The role of cities in climate change mitigation: A South African perspective

Tirusha Thambiran
Outline

• The role of cities in climate change mitigation
  – examples of local actions to reduce emissions
  – quantification of emissions at a local level

• Gaps, opportunities and challenges for cities in South Africa
Introduction

• Climate change mitigation challenge
  – to reduce greenhouse gas (GHG) emissions
  – difficulties in finding consensus and commitment from nations to reduce their GHG emissions

• Local governments in many cities around the world have begun to plan and implement measures to reduce their GHG emissions

• Cities have demonstrated the ability to influence GHG emissions
  – as a co-benefit to other policies and strategies
  – alternatively mitigation policies have significant co-benefits for other sectors
    • especially relevant from a developing world context
City initiatives to reduce GHG emissions

• Canadian and German cities
  – green infrastructure
  – design of walkways in city centres

• European cities
  – congestion charging in London
  – the development of ‘environmental (low carbon) zone’ on Prague
    • restrictions on freight vehicles entering the city

• China
  – local government mitigation is legislated in national climate policy
  – The development of the Chongming Dongtan Eco-city
    • green buildings
    • solar energy
    • aims to be carbon neutral
Masdar city

• To be powered by the sun…

• “The quality of air will be better than any other street in the Gulf and in the world, and that alone will bring you safety, health and happiness.”

Image source: http://inhabitat.com/lavas-winning-design-for-masdars-city-center/
Low carbon cities

• Increasingly the concept of ‘low carbon city’ is used

• A low carbon city is typically described as a city that is
  – actively and significantly lowering carbon emissions, even as its economy is growing (low carbon economy)
  – has low emissions and low pollution
  – prioritises green spaces and green jobs

• Each city has unique characteristics which influence GHG emissions and the potential to mitigate
  – natural resources, climate, gateway status, socio-economic structure

• GHG emissions inventory
  – at the core of characterising these emissions and understanding the potential for mitigation is a suitable baseline
GHG emissions uncertainties

- Significant challenges to establishing suitable local GHG emission baselines
  - typically GHG emissions are determined at a national level – enables international comparison of emissions
  - reporting requirements for non-annex 1 countries has possibly inhibited innovation in the characterisation of pollution sources in these countries
    - data availability and reliability at a local level is often poor
  - issues around defining activity boundaries and assigning responsibility for emissions
    - each city is unique
    - use of different methodologies as there is no standard protocol
    - accounting for lifecycle of emissions and production/consumption
      - how do we fairly allocate emissions?
<table>
<thead>
<tr>
<th>City</th>
<th>Total GHG Emissions, Including End-Use, Life Cycle, and within City Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>emissions within city tCO₂/cap</td>
</tr>
<tr>
<td>Barcelona</td>
<td>2.4</td>
</tr>
<tr>
<td>Cape Town</td>
<td>not determined</td>
</tr>
<tr>
<td>Durban</td>
<td>not determined</td>
</tr>
<tr>
<td>Denver</td>
<td>not determined</td>
</tr>
<tr>
<td>Geneva</td>
<td>7.4</td>
</tr>
<tr>
<td>London</td>
<td>not determined</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>not determined</td>
</tr>
<tr>
<td>New York City</td>
<td>not determined</td>
</tr>
<tr>
<td>Prague</td>
<td>4.3</td>
</tr>
<tr>
<td>Toronto</td>
<td>8.2</td>
</tr>
</tbody>
</table>

GHG emissions in South African cities

• The White Paper Climate Change response
  – targets for GHG emissions at a national level
  – local governments are not legislated to reduce GHG emissions

• Very few municipalities have updated GHG emissions inventories
  – state of energy reports
    • poor understanding of the non-energy consumption sources
    • characterise emissions from government operations

• South African cities have the ability to influence GHG emissions
  – generally well capacitated with authority over key polluting sectors
    • air quality, waste management, transport planning

• Potential for co-benefits is not always realised
  – lack of awareness or willingness to act
## Industrial Sector co-benefits in SA cities

<table>
<thead>
<tr>
<th>Industry measure</th>
<th>Emissions ↑</th>
<th>Emissions ↓</th>
<th>Impact on fossil fuel use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installing/modifying cleaning devices</td>
<td>CO₂, N₂O</td>
<td>SO₂, NOₓ, PM (depends on type of devise used)</td>
<td>↑</td>
</tr>
<tr>
<td>High sulphur coal to low sulphur coal</td>
<td>--</td>
<td>SO₂</td>
<td>--</td>
</tr>
<tr>
<td>Change in fuel toward cleaner, more efficient fuels</td>
<td>--</td>
<td>Reduces all related emissions from original fossil fuel source</td>
<td>↓</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td>--</td>
<td>Reduces all related emissions from fossil fuel source</td>
<td>↓</td>
</tr>
</tbody>
</table>
South Durban Multipoint Plan impact for GHGs

Change in fuel at petroleum refineries

National road transport emissions

Provincial CO$_2$ emissions for 2010 from road transport

## Road transport sector co-benefits in SA cities

<table>
<thead>
<tr>
<th>Transport measure</th>
<th>Impact on emissions</th>
<th>Impact on fossil fuel use</th>
<th>Impact on road safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleet renewal</td>
<td>↓ PM, NO$_x$( diesel)</td>
<td>↓ due to improved fuel efficiency of new vehicles</td>
<td>Dependent on VKT and other factors</td>
</tr>
<tr>
<td></td>
<td>↓ CO (petrol)</td>
<td>↑ newer vehicles increase VKT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VKT impt for CO$_2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce congestion</td>
<td>↓ all emissions due to lower VKT</td>
<td>↓</td>
<td>Benefits</td>
</tr>
<tr>
<td>Increase efficiency of freight transport</td>
<td>↓ all emissions due to lower VKT</td>
<td>↓</td>
<td>Benefits</td>
</tr>
</tbody>
</table>

Conclusion

- Given the potential for co-benefits and opportunities to participate in the carbon market, South African cities need to properly account for GHG emissions.

- Using a co-benefits approach may have limited impact in the long run
  - short-term solution and will still need specific GHG mitigation targets for cities.

- Need for the development of a South African low carbon framework
  - guidelines for estimation of GHG emissions
  - criteria for selection of low carbon indicators
    - macro-level indicators with may not be ideal
      » disaggregated local emissions and activity data
      » to understand where the inefficiencies occur and how to mitigate.
Acknowledgements

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