ESMAP

Energy Sector Management Assistance Program

Energy Efficient Cities Initiative

Helping Cities Meet Their Energy Challenges of the New Century

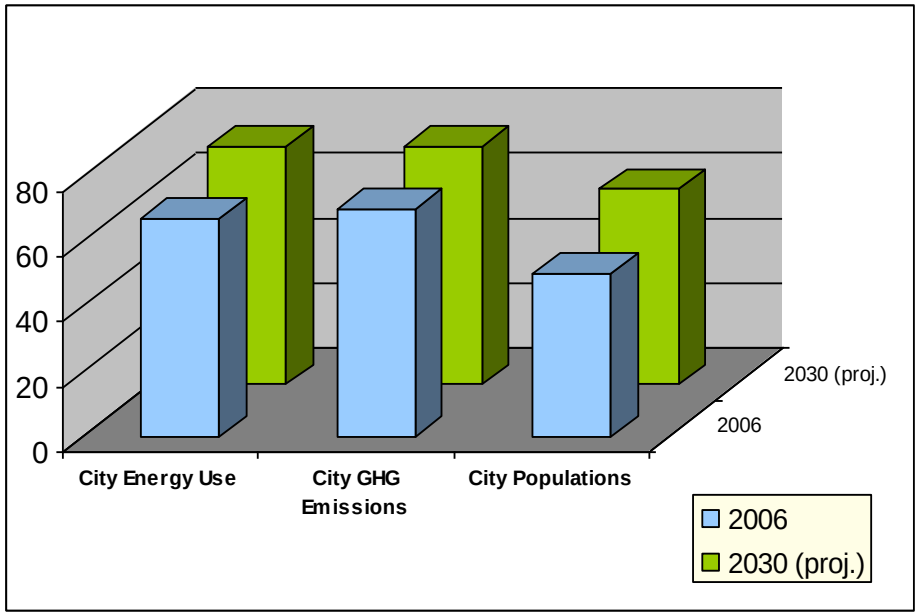
What is the Problem?

- Cities are engines for socioeconomic development
- Escalating energy demand puts pressures on costs, service quality, access and the environment across all sectors:
  - *Buildings/public housing*
  - *Water/wastewater*
  - *Transport*
  - *Public lighting*
  - *Solid waste*
  - *Power/heating*
- Constrained city budgets and technical/institutional capabilities
- Priority on delivering key services and expanding access
- Growing interest in sustainable energy/“eco-cities,” but on-the-ground results have been limited

Facts and Figures

By 2030:

- Almost ¾ of energy use and GHG will come from cities
- 81% of urban energy demand increases will come from non-OECD cities
- Developing countries will triple their built-up urban area



	2006	2030 (proj.)
City Energy Use	67%	73%
City GHG Emissions	70%	76%
City Populations	50%	60%

Source: IEA WEO, 2008

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Why Energy Efficiency?

Energy Efficiency (EE) can:

- Offer practical solutions to meet city energy needs without sacrificing socioeconomic development priorities
- Lower a city's fuel imports and energy costs while creating fiscal space for service improvement/expansion
- Offer win-win-win solutions – it is good for the government, private sector and environment
- Provide other socioeconomic co-benefits (e.g., improved competitiveness, job creation, quality of life)

Barriers to EE in Cities

Policy / Regulatory	Public End Users	Equipment/ Service Providers	Financiers
▪ Low energy prices ▪ Rigid procurement and budgeting policies ▪ Limitations on public financing ▪ Inadequate planning and design methods ▪ Limited autonomy vis-à-vis national/ state bodies ▪ Informal settlements ▪ Election cycles	▪ Limited incentives ▪ No discretionary upgrade budgets ▪ Lack of financing ▪ Unclear ownership of cost/energy savings ▪ Weak linkages across sectors ▪ Lack of awareness and expertise ▪ Behavioral biases	▪ High project development costs ▪ High transaction costs for public sector ▪ Limited technical and risk management skills ▪ Public sector repayment concerns ▪ Limited equity	▪ High perceived risks ▪ New technologies ▪ Small sizes/high transaction costs ▪ Behavioral biases

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Municipal Control of Energy Use

Sector Cluster Category	Subcategory	City Government Potential Leverage
Industry	Manufacture	Indirect, relatively weak
	Construction	Indirect, relatively weak
Transport	Private motor vehicles	Indirect, relatively weak
	Commercial motor vehicles	Indirect, relatively weak
	Public transit system	Direct, strong
	Government motor vehicles	Direct, strong
Municipal Services	Water supply & wastewater treatment	Direct, strong
	Solid waste management	Direct, strong
	Public lighting (street, traffic, parks)	Direct, strong
Buildings	Government buildings	Direct, strong
	Commercial buildings (non-public)	Indirect, strong in new construction
	Residential buildings	Indirect, strong in new construction

Where Should a City Start?

- Retrofit existing public facilities
  - *Energy system retrofits in public buildings and services*
  - *Promote distributed generation and load reduction options*
- Implement policies and programs in non-public facilities
  - *"Green" buildings*
  - *Electrical equipment and appliances*
  - *Industrial process improvements*
  - *Promote "green" transport*
- Integrate energy considerations in land use planning and development
  - *Spatial densification*
  - *Integrated urban planning, city design*
  - *Coordinated utility planning*

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Illustrative Economics of Municipal EE

Sector	Short-Term Payback (under 5 years)	Medium-Term Payback (5-10 years)	Long-Term Payback (10+ years)
Public Buildings	▪ Equipment retrofits ▪ Labeling building energy use ▪ ESCO contracting ▪ Solar water heating	▪ Building envelop measures ▪ Green roofs ▪ Training in good building O&M practices ▪ Windows	▪ Building codes ▪ Certification of building materials ▪ Building integrated PV ▪ Equipment standards
Public Lighting	▪ Lighting retrofits (HPSV) ▪ Control systems & sensors	▪ Retrofits using LEDs ▪ Lighting system redesign	▪ Lighting standards ▪ Chauffage contracts
Water/ Wastewater	▪ Pumping retrofits, incl. VSDs ▪ Leak reduction ▪ Load management ▪ Pressure management	▪ ESCO contracting ▪ Wastewater methane recovery for power generation ▪ Water DSM (low-flow outlets)	▪ System redesign & optimization
Transport	▪ Improve traffic circulation planning ▪ Differential fuel taxation/pricing ▪ Congestion/Parking fees ▪ Promote non-motorized transport	▪ Alternative fuels for buses/ taxis ▪ BRT systems ▪ Fuel efficiency vehicle standards ▪ Promote fuel-efficient vehicles through fiscal incentives	▪ Modal shifts ▪ Vehicle I&M programs ▪ Changes in land-use patterns to promote urban densification

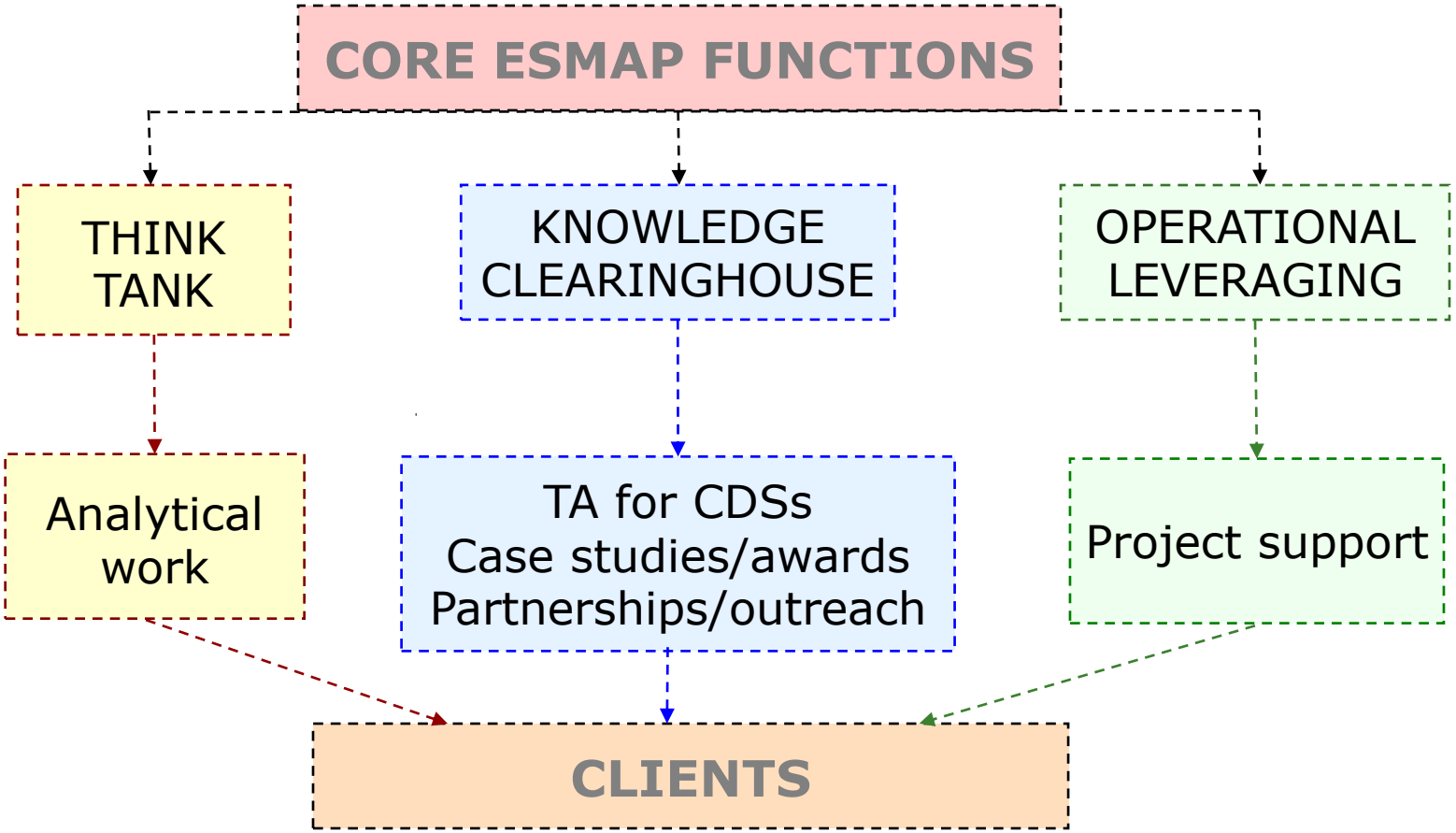
What is ESMAP's EECI?

- Objective. Mainstream and scale-up urban EE programs
- Innovative features of EECI:
  - *Clients are city mayors and municipal bodies*
  - *Demand-driven, responsive to city needs*
  - *Fully integrated, centrally managed, multi-sector program*
  - *Promotes innovation while still focusing on results*
  - *Foster global partnerships*
- EECI includes:
  - *Range of intervention points – from upstream assessments to operational support to evaluation and dissemination*
  - *Creating global knowledge and expertise to better inform and influence city officials*

EECI Components

1. Analytical work, including diagnostic tool (RAF) for energy use in cities
2. Direct TA to cities with Cities Alliance CDS grants
3. City EE good practice database and awards
4. Project support for WB urban investment operations
5. Dissemination, outreach and partnerships

EECI functions and components



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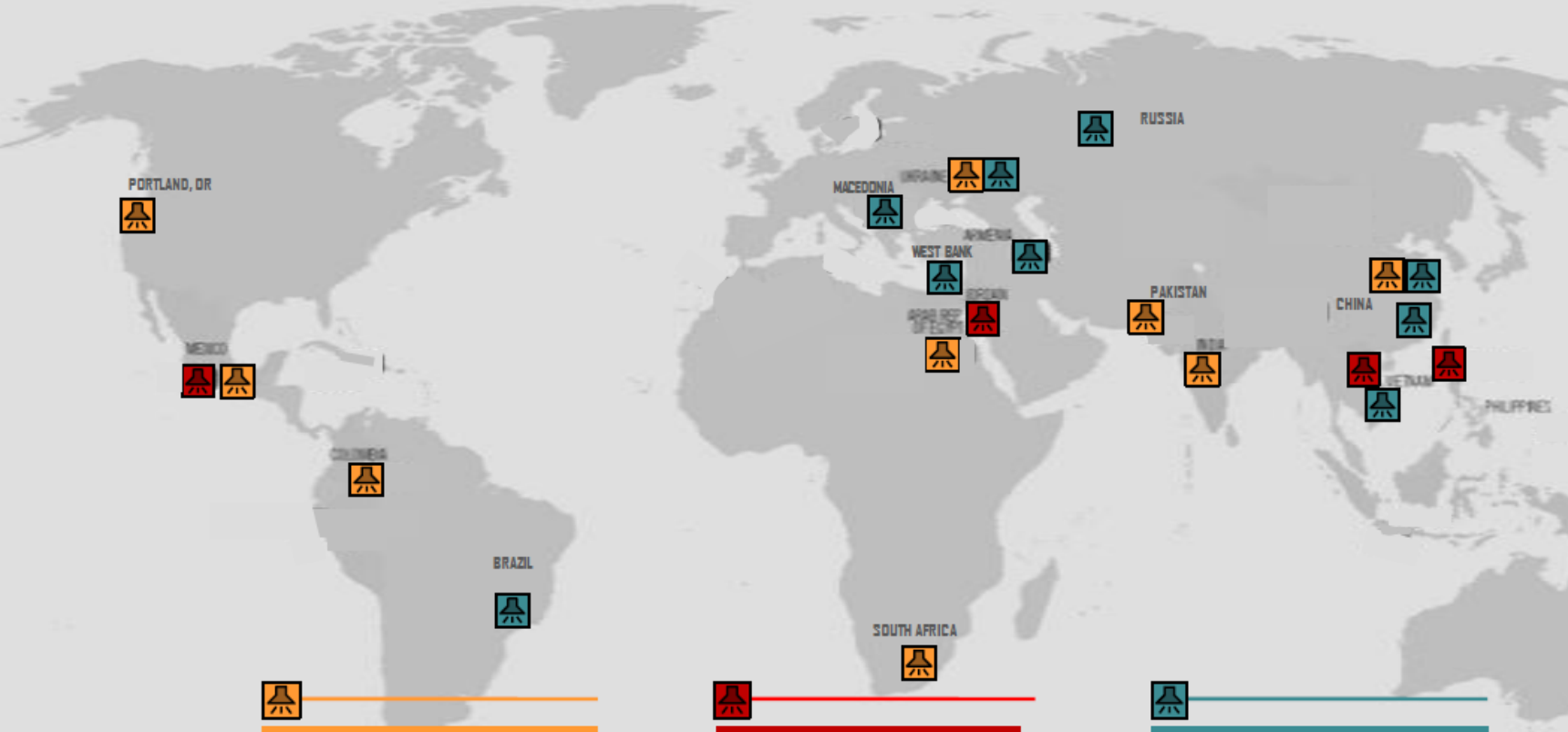
Energy Efficiency Cities



Case Studies
Akola, India
Bogota, Colombia
Emfuleni, South Africa
Kiev, Ukraine
Monclova, Mexico
Portland, Oregon, USA
Tianjin, China
Cairo, Egypt
Lahore, Pakistan

Partnership Programs

City Alliance CDS
Quezon City, Philippines
Zarka City, Jordan

IBNET
Mexico
Vietnam

World Bank Urban Projects
Armenia
Ningbo, China
Tianjin, China
Macedonia
Ukraine
West Bank, Palestine
Brazil
Russia
Vietnam

Think tank – analytical work

- Development of city diagnostic tool
  - Called Rapid Assessment Framework or RAF
  - Based on minimizing data needs using 30-50 city energy KPIs
  - Benchmarking to prioritize sectors
  - Also recommends actions with links to case studies, tools, etc.
  - Virtual panel peer review at critical milestones
- Publications on
  - public procurement
  - energy and cities (part of Eco2 report)
  - building codes
  - assessment tools and benchmarking practices

Rapid Assessment Framework - RAF

A diagnostic tool for analyzing energy use in cities, that prioritizes sectors and suggests specific actions to save money and improve performance

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RAF

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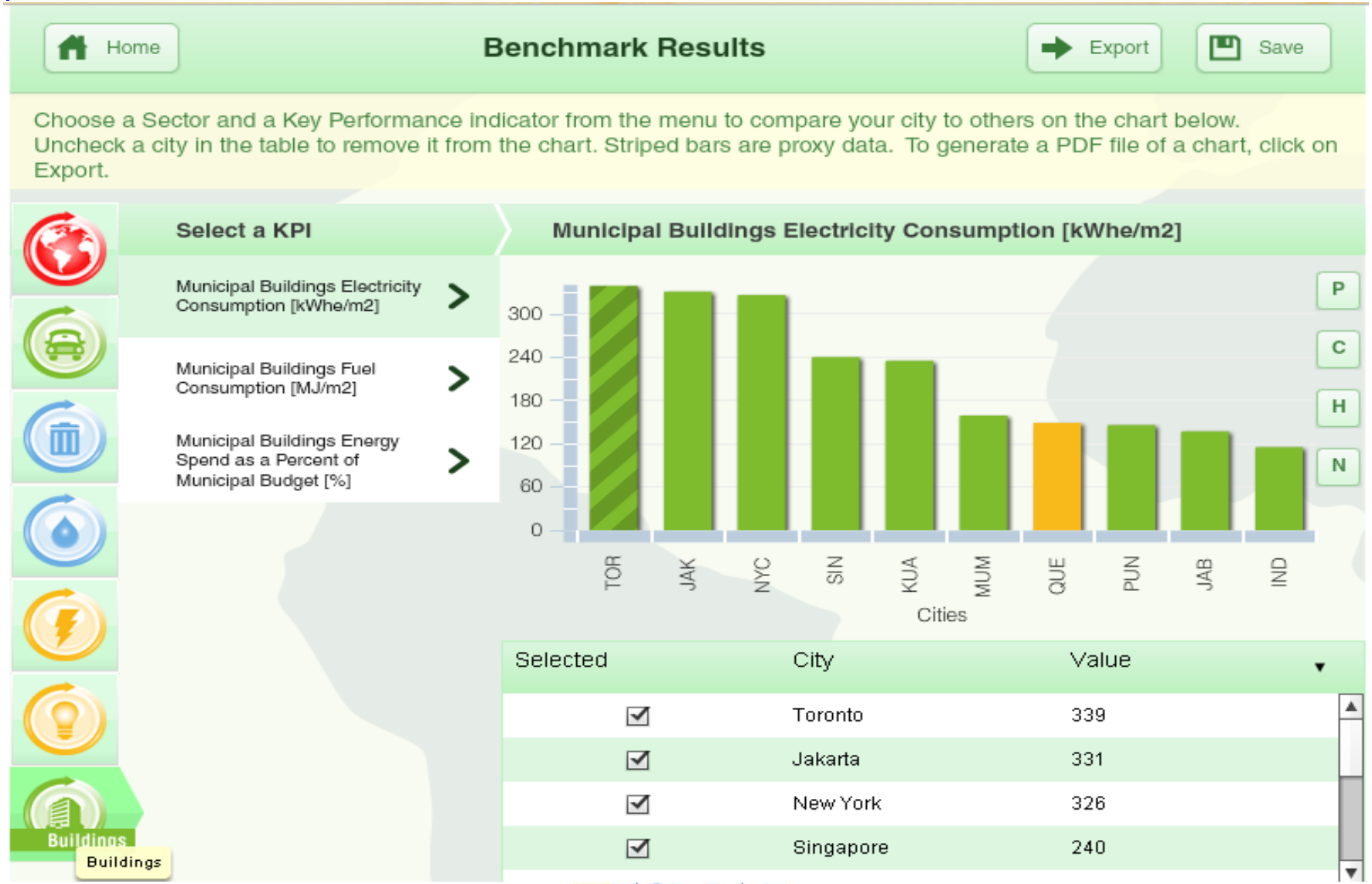
RAF



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Think tank – analytical work (contd.)

RAF- Vital Statistics

- **Coverage**: 6 Sectors :- Power/Heat (Cooling), Water & Wastewater, Buildings, Transport, Street Lighting and Waste
- **Principal Components**: Benchmarking Tool, Prioritisation Process, EE Recommendations Tool, EE Options Appraisal Process
- **Duration**: ~3 Months
- **Implemented by**: International/local consultants or City Authorities if have technical capability
- **Training**: Required
- **Status:** Currently being developed by Happold Consulting, UK

Recent Publications

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Operational leveraging

Project Dev Support	Sector							Feature	Leverage (US$m)	Status
	City-wide	Buildings	Public Lighting	Transport	Water/ Wastewater	Solid waste	Power & Heating			
Ningbo, China		■						Township building design	0.6	Board approved Feb '10
Tianjin, China	■	■		■				Greenfield eco-city	28.5	Board approved July '10
West Bank		■	■		■			EE in fragile state using MDF	0.7	Board approved Sept '09
Ukraine		■	■				■	Muni credit guarantees	50	Pre-appraised Apr '10
Armenia		■					■	Public procurement	13.8	PCN approved Feb '10
Macedonia		■					■	MOF partial grant program	3.2	Restructured June '10
TOTAL									**96.8**	

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Knowledge clearinghouse

- Partnerships
  - Direct city TA to influence Cities Alliance CDSs
  - Virtual panel to peer review RAF
  - Various collaborations with:
    - *Singapore Institute of Planners*
    - *Curitiba Inst. of Research & Urban Planning*
    - *Association of EE Cities (Ukraine)*
    - *Local Governments for Sustainability (ICLEI)*
    - *Clinton Climate Initiative*
    - *International Energy Agency*
    - *Swedish Energy Agency*
    - *CITYNET*
    - Internal units – *Urban/Transport/Energy Anchors, IBNET, carbon finance, WBI*
    - Several cities - *Quezon City, Durban, Lviv, Tianjin, Stockholm*
- Knowledge dissemination and outreach
  - City EE case study database
  - City EE awards
  - Regional practitioners workshops (Russia, Brazil)
  - Dissemination of EECI work at WB events (sector weeks, BBLs)
  - Ongoing sharing of experiences at global foras

Thank you!

For more information on EECI, please visit:
www.esmap.org

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