

Importance of urban carbon management in global carbon management



Shobhakar Dhakal, Ph.D.

Executive Director, Global Carbon Project (GCP)

Global Carbon Project - Tsukuba International Office
c/o National Institute for Environmental Studies (NIES)

Onogawa 16-2, Tsukuba, Japan 305 8506

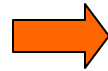
E-mail: shobhakar.dhakal@nies.go.jp

Contents

- Past and future world **urbanization trends** and what it means for urban carbon emissions
- **Urban's share** in global carbon emissions
- **Scientific and policy** responses
- Few **positive developments**

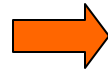
World urbanization at nutshell

- Historically urbanization speed has been accelerated



World urban population	Time taken	Years
0 – 1 billion	10,000 years?	8000 BC - 1960
1-2 billion	25 years	1960 – 1985
2-3 billion	17 years	1985 – 2002
3-4 billion	15 years	2002 -2017

- Size of urban population has been unprecedented



1950	2005
0.7 billion	3.2 billion

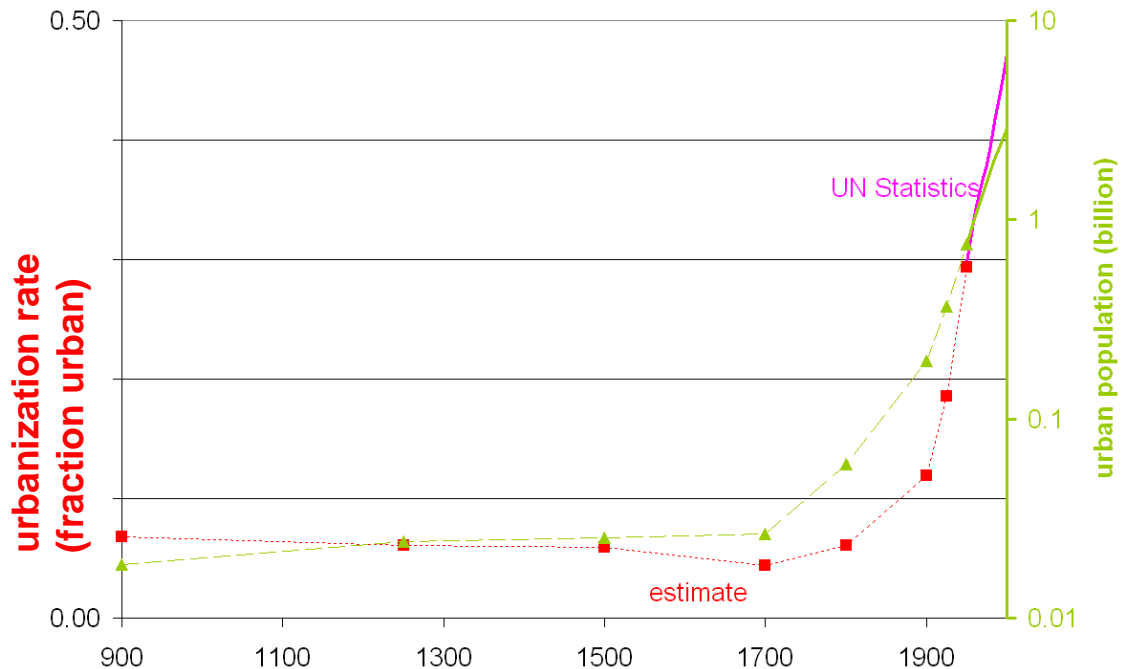
- Urban and rural population to be equal in 2008(?)



1900	2008 (perhaps)
15% (urban pop)	50%

World urbanization at nutshell

- World urban population: 3.2 billion (49% of world population of 6.5 billion in 2005, will be 50% by 2008)
- Asia hosts largest world urban population (Asia 1.6 billion, Europe 0.5, Africa 0.3, North America 0.3, Latin America Caribbean and Oceania 0.4 - in 2005)
- China, India, USA have largest urban population



Slide courtesy: Arnulf Grubler, Yale/IIASA; Mostly from T. Chandlers and UN data

Presently cities (probably) account for

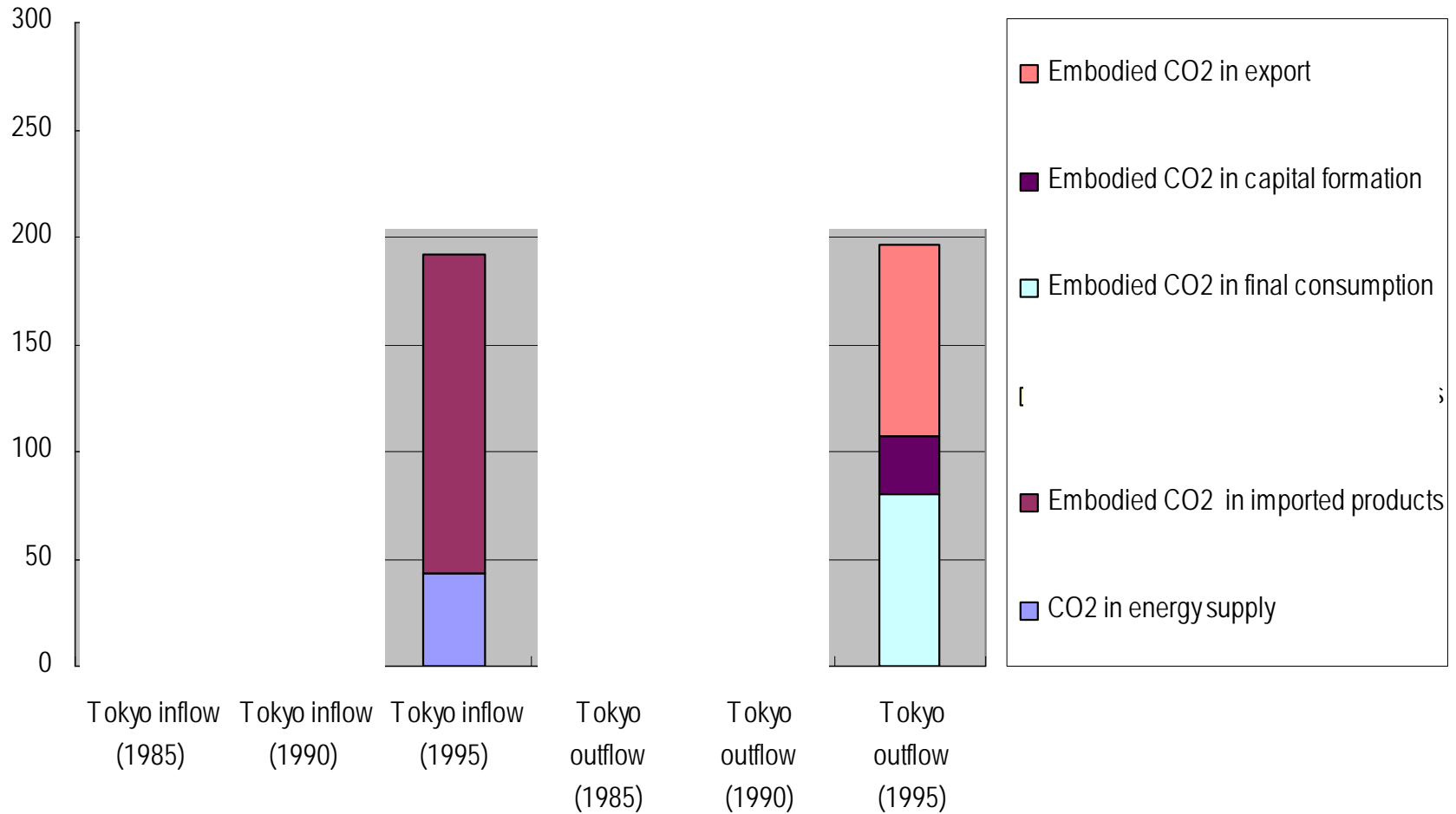
- ~50 % of world population (UN Urban data)
- ~85 % of world GDP
- ~80% of world commercial energy use
- ~95 % of world internet sites and traffic

Urban's share in present global CO2 emissions

Determining factors

- What is urban?
 - Caution for UN urban population statistics: Lower ends of “urban” definition swings urbanization levels drastically
- What is emission accounting framework?
 - Direct emissions (plus electricity)
 - Carbon emission footprint

CO₂ Balance, million t-CO₂ (2)



Carbon footprint: 4.44 for 1995

What is urban's CO2 share?

- Largely unknown- No such established number yet
- Direct emission (plus electricity)
 - Perhaps somewhere between 70-85 percent
- Carbon footprint
 - Should be significantly higher than direct emissions

(We are working on to estimate such number)

World urbanization- Future

- Urban population will grow twice as fast as compared to total population growth (1.78% vs. 0.95%-annual rate for 2005-2030 projected) resulting 4.9 billion (about 60% of total population) by 2030 (out of 8.2 billion)
- 1.8 billion urban population will be added in 2005-2030 out of which 1.1 billion will be added in Asia
- Cities and Asia:
 - 11 out of 20 mega-cities (over 10 million), 17 out of 30 cities of 5-10 million, 184 out of 364 cities of 1-5 million, 225 out of 455 cities of 0.5-1 million

What this means?

- **Enormous fossil energy use in urban areas**
 - Rising fossil energy per capita within cities due to rising income/economic growth
 - Rapid speed and size of urbanization (per capita fossil energy use in cities > rural area)
 - Energy efficiency gains small compared to the scale of energy use
- **Serious environmental consequences** (Local and global)
- **Cities provides us opportunities** to develop a low carbon society

Scientific and policy response to urban energy and carbon challenges has been inadequate

- “Talk the talk” (everybody recognizes that it’s the most important) VS “Walk the talk” (no systematic efforts)
- Energy and carbon related research as well as policies have largely ignored “urban” as a unit of concern or analyses
- Reductionism approach- tackling the individual pieces (sectors or fuels) than the whole system
- Over-reliance on technology with less or no attentions to “urban system integration”
- Lack of mechanism to collect and develop numerical data and information base at urban scale
- Weaker scientific knowledge on past and future urban development pathways, energy use and carbon implications to guide decision-makers

Positive developments

- Emergence of several policy networks and scientific responses in recent days
- Greater realization for needs to
 - Develop urban level information base and
 - Understand the implications of alternate urban development pathways on carbon emission
- Greater interests (than before) from multilateral, bilateral and development community
- Emerging discussions on how to tap co-benefits as a tool to streamline carbon concerns especially in developing country cities and possible mechanisms Growing awareness in citizens and urban policy makers

Conclusion

- The role of urban areas in global carbon management is immense which will further increase
- Response has not be adequate
- Greater scientific and policy drives are needed for understanding, developing long-term visions and finding solutions to urban carbon management issues

Thank you !!

- For more, please contact

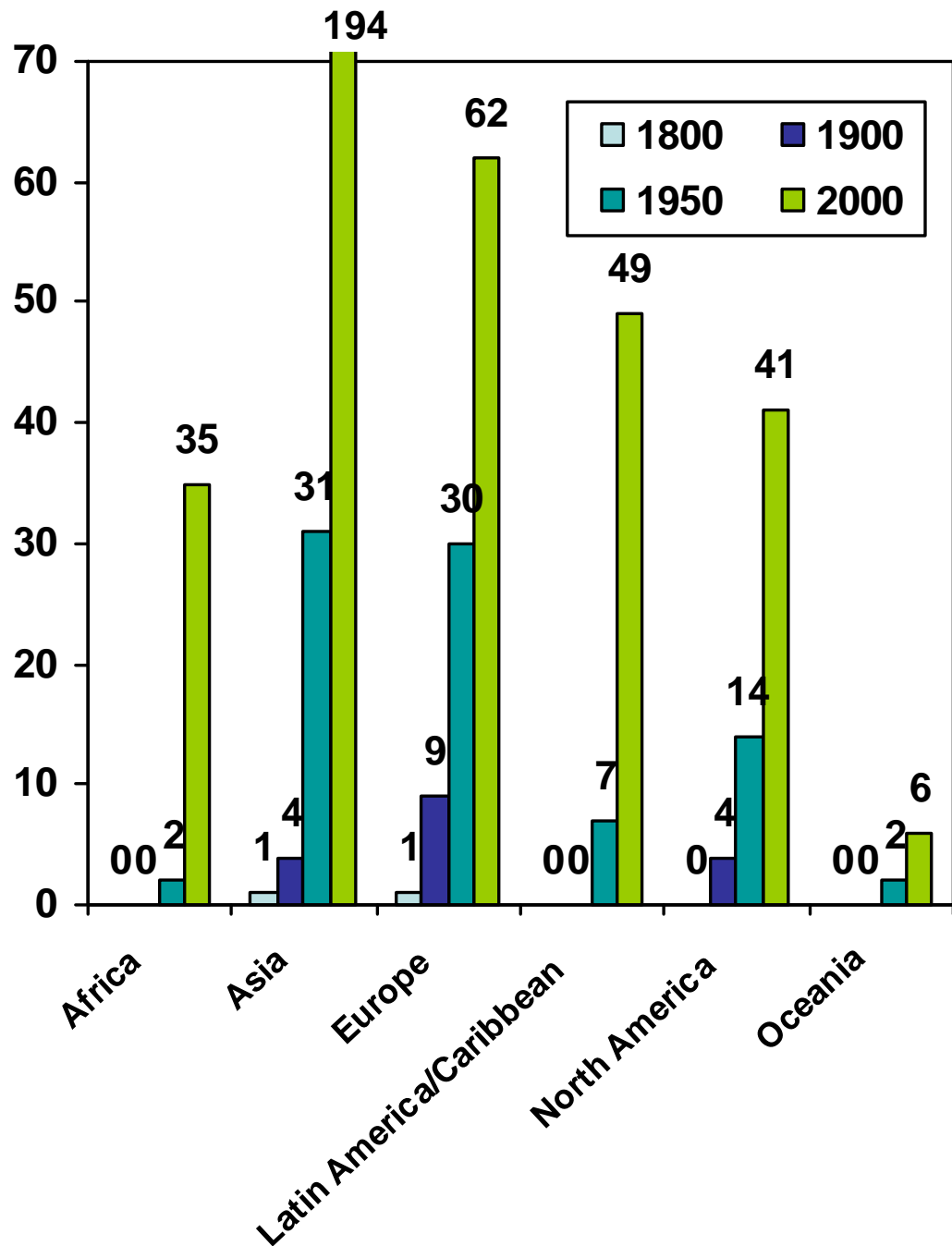
Shobhakar Dhakal
Global Carbon Project

www.globalcarbonproject.org

Shobhakar.dhakal@nies.go.jp

Number of “Million-cities” by region over time

1800- London and Peking



Factors to be addressed for developing low carbon cities

- Urban demography
 - Economy and income
 - Urban infrastructures and technology
 - Urban forms and functions
 - Behavioral and societal factors
 - Globalization and trade
 - Institutional and political factors
 - Natural factors
- Such as:**
- Compactness of settlements
 - Urban spatial structure and urban function
 - Nature of transportation systems
 - Energy efficiency of key technologies and appliances
 - Industrial processes; big industries and SMEs
 - Building technologies and building floor space uses
 - Household number
 - Income level and lifestyle
 - Climate factors

What is urban's share in present global CO2 emissions?

Determining factor: What is urban- definition?

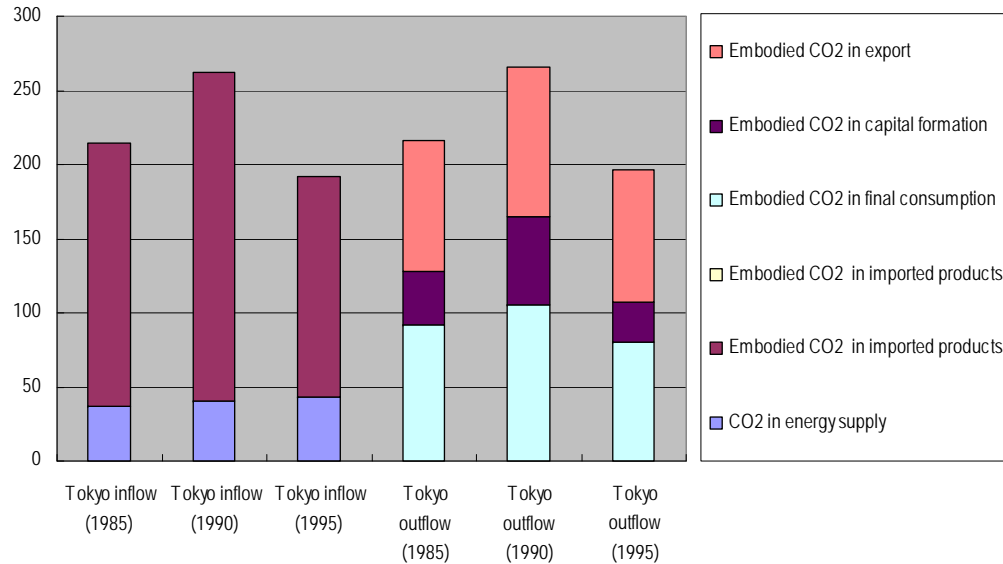
UN urban data

- India classifies 500-5,000 inhabitant settlements as rural
- 17.5% of Egypt's population live in settlements with 10,000 to 20,000 inhabitants which were not classified as urban (1996)
- In Sweden, urban (*tätort*) refers to settlements of more than 200 inhabitants with continuous built-up area that houses are not more than 200 meters apart when discounting rivers, parks, roads, etc
- What would be world's urban population data if we apply Swedish definition to other countries?
- Lower ends of “urban” definition swings urbanization levels drastically

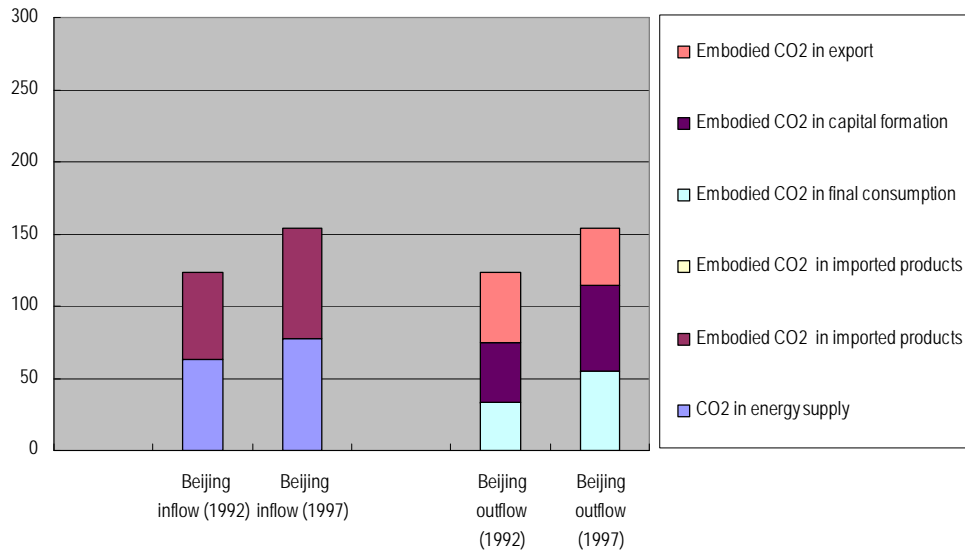
...challenges of carbon management add up when comes to urban carbon management?

- **Boundary problem** - What is city? Do we have relevant information consistent to such boundary(ies)?
 - Administrative/political boundary? May Underestimate (e.g. Bangkok, Dhaka) or overestimate (e.g. Beijing, Chongquin);
 - Agglomeration?
 - Internal and external “reach” of urban activities?
- **Internal dynamics** as well as urban development in a larger regional context
- Complex and difficult to understand **cross-scale linkages**
 - Trade, globalization, material, energy, mobility etc.
- **Who “governs”** environmental issues in cities?
 - Municipal authority, national or state governments, everybody, nobody, story of decentralization
- **Who is responsible** and who **should be managed**
 - Consumer or producer? Direct, indirect and embodied?

CO₂ Balance, million t-CO₂ (2)



- Tokyo 85-90-95
- Carbon footprint
 - 5.81 (1985)
 - 6.55 (1990)
 - 4.44 (1995)



- Beijing 92-97
- Carbon footprint
 - 1.95 (1992)
 - 1.99 (1997)