Combining Building Efficiency and District Energy for More Sustainable Cities:
A Sustainable Energy for All Webinar

1st September 2015

Welcome and Introduction of SE4ALL Energy Efficiency Accelerators
Maryke van Staden, Low Carbon Cities Program Manager, ICLEI World Secretariat
Lily Riahi, Advisor on Sustainable Energy in Cities, UNEP
Today’s agenda

- **Welcome and Introduction of SE4ALL Energy Efficiency Accelerators** (10 minutes)
  - Maryke van Staden, Low Carbon Cities Program Manager, ICLEI World Secretariat
  - Lily Riahi, Advisor on Sustainable Energy in Cities, Energy, Climate and Technology Branch, UNEP

- **The building efficiency and district energy relationship and opportunities for action in cities: Building Energy Accelerator and District Energy in Cities** (15 minutes)
  - Ingo Wagner, Policy and Project Officer, Euroheat and Power

- **Warsaw’s building efficiency and district energy activities** (20 minutes)
  - Leszek Drogosz, Director of Infrastructure Department, City of Warsaw, Poland
  - Marcin Wróblewski, Infrastructure Department, City of Warsaw, Poland

- **Dubai’s building efficiency and district energy activities** (10 minutes)
  - Samer Khoudeir, Chief Sales & Marketing Officer, Empower

- **Summary & call to action** (5 minutes)
  - Maryke van Staden, ICLEI

- **Questions & answers** (30 minutes)
UN Sustainable Energy for All

ENSURING universal access TO MODERN ENERGY SERVICES.

DOUBLING THE GLOBAL RATE OF IMPROVEMENT IN energy efficiency.

DOUBLING THE SHARE OF renewable energy IN THE GLOBAL ENERGY MIX.
## Energy Efficiency Accelerators

The Accelerator Platform was established to support specific sector-based energy efficiency accelerators.

<table>
<thead>
<tr>
<th><strong>Lighting</strong></th>
<th><strong>Appliances &amp; Equipment</strong></th>
<th><strong>Vehicle Fuel Efficiency</strong></th>
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<tr>
<td>Global market transformation to efficient lighting</td>
<td>Global market transformation to efficient appliances &amp; equipment</td>
<td>Improve the fuel economy capacity of the global car fleet</td>
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<tr>
<th><strong>Buildings</strong></th>
<th><strong>District Energy</strong></th>
<th><strong>Industry</strong></th>
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<tr>
<td>Promote sustainable building policies &amp; practices worldwide</td>
<td>Support national &amp; municipal governments to develop or scale-up district energy systems</td>
<td>Implementing Energy Management Systems, technologies &amp; practices</td>
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Power Sector Accelerator is under development.
An Introduction to the SE4ALL Building Efficiency Accelerator
Partners

Coordinating partner:

Cities:
Mexico City (Mexico), Milwaukee (United States), Science City of Muñoz (Philippines), Toyama (Japan), Warsaw (Poland)

NGOs/Associations:
- Global Buildings Performance Network
- Global Green Growth Forum
- ICLEI - Local Governments for Sustainability
- UN Environment Programme
- UN Foundation
- US Green Building Council
- World Business Council for Sustainable Development
- World Green Building Council

Companies:
- Accenture
- Alstom
- China Energy Conservation and Environmental Protection Group (CECEP)
- Danfoss
- Johnson Controls
- Philips
- Saint-Gobain
- TECNALIA
Why is the efficiency of buildings important?

Large impact:
- Buildings consume nearly 40% of energy demand and account for about one third of GHG emissions globally.

Large potential:
- Global building energy demand can be reduced by one-third by 2050, if known EE best-practices are implemented on a large scale across regions.

Long-lasting implications:
- Buildings last for 30-50 years or more. Poor choices today can lock-in high costs, carbon emissions, and poor urban services.

Multiple benefits:

**Economic**
Cost-effective opportunities: each additional $1 spent on EE avoids more than $2, on average, in energy supply investments.

**Social**
Energy access, Reliability, Security of energy supply, Health & productivity improvement, Job creation.

**Environmental**
GHG emissions reduction, Sustainable building materials, Water conservation, Climate resilience.
The building efficiency conundrum

- Technologies are available and cost-effective
- *Barriers are behavioral and institutional, not technical*
  - Awareness
  - Technical expertise
  - Performance uncertainty
  - ROI requirements
  - Split incentives
  - Funding
- Diffuse decisions, result in inaction or single-technology approaches
- Must overcome barriers to achieve “deep” efficiency

New partnerships enable implementation of ambitious projects and policy packages to address barriers, bridge efficiency gap, and avoid lock-in of inefficient building stock.
What are BEA cities signing up to do?

**Overarching commitment:**
double the rate of building energy efficiency by 2030 in targeted sector within the jurisdiction

**Interventions**
- Implement one enabling policy and one demonstration project to be announced at COP21 in Paris

**Baseline**
- Create a baseline of building energy efficiency performance

**Tracking & communication**
- Track, report annual progress, and share experiences and best practices with other governments
DISTRICT ENERGY IN CITIES
A GLOBAL INITIATIVE TO UNLOCK THE POTENTIAL OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
A GLOBAL PARTNERSHIP TO SCALE-UP MODERN DISTRICT ENERGY SYSTEMS

[Logos of various organizations associated with district energy systems]
OBJECTIVES
OF THE INITIATIVE

TAP THE POOL OF EXPERTISE ACROSS ITS PARTNERS TO:

• Increase awareness

• Promote and strengthen local - national policies

• Create an environment that attracts investment
WHAT IS DISTRICT ENERGY?

DISTRICT ENERGY IN CITIES

Connecting Renewable Electricity Generation
Excess variable electricity production, such as wind generation, can be utilized and stored using district energy, providing valuable demand response for the power system. This electricity can power large-scale heat pumps, which capture low-grade heat (such as from underground) to produce hot water to be used as heat or fed directly into a district's heating network. Similarly, high-efficiency electric chillers could provide demand response and serve surplus cold water as cold to be used in district cooling. Through such means, district energy can enable higher shares of renewable energy in power systems.

Connecting Commercial Demand
The high density of heat and cooling demand from commercial consumers makes them ideal to connect to district energy.

Connecting Industrial Demand
The high density of heat and cooling demand from industrial consumers makes them ideal to connect to district energy.

Solar Thermal Connected to District Heating
Solar thermal can be connected to district heating systems at a large scale (such as large ground-mounted installations) or at the building level. For building-mounted solar thermal, systems can be designed that allow building owners to provide heat to the district heating network in times of surplus, cutting the need for excess heat in the building.

Connecting Residential Customers
Buildings typically will be connected individually to the district energy network, with a heat exchanger separating the building's central heating or cooling system from the network. District heating can be used to provide heating as well as hot water, and in some cities buildings are connected to both district heating and district cooling systems.

Connecting Waste Incineration
Instead of sending non-recyclable municipal solid waste to landfills, cities can incinerate it. The water heated in the incinerator is then transferred into the district heating system. Some larger waste incinerators also have a steam turbine to produce electricity from heat and electricity. The exhaust fumes of the incinerator must be controlled to not contribute to local air pollution.

Connecting Sources of “Free Cooling”
Many cities have renewable sources of low-temperature water that can be used to provide district cooling. The cooling is extracted from the sea, river, lake or aquifer. Water using a heat exchanger from a waste heat source. District cooling networks can meet the demands of data centers, which normally require huge amounts of electricity to stay cold.

Connecting a Combined Heat and Power (CHP) Plant
Combined heat and power (CHP) plants are steam turbines that can use the heat to produce cooling for the district cooling systems.
50% of the global energy consumption in buildings, largely met by fossil fuels.
Connecting sources which cannot be used on an individual building level. Can achieve 30-50% reductions in primary energy consumption for cooling.
Cost & Energy Efficient Means to Heat/Cool Buildings in Energy Dense Areas
MULTIPLE BENEFITS TO ACHIEVE DIVERSE POLICY OBJECTIVES

- Green economy and resilience
- Energy efficiency and access
- Lower cost of cooling
- Reduced blackouts/grid stress
- Local, free and RE Sources
- Reduced CO2 emissions
- HCFC emissions
- Paris reduced refrigerant emissions by 90%
- Cyberjaya lowered cooling costs by 39%
- Empower created 700 full-time jobs.
- GIFT City could lower electricity consumption for cooling by 65-80%

Cities develop DES to achieve a variety of objectives.
INITIATIVE ACTIVITIES

ASSESSMENTS
- National assessments of DES potential and benefits
  - City assessments and mapping

POLICY
- National policies to ensure cities assess DES
  - Disseminate best practice local policies for supporting DES

IMPLEMENTATION
- Initiative methodology rolled-out to multiple cities across four regions
  - Demonstration projects and policy-investment roadmap for cities
LIGHT TOUCH ACTIVITIES

- Targeted outreach
- Training on Initiative tools
- Study tours & workshops
- Rapid assessments
DEEP DIVE ACTIVITIES

- Targeted outreach
- Training on Initiative tools
- Study tours & workshops
- Rapid assessments
- Deep assessment
- Demonstration Projects
- Capacity building
- National / Regional Policy

Picture Source: London Heat Map
PLANNED ACTIVITIES
IN MULTIPLE REGIONS

Per region the Initiative will do:

- 5 country assessments
- 25 cities with diverse climates
- 5 demonstration projects and policy-investment roadmaps
- Attract project co-financing
- Regional capacity building, learning and replication
“In launching this report we want to draw the **attention of the world’s decision makers**, mayors and leaders at the community level **to the importance of district energy systems.**”

DEVELOPING THE INITIATIVE’S APPROACH FOR ACCELERATING DES

Best Practice Guidance developed with 45 champion cities (150 Interviews)
- Technology Options and Benefits
- City policies
- Business models
- National policies

BOX 1.1
CITIES AROUND THE WORLD

The 45 champion cities for district energy use

- ABERDEEN, U.K.
- AMSTERDAM, the Netherlands
- ANSHAN, China
- ARLINGTON COUNTY, USA
- BERGEN, Norway
- BOTOSANI, Romania
- CHRISTCHURCH, New Zealand
- COPENHAGEN, Denmark
- CYBERJAYA, Malaysia
- DOHA, Qatar
- DUBAI, United Arab Emirates
- FRANKFURT, Germany
- GENOA, Italy
- GOTHENBURG, Sweden
- GUELPH, Canada
- GÜSSING, Austria
- HELSINKI, Finland
- HONG KONG, China
- IZMIR, Turkey
- JINAN, China
- KUWAIT CITY, Kuwait
- ŁÓDŹ, Poland
- LONDON, U.K.
- MALMÖ, Sweden
- MILAN, Italy
- MUNICH, Germany
- OSLO, Norway
- PARIS, France
- PORT LOUIS, Mauritius
- RIYADH, Saudi Arabia
- ROTTERDAM, the Netherlands
- SEATTLE, USA
- SEOUL, South Korea
- SINGAPORE, Singapore
- SÕNDERBORG, Denmark
- ST. PAUL, USA
- SYDNEY, Australia
- TOKYO, Japan
- TORONTO, Canada
- VANCOUVER, Canada
- VÅXJÖ, Sweden
- VELEJNE, Slovenia
- VILNIUS, Lithuania
- WARSAW, Poland
- YEREVAN, Armenia

INITIATIVE’S APPROACH
THANK YOU!

DISTRICT ENERGY IN CITIES

unep.org/energy/des
How do the accelerators benefit cities (and countries)?

• Partners for implementing efficiency in the buildings sector
  – Development of shared vision and agenda (meaning?)
  – Private sector commitments to local efficiency improvement
  – Collaboration across government ministry “silos” (horizontal) and between national and subnational government (vertical)
  – Knowledge exchange with cities, countries, global partners

• Technical assistance
  – Holistic assessment of efficiency opportunities tailored to local conditions and objectives
  – Capacity building and stakeholder engagement on project development and policy design
  – Identifying funding for policies and projects

• International recognition and regional leadership
### BEA’s Menu of policy options

<table>
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<tr>
<th>Codes</th>
<th>• Building codes to establish minimum requirements of energy performance.</th>
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<td>Targets</td>
<td>• Targets to align interests and spur action in the building sector.</td>
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<td>Government Leadership</td>
<td>• Programs to support government efficiency, including public building retrofits and innovative procurement.</td>
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<tr>
<td>Benchmarking &amp; Disclosure</td>
<td>• Policies that generate data, baselines, and disclosure to support transparent building performance to the market.</td>
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<tr>
<td>Financial Mechanisms</td>
<td>• Programs and incentives to provide funding to building efficiency improvements.</td>
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<tr>
<td>Utility Actions</td>
<td>• Planning and programs for utility companies for energy efficiency progress.</td>
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<tr>
<td>Certifications</td>
<td>• Certifications including green buildings that allow market differentiation of key environmental attributes.</td>
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### DES Initiative’s Menu of policy options

| Codes and planning policies | Tailored planning policies for connection ready buildings
|                           | Building codes assessing system efficiency of heat/cool

| Targets                     | Targets to align interests, get political buy-in from multiple stakeholders and reduce risk for investment

| Government Leadership       | Strategy that includes heat/cool sectors and identifies benefits and role of DES in relation to policy objectives
|                           | National framework for local planning

| Benchmarking & Disclosure   | Policies that generate data, baselines, and disclosure to support transparent building performance (supply and demand) to the market.

| Financial mechanisms        | Set-up revolving funds, price-support for cogeneration, loan guarantees, subsidies, pollution taxes

| Tariff Regulations          | Local and national tariff regulations that protect consumers and stabilize district energy business models

| Certifications              | Certifications of buildings that include assessment of efficiency and renewables in heating and cooling supply |
Ministries, governments, industry, universities, NGOs and international organisations can help support our drive to doubling the global rate of improvement of energy efficiency.

The SE4All Building Efficiency Accelerator and Global District Energy in Cities Initiative welcome your support in achieving system efficiencies in the buildings sector.

Make your leadership known at the COP21 in Paris, Dec 2015!
Join the Initiatives

For more information or to join as a partner, contact:

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http://unep.org/energy/des