



City Regions and Climate Change

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Overview

Background and Environmental Issues in Cities

The Institutional Structure



A Process to Address Climate Change

Examples of Process Steps



Background and Challenges

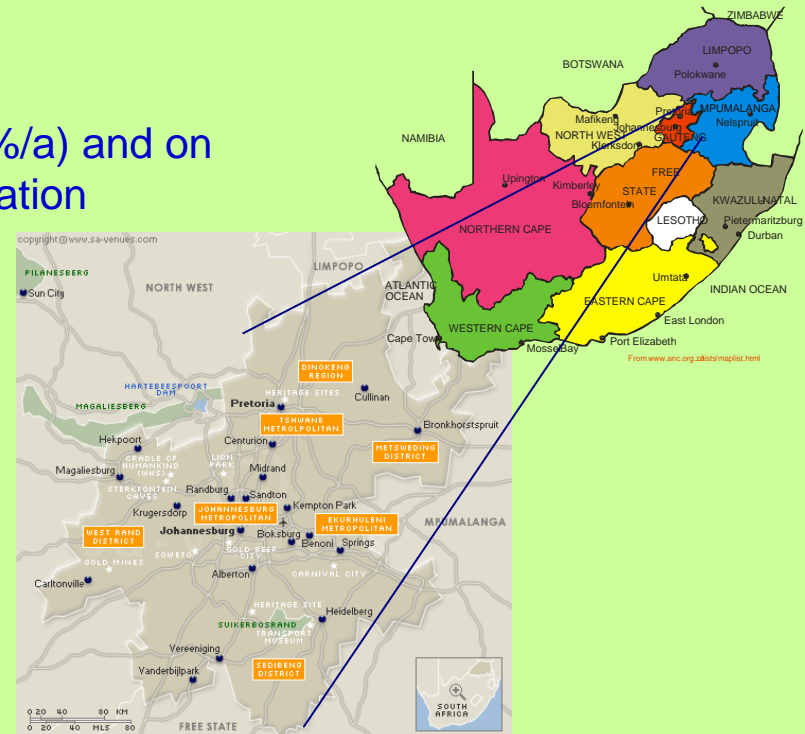
City Region Economies and the Energy System

- Cities use about 85% of energy and generate about 75% of GHGs to produce almost 80 % of the GDP
- 40% of energy consumed is for buildings and another 40% is for transport (mostly urban)
- CO₂-emissions are per capita in many third world cities (for example Johannesburg 9,2 t/a) are as high as in developed cities (for example in Germany 9.74 t/a) and per GDP (2.07 kg/\$) fivefold compared with Germany (0.41 kg/\$)

Asian Cities

- show an enormous population growth (average 3 %/a) and on average account for almost 50 % of national population
- show a lack of energy supply security (blackouts!), public transport systems and effective planning
- grow together as one large urban agglomeration

Urgent need for efficiency gains, reduction in pollution and GHGs and integrated planning for adaptation



Environmental Management Issues

Global Environment (GHGs)

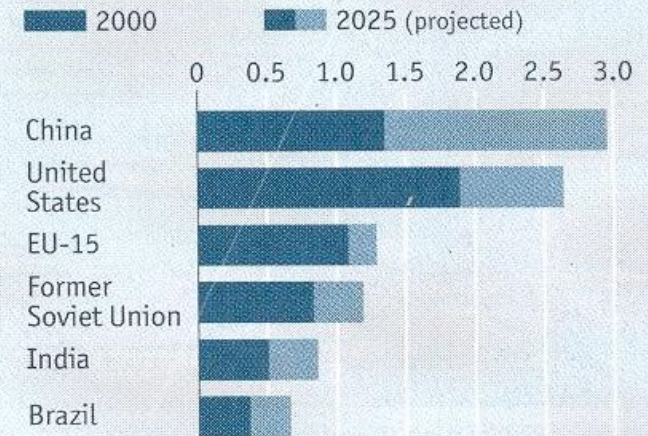
- Public transport
- City form and car usage
- Energy inefficient buildings
- Solid waste/ methane generation
- Air quality – cross border haze
 - driven by city demand
- Water quality and quantity
 - Singapore/ Malaysia water issue
 - Water pollution across boundaries

Management Issues

- Pollution legislation largely in place – not enforced
- Planning for city form – largely non-existent and not enforced
- Incentives for energy efficiency – not in place
- No global incentives for global public goods (greenhouse)
- No clear indication of what incentives should be used to build required environmental infrastructure (sanitation, solid waste etc)

A chilling comparison

Greenhouse-gas emissions
Billion tonnes of carbon equivalent



Source: World Resources Institute

The core problems are:

the lack of international incentives for action towards preservation of global public goods and

lack of capacity in, and funding for, management entities at the local level

- *Rise in pollution and sea levels puts trillions in economic output and hundreds of millions of people at risk*

EnVironmental ISSUES

Local Environment/ GHGs

- Air quality
 - Factories
 - city form – increasing car dependence and decreasing density
- Water quality
 - Sanitation
 - Factories – enforcement
 - lack of infrastructure
- 'Natural' disasters
 - flooding – lack of enforcement and infrastructure
 - Coastal erosion – lack of enforcement and infrastr.
 - Energy use
 - Factory process and industrial estate design
 - City form
 - Building design
- Ecological footprint and urban sprawl
 - City form – size and density of built up area
 - Industry resource usage
 - Energy use in buildings

Urban Management Issues

- *Strategic/transport planning*
- *building codes etc*
- *eco-parks/ serviced industrial estates*

Underpinnings

- *implementing infrastructure*
- *pricing policies*
- *monitoring and enforcement capacity*

The Dilemma

If cities use so much energy, why not all just move people to rural areas?

Assuming we could all fit without further encroachment on agricultural land:

1. Cities are actually less energy intensive than rural areas at similar levels of living standards – recent US data show city per capita emissions to be 14 percent below the US average and thus well below rural areas.
2. This is reasonable given the efficiencies in energy use for transport, heating etc achieved by higher population densities
3. Cities are the only real opportunity to generate the ‘nega-watt’ – energy savings – on the demand side
4. A recent Mckinsey study has estimated rates of return on such investments of between 10 and 17% and they could contribute up to 50% of carbon reduction required to keep GHGs below 550 parts per million - yet they are not being made.
5. The main issue is the institutional and incentive structures applying to project developers and consumers, do not encourage such investment.

Climate Change in Developing Countries

The key challenges:

1. Competing priorities – short term poverty relief or long term global benefit.
2. Low institutional capacity – especially for coordination of investment and enforcement of standards
3. Low technical capacity in climate change related finance, engineering etc
4. Perverse incentives applying in particular to do with pricing – charging a flat, low fee for district heating means that people regulate the temperature by opening windows rather than installing thermostats.

Current International Support for Climate Change Initiatives in Developing Countries

Key features of the current Clean Development Mechanism which make it user unfriendly for developing countries:

The approved methodologies for calculating CERs are not easily applicable to urban regions requiring

- High levels of technical competence in proposal preparation
- High transaction costs in terms of time and expertise
- Competent specialized institutions to ensure projects are implemented as designed, and to monitor and certify emissions

It should be noted that these features are exactly the areas where on the previous slide, we saw developing countries have difficulty.

**There is a lower standard of VERs – Verifiable Emissions Reductions
But this mechanism is not, as yet, making a systemic difference**

Current CDM Approach Shortcomings

Supply-driven, technically focused and on the demand-side lacks:

- a clear concept of project implementation to address demand-side issues on a systemic basis
- a clear concept of how to handle the social, economic and environmental issues and costs and their inter-relation with GHG reduction investments - this is basic stuff since the 'Limits to Growth'
- established indicators e.g. ecological footprint, established methodologies e.g Sustainable Cities Programme
- established analytical tools except in narrow fields of environment and transport (and even these are limited).
- methodologies for trading off among, and prioritizing, sectoral options
- institutional analysis: particularly in FINANCIAL systems (the CDM is a financial mechanism after all)

Current levels of carbon credit pricing do not provide a significant incentive for the adoption of EE investments in developing countries

Elements of the Climate Change/ Adaptation Process

Stage	Local Process	National/ International Support
Information base/ planning response	Climate and vulnerability modeling of city region	Coordination of national/ international research Tool building (models etc) Coordination of planning
Institutional structure	Institutions to agree response among stakeholders and to prioritize and coordinate investment	National/ international support to awareness raising (political establishment/ civil society)
Implementation	Organization to structure coordination of investment and finance Organization for sustainable operation	Finance – sector development (CDM plus) and link to financial resources Capacity development Strengthening sector coordination structures Networking of peers in above areas
Feedback system	Effective monitoring, evaluation and enforcement systems for environmental agencies and others	Capacity development and networking

Model/ Tool Development: BMBF Research Program Example

University of Stuttgart

Development and Use of Modular and Integrated Planning Tools

Building energy
efficiency
EnerKey
Concept Adviser

Settlement and
infrastr. planning
Arc GIS

Traffic and
Mobility
GIS, IKARUS -ITM

*System development
and scenario calculations*
TIMES

*Spatial
planning*
GIS

Energy conv.
technologies
**LCA Balance,
RetScreen, etc.**

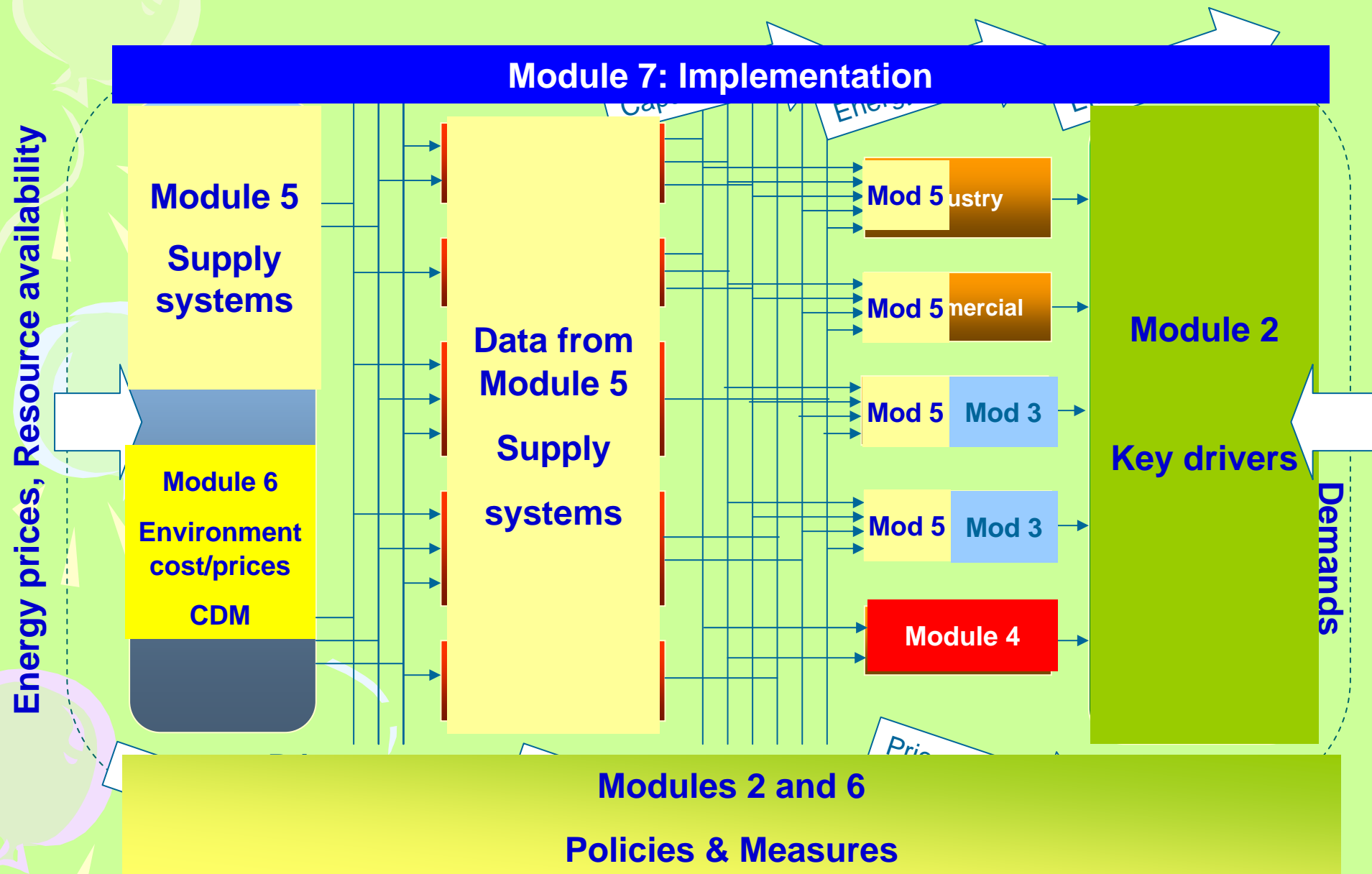
Socioecon. drivers
**panels, interviews,
etc.**

Climate policy,
CDM
**Training,
consulting**

Cost-benefit analysis

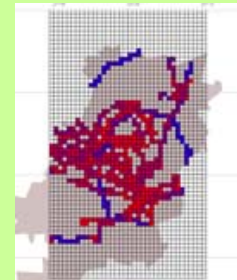
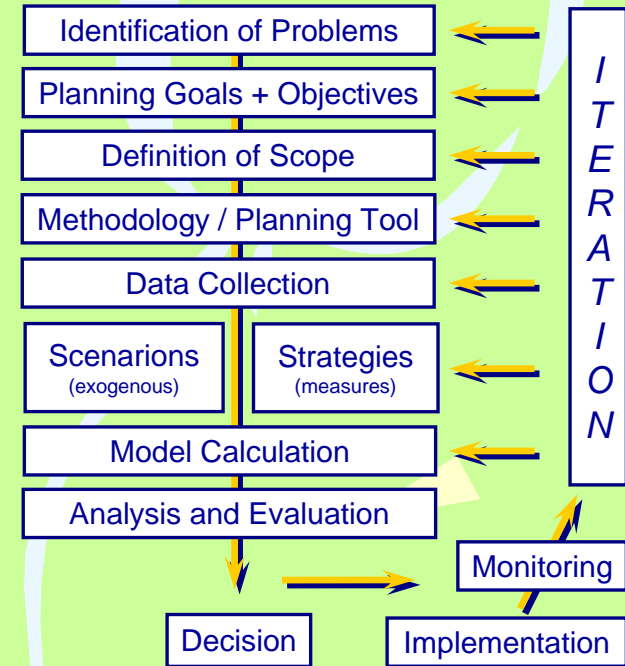
Cost-potential analysis

Stuttgart's Energy System Model TIMES and Cost and Emission Balance

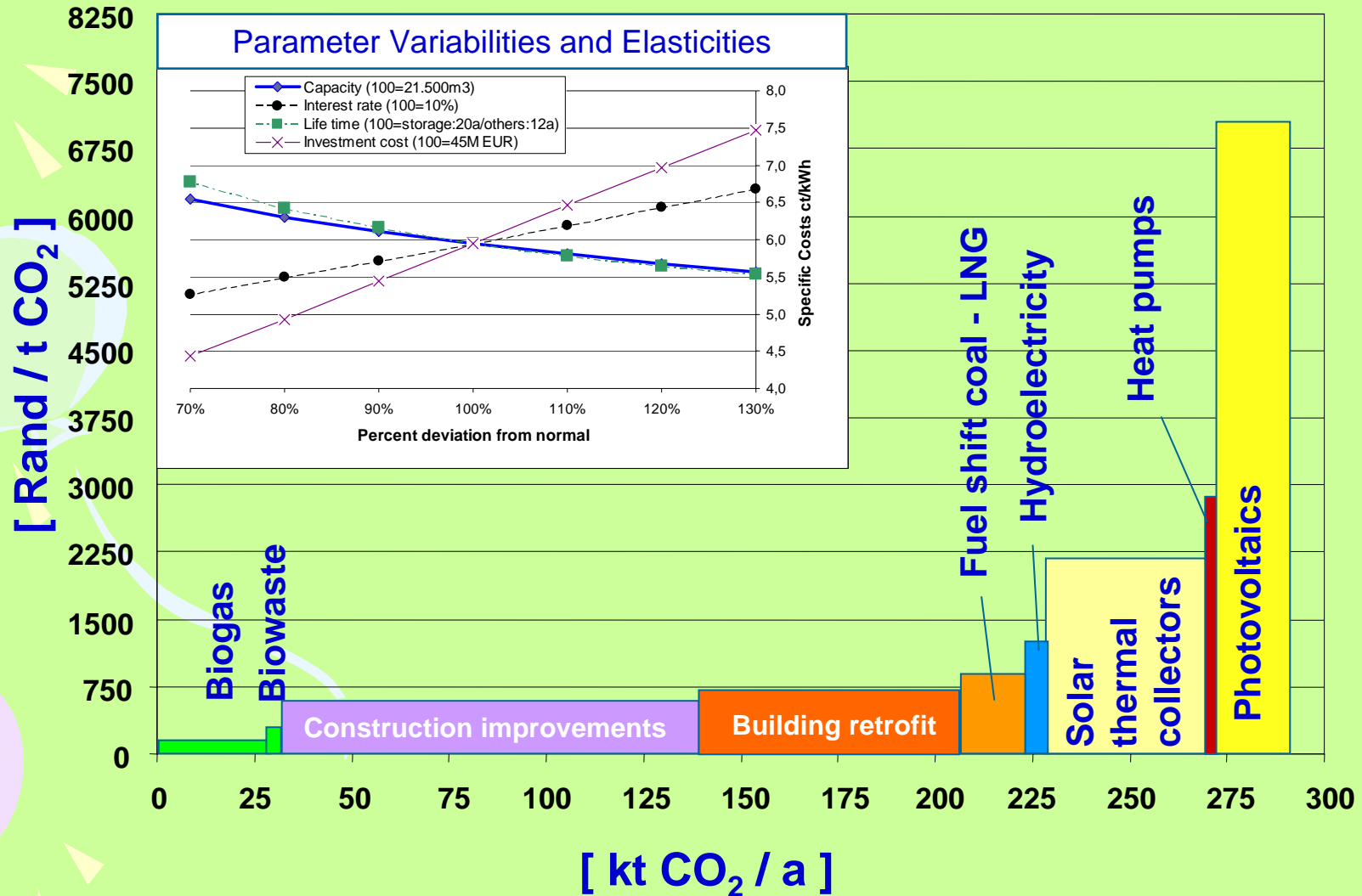


City Implementation Project Examples

Initiatives	Purpose
State of energy report and strategic energy plan	review of energy supply and demand patterns, development of a long term energy and climate protection plan
Energy management and lighting in buildings	Demand side management in municipally owned buildings
Schools Project	Integrated technology and system learning project in schools
Greenhouse gas inventory, climate change vulnerability	greenhouse gas inventory and assessment of vulnerability of the cities to climate change
LFG-to-Energy	Capturing and utilization of methane from metro landfills for energy provision
SWHs installation	Mass installation of Solar Water Heaters, e.g. in Cosmo City
Air Quality Management Plan	Traffic management initiative to mitigate air borne pollutants
Sustainable Housing	Establishment of an ASH settlement



Cost-Potential-Curve for Emission Reduction Measures



Institutional Structure

Project organization and work allocation example

German partners

- IER** M1: Integrated Modelling
M5: Energy Supply Systems
- IZT** M2: Stakeholders and Socioecon. Drivers
- IBP** M3: Building and District Systems
- TIE** M4: Traffic and Mobility
M6: Climate protection policy

Research
Implementation



Africa Society of German Enterprises

Technologies and Business Networks

German Chamber of Commerce

ASH / INEP Buildings + socioecon.

Others e.g. Solar Reichel SWH etc.

EnerKey Governing Board

Program Management Committee

Strategic support and quality assurance



IER

Uni Joburg

Project Management



City of Stuttgart

**JET-Cities:
Joburg,
Ekurhuleni,
Tshwane**



expert exchange, energy management
capacity building, information, transfer,
training, education

South African partners

- Energy Supply Systems **UJ**
- Integrated Modelling **ERC**
- Built Environment + Spatial Integration **CSIR**
- Socioeconomic Aspects **Wits**



ESKOM **City Power**

Companies and Implementing agents

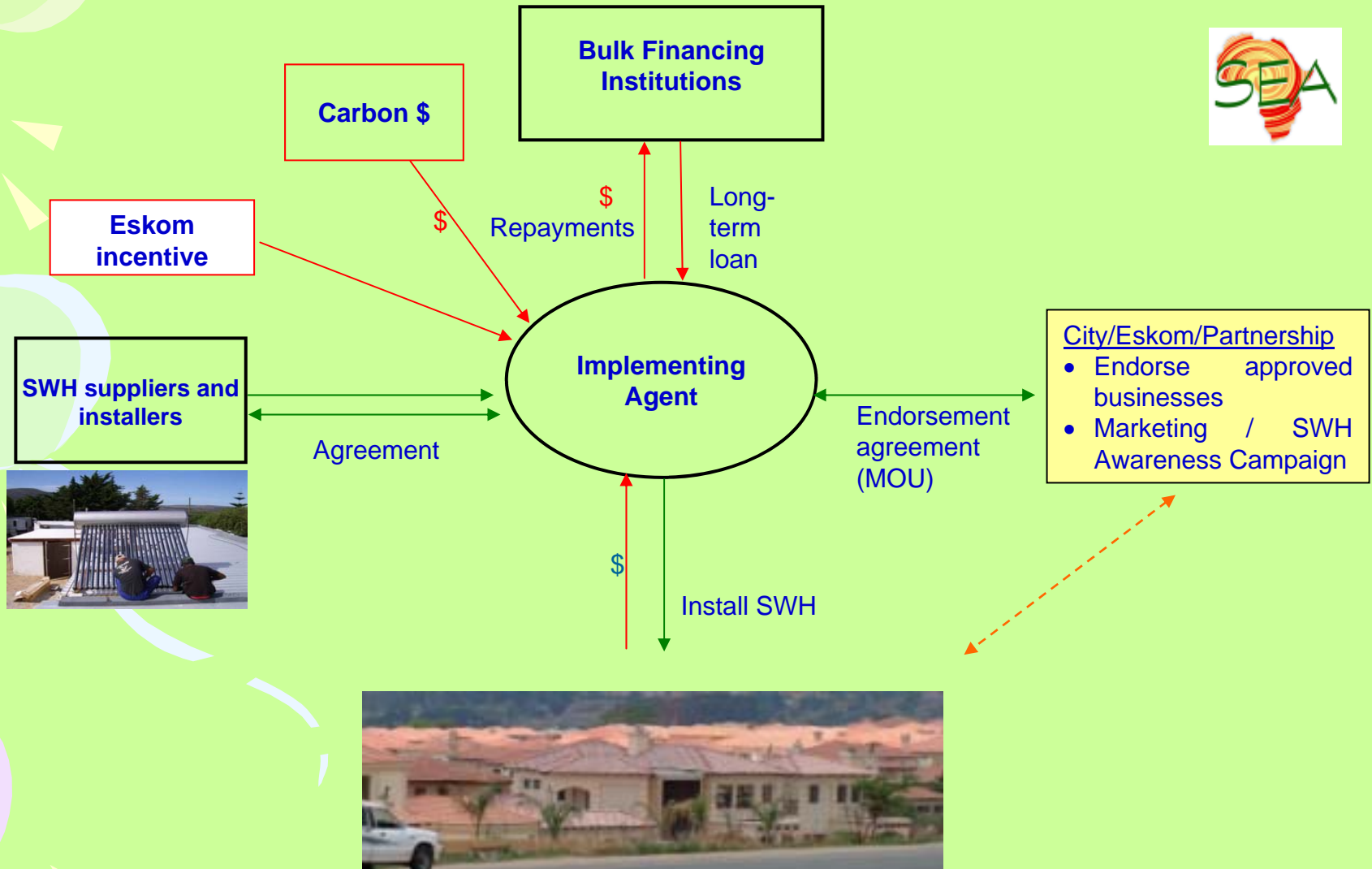
energy mgt. **SEA**

Buildings + socioecon. **PEER Africa**

SWH **SESSA**

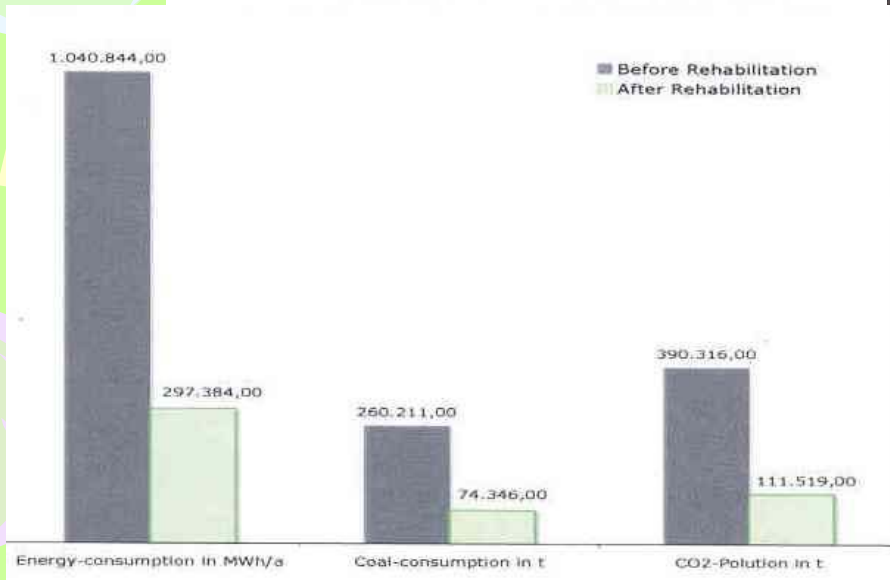
Structure for Implementation

Example result: Draft plan for mass implementation of SWH



An example: energy savings for Mongolian housing

The Building – before and after



The Savings – energy, coal and CO₂

Needed reforms to CDM post Kyoto

Key issues:

1. Different approach to 'approved methodologies' - which are not easily applicable to city-level, or city-region-level, activity and are technology driven
2. Reduction in the transaction costs of CDM mechanisms – baseline studies
3. Current levels of carbon credits do not provide a significant incentive to change for some types of investment for example in urban public transport such as busways – a 'sustainability gap' financing mechanism will be needed if prices stay low
4. Project formulation capacity needs to be enhanced and upscaled
 - The Cities Development Initiative for Asia

The Cities Development Initiative for Asia Supporting Energy Efficiency Investments

- Assist cities in ADB's DMCs to fill the gap with advisory and capacity development support
- Link cities and their investment proposals to investment financiers – both local and international
- Demand-driven (application based) and flexible approach
- Start with 6-7 pilot cities in the ADB region, scale up to 25 by end 2009



Thank You