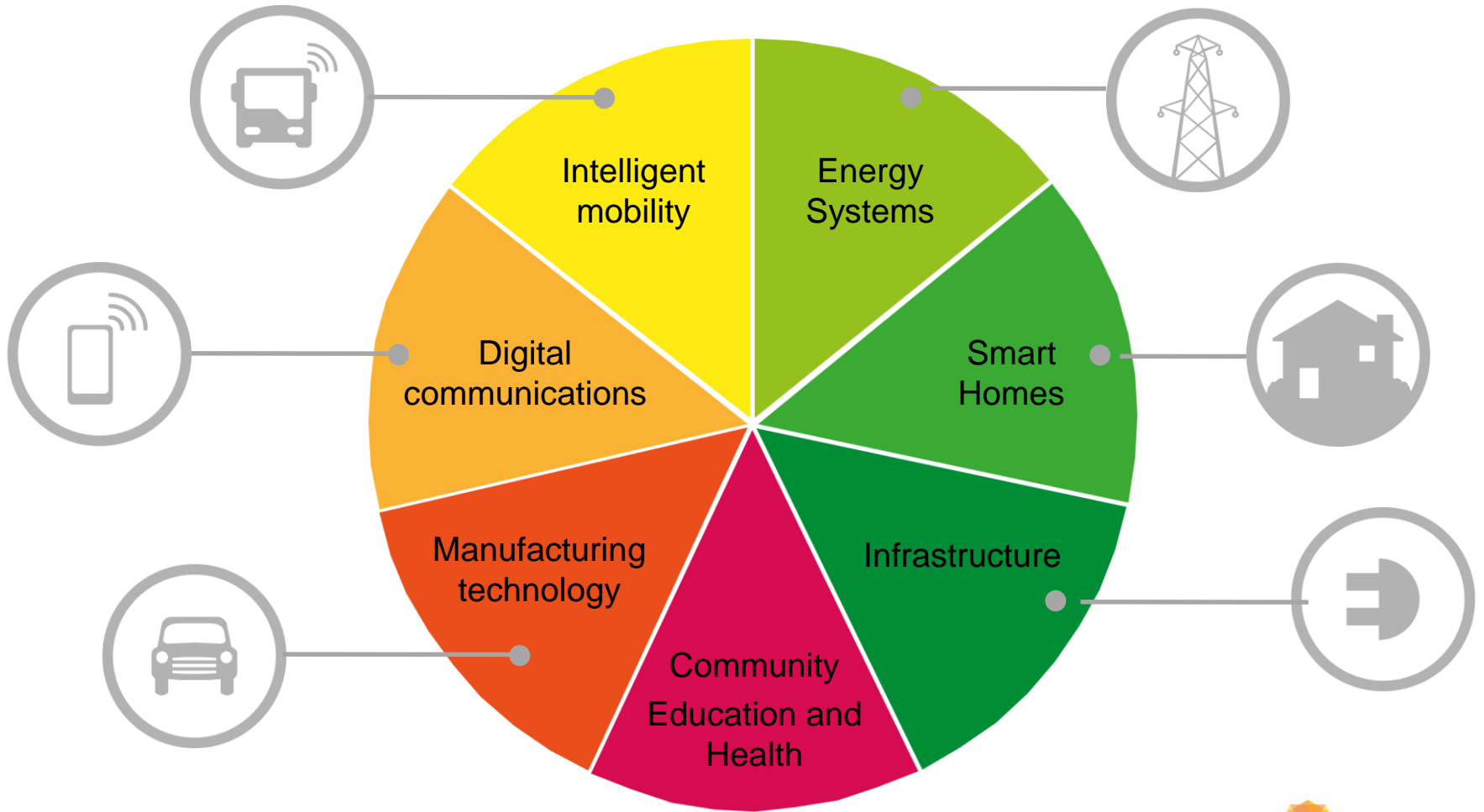
HOME

COMING?



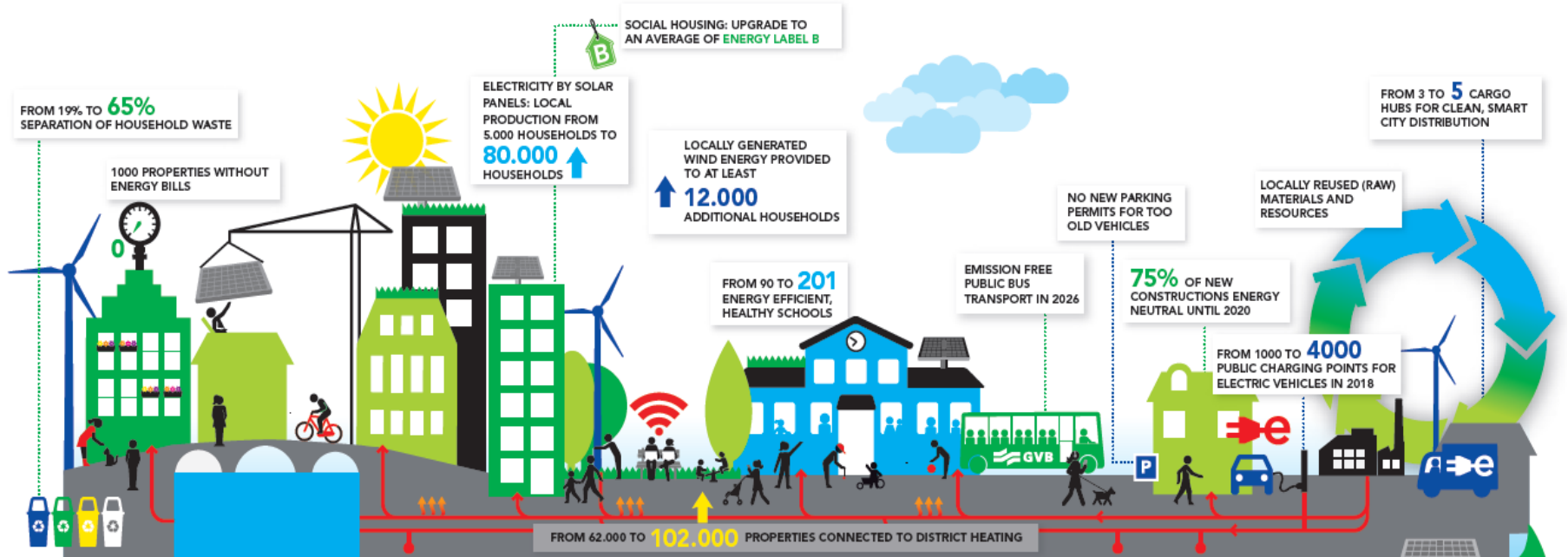
CITY

Making the future city relevant to everyone.





## Sustainable Amsterdam



**RENEWABLE ENERGY**

IN 2020, 20% MORE LOCALLY PRODUCED RENEWABLE ENERGY PER INHABITANT, AND 20% ENERGY SAVED PER INHABITANT.

**CLEAN & HEALTHY AIR**

BY 2025 AS MUCH EMISSION FREE TRAFFIC IN THE CITY AS POSSIBLE.

**CIRCULAR ECONOMY**

WASTE IS A RESOURCE. RAW MATERIALS AND RESOURCES WILL BE MINED LOCALLY AND RE-USED. NEW FORMS OF DISTRIBUTION, CONSUMPTION AND DISTRIBUTION WILL ARISE.

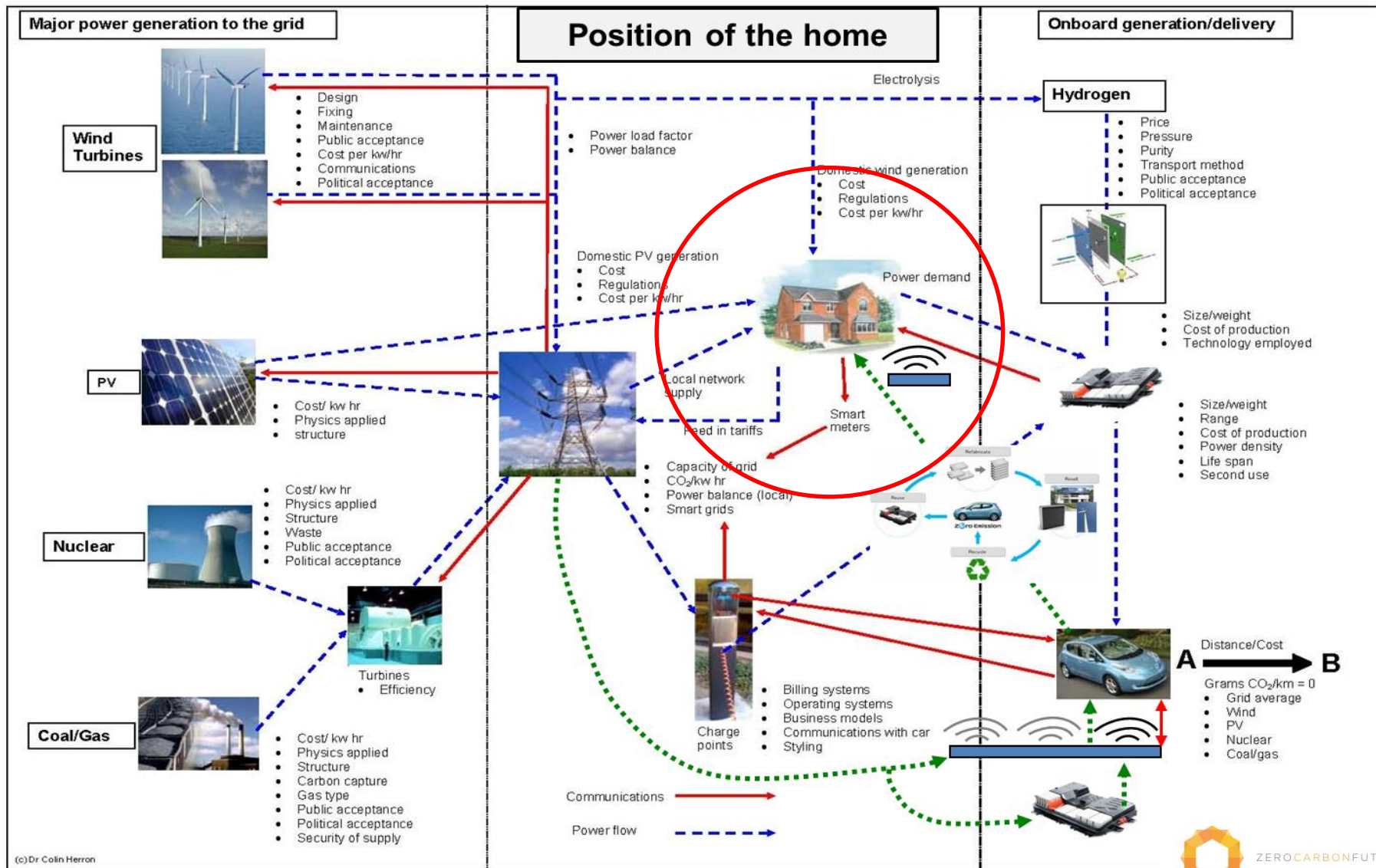
**CLIMATE RESILIENT CITY**

CLIMATE CHANGE AS A KEY FACTOR BY THE DEVELOPMENT AND DESIGN OF THE CITY OF AMSTERDAM.

**SUSTAINABLE CITY**

AMSTERDAM ENVISAGES RAPIDLY IMPROVING SUSTAINABILITY WITHIN THE MUNICIPAL ORGANIZATION ITSELF.

## The new energy picture



# Emerging Technologies and Research

## The new integrated energy picture

### POWER GENERATION



WIND TURBINES



PV PANELS



NUCLEAR/COAL/GAS

### THE GRID



ELECTRICITY



HYDROGEN

### DELIVERY TO THE VEHICLE



HOME

### ONBOARD GENERATION/DELIVERY



CAR



BATTERY



PV PANELS

## **Demonstration Projects :-**

- EV Infrastructure
- SMART cities
- Reduce bills to tenants in fuel poverty
- Energy Storage
- Councils
- Housing Associations

## **Capacity Building :-**

- Training
- Installer
- Maintenance
- Smart Grid
- Renewables Integration

## **Deployment :-**

- Installation
- Project Management
- Consultancy
- Leading the market

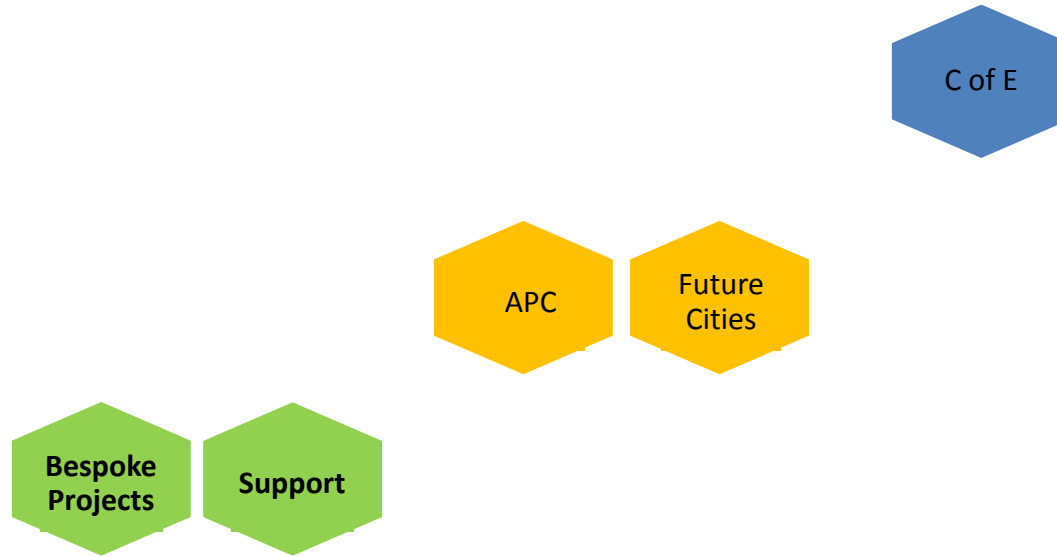
## Learner Groups

- Full time learners
- Pre/Apprentices
- STEM (14-19) Agenda
  
- **Commercial Business**
  1. Installers
  2. Manufacturers
  3. Social housing
  4. Local authorities
  5. Transportation



**PRIME  
DRIVERS**





We embrace the opportunities offered by the new developments surrounding low carbon transportation and smart home technologies.



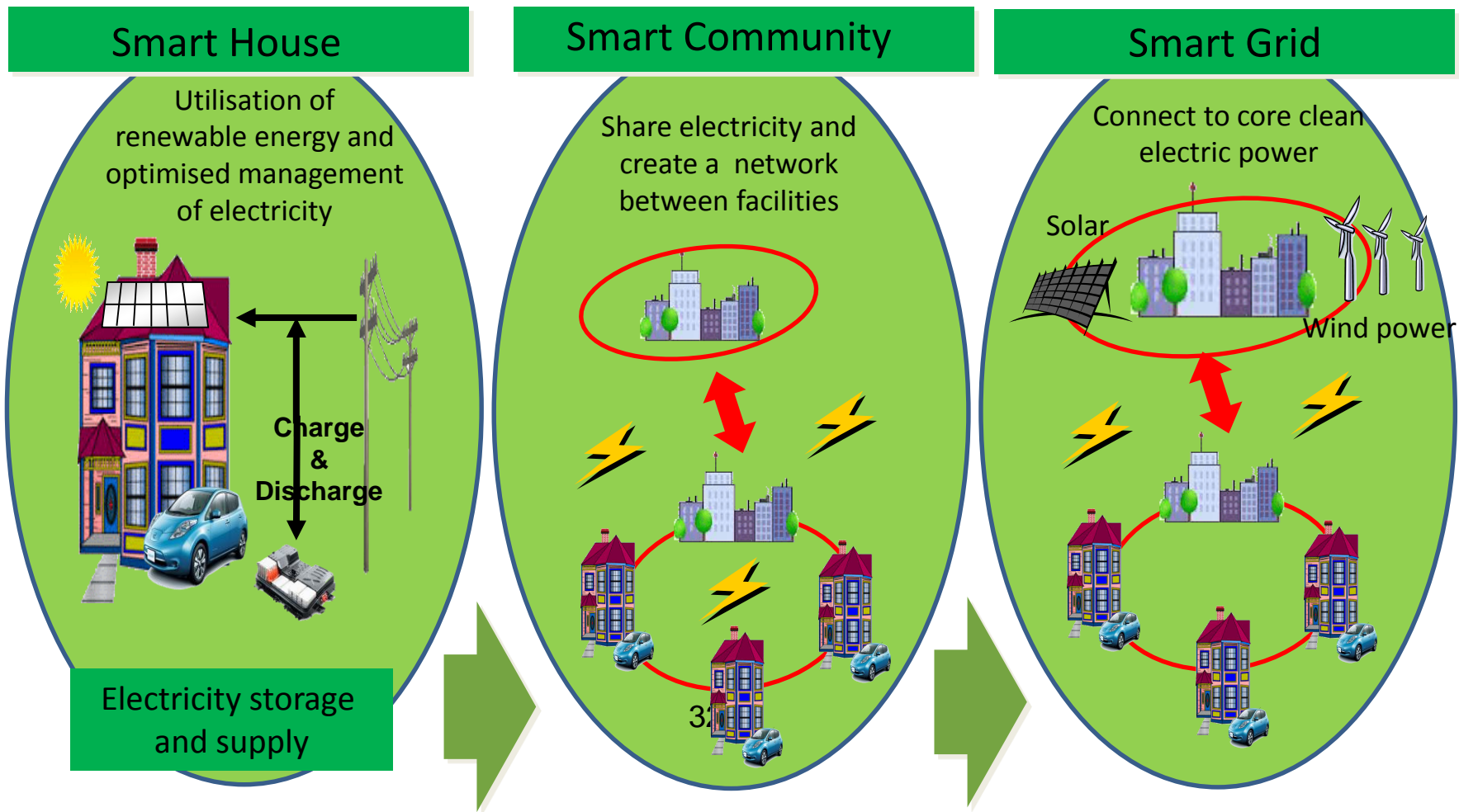
- APC 4 Driving UK Capability and Economic Impact through LC Propulsion Technologies (NMUK - HEDB – Skills and Training)
- APC 5 Driving UK Productivity through LC Propulsion Innovation (NMUK – Casting Plant – Skills and Training)
- H2020 ELSA (Energy Local Storage Advanced system)  
[www.elsa-h2020.eu](http://www.elsa-h2020.eu)



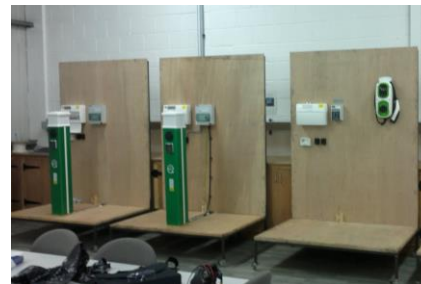
Technology transfer, science research developed into practical and commercially relevant training applications and learning packages.

- GC - Low Carbon Technology Enrichment – Pre - Apprentices
- GC - CPD to lecturers and technicians
- Riverside HA - Voltage Optimisation – Unemployed
- First Group - Hydrogen Technologies – Apprentices

# Zero-emission mobility will evolve and be linked to Smart House, Smart Community and Smart Grid



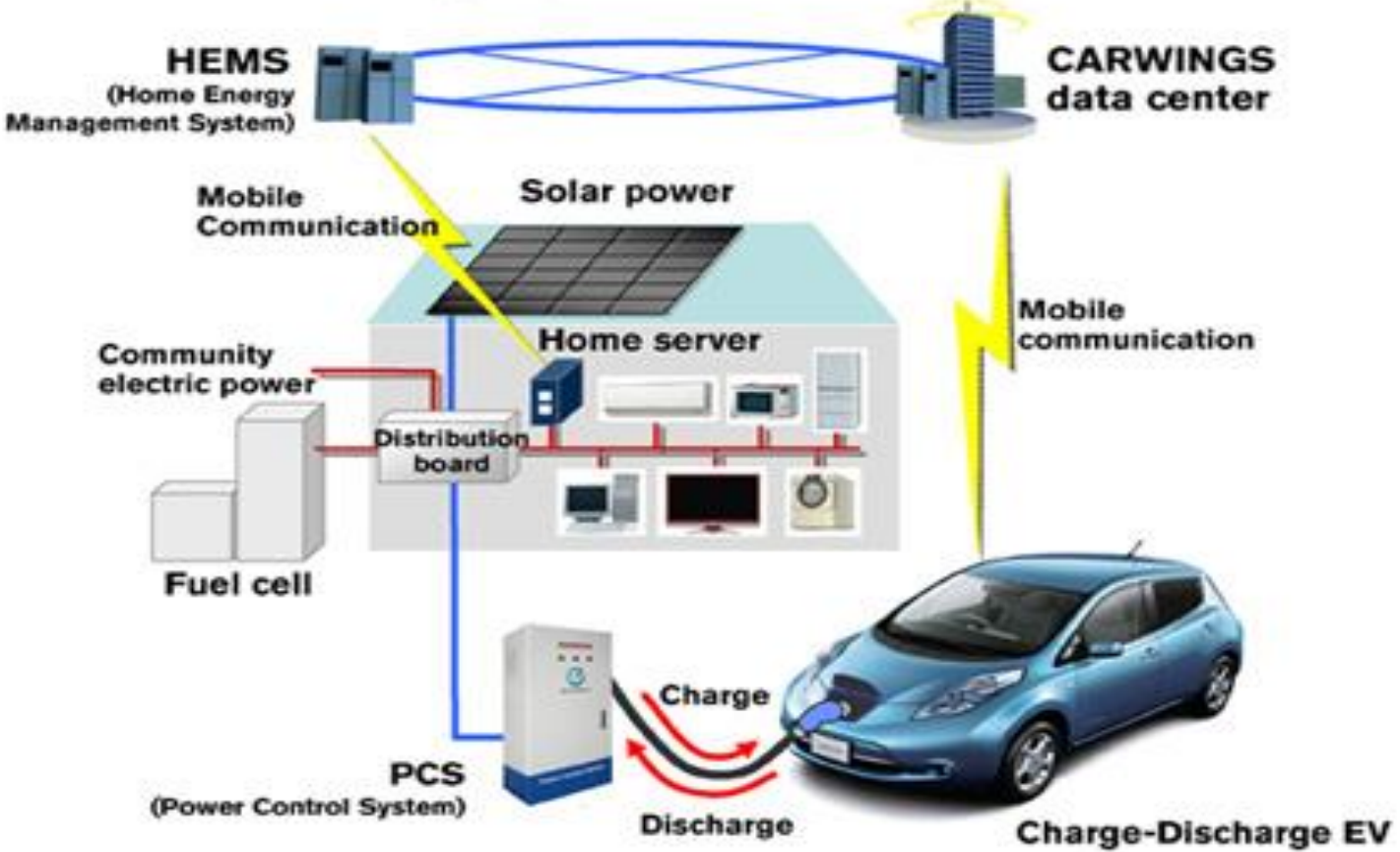
**Max output: 6kW from PCS unit delivers enough power to use main home appliances at once.**



# HOW THE CAR INTERACTS WITH THE HOME

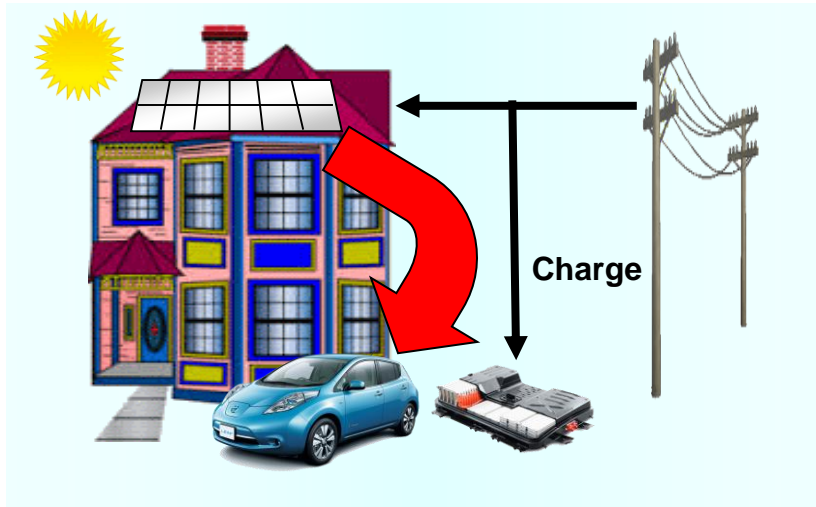


## Stand-alone Energy System with 'LEAF to Home (V2H)'

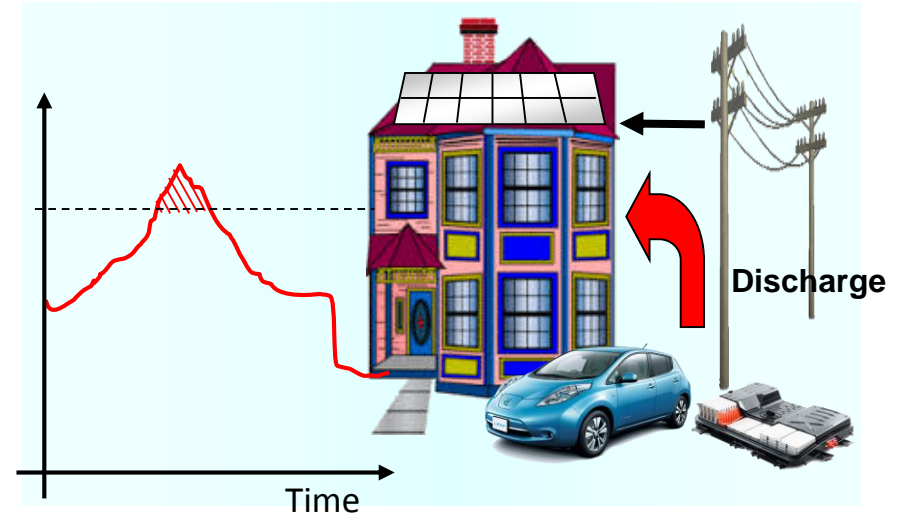




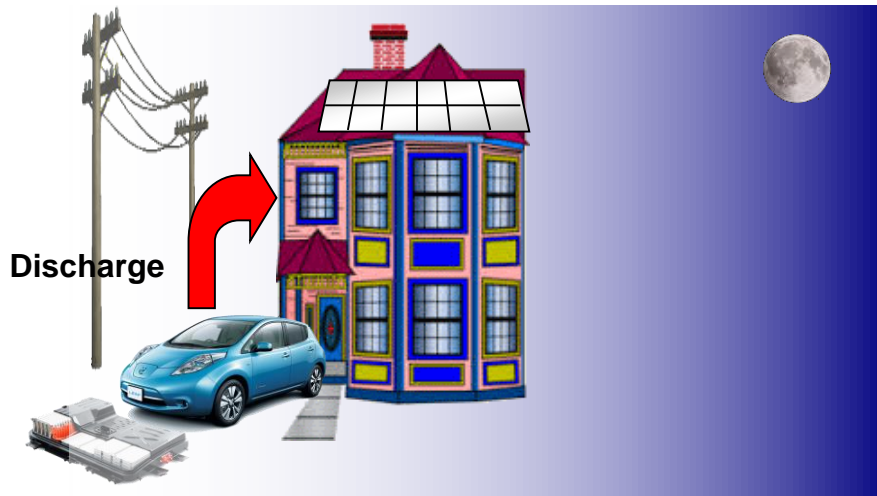
## Storage Solar Energy



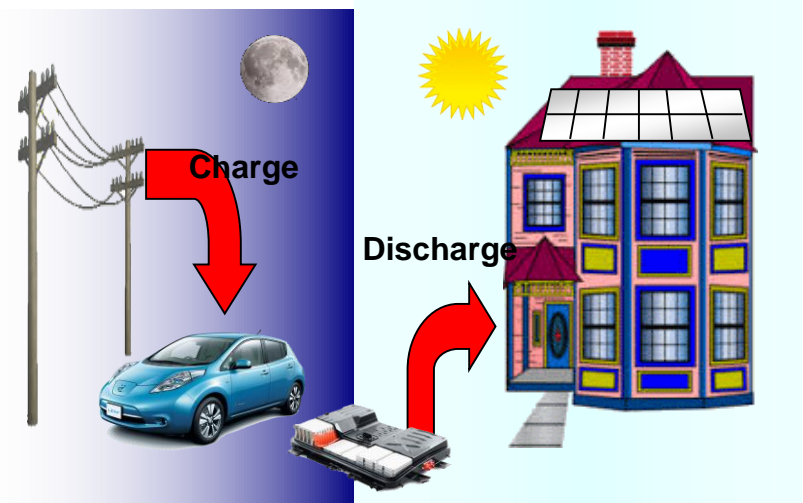
## Peak-shaving

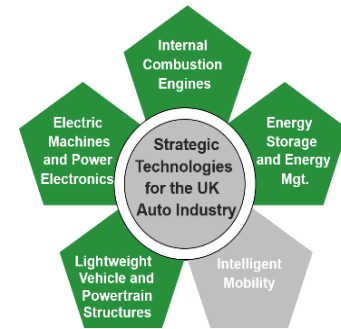


## Backup during black out



## Demand Optimisation

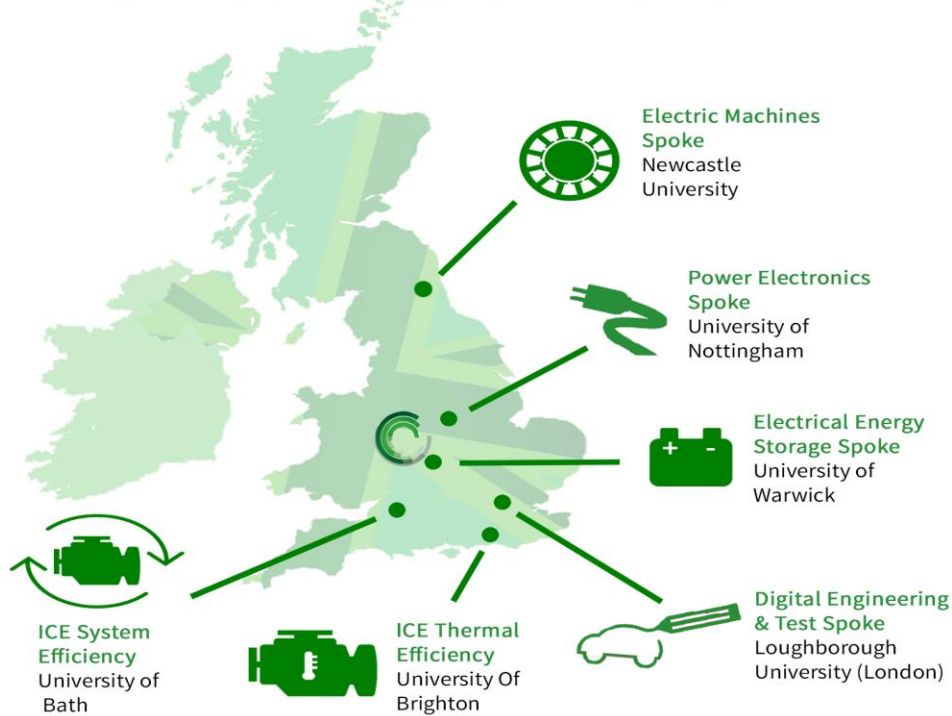




National Centre 4 Skills. Work closely with the APC and its spokes to translate new technology into vocational skills via a national framework.

## The Propulsion Nation

*"Turning low carbon propulsion technology into products developed and produced in the UK"*



Expertise in key automotive technologies exist across the UK.

The APC Hub & Spoke model provides open access to the UK's expertise and resources by creating a national network of logically located centres, each representing a key strategic technology for the automotive industry.

*More Spoke announcements to be made during 2015*

The new development cycle through the APC engages universities but there is a translation gap to skills.



@theapcuk



[www.apcuk.co.uk](http://www.apcuk.co.uk)



@theapcuk

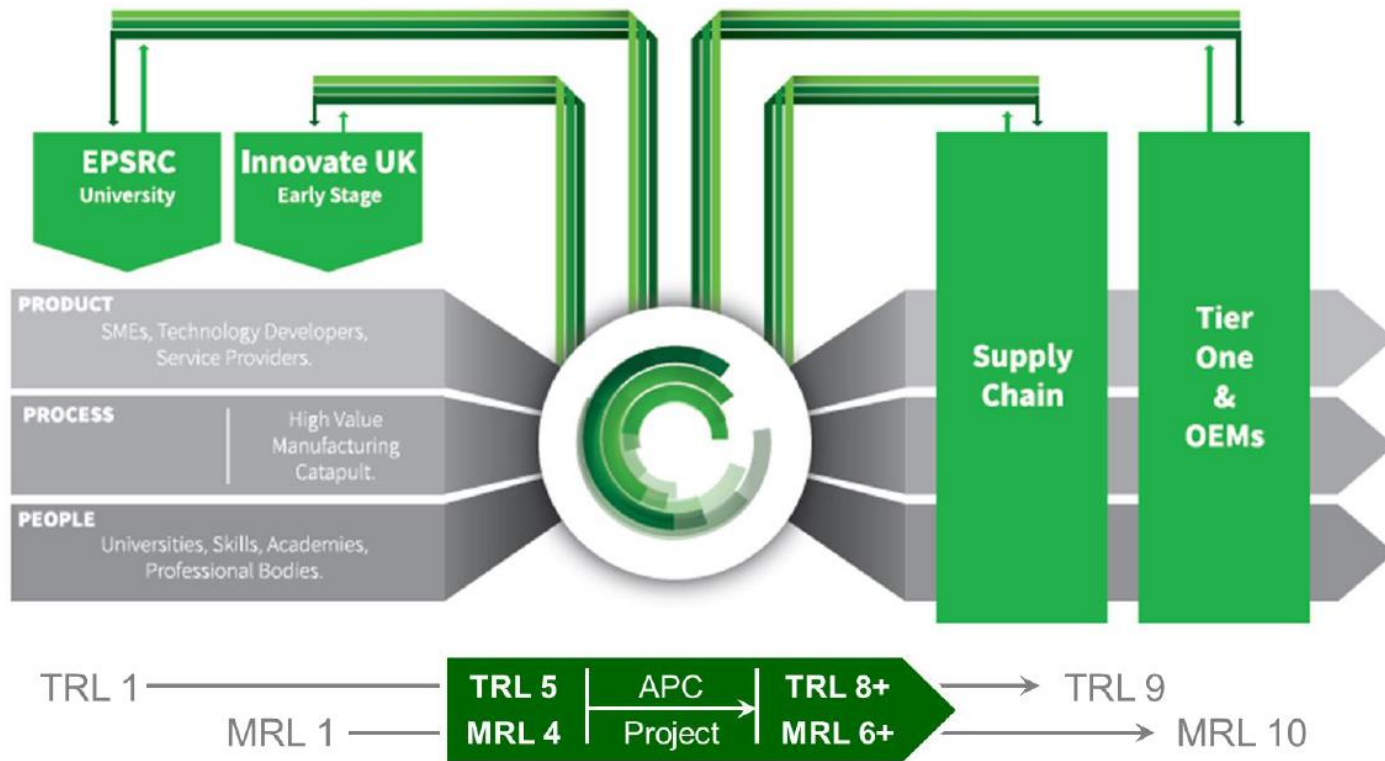


Advanced Propulsion  
Centre UK



ZERO CARBON FUTURES

# National Innovation Space - Inconsistency





To support different types of learners to acquire the awareness and skills relevant to smart cities.

- EV Works
- Riverside Homes
- Science Central
- Energeia



Making EV Work for You.

## The Charged up Package

Introduction to EV World with Impartial advice on electric vehicles and infrastructure with site surveys.

## The EV Works-shop

One day workshop covering Strategy, Research, Vehicles, Charging, Marketing, Evaluation, Dos and Don'ts

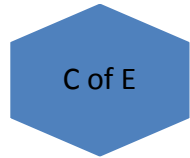
## Joint consultancy

A turn-key solution to companies and organisations

## The Big EV Works event

Plan for 2017 Aimed around 'Big Ideas'





A stage for industrialising innovative techniques and technologies; testing and demonstrating reliability in a production facility; and cross-sector dissemination.

This is currently being developed in partnership with the LEP, NEAA, Nissan, KTN and universities.

Thank you for your attention.

Is there anything you would like to ask about our work at Zero Carbon Futures?

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