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Simplifying Assumptions in Models of Complex Systems: Break, Make, Justify Workshop

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Simplifying Assumptions in Models of Complex Systems:
Break, Make, Justify Workshop 7.5.14

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Development of a Resource Secure City using the City Analysis Methodology: the Liveable Cities approach to addressing this challenge over the next 50 years

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Overview

- Liveable Cities Programme
- City Analysis
- Energy and Material flows
- Birmingham energy flows and CO_2 emissions
- Further work planned

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Liveable Cities Team

UNIVERSITY OF BIRMINGHAM

Civil Engineering;
Geography, Earth & Environmental Sciences

LANCASTER UNIVERSITY

Lancaster Institute for Contemporary Arts

Imagination Lancaster

UCL

Civil Engineering;
Faculty of Engineering Science

UNIVERSITY OF Southampton

Engineering and the Environment

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Approaches

Joanne
Overall structure including governance and future visioning

Chris B Systems approach. Detailed analysis
Provides a "cross-check" to the top-down approach

Susan Top-down approach

Issues:
Time. What can be done sensibly in the time available?
How does our work link in and inform the CDF?
e.g. waste and energy/material flows

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City Description Framework

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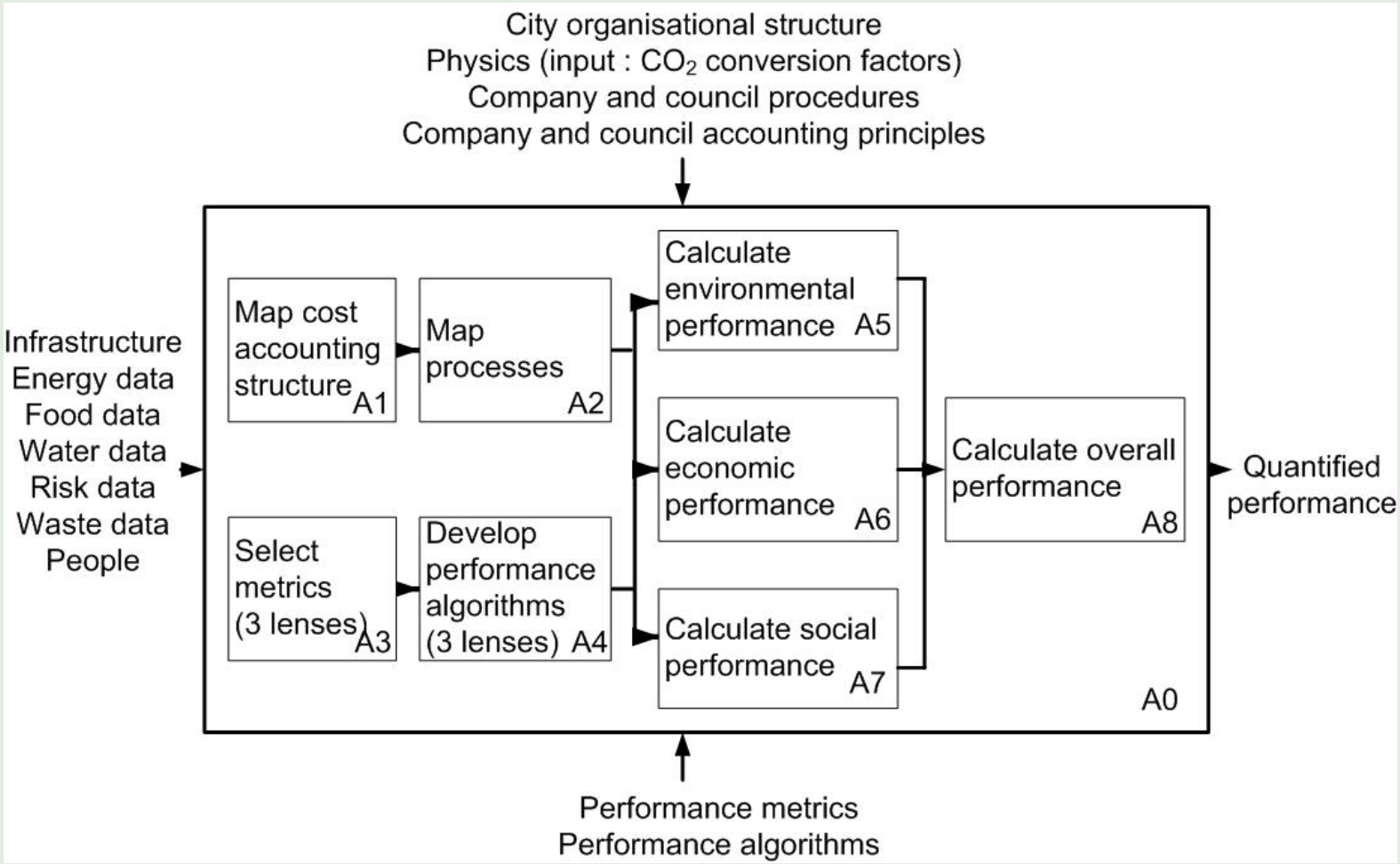

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Energy and Material Flows

- Identification of overall flows in and out of Birmingham/city
- Using data that are available to planners/developers
- Identification of major energy users and CO_2 emissions

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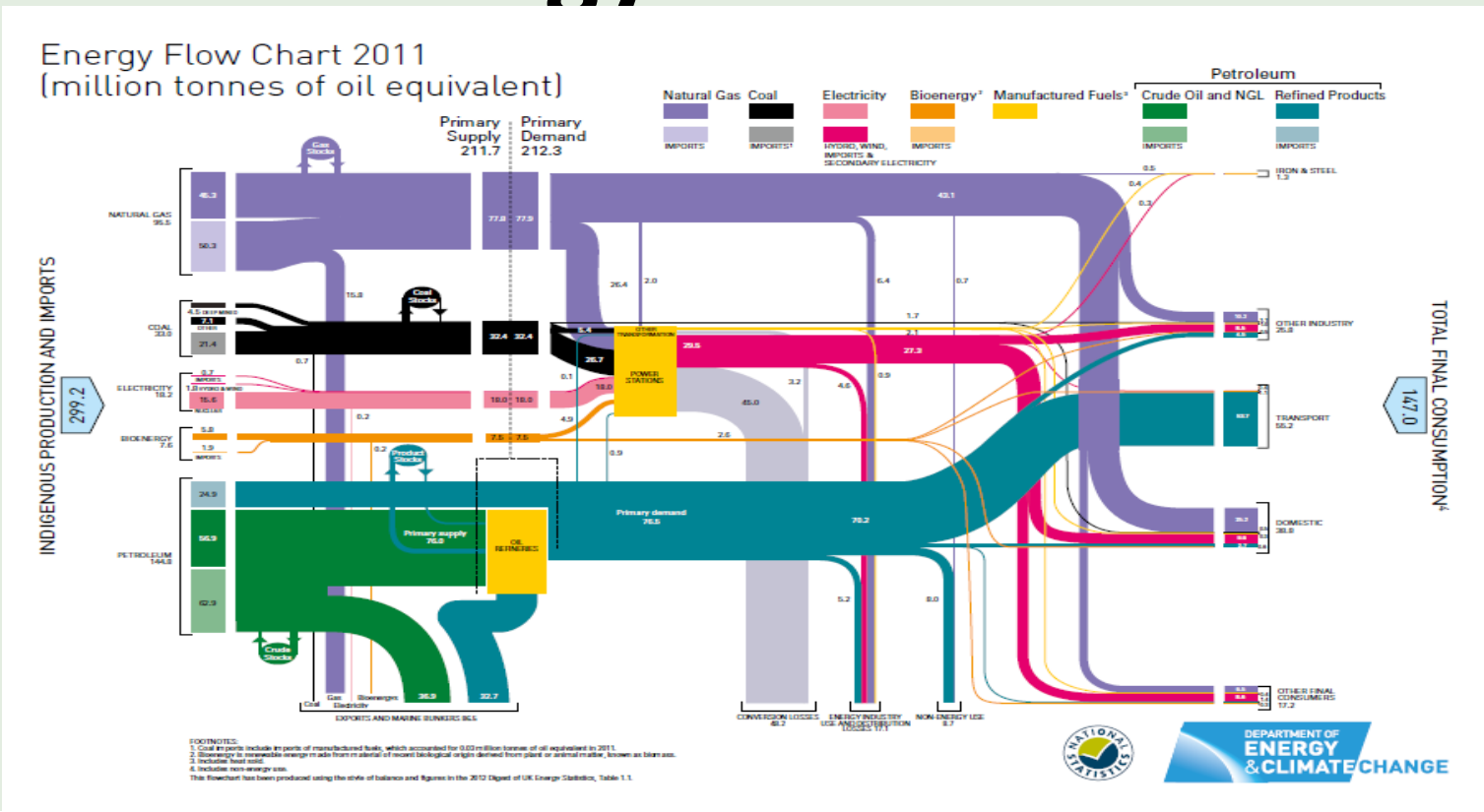
UK Energy Flow Chart 2011



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Birmingham

- Birmingham is the UK's second largest city after London.
- It is a post-industrial city with a population of just over a million (1.074 million) people.
- Birmingham Metropolitan District covers an area of 268 km^2 with a density of 4,012 people/km and employs 467,300 people.
- It is Europe's youngest city with 22.8% of Birmingham's population under 16
- It is ethnically diverse (black and minority ethnic groups accounting for 42% of the city's population).
- Birmingham is at the centre of the UK's road and rail networks

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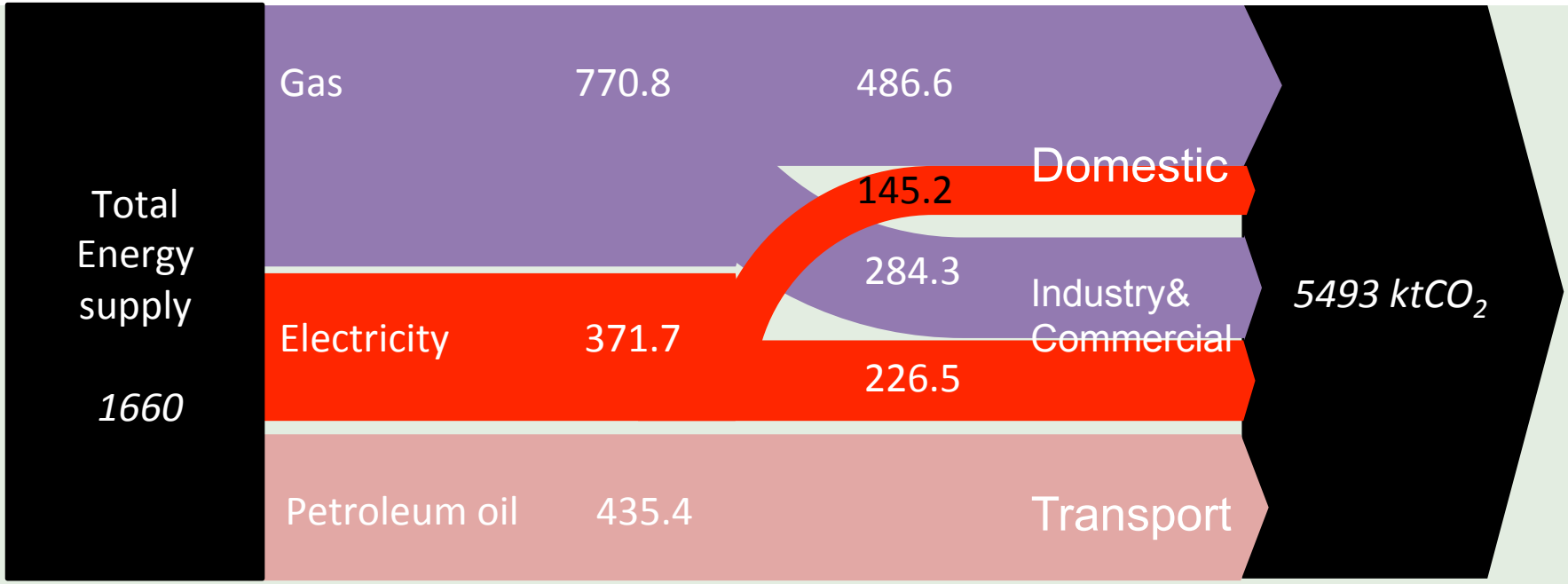
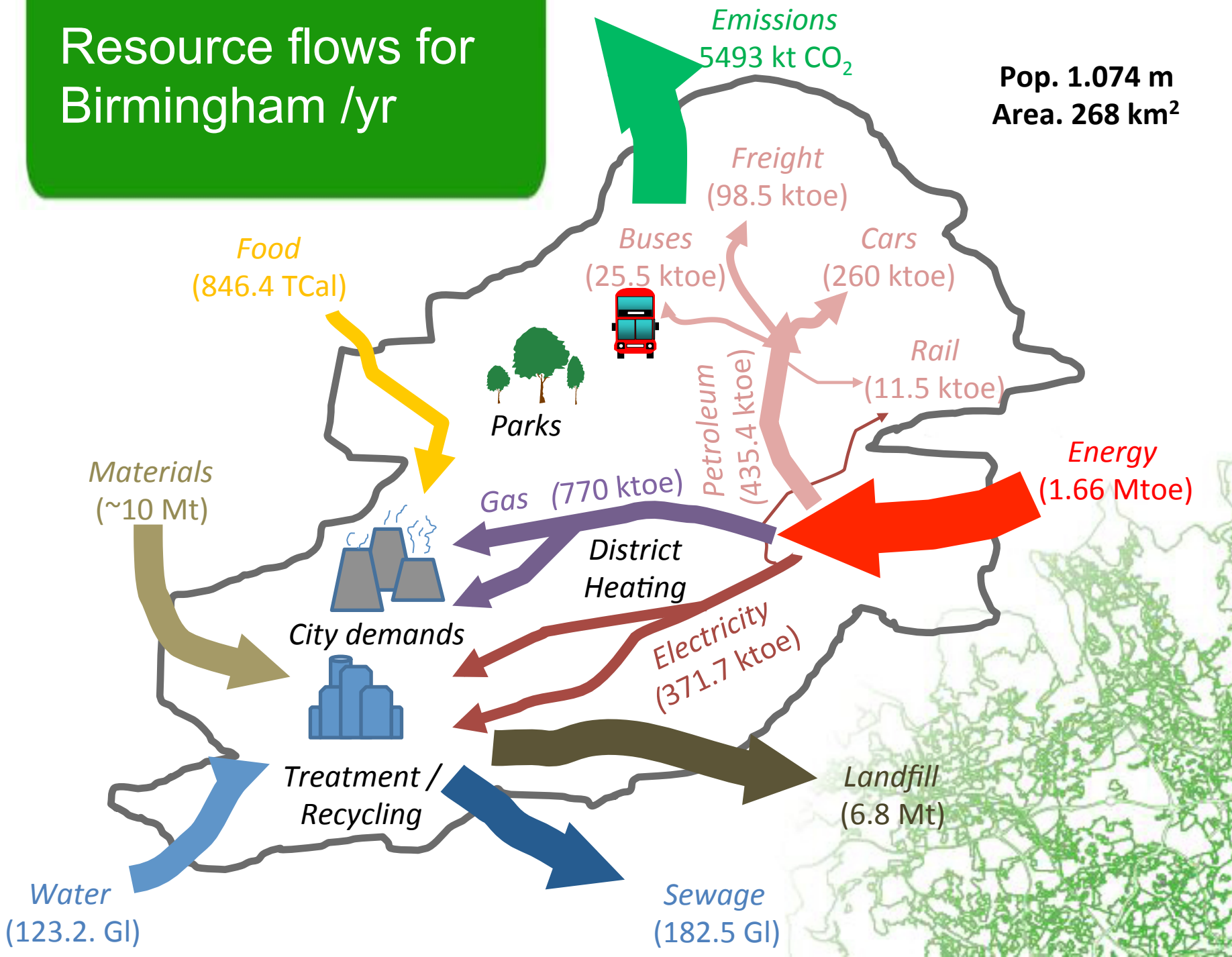
Birmingham Energy Flow



Units: ***ktoe / yr***

Resource flows for Birmingham /yr



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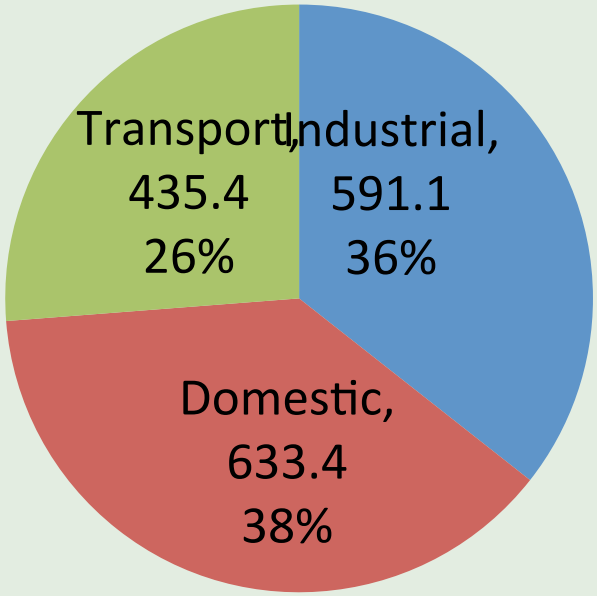
Birmingham's energy consumption (2011) for different sectors



Units: ktonnes of oil equivalent

Source: DECC (2013)

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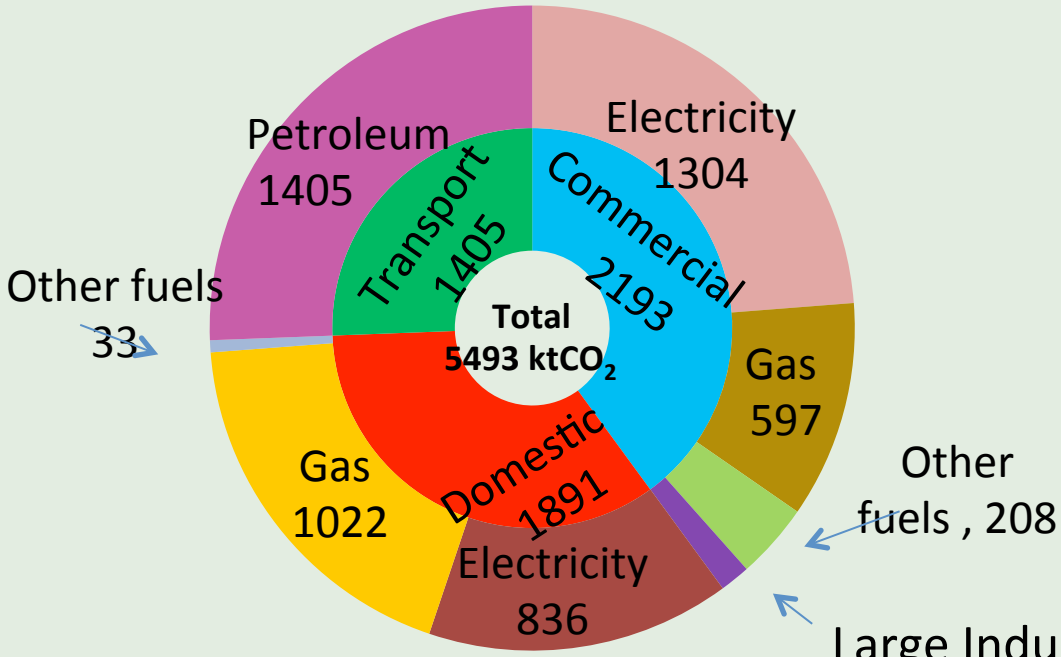
Birmingham's CO2 emissions (2011) by end use and fuel ($ktCO_2$)



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Work in progress

- Further investigations and data collection on the interactions between flows (water, energy, food, raw materials and manufactured goods).
- A paper on the current flows within Birmingham and their interactions
- Radical re-engineering solutions are to be proposed for 2050 that will take into account environmental and societal well-being

2050

- Low carbon
- Zero Waste
- Happy people

www.liveablecities.org.uk