HEADLINE SPONSOR

ENGIE

scottish renewables

LOW-CARBON CITIES CONFERENCE

22 FEBRUARY 2017 **EDINBURGH**

Plenary 1

Jenny Hogan, Scottish Renewables

Keynote Address

Keith Brown MSP, Cabinet Secretary for Economy, Jobs and Fair Work

Speakers

Jan Johansson, Växjö municipality, Sweden

James Alexander, C40 Cities

Jan Johansson

Energy Manager, Växjö municipality, Sweden

Växjö – green transition in practice

Jan Johansson, Energy Manager

Växjö kommun

The Greenest City in Europe

Film about City of Växjö

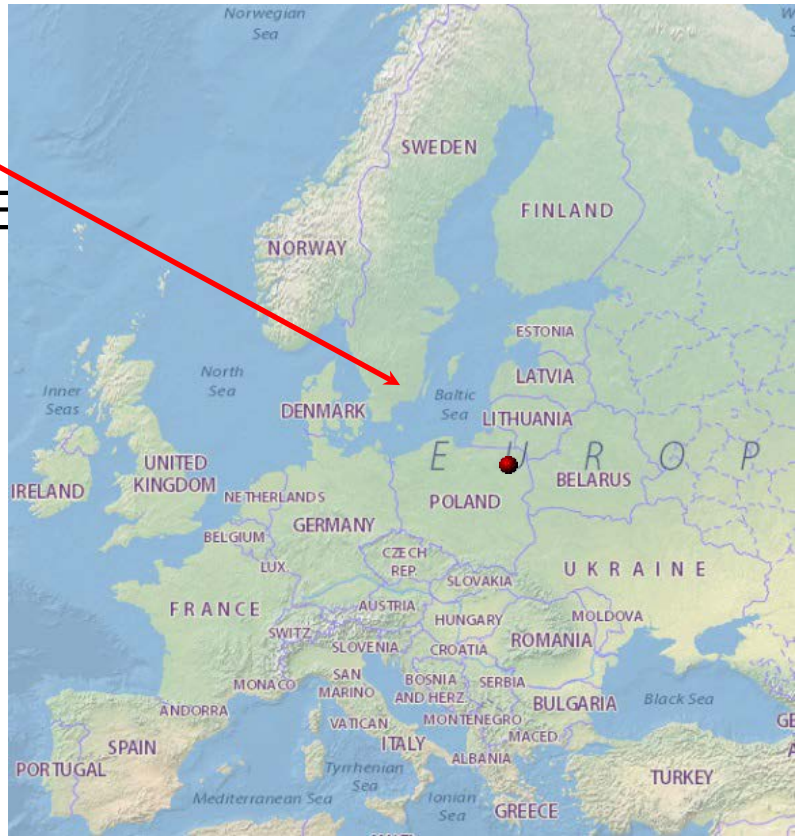
https://www.youtube.com/watch?v=_kVCDJAAzWc
https://www.youtube.com/watch?v=cbtA5CL4qpM

Växjö kommun
The Greenest City in Europe

This is Växjö, Sweden

- Population 89 000
- Forests and 200 lakes
- Centre of glass, furniture, SME bio energy and education
- 8 000 SME-companies
- Political majority, right wing:

  M, C, FP, KD, MP
- 6500 employees in administration
- 500 employees in municipal companies



Växjö kommun
The Greenest City in Europe

From fossil community to bio-community

- Energy security
- Local economy
- Renewable energy (64%)

➢ Wooden buildings

➢ Sustainable transport

Växjö kommun
The Greenest City in Europe

District heating is smart

Växjö kommun
The Greenest City in Europe

District heating from wood is smarter

Växjö kommun
The Greenest City in Europe

District heating from wood is smarter

Växjö kommun

The Greenest City in Europe

The Modern Wooden City

Passive house

Portvakten Söder (40 kWh/m^2)

Energy efficient houses

Limnologen (80 kWh/m^2)

The first passive tennis court arena

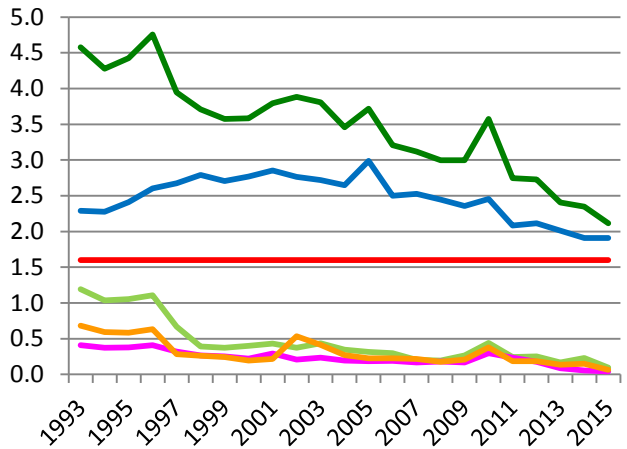
(11 kWh/m^2 excl hot water)

From biological waste to city buses

Collection of biological household waste started February 2012

Biological household waste will be collected and made to biogas for city buses and private vehicles

Växjö kommun
The Greenest City in Europe



Strategic environmental work

Environmental programme
local goals adopted by City Council.

Activities in Budget

Annual evaluation.

Växjö kommun
The Greenest City in Europe

The fossil CO_2 emissions per capita shall be reduced by 65 % between 1993 and 2020, and by 100 % until 2030

Växjö kommun
The Greenest City in Europe

Smart Cities
and Communities

SEVENTH FRAMEWORK
PROGRAMME

- EU-funded project
- Budget Växjö 12 601 000 EUR
- 6 855 000 EUR contribution
- Reduce energy need by >50% in 400 apartments
- Innovative technology

Växjö
kommun
The Greenest City in Europe

Success factors

- Municipal autonomy – decisions are taken at local level
- Political consensus and long term targets
- Broad co-operation Triple Helix

Växjö kommun
The Greenest City in Europe

For more information

The City of Växjö
http://www.vaxjo.se/english

Environmental program
Energy plan
The Swedish version (the English will come any day)

Transport plan
www.vaxjo.se/miljobroschyr

Växjö kommun
The Greenest City in Europe

Thanks for listening!

jan.johansson3@vaxjo.se

Växjö kommun
The Greenest City in Europe

James Alexander

Director, Finance & Economic Development Initiative

C40 Cities

scottish renewables

ENGIE

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LOW-CARBON CITIES CONFERENCE

22 FEBRUARY 2017 **EDINBURGH**

Plenary 2

Rachelle Money, Scottish Renewables

Speakers

Sam Greer, Stagecoach UK Bus
Ian Booth, Aberdeen Heat and Power Ltd
Councillor Adam McVey, Energy for Edinburgh

Sam Greer

Engineering Director

Stagecoach UK Bus

Sam Greer
Engineering Director
Stagecoach

Inspiring Change

Sustainable power security

Making buses a better choice

Stagecoach UK Bus

- Operate 8500 buses and coaches
- Cover 350 million miles a year
- 118 locations 21000 staff
- 660 million passenger trips
- 40 million gallons fuel

Sustainability

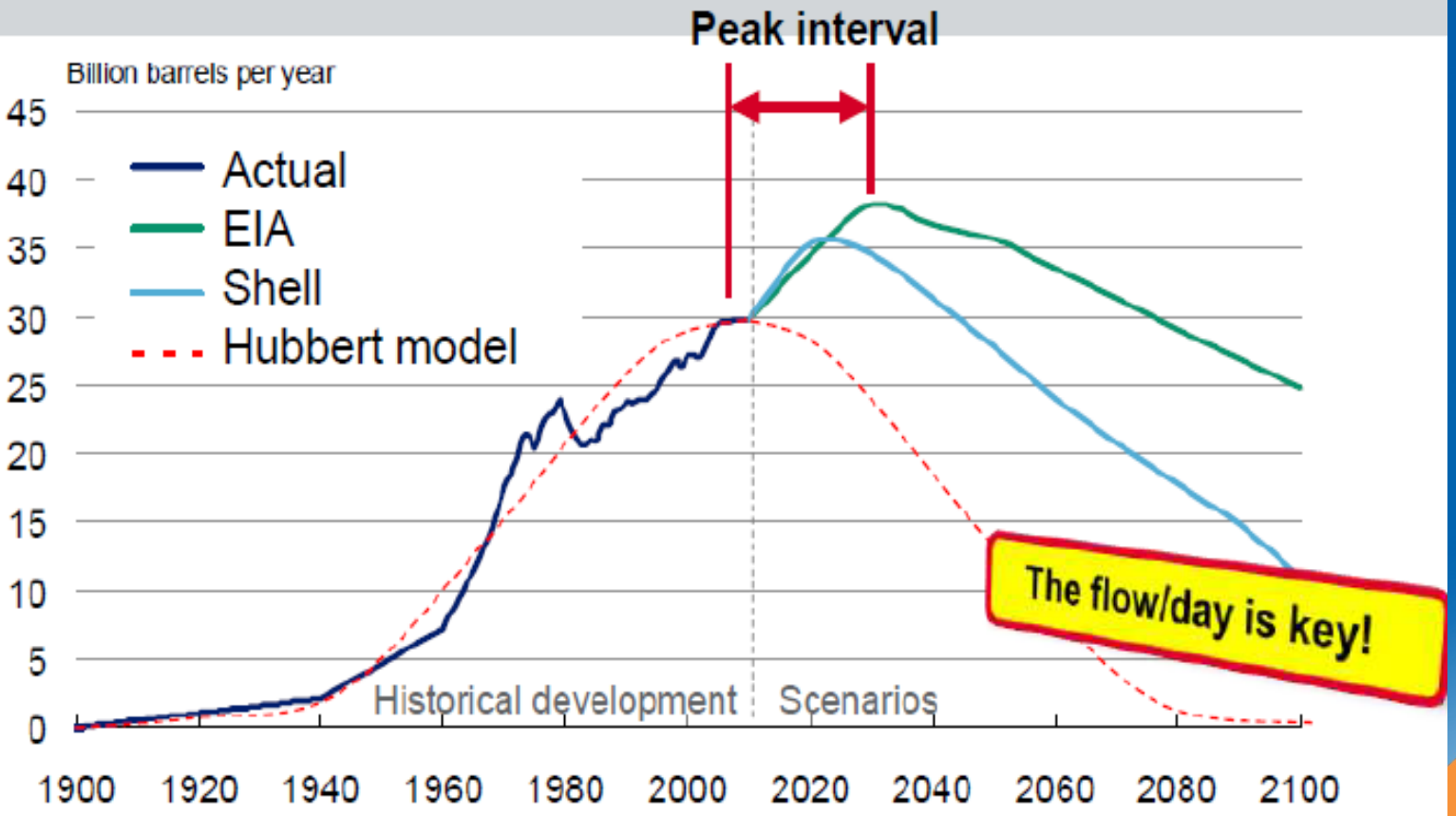
”To meet the needs of the present without compromising the ability of future generations to meet their own needs.”

- *Environmental, social and economical demands must be fulfilled – at the same time.*
- *Too expensive systems will not be introduced in a scale that has an impact…*
- *…so, don’t let the best be the enemy of the good.*

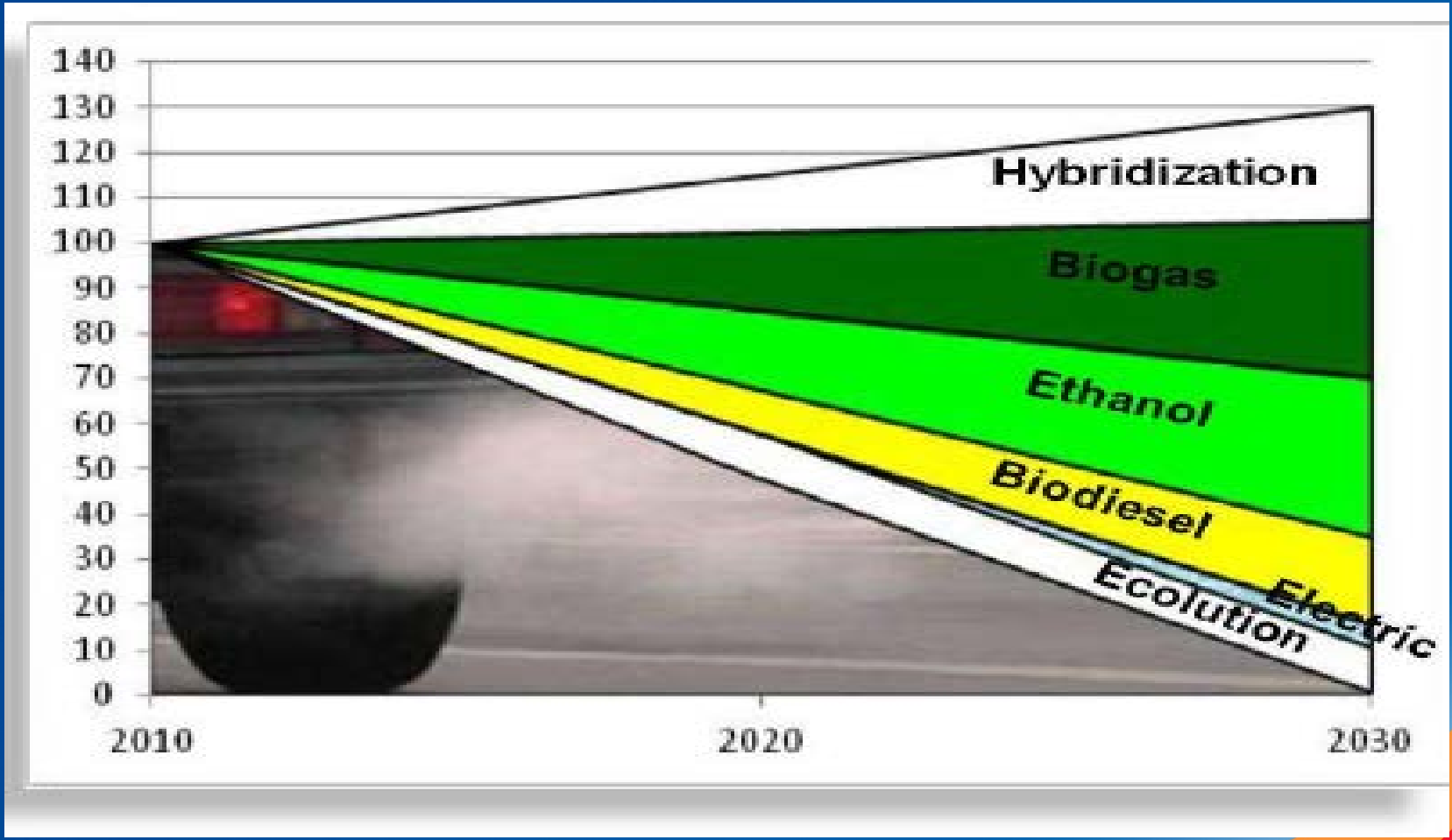

The Economist
A SURVEY OF CORPORATE LEADERSHIP
The end of the Oil Age

Drivers for sustainable transport

Local energy security and the end of cheap oil..?



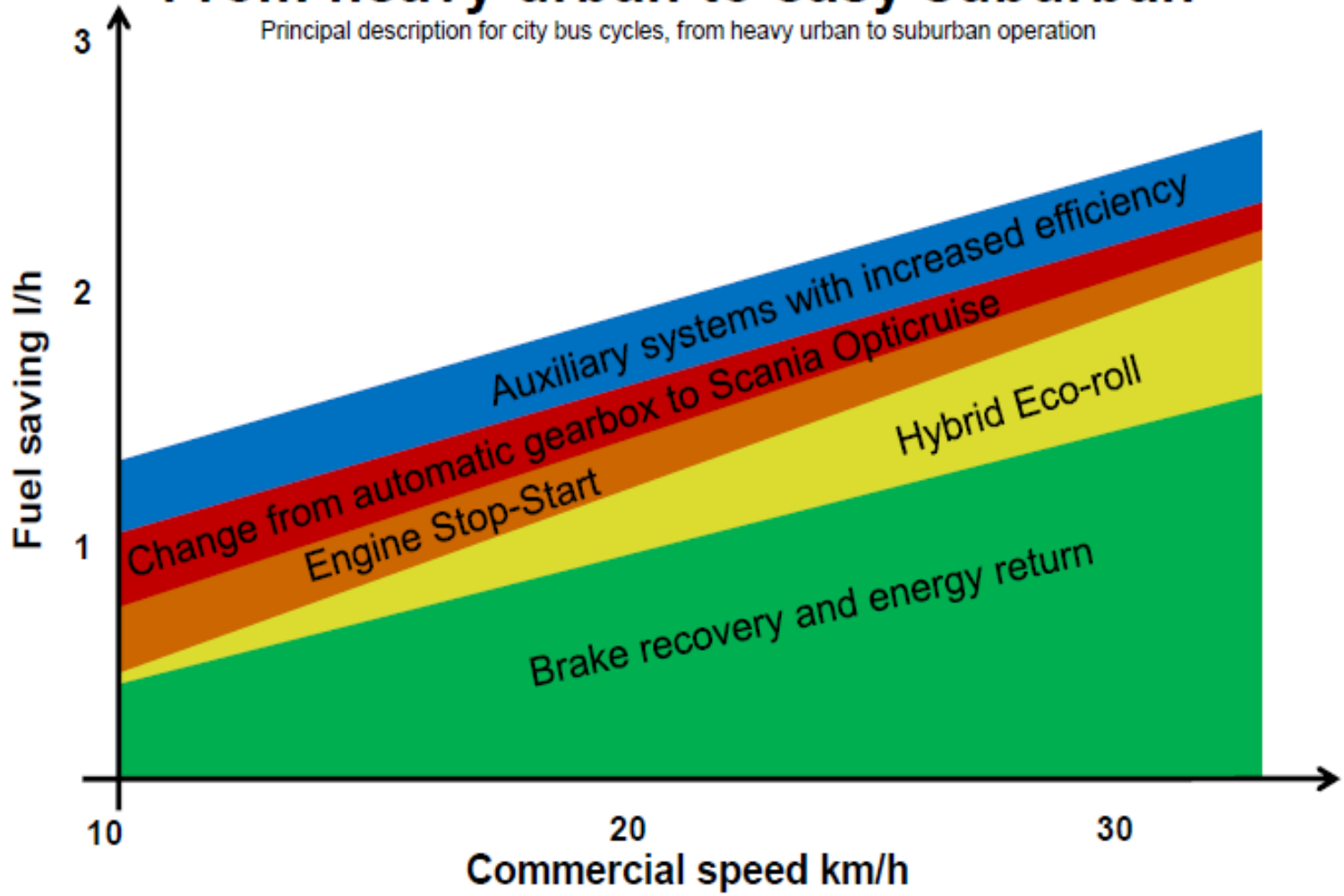
Technology Blind



HEV
Hybrid Electric Vehicles

- Largest HEV fleet in UK 572
- Series and Parallel . ADL & Volvo
- Geo-fence capability
- Reliability
- Cost of ownership
- Commercially viable

Fuel saving, HEV, for different bus drive cycles
From heavy urban to easy suburban



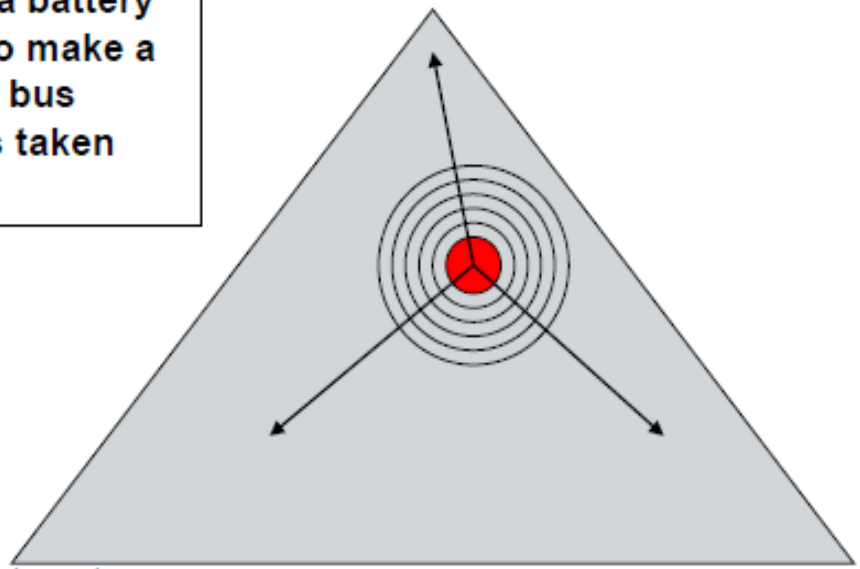
BEV Bus
Battery Electric Vehicle

- Operate 6 Buses in Inverness
- Range of 80 miles between charge
- Fast and slow charge
- Very reliable
- Cost of ownership
- Commercially viable


Inverness
ELECTRICity
POWERED BY
ELECTRIC
100% Electric Powered
Regenerated Energy
Zero Emissions

Electrified bus systems must be optimised regarding cost, operation performance, infrastructure, service life, weight/pax-capacity…

- System view necessary to avoid sub-optimisation.
- It is easy to build a battery bus – but difficult to make a sustainable battery bus system – all factors taken into account.



SOME OF THE TOP CHALLENGES FOR E-BUSES

Technical and Operational

- Energy density vs Battery lifetime
- Operative range vs Flexibility of service
- Interoperability / Standardisation
- Connection to grid
- Depot changes (infrastructure, operation, safety, logistic…)
- New skills in operation and maintenance

Financial and Contractual

- Cost of system elements (and who pay)
- Risk sharing between stakeholders
- Infrastructure ownership
- (System) Tender process and concession/contract duration
- Local Depreciation rules
- Energy provision conditions and costs

Hydrogen Bus

- 6 buses operate in Aberdeen
- Partnership / EU Funded project
- Zero emissions
- Polymer Electrolyte Membrane Cell
- 1.1 million Euros each
- Cost of ownership


Stagecoach
Aberdeen
Hydrogen Bus Project
Powered by Hydrogen
Aberdeen

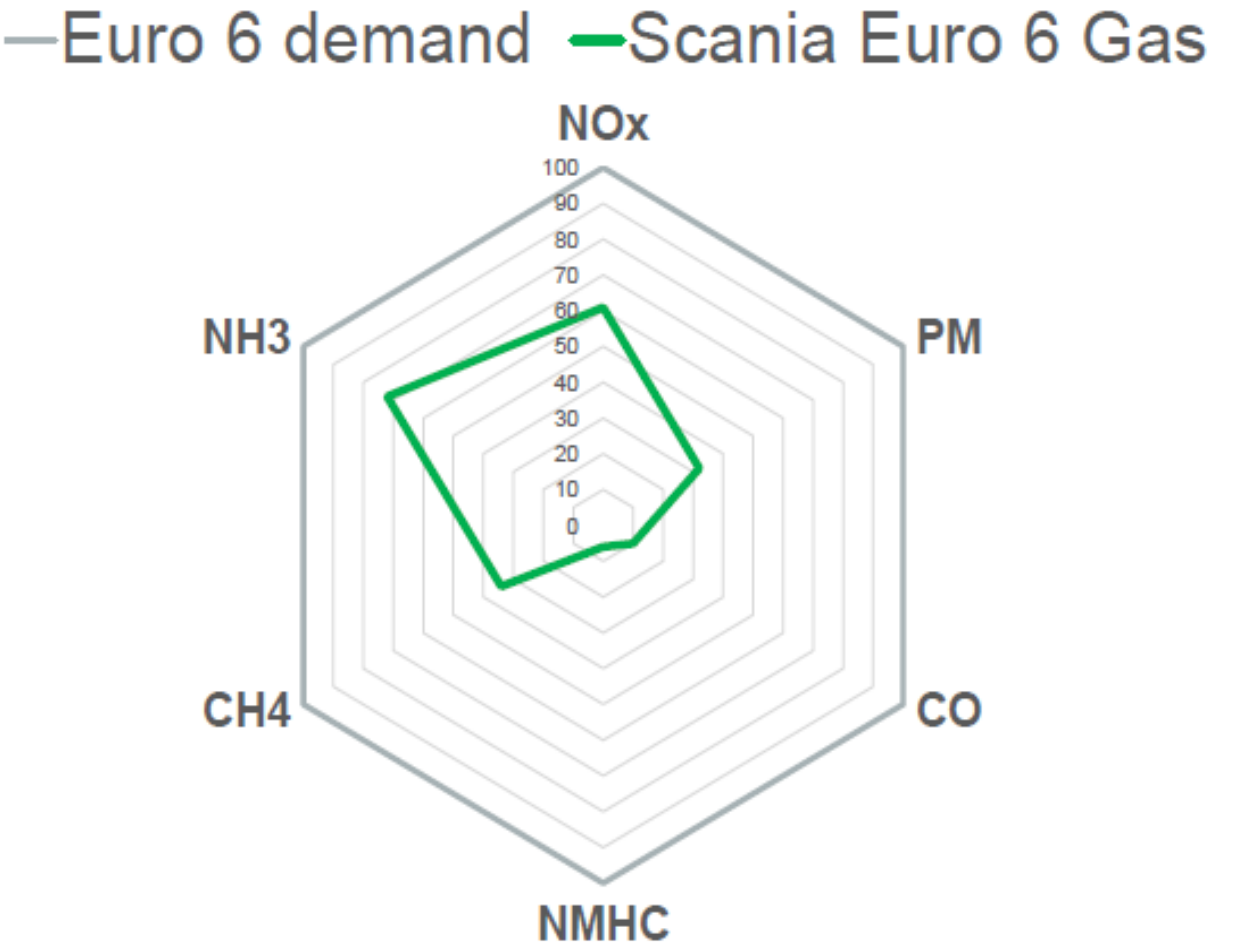

Aberdeen Hydrogen Bus Project
Powered by hydrogen for a green Aberdeen
H2
Aberdeen
Aberdeen

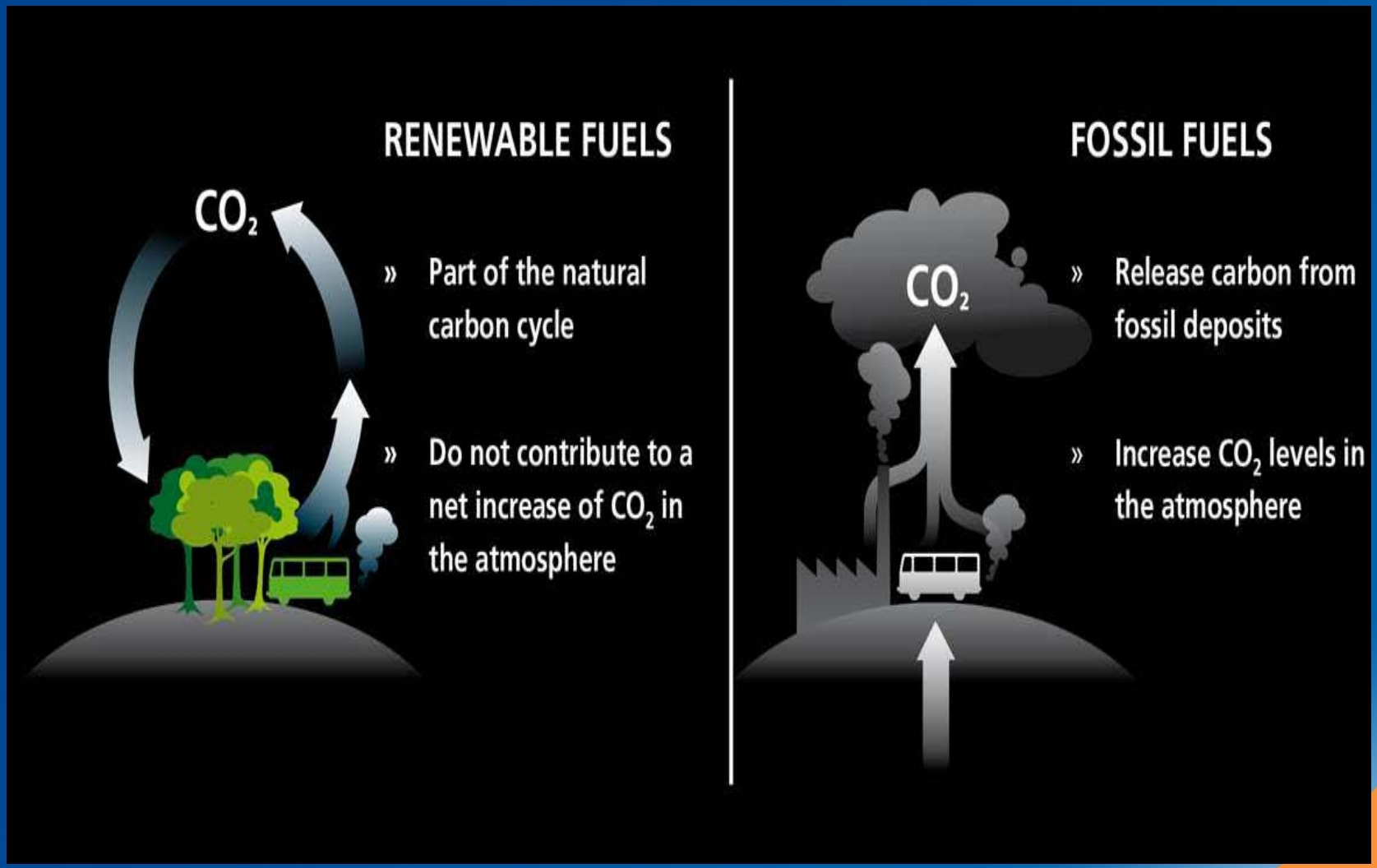
Bio Methane Gasbus

- 40 buses operating UK
- Mains fast fill supply
- Bio Methane Grid injection
- Fuel delivery & supply
- Infrastructure costs

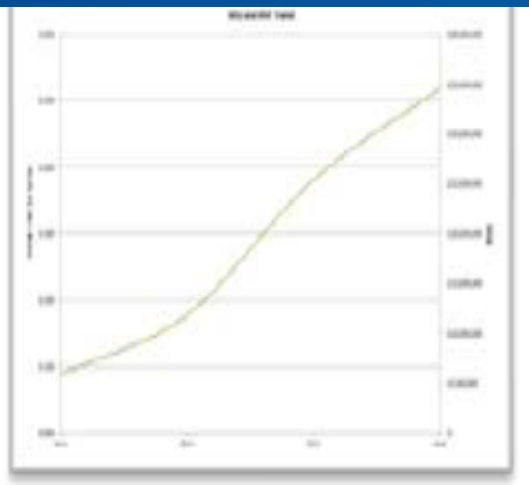

Check out our new ride - it's a gas!
Stagecoach
QUEUE HERE
FOR GAS BUS RIDE
12:00 & 13:00
Stagecoach
28017
YN63 BXU

Ultra-clean emissions - lower than Euro 6




RENEWABLE FUELS
CO_2
» Part of the natural carbon cycle
» Do not contribute to a net increase of CO_2 in the atmosphere
FOSSIL FUELS
CO_2
» Release carbon from fossil deposits
» Increase CO_2 levels in the atmosphere

- Biogas production is increasing
- 66% of all waste water plants produce biogas + 100 other biogas plants
  - 0,6 TWh today and increasing
  - Similar to Swedish situation 10 years ago
  - Target: 10-20 TWh 2020
- Incentives
  - Biogas injection to the grid receives 7.1 p/kWh.
  - One of few fuels that fulfils the Renewable Transport Fuel Obligation (RTFO)



Bio Diesel

- 7500 vehicles across UK
- Waste derived sustainable biodiesel
- Blend of UCOME and TME
- 80-85% carbon reduction RED
- High value blends (B20)

Most biofuels are sustainable today

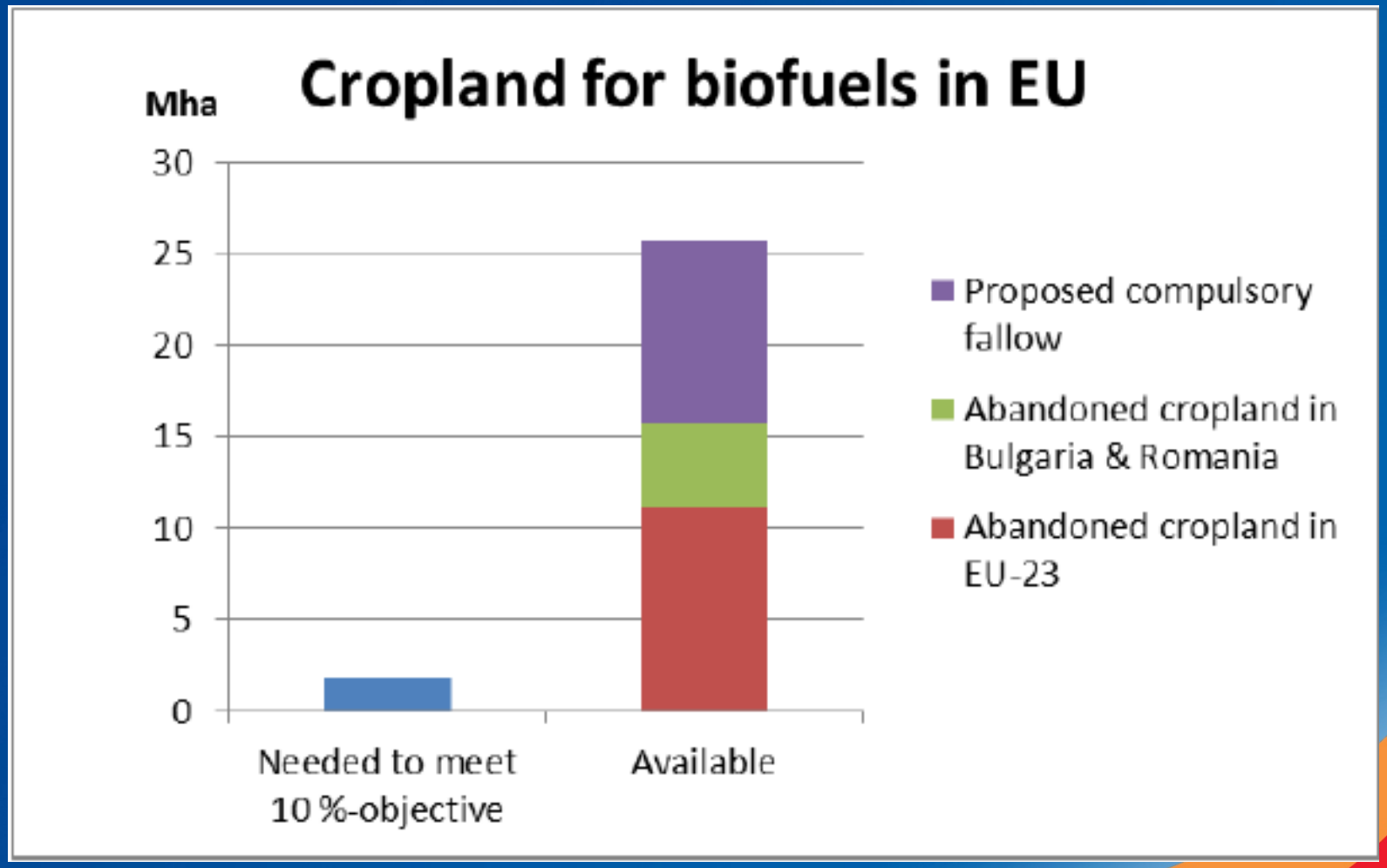
- There are both good and bad biofuels
- But today the market is strongly regulated by sustainability standards
  - EU regulation toughest
- Most biofuels are therefore sustainable today
- But oil is also becoming more and more unsustainable
  - Tar sand, deep sea, fracking…

Biofuel production pathway	Average GHG emission saving
Sugar beet ethanol	52%
Wheat ethanol, NG as process fuel	47%
Wheat ethanol, straw as fuel	69%
Sugar cane ethanol	71%
RME (Bi[illegible]ese)	38%
W[illegible]ste oil FAME (Biodi[illegible])	83%
[illegible]ogas from organic waste	73%

Sustainability verifications

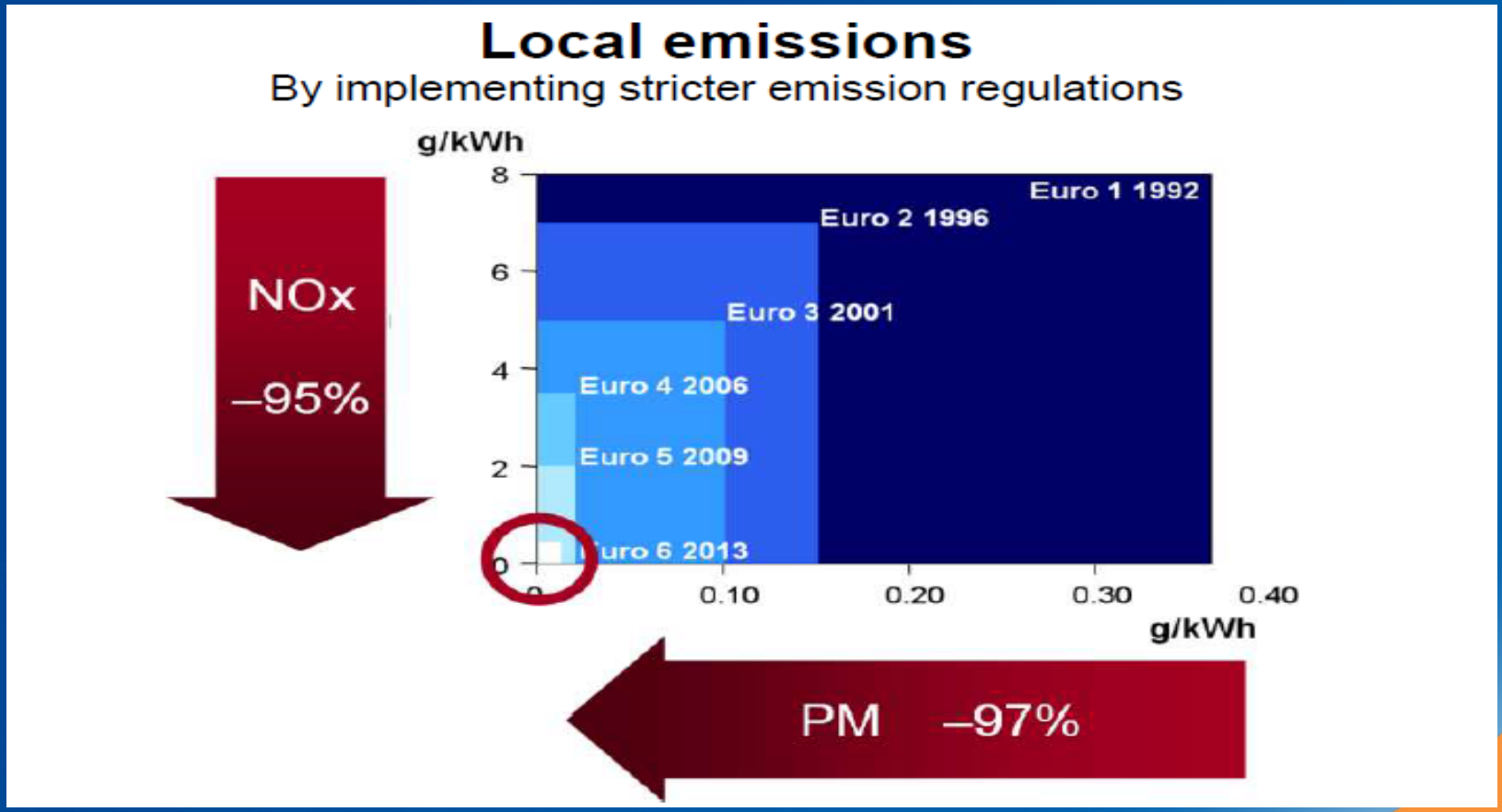
[From Annex V of the EU RED directive]

.....is it sustainable




Argent
Energy

Step Change
Euro 6

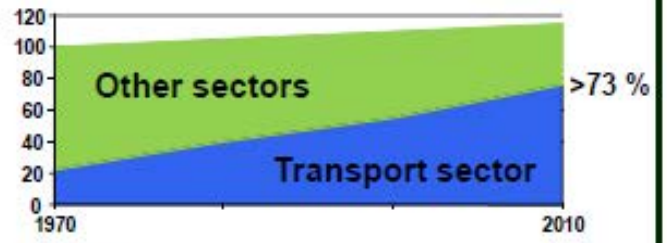


Climate Change and CO_2

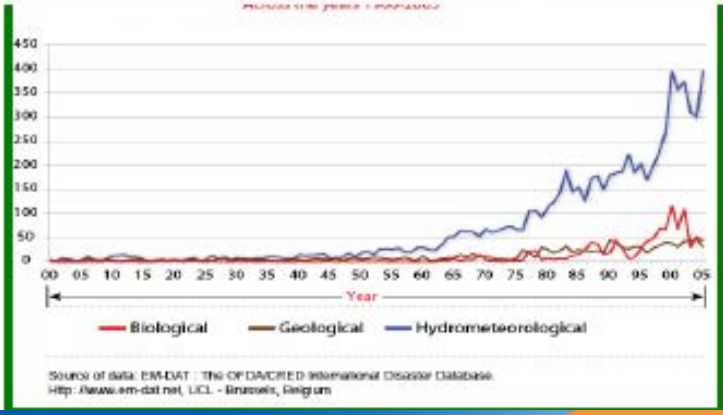
Air Quality & Congestion

Are you part of the **problem**?
Or part of the **solution**?

Oil use in OECD



1970: Index 100

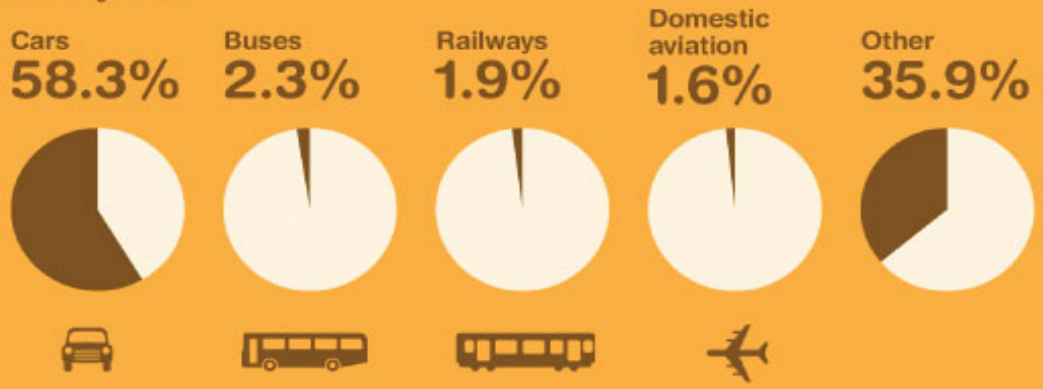



Challenges for cities
More people die from air pollution
than from traffic accidents

GREENHOUSE GAS EMISSIONS BY TRANSPORT MODE

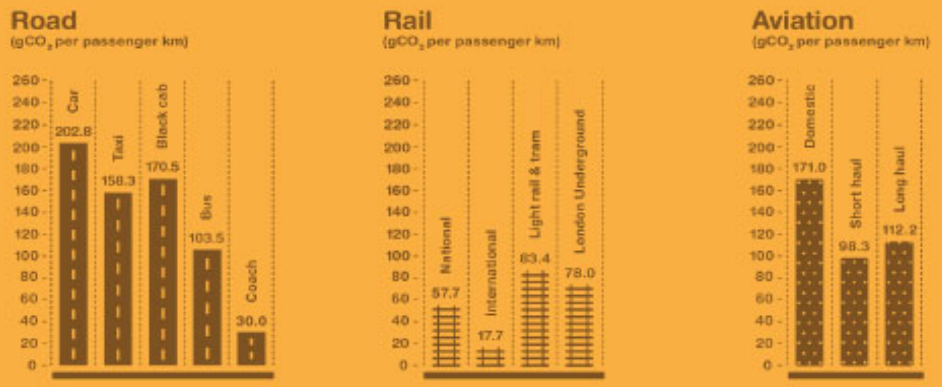
UK DOMESTIC TRANSPORT GHG EMISSIONS

Percentage of total



Source: National Atmospheric Emissions Inventory (IPCC categories) 2007. Other includes HGVs, vans, domestic shipping, mopeds and motor cycles.

HOW GREEN IS YOUR JOURNEY?



Source: 2009 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting: Methodology Paper for Emission Factors (October 2009).

BEFORE

CLEAN VEHICLES

AFTER

CLEAN VEHICLES

Sam Greer
Engineering Director
Stagecoach

Inspiring Change

Sustainable power security

Making bus a better choice

Ian Booth

Chief Executive Officer

Aberdeen Heat and Power Ltd

Aberdeen Heat & Power
(AH&P)

Aberdeen
Heat & Power

SR Low Carbon Cities Conference
Edinburgh

23rd February 2017

Delivering Affordable Warmth .

Aberdeen Heat & Power (AH&P) Background

Aberdeen
Heat & Power

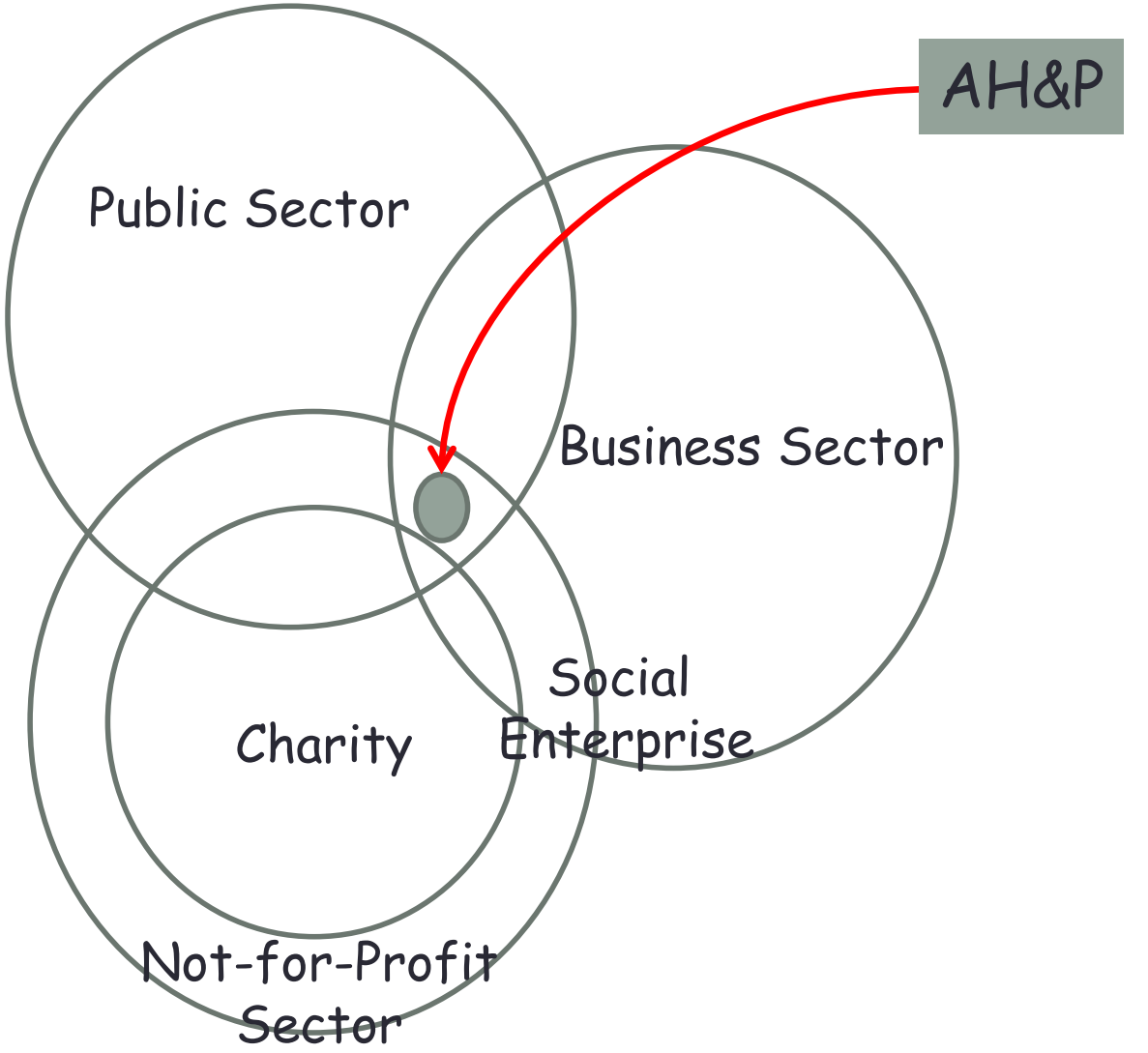
- In 2001 Council commissioned options appraisal of all 59 multi storey blocks (4,500 flats)
- Had electric storage or warm air heating
- 70% in fuel poverty
- Recommended install CHP in clusters of multis
- Appointed a CHP Engineer through tendering process to work up a costed Feasibility Study for a cluster of multis

Aberdeen
Heat & Power

Aberdeen Heat & Power (AH&P) a not-for-profit model

- In 2002 the Council established Aberdeen Heat and Power
  - Independent – not-for-profit company,
  - limited by guarantee,
  - to develop and manage DH / CHP schemes "for the benefit of the people of Aberdeen"
- With the aims of:
  - Delivering affordable heat to hard to heat properties
  - Helping to alleviate fuel poverty
  - Reducing Aberdeen City Council's carbon footprint
  - Developing and managing combined heat and power district heating systems (CHP) in a strategic way in high heat density areas of Aberdeen

Aberdeen
Heat & Power



Public Benefit ⟷ Private benefit

Delivering Affordable Warmth .

Aberdeen
Heat & Power

Aberdeen Heat & Power (AH&P) Legal Agreements

- Framework Agreement between the Council and AH&P
- Then for each project:
  - Installation Agreement inclusive of project costs (although Council carry capital risk, AH&P must manage project costs within budget)
  - Licence to occupy land for energy centre and wayleave for underground services
  - Heat Supply Agreement
  - Maintenance Agreement

Aberdeen
Heat & Power

Aberdeen Heat & Power (AH&P)

The Framework Agreement

- Council specifies buildings to which heat is to be delivered
- AH&P agree to procure, install, operate and maintain systems to facilitate provision of heat
- Supply period is to 31st March 2052
- AH&P warrants performance and delivery of heat, with plant operated to Good Industrial Practice
- Teckal Exemption - Council appoints AH&P to develop DH/CHP projects without tendering; AH&P must abide by public procurement procedures

Delivering Affordable Warmth .

Aberdeen Heat & Power (AH&P) Capex

Aberdeen
Heat & Power

- For housing full capital costs need to be covered
- If capital had to be borrowed the heat charge would increase
  and occupants would be back in fuel poverty

- To date full capital for the housing from combination of:
  - Housing Capital Programme - at approx same unit cost as low rise housing having electric changed to gas heating
  - Charge to owners for connections
  - Government grants - Community Energy Programme Grant (CEP) – from Scottish Government
  - Fuel utility grants – EEC, CERT, CESP, ECO

For public buildings used CEEF or Spend to Save.

Means AH&P has had no borrowing to repay on domestic connections

Aberdeen Heat & Power (AH&P)

Opex

Aberdeen
Heat & Power

- In 2015/16 turnover of £3.62 million; operating surplus of £538k; no overdraft but took out £1 million loan from Scot Gov in 2015 to purchase additional generator.

- Sources of income:
  - Sale of electricity 37%
  - Sale of heat to domestic customers 38%
  - Sale of heat to non-domestic customers 25%

- Costs:
  - Fuel – 75% of costs
  - Maintenance - 11% of costs
  - Overheads, inc staff, depreciation & rates – 14% of costs

Progress thus far...?

Aberdeen
Heat & Power

Delivering Affordable Warmth .

Aberdeen
Heat & Power

Aberdeen Heat & Power (AH&P)

What we have achieved so far

- Of the 59 multis, 33 now provided with heating and hot water from CHP district heating schemes, plus 8 have communal gas heating designed to link into a wider heat network without needing any further internal works. None of the occupants of these 41 multis are now in fuel poverty
- 15 public buildings connected to the heat networks
- Development of an overall strategic plan for district heating across the high heat density areas of Aberdeen
- A reputation for delivering projects on time and on budget


Stockethill
2003-4

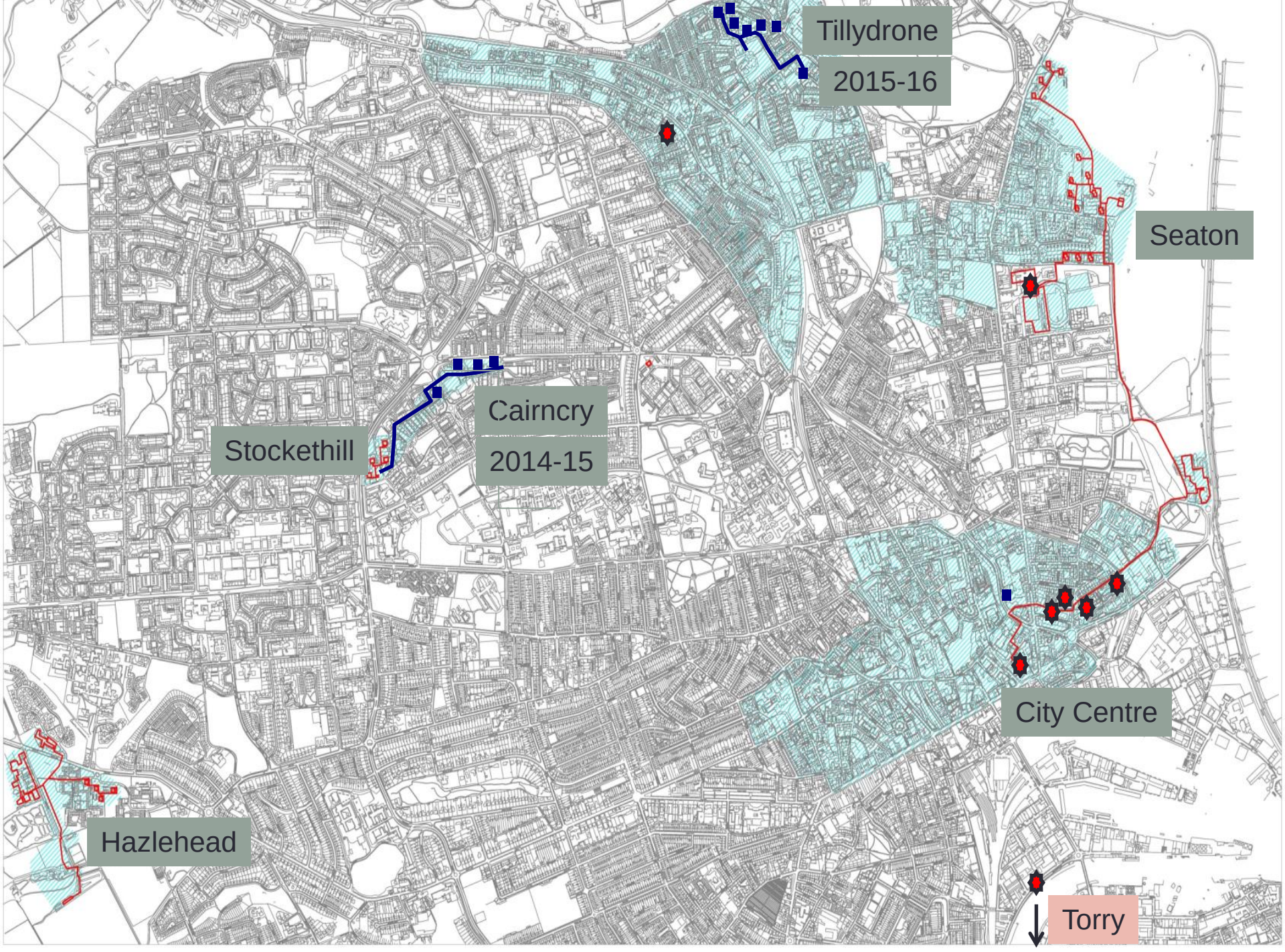

Stockethill
Hazlehead
2005-6

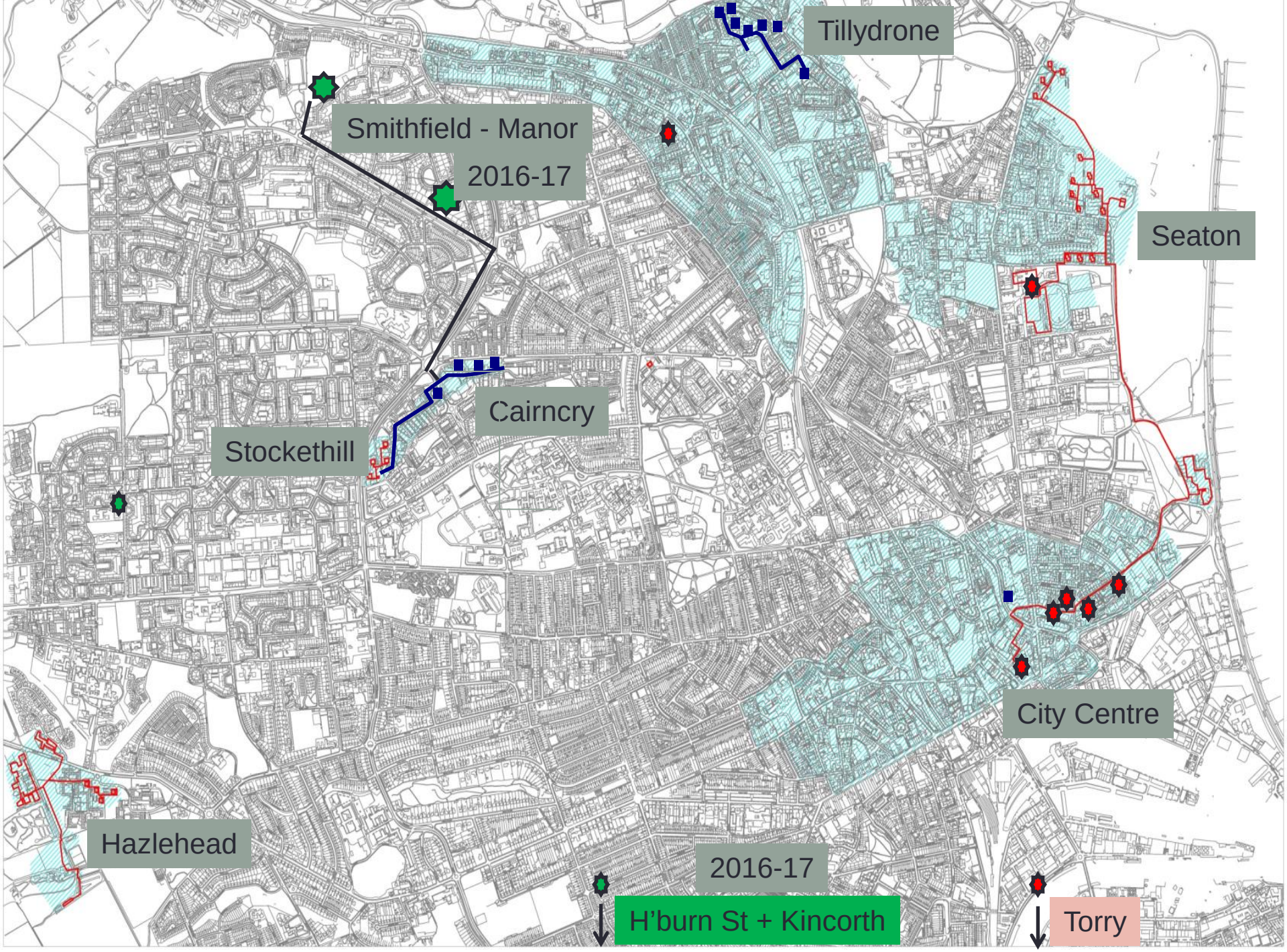

Seaton
2006-8
Stockethill
Hazlehead


Seaton
Stockethill
Hazlehead


Seaton
Stockethill
City Centre
Hazlehead


2011-12
Seaton
2008-9
Stockethill
2012-13
City Centre
Hazlehead
Torry
2012-13


Tillydrone
2015-16
Seaton
Cairncry
2014-15
Stockethill
City Centre
Hazlehead
Torry


Tillydrone
Smithfield - Manor
2016-17
Seaton
Cairncry
Stockethill
City Centre
Hazlehead
2016-17
H'burn St + Kincorth
Torry

District Energy Aberdeen Ltd (DEAL)

Aberdeen
Heat & Power

- DEAL established in 2013 as a wholly owned subsidiary of AH&P
- Profits from DEAL returned to AH&P as parent company to:

1. keep heat prices at affordable levels
2. contribute to heat network extension

- AH&P is the Network Operator:
  - Retails heat supply to Council domestic, (including domestic owner / occupiers) and non-domestic premises
  - Private wire electricity supply to Council where applicable
  - Wholesale heat supply to DEAL

- DEAL is a retailer of:
  - Heat supply to non-Council, non domestic customers

Aberdeen Heat & Power (AH&P)
So has the Business Model worked?

Aberdeen
Heat & Power

Objective:

Tackle fuel poverty and provide affordable heat

Actual:

Our 2015/16 weekly heat charge for a 2 bedroomed flat is £10.54

No-one connected to the CHP schemes is now in fuel poverty

Costs per household reduced by 20-50%

Delivering Affordable Warmth .

Aberdeen Heat & Power (AH&P)
So has the Business Model worked?

Aberdeen
Heat & Power

Objective:

Reduce carbon emissions

Actual:

With existing gas fired CHP - carbon saving of 40% compared to electric heating;

Reviewing renewable technologies to "bolt on" the front end (e.g. EfW, Geothermal, large scale water source heat pumps, biofuels, hydrogen)

Aberdeen Heat & Power (AH&P)
So has the Business Model worked?

Aberdeen
Heat & Power

Objective

Strategic approach to development of district heating across high heat density areas of Aberdeen

Actual

Desktop study to identify potential heat demand

Enabled future proofing of the network as we go

Future plan - multiple CHP stations around the City linked into one city-wide heat network

Delivering Affordable Warmth .

Aberdeen Heat & Power (AH&P)
So has the Business Model worked?

Aberdeen
Heat & Power

Improved standards of housing

- Multis are much warmer
- Reduced turnover
- Reduced damp
- Improvements in health
- Improvements in social conditions
- Much reduced level of complaints

National and International Awards

- Environmental sustainability COSLA award 2008
- Global District Energy Climate excellence award 2013
- VIBES Product and Service award 2015

Aberdeen Heat & Power (AH&P)

So has the Business Model worked?

Aberdeen
Heat & Power

YES !

We are still meeting our original aims

and

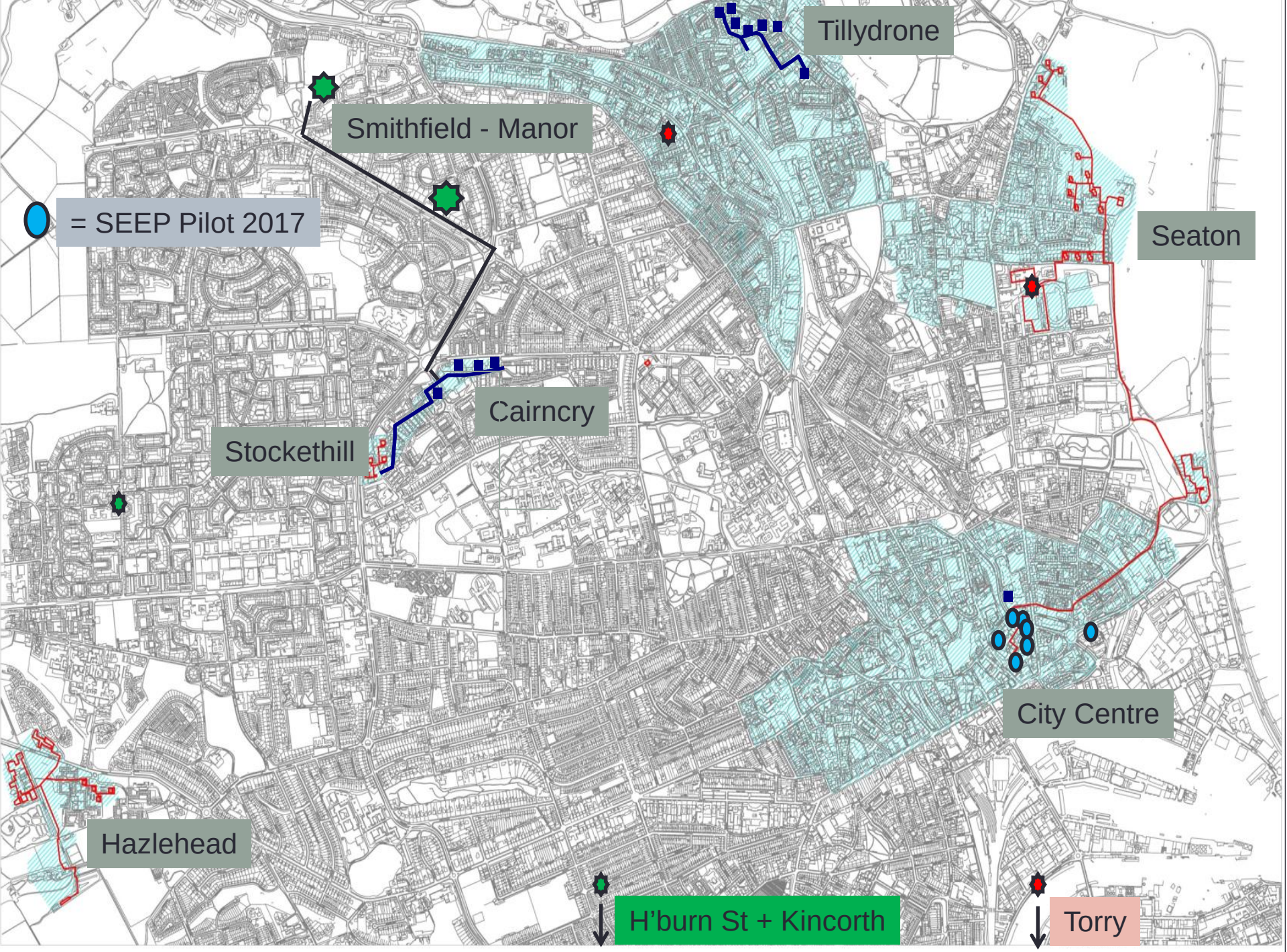
we are a financially viable company

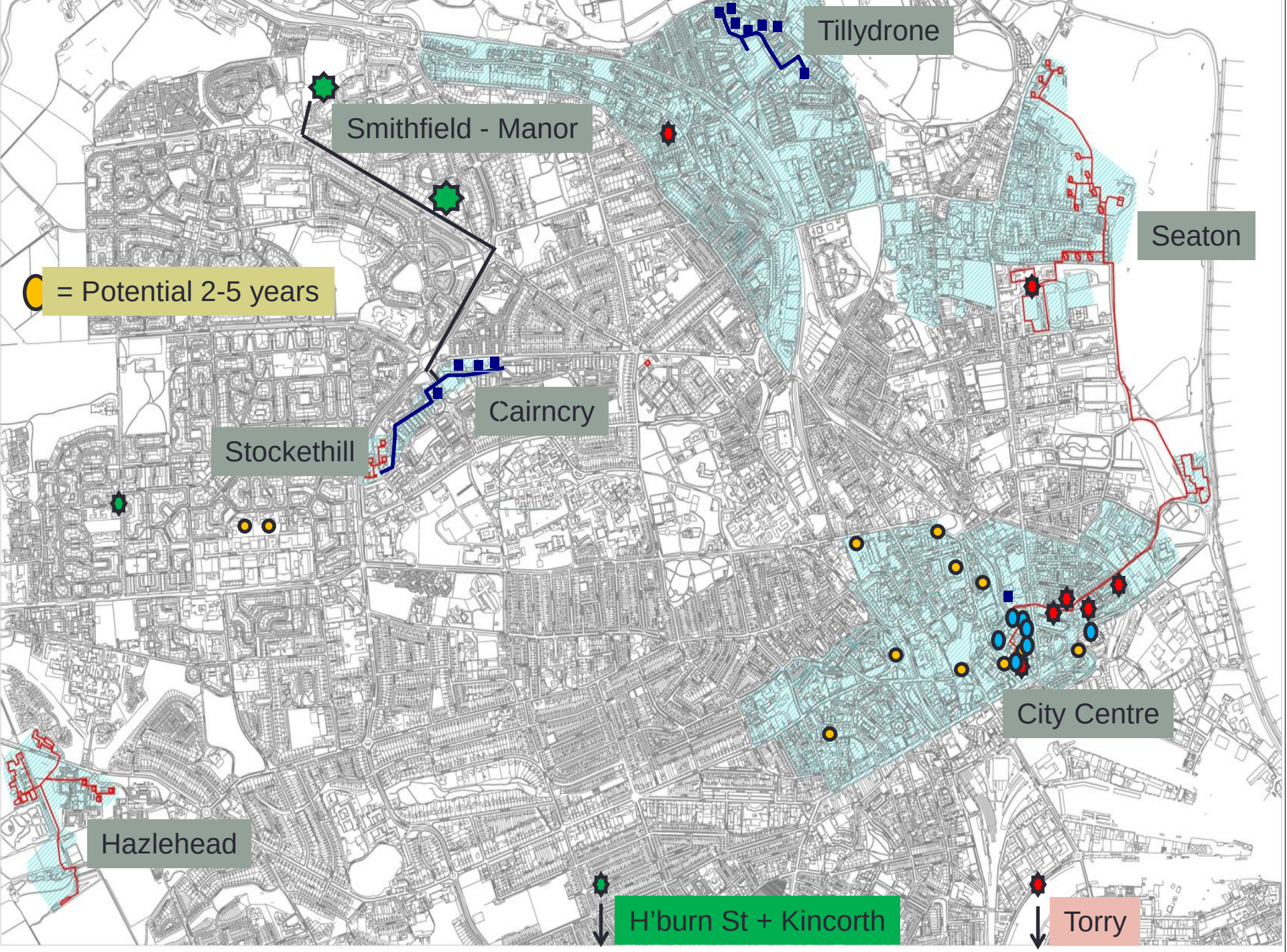
Delivering Affordable Warmth .

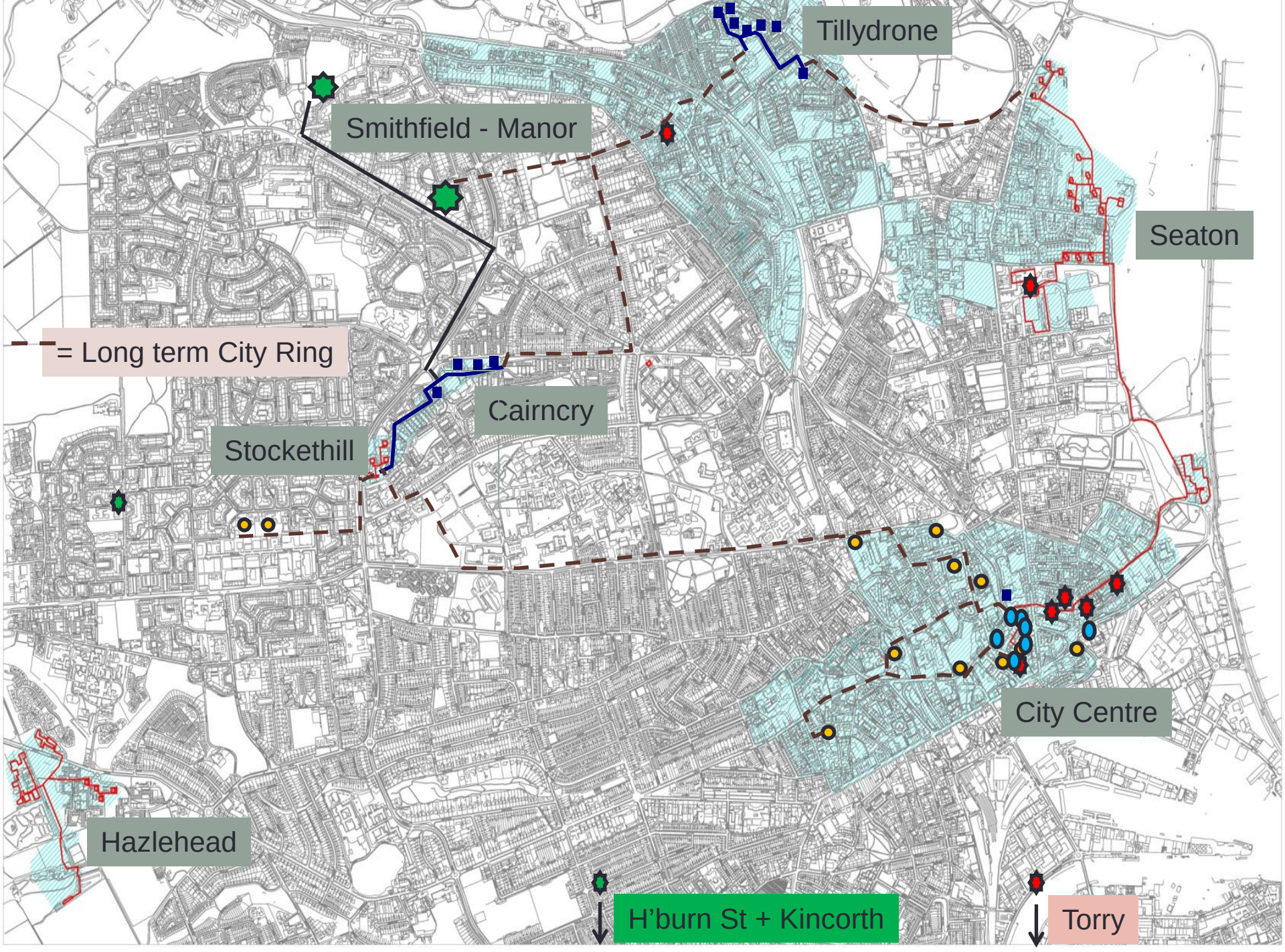
Where next ...?

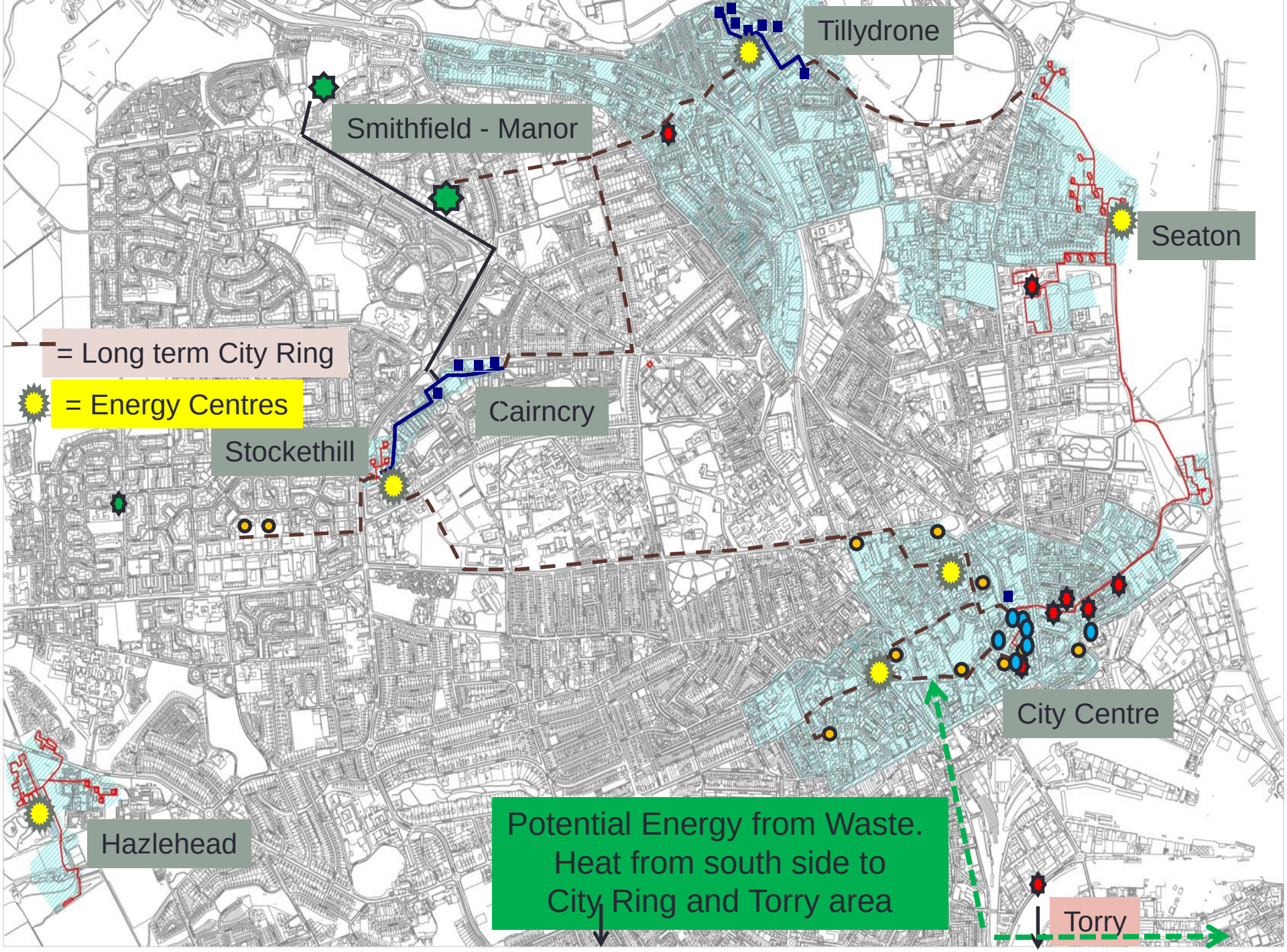
Aberdeen
Heat & Power

Delivering Affordable Warmth .


Tillydrone
Smithfield - Manor
= SEEP Pilot 2017
Seaton
Cairncry
Stockethill
City Centre
Hazlehead
H'burn St + Kincorth
Torry


Tillydrone
Smithfield - Manor
Seaton
= Potential 2-5 years
Cairncry
Stockethill
City Centre
Hazlehead
H'burn St + Kincorth
Torry


Tillydrone
Smithfield - Manor
Seaton
= Long term City Ring
Cairncry
Stockethill
City Centre
Hazlehead
H'burn St + Kincorth
Torry


Tillydrone
Smithfield - Manor
Seaton
= Long term City Ring
= Energy Centres
Cairncry
Stockethill
City Centre
Hazlehead
Potential Energy from Waste.
Heat from south side to
City Ring and Torry area
Torry

The Future…….

- New subsidiary company District Energy Aberdeen Ltd (DEAL) now set up as a heat retail arm to develop links to non-Council and non- Public Sector connections and identify infrastructure developments.
- Extend the DH network at a pace which is financially and practically viable. Make use of heat mapping and previous development work
- Consider funding for more new projects through the District Heating Loan Fund and other funding opportunities but mindful of the risks
- Build and sustain partnerships and agreements for future connections
- Multiple CHP stations around the City linked into one city-wide heat network
- Consider and review alternative heat source technologies that can be "bolted on the front end" (geothermal, water source heat pumps, absorption heat pumps, hydrogen derived technologies, solar, EfW, etc.)

Contact Details …….

Aberdeen
Heat & Power

Ian Booth – Chief Executive Officer

Aberdeen Heat and Power

63 Cotton Street

Aberdeen AB11 5EG

T: 01224 580058

e-mail – info@aberdeenheatandpower.co.uk

Web: www.aberdeenheatandpower.co.uk

Delivering Affordable Warmth .

Councillor Adam McVey

Chair

Energy for Edinburgh

Energy for Edinburgh / SEAP

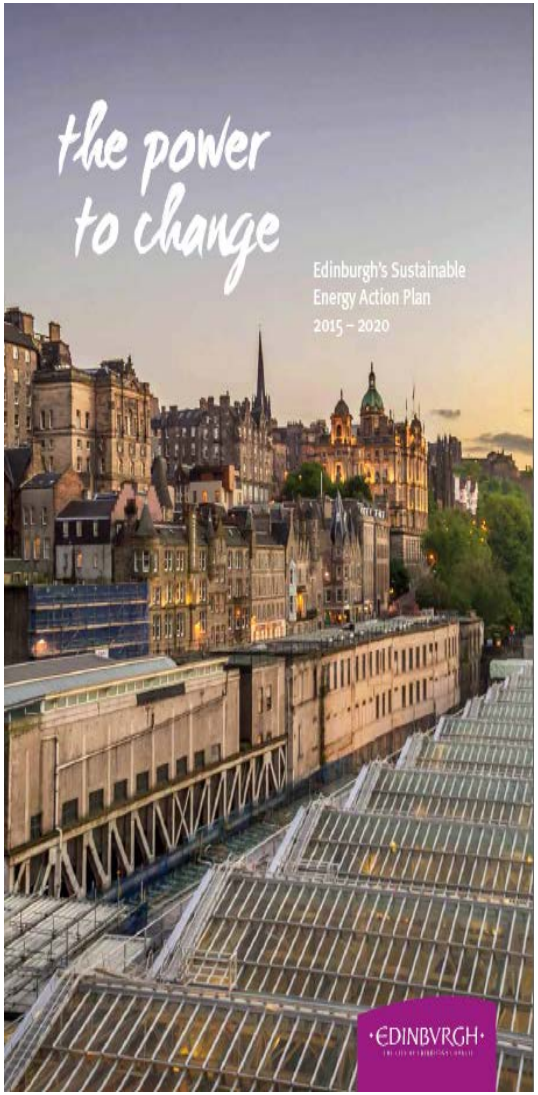
Cllr Adam McVey
Vice Convenor Transport and Environment Committee

The City of Edinburgh Council

EDINBVRGH
YOUR COUNCIL – YOUR CITY

Edinburgh's SEAP

- The Sustainable Energy Action Plan is the key programme for energy and low carbon.
- Aim to reduce carbon emissions by 42% by 2020.
- Reduced carbon emissions by 26% since 2005.
- Over 120 projects in the programme.
- Identified over 80% of potential carbon reduction.



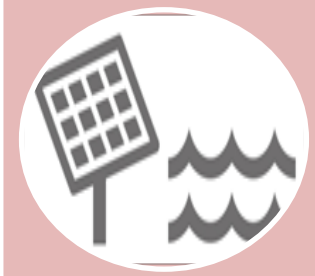
SEAP: Five Programmes of Activity for a Low Carbon Transition

Energy Efficiency

aiming to increase the energy efficiency of buildings and infrastructure such as street lighting

District Heating

aiming to increase the use of heat networks across the city and create new networks



Renewables

increasing the percentage of renewables used for both power and heat across the city

Resource Efficiency

encouraging the more sustainable use of resources and waste by businesses and consumers

Sustainable Transport

supporting more sustainable transport and cleaner, greener fuels

Edinburgh's Energy Challenges – Future Development

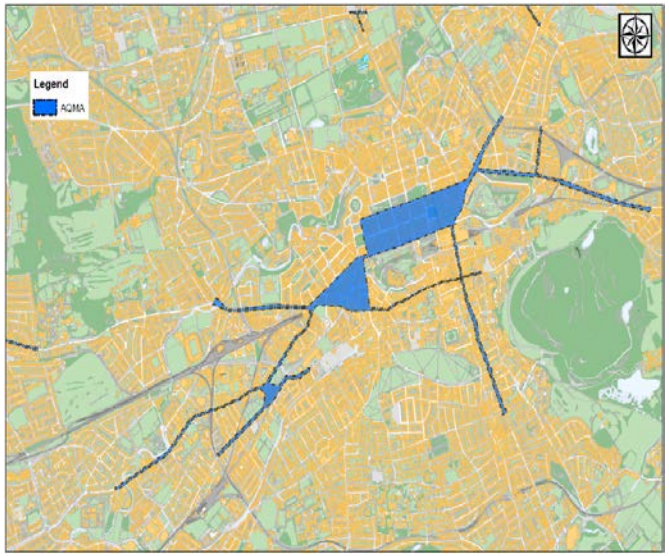
- Population growth – 492,680 (2014) to 618,278 (2037)
- New housing a priority – 36,000 homes needed over the next 10-years
- Associated infrastructure upgrades (roads, street lighting etc.)
- All will lead to potential increases in consumption and travel

Edinburgh's Energy Challenges – Existing Buildings

- Built environment – 235,000 homes, high percentage of tenements
- 65% of homes are flats (a quarter of which are pre 1919 stone tenements and 'hard to treat' properties)
- High percentage of rented flats (22% of homes) significant issues with fuel poverty and multiple ownership

Edinburgh's Energy Challenges – Transport

- Transport CO2 emissions have risen from 2013-2014
- Four of the UK's worst traffic bottlenecks occur on the Edinburgh bypass
- Air Quality issues – 6 AQMAs now declared



Edinburgh's Energy Opportunities

- Sustainable transport - Edinburgh has the highest share of travel to work in Scotland by foot, cycle and bus, and the highest share in the UK for bus – the challenge is to build on this trend
- Low carbon infrastructure and technology – the move to a low carbon city creates opportunities for low carbon solutions and for trialling new technologies (for retrofitting and new build properties)

Edinburgh's Energy Opportunities

- Behaviour change – encouraging consumers and employees to reduce and change their patterns of energy use and travel could make a significant contribution reducing carbon emissions
- Decentralised energy systems could make a significant contribution to supplying Edinburgh's energy needs and reducing carbon emissions from its buildings

Delivery Mechanisms: Energy for Edinburgh (ESCO)

- New Energy Services Company set up in November 2016
- To deliver large scale, strategic energy projects that will help to support the delivery of the SEAP
- Eight Directors
- Four Objectives:
  - reduce carbon emissions;
  - deliver affordable energy (in particular address fuel poverty;)
  - encourage wider community benefits;
  - generate income.
- Strategic energy remit – EE, renewables, DH, EV

Energy for Edinburgh – Key activity to date

- Identifying key energy projects that align with the ESCo's aims and objectives.
- A shortlist of 10 energy projects were selected to be looked at in more detail.
- District Heating Position Statement in development
- 3 evidence gathering sessions with housing developers and district heating operators and contractors – to explore what role the ESCo should take in supporting district heating

District Heating – Key ESCo Opportunity

- Mix of small and medium scale schemes across the City.
- 550 Council tenants currently connected to DH and/or communal schemes.
- Largest Schemes from the University of Edinburgh - four schemes (fifth in development)
- Projects being developed at Bioquarter, Fountainbridge and Leith
- Ongoing discussions with private sector developers, including West Edinburgh, Leith.

West Edinburgh:
Consultants Ramboll
2-5MW scheme
Carbon savings:
5-12,000
tonnes carbon per annum

Fountainbridge:
Consultants Aecom
10MW scheme
Carbon savings:
4,700
tonnes carbon per annum

BioQuarter:
Consultants Ramboll
4MW scheme
Carbon savings:
5,780
tonnes carbon per annum

District Heating Strategy For Edinburgh

District Heating role for the ESCo

- Following the sessions with developers and the DH contractors / operators the key potential roles identified for the ESCo, included:

1. To contribute to an overarching strategy or city wide plan.

2. A managing agent or facilitator role to provide support to developers.

3. Acting as the pipe network infrastructure owner

Energy for Edinburgh – Development of solar PV

- Feasibility study for solar PV canopies and battery storage at two Park & Ride sites is currently being progressed.

HEADLINE SPONSOR

ENGIE

scottish renewables

LOW-CARBON CITIES CONFERENCE

22 FEBRUARY 2017 **EDINBURGH**

Plenary 3

Sara Thiam, ICE Scotland and Low Carbon Infrastructure Task Force

Speakers

Sue Kearns, Scottish Government

Rory Shanahan, The Carbon Trust

Amy Braddick, Scottish Cities Alliance

Alastair Brown, Stirling Council

Rob Pedersen, Dundee City Council

Sue Kearns

Head of Energy Deployment

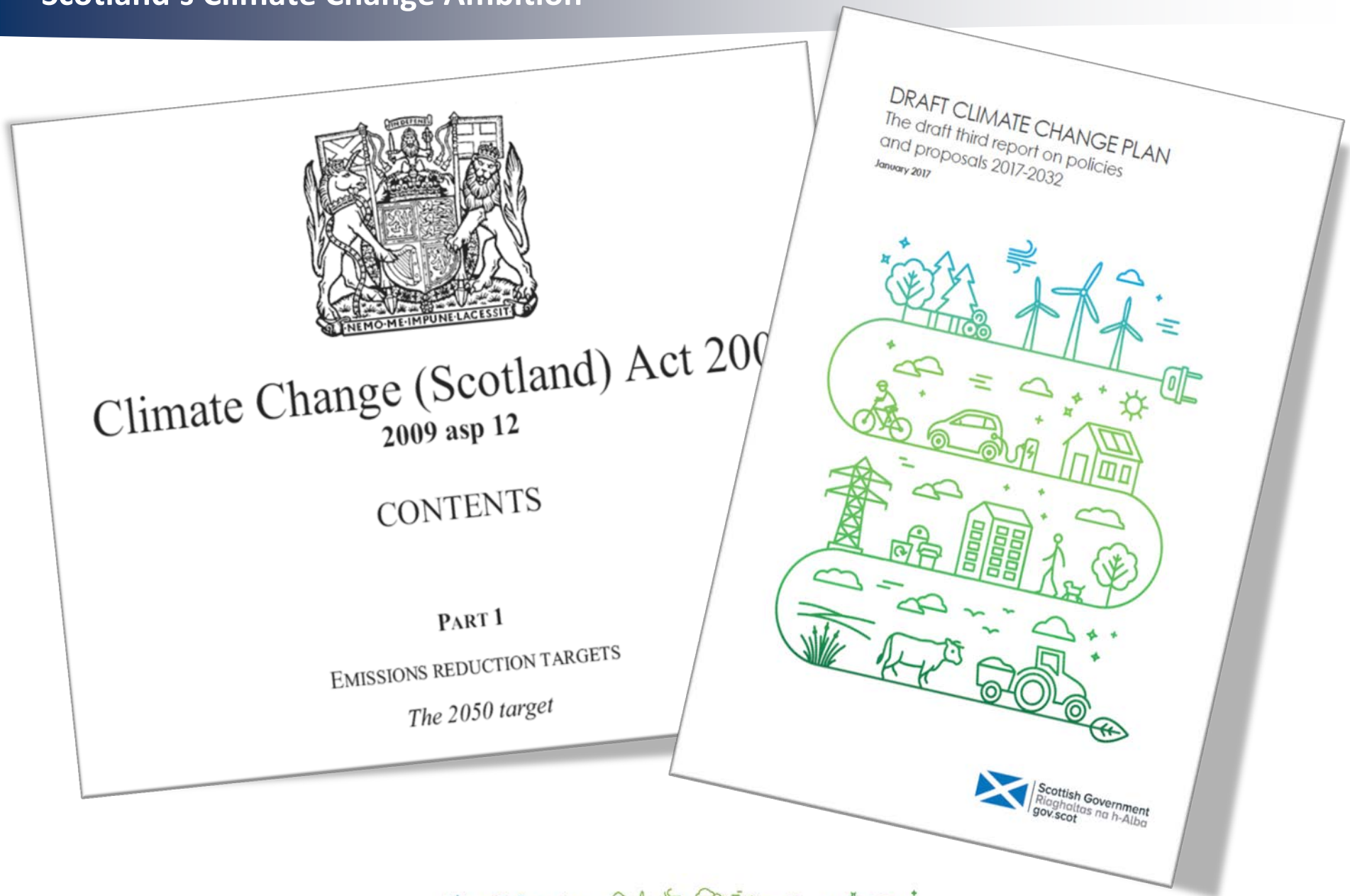
Scottish Government

Scottish Energy Strategy:
The future of energy in Scotland

Sue Kearns,
Deputy Director
Energy and Climate Change Directorate

Scottish Government
Riaghaltas na h-Alba
gov.scot

Scotland's Climate Change Ambition



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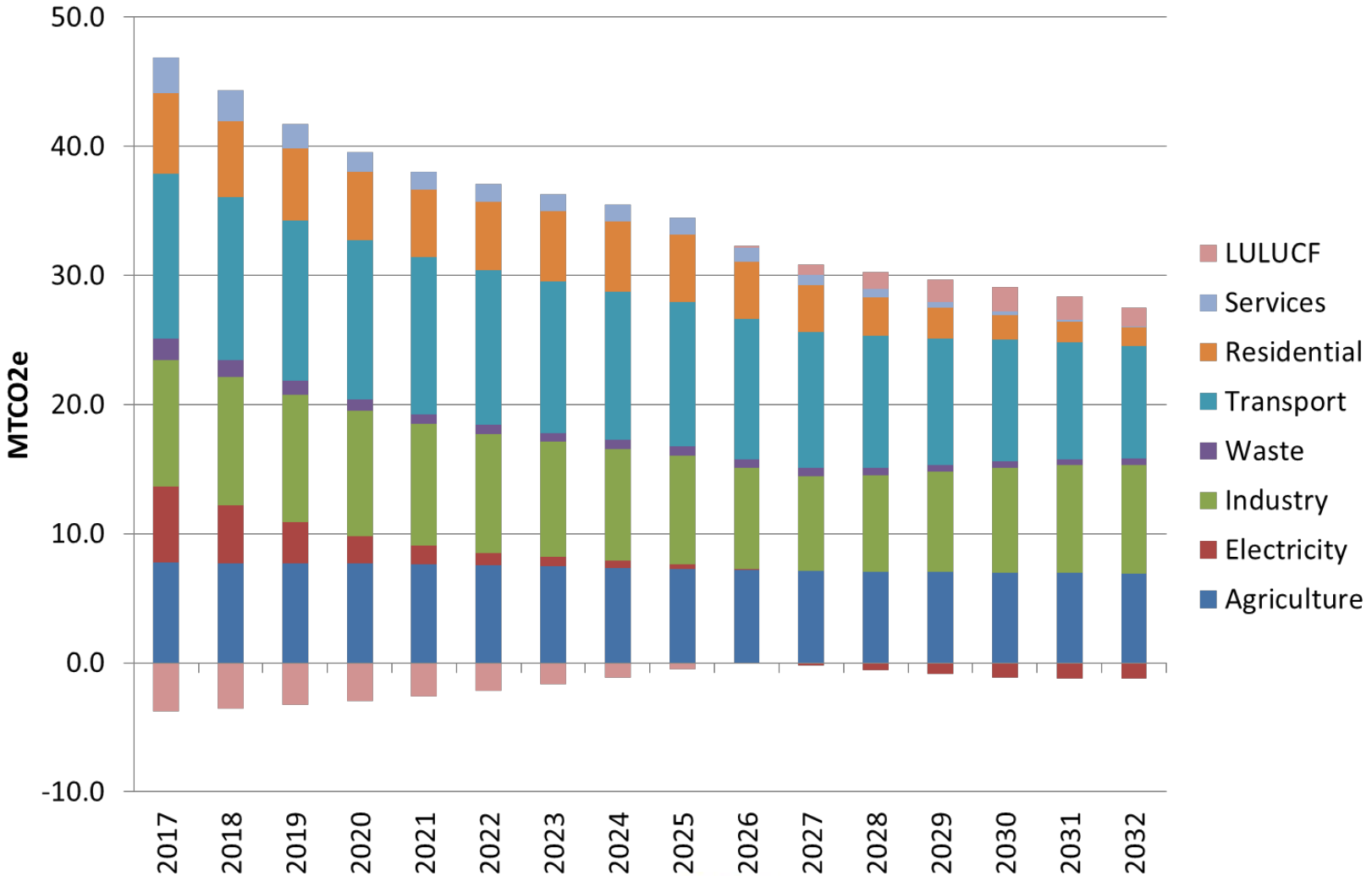
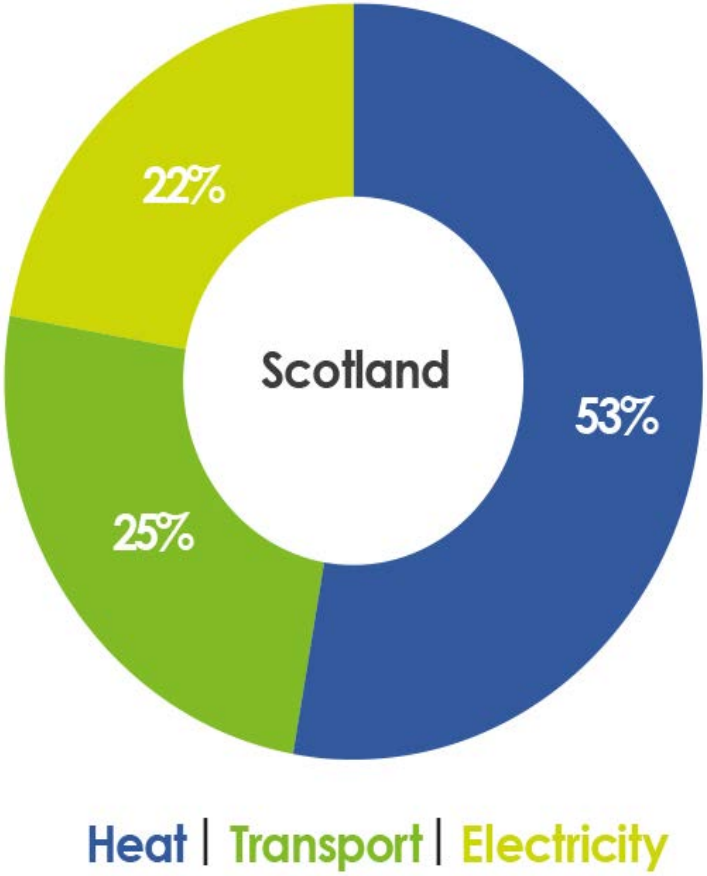
Draft Climate Change Plan

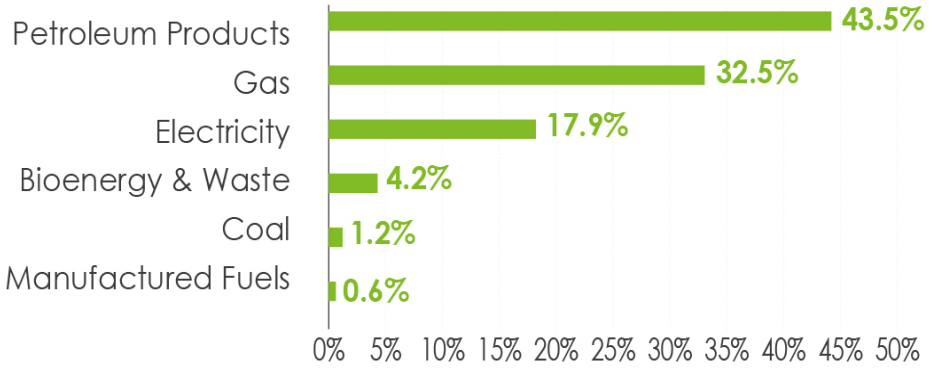


Transforming our energy use

Final energy consumption



Energy consumption by fuel type



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gov.scot

Themes of draft Energy Strategy

‘Whole-system’ view

- Economic modelling, informing view of Scotland’s future energy supply and demand
- Integrated approach to heat, power and transport
- New 50% ‘all energy’ 2030 renewables target
- Renewed focus on energy efficiency and demand reduction

Stable energy transition

- Long-term plan, consistent with Climate Change (Scotland) Act
- Flexible to future changes in technology and patterns of energy use
- Managed transition of energy supply, considering our strategic energy sites after the safe closure of nuclear facilities

A smarter model of local energy provision

- Encouraging new localised models of energy supply and use
- Enhanced role for local planning and local ownership
- New economic opportunities of energy storage and ‘smart’ energy solutions

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National Infrastructure Priority for Energy Efficiency:

Scotland's Energy Efficiency Programme

Scottish Government
Riaghaltas na h-Alba
gov.scot

2050 Vision

Scotland's buildings are near zero carbon by 2050 and this is achieved in a way that is socially and economically sustainable.

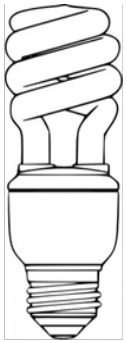
Aim

Scotland's Energy Efficiency Programme aims to reduce the energy demand and decarbonise the heating of Scotland's built environment in a way that is socially and economically sustainable.

Objectives

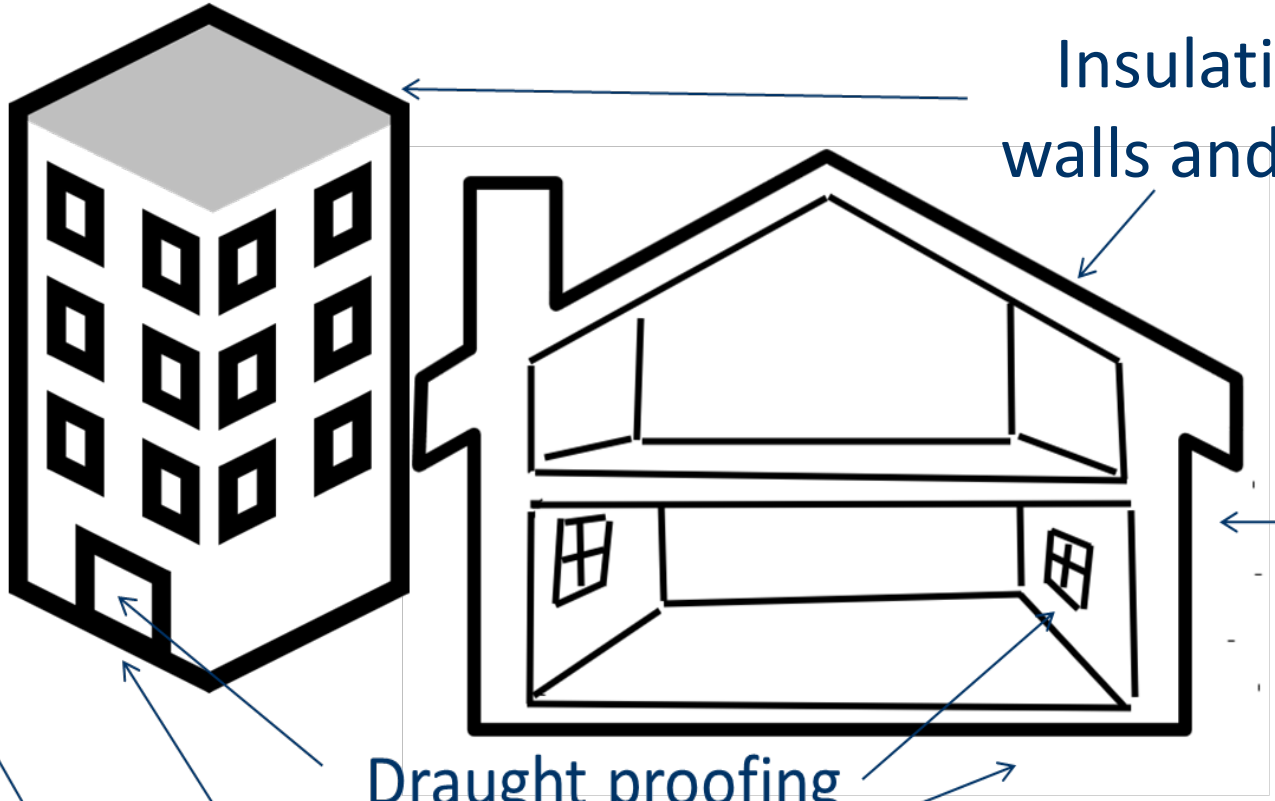
- By 2030 94% of non-domestic buildings' and 80% of domestic buildings' heat is supplied using low carbon heat technologies
- Improvements to the fabric of Scotland's non-domestic buildings result in a 10% reduction, and Scotland's domestic buildings results in a 6% reduction, in their heat demand by 2032.

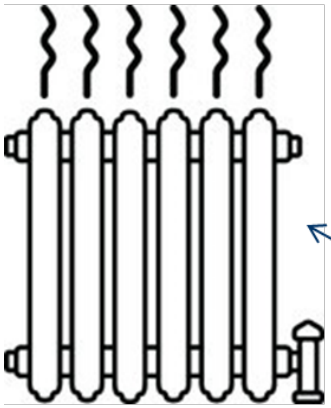
In practice this means:



Low energy lighting

Insulating walls and loft





Draught proofing

Insulating floors

Low carbon heat/cooling sources

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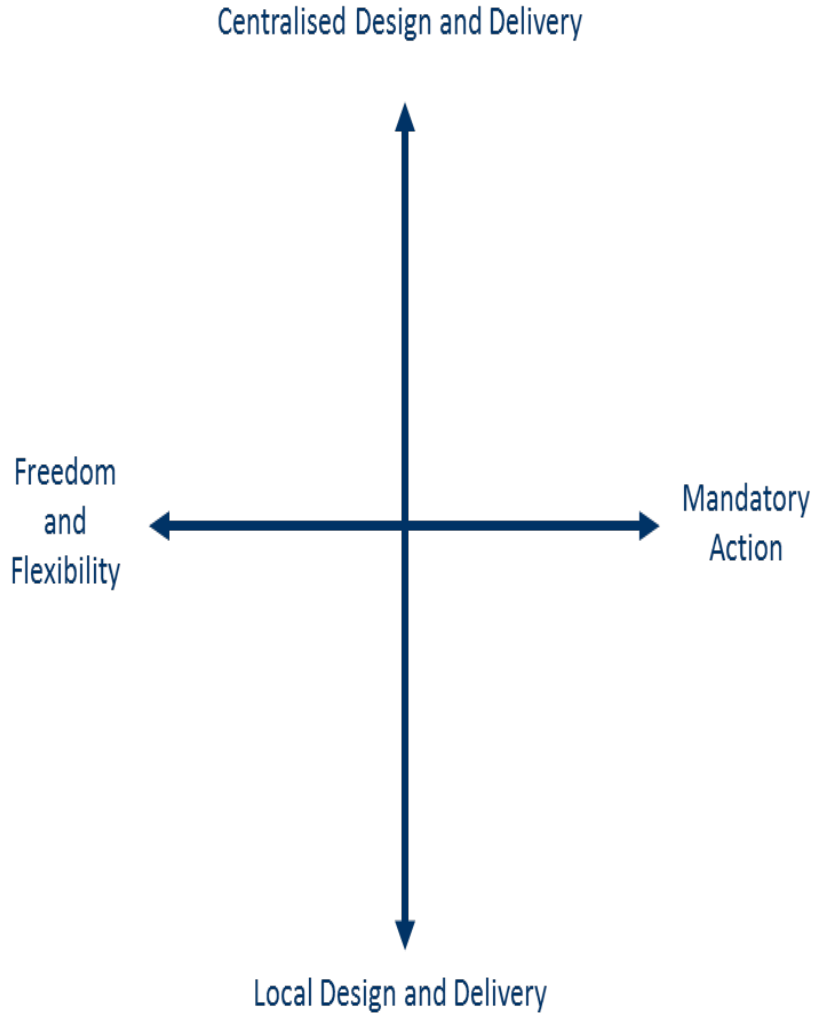
gov.scot

- the role of regulation, standards and financial incentives
- what are appropriate levels and sources of funding
- the provision of advice, information and consumer protection
- how to establish and sustain trusted supply chains
- the nature of programme delivery
- the balance between local and national responsibilities



SEEP Pathfinders

- Building Blocks of Programme Delivery
- LHEES
- Heat Decarbonisation
- Hard-to-treat Properties
- Sector-specific Projects

Application Process

Stage 1: Expression of Interest

Stage 2: Detailed Application

Indicative Timescales

Call Issued: 14 February

Workshop: 17 February

Stage 1 Deadline: 31 March

Support

Q&A: Online

Email: SEEP@gov.scot

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gov.scot

Local Heat & Energy Efficiency Strategies and

District Heating Regulations

Consultation

- We are **currently consulting**, alongside the Energy Strategy, on options for Regulation of district heating and Local Heat & Energy Efficiency Strategies (LHEES)
  - to help meet SEEP heat decarbonisation objectives through more district heating
  - to help ensure a coordinated, phased, area-based approach by local authorities to delivering SEEP's objectives
- This is a **high level policy scoping consultation** that seeks views and further evidence.
- It **sets out broad scenarios**, based on the recommendations from the Special Working Group on District Heating.

Consultation - LHEES & DH Regs

We propose that a new regulatory framework for heat and energy efficiency strategies, and for regulation of district heating, should focus on 2 key areas. These are:

A. that local authorities are required to create local heat and energy efficiency strategies (LHEESs) to support the delivery of heat decarbonisation and energy efficiency objectives of Scotland's Energy Efficiency Programme (SEEP); and

B. that regulation be put in place to specifically support the development of district heating, including provisions for zoning of areas for heat networks, connecting users and surplus heat loads, technical standards and consumer protection.

The draft Climate Change Plan undergoing parliamentary scrutiny.

The draft Energy Strategy is open for public consultation until 30 May;

- **Onshore Wind Policy Statement** (30 May);
- **Scotland's Energy Efficiency Programme** (30 May);
- **Local Heat and Energy Efficiency Strategies and District Heat Regulation** (18 April);
- **Unconventional Oil and Gas: Talking 'Fracking'** (31 May)

https://consult.scotland.gov.uk/energy-and-climate-change-directorate/draft-energy-strategy/

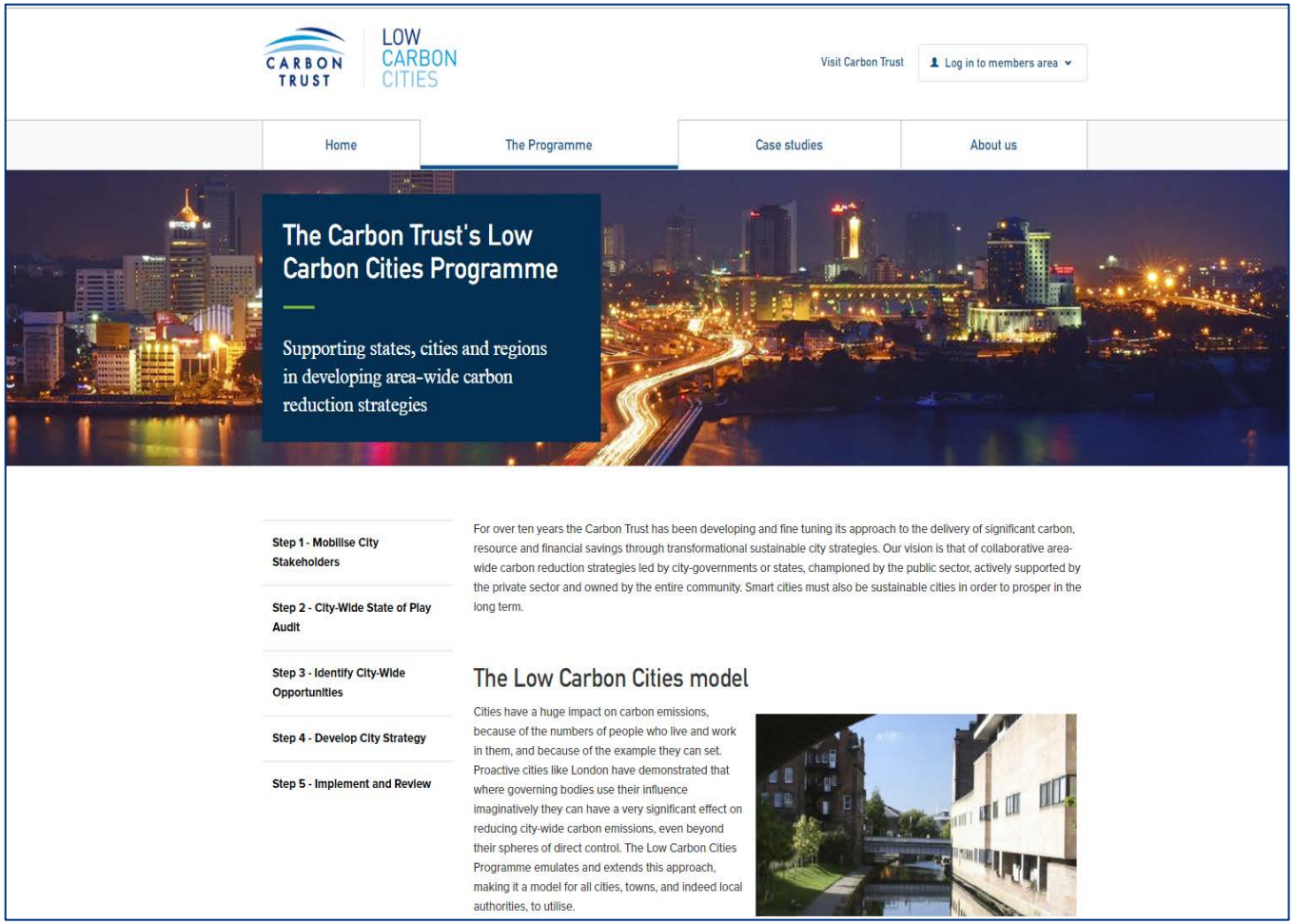
Rory Shanahan
Energy Consultant
The Carbon Trust

Low Carbon Cities & Opportunities for the Scottish Public Sector

Rory Shanahan, 22nd February

Carbon Trust - Low Carbon Cities

https://www.carbontrust.com/low-carbon-cities/the-programme/



Carbon Trust - Low Carbon Cities

- Step 1 - Mobilise City Stakeholders
- Step 2 - City-Wide State of Play Audit
- Step 3 - Identify City-Wide Opportunities
- Step 4 - Develop City Strategy
- Step 5 - Implement and Review

MOTT MACDONALD

CARBON TRUST

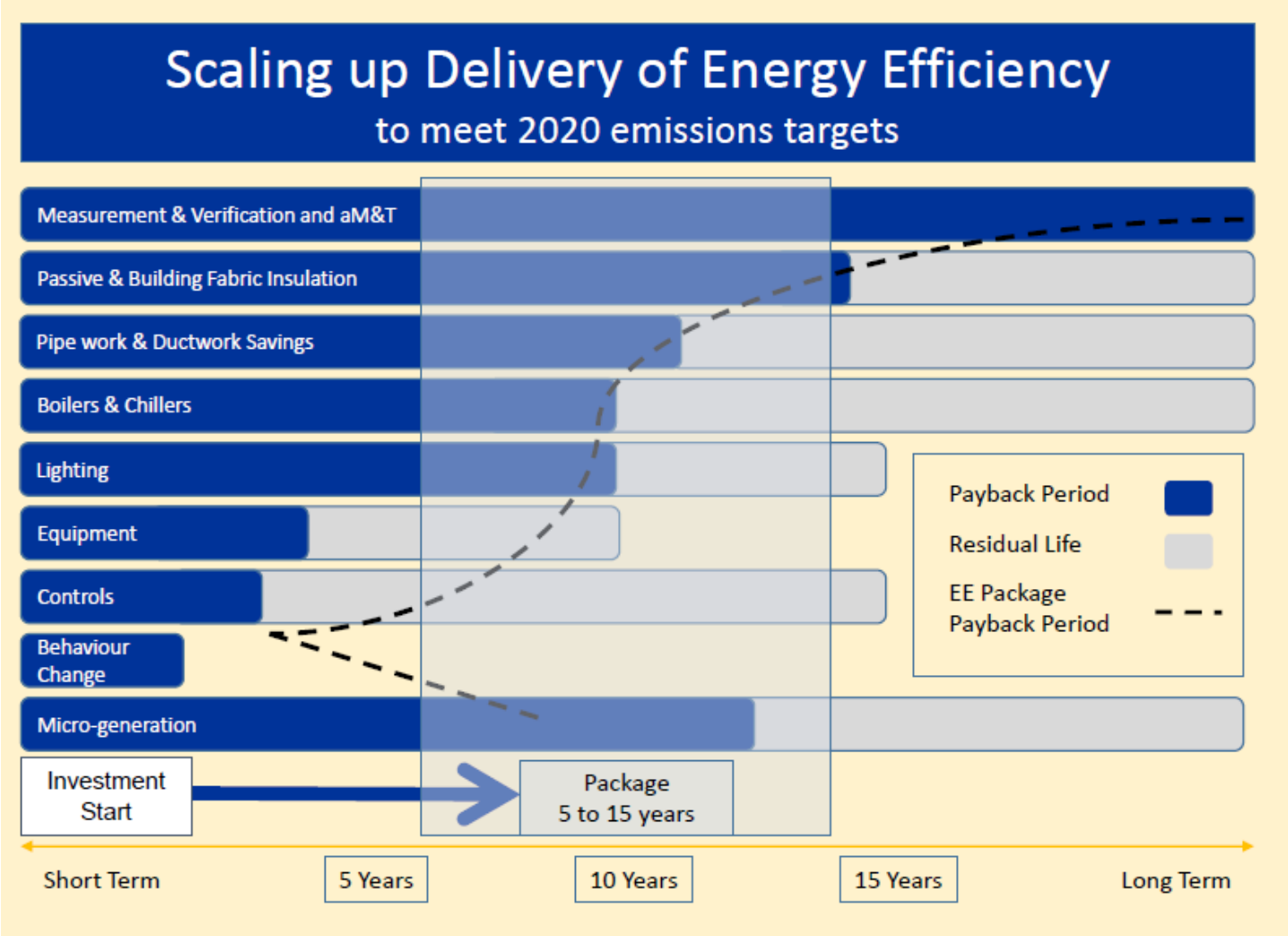
Opportunities for the Scottish Public Sector to **lead by example**

MOTT MACDONALD

CARBON TRUST

The Non Domestic Energy Efficiency (NDEE) Framework for the Scottish Public Sector

NDEE EnPC
Energy Conservation Measures (ECMs)



› Image c/o SFT

NDEE Framework EnPC Introduction

How Does it Work?

- The NDEE Framework is based on an Energy Performance Contract (EnPC) with a performance guarantee which can be delivered on the basis of any of the following models:

1. Design and build;
2. Design, build and operate;
3. Design, build, operate, finance; or
4. Design, build, operate, finance and maintain

NDEE Framework EnPC Introduction

How Does it Work?

The Framework and associated EnPC model therefore provides public bodies in Scotland with opportunities for:

- Economies of scale and a robust, standardised approach
- Step change in carbon reduction and major energy cost savings, with Guaranteed Energy Performance
- Large, well-defined projects which pay for themselves over time
- Investment in whole-building / whole-estate balanced packages of measures
- The facilitated engagement of private sector expertise and resources
- A coordinated approach to building refurbishment, which allows energy efficiency refits to be packaged together with corresponding maintenance/upgrading of building fabric
- A variety of wider community benefits, including employment opportunities and business growth opportunities for the Scottish supply chain

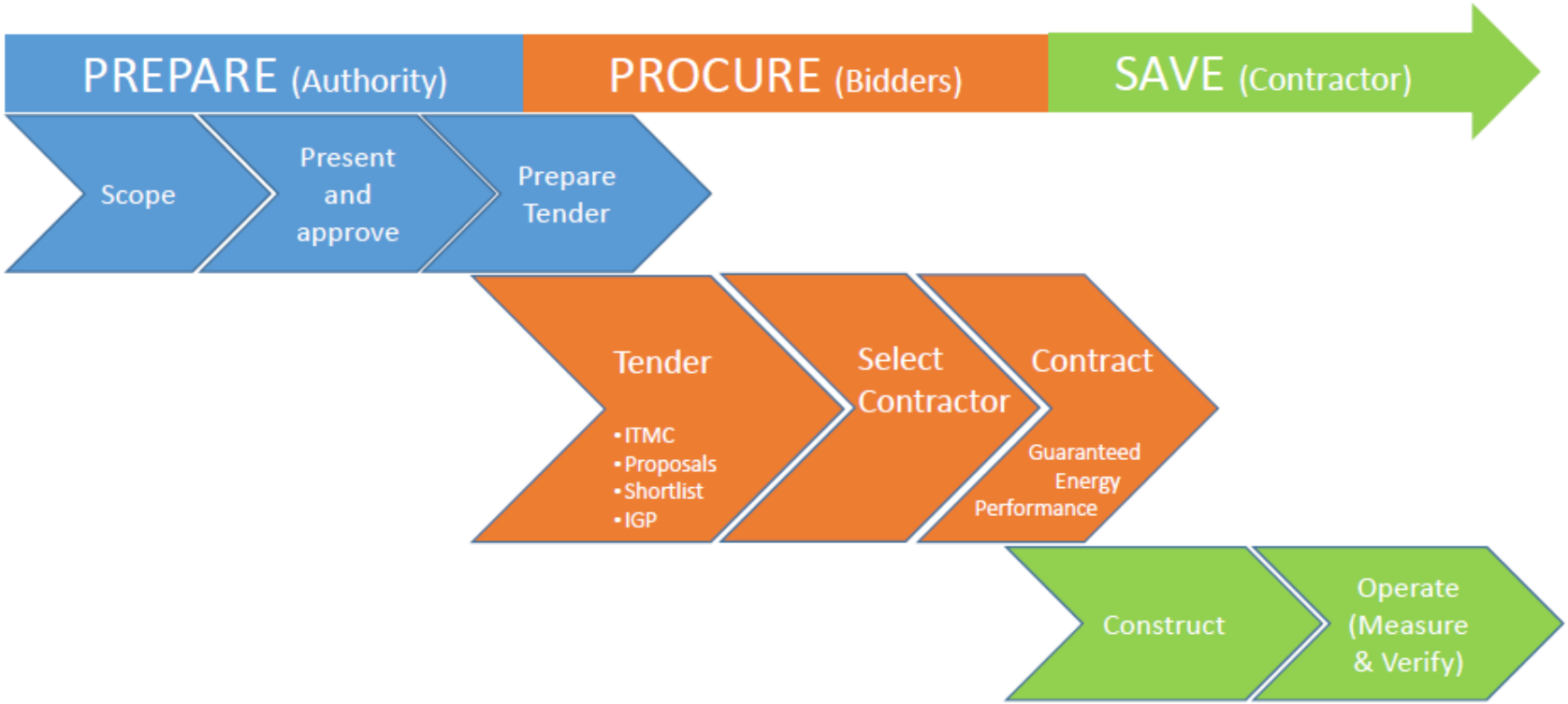
NDEE EnPC – Project Process

- Single Lot of Framework of Contractors to call-off
  - Alternative Heat Ltd
  - Ameresco Ltd
  - Blackbourne Ltd
  - British Gas Trading Ltd
  - Cofely Ltd (ENGIE)
  - Cynergin Projects Ltd
  - Everwarm Ltd
  - FES Ltd
  - Matrix Control Solutions Ltd
  - Robertson Group Ltd
  - SSE Contracting Group Ltd
  - Vital Energi Solutions Ltd

http://www.gov.scot/Topics/Government/Procurement/directory/Utilities/NonDomesticEnergyEfficiency

NDEE EnPC – Project Process

- Based on ‘Prepare, Procure, Save’ process



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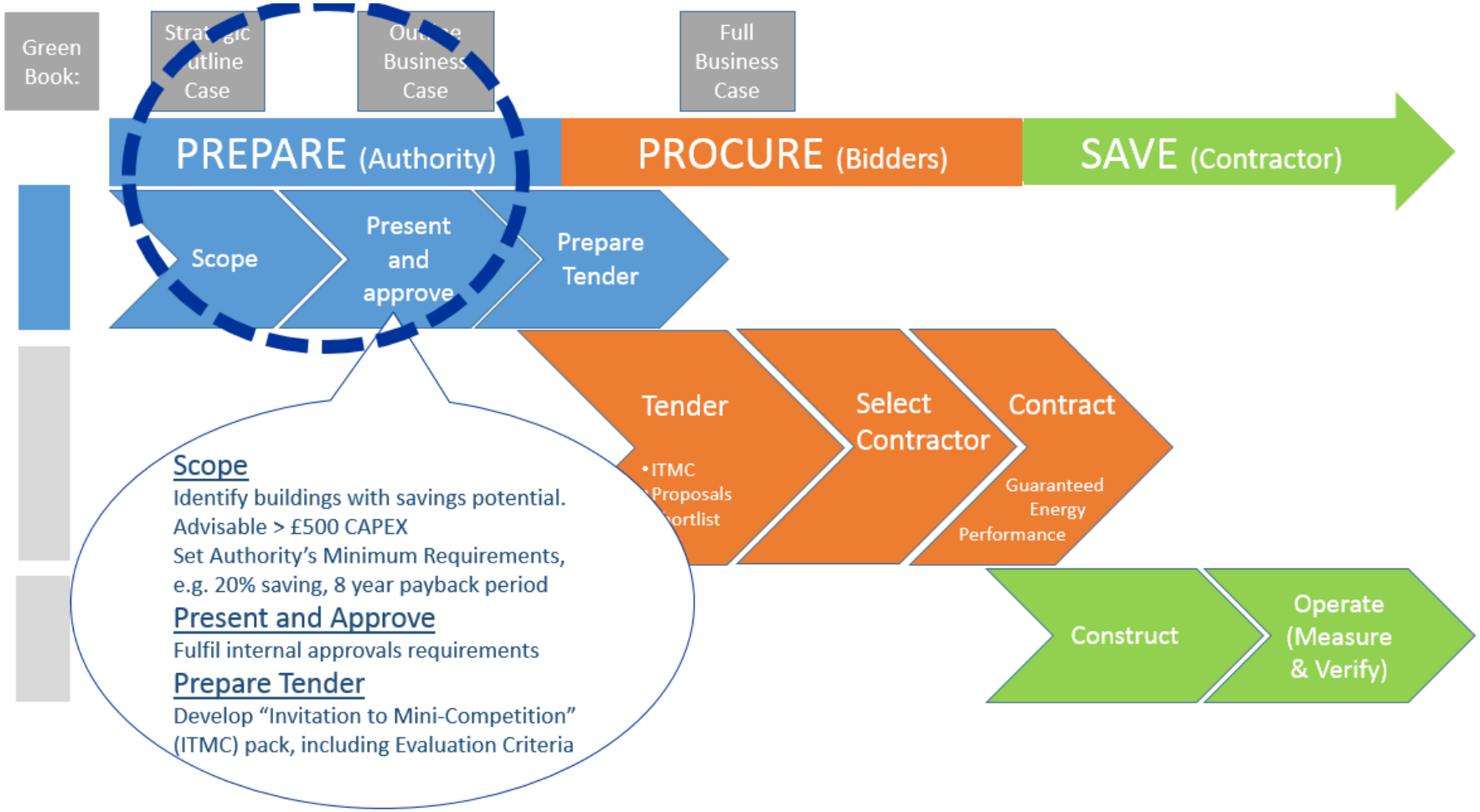
NDEE EnPC – Project Process



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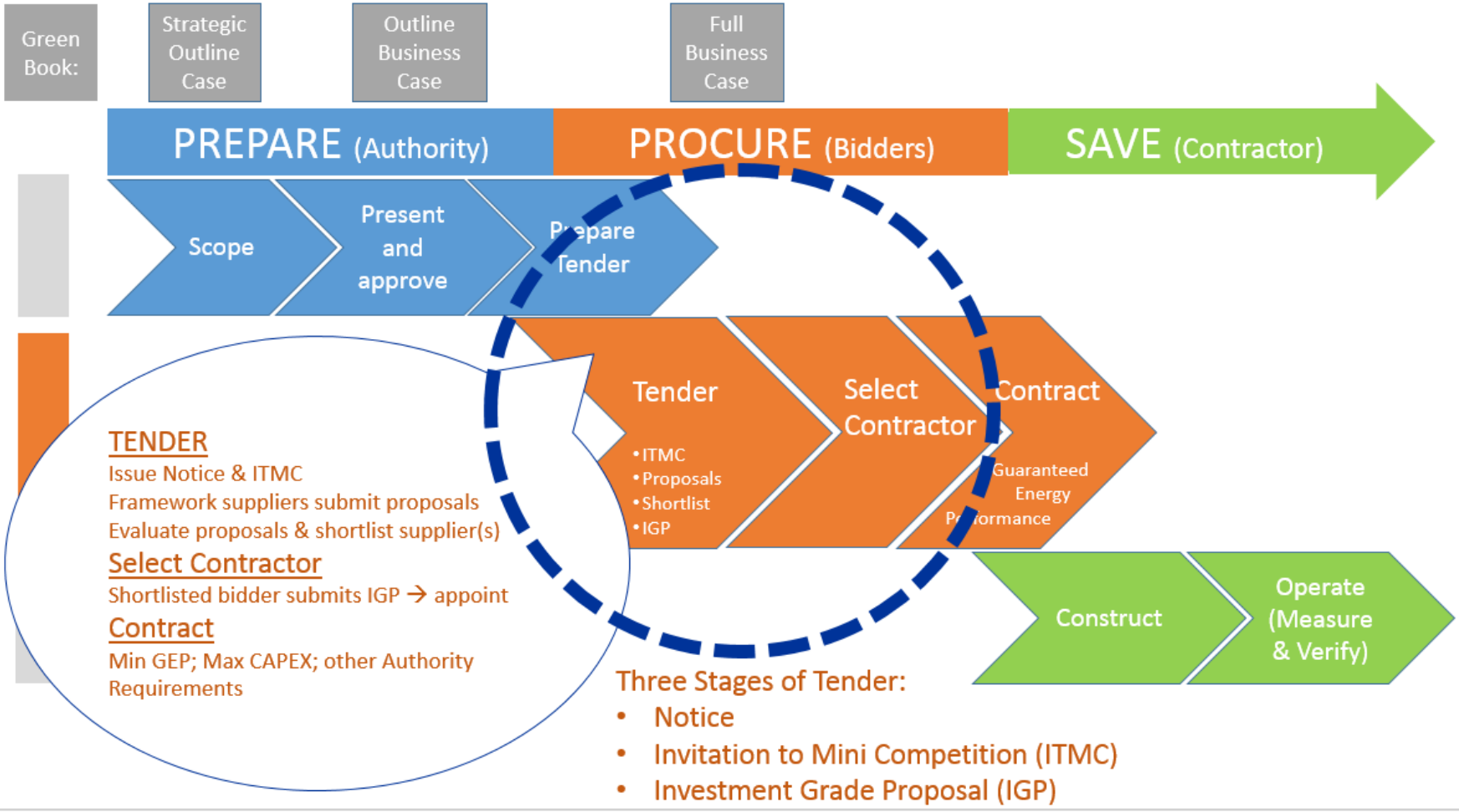
NDEE EnPC – Project Process



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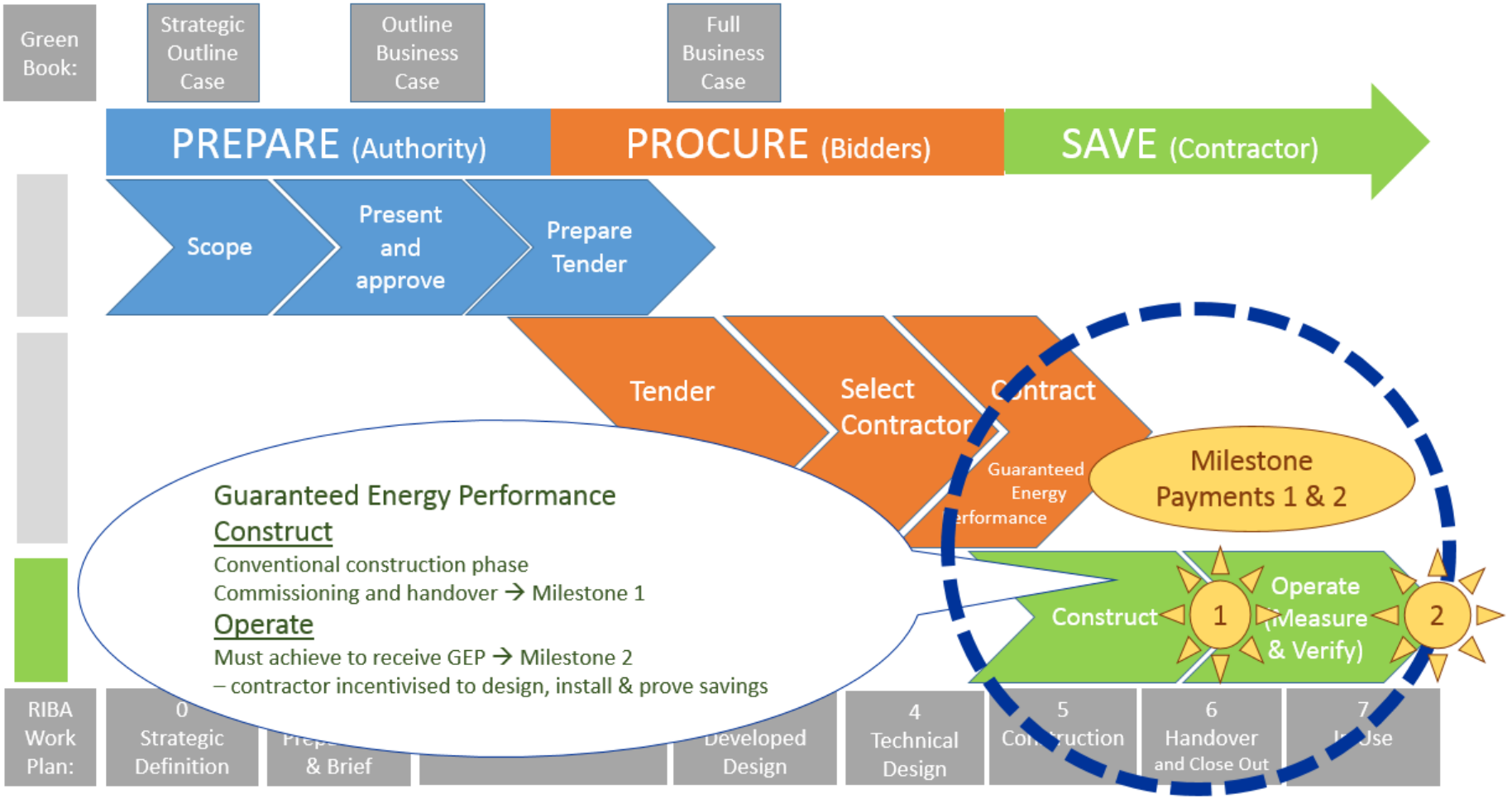
NDEE EnPC – Project Process



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NDEE EnPC – Project Process

- External advisory support is available through the Project Support Unit (PSU)
- PSU is a single framework supplier, managed by **Mott MacDonald** and including:
- **Carbon Trust**
  - Mobilisation and Engagement (Lead)
  - Programme support (Co-Lead)
  - Individual project call off technical support as required
- **EEVS**
  - Measurement and Verification Specialists
- **Tamburrini Energy Consultants**
  - SME Energy Auditor
- **Roger Simpson-Jones**
  - Procurement specialist

NDEE Framework EnPC

- PSU will provide flexible support service to the right level, at the right time:
  - Specialist Technical, Commercial, Management and Procurement advisory services
  - Business cases
  - Data collation
  - Process and Contractor management
  - Ad-hoc specialist support

- Scottish Government funded - up to £50,000 per project
  - On commitment from Senior Management

Next Steps

NDEE Project Support Unit

For further information and advice on how this process would work for NDEE projects in your organisation please contact the Project Support Unit at NDEESupportUnit@mottmac.com

Scottish Procurement Website

http://www.gov.scot/Topics/Government/Procurement/directory/Utilities/NonDomesticEnergyEfficiency

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Published in the UK: 2017.

Amy Braddick

Low Carbon Officer

Scottish Cities Alliance

scottishcitiesalliance

Aberdeen • Dundee • Edinburgh • Glasgow • Inverness • Perth • Stirling

Master-planning and future-proofing: making the transition

Scottish Cities Alliance

Amy Braddick

Scottish Cities Alliance

- Scotland's seven cities and Scottish Government in partnership (established 2011)
- Scotland's Agenda for Cities
  "A Scotland where our cities and our regions power Scotland's economy for the benefit of all"
- Support Cities Vision : Shared Vision for Scotland's Success 2015
- Cities as economic drivers of growth

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Scottish Planning Policy

Local development plans **should support the development of heat networks in as many locations as possible**, even where they are initially reliant on carbon-based fuels if there is potential to convert them to run on renewable or low carbon sources of heat in the future.

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District Heating and Planning

- Consistent Heat Network Policy and Supplementary Guidance

- Act to develop this, noting that each city has a different timescale and that the Policy/SG may be fed in at a later date.
- Stirling and Aberdeen draft produced in Autumn 2016
- Draft Energy Statement Template produced by ZWS Autumn 2016

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District Heating and Planning

Planning and Energy Consultant appointed to assess the methodology that would be applied to review an energy statement and determine ‘who’ may be best placed to conduct this review work to be completed in March.

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Places, People and Planning – Consultation

- Improving pre application consultation
- Regional partnership working
- Embedding and infrastructure first approach – coordination of infrastructure planning.
- Allocating development land in the plan
- Simplified planning zones
- New Levy to raise finance for infrastructure
- Infrastructure future planning – Low carbon and smart
- Develop skills to deliver outcomes and making better use of resources

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Scottish Energy Strategy Consultation

- Role for Land Use Planning to support new technology
- As part of the infrastructure first approach consider how the planning system can support the future energy system in SPP and NPF now and in the future.
- Reference to Energy Master planning
- The role of the local authority is enhanced through strategic approaches such as Scotland's Energy Efficiency Programme.
- Government Owned Energy Company

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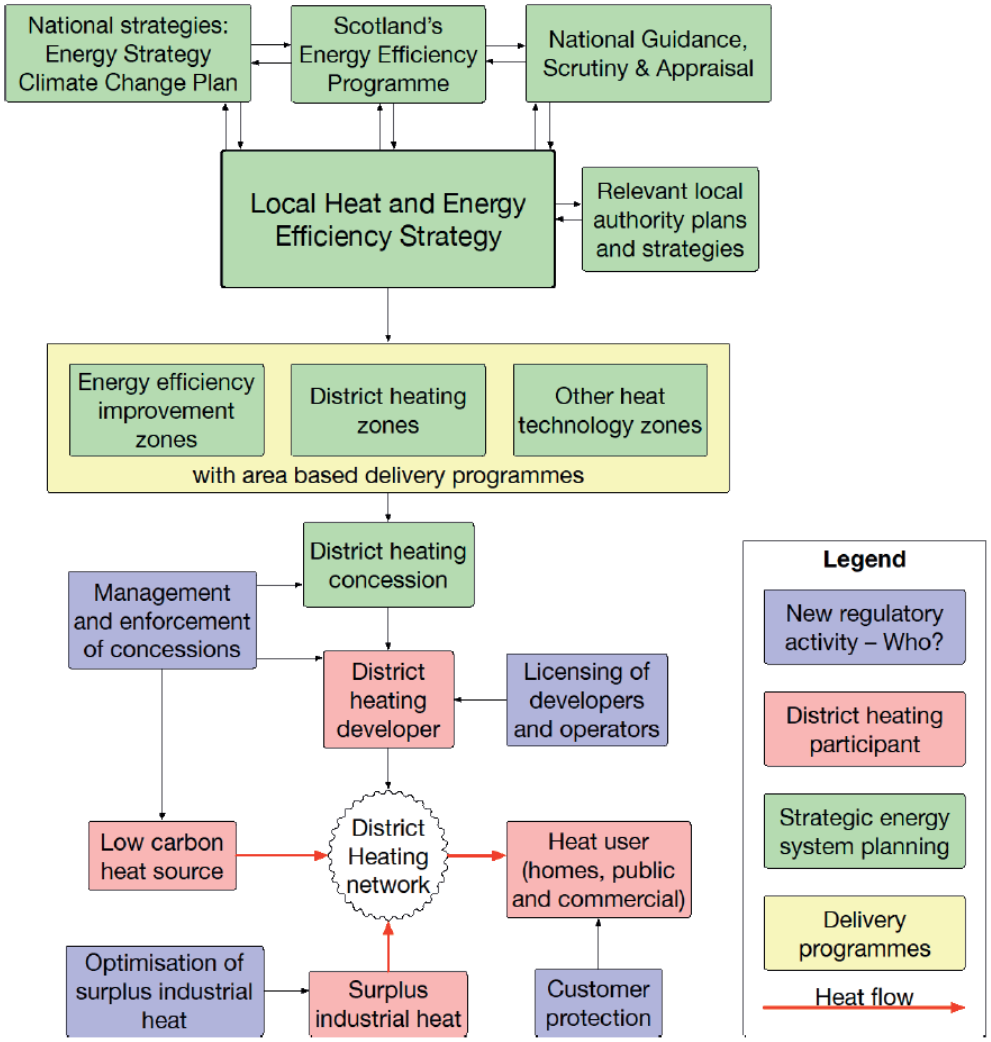
Local Heat and Energy Efficiency Strategies

- LHEES links to planning
- Recognition of additional burden
- Analytical skills, resources and techniques
- Support link to Government Owned Energy Company



Alastair Brown

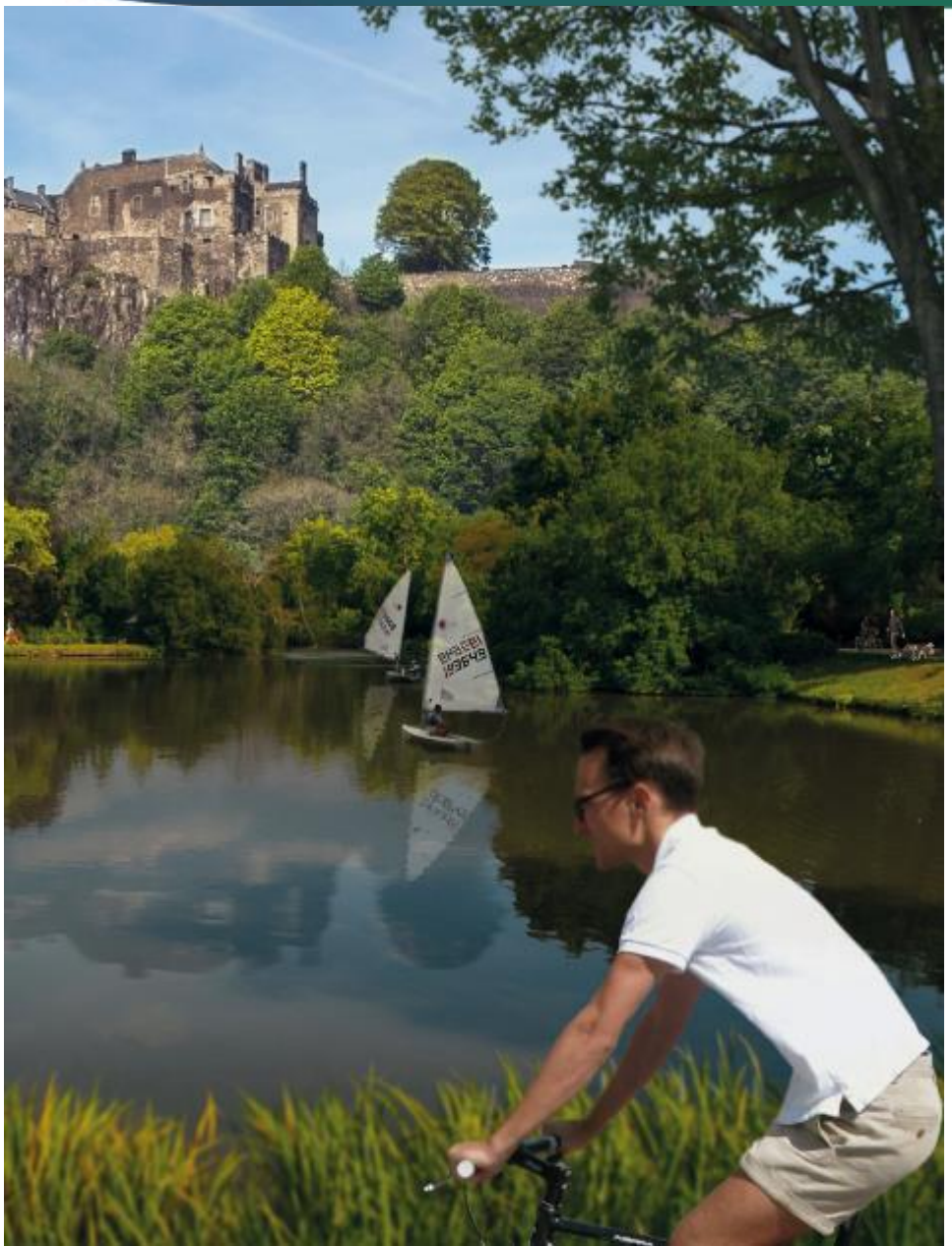
Director of Localities and Infrastructure

Stirling Council

Alastair Brown

Director of Localities & Infrastructure

Stirling Council



Rob Pedersen
City Architect
Dundee City Council

Transitioning to a low carbon future

Rob Pedersen,
City Architect, Dundee City Council
Chair, Dundee Partnership Environment Steering Group

Socio-economic challenges

- Third largest percentage of its population living in the 15% Most Deprived areas in Scotland (over 42,000 people)
- 28% of children are classed as living in poverty.
- Long-term unemployment has historically been higher than national average.
- NVQ3 level qualification is behind the national average.
- Fuel poverty has risen to 42% across all housing tenures in Dundee.
- Dundee has highest level of households in fuel poverty across all Scottish cities.
- 66% of single pensioner households and 38% of single parent households suffer from fuel poverty.

Source: ONS and Report of the Dundee Fairness Commission, May 2016

Dundee City Council www.dundeecity.gov.uk CHANGING FOR THE FUTURE

Developing an Integrated Approach

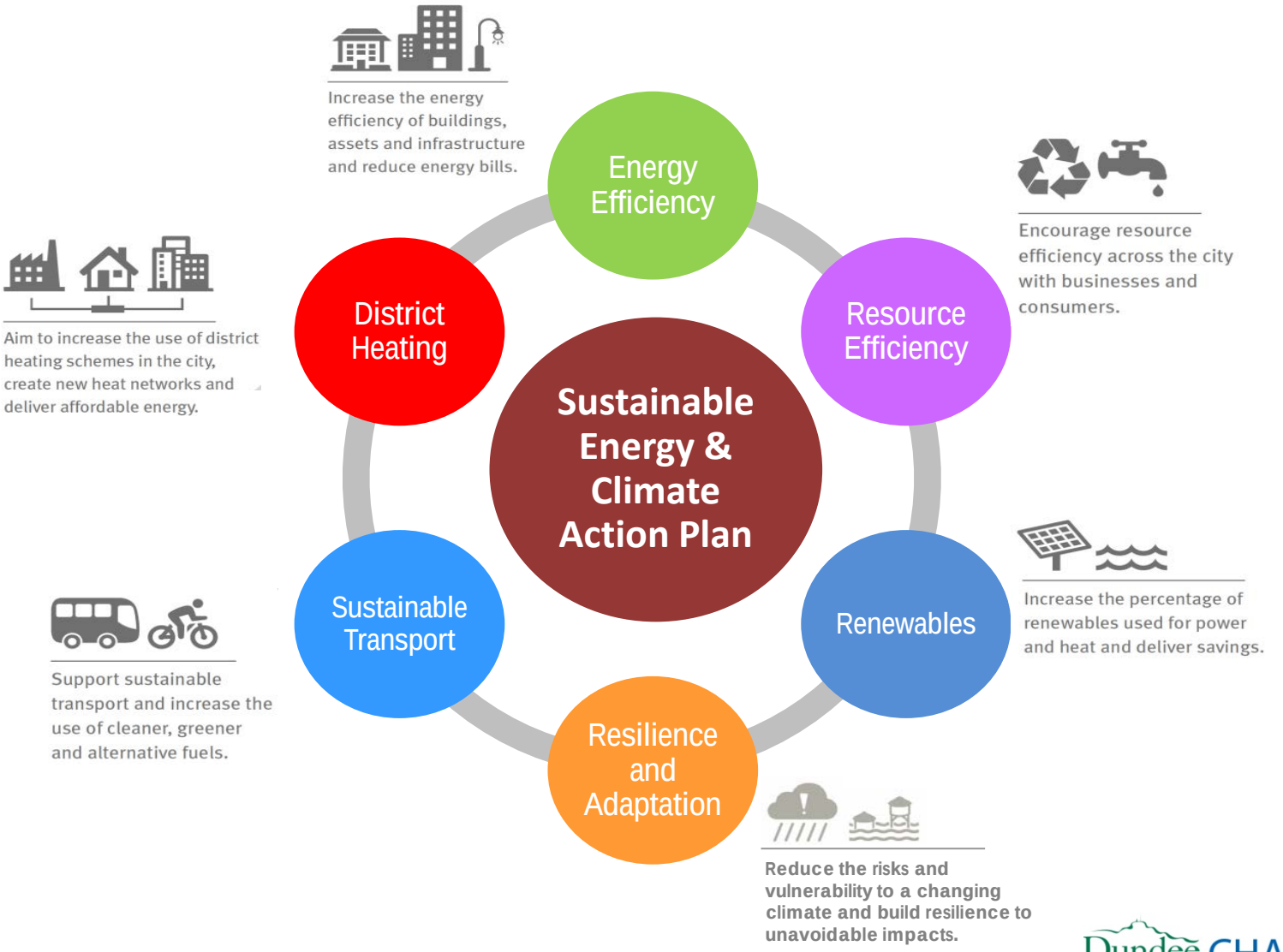


Image credit: City of Edinburgh Council

Dundee City Council www.dundeecity.gov.uk CHANGING FOR THE FUTURE

Energy Efficiency	Programme likely to achieve greatest reduction in emissions, with focus on existing buildings. Options include: • Energy retrofit programmes for non domestic buildings. • Working with the largest employers and commercial property owners to reduce carbon emissions. • continuing with initiatives to reduce energy in homes and construct new energy efficient ones. • Implementing new technologies for monitoring energy in buildings. • Retrofitting street and stair lights. • Behaviour change campaigns.
Renewables	Programme aims to increase the use of renewables in both the domestic and non-domestic sectors. Options include: • Pilot ground source heat pumps in parks; • Assessing the potential for renewables in the public sector estate; • Providing guidance for community groups and householders. • Assessing opportunities biodiesel, solar P.V. and microhydro projects.
Resource Efficiency	Programme aims to encourage resource efficiency across the city with businesses and consumers. Options include: • Progressing the Zero Waste and circular economy projects. • Evaluating opportunities for capturing waste heat and power. • promoting advisory and support services; engaging with organisations involved in reuse and repair activities in the city. • working in partnership with Scottish Water piloting waste heat from sewage pipes.

Sustainable Transport	The programme on transport will support Local and Regional Transport Strategies, aiming to reduce the need to travel, encourage active travel and decarbonising travel. Options include: • Integration of smart travel/integrated ticketing. • Behaviour change programme. • Building on success of electric vehicle and infrastructure investment to grow Dundee's reputation in the adoption of Ultra Low Emission Vehicles. • Investigate ESCO model to reduce barriers to ULEV fleet investment. • Promotion of Active Travel. • Working with the City Car Club.
Resilience	The new CoM 2015 includes a commitment to strengthening resilience and capacity to adapt to adverse climate change impacts. Key to this will be preparing a 'Climate Change Risk and Vulnerability Assessment'. Public sector bodies in Dundee are already working with Adaptation Scotland on these issues and the challenge will be progressively mainstream adaptation considerations into relevant policies, strategies and plans.
District Heating	A key objective of the SECAP is to decentralise energy. Options include: • District Heating Delivery Plan and heat maps. • Heat Network Policy and integrate into the new Local Development Plan. • Feasibility studies. • Guidance for developers. • Working with partners to assess opportunities from new developments. • Heat Network Policy and integrate into the new Local Development Plan. • Taking forward major schemes including Ninewells/Menzieshill, RPCS, Baldovie, City Centre.

A compact city with untapped resources

A tidal river

Victoria Dock

A solar resource

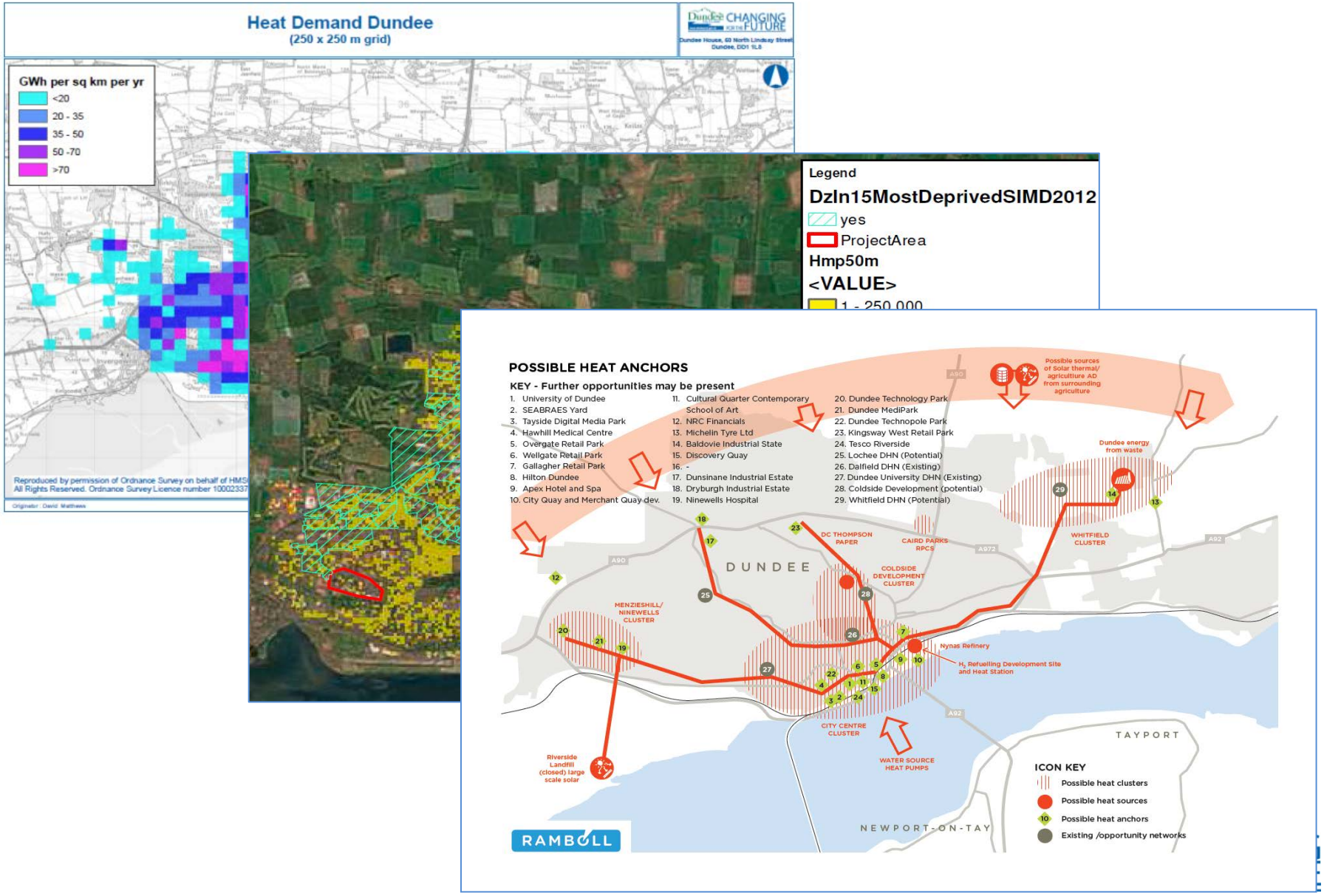
Waste to Energy plant

Heat from Sewers

Heat from Industry

Dundee City Council www.dundeecity.gov.uk CHANGING FOR THE FUTURE

Planning Opportunities



Utilising Existing Assets & Infrastructure

Whorterbank MSD

Lansdown Gardens MSD

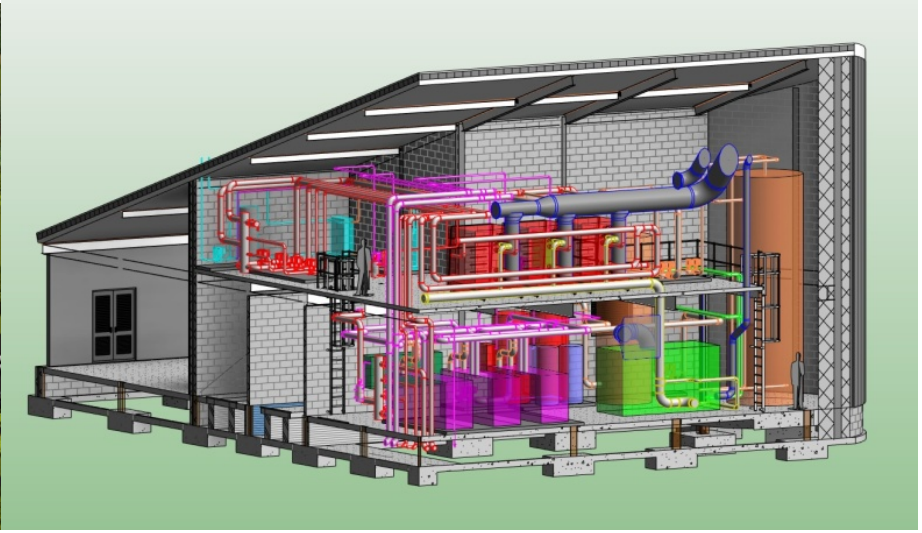
Kirk Street MSD

Dallfield MSD

District Heating - Phased Approach

Phase 1 (2017-2018)

- Regional Performance Centre for Sport



District Heating - Phased Approach

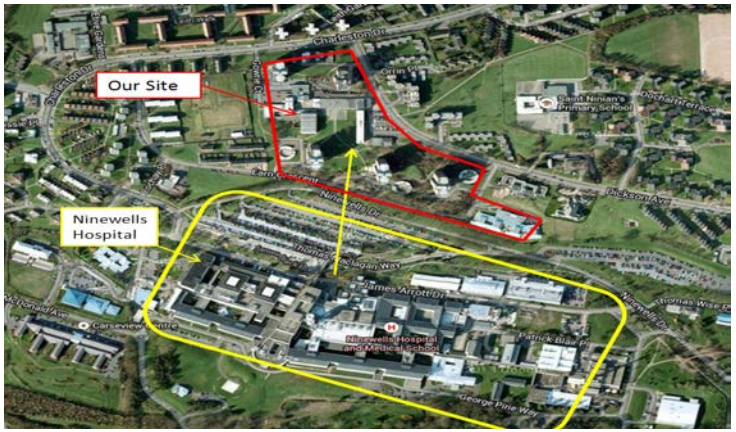
Dundee City Council CHANGING FOR THE FUTURE
www.dundeecity.gov.uk

District Heating - Phased Approach

Phase 2 (2018-2024)

- Coldside

- Menzieshill



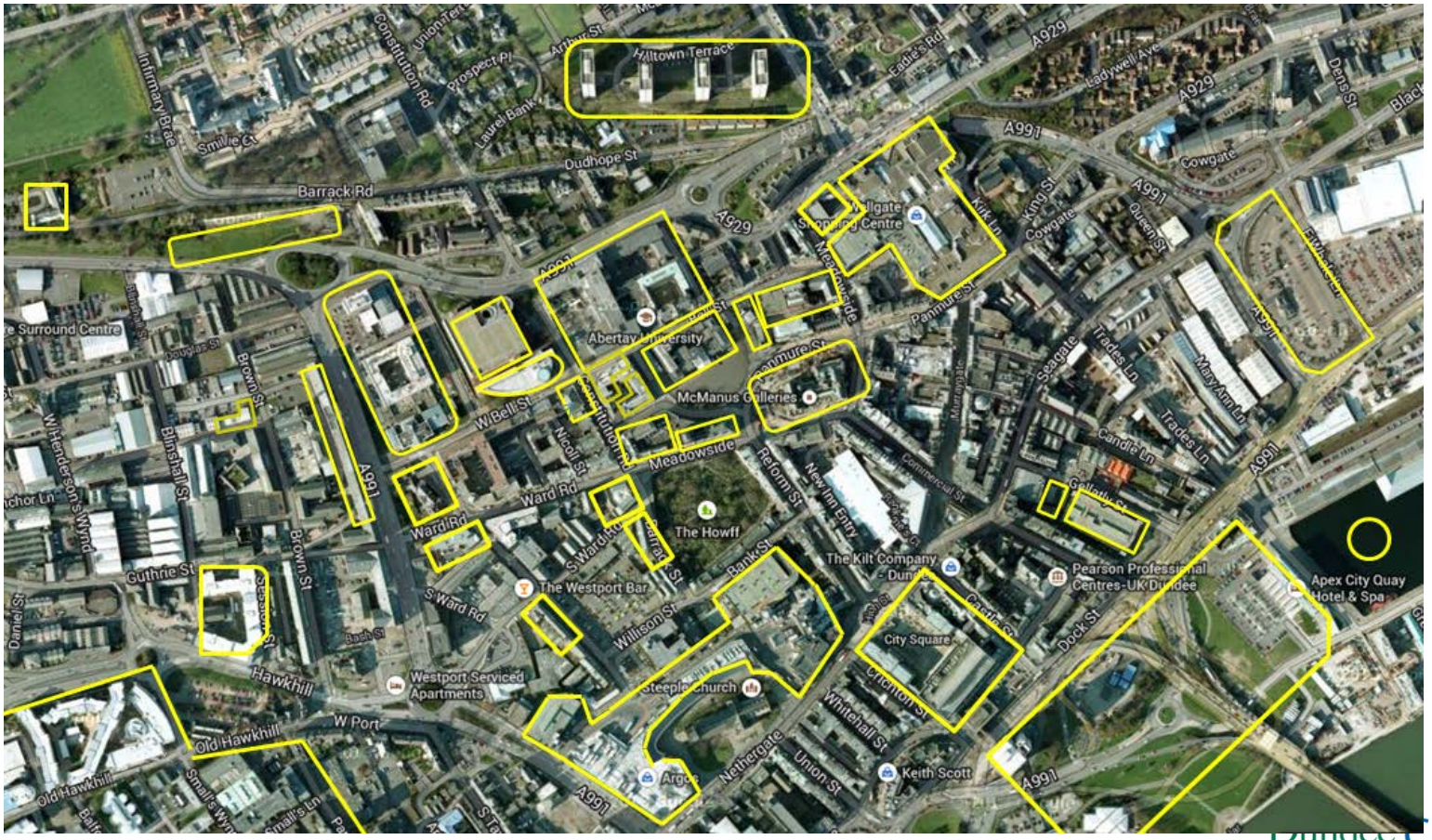
- Lochee

- Whitfield

District Heating - Phased Approach

Phase 2 (2018-2024)

- City Centre

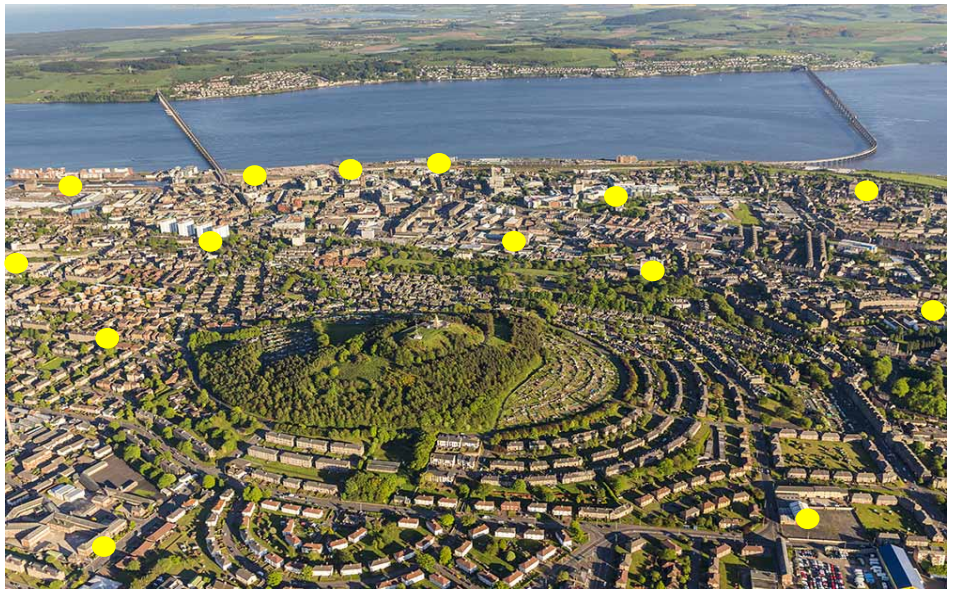


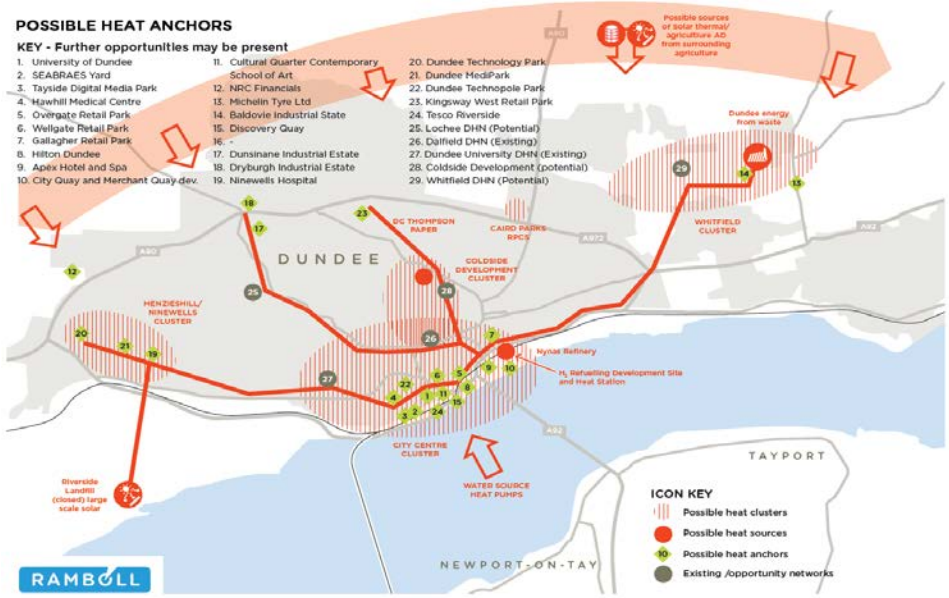
District Heating - Phased Approach

Phase 3 (2020-2024)

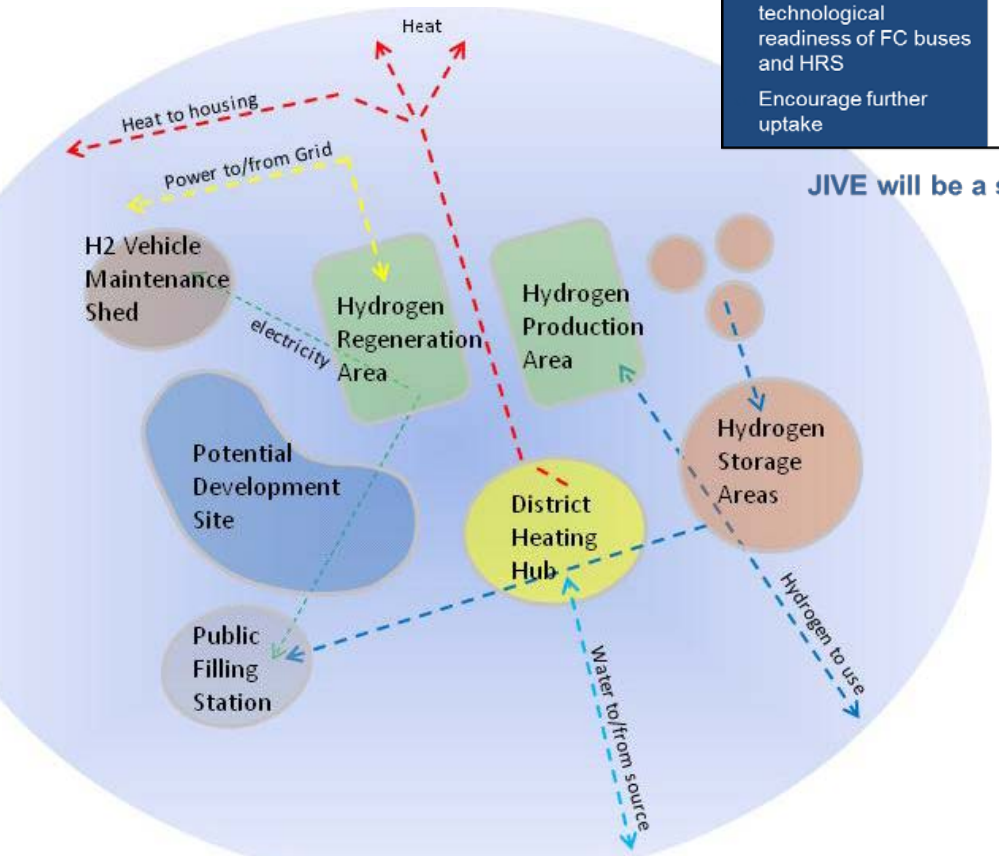
To be part/wholly ESCO financed/ investment secured

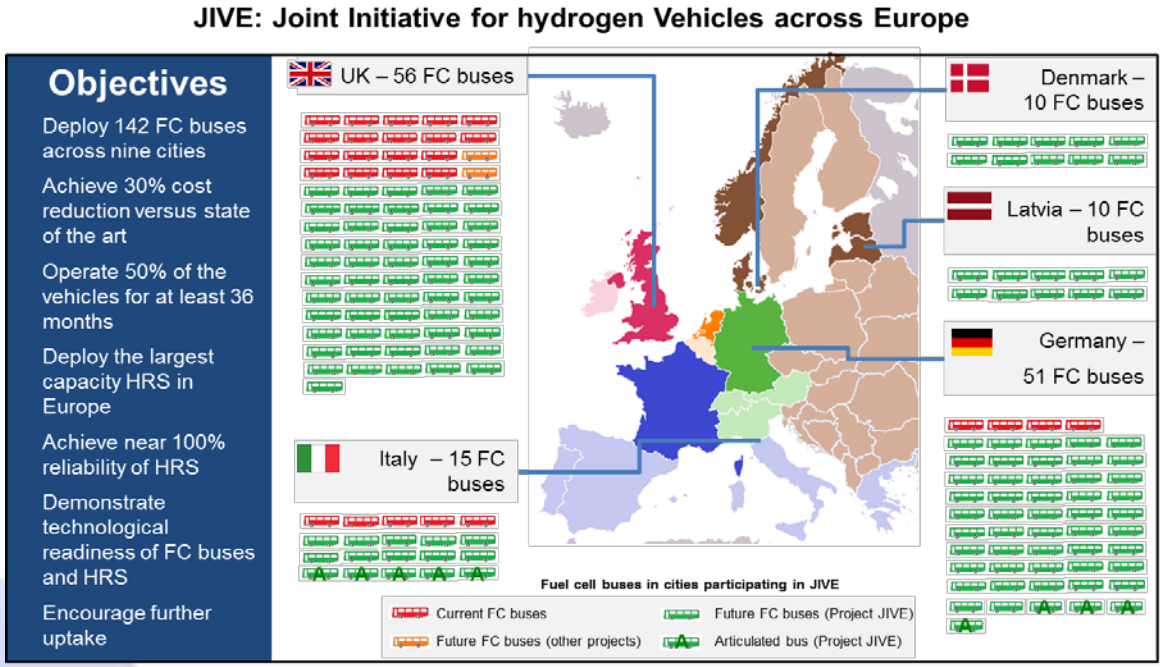
- Port – Craigie – Whitfield
- Whitfield – Fintry
- Fintry – Claverhouse
- Claverhouse – Kirkton
- Kirkton – St. Mary's
- Menziehill - Camperdown





Hydrogen





JIVE will be a six year project, with an anticipated start date of early 2017

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

scottishcitiesalliance

Dundee City Council www.dundeecity.gov.uk CHANGING FOR THE FUTURE

Going Ultra Low

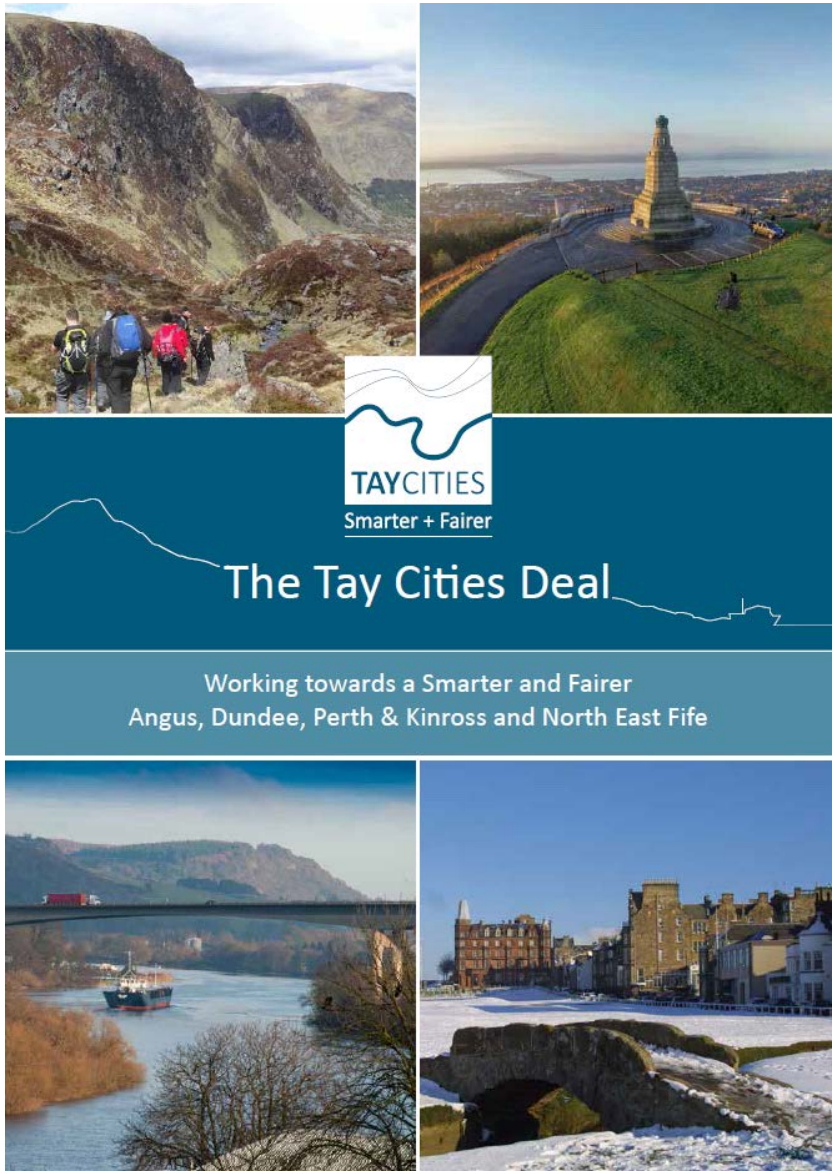
- 81 pure electric vehicles in Council fleet.
- Dundee has 2 most used chargers in Scotland, (Queen Street Broughty Ferry averaging 18 sessions per day).
- Currently 40 pure electric taxis registered in the city

Dundee's eMission

An ambitious programme that builds on the city's strong position and expertise, outlining a comprehensive and integrated approach that will:

- Create a step-change in ULEV uptake.
- Improve air quality and the public realm.
- Establish the city as a leading international location for the development of new ultra low emission mobility technologies and business models.

Regional Collaboration



A partnership project between Angus, Dundee City and Perth & Kinross Councils to decarbonise and democratise energy services within the TAY Cities area.

Proposals to:

1) Deliver a 3-phase pipeline of Council-led projects - focusing on low carbon heating and low carbon transport.

2) Establish a regional ESCO (known as Tay Cities Energy Services Company).

Funding request of £95m (total project costs £180m)

Dundee City Council www.dundeecity.gov.uk CHANGING FOR THE FUTURE

HEADLINE SPONSOR

ENGIE

scottish renewables

LOW-CARBON CITIES CONFERENCE

22 FEBRUARY 2017 **EDINBURGH**

Plenary 4

Richard Bellingham, University of Strathclyde

Speakers
James Higgins, SGN
Professor Jill Anable, University of Leeds
Simon Tricker, Urban Tide
Richard Long, ENGIE UK

James Higgins
Policy Manager
SGN

Low-Carbon Cities Conference

22 February 2017

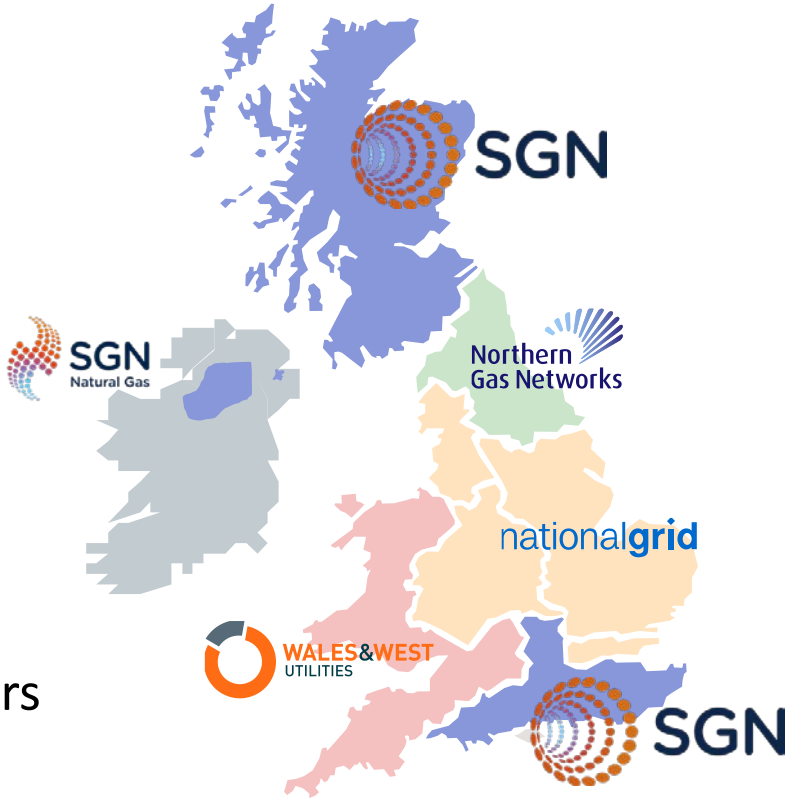
James Higgins – Policy Manager

SGN

Your gas. Our network.

SGN in Scotland

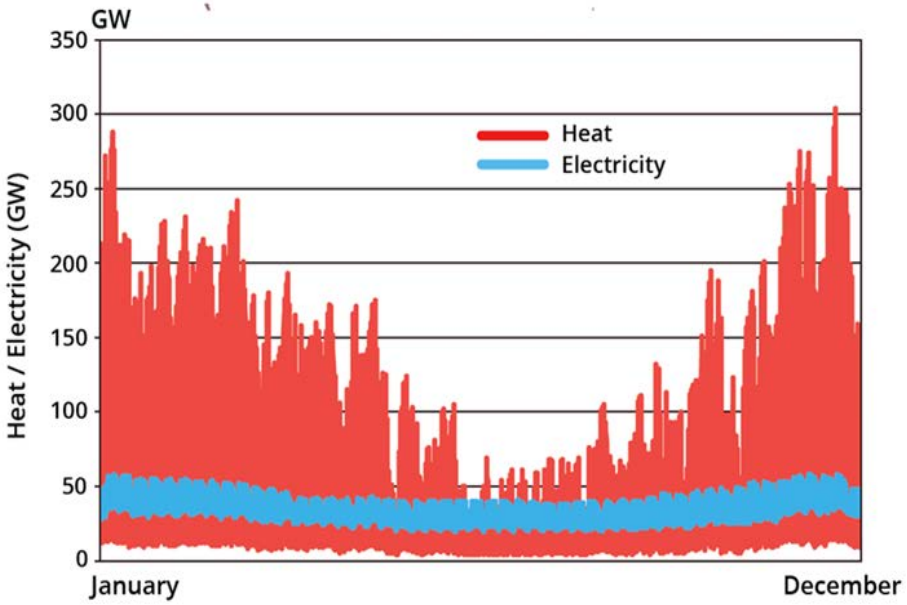
- 25,000km of pipeline
- 1.8m customers
- 12 biomethane plants connected
- 300km metal mains replaced with plastic pipe each year
- Connections - 12,000 p.a.
  (3,000 fuel poor p.a.)
- 1,400 employees plus 400 contractors



SGN

Scotland's gas network of today

- **25,000km** of pipe
- **80%** of homes connected
- Provides **80%** of total energy demand at peak times
- **1/3** of all energy consumption is for heat provided by natural gas
- **99.99%** security of supply
- **1/3** of the cost of electricity per kWh



SGN

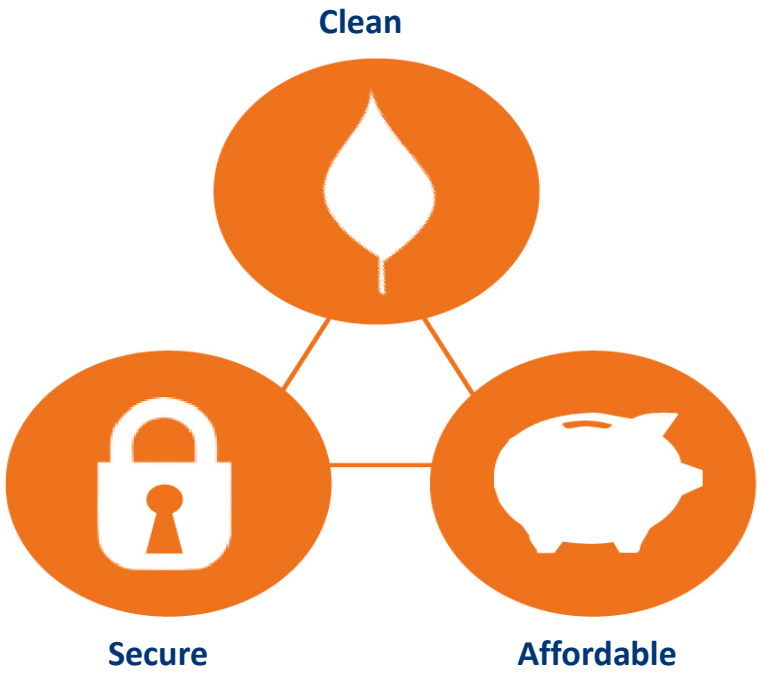
The challenge and the opportunity

We need a future gas network that is:

Clean: helps us to meet our climate change targets

Secure: continues to meet peak demand on the coldest days

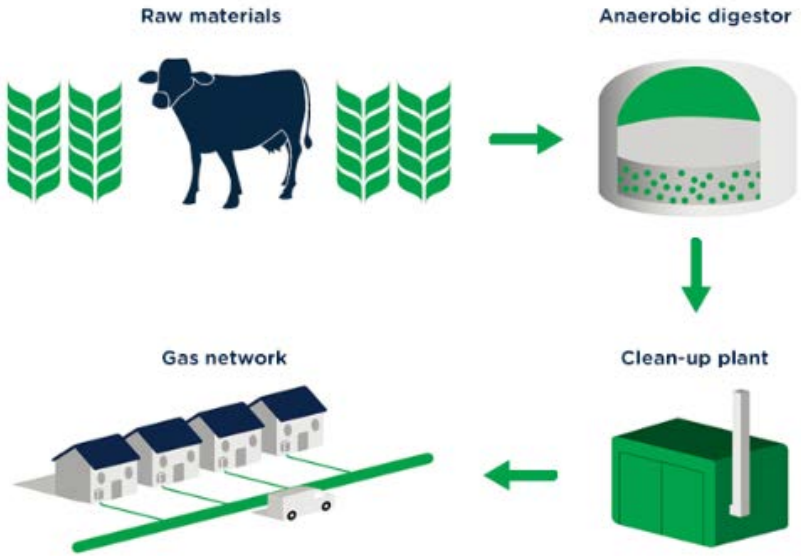
Affordable: continues to provide affordable heat for customers



SGN

Greening the gas

- Biomethane a vital low carbon fuel for homes and businesses
  - Renewable Heat Incentive (RHI) support crucial
- 12 biomethane plants connected in Scotland
  - Supplying green gas to 75,000 homes
- On track to meet our target to supply 250,000 homes with green gas by 2021



SGN

Oban project

- Trial demonstrated GB gas regulations can be safely widened
- Would allow a more competitive range of gases to be used
- Increased security of supply
- Reduced need for processing which currently costs £325m a year
- Working on the legislative changes for GB roll-out

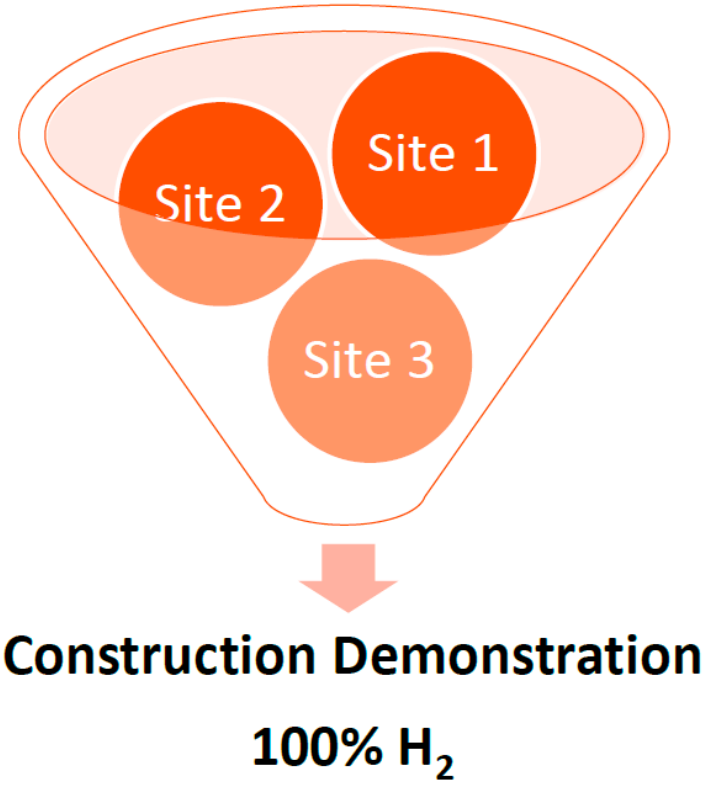
Real-time networks

- Project to develop a more flexible ‘real-time network’
- Sensors measuring energy content not just flow and volume
- Potential enabler for greater volumes of renewable gas
- A network adapted to the future energy needs of GB

SGN

H_2 project

- Hydrogen is one of the leading solutions to decarbonise heat
  - Potential to blend with natural gas in the short term
  - Longer term potential for 100% hydrogen networks
- Undertaking feasibility for a 100% hydrogen network demonstration in Scotland
  - Up to 3 sites considered
- Need for multiple coordinated demonstration projects



SGN

Looking beyond the trilemma

What options do we have?

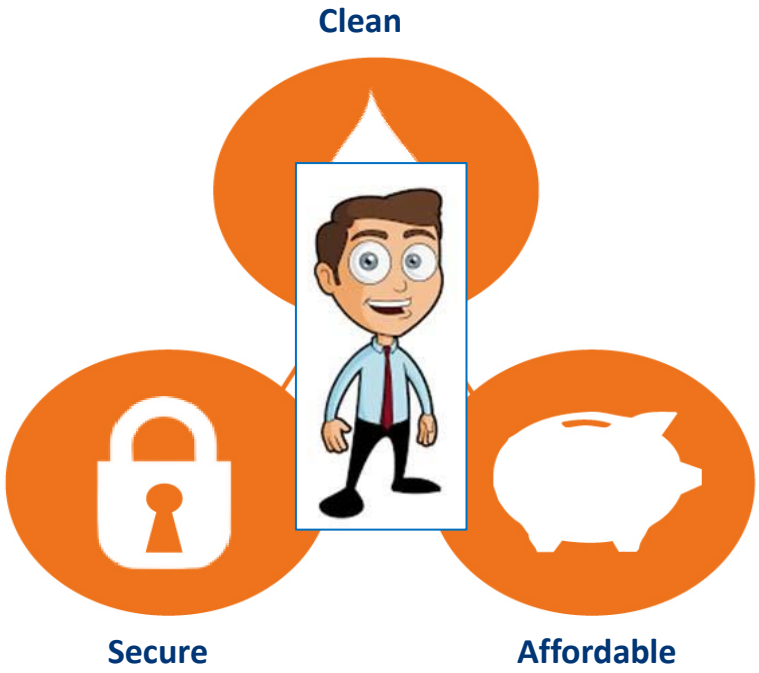
- Heat pumps
- Heat networks
- Some of these
- Blended gas networks
- Hydrogen networks
- All of these

What's best and how do we decide?

- Neighbouring communities may require different solutions
- What's the right balance between cost, security of supply and carbon reduction?

Which one for customers?

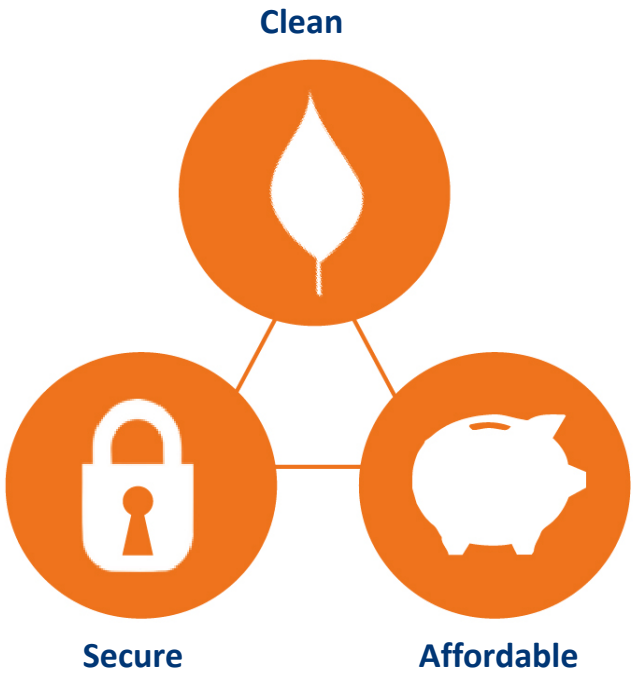
- Will they get a say or choice?
- How much will they pay?
- How will it compare with neighbours or friends in another area?



SGN

Our vision - fit for the future

- By 2032 network largely plastic and low maintenance
- Flexible to support different compositions
- Diverse low carbon sources ensuring security of supply
- Efficiency maximised through innovation
- Minimal system investment
- Keeping us on target for 2050



SGN

Thank you

james.higgins@sgn.co.uk

SGN

Your gas. Our network.

Professor Jillian Anable
Chair in Transport and Energy
Institute for Transport Studies
University of Leeds

Institute for Transport Studies
FACULTY OF EARTH AND ENVIRONMENT

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Transport technologies and behaviour

SR Low Carbon Cities Conference, 22nd February 2017, Edinburgh

Jillian Anable

Professor of Transport and Energy

The Institute for Transport Studies (ITS), University of Leeds

J.L.Anable@leeds.ac.uk

UKERC UK Energy Research Centre
Researching pathways to a low carbon future

Research Councils UK Energy For a Low Carbon Future

ITS

The ‘vision’ for transport & energy in Scotland

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“Our future transport needs will be met substantially through electricity or alternative fuels; presenting new infrastructure challenges and new patterns of behaviour for users. How consumers engage with these choices will be guided by ‘smart’ technologies, providing better information on energy use and a better platform for informed decisions on when it is best to consume energy.”

Scottish Energy Strategy, January 2017, Ministerial Forward

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Showing results for revolution definition
revolution
/rɛvəˈluːʃ(ə)n/
noun
1. a forcible overthrow of a government or social order
"the country has had a socialist revolution"
synonyms: rebellion, revolt, insurrection, mutiny, riot, rioting, rising, insurgence, insurgency, coup, overthrow, regime change; More
2. an instance of revolving.
"one revolution a second"
synonyms: single turn, turn, rotation, circle, whirl, spin, wheel, roll, round, cycle, circuit, lap
"the prop shaft turns 4.7 times for one revolution of a road wheel"
Translations, word origin, and more definitions
Feedback
in favour of a new system.

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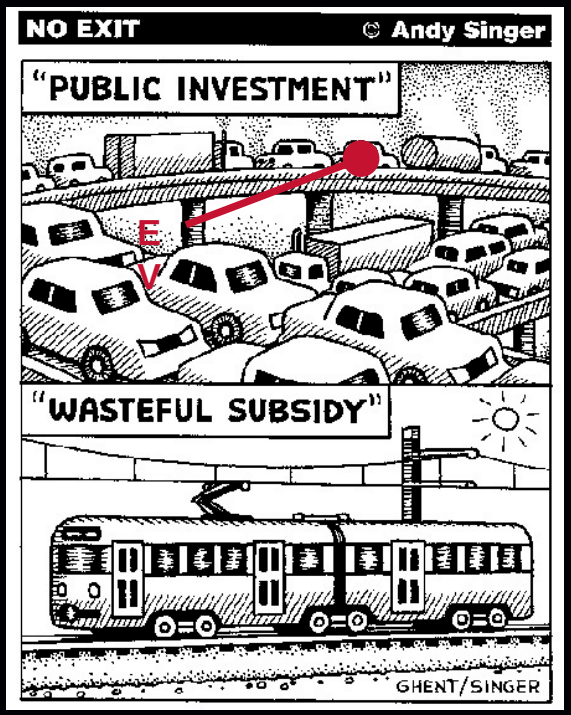
Reason #1:
An electric car is JUST a car

*Accidents
*Parking pressures
*Road user conflicts
*Congestion
*Mineral extraction
*Energy supply & emissions
*Disposal
*Subsidy



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Purchase incentives do not necessarily correlate with EV sales

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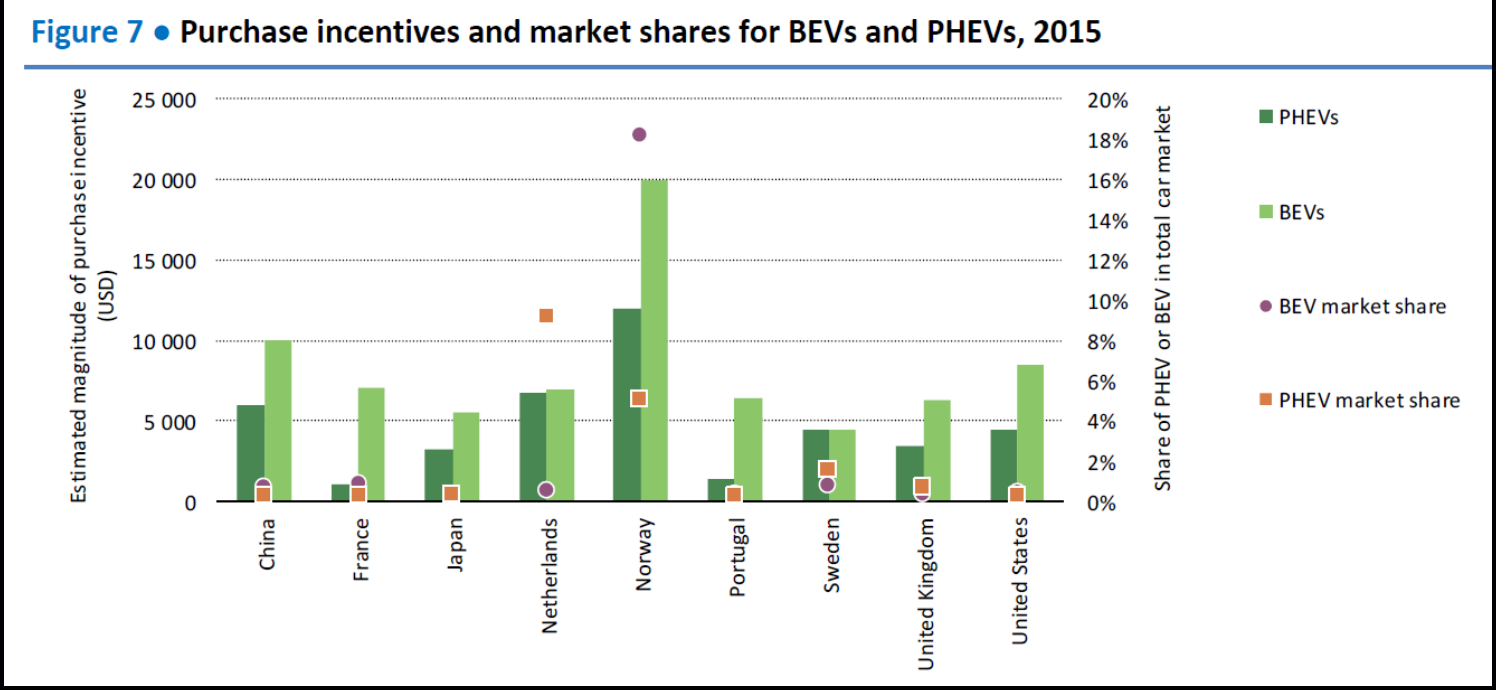

IEA. (2016) Global EV Outlook

ICEs are preferred, even when costs are the same

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- The disutility associated with the purchase price of an ICE is smaller than for an EV
- Uncertainty and other cost factors are as important
- Even where optimistic cost and range parity is tested, ICEs are preferred

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It is the *combination* of running cost savings and range that is important

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- PHEVs emerge consistently as more popular than BEVs, even where running cost savings information is given
- This demonstrates the trade-off between range and running cost
- Also lower perceived costs of battery replacement of PHEVs

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The top five factors which influence current EV ownership:

Identity	the degree to which people feel they associate with ‘typical’ EV owners
Anxiety	perceived suitability of these vehicles particularly in relation to range
Parking Difficulty	perceived ease of being able to charge a vehicle at home
Willingness to pay	willingness to pay more for plug-in technology and/or environmental benefits
Symbolic motives	capture the perceived status, social acceptability and embarrassment or otherwise of owning an EV.

ANABLE, J., et al. (2016) Consumer segmentation and demographic patterns. Report for Energy Technologies Institute Plug-in Vehicles Infrastructure Project (April 2011). Transport Research Laboratory Published Project Report PPR769.

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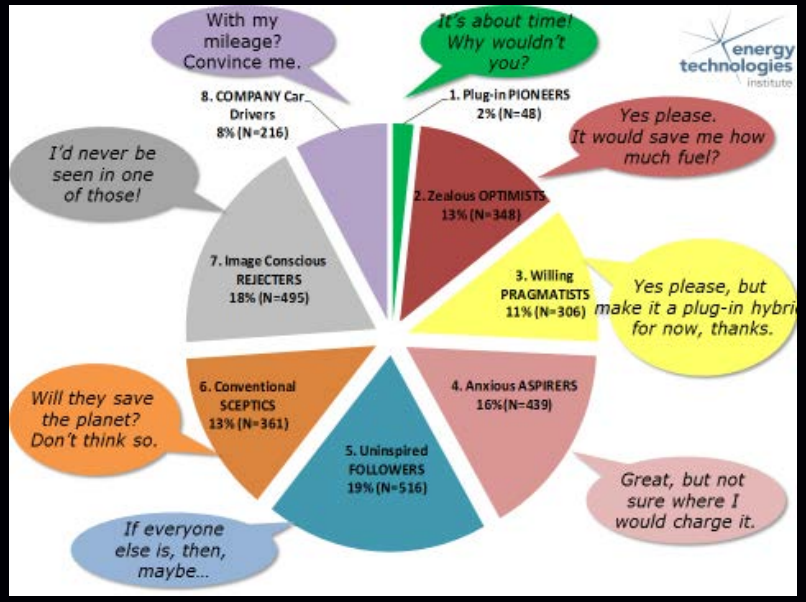
We need:
To understand non-economically rational consumer motivations



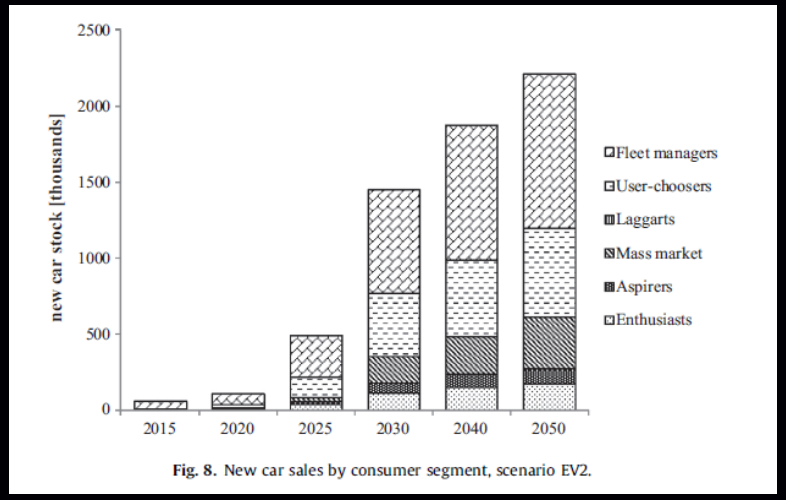


Fig. 8. New car sales by consumer segment, scenario EV2.

Brand, C., Cluzel, C. and **Anable, J.** (2017) Modeling the uptake of plug-in vehicles in a heterogeneous car market using a consumer segmentation approach. *Transportation Research A*: Policy and Practice, 97: 121-136.

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We need:

~~Place-based, not technology-based solutions~~

"Almost complete decarbonisation of road transport by 2050 with significant progress by 2030 through wholesale adoption of electric cars and vans" *(Scotland's Climate Action Plan (2009))*

- *Where* is this going to happen? Is this the right solution *everywhere*?
- Are local and city authorities the agents for transformational change?
- How can local decisions be guided among different potential futures?

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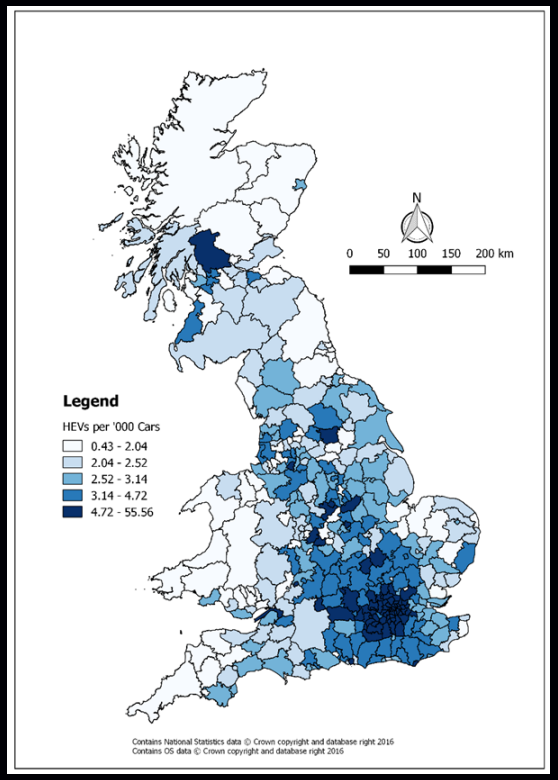
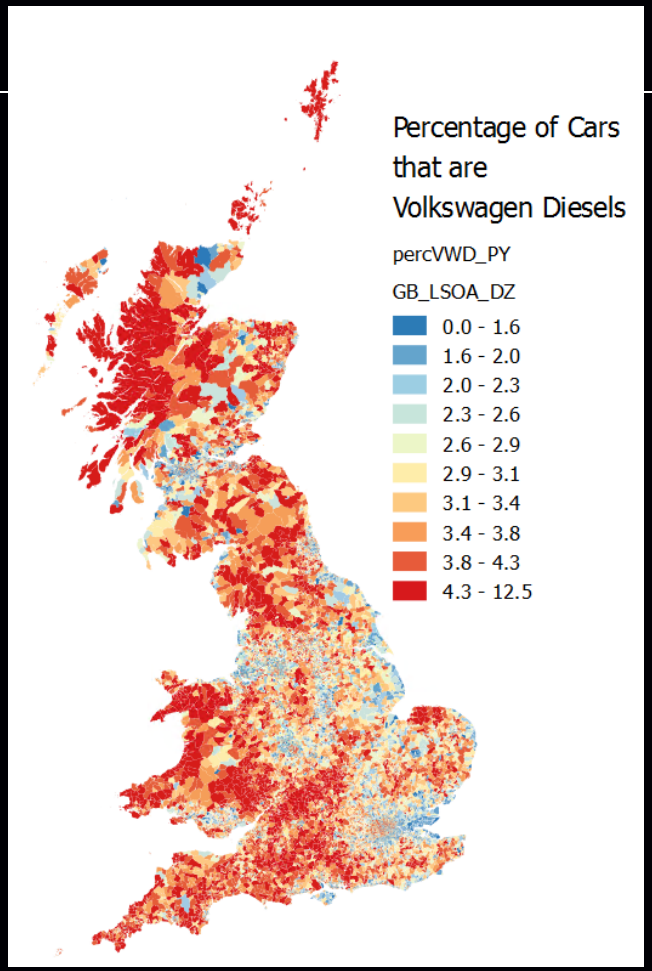
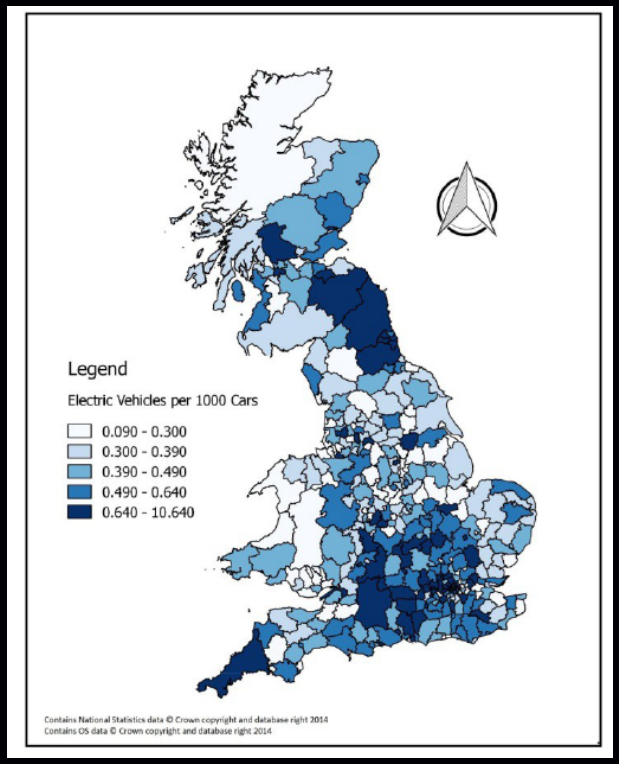
Technology Diffusion







MOT
Motoring and Vehicle Ownership Trends in the UK

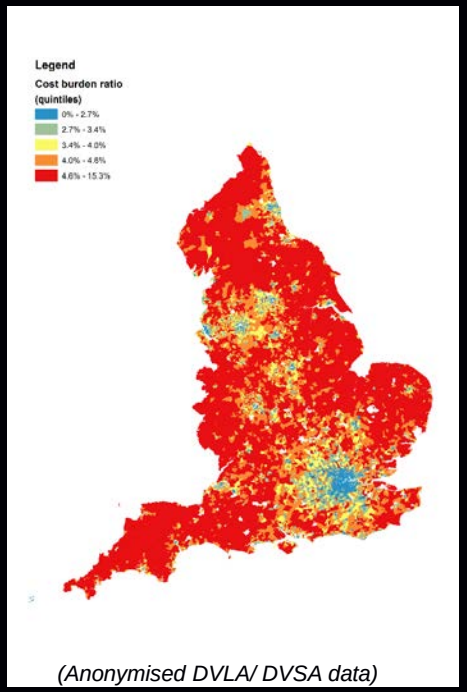
A spatial index of vulnerability to fuel price increases – England 2011

1. Exposure:
Cost burden ratio = per household expenditure on fuel / median income

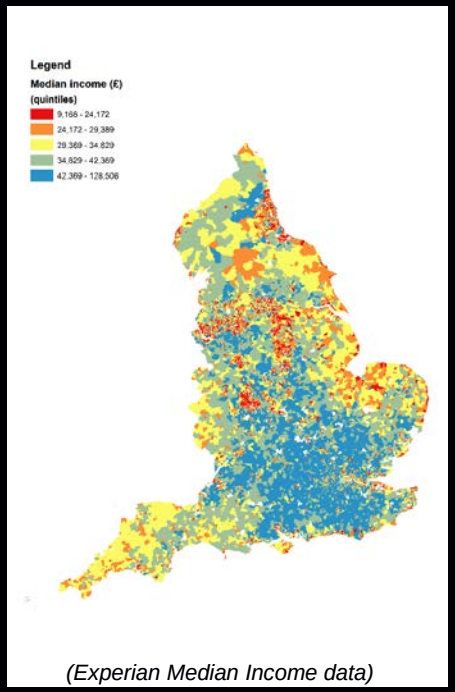
2. Sensitivity
Median household income

3. Adaptive capacity
Travel time to 8 key services by public transport / walking

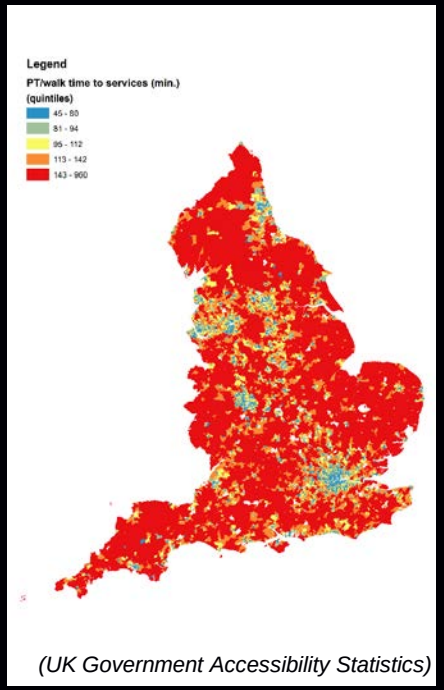
4. Vulnerability Index



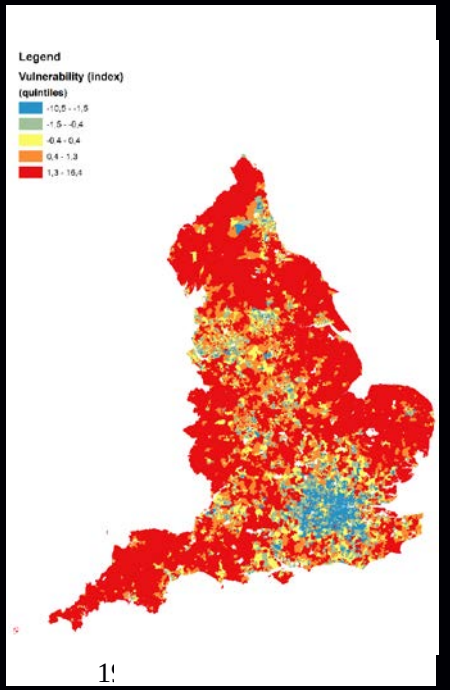
(Anonymised DVLA/ DVSA data)



(Experian Median Income data)



(UK Government Accessibility Statistics)



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Reason #2:
Smart Cities are only as good as the policies that govern them

- We don't do transport governance well *now* when it's relatively simple …
- … consider what we think is happening:
  - Transport regulation disrupted (or under attack)
  - Consumers become mobility providers too in the 'sharing economy'
  - Technology firms are promoting their own vision of change… which is producer interest

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The MAAS* business model relies on selling more and more mobility (*Mobility As A Service)

space required
to transport **60 people**

car | electric car | uber | autonomous car

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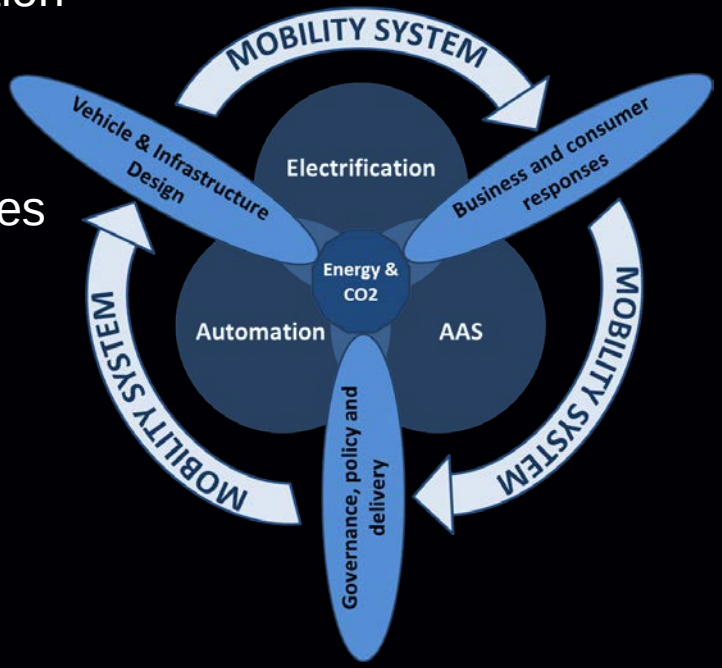
We need:

Smart policy, not smart cities

- We are only at the beginning of the digital revolution for the city
- But can we really have a city run by data?
- How will the benefits and any negative externalities of such a transition be managed?
- How will be ensure the objectives of each ‘revolution’ are aligned?



Access

~~M~~AAS

The more mobility the better

…

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We need:

Small data, *and* big data

- What is real time and big data actually enabling?
  - Do we understand the ‘traditional’ policy impacts of the innovations we foresee? (modal shift, congestion, social polarisation etc)
  - Do we understand how smart mobility will change our demand responses and change our cities, our places, our societies?
- What are we transforming ourselves into if we really can deliver smart, instant mobility?
- We need radical changes in theory, method and data to explain the world as it really is before it is too late

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Reason #3:
The efficiency and decarbonisation discourse is limiting our vision

To decarbonise = doing the same without the carbon

- Therefore - Energy Policy focuses on technologies for decarbonising supply with little or no reference to demand

THIS CLOSES LOTS OF DOORS

- It assumes that technologies are neutral – they can simply be replaced by decarbonised equivalents
- Even if this were true, it is acknowledged not to be enough

Historical trends do not need to be taken for granted

- If demand were to be expected to be lower than present - different decarbonisation options would come in to view

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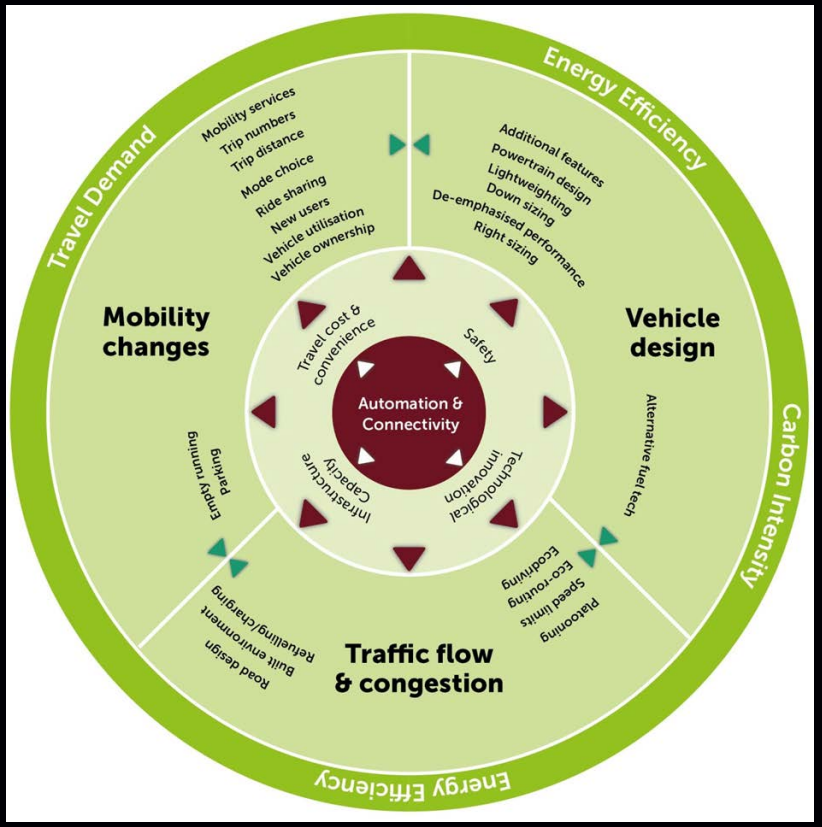
Automation is not automatically a good thing



Download the report: Wadud, Z. and Anable, J. (2016) Automation: automatically low carbon? Report for the Low Carbon Vehicle Partnership, London.

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We need:
Socio-technical change, not technology vs. behaviour change

- Early quantitative analysis of the IPCC budgets and Paris Agreement suggest mitigation rates for wealthier industrialised nations of at least 10% p.a.; higher still if the 1.5°C commitment is to seriously inform UK policies.
- Delivering such near term mitigation cannot wait for wholesale infrastructure change
- Instead, must deliver within the existing socio-technical system whilst at the same time fostering the need for a wider system-level transformation

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Reason #4:
Transport revolutions are not what shape travel

The biggest changes to travel patterns are not coming from transport policy

www.parliamentstreet.org

www.agelessvoice.net

www.walesonline.co.uk

Home.38degrees.org.uk

www.mrw.co.uk

www.smilemachine.com

Demand Uncertainty is Growing

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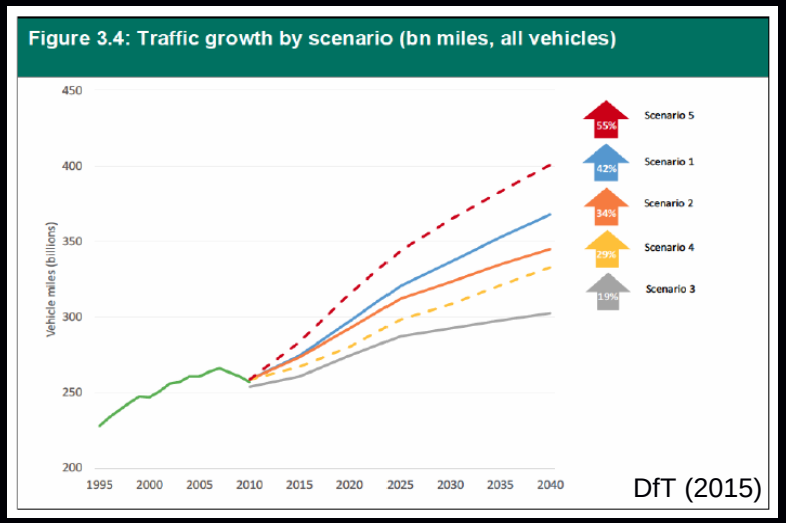
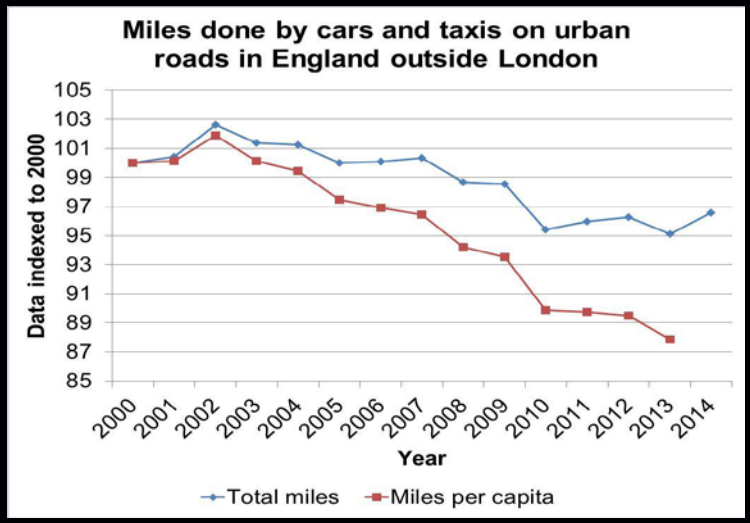
DFT Traffic Demand Scenarios



DfT (2015)

Recent demands – 'Peak Car'?



And there are things going on that were not expected

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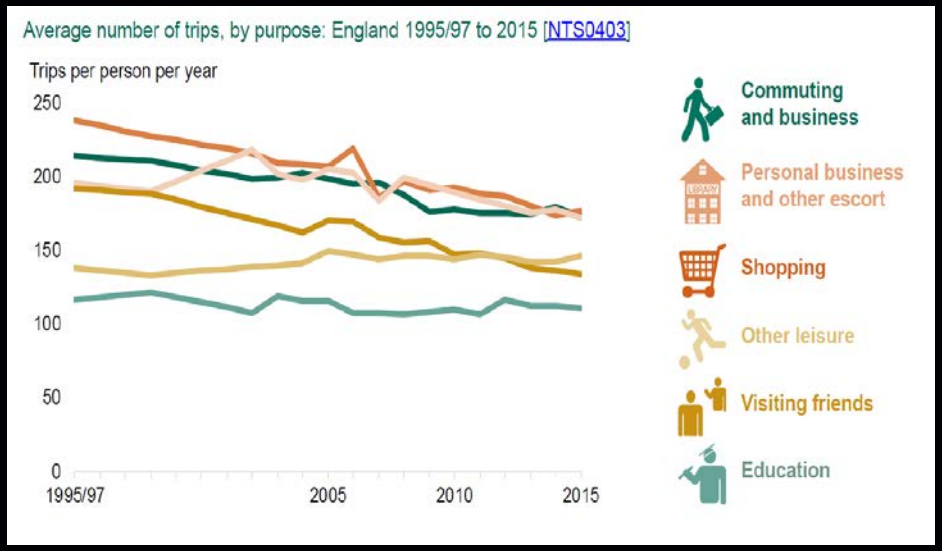

Profile of population

- In the past 25 years 59% of the increase in population has been working age
- In the next 35 years 63% of the increase in population will be in over 65s

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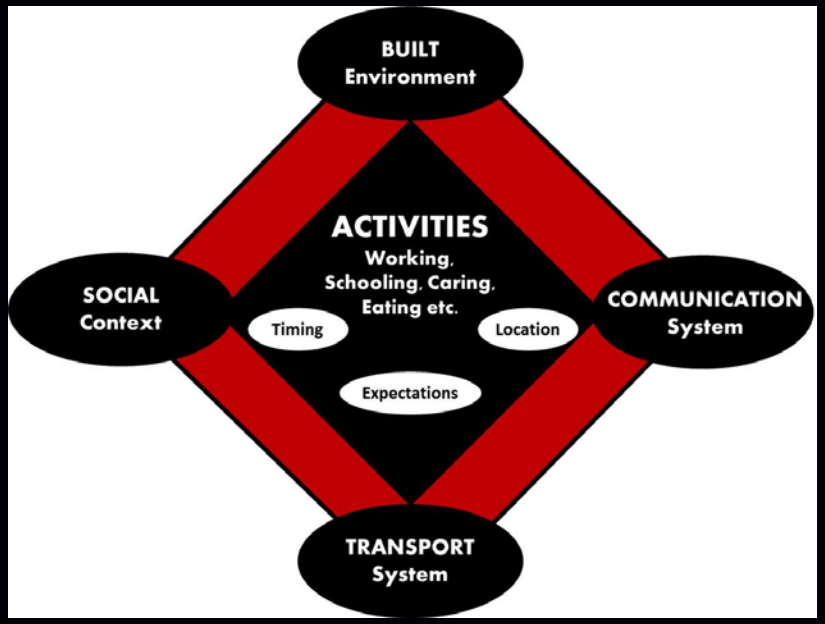
We need:

To design policy for the *Mobility* sSystem,

not the *Transport* System



Automobility: needs more attention to the systems through which mobility needs are generated

Peak car: cannot rely on the hope that the younger generation will do things differently – what must come together to tip into a post-car mobility system?

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Key Points

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- There is no time for large scale technological or infrastructural changes
- The biggest technological challenges involve how to integrate it in to society – not the technology itself
- Energy Policy focuses on efficiency with little reference to demand
- Transport and Energy Policy has very little relevance for transport and energy demand
- An electric car is just a car; it is not revolutionary
- We need Smart Policies, not Smart Cities
- We need as much Small Data as Big Data

ITS

Simon Tricker

Chief Digital Officer & Smart Cities Consultant

Urban Tide

UrbanTide

Smart cities, investment roadmaps and smart data

SR Low-Carbon Cities Conference

Simon Tricker - Co-Founder & CDO

22nd February 2017


Cities currently account for approximately 80% of GDP generated worldwide
http://www.worldbank.org/en/topic/urbandevelopment/brief/inclusive-cities

Rapid Urbanisation

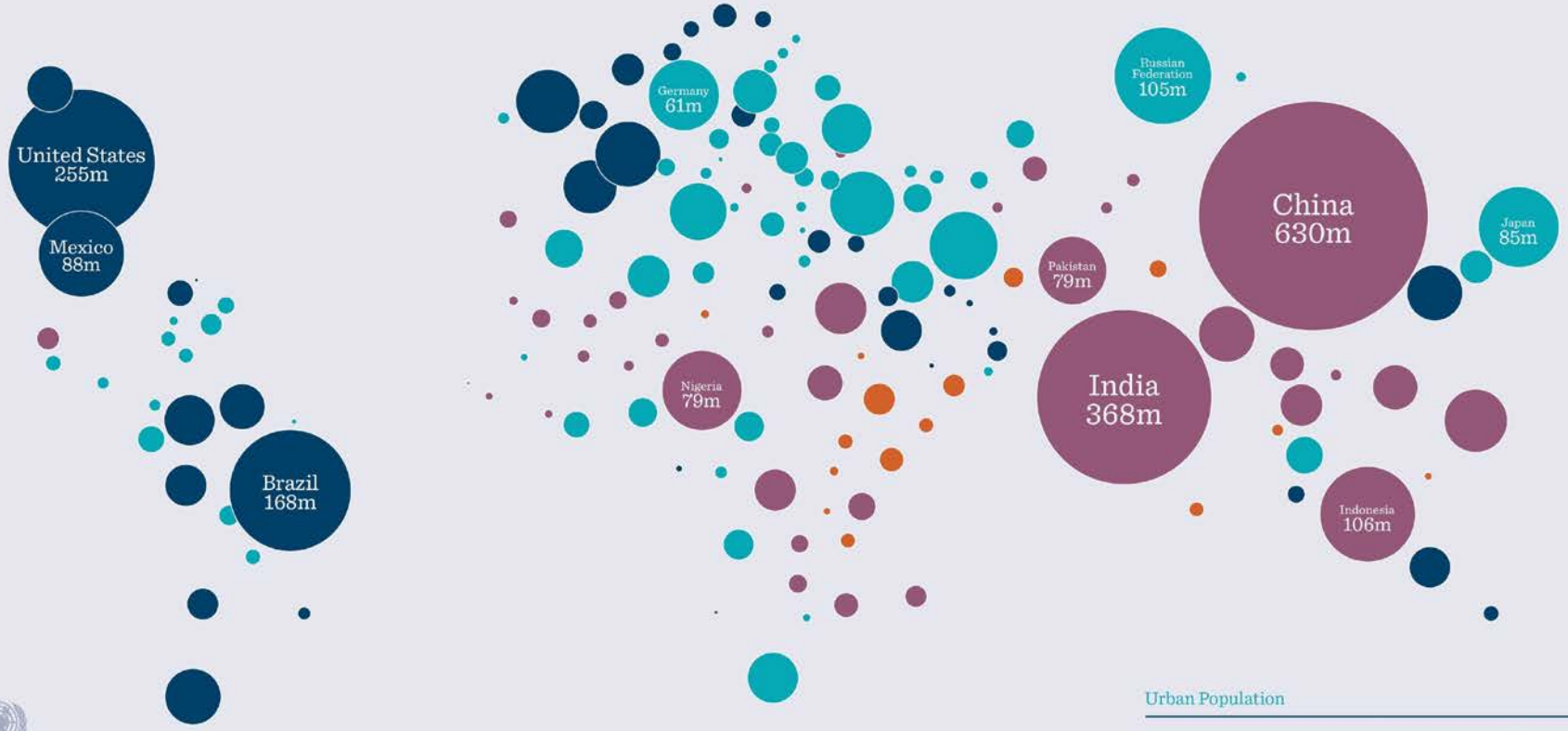
Figures from the United Nations

Urban Population

- Greater than 75%
- 50% - 75%
- 25% - 50%
- Less than 25%

1990

Rapid Urbanisation



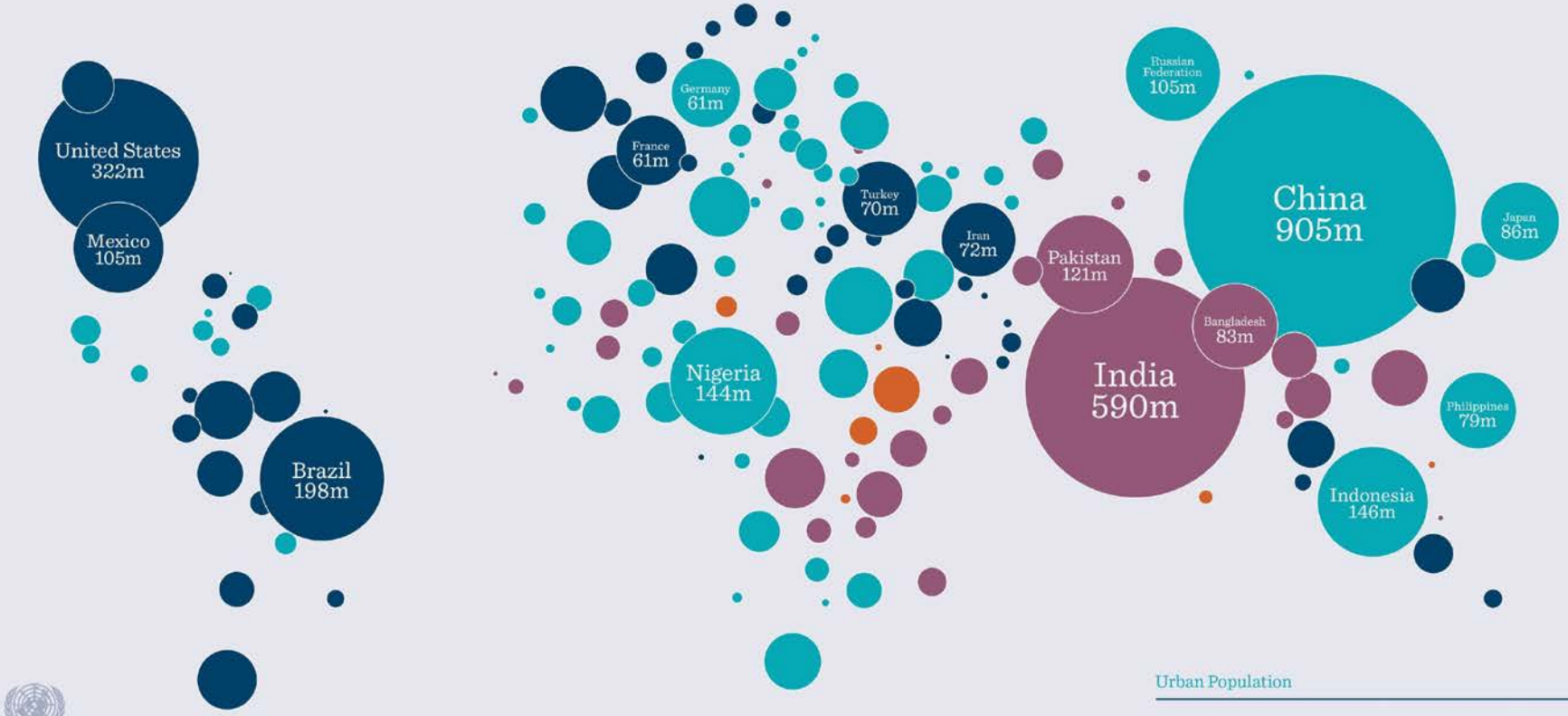
Figures from the United Nations

Urban Population

- Greater than 75%
- 50% - 75%
- 25% - 50%
- Less than 25%

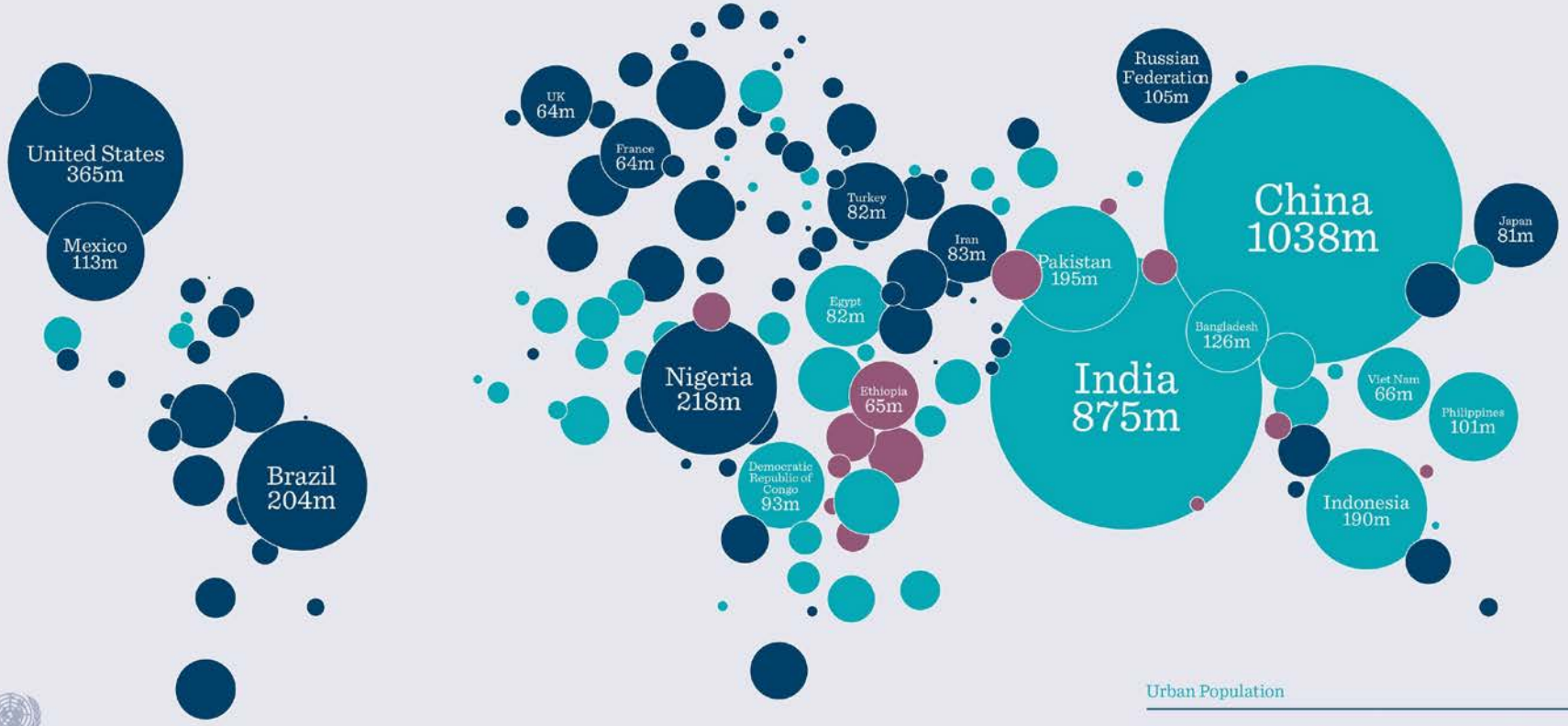
2010

Rapid Urbanisation



Figures from the United Nations

Rapid Urbanisation



Figures from the United Nations

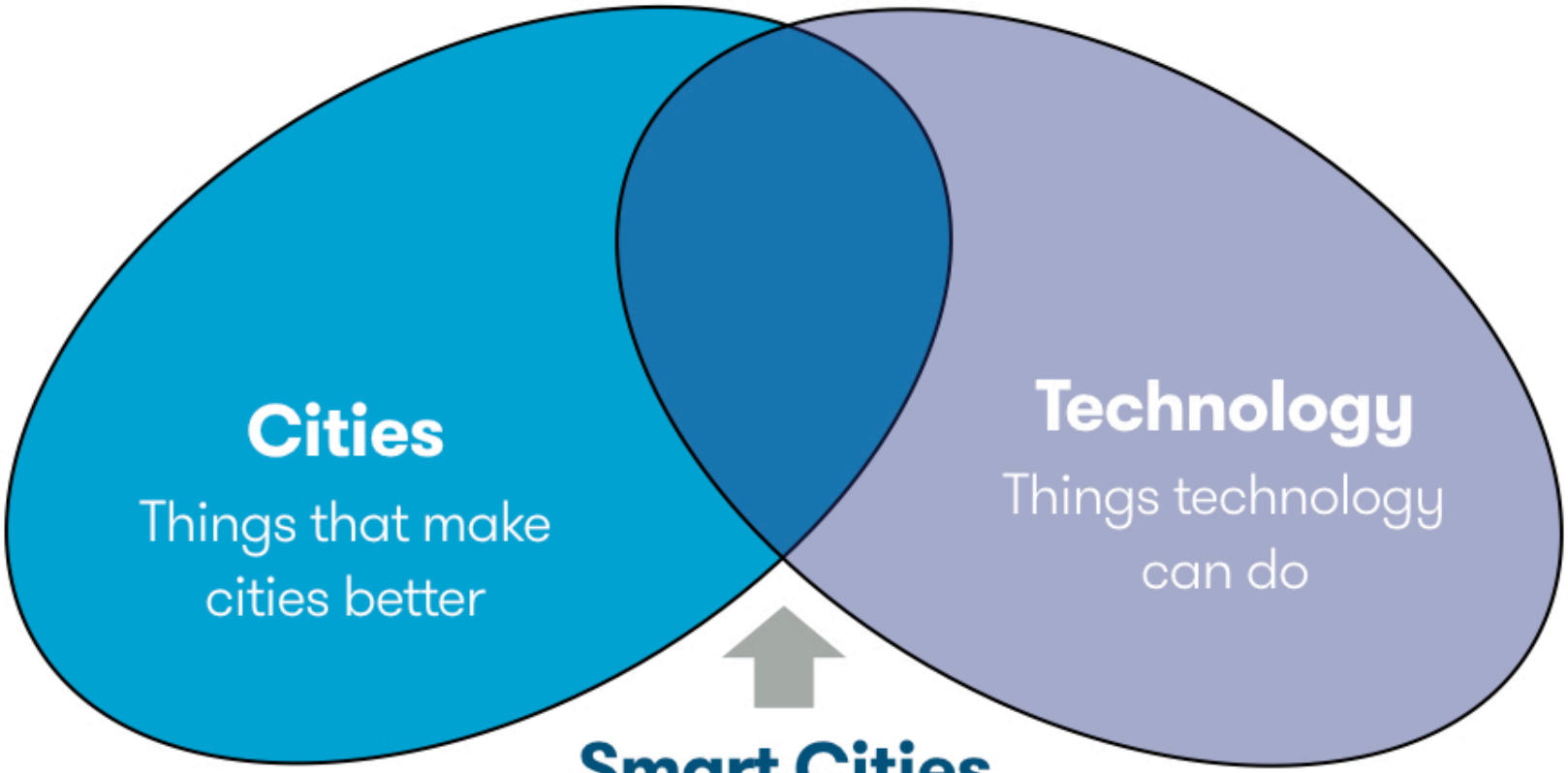
Urban Challenges

Cope
More people & data

Compete
More with less

Collaborate
More open

What are smart cities?




How do we build smart cities?

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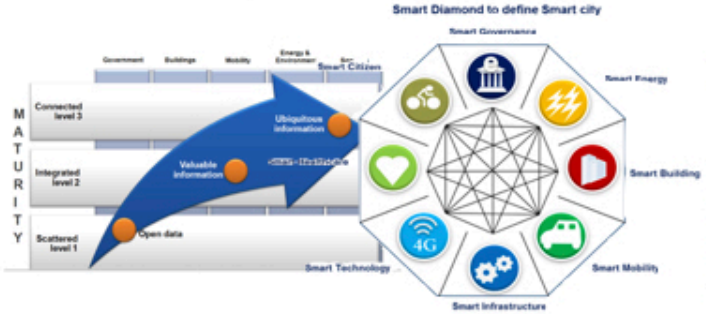


How do we build smart cities?

Strategic Intent | Data | Technology | Governance & Service Delivery | Citizen & Business Engagement

The Scottish Government – Riaghaltas na h-Alba
Llywodraeth Cymru – Welsh Government
scottishcitiesalliance
EDINBVRGH – The City of Edinburgh Council
Glasgow City Council
Dundee City Council
Aberdeen City Council
The Highland Council – Comhairle na Gàidhealtachd
Perth & Kinross Council
Stirling Council
Renfrewshire Council
Neath Port Talbot County Borough Council
The City of Newcastle
Basingstoke and Deane

“The integration of data and digital technologies into a strategic approach to sustainability, citizen well-being and economic development”

Urban Tide & Scottish Government

The Scottish Government
Riaghaltas na h-Alba

Llywodraeth Cymru
Welsh Government

scottishcitiesalliance

EDINBVRGH
THE CITY OF EDINBURGH COUNCIL

Glasgow City Council

Dundee City Council

ABERDEEN CITY COUNCIL

The Highland Council
Comhairle na Gàidhealtachd

Perth & Kinross Council

Stirling Council

Renfrewshire Council

North Port Talbot County Borough Council

The City of Newcastle

Basingstoke and Deane

How do we build smart cities?

Optimised — 5
City Mgt Status: Sustainable and Open 'System of Systems'
Smart City Status: Continuously adaptive city-wide 'smart' deployment
Outcome: City-wide open 'system of systems' approach drives innovation that enhances city competitiveness

Managed — 4
City Mgt Status: Managed System
Smart City Status: Technology and data enabled dynamic sense and response systems
Outcome: Improved prediction, prevention and real-time response delivers improved outcomes

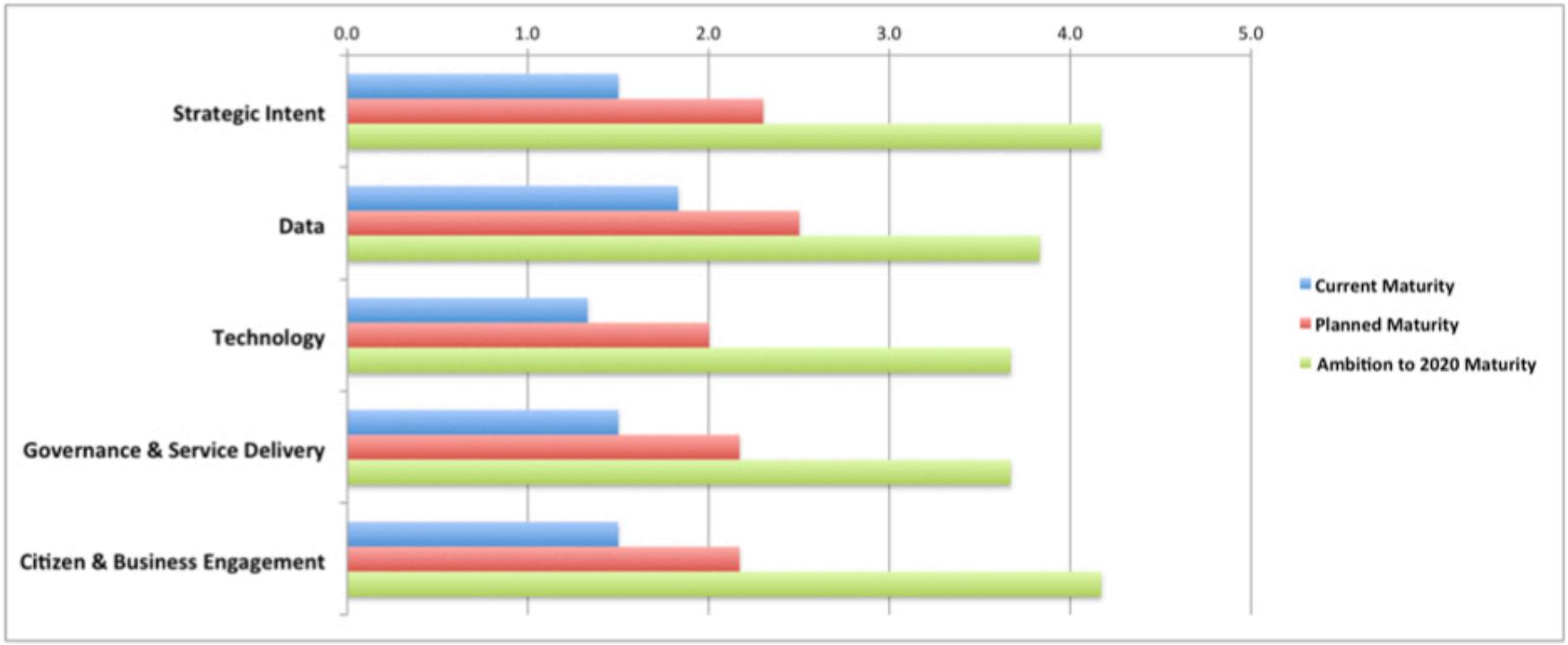
Repeatable — 3
City Mgt Status: System Integration
Smart City Status: Strategy led and outcome driven, enabled by system wide technology investment
Outcome: Shared accountability for outcomes and joint system-wide investment programme

Opportunistic — 2
City Mgt Status: System Collaboration
Smart City Status: Holistic system thinking and emergent sharing of data
Outcome: Cross boundary partnerships emerging to focus on shared outcomes

Ad Hoc — 1
City Mgt Status: Siloed
Smart City Status: Operation focused digital and data driven service improvement
Outcome: Capturing evidence and building business case

http://www.scottishcities.org.uk/site/assets/files/1103/smart_cities_readiness_assessment_-_guidance_note.pdf

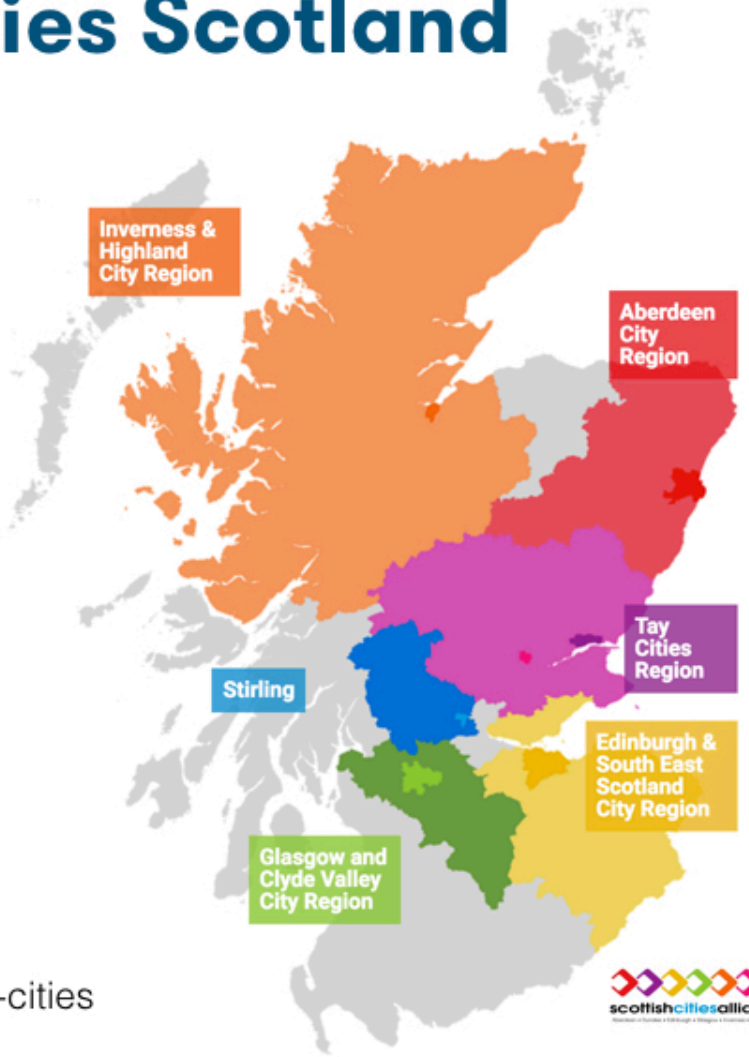
Overview of Scotland Smart Cities Maturity



Smart Cities Scotland

smart cities scotland

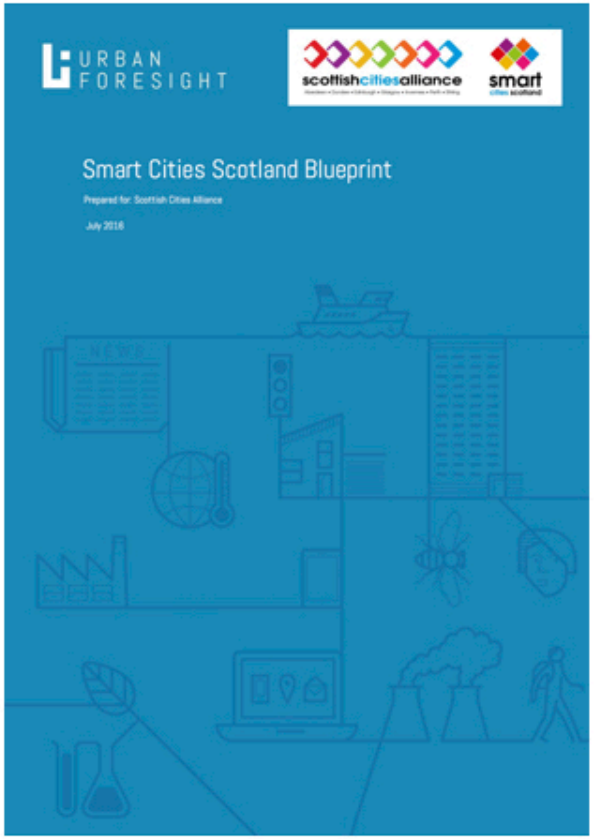
One collaborative application for European Funds



http://www.scottishcities.org.uk/workstreams/smart-cities

scottishcitiesalliance

EUROPE & SCOTLAND
European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future



Scotland Blueprint

5 key areas

Smart & Healthy Living:
Data-led smart & healthy living test-bed

Circular Economy:
Manage the flow of resources within and between cities

Collaboration & Engagement:
Sharing & learning platform

Open Data & Transparency:
Code for Scotland

Technology & Innovation:
MaaS Scotland


Smart Data

Making data smart = reusable beyond its original purpose

Where do I build my next housing development?

- ✓ Demographic forecasts
- ✓ Land ownership
- ✓ Planning applications

Making data smart = reusable beyond its original purpose

Where do I build my next housing development?

- ✓ Demographic forecasts
- ✓ Land ownership
- ✓ Planning applications

How do I reduce the cost of waste collection?

- ✓ Location & Customer info
- ✓ Bin sensors
- ✓ Route mapping

Making data smart = reusable beyond its original purpose

Where do I build my next housing development?

- ✓ Demographic forecasts
- ✓ Land ownership
- ✓ Planning applications

How do I reduce the cost of waste collection?

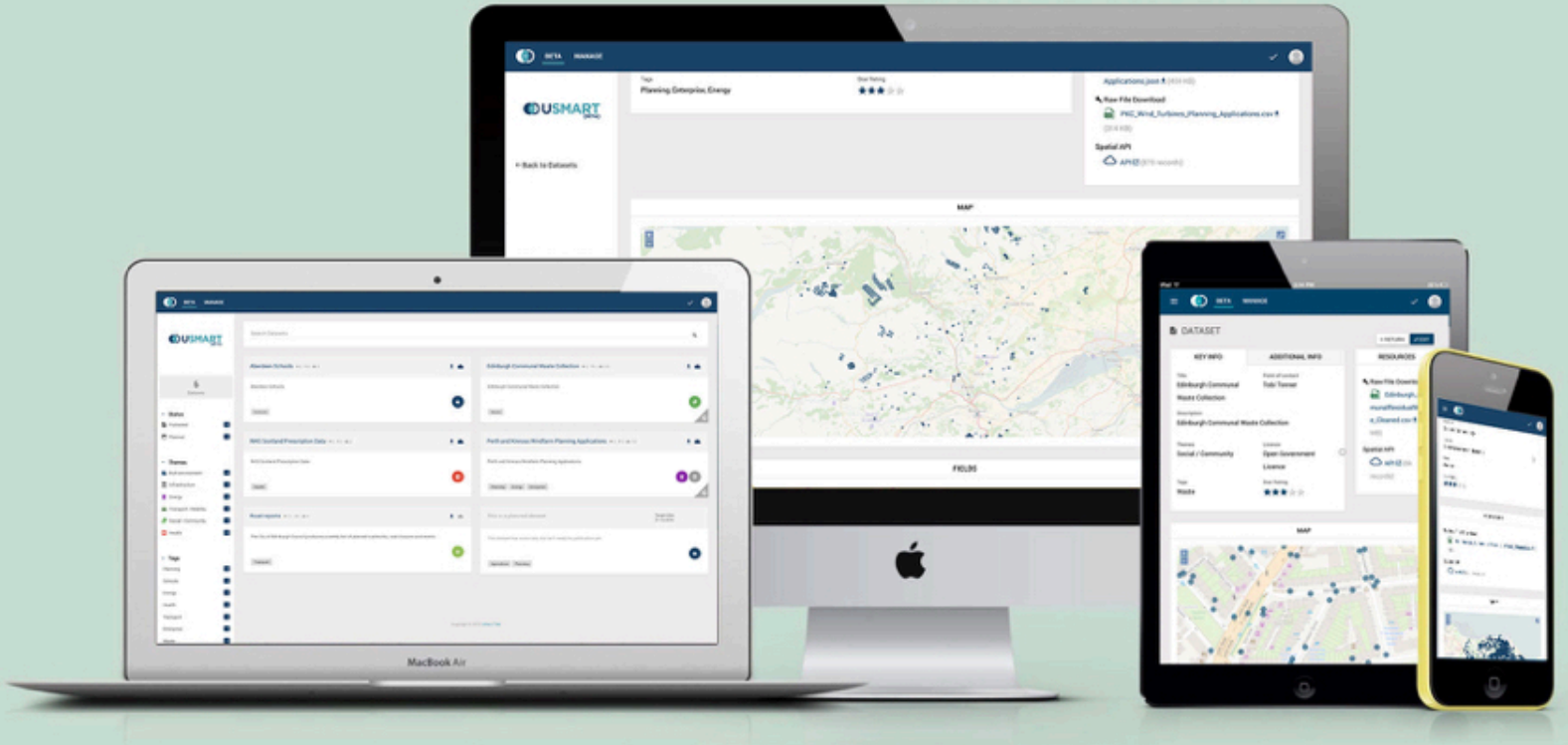
- ✓ Location & Customer info
- ✓ Bin sensors
- ✓ Route mapping

How do I plan my route to work?

- ✓ Public transport
- ✓ Congestion & parking
- ✓ Air quality

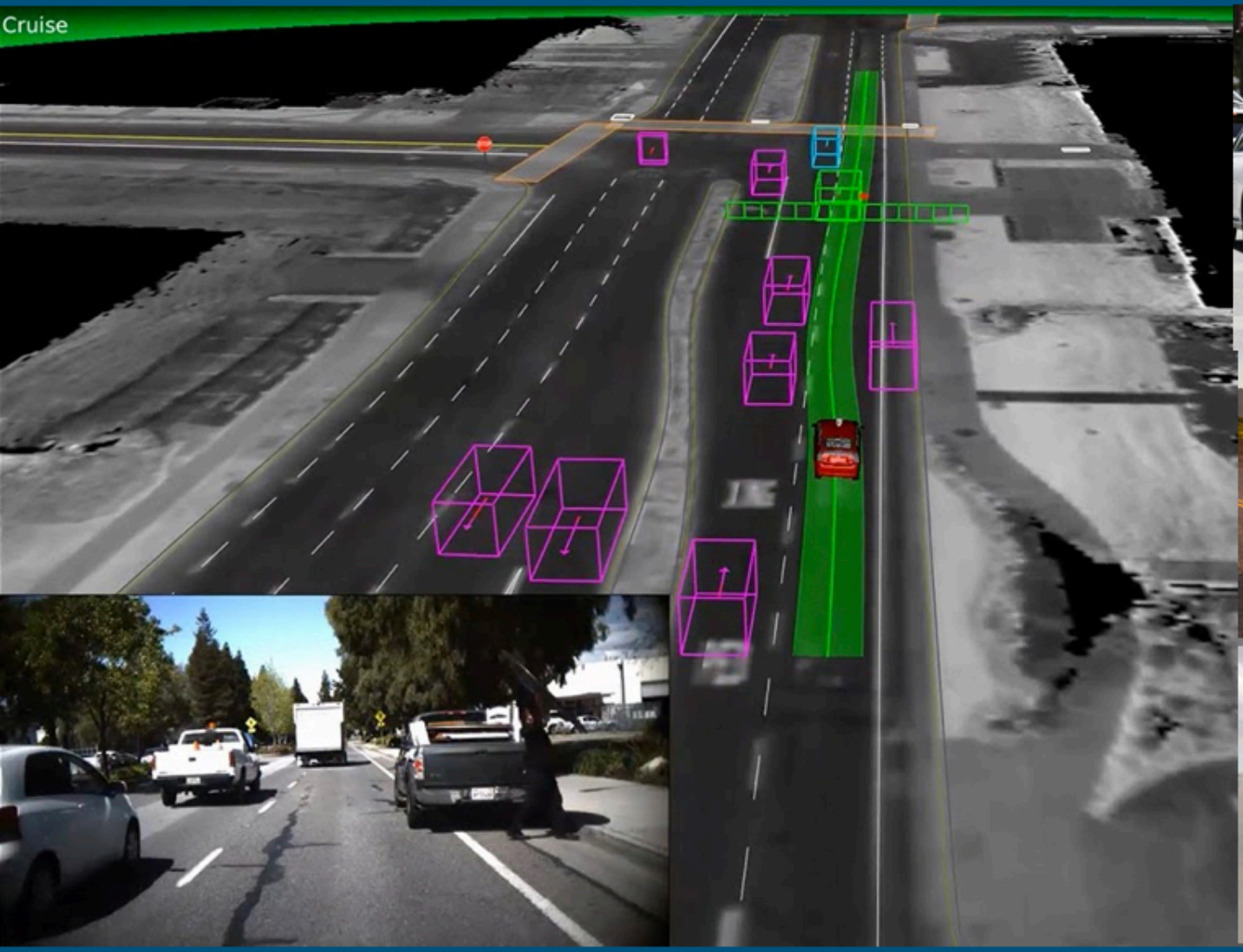
Making data smart = reusable beyond its original purpose

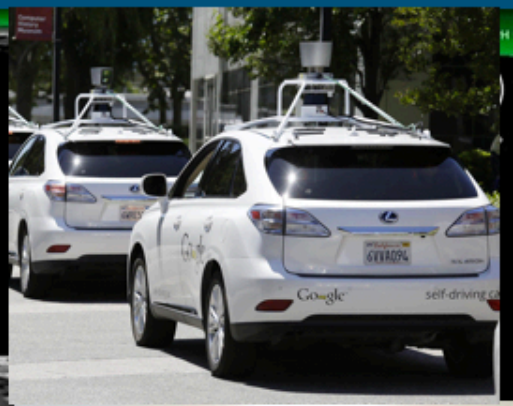
USMART



Making data smart = reusable beyond its original purpose

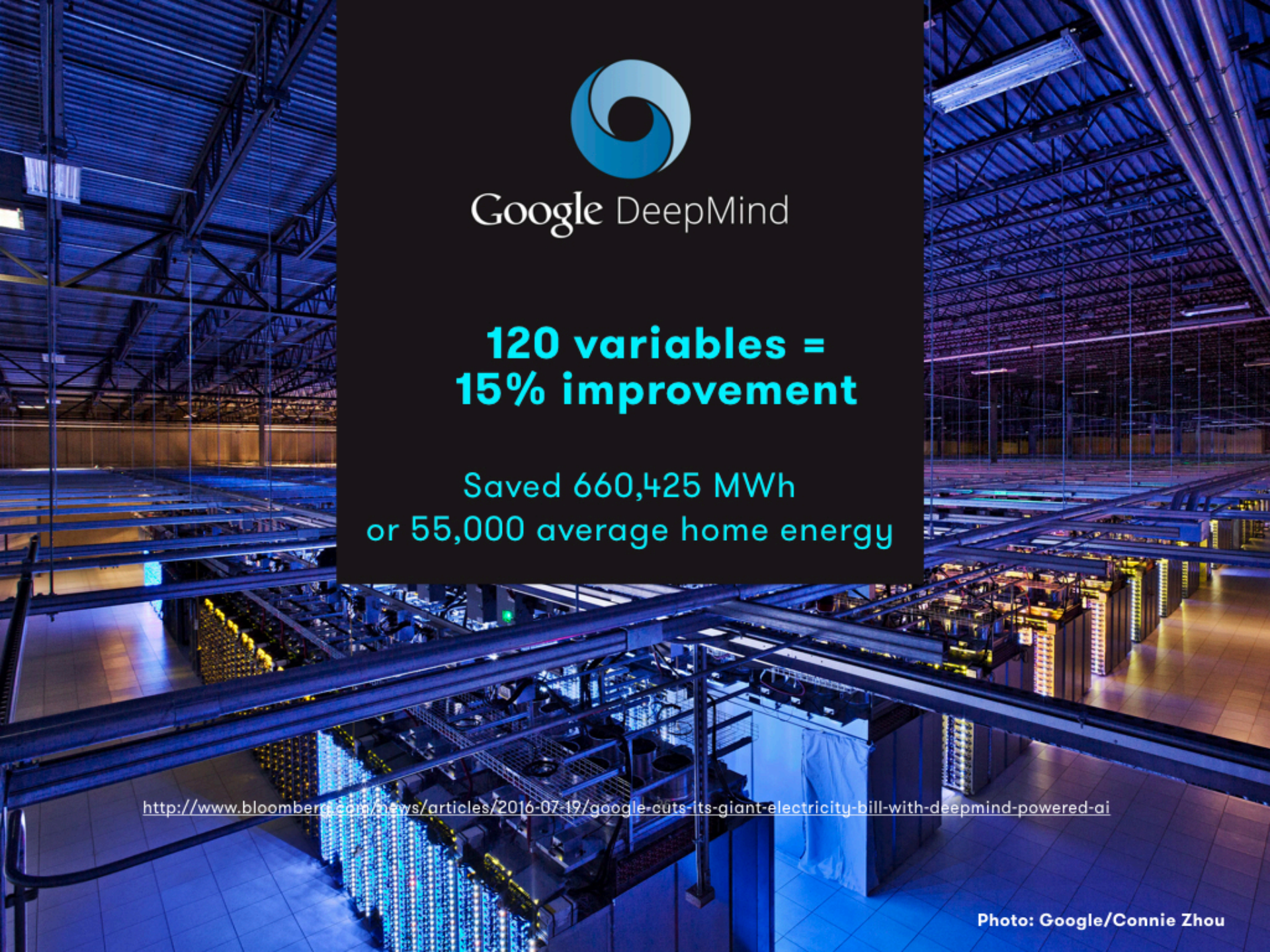

Examples





Over one billion cars on the road today

Most cars are parked about 95% of the time.


Google DeepMind
120 variables =
15% improvement
Saved 660,425 MWh
or 55,000 average home energy
http://www.bloomberg.com/news/articles/2016-07-19/google-cuts-its-giant-electricity-bill-with-deepmind-powered-ai
Photo: Google/Connie Zhou

DATA FEST 2017

March 20th - 24th | Scotland

EVENTS

UrbanTide

Play & Work with Open Data

EDINBURGH

Learn how to navigate through the evolving open data ecosystem in this hands-on workshop where you will gain practical knowledge in the use and application of open data.

Event Date: Tuesday 21st March 2017

Event Host: UrbanTide

Time: 9:30am - 4pm

Location: Codebase, 32 Castle Terrace, Edinburgh, EH3 9DZ

REGISTER HERE

UrbanTide

How Data Transforms Cities & Communities

EDINBURGH

Showcasing USMART - UrbanTide's next generation data sharing platform for open data, real-time data and smart organisations, the event will include a series of talks and presentations by members of the open data and smart cities community in Scotland.

Event date: Tuesday 21st March.

Event host: UrbanTide

Time: 6pm – 9/9.30pm

Location: Codebase, Edinburgh

REGISTER HERE!

Loads of events and great speakers

www.datafest.global

UrbanTide

Please visit
www.UrbanTide.com
for more Smart Cities insights

SR Low-Carbon Cities Conference

Simon Tricker - Co-Founder & CDO

22nd February 2017

Richard Long

Head of Business Development - Urban Energy

ENGIE UK

Retrofitting District Heating

Low Carbon Cities Conference
Edinburgh
22nd February 2017

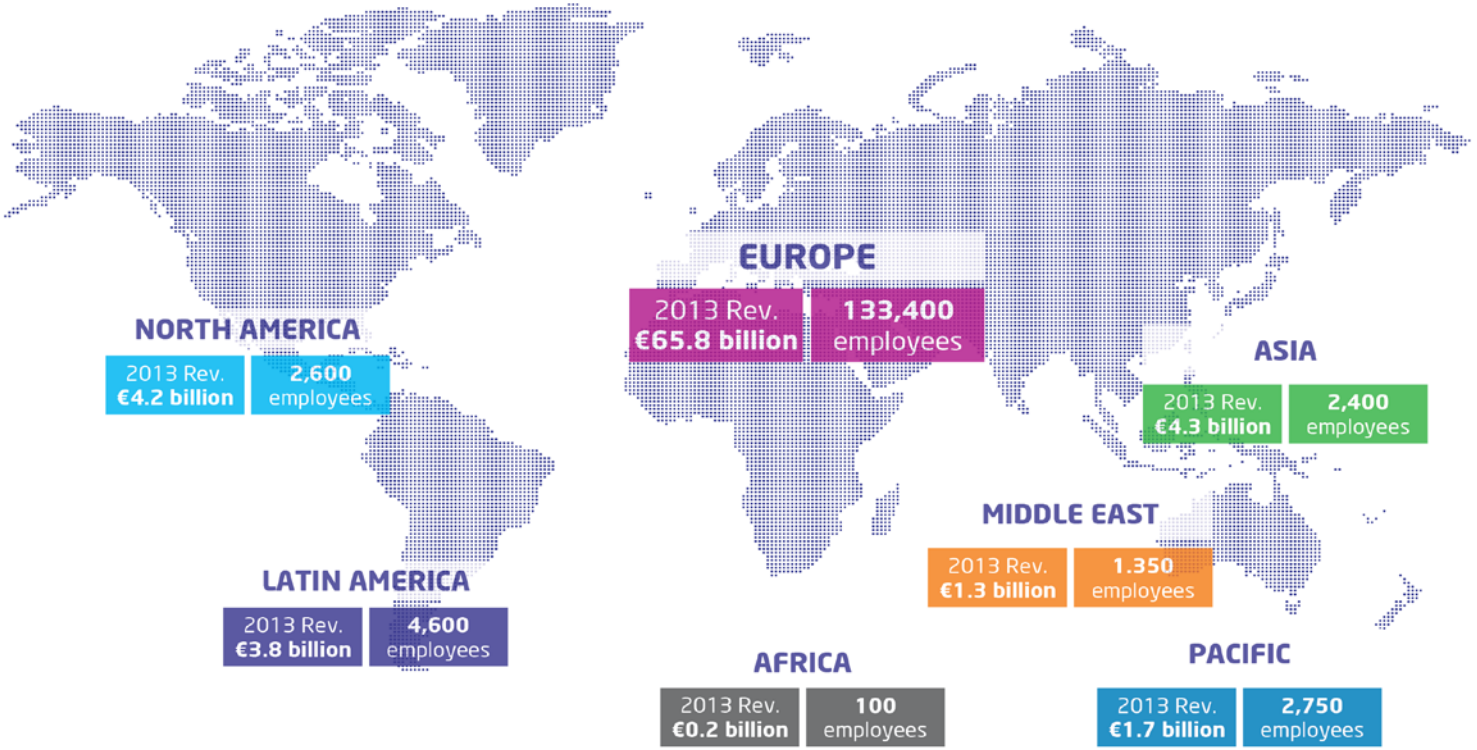
ENGIE

A Global leader in Energy Infrastructure, Solutions and Services

Activities in **70** countries

ENGIE is the **24th** largest global organisation

147,200 employees worldwide



No.1
independent power producer in the world

113.7 GW
of installed power production capacity

€74bn
revenue in 2014

ENGIE in the UK

£2.8bn
UK turnover

25m
M^2 of space managed

20,000
Employees

No. 1
In district and industrial energy

5GW
Of power generation capacity

27,000
Customer sites

SUSTAINABLE CITIES – INTEGRATED SOLUTIONS

Cities' Needs

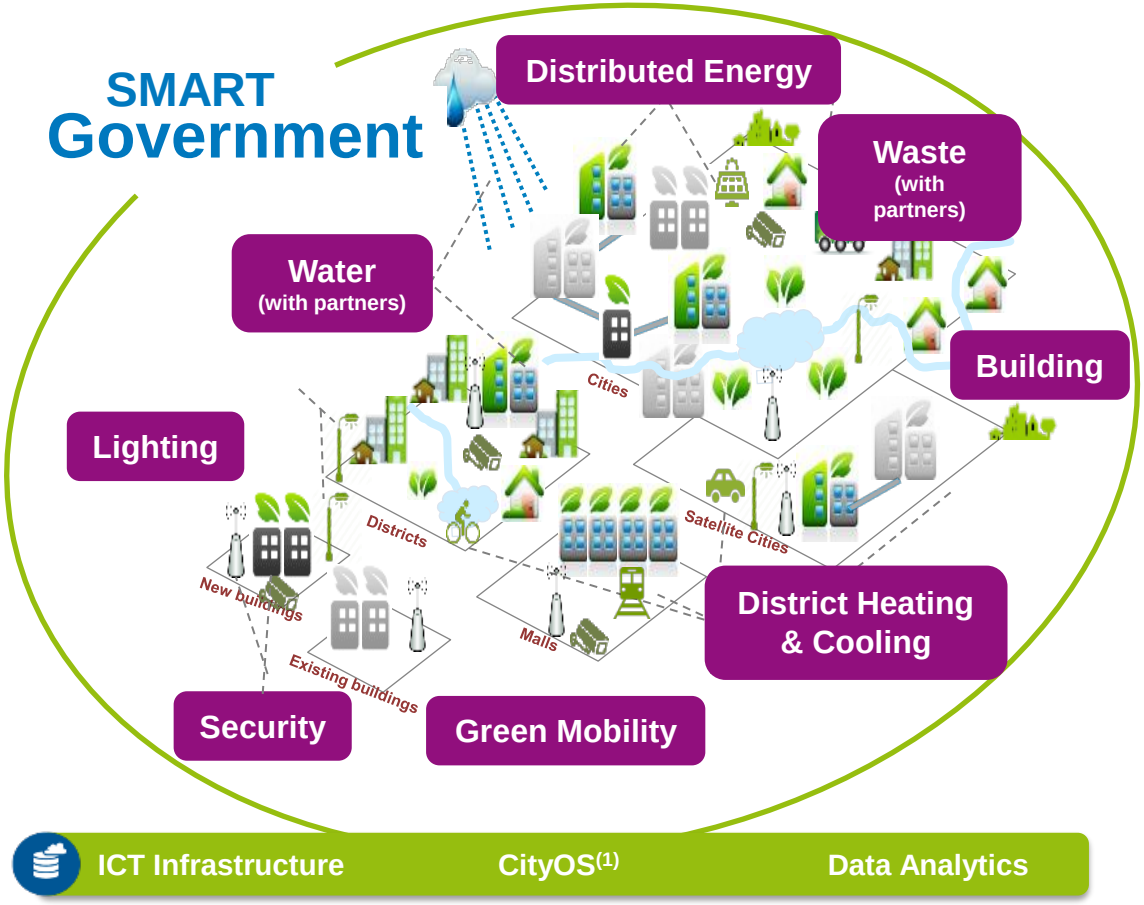
To improve
Security and Resilience

To benefit from
Fluid & Green mobility

To ensure an
Enjoyable environment

To develop the
Local attractiveness

To allow to
Reduce costs

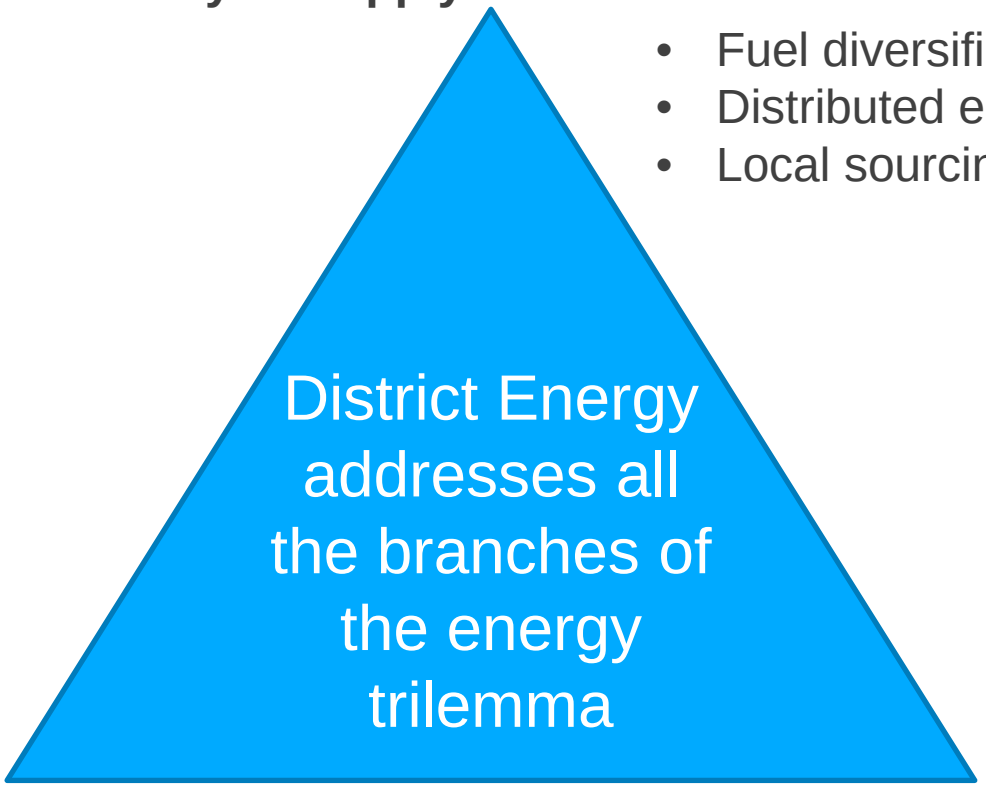


ENGIE > 200 District Energy References

District Energy – Meeting the Energy Trilemma

Security of Supply

- Fuel diversification
- Distributed energy
- Local sourcing



Affordability

Potential for lower cost heat

Climate Change

Low carbon heat

- CHP
- Biomass/EfW
- Heat pumps

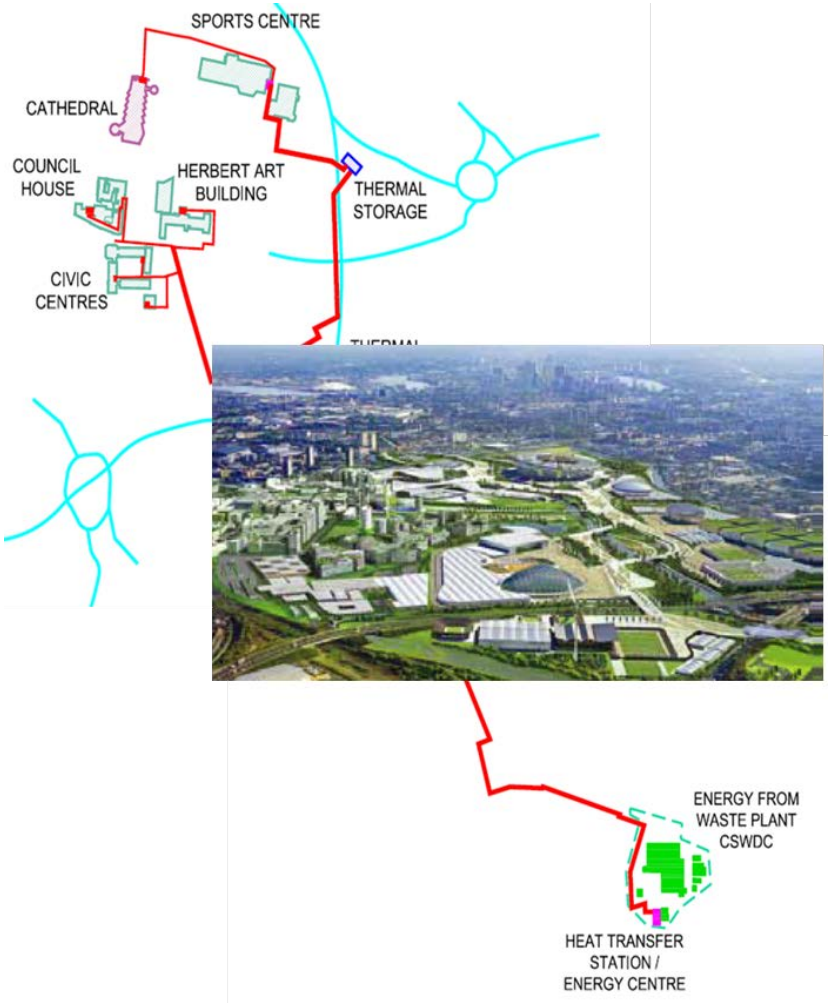
District Energy – Opportunities

Deployment

- Retrofit to existing buildings
- New build developments
- Extensions to existing networks
- Repowering of existing networks
- Heat from energy-from-waste, biomass and other heat producers

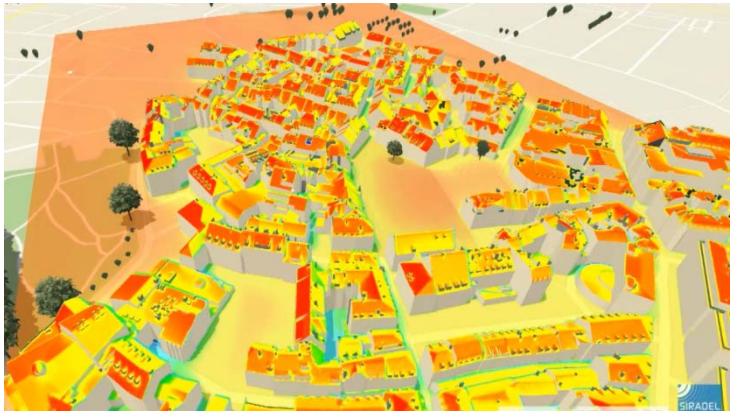
Funding and operation

- Public Sector
- Private Sector
- Partnerships



District Energy – Key Challenges

- Widely available gas network
- Installing in dense urban areas
- Customer uptake and perception
- Viability
- Planning consent
- Long-term carbon sustainability
- Inconsistency with other policy measures



District Energy – Policy and Incentives

Increasing Policy Support and Incentives

- In Scotland 1.5TWh of heat demand to be met by district heating by 2020.
- Heat Networks Partnership for Scotland and District Heating Action Plan.
- District Heating Load Fund
- Planning Policy
- Heat mapping
- RHI
- HNDU/HNIP in England and Wales

District Energy – Customer Behaviour

Key Issues

- Lack of familiarity / inertia
- Adverse press
- Unregulated – pricing, monopoly Supply and complaints
- Long-term operation and maintenance

Approach

- Heat Trust
- Welcome Packs
- ESCos
- Clear contracts with KPIs

HEAT TRUST

HEAT SUPPLY YOU CAN TRUST

Technology – Decarbonisation and Future Proofing

- Long-life heat network
- Technologies
  - Gas CHP
  - Biomass
  - Heat from EfW
  - Heat pumps
  - Geothermal
  - Biogas
- Private wires and embedded generation

Richard Long

Head of Business Development

ENGIE Urban Energy

Tel: 07973 723460
richard.long@engie.com

Closing Remarks

Rachelle Money
Director of Communications
Scottish Renewables

HEADLINE SPONSOR

ENGIE

scottish renewables

LOW-CARBON CITIES CONFERENCE

22 FEBRUARY 2017 **EDINBURGH**