



Cofely District Energy

Presentation to CHP Conference

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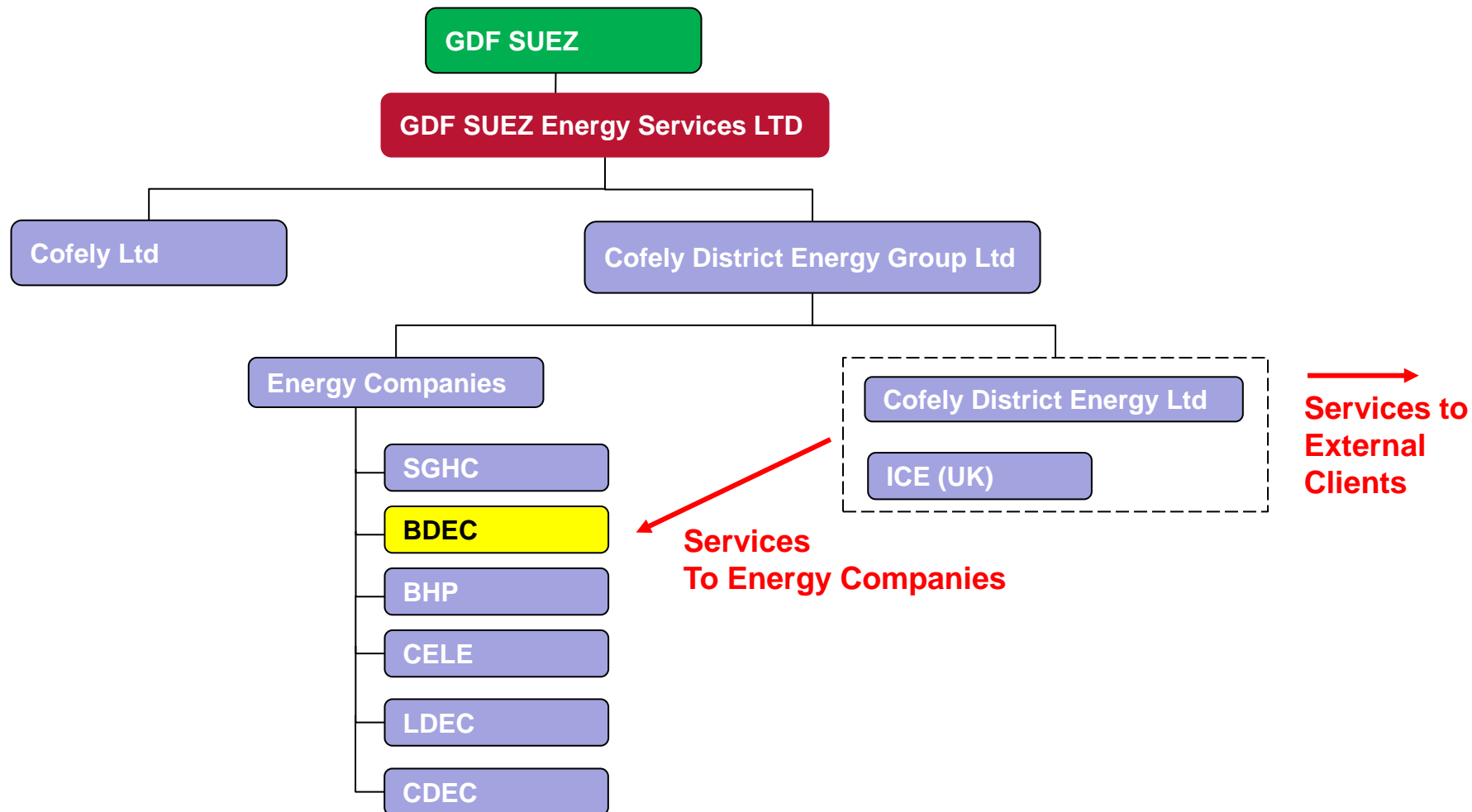
Introduction

- BDEC, COFELY DISTRICT ENERGY & GDF SUEZ
- Combined Heat & Power (CHP) and District Energy
- Birmingham District Energy Company (BDEC)
 - Background
 - Partnership
 - Technical
 - Benefits
- Other Case Studies
 - Southampton
 - Olympics
 - Leicester
 - Coventry
- Summary

- > **No. 1** - World's largest multi-utility (Forbes Top 2000)
- > **€97 billion** turnover
- > **€11 billion** gross investment (2012);
- > **217,550** employees throughout the world
 - > 60,700 in electricity and gas
 - > 77,350 in energy services
 - > 79,500 in environmental services
- > **118 GW** of installed capacity (12 GW under construction);
- > **1,100** researchers and experts in **9** R&D centers
- > Operational presence in almost **70** countries
- > **6** business lines



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- ▶ **£2.5bn** revenue stream over the concessions
- ▶ **77,000 tonnes** CO₂ saved per annum
- ▶ **270 GWh** energy sales per annum

Manchester

MediaCity UK

London

Olympic Park & Stratford City
Whitehall
Bloomsbury Heat & Power
Greenwich Millenium Village
Equinox, Hatfield
ExCel Arena

Midlands

Leicester District Energy
Birmingham District Energy
Coventry District Energy

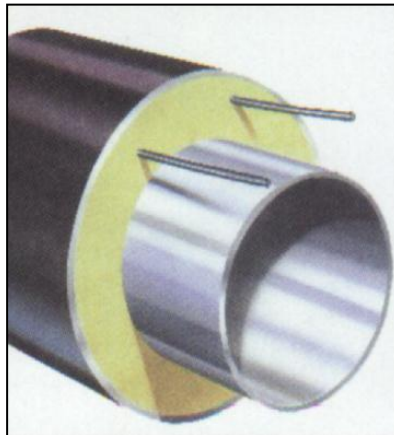
South Coast

Southampton Geothermal
Eastleigh



District Energy

- Piped heating & cooling services to buildings – “Energy Linking”
- Pre-insulated pipe, buried circa 1-1.5m below ground in the highway
- Pipe can be plastic (HDPE) or Steel and is typically between 100mm and 500mm (OD)
- Heat losses generally $< 0.5^{\circ}\text{C}$ per km
- Reliability $\sim 100\%$ (e.g. 99.98% for Southampton over 25 years)
- Networks last for > 50 years
- Energy density is key, i.e. Size of heat load and distance from network



Typical pipe work Installation

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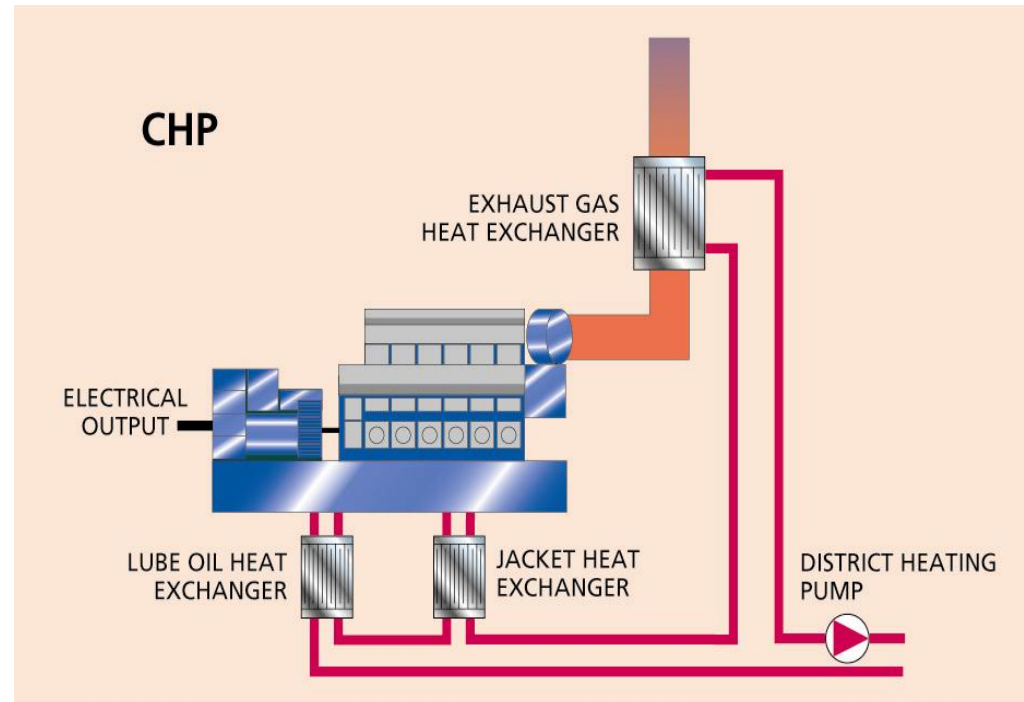
Suitable Technologies for heat networks?

Many and Varied !

- The energy network is the priority
 - but consider the generation technology too
- **Networks are technology agnostic**
 - they don't mind where the heat comes from
- The key principles must be **lower carbon and lower cost**
- Generation technologies can include:
 - ✓ Biomass – e.g. wood chip and pellets
 - ✓ Deep Geothermal
 - ✓ Industrial Heat Sources
 - ✓ Energy from Waste
 - ✓ **Gas Fired CHP**
 - ✓ Bio CHP
 - ✓ Pyrolysis
 - ✓ ... Etc

Combined Heat and Power (CHP)

- CHP produces heat in the form of recovered hot water/steam and electricity
- Higher efficiency (80-85% compared with traditional thermal power station 25-35% and gas boilers)
- Gas turbines, steam turbine or reciprocating engines
- Fuel 'agnostic' – biogas, vegetable oil, biomass etc



City Wide DE Scheme

12,000 tonnes CO2 saved p.a.

3 Core Partners

Providing heat chilled water & electricity from

4 Energy Centres

7.5MWe_{CHP}

Birmingham District Energy
Company, Birmingham



The Background

- District energy is part of BCC's long held a vision to develop large scale sustainable energy infrastructure across the city and reduce its CO₂ emissions by 60% by 2025.
- Following various feasibility studies and development of the business case between 2004-06, BCC, Aston University & Birmingham Children's hospital commenced a single OJEU procurement process for a long term energy services contract to develop, operate and supply energy via a district energy scheme for the City for 25 years.
- CDE were successful in winning this bid and incorporated a new ESCo, the Birmingham District Energy Company (BDEC) as the wholly owned company to deliver the schemes.
- Agreements with the core partners were signed between 2006-09

The Commercial Framework

- 25 year agreements with BCC, Aston and BCH
- 100% risk transfer to BDEC i.e. responsibility for existing assets, efficiency etc all rests with BDEC plus new investments in CHP and other plant
- Financial savings (on a whole life cost basis) maintained throughout the contract by indexing charges to national fuel prices, RPI etc
- Scheme supplies heat, chilled water and electricity to agreed output specifications with penalties for non performance
- Savings to consumers >£0.5M p.a.
- Emission reductions of 14,000 tCO₂ p.a. with target for 20,000 tCO₂ through growth and low carbon supply
- Extensions to Third Parties increase the benefits to all – better CO₂ savings

Benefits to Third Party Consumers

- **Capital cost savings**
 - connection charge up to 20% less than conventional plant
- **Operating cost savings**
 - up to 10% saving compared to alternative cost of heating/cooling
- **Guaranteed Savings**
 - prices index linked to market prices to ensure savings are maintained
- **Carbon Savings**
 - Building Regs, BREEAM, CfSH, CSR targets
- **Risk Transfer**
 - no mechanical plant, flues, gas etc on site
- **Space savings**
 - very little plant space required compared with boiler house and more flexible in terms of location

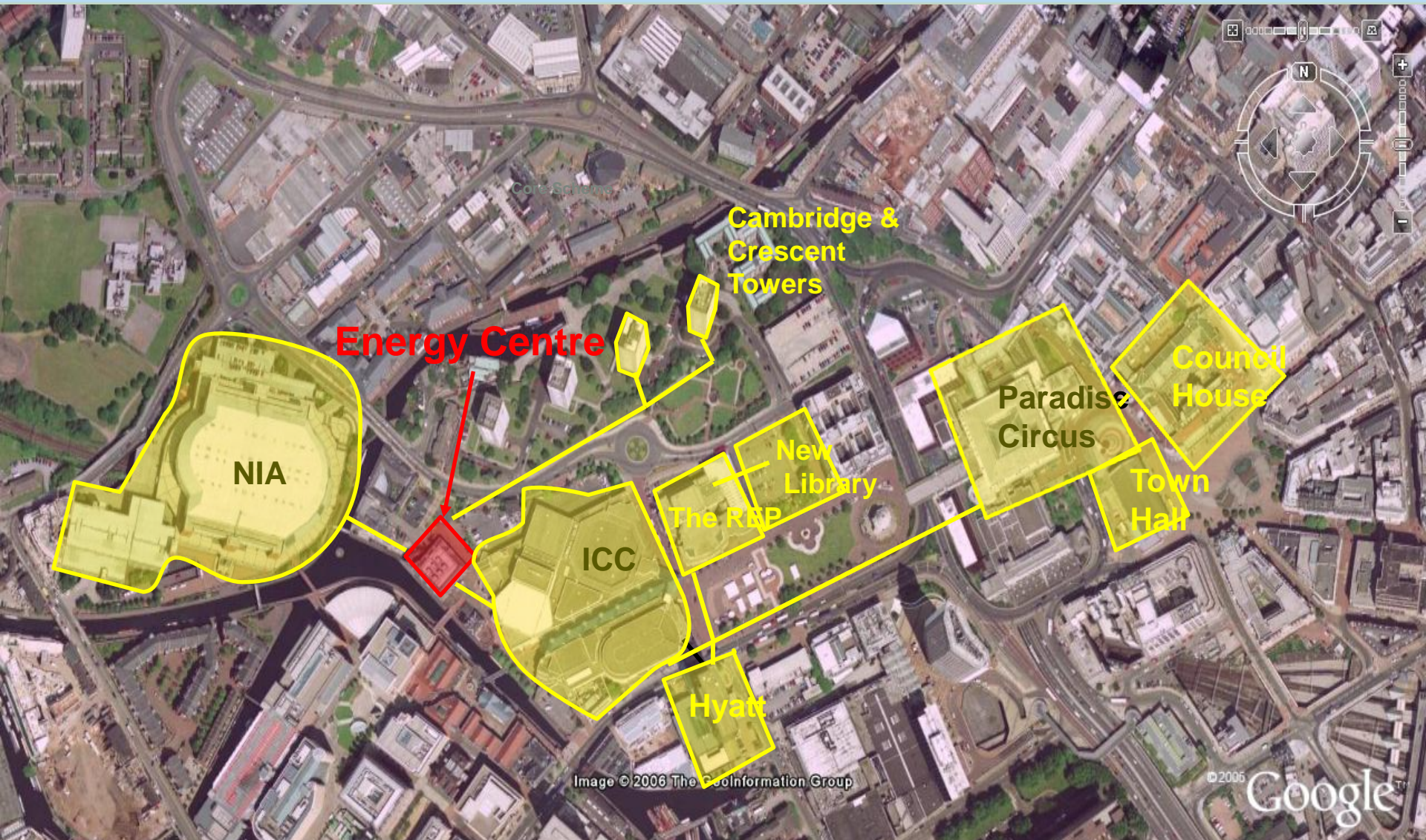
- Large commercially developed CHP/district energy scheme
- Commenced 2006
- 3 Initial Schemes: City Centre, Aston University & Birmingham Children's Hospital
- £7.0 M p.a. Energy Sales
- £0.5 M p.a. cost savings to consumers
- 14,000 tonnes of CO₂ saved p.a.
- 7.5 MWe of CHP (incl. LoB)
- Supplying heating, cooling and electricity
- Project built on 25 year energy supply contracts
- Capital cost to date £7M



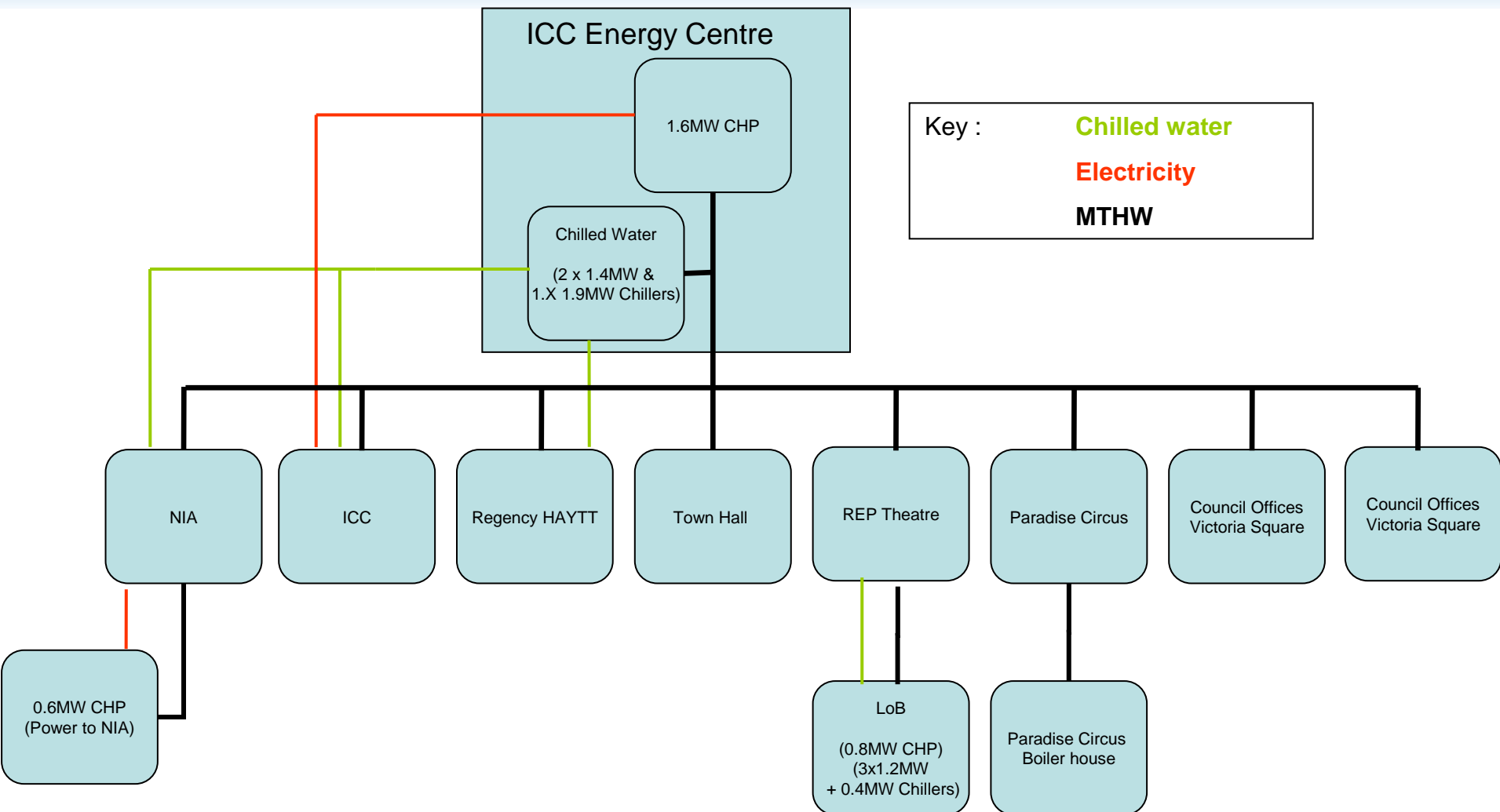
Broad Street Scheme

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Broad Street Scheme - Installation



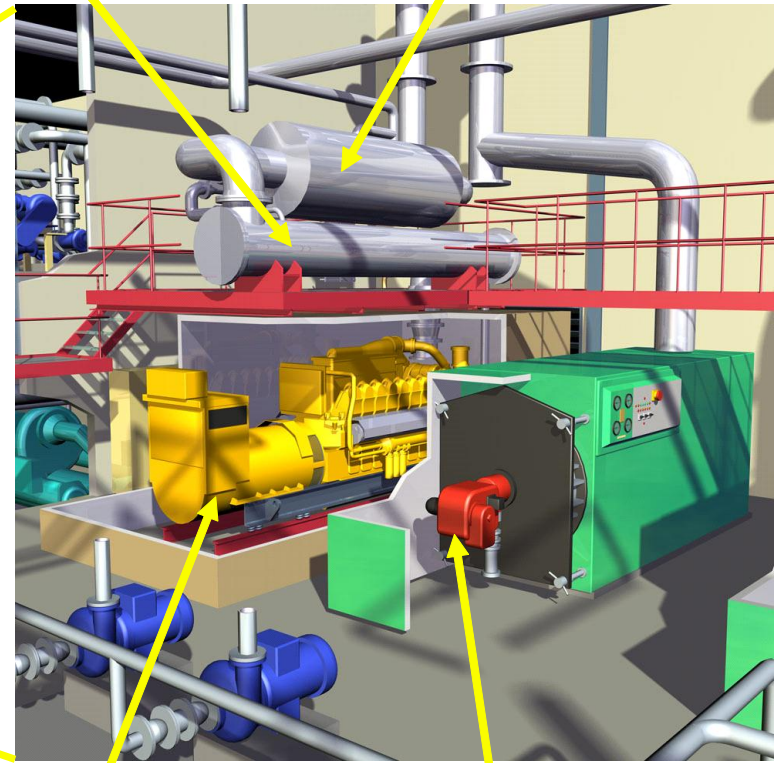
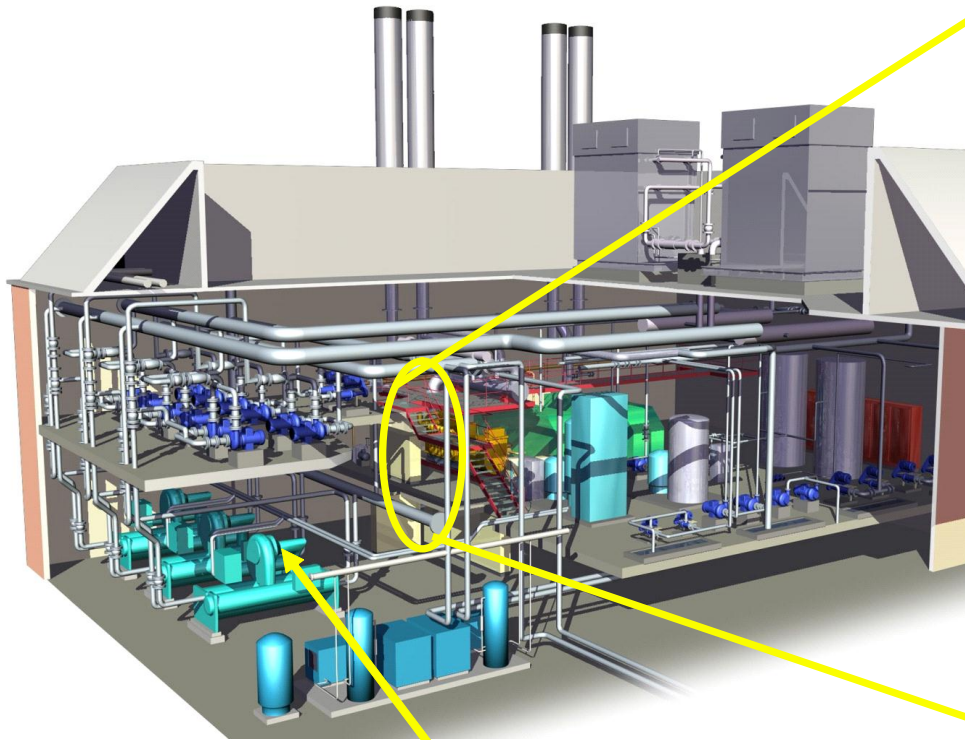
Broad Street Energy Centre

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Exhaust Gas Heat Exchanger

Silencer



Chillers for Cooling

CHP (1.6 MW_e gas fired)

Gas Boiler
(top up back up)

Birmingham - Eastside Schemes

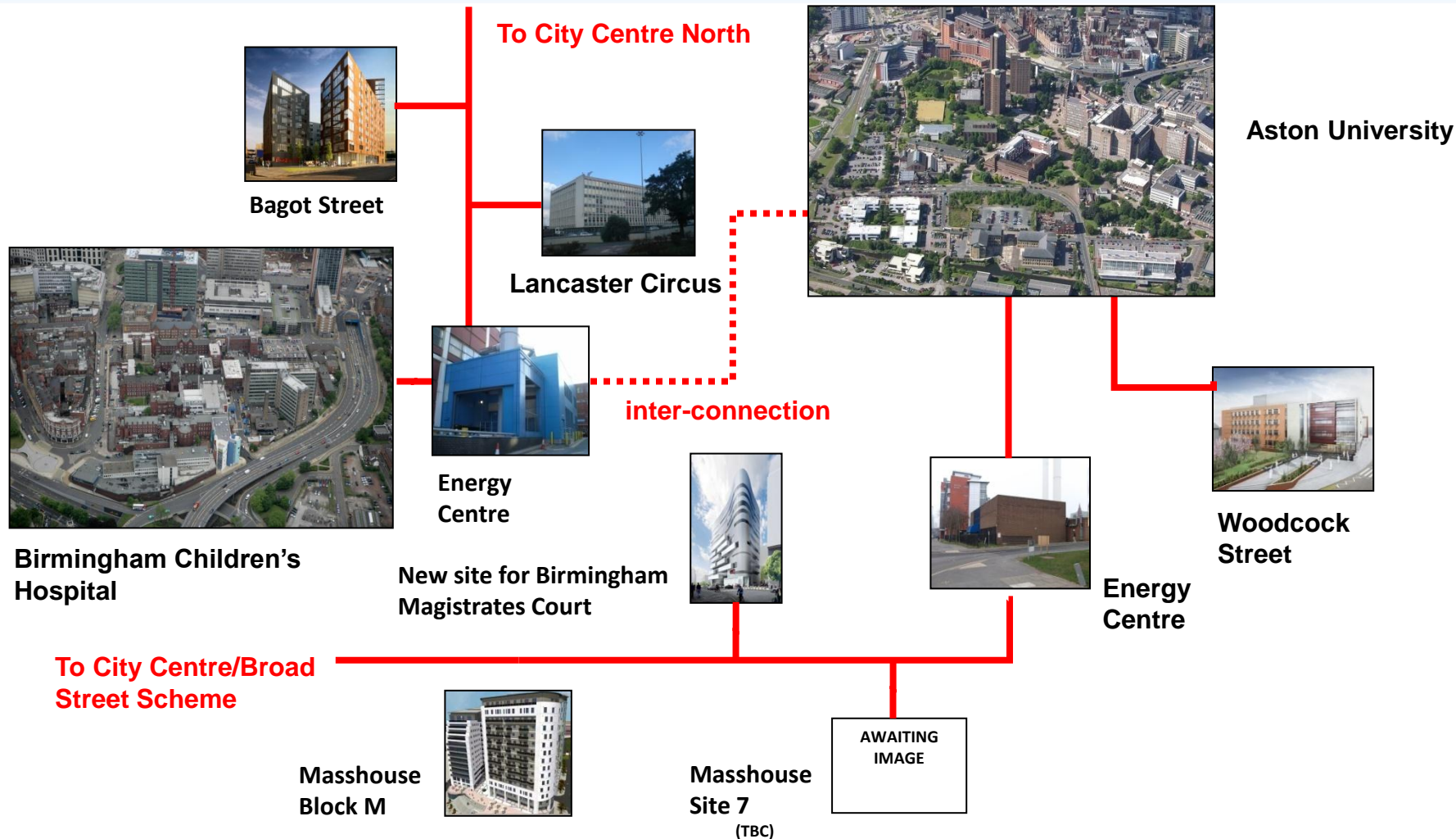
1. Phase I – Aston University

- CHP – 1 x 2.0MW & 1 x 1.0MW in existing boiler house
- 2 x 3.5 MW + 1 x 7.3 MW back-up/top-up gas boilers
- Energy Sales - £2M
- Carbon Savings - 5,300 Tons of CO₂

2. Phase II – Birmingham Children's Hospital and BCC Lancaster Circus

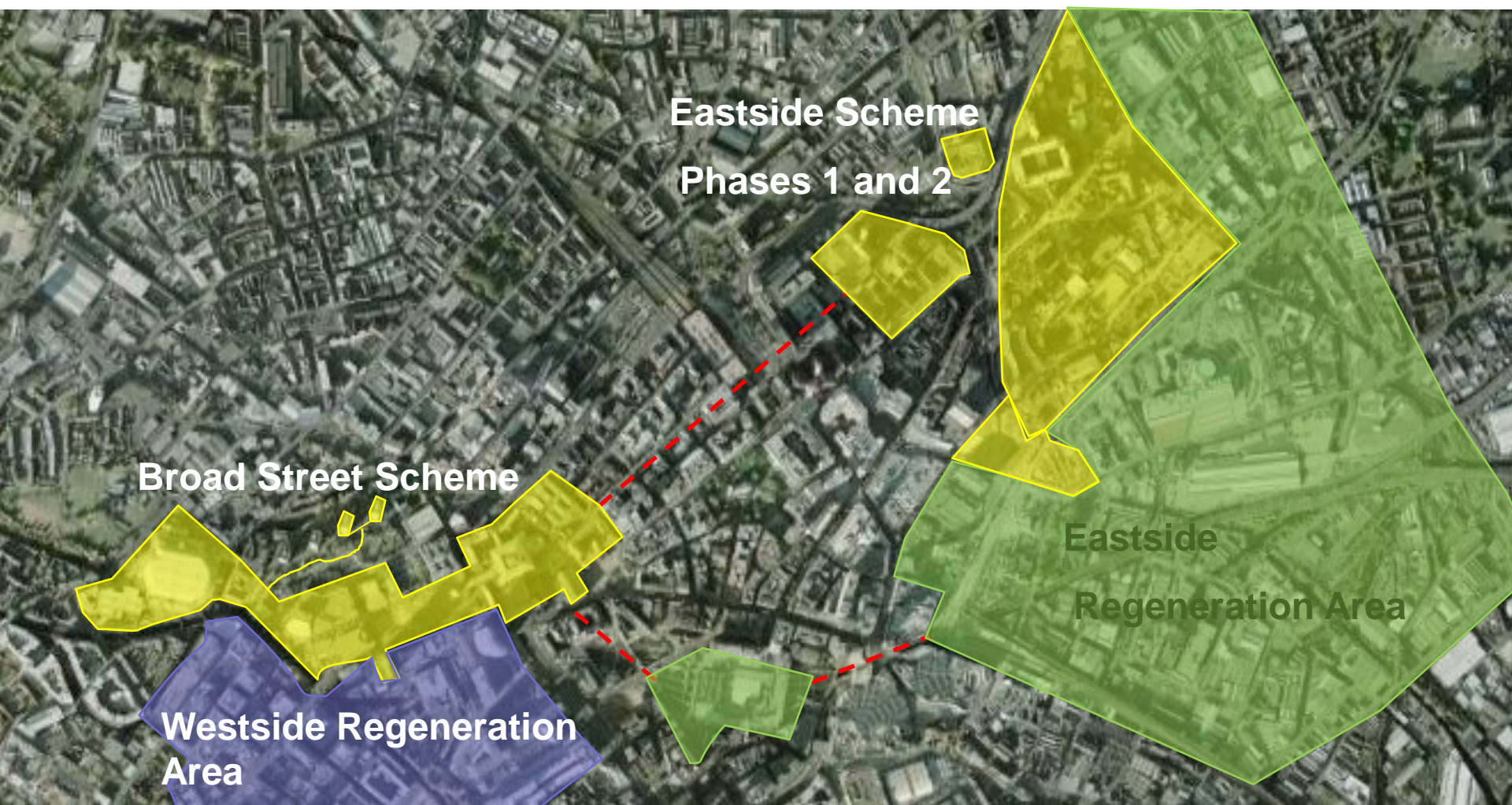
- CHP – 1.6 MW in new energy centre
- 2 x 4.5 MW back-up/top-up gas boilers
- Application made for £1M NHS Capital Grant
- Energy Sales - £1.04M
- Carbon Savings - 3,500 Tons of CO₂

Eastside Scheme





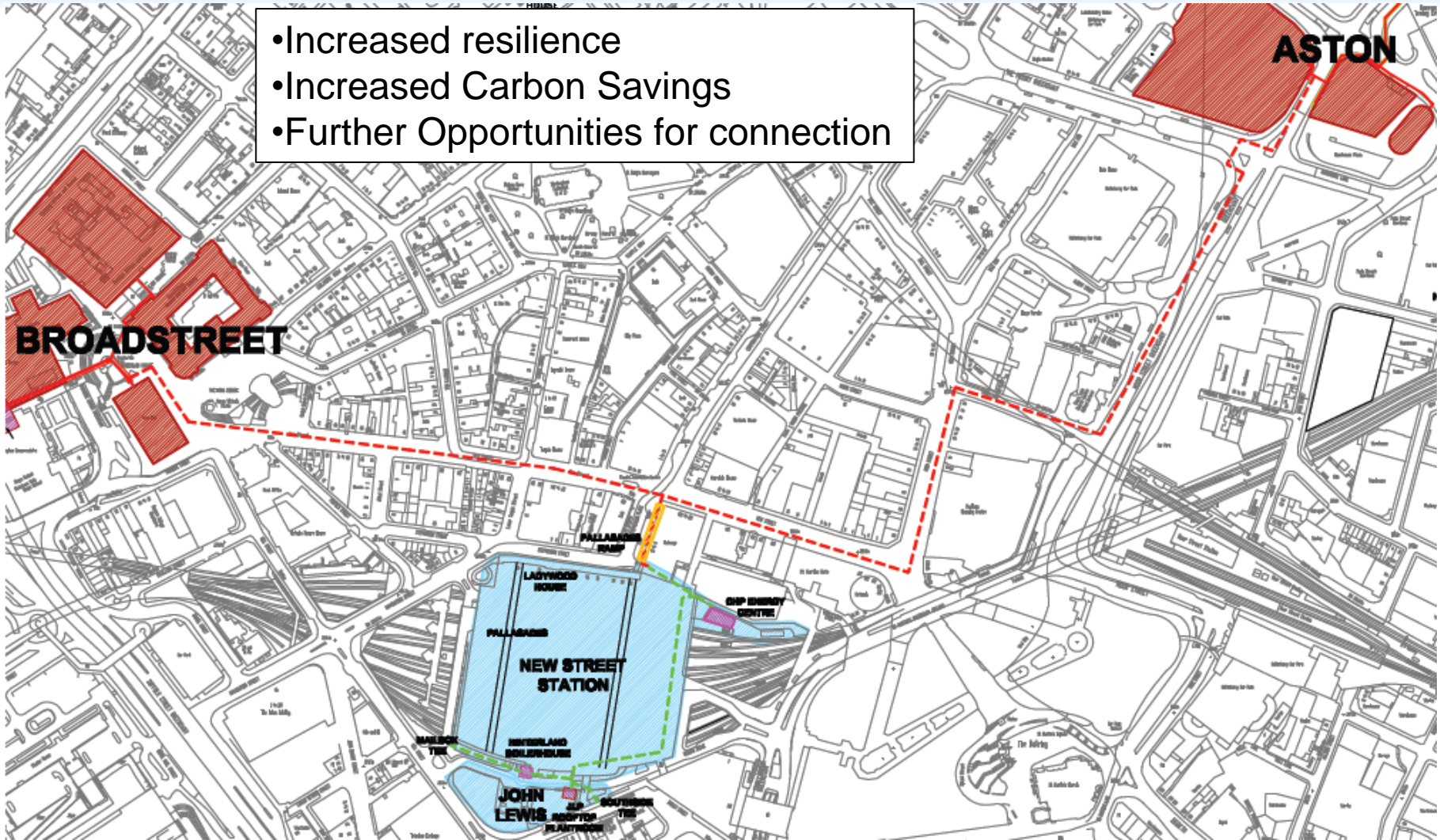
Combined Schemes



----- Potential future energy links

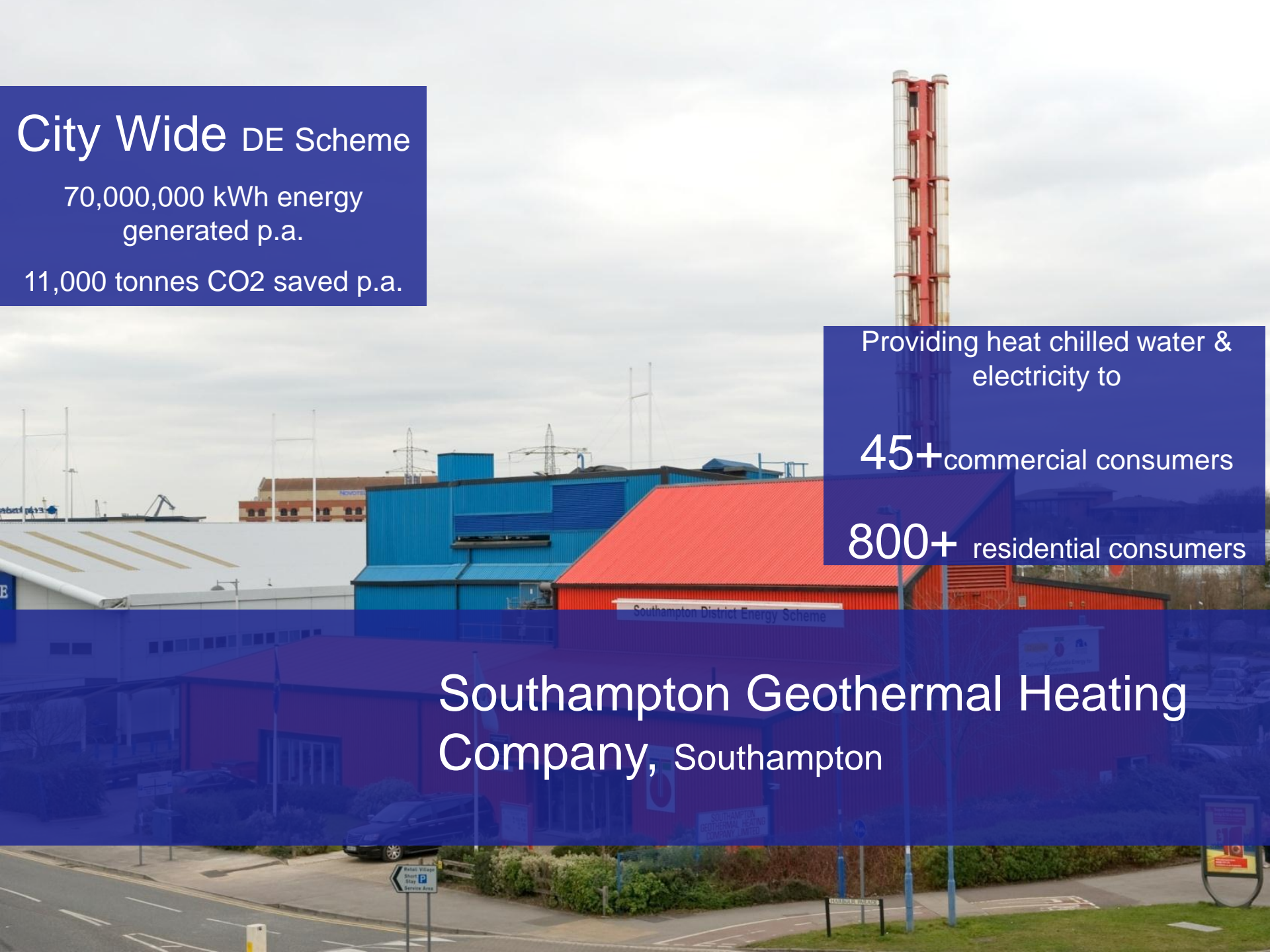
Broad Street & Aston Interconnection

- Increased resilience
- Increased Carbon Savings
- Further Opportunities for connection



Future Plans

- Scheme Expansion (City Core)
 - New Street Station & John Lewis
 - Victoria Law Courts Cluster, Police HQ, Snow Hill
 - Aston University (incl Gosta Green)
 - Paradise Circus
 - Brindley Place
 - Arena Central
 - Colmore Row Area
 - NIA Atrium
 - Southside
- Scheme Expansion (new clusters)
 - Sellyoak (i.e. Battery Park)
 - Birmingham Airport/UK Central
- Further Carbon Reduction & Increasing Renewable Content
 - Anaerobic Digestion (AD) plant
 - EBRI Pyrolysis plant (Aston Campus)



City Wide DE Scheme

70,000,000 kWh energy
generated p.a.

11,000 tonnes CO2 saved p.a.

Providing heat chilled water &
electricity to

45+ commercial consumers

800+ residential consumers

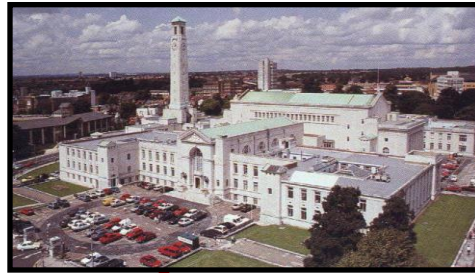
Southampton District Energy Scheme

Southampton Geothermal Heating Company, Southampton

Parkview



Civic Centre



RSH
Hospital

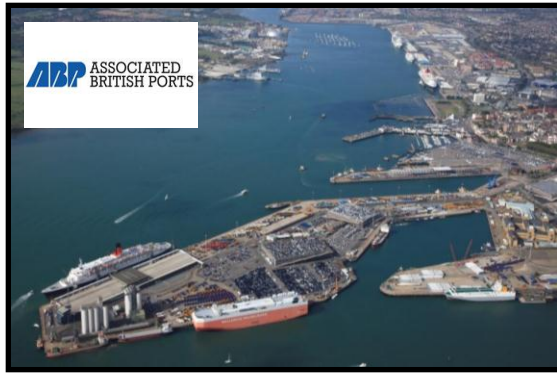


BBC TV Studio's



Southampton
Solent
University

ABP



Skandia Life



The Heat
Station



West Quay

IKEA



Carnival



Quays

DeVere
Hotel



16 km of energy network

2 energy centres
(district heating & cooling)

£100 million investment

40 year concession

Energy price regulation



Olympic Delivery Authority

Energy Centres for London 2012

Kings Yard Energy Centre

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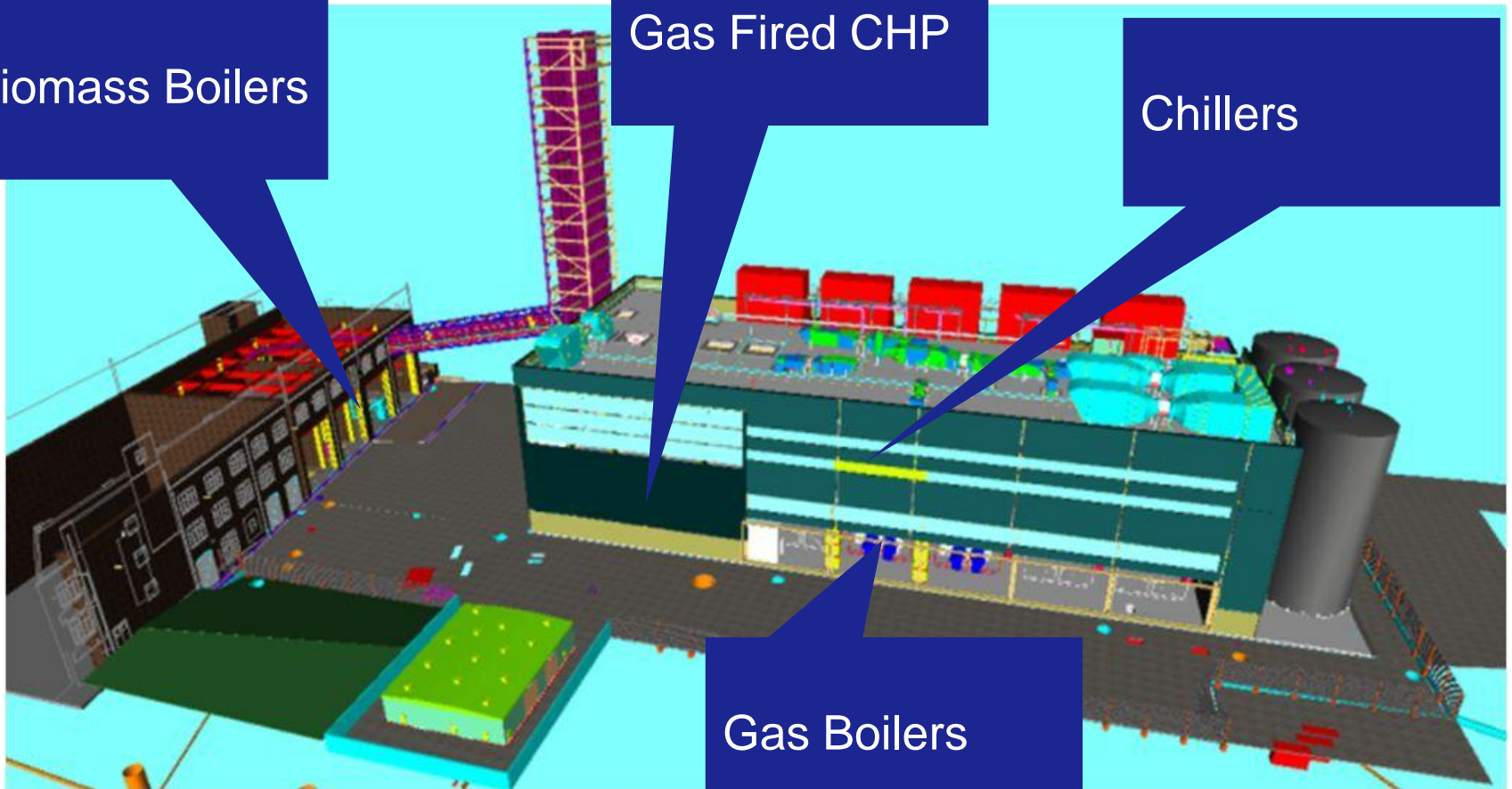
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Biomass Boilers

Gas Fired CHP

Chillers

Gas Boilers



City Wide DE Scheme

25 year contract with
Leicester City Council

£15 million investment

CHP and large scale district
networks -

3,000 Council Dwellings

15 Administration Buildings

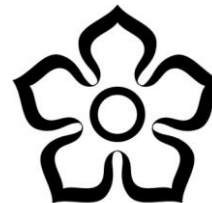
Leicester District Energy Scheme - Leice

Leicester District Energy Scheme

- City wide District Energy Scheme
- £15M CDE investment & adoption of existing assets
- 4.8MW CHP – two energy centres
- 150kW Biomass boiler
- Core customers; City Council & University
- 4 Core schemes including City Centre
- ~2,900 homes & 32 administrative buildings
- Plans to connect prison, hospital and many other public and private buildings
- 25 Year Energy Supply Agreement + 5 year extension



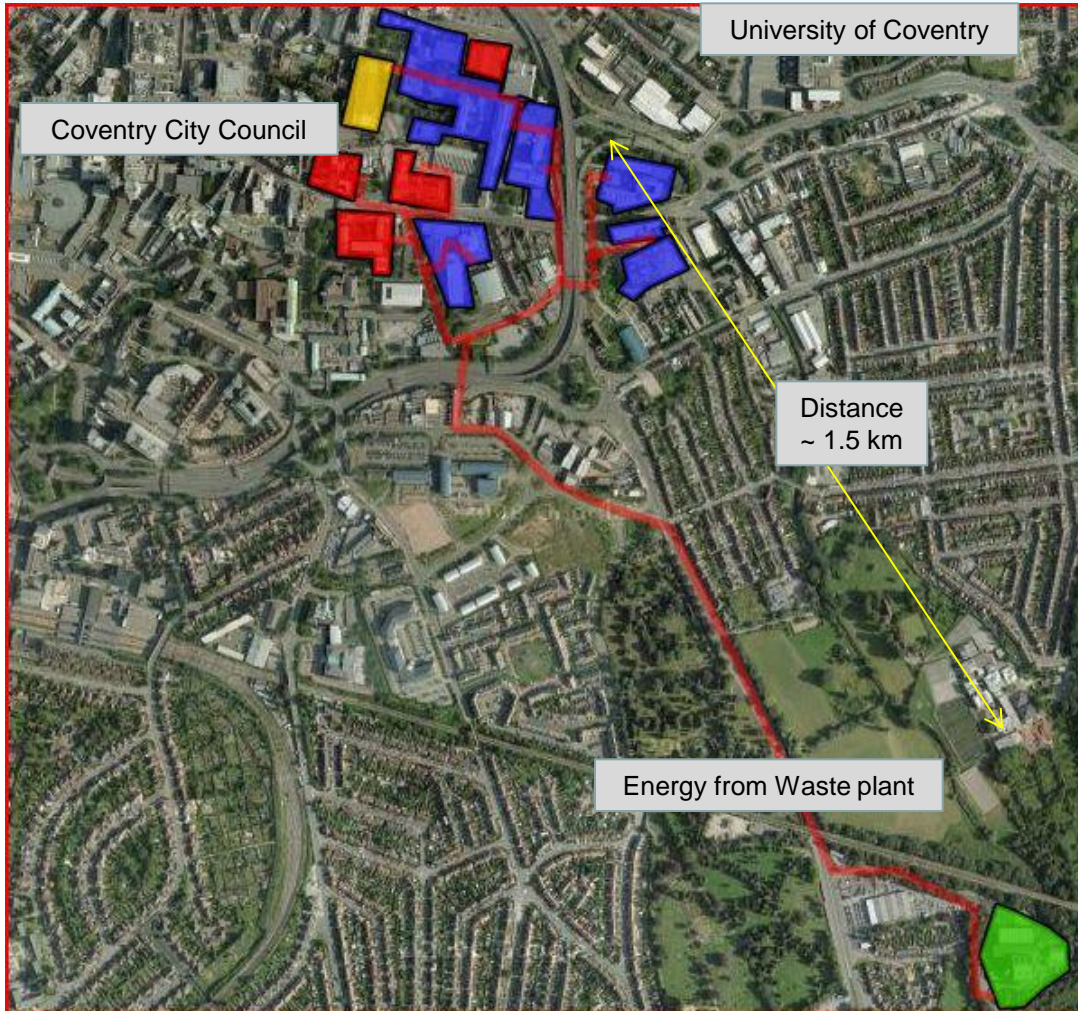
University of
Leicester



Leicester
City Council

Coventry District Energy Scheme

Coventry Cathedral



- Highlighted buildings represents the core scheme (excl. University)
- There are opportunities to grow the scheme substantially beyond this core group

Summary

- Implementation required drive and ambition within LA
- Future expansion requires coherent planning policy and good co-ordination with planning team
- The key issue in terms of connection viability is usually the connection distance (capital investment) vs. energy density (revenue)
- Currently, gas fired CHP is the most cost effective way of delivering heat to a district energy scheme
- However, once the network is installed the heating and cooling technology can evolve as technology matures
- Anticipated that LA's will increasingly require:-
 - Reduced carbon content
 - Increased % of renewable content



Thank you

Ian Forsyth - Business Development Manager

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