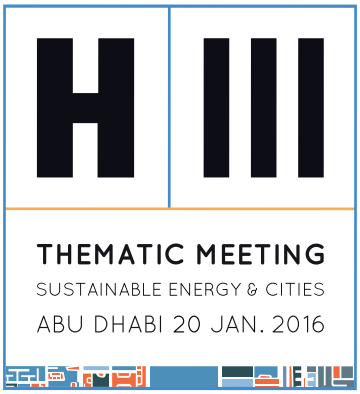

HABITAT III URBAN DIALOGUES

Abu Dhabi Thematic Meeting on Sustainable Energy and Cities

12 - 24 January, 2016

United Nations

Host Partners

Sustainable Energy and Cities

Moderators: Vincent Kitio and Ruud Kempener

Dialogue Structure:

The Habitat III thematic discussion on Sustainable Energy and Cities took place over a 10-day period from 12-24 January 2016 immediately prior to and during the one-day Thematic Meeting on Sustainable Energy and Cities in Abu Dhabi on 20 January 2016.

The discussion was overseen by two substantive experts ("moderators") from UN HABITAT and IRENA respectively, acting on a voluntary basis. The Habitat III Secretariat, in consultation with the moderators, devised two general framing questions for the discussion (below). The moderators responded to participants' particular questions and comments, engaging them through an extensive discussion around urban renewable energy (RE) technologies and integration policies. Questions sought to encourage the exchange of experience, as well as get to the heart of practical difficulties and challenges faced by cities in the transition to RE.

Energy access and urbanization are interlinked. Energy is the driver of urbanization; without proper energy access, suitable infrastructure and basic services cannot be provided. Energy consumption also contributes also to environmental pollution, greenhouse gas emission and climate change. For cities and towns to develop in a sustainable way, we need also to generate and consume energy sustainably. Developing countries need to generate more energy to address the rising demand from the growing urban population and also to create wealth. The dialogue looked at how this can be achieved without compromising the environment.

Participation:

During the online discussion, over 700 individuals visited the discussion forum at: www.habitat3.org/the-new-urban-agenda/abudhabi, representing 86 countries, with the largest number of visitors from the United States, United Kingdom, United Arab Emirates, Ecuador and Germany. The platform featured the ability for participants to translate the discussion pages into several dozen languages, which provided greater accessibility for participants to post and comment on the discussion in their native language.

Framing questions:

- **Q. 1.** Which RE technologies are most suitable to integrate into existing urban infrastructures in established cities, and which are more appropriate for expanding cities in areas that are rapidly urbanizing? – 50 replies
- **Q. 2.** What policies are needed to mainstream RE in cities, in both established and rapidly expanding cities? – 5 replies

Key Recommendations from Dialogue:

Participants discussed the different types of RE technologies and their suitability for integration into existing cities and expanding, rapidly urbanizing cities. It was agreed that each situation and context calls for a specific solution, depending on the climate, geography, types of buildings, existing energy used, rate of urbanization, etc. Useful studies were shared identifying the most economically attractive and carbon-effective options available in cities around the world (see final section below). It was agreed that city residents and authorities' "buy-in" is essential to support the successful integration of RE, and several

methods were suggested to ensure that people are at the centre of any strategy in order to ensure its future sustainability.

A holistic approach to planning the urban infrastructure itself was proposed, integrating other sectors (transport, buildings, services, infrastructures, etc.) as the energy point to achieve sustainable urban development. A three-step RE transition strategy was proposed, beginning with identifying ways to reduce energy demand, adopting leap-frogging technologies to further reduce energy usage and finally finding areas where fossil fuels can be replaced by sustainable energy sources.

ICLEI Canada cautioned that most cities would have to cooperate with the wider "hinterland" or region in order to be able to meet their energy demand exclusively with RE, as given cities' inherent density there is generally not enough surface area available to match energy demand using a low energy density renewable resource such as solar or small-scale wind power. Several participants also highlighted the importance of using energy more efficiently, particularly in new, rapidly expanding cities.

Summary of the Dialogue:

Q. 1. A) Proposals to integrate RE into established cities

Decentralized and variable RE sources – there was consensus that a decentralized approach is required, using a variety of energy sources to ensure energy security. However, the need for further technological development was highlighted to address standing operational challenges, e.g. development of smart grids, systems integration between different energy carrier grids, energy storage, etc. Participants also cautioned that some RE sources have constraints, particularly their availability and reliability, which must be taken into consideration to ensure any solution is realistic and cost-effective.

Recommended technologies:

The six sources of RE – **solar, wind, geothermal, biomass, hydro and sea wave** – are unequally distributed but at least one of them can be found in any urban area. Participants proposed RE technologies suited to urban areas to address the energy shortage.

- **Solar PV panels** – Several participants recommended the installation of solar PV panels on rooftops in both existing and expanding cities to provide the individual building's electricity needs, particularly lighting. One contributor proposed a maximum ratio of roof surface to total usable floor area allowable, limiting the maximum height of new buildings, "a new constraint in the debate about optimum urban density and a new aspect to be considered in the other debate on sustainability of high rise buildings." Other participants proposed grid-connected rooftop mini grids to support national generation capacity, while others suggested "greening" the grid itself, with private investment in solar PV parks to supply power to large-scale enterprises, including for electric cars.
- **Solar thermal or electricity co-generation** – was recommended to provide RE for heating and hot water, where needed. Penalties were proposed for heating water with electric heaters.
- **Wind energy** – Several participants highlighted wind turbines as a suitable urban energy source for electricity generation, water pumping, etc., recommending small rooftop units designed specifically for urban areas and providing enough energy for the building or a public space where they are located. Examples show that with good design they have been accepted by citizens and city authorities due to good design. It was suggested that visible urban wind turbines have the added benefit of raising awareness of sustainable energy thereby increasing understanding of the need to use energy sustainably.

- **Groundsource/Geothermal energy** – can be tapped through simple heat exchangers to heat or cool housing in certain favourable locations.
- **Sustainable biomass** – recommended as a major component of the energy mix, particularly suitable for many cities in Africa for domestic cooking needs as well as SMI/SME agro-food companies and restaurants.
- **Biogas** – generated from sewage sludge treatment and or organic fraction of Municipal Solid Waste to provide for public transport fuel needs, e.g. bus fleets. Requires landfill sites to be relatively well-managed, which is often not the case.
- **Electric vehicles/public transport** – with electricity from RE sources. Requires installation of recharging infrastructure. Must be combined with Transit Oriented Development (TOD) and an urban transport planning strategy to address urban logistics and congestion.
- **Hybrid systems** – that combine wind and solar PV were suggested for very low capacity to produce both heat and electricity simultaneously.
- **Pico hydroelectric power generation** – was suggested for urban areas for example in parts of Africa with streams and sufficient gradient.
- **RE storage** – storage options such as batteries were mentioned, but it was cautioned that
- **Innovation** – to enable transformative change in the energy sector. For example, energy storage was mentioned by some respondents. The moderators highlighted that advancement in technology and a shift towards a more distributed energy system would enable **technology "leapfrogging"** and suggested funding for innovation be freed up by removing fossil fuel subsidies, estimated at more than $500 billion annually by one contributor. Another participant recommended international cooperation between cities to test and refine innovations to ensure that the resultant technology is "people and place-centred".

B) Proposals for integrating RE in expanding cities in areas that are rapidly urbanizing:

Participants suggested that expanding cities have several key opportunities:

- **Integrate RE into urban planning** with sectoral policies to increase efficiency of energy use at the scale of urban infrastructure systems and at neighbourhood scale, particularly energy and transport (e.g. district energy systems, reuse waste heat, TOD, etc.).
- **Sustainable design and type of construction:**
  - **Increase energy efficiency in buildings** drastically, on the demand side, at building scale, by introducing Building Energy Efficiency Codes, enforcing or encouraging passive house standard, connection to district energy systems, etc.
  - Require new buildings to use RE decentralized energy systems depending on the locally available resources, whether solar, biomass, geothermal, etc.

Q. 2. Policies required to mainstream RE in cities, in both established and rapidly expanding cities

In addition to the technology and technical considerations, participants argued that in order to introduce RE technologies into existing infrastructure in cities the the right policies are required to create an enabling environment for the transition to sustainable energy, including:

- **Standards/regulations** – to promote sustainable infrastructure for buildings, industry, transportation, appliances, etc. that suit the local context. E.g. change planning approval processes to include energy efficiency criterial; encourage retrofitting systems with

"People should be at the center of technologies, failing to do so drastically compromise the results." – Vincent Kitio, Discussion Moderator, UN-Habitat, Nairobi

sufficient incentives or, where politically feasible, mandatory requirements. It was suggested to incentivize schools, offices and shops that operate during the daytime to use solar energy, and create innovative electricity tariffs for residential users to carry out certain activities during the daytime, in order to relieve pressure on the grid in the evening and make use of RE when it is available, given the difficulties of RE storage and the losses incurred.

- **People-centred approach** – cultural attitudes and behavioural patterns are important factors to consider in developing a strategy to transition to RE, failing to do so may drastically compromise the results, given that in the end it is people who are the end users of the technologies and create the demand. Education and changing 'mind-sets' among both consumers and policy-makers is vital to up-scaling clean, affordable and reliable energy options in developing countries.

- **Awareness raising and sensitization among citizens** – to increase understanding and support of RE adoption and use, as well as more efficient energy usage. Participants agreed that people should be at the centre of energy sustainability. Capacity building is critical and requires strengthening academic research and vocational training for future experts.

- **Capacity building on sustainable urban energy for:**
  - Local governments to act and a key player and bring about systemic change. One contributor from Africa shared their experience of providing consistent, structured support over 5-10 years resulting in significant changes in institutional structure and operation. Slow and labour-intensive but can create long-lasting institutional change. Existing local government mandates officially empower them to play a significant role in sustainable energy in areas such as urban planning, transport planning, and building plan approvals, etc.
  - Academia, research and other organizations which can support local government, particularly in sub-Saharan Africa to promote institutional building for decision makers or energy planners. Another suggestion was a Joint University Program to build multidisciplinary capacity for engineers and technicians in developing countries as a starting point to develop RE technologies that are locally adapted, in cooperation with local civil society through technical/vocational programmes.

- **Localize energy policy-making** – give local city authorities more autonomous power to decide energy policies and regulations.

- **Market transformation** - Cities need to be "investment ready" both to attract projects and facilitate investments in energy assets, "Distributed energy requires an ecosystem of developers, suppliers, financiers, and operations and maintenance parties, all of whom need to be convinced that the applicable governance structures are supportive.[...]This ecosystem development and collaborative focus will not happen automatically. […] The local job creation and broader economic growth benefits from a distributed energy paradigm make it well worth the effort." – Matthew Ulterino, Urban Planning Consultant, UK.

- **Financing and fiscal mechanisms** – it was argued that as the cost of renewables decreases and cost parity between fossil-based energy and RE is reached, it will be more economically viable to invest in RE. One recommendation was for the municipal authorities to ensure energy pricing includes not only direct costs but also externalities, such as depleting of resources, impact on local and global environment, etc. Revenue generated could be used to support people to adopt energy efficiency measures or invest in RE generation.

- **Beyond RE** – participants argued that RE is only part of the solution for sustainability and a holistic energy planning approach is needed. This includes understanding the needs, taking stock, energy efficiency, hybrid solutions, switching to RE, and empowerment of local governments.

Benefits of RE transition:

In addition to the environmental benefits, local job creation and broader economic growth were highlighted as benefits from a distributed energy paradigm.

Good platforms/programmes/initiatives identified and discussed:

Leeds, United Kingdom

- Best energy technologies: renewable heat (from biomass) in industry and buildings and small-scale wind turbines.
- Best energy efficiency measures: wall insulation, hybrid cars and more efficient boilers.
  See: http://climatesmartcities.org/sites/default/files/Mini-Stern%20Review_0.pdf

Palembang, Indonesia

- Best energy technologies: biofuel in the transport sector, solar PV panels and energy-from-waste (concentrated heat and power).
- Best energy efficiency measures: improvements to the fertiliser industry and more efficient air conditioners.
  See: http://www.sciencedirect.com/science/article/pii/S030142151500021X

Recife, Brazil

- Best energy technologies: landfill gas utilisation and solar photovoltaic panels (but not that effective, because grid is mostly hydropower so not very high emitting).
- Best energy efficiency measures: carbon emission standards for new cars, converting the bus fleet to hybrid vehicles and parking demand management.

http://climatesmartcities.org/sites/default/files/Recife%20The%20Economics%20of%20LCC_ENG_v6%20web%20%281%29.pdf

Johor Bahru, Malaysia

- Best energy technologies: biofuel in the transport sector, solar water heaters, solar photovoltaic panels and landfill gas utilization.
- Best energy efficiency measures: improvements in the rubber industry and hybrid cars.
  See: http://www.tandfonline.com/doi/abs/10.1080/17565529.2015.1040367

There are also studies for Kolkata (India), Lima (Peru) and Kigali (Rwanda - forthcoming).