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The Issue of Accounting for Import/Export Emissions
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Development of a Low Carbon City Index: the Issue of Accounting for Import/Export Emissions

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Abstract

The aim of this paper is to contribute to the development of a low carbon city index including low carbon city development policies, the global impacts of the city, a dialogue and exchange of best practice between cities around the world and a comparison of various cities development paths and how far they are in the transformation from a carbon intensive city to a low carbon city. Several indices attempt to do this at a national level but no index exists at the global level, and none of the existing indexes so far include import and export as relevant factors. The proposed index includes three different parts covering the effects from direct measures as well as measures related to export and import: 1) indicators assessing the direct carbon emissions in the city (to which degree does the city directly contribute to increased or decreased carbon emissions and impact the environment?); 2) indicators assessing the carbon footprint from export (to which degree do products and services originating from the city result in increased or decreased carbon emissions and impact the environment impacts at place of consumption?); 3) indicators assessing the carbon footprint from import (to which degree do the city sources, materials and services contribute to increased or decreased carbon emissions and impact the environment at place of origin?).

Keywords


Introduction

Today, more than half of the world’s rapidly growing population lives in cities. Cities, with high population density, are naturally intensive areas of activity, which mobilize resources, goods, services, financial and human capital. Even if studies such as Satterthwaite (2008) suggest that the contribution of cities to global anthropogenic greenhouse gas emissions is overstated, it is likely that, worldwide, more than half of all anthropogenic greenhouse gas emissions are generated within city boundaries (Munich Re, 2004; Newman, 2006). Cities need to be based on a sustainable economy and to steer away from a development path linked directly to ever-increasing greenhouse emissions. This is particularly important in rapidly developing economies such as China and India where more than half of the world’s future built environment will be constructed (Dhakal & Kaneko, 2002; Zhuang, 2008).

Sustainability and more specifically greenhouse gases emissions measuring and accounting at a city level are difficult. The measuring is mostly done at a national level and focuses on the evaluation of the environmental performance associated with domestic production. Current methods for estimating greenhouse gases, such as the reference approach and sectoral approach, adopted by the Intergovernmental Panel on Climate Change, estimate the amount of anthropogenic emissions generated within the political boundaries of countries. This principle is referred to as territorial or producer responsibility (Wiedmann et al. 2007).
However, this accounting scheme encourages developed countries to artificially reduce their domestic emissions and shift their environmental burden through globalization and international trade, while simultaneously increasing global emissions through freight transportation and exporting heavy industry to developing countries, and importing raw materials and energy-intensive products (Hamilton & Turton, 2002; Schutz et al. 2004; Browne et al. 2008). Thus, globalization has allowed for ‘pollution haven’, i.e. relocation of traditional labor-intensive industries such as textiles and heavy manufacturing industries to developing countries with less stringent environmental regulations (Friedl & Getzner, 2003; Akbostanci et al. 2007). Therefore, the assessment of the environmental performance of the national economy requires distinguishing between environmental impacts created by a nation’s residents and the emissions generated within national boundaries. It is necessary to account for the global dependencies rather than local resources and capacities and to expand the scale of analysis beyond national boundaries to trade and transboundary flows if equitable policies are to be devised and implemented (Ravetz, 2000).

In the recent years, it has been suggested that the emissions associated with production of imports and domestic consumption should be used as a necessary complementary indicator to emissions associated with domestic production based on the consumer responsibility principle. Despite the fact that countless studies claim to measure the ‘carbon footprint’, scientific literature has only recently clarified the term. The European Commission (2007) sees the carbon footprint or profile as the overall amount of all greenhouse gases emissions associated with a product. Wiedmann and Minx (2007) define the carbon footprint as “a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product.” Included in the life cycle of a product are all the production processes and services associated with the product through its life cycle, from the extraction of raw materials to its recycling or disposal (European Commission, 2008). Wiedmann et al. (2007) provide a comprehensive review of the assessment of environmental impacts embodied in trade and their appropriateness to estimate the footprints of production, consumption and trade, with the possibility to track their origin via inter-industry linkages, international supply chains and multi-national trade flows.

City sustainability initiatives

Today, a number of cities around the world attempt to implement sustainability initiatives aiming at lowering their greenhouse gases emissions and combating climate change.

The C40 Large Cities Climate Leadership Group comprises 40 of the world largest cities that share sustainability experiences and technologies. The action plan involves not only direct CO₂ reductions but also protection methods for climate crises, for example by setting up detection and monitoring of forest fires.¹

The Clinton Climate Initiative launched by President Clinton in August 2006 serves as the exclusive implementing partner of the C40 initiative.²

The Project 2° is a non-profit network of cities which started as a collaboration between the Clinton Climate Initiative, Microsoft Corporation, and ICLEI - Local Governments for Sustainability.³ Project 2° has developed a software called Web-based Emissions Tracker that enables cities to calculate the carbon footprint of their communities, to plan actions that save energy, money and fight against climate change.

² See www.clintonfoundation.org, accessed on 07.02.2009
³ See www.project2degrees.org, accessed on 07.02.2009
The Low Carbon Cities Programme\(^4\) in UK, funded by DEFRA\(^5\) and delivered by Carbon Trust and Energy Saving Trust are supporting Bristol, Leeds and Manchester in developing citywide carbon reduction strategies.

Several cities attempt to implement more ambitious initiatives focusing on the trajectory towards carbon neutrality. We can mention Penang Global City Centre (Malaysia), Sonderborg (Denmark), Wellington (New Zealand), Montfort Boys Town (Fiji), Masdar-Abu Dhabi (United Arab Emirates), Sonoma county, CA, Woodstock, NY, Cambridge, MA and Treasure Island, CA (US), Newcastle on Tyne and Milton Keynes (UK), Vancouver (Canada), Baoding (China), Växjö (Sweden), Singapore. In the final version of the paper we will include a comparative study of these and other initiatives.

A common issue of all these initiatives is the limited availability of local data on greenhouse gases emissions. Therefore, only direct emissions are calculated or estimated and this is done by sector. Usually the following sectors and sub-sectors are considered: industrial and commercial (electricity use, gas use, oil and solid fuel use, waste, agricultural processes and fuel use, off road machinery), domestic (electricity use, gas use, oil and solid fuel use, home and garden machinery, transport (road transport, railways), land use, land use change, and forestry.

**Calculation of direct emissions**

In order to illustrate the difficulties for achieving standard calculations of direct CO\(_2\) emissions, we take the city of Sønderborg, Denmark as an example. At a national level, Denmark releases annually the National Inventory Report,\(^6\) based on local authorities data on emissions of CO\(_2\) and other greenhouse gases.

In Sønderborg, the estimation of emissions for transport is based on a questionnaire, developed for the transport of goods and people. The distances people drive in the city are summed up and multiplied by a coefficient depending on the type of fuel and the size of the vehicle used. For agriculture, the livestock is counted in order to get the equivalent CO\(_2\) emissions from N\(_2\)O weighted by a specific factor. For waste, the amount of waste that is burned, composted and recycled is evaluated. For the energy, the energy utilities provide the data and their specific emission factors.

**The proposed low carbon city index**

As we already mentioned, the ways the estimations of emissions are done for different cities vary to a great extent. A commonly accepted global index that measures a city’s progress towards a low carbon economy is needed. The proposed low carbon city index attempts to address this gap through the development of a global index for low carbon cities and by identifying policy measures that efficiently foster and facilitate the required transition.

The first step towards creating such an index was taken in Copenhagen in September 2008, where a broad group of experts in sustainable cites met during the COPENMIND conference to formulate the founding principles for the proposed low carbon city index. These principles are formulated in ‘The Copenhagen Declaration.’\(^7\)

The proposed index includes three different parts covering the effects from direct measures as well as measures related to export and import according to the life cycle concept: 1) indicators assessing the direct carbon emissions in the city (to which degree does the city directly contribute to increased or decreased carbon emissions and impact the environment?); 2)

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\(^4\) See www.lowcarboncities.co.uk, accessed on 09.02.2009.

\(^5\) Department for Environment, Food and Rural Affairs

\(^6\) Released by the National Environmental Research Institute, University of Aarhus (www2.dmu.dk/Pub/FR667.pdf).

\(^7\) See http://pamlin.net/blog/2008/09/copenhagen-declaration-for-low-carbon.html
indicators assessing the carbon footprint from export (to which degree do products and services originating from the city result in increased or decreased carbon emissions and impact the environment impacts at place of consumption?); 3) indicators assessing the carbon footprint from import (to which degree do the city sources, materials and services contribute to increased or decreased carbon emissions and impact the environment at place of origin?).

Currently we are in the process of building the gross list of qualitative and quantitative indicators across the three dimensions: direct, import, export and establish ranking methodology. We will soon start testing the index on three test low carbon cities: Sønderborg (Denmark), Bao Ding (China) and Tiruvallur District (India). Please refer to the Appendix 1 for a compact view of the index development process and timing.

References


Appendix 1:

**Process for building and activating the low carbon city index**

<table>
<thead>
<tr>
<th>Timing</th>
<th>Activities</th>
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</table>
| Jan 2008 – Feb 2008 | **1. Build and test index**  
* Build gross list of qualitative and quantitative indicators across 3 component dimensions: direct, import, export  
* Establish ranking methodology: weighting, of indicators scale, building on the 'Copenhagen Declaration for Low Carbon Cities'  
* Test index on 3 leading low carbon cities (Sønderborg, Bao Ding (China) and Trivallur District (India)) |
| Mar 2009     | **2. Achieve buy-in & build gross list of cities for index**  
* Solid feedback from relevant stakeholders (e.g. UNEP, SBCI, C40, Clinton Climate Initiative, ICLI, WBCSD and Tata Energy Research & Resource Institute)  
* Refine composition of index as required  
* Seek fundraising opportunities from stakeholders and media partner  
* Develop gross list of 40 cities for the index |
| Mar 2009 – Apr 2009 | **3. Conduct survey**  
* Choose 25 cities to be included in ranking from gross list  
* Develop questionnaire for city survey  
* Conduct survey on selected cities using combination of phone interviews and email/web correspondence  
* Complete ranking based on gathered data  
* Compile catalogue of success stories |
* Promote ranking and success stories internationally: conferences on sustainability  
* International press coverage  
* Present final ranking at selected conferences  
* Scope hosting arrangement and identify feasible arrangement  
* Handover methodology to future host of index |

**Deliverables**

- Draft index structure designed covering three dimensions  
- Draft index structure tested on 3 low carbon cities  
- Index refined, ready for activation  
- Index accepted by key relevant stakeholders  
- Gross list of 40 suitable cities developed  
- Index populated and ranked with 25 cities  
- Success stories (policies and initiatives) from 25 cities collated  
- MoU signed with media partner  
- Dissemination of list of ranked cities and success stories  
- Index handed over to future host