



THE WORLD BANK



Eco² Cities: Ecological Cities as Economic Cities

The World Bank's New Urban Development Initiative

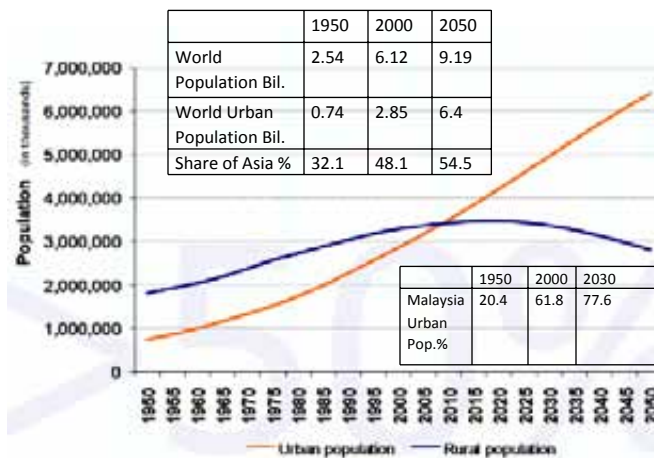
www.worldbank.org/eco2 Hsuzuki@worldbank.org



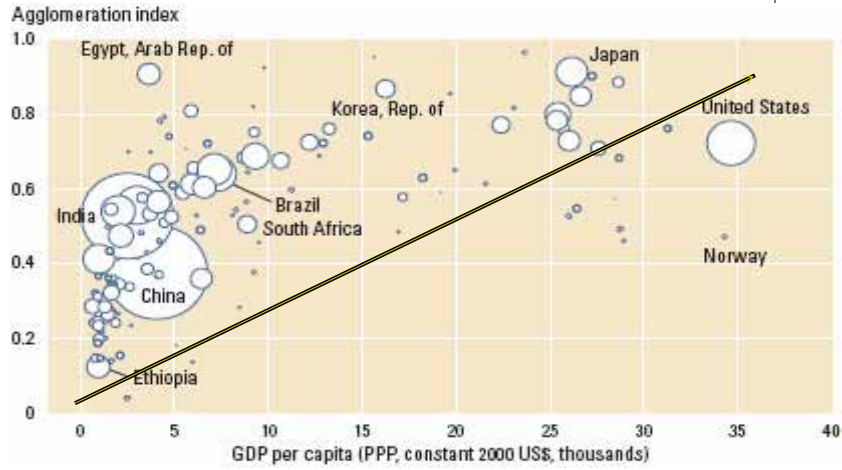
Green Cities International Conference , Putrajaya Malaysia, Feb. 23-24,2010

Hiroaki Suzuki Lead Urban Specialist
Finance, Economic and Urban Department, the World Bank

The World Urbanizes



Cities as Engines of Economic Growth

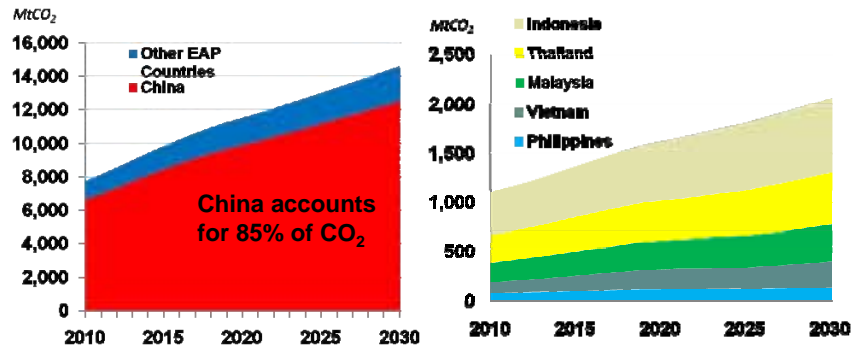


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Urbanization/Economic Growth Leading To Higher Energy Consumption/GHG Emission



GHG emissions will double for all countries by 2030



Local air pollutants will also double by 2030

4

Environmental Pressures Can Turn into Limits to Growth



Scarce Water Resources



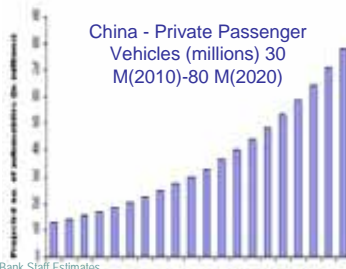
Untreated Wastewater



Increasing Solid Waste



Rapid Motorization->Air Pollution & GHG



Natural Disaster

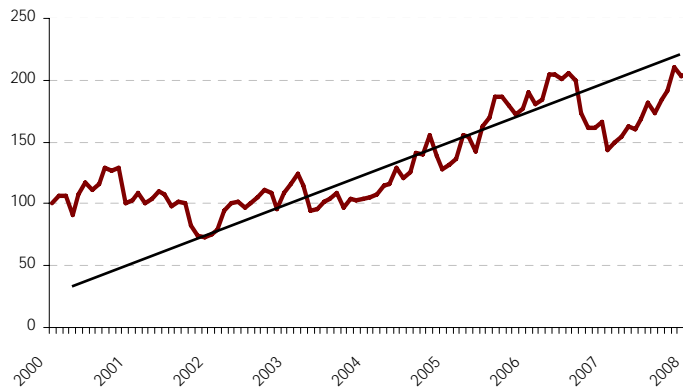


Source: International Energy Agency, 2005; World Bank Staff Estimates

Higher Energy Prices Imposing Fiscal Burden & Economic Costs



Real oil prices (US\$ / b), Index, 2000=100



Source: World Bank, DECPG; Financial Times, March 4, 2008

Unsustainable Growth



- Projected new urban built up area in developing countries alone is 400,000 km² (2000 – 2030)
- This equals the total urban built up area of the 'entire world' as of the year 2001 – ***we are building a 'whole new world!'***
- ***4 Earths (Ecological Footprint)*** required if developing country cities urbanize following the models of developed country cities



Eco² City ---- Fusion of Ecological and Economic Sustainability



- Explicitly builds on the positive synergy and increasing interdependence of ecological and economic sustainability
- Enhances resource efficient in ways that also enhance quality of life, competitiveness, and resilience
- Uses these benefits to help the urban poor
- Makes long-term and sustainable investments that serve to
 - strengthen fiscal capacity, and
 - create an enduring ecological and economic sustainability
- Eco² Cities attract talented people/FDI.

How did we arrive at our Eco² solutions?



By focusing on global best practice cities:

- Curitiba, Brazil
- Stockholm, Sweden
- Yokohama, Japan
- Singapore
- Vancouver, Canada
- Auckland, New Zealand
- Brisbane, Australia

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Eco Cities – Global Experiences (1) Curitiba, Brazil

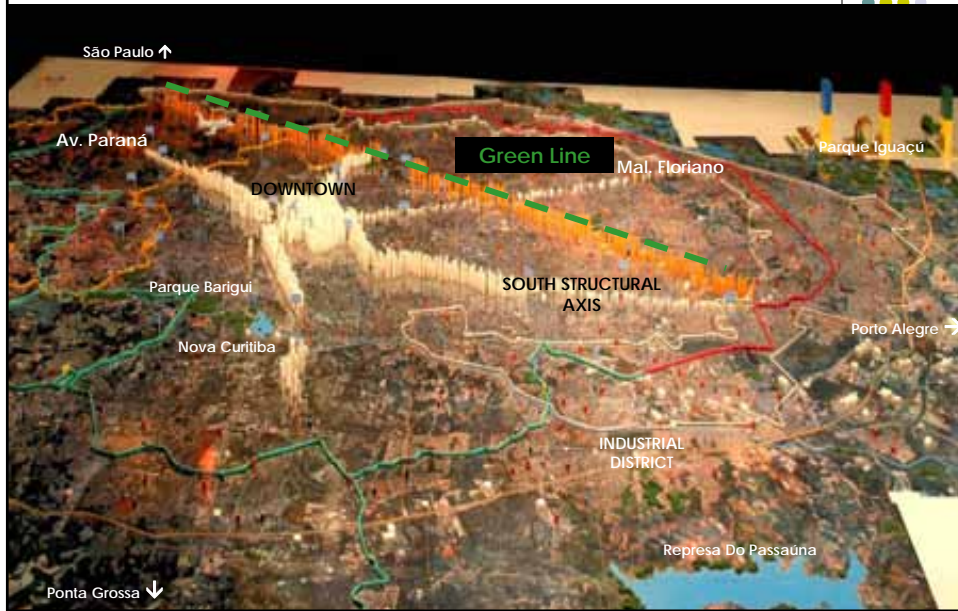


Integrated Land & Transport Development

- Innovative Land Use Management
 - Urban Planning Institute of Curitiba (IPPUC) for integrated planning
 - Linear urban growth along five strategic axes with highly dense commercial/ residential development to absorb rapid population growth
 - Flood control with enhanced green space
- Affordable and Integrated Bus System
 - Bus Rapid Transit lane along the five strategic axes
 - Investment cost – about US\$ 3 mil/km (about 3-6% of underground metro)
 - 45% Bus ridership
 - Less traffic congestion



Curitiba's Transit Oriented Development



Eco Cities – Global Experiences (2) Stockholm, Sweden



Integrated Utility Management & Resource Management

- Redevelopment of southern district in Stockholm, Sweden



Source: Stockholm City Planning Administration

Eco Cities – Global Experiences (3) City of Yokohama, Japan



- Solid Waste Reduction
 - Implementation of 3R (Reduce, Reuse, Recycle) with citizen's collaboration
 - Achieved 38.7% reduction in six years (2001-2007)

- Cost Saving and Revenue from Recycling
 - Closure of two incinerators because of reduced waste
 - Saved about US\$ 1.1 billion capital costs of incinerator reconstruction, US \$ 6 million from reduced operation and maintenance costs.
 - Longer life of landfill sites



Source: City of Yokohama Website

Eco Cities – Global Experiences (4) Singapore

Closed Water Loop

Integrated Water Resource Management

- Closed Water Loop
- Entire Water Cycle Managed by One Organization
- Water Security
 - Water Catchment
 - Wastewater reclamation
 - Desalination
- Demand Management
 - Tariff: Financial incentive to reduce water consumption



Source: PUB website, Singapore

Demand Control and Water Consumption

Year	2000	2004
Population ('000)	4,028	4,167
GDP (US\$ mil.)	92,720	109,157
National Water Consumption (mil. m ³)	454	440

Eco Cities – Global Experiences (5) London, Stockholm, Milan, Singapore



Congestion Pricing – Urban Transport Management

- Ease of Traffic Congestion within the City

London:

- £137m revenue 2007/08
- Invest back into public transport
- Reduced traffic 21% lower
- (70,000 fewer cars/ day) within the charging zone.
- Increased usage of bus and bicycle.

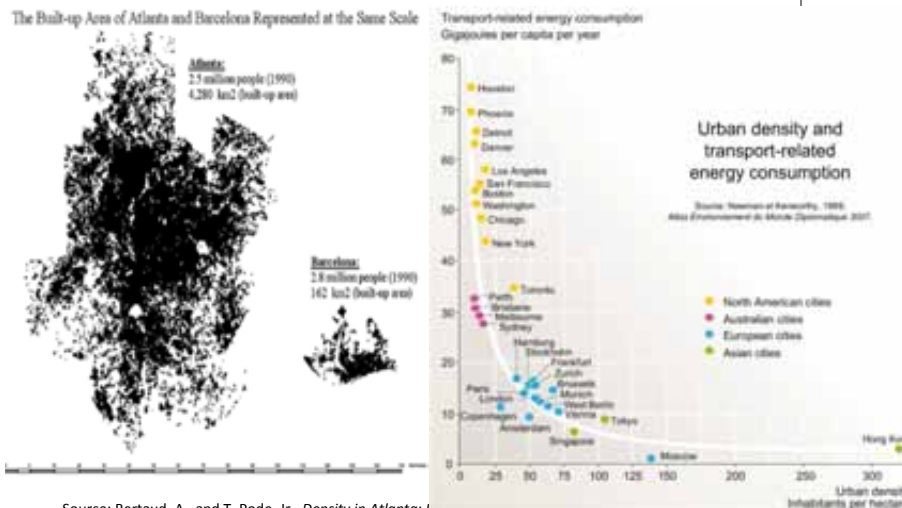


Source: Transport for London website

Spatial & Urban Form Determine Cities' Energy Efficiency



Decisions today are limited by decisions in the past



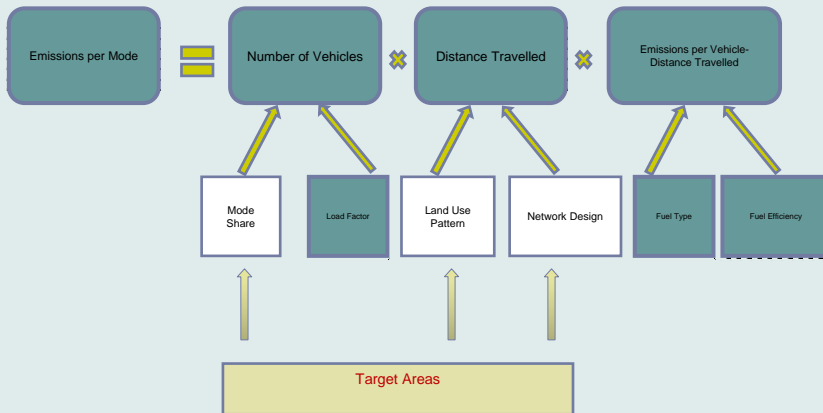
Source: Bertaud, A., and T. Pöde, Jr., *Density in Atlanta: 1* (Los Angeles: Reason Foundation, 2007).

Public Transport vs.. Cars

Seattle/King County, Washington State USA



Compact cities have greater potentials for reducing carbon footprints



Best practices were used to establish 'Core Eco² Principles'



Core principles are strategies that are:

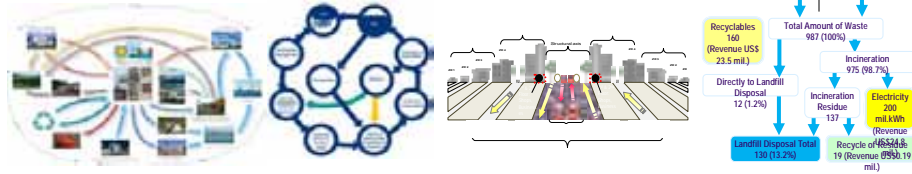
1. Universally applicable
2. Critical to success
3. Under-appreciated

The Four Core Principles of Eco²



1. A City-based Approach
2. An Expanded Platform for Collaborative Design and Decision-making
3. A One-System Approach
4. A Framework for Investing in Sustainability and Resiliency

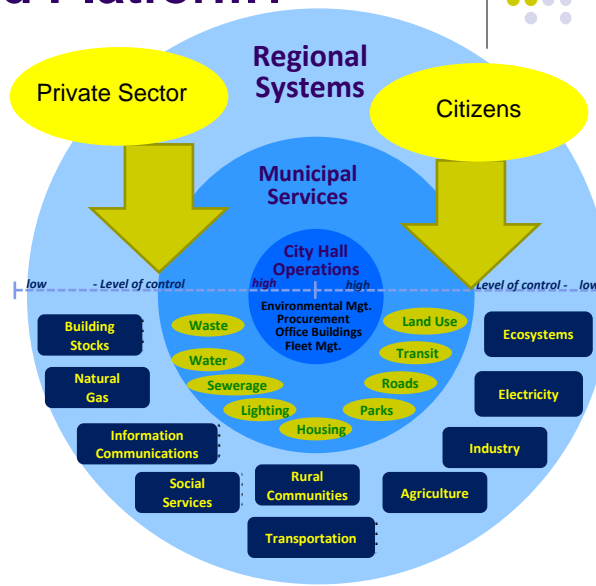
Principle 1: How do we define a City-based Approach?



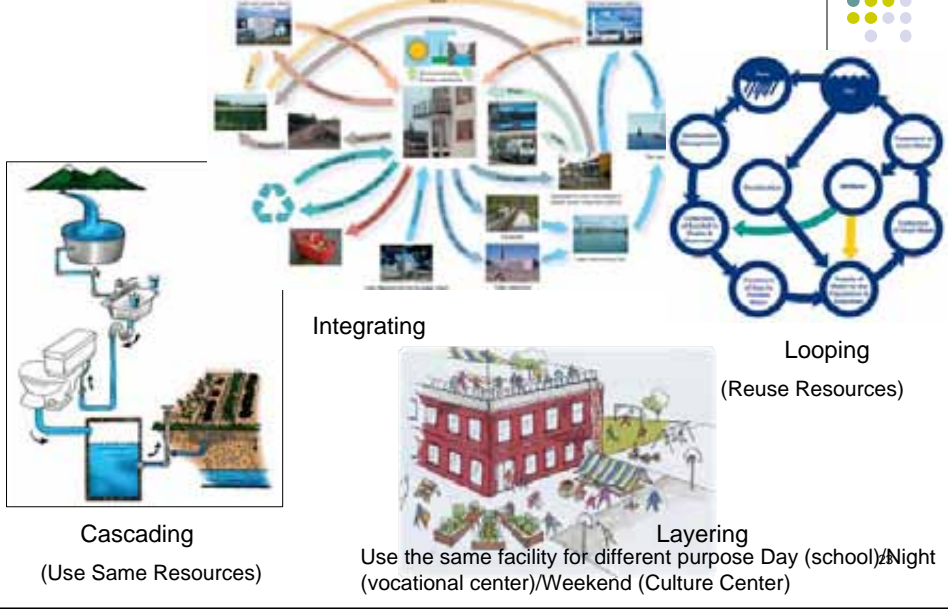
1. Leadership from local governments
2. An action-oriented network provides support
3. Special emphasis is given to the local condition, particularly ecological context
4. Methods and tools are adapted and used to enhance capacity of cities

Principle 2: How do we define an Expanded Platform?

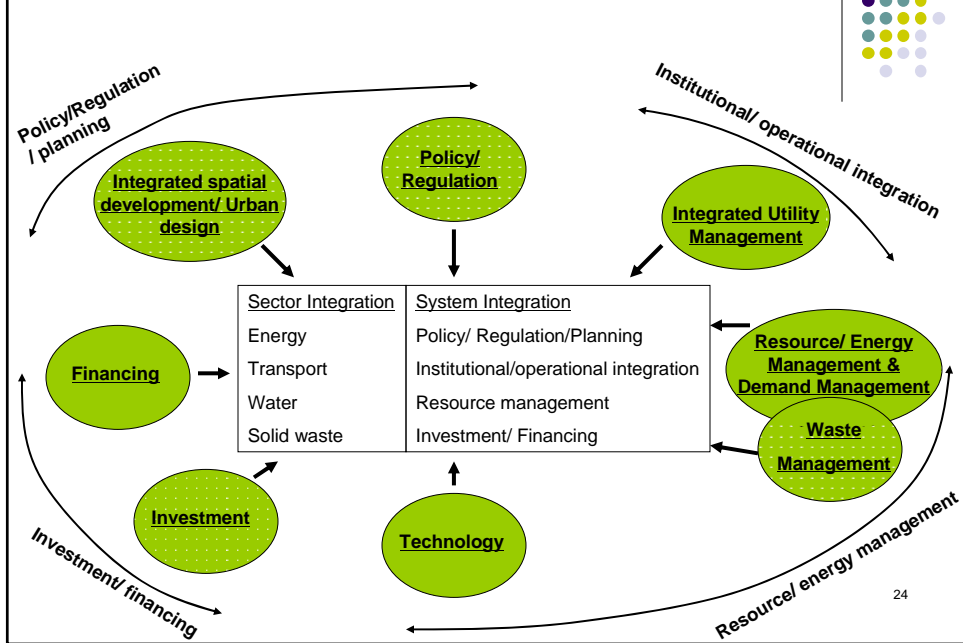
1. Formal collaboration on three tiers
2. A shared planning framework
3. Integrated Design Process



Principle 3: How do we define a One-System Approach?



Eco2 Key Instruments



Principle 4: How do we define an Investment Framework?



- Lifecycle Cost Accounting
 - e.g. Building:
 - Capital Investment Cost + Lifetime Operating & Maintenance Cost
 - (10 - 20%) (80 - 90%)
- Cost Benefit Analysis of Four Capital Assets
 - Manufactured Capital (too much focus on MC)
 - Natural Capital
 - Social capital
 - Human (Cultural) Capital
- Proactive Attention to Managing All Kind of Risk
 - e.g. Natural e.g.. Flood as Result of Sea Level Rising due to Climate Change, Global Financial Crisis, etc

How do we Prepare Eco2 City Program with Eco2 Tools?



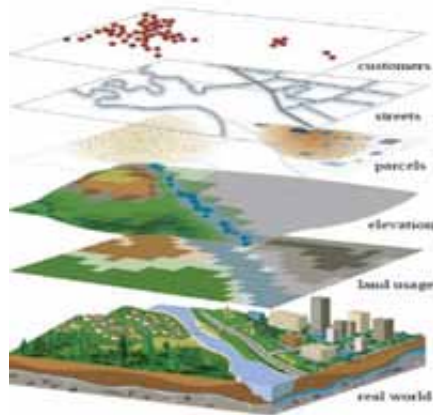
GIS to Analyze Form

Design Charrettes to Forecast and Plan

Sankey Diagram to Analyze Material Flows

Life Time Cost Benefit Analysis to Compare Alternatives for Decision

Form: Understand Form by GIS



FORMS: Layering of Information Maps

Flow



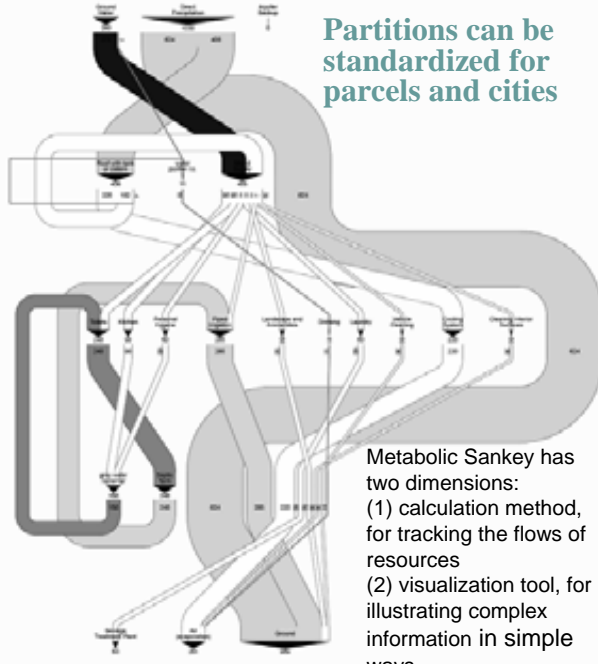
Sources →

Converters →

Demands →

Re-converters →

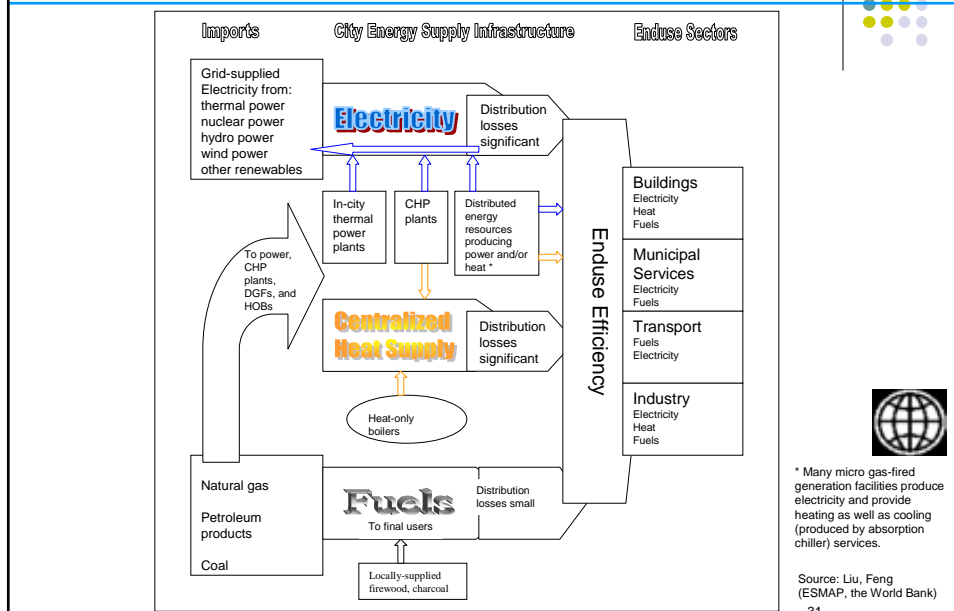
Sinks →



Partitions can be standardized for parcels and cities

Metabolic Sankey has two dimensions:
(1) calculation method, for tracking the flows of resources
(2) visualization tool, for illustrating complex information in simple ways

Integrated Platforms at Sector Levels: Plan Systems, Then Invest: Diagram of Urban Energy Supply Sources and Systems



Integrated System Design Charrettes



An Investment Framework that Values Sustainability and Resiliency



- Life Cycle Cost Benefit Analysis: Investment Decisions



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An Investment Framework that Values Sustainability and Resiliency



- Life Cycle Analysis: Investment Decisions

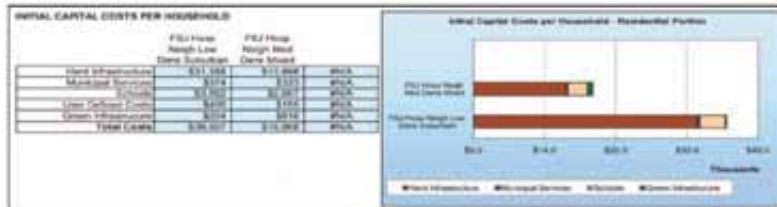


Figure 2.41. Comparison between Baseline and Sustainable Neighbourhood Scenarios—Initial Capital Costs



Figure 2.42. Comparison between Baseline and Sustainable Neighbourhood Scenarios: Annual Operating Costs

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Life-Cycle Costing - Method/Tool 5



The Environmental Load Profile, Sweden

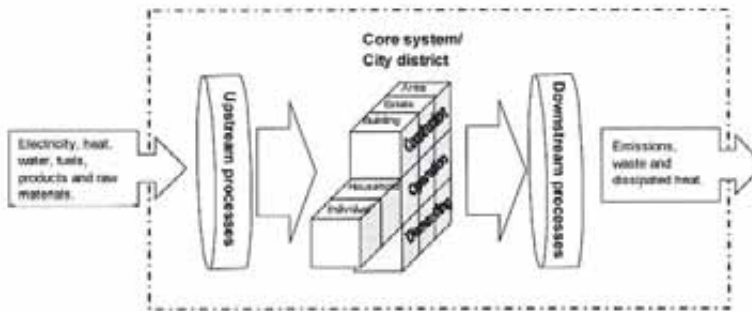
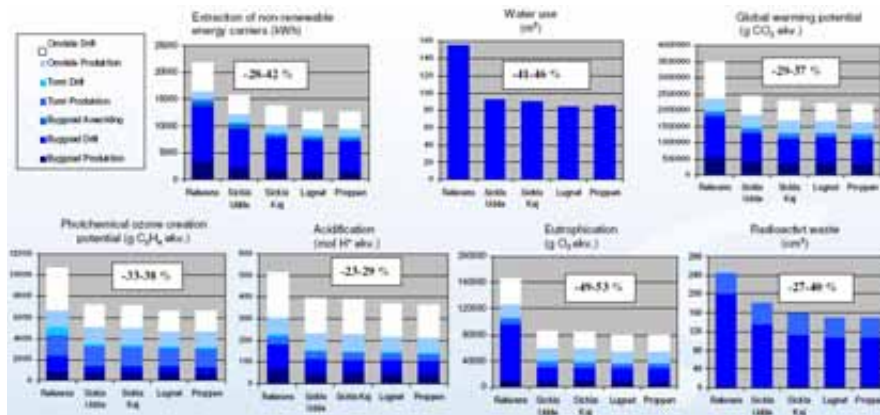
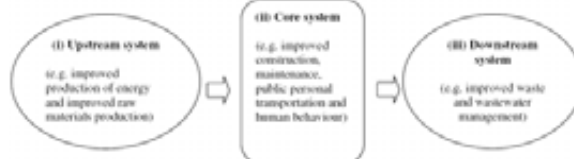


Figure 1. The conceptual model illustrates the system boundaries in the ELP. The cubes in the Figure demonstrate the core system (the district) and the various subparts (the individual level, etc) including the three life cycle stages: construction, operation and dismantling. The circles symbolise upstream and downstream processes supporting the district. The outer limit (dash-dotted line) illustrates how far the flows are followed upstream and downstream.

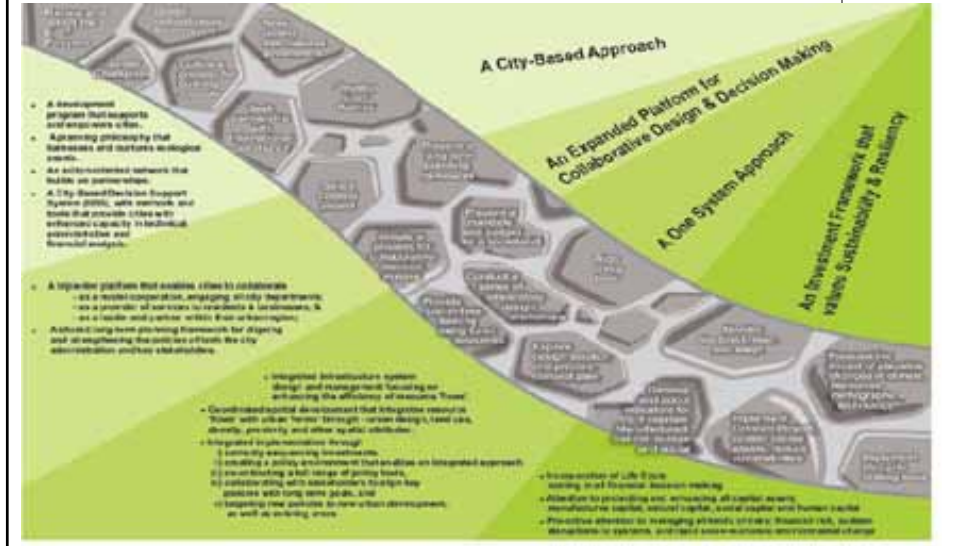
Figures are from Anna Forsberg's Thesis, "Development and First Application of the Environmental Load profile for Hammarby Sjostad," KTH (The Royal Institute of Technology, Stockholm), May 2003

Performance evaluation over lifecycle

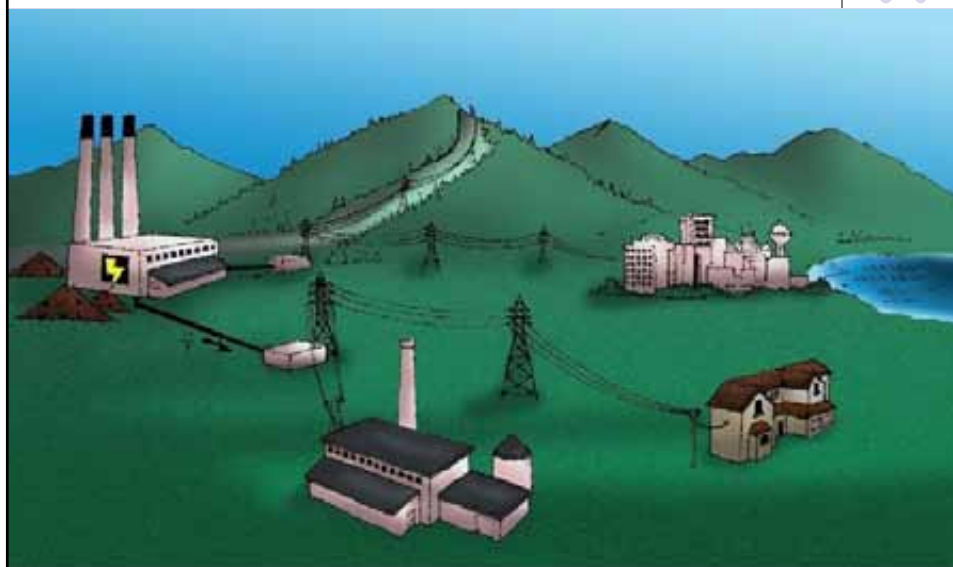


Environmental Load Profile

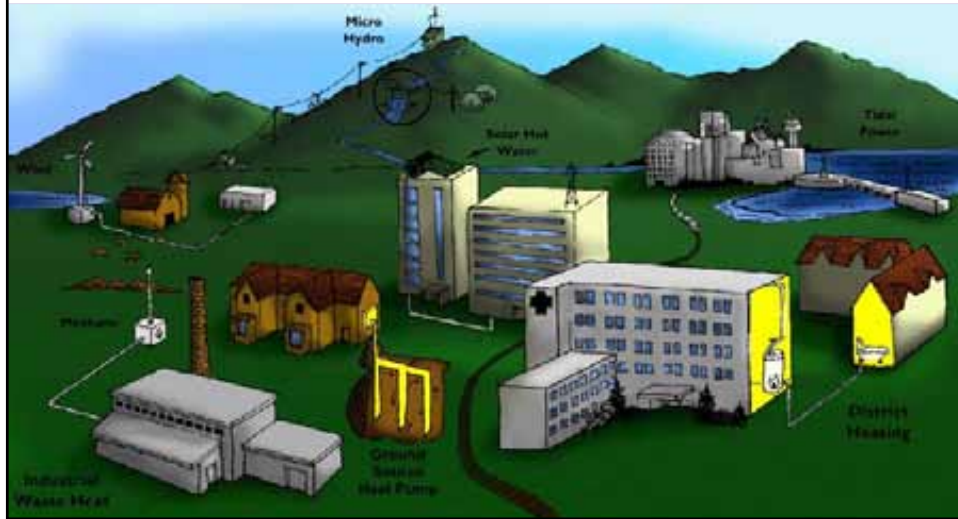
Principles are used to create a unique Eco2 Pathway:



19th Century Industrial model



Ecological Energy Model



Across all sectors Plus Ecology



Eco2 Project can finance TA and Multi Sector Projects E.G.



TA - Eco2 Diagnostic-One System Approach- Master Plan-Sub Projects Identification-Preparation

Investments (e.g.)

- Spatial Development and Land Adjustment (Compact City)
- Green Public Transport (BRT, Light Rail Metro, Electric Ferry), Bicycle Pass and Rental Bike, Intelligent Transport System, Congestion Tax Introduction
- Green Building (energy saving, solar panel, water saving)
- Wastewater- Collection of Biogas, Bio soil
- Water Demand Management/Loss Reduction
- Landfill collection of Methane Gas for Power Generation
- Cogeneration-District Heating/Cooling
- Recycling of Waste and Composting
- LED Street Lighting
- Green Infrastructure (Green Roof, Wetland Waste Treatment) and Urban Agriculture

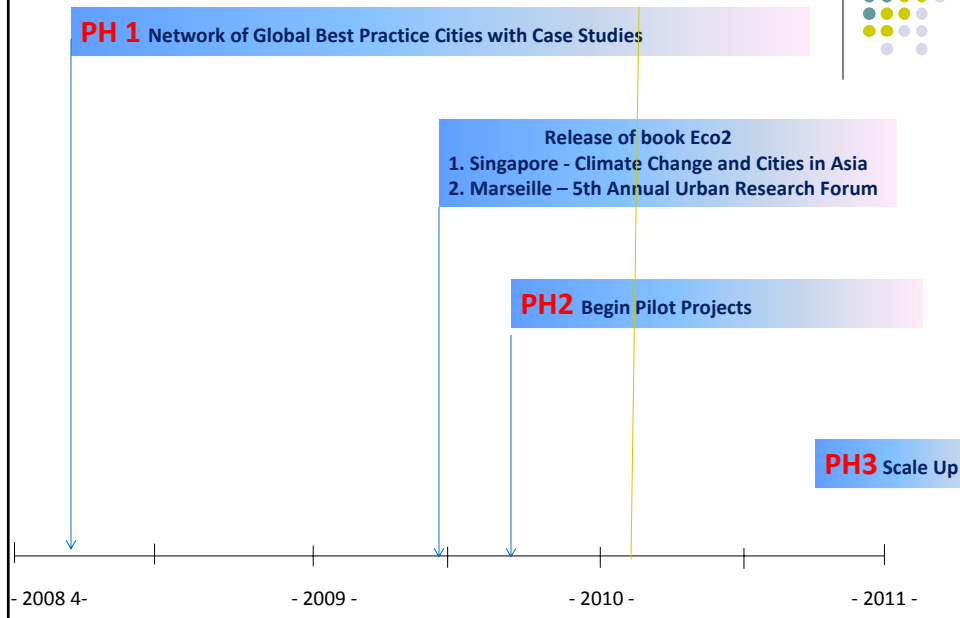
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Eco2 City Elements

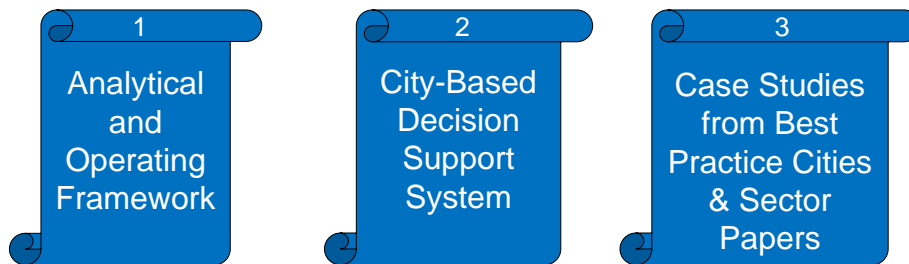


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WB Eco²Busines Process & Timeline



Phase 1: Eco² Book in 3 Parts



Comprehensive:

- process;
- analysis;
- financing.

Builds Capacity:

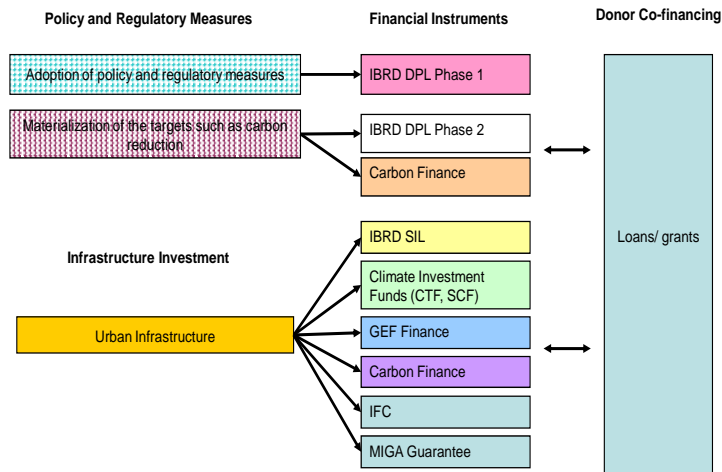
- basic methods,
- operationalized with scalable tools

Bottom Up:

- derived from experience of best practice cities/sectors

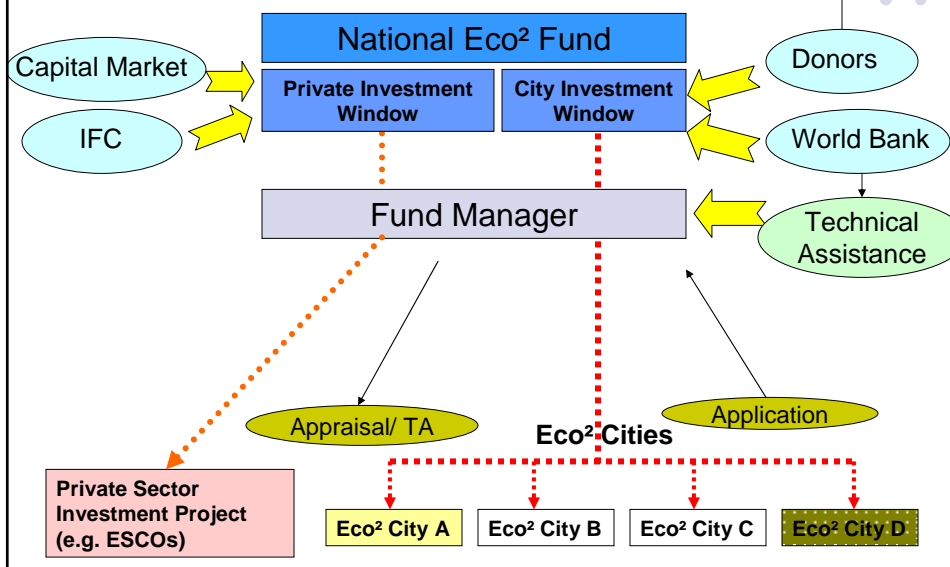
Phase 2: Pilot Cities

- Capacity building
- Alignment of World Bank financing instruments:



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Phase 3 Possible Scaling-up of support in partnership with national governments

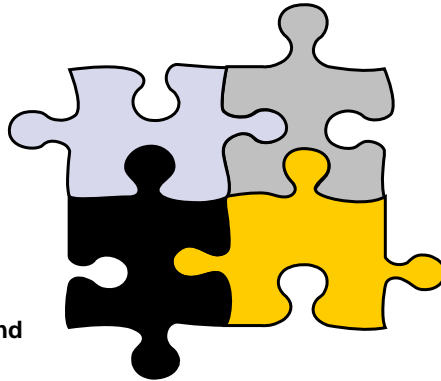


Eco² Partnership: Each of you have a place to participate in Eco² Cities Program



National and
municipal
governments

Research
Institutes,
academics and
NGOs



Donors
Financial
Institutions

Private sector
Investors
Citizens

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Contact:

Hiroaki Suzuki: Hsuzuki@worldbank.org

Website: worldbank.org/eco2 (Eco² Book can be Downloaded)

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