

Moving Cities Towards a Sustainable Low Carbon Future

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Energy and Climate Change

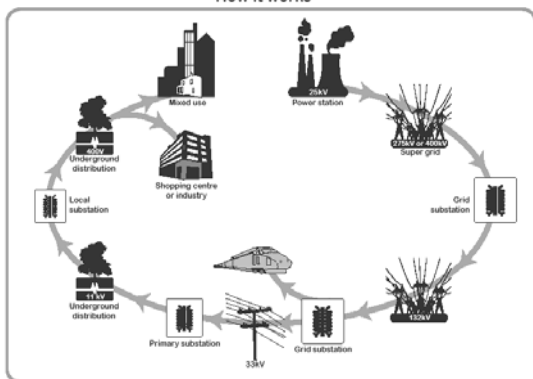
Former Chief Executive Officer
London Climate Change Agency Ltd
and
Director/Trustee
Sustainable Environment Foundation

Strategy for a Sustainable Low Carbon City

- For the first time in history more than 50% of the world's population live in cities
- Cities emit 75% of the world's greenhouse gases
- Cities are the primary cause of climate change, are most at risk from climate change and have a vested interest to tackle climate change

This presentation summarises a practical strategy for cities deriving their initial energy needs from low carbon energy resources whilst at the same time establishing a sustainable energy infrastructure to enable future energy needs to be derived from wholly renewable resources via a hydrogen economy

National Grid: How it works



Centralised Power Generation

Thermal Efficiencies of UK Power Stations¹

- Coal 36%
- Gas 46%
- Nuclear 38%

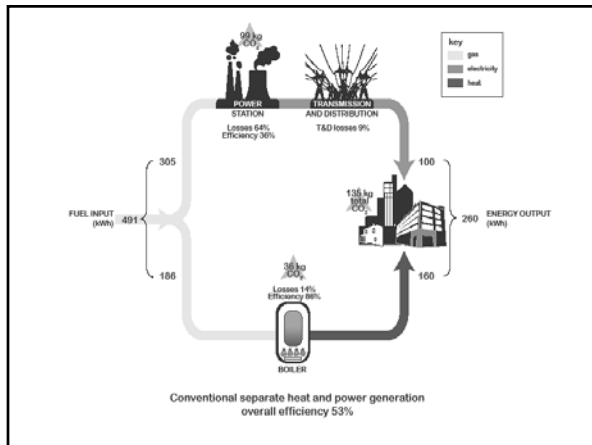


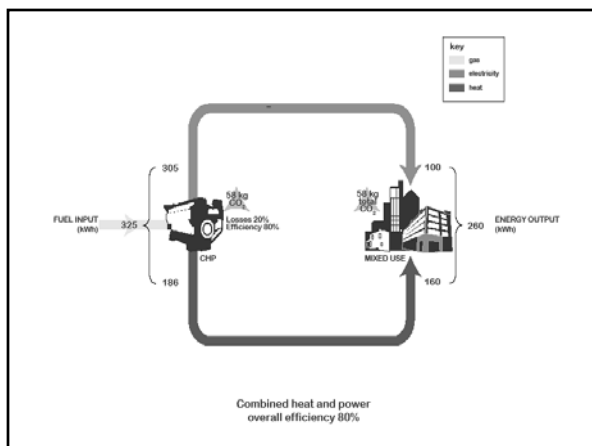
Grid Losses²

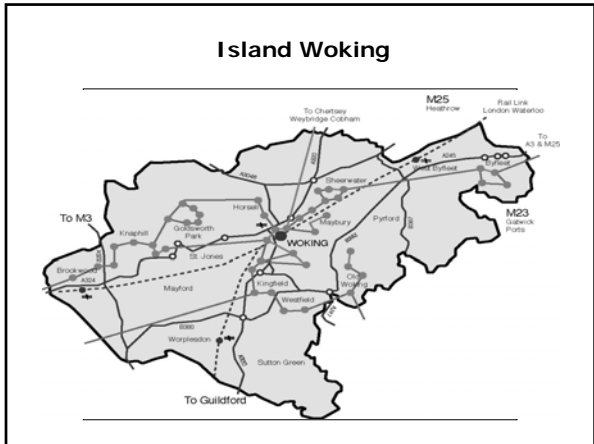
- Transmission 2%
- Distribution 7%

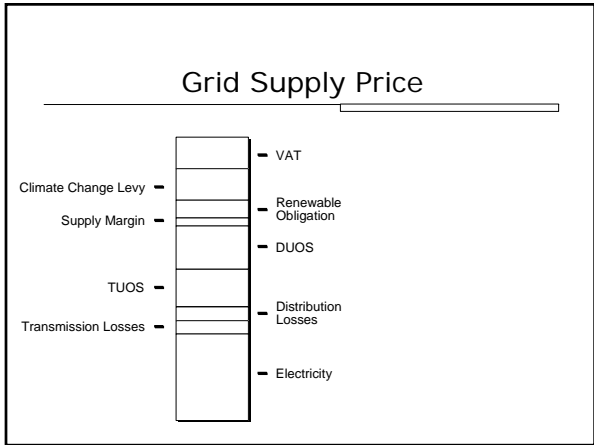


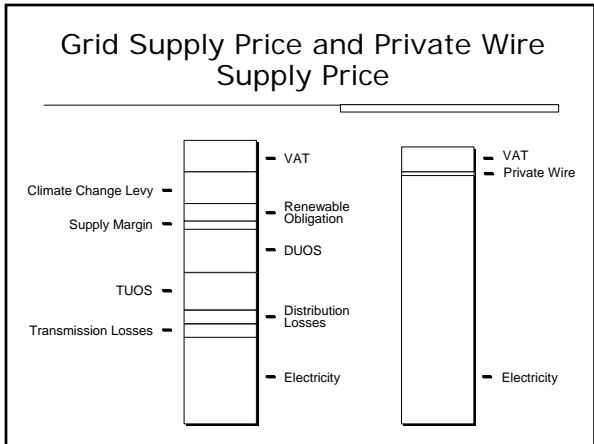
(1) DTI Digest of UK Energy Statistics
 (2) Ofgem



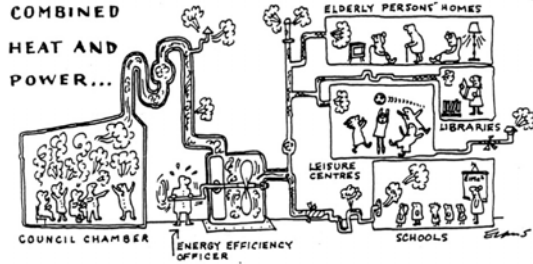




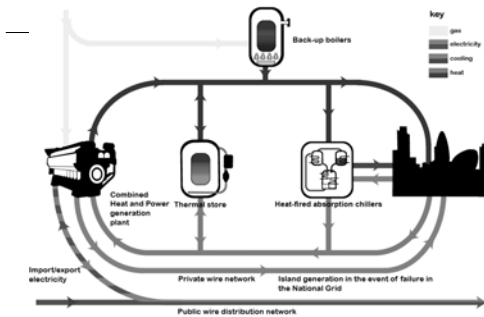




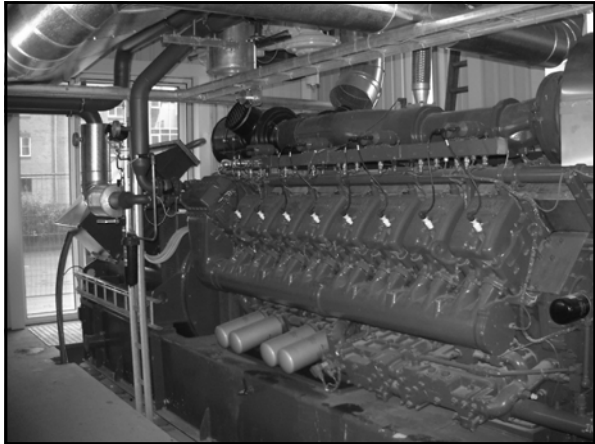
Decentralised Energy System



Trigeneration - Combined Cooling Heating and Power

















**Summary of Energy,
Environmental and Financial Savings
1 April 1990 to 31 March 2007**

- Reduction in Energy Consumption 51%
- Reduction in Water Consumption 44%
- Supply from Low or Zero Carbon Local Decentralised Energy 98%
- Energy Efficiency Improvement of Borough's Housing Stock 33%
- Reduction in CO_{2e} Emissions 80%**



Queen's Award for Enterprise: Sustainable Development 2001 in respect of its Energy Services activities in the Development of Local Sustainable Community Energy Systems

London Climate Change Agency

- Practical delivery agency implementing climate change projects in:
 - Energy
 - Water
 - Waste
 - Transport



Municipal company 100% owned by the London Development Agency



**Mayor's
Climate Change Action Plan**

- 60% Reduction in CO₂ Emissions by 2025
 - Existing Homes
 - Green Homes Programme
 - Existing Commercial & Public Sector
 - Better Buildings Partnership, Green Badging, Lobbying, etc
 - New Build and Development
 - New London Plan, London Boroughs, Housing Strategy, etc
 - Energy Supply
 - Decentralised Energy, On Site Renewables, Large Scale Renewables, Carbon Sequestration, etc
 - Ground Based Transport
 - Aviation
 - The Mayoral Group
 - 'Show by Doing'

Energy Supply

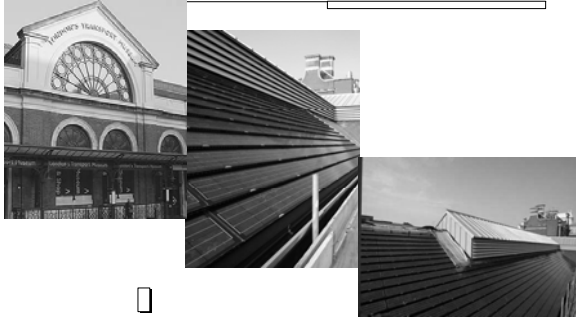
- Centralised energy – 75% of London's CO2 emissions – 35M tonnes (+15% growth by 2025)
- Decentralised energy in London:
 - 25% off the grid by 2025
 - 50% off the grid by 2050
- Renewable fuels and transport – 2M homes
- Large scale renewables, inc. offshore & marine
- Carbon capture and sequestration
- Future proofing for renewable hydrogen economy

Barkantine CHP District Energy Scheme





London's Transport Museum – Photovoltaics



□

Palestra Photovoltaic Roof



City Hall Photovoltaic Roof and Solar Shading





Renewable Energy in New Developments in London

- London South Bank University Independent Study into the London Plan Renewable Energy Targets¹:
- Significant number of new developments with 10% renewables readily achievable
- 25% of developments exceed 10% renewables
- 8% of developments exceed 20% renewables
- 10% renewable energy target was met on average by late 2005
- 26% reduction in CO₂ emissions

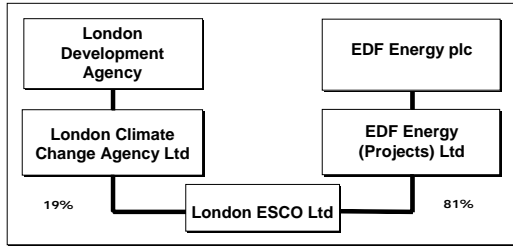
1. Mayor's 2nd State of the Environment Report for London – July 2007

Better Buildings Partnership

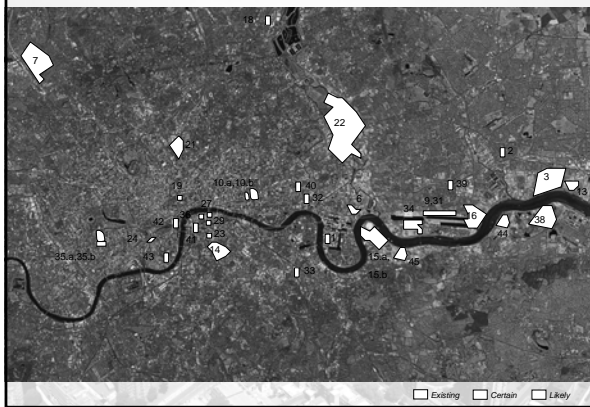
Commitment to improve the sustainability of London's existing building stock and to accelerate the reduction in CO₂ emissions to significantly contribute to achieving London's target to reduce CO₂ emissions by 60% by 2025.

- BBP Founding Members:
 - British Land
 - Grosvenor Estates
 - Hammerson
 - Hermes
 - Land Securities
 - Transport for London
 - London Climate Change Agency
- BBP Established as a Company on 30 April 2008
- New Members:
 - Canary Wharf
 - GE Real Estate
 - Legal & General
 - Quintain Estates
 - Workspace Group

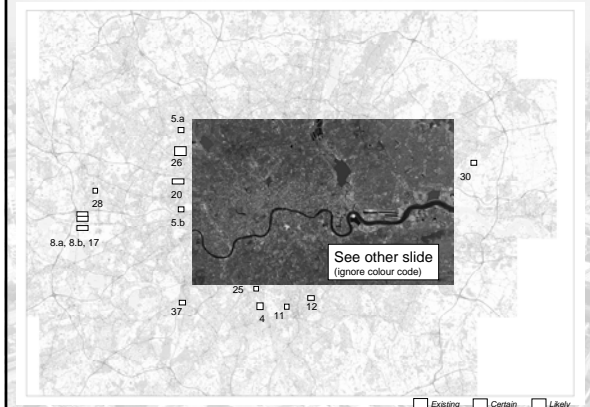
London ESCO Ltd – Company Structure



Decentralised Energy developments in Central London



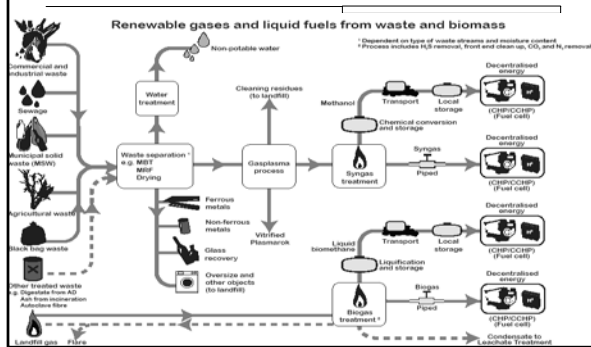
Decentralised Energy developments in Greater London

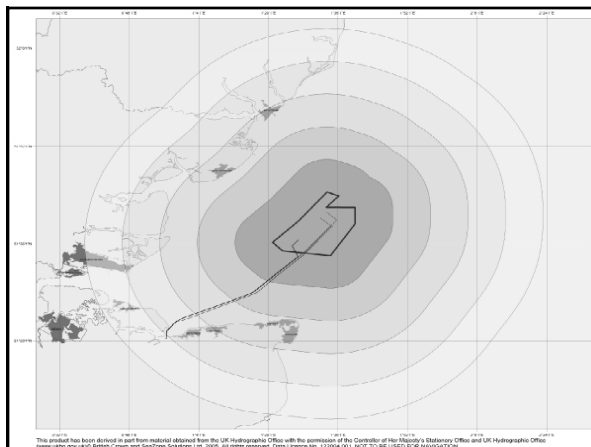


Progress Towards London's 25% Decentralised Energy by 2025 Target

CHP/CCHP installed by 2008	205MWe
CHP/CCHP under construction from 2008	63MWe
CHP/CCHP new development consented to 2017	349MWe
CHP/CCHP capacity required from Low Carbon Zones	<u>583MWe</u>
	1200MWe

Renewable Gases from Waste and Biomass

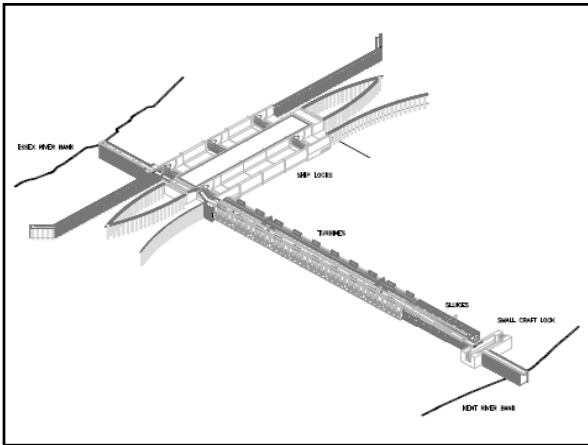




Thames Barrage Renewable Energy Study



Location	No. of Sluices	Total Sluice Area (m ²)	No. of Turbines	Installed Capacity (MW)	Theoretical Annual Energy (GWh)	Realistic Annual Energy (GWh)
1. Thames Barrier	60	2400	10	120	141	110
2. Enth	90	3600	24	288	266	210
3. Tibbury	120	4800	36	432	382	300
4. Cliffe	150	6000	60	720	577	460



C40 Climate Leadership Group Climate Change Action Plans City Leaders

- Los Angeles**
 - 35% reduction in CO₂ emissions from 1990 by 2030
 - 35% renewable energy by 2020
- London**
 - 60% reduction in CO₂ emissions from 1990 by 2025
 - 25% DE (1200MW_e) by 2025 and 53% DE (2500MW_e) by 2050
- New York**
 - 30% reduction in CO₂ emissions from 2007 by 2030
 - 800MW_e DE by 2030
- Paris**
 - 75% reduction in CO₂ emissions from 2004 by 2050
- Sydney**
 - 70% reduction in CO₂ emissions by 2030
 - 330MW_e trigeneration by 2030
- Toronto**
 - 80% reduction in CO₂ emissions from 1990 by 2050



City of Sydney – Sustainable Sydney – 2030 Vision

A Leading Environmental Performer


- 70% reduction in CO₂ Emissions by 2030
 - Increase Local Energy Generation and Water Supply
 - 330MWe Trigeneration
 - Renewable Energy
 - Waste to Energy
 - Energy Efficiency
 - Reduce Waste Generation and Stormwater Pollutants
 - Improve Environmental Performance of Existing Buildings
 - 'Show by Doing'

Sydney Climate Change Agency ?

□ Practical delivery agency implementing climate change projects in:

- Energy
- Water
- Waste
- Transport

Municipal company 100% owned by the City of Sydney



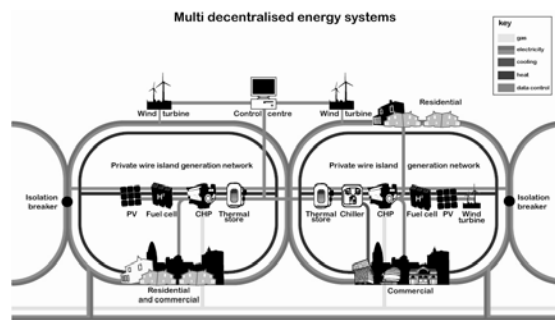
SCCA Projects

- City of Sydney Catalyst Projects
 - City of Sydney CHP – Phase 1 (City Precinct Trigenation)
 - Town Hall House Data Centre – Fuel Cell/Island Generation
 - Town Hall Photovoltaic Roof
 - Prince Albert Park CHP (Trigenation)
 - 307 Pitt Street CHP
 - LED Street Lighting
 - Advanced Waste Treatment
 - LNG Vehicles
- Better Buildings Partnership
- City of Sydney Development Projects
- Sydney ESCO
- Renewable Gases and Liquid Fuels from Waste/Biomass
- Removal of Regulatory Barriers to Decentralised Energy
- Macro Decentralised Energy – Low Carbon Zones
- Sustainable Water and Waste Systems
- Alternative Low Emission Fuels for Transport
- Asia/Pacific Region C40 City Leader

Delivering the Sustainable Sydney 2030 Vision

- City of Sydney 'Show by Doing'
 - City of Sydney Projects
 - Working with the Private/Other Public Sectors
 - Planning, Development & Property Coordination
 - Sydney Climate Change Agency
- Macro Decentralised Energy Master Plan
- Other Potential Infrastructure Blueprints
- Sydney ESCO
- Other Public/Private Joint Ventures
- Removal of Barriers to 2030 Vision
- Research & Development
- Climate Change Adaptation

Low Carbon Zones – Macro Decentralised Energy Systems



Sustainable Sydney 2030
Vision

- The City of Sydney can deliver a sustainable low carbon future whilst at the same time establishing an infrastructure to enable future energy and other green infrastructure needs to be derived from wholly renewable resources
- The barriers to this are not technical but, regulatory, mindset and vested interest
