Low Carbon Cities: London explorations

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Explorative options analysed for CO$_2$ reductions in London

1. **Urban Form: compact or dispersed?**
   - Argument for compact development (Newman and Kenworthy, 1999)
   - Assessment of alternative urban form (Echenique et al, 2012)

2. **Pricing congestion**
   - London experience
   - Other - Cambridge

3. **New technologies in transport and buildings**
   - Compact and dispersed
   - retrofit

4. **Conclusions**
Alternative urban forms: Energy in Transport (30%) & Buildings (42%)

- Research (mainly South East of the UK) by a consortium of universities
London: current land and transport policies

• Green belt and compaction in the last decade:
  – 72% new built housing is in “brownfield” (not where employment is growing necessarily)
  – 89% increase in gross density in new built (from 56 to 106 dw/ha)

• Investment in public transport and pricing congestion in central area:
  – 19% increase in public transport trips in London (mainly rail) but increased VKT in the outer region due to separation of jobs and housing
  – Effective congestion pricing in central London (17% reduction of cars entering the area)
The case for compact development: Newman & Kenworthy (1999)

- Faulty causal argument
  - Higher density reduces transport energy
- Real causal argument
  - Lower transport cost reduces density
Urban Form Results

- Published in *Growing Cities Sustainably: Does Urban Form Really Matter? Journal of the American Planning Association Vol 78:2 2012*

- **Conclusions:**
  - Relatively minor environmental differences between urban forms which are overwhelmed by socio-economic trends
  - Compact cities reduces environmental impacts by less than 5% but increases economic and social costs
  - Dispersed cities increases environmental impacts marginally but reduces economic and social costs
  - More scope for reduction of carbon in cities is by the introduction of new technologies in transport and energy generation
Pricing congestion for CO$_2$ reduction

- **London experience:**
  - 17% reduction of car traffic into central area (but no change in speeds due to reduction of road space)
  - 16% reduction of CO$_2$ emissions (but increase in the fringes of the pricing area)

- **Other - Cambridge study:**
  - 27% reduction of car traffic (but increase in bus use)
  - 8% reduction in CO$_2$ (less impact due to bus increase)

- **Source:** Road Congestion Pricing in Europe (Eds. H W Richardson and C Bae, 2008)
Exploration of technology in future cities

**Compact**: CHP, public transport, etc.

**Dispersed**: renewable energy – ground source heat pumps, PV, electric cars, etc.

**Retrofit** is essential

**Conclusion**: Buildings: medium to low density may enable a greater saving in CO₂ emissions than higher density development
Conclusions

• **Urban Form:**
  – dispersed around transport corridors
  – Polycentric structure (nodes of public transport)

• **Congestion pricing:**
  – Effective in reducing car traffic and CO$_2$ emissions
  – Encourage dispersal

• **Technological potential in building and transport:**
  – Dense nodes facilitate CHP
  – Dispersal facilitates renewables (PV, heat pumps, etc.)

• **Thanks**