ENVIRONMENTAL SUSTAINABILITY IN URBAN CENTERS

Summary Report of the Concluding Seminar
Perth, Australia
11-13 April 2011

Pacific Economic Cooperation Council
International Project (2009-2011)

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(An International PECC Project, Perth, Australia, 11-13 April 2011)

Background and Summary Report

In 2009/2010, the France Pacific Territories committee for Pacific Economic Cooperation (FPTPEC), in cooperation with their counterparts from Australia, New Zealand, and Chile, launched a series of three seminars focusing on the development of renewable energies to achieve more efficient use of water and energy in urban services. This project was approved by the Pacific Economic Cooperation Council (PECC)'s Standing Committee in May 2009 and has been conducted in cooperation with the World Water Council, the French Ministry for Ecology, Energy, Sustainable Development and Oceans, and international companies active in the water and energy management sector alike.

The initiative aimed to meet the following three key objectives:

- Emphasize the cost-benefit advantages and promote the use, in public infrastructure, of less energy-intensive technologies emitting less carbon, less or no waste, facilitating wastewater and solid waste recycling and raising the quality of the environment;
- Help PECC member economies, confronted with a credit crunch, higher energy and commodity prices, implement technologies that use less and cheaper energy in order to compensate for price hikes and growing scarcity;
- Demonstrate the prospects offered by renewable technologies (solar, wind, biomass) and new emerging technologies (wave, tidal) for meeting energy demand at a competitive price.

The first seminar, held in December 2009 in Auckland, has demonstrated that prospects offered by renewable technologies in the field of water and energy are highly promising and may help PECC economies offer a sustainable urban development. Presentations made at the Auckland seminar have been made available on the PECC website *(www.pecc.org)* for a wider dissemination.

The international community as a whole, including multinational enterprises and multilateral organizations, are available to facilitate R&D and contribute to the efforts of PECC economies towards sustainable development by promoting the renewable energies and cooperative programs for clean energies. Governments were called upon to support R&D technically and financially. It was also noted that because of their size, large firms can more easily benefit from best practices available in the market compared to the smaller firms. Regulations should be framed to strike a balance between private interests and government responsibilities since market forces cannot be the sole response. It was stressed that application of the "sobriety-efficiency-renewable scheme", the "Negawatt" scheme, could lead to better governance for the joint management of water and energy. Such governance could be linked to international indicators, regional or industry recommendations, programs to foster innovation, and plans to guarantee local access to water and energy.

A second seminar was held at the time of the PECC General Meeting in Tokyo as a concurrent session. It offered the opportunity to address major issues such as the quality of life in large cities today; the criteria for future cities; and what it means to improve governance of large cities in the Pacific Rim.

The Perth seminar, the concluding one of the series, has provided an impetus and raised the visibility of the recommendations derived from the Auckland seminar. It has addressed the environmental challenges faced by large growing cites, identified new technologies to tackle these challenges, and highlighted the importance of urban planning and governance to ameliorate urban living conditions and achieve environmentally sustainable cities.

The concluding seminar has led to identifying proposals for best practices in the provision of public services that could serve as “guidelines“for a better protection of the environment of large cities in the PECC economies. Representatives from public agencies and private companies, as well as researchers working in the field have participated in the Perth seminar to shed light on the experiences of their respective home countries or regions. All presentations made at the seminar are available on the PECC website.

Discussions at the seminar have been rich and have led to proposals and recommendations presented here.

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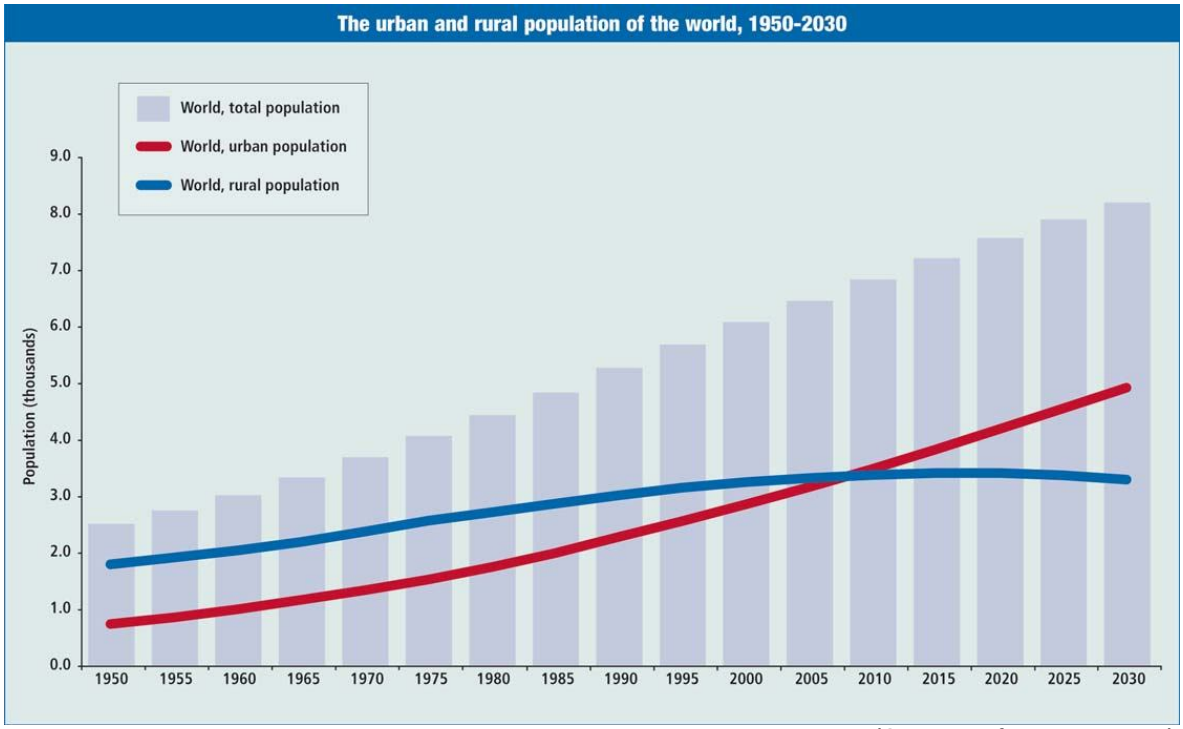
Rapid Urbanization and Climate Change

Confronted by various forms of climate changes and natural disasters there is a need to rethink and reevaluate the way people live, manufacture, and consume. Most important, people need to change the way they behave on a daily basis. And this applies most critically to those living in urban areas containing dense populations, pollution, and traffic congestions.

At present, approximately half of the world population of 6.8 billion live in urban areas. By 2030, according to the United Nations projections, 1.5 billion more people will live in urban areas raising the proportion of urban population from 50% to 60% vis-à-vis rural population. Approximately 99% of the global population growth in the next two decades will be in urban areas. Urban expansion will take place mostly in the Asia Pacific region and by 2030, about 400 new cities will be created in China alone.



(Courtesy of ADB presentation)

Rapid urbanization will continue and with the limited resources it is crucial to innovate technologies that are smart and adopt policies that are efficient in order to cope with this trend. Urban planners have to look for integrated solutions including urban design, planning and the management of facilities. Over 99% of the global growth is located in urban cities and more than 65% of it in the Asian cities.

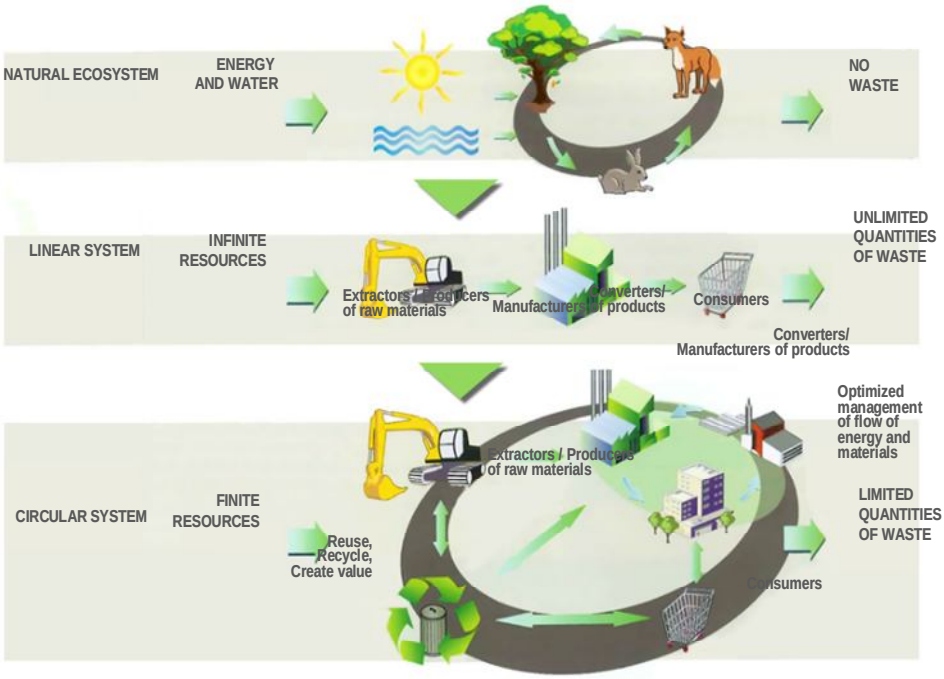
The development of large cities in the Asia Pacific region leads to environmental issues: Asian countries have consumed over 75% of their ground water, leakages account for more than 50%. About 90% of waste water is rejected into the ocean in Asia, 85% in Latin America, 80% in south East Pacific. There is an urgent need to respond to water challenges, to move towards “eco-cities”, as an urban model consuming less water and less land, better managing the whole water cycle and limiting the water footprint (stop the underpricing of water, save water and look for new sources). The more prosperous is the city, the more waste is created; urban planners have to look for a deeper integration of urban services to bring synergy; innovation at the city level will come from integration. Innovation will lead to new economic models for building, transportation, waste, and water management.

Circular Economy and Sustainable Cities

There will be increasing scarcity of water and other natural resources if all continues as business as usual: demand for water increases by 2% per annum as water supply decreases by 40%; this calls for more reuse and treatment of waste water. . The non-sustainable trajectories for energy and the environment are made clear simply by glancing at the graphs showing population growths, oil prices, CO^2 concentration in the atmosphere, and the global energy consumption levels. It is imperative for all actors – e.g. utilities, government, regulators, industry, manufacturers, and customers - to collectively move towards an energy-efficient and cost-effective ‘circular economy.’ Moving away from the conventional linear system whereby infinite resources led to unlimited quantities of waste after consumption, people will now need to move into a circular system where finite resources, met by efforts to reduce, reuse and recycle lead us to the optimization of energies and resources yielding limited quantities of waste and more energy recovery. Significant advances have been made in developing new technologies and implementing initiatives to realize circular economy as a solution whereby waste transforms into a feedstock in its next life. Circular economy is less energy, low emission, and high efficiency. Increased efficiency in the use of water conducts to reduce demand, reduce water losses, secure new sources of water, and the recovery of energy through the recapture of used water. In addition, recycled water can be used for irrigation, industrial use and aquifer recharge. Sludge can be reused for agriculture. While 60% of waste water is recycled in the European Union (EU), 80% is the goal.

Evolution of the Circular Economy

Circular economy is about sustainable production and consumption

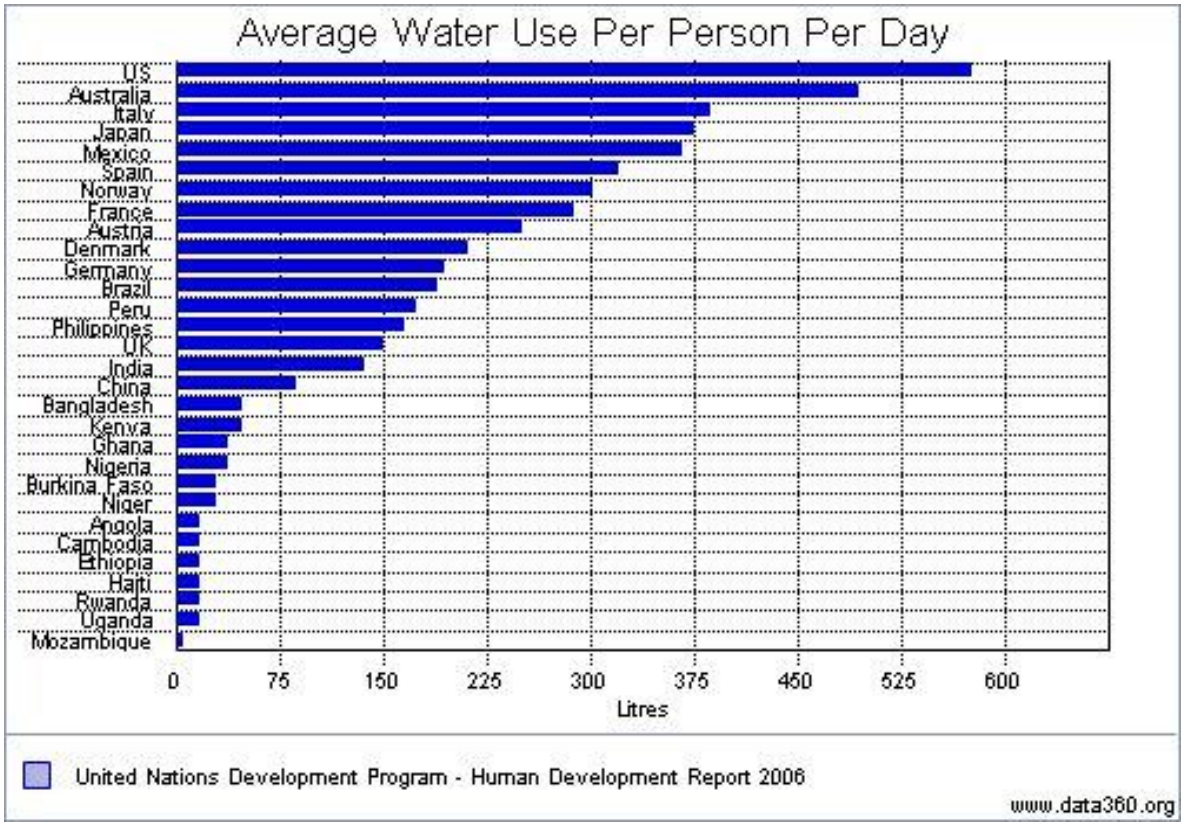


In order to realize circular economy, it needs to be made obvious to the end-users and consumers how much they are saving and what the personal benefits are from reducing and recycling. Water and energy consumption per household must be made convenient and easy to monitor. Waste separation and disposal also need to be convenient and easy to follow. Installation of smart grids and smart meters are increasingly promoted as a solution but due to high cost of initial investment and concerns over privacy, there are still significant barriers to widely adopting them in the US and Europe.

Climate Change and Water Supply

Climate changes have resulted in Australia overall experiencing extreme weather conditions with the east coast receiving extraordinarily high rainfalls and the west getting the lowest ever recorded. In the case of Western Australia (WA), the current population of 2.36 million is set to double to 4.3 million by 2058. In recent years, WA has seen its southwestern region getting drier and its northeastern region wetter each year. Also in South Australia, which is positioned at the bottom of Australia's river system, its future is predicted with higher temperatures, lower rainfall, and more frequent droughts and thus climate change constitutes a central concern for its 30-year urban sustainability plan.

At the same time, the demand for water has increased three-fold between 1980 and 2005 throughout Australia. In 2010, demand for water increased by 7% in the mining industry in WA, and by 4% in agriculture. Australia ranks second to the United States in the world for the highest daily consumption of water per capita.



With the drying trend in Perth, irrigation takes up as much as 39% on average at Australian households which typically include a European-style garden. The first step to managing the water challenges is to mitigate the increasing demand. *Veolia Environnement* prioritizes reducing the water footprint and moving away from a culture of supply management to demand management. Water is still considerably cheap in Australia and the objective is to adopt more "cost-reflective pricing" in water supply throughout the country. The first step to encouraging people to save water is to enable them to monitor and control water consumption through installation of household water meters and remote meter-reading systems.

As presented by the Water Department of WA, the next steps being taken to meet the increasing demand are identifying new sources of water such as groundwater, stormwater, setting up additional rainwater tanks and building a second desalination plant while boosting the water management efficiency.

Sanitation and Water Management

Some of the practical examples to achieve efficient water management include *Suez Environnement's* initiatives to reduce demand, reduce water losses, secure new water sources, optimize energy recovery, and reuse water.

For example, water leaks are now more efficiently monitored by the installed sensors which detect noise from the leaking areas of the pipes in real time. This method has resulted in saving 1.2 million cubic meters of water just in Dijon, France in 2007. A better use of data should be made, fixed leakage detectors, smart meters for real time information, and remote meter reading with leaks alert on smartphones could help to reduce water losses.

The water shortage problem is also compounded by the water transportation problems. Water losses during its transport to the consumers can be as high as 50% in the networks of Colombo, Delhi, and New Orleans._However, as pointed out in *Degremont* analysis, as

much as 40% of the world population lives less than 100 km from the sea coastline. Out of 70 cities in the world with more than 1 million inhabitants with no access to additional fresh water, 42 are located on a coast. Increasing the supply of drinking water through the process of desalination would seem one logical solution to coping with water shortage. The technology is becoming more efficient and viable. Used only in the Gulf countries in the past, desalination is now expanding rapidly in other parts of the world. Significant improvement has also been made in recent years toward achieving "green desalination plants" whereby the drinking water production becomes carbon neutral and the level of needed energy greatly reduced.

Waste Management

Urban household wastes are expected to expand rapidly. Solid wastes will expand from 12.7billion tons per year to 27 billion tons between 2000 and 2050. This goes far beyond the treatment capacity currently available.

It will first take a mindset change. Waste is no longer just a waste; it is a secondary resource. What used to be burned or thrown out as waste are actively recycled and reused to produce new materials or returned to the economic cycle in the form of recovered energy, products, and new sources to build infrastructure. Taking signals from various stakeholders including the local, regional governments, the market, and individual consumers, *SITA Environmental Solutions* has seen fast expansion in their Organics division over the years which is essentially a manufacturing/ processing business, an evolution from the days *SITA* was known just for its waste collection and treatment services. An "open data" program would be suitable to release information on city services and on the environmental impact of the city.

In the same fashion, *Veolia Environnement* claims that the wastewater that goes through a treatment plant today will go through a 'biorefinery' by 2020 and yield not only treated wastewater but also bio material and bio energy in the near future. This means, instead of simply removing the pollutants from used water, resources will be extracted, starting with water, followed by energy, organic and mineral matters.

Urban Transportation and Oil Demand

While transport is a key driver of development, there are serious issues in the sector for Asia that need to be tackled. For example, motorization is doubling every 5-7 years, congestion costs 2-5% of Asian GDP and another 2-5% of GDP for road accidents. Energy use on transport in Asia accounts for 30% of world energy and as much as 23% of GHG emissions is coming from the transport sector. In 2006, the global oil production has reached its peak and ever since, there has been inexorable rise in oil prices reaching as high as USD 147 per barrel in the last two years.

By 2008, the 'peak fossil fuel power investment' had occurred, i.e. the global renewable power investment recorded higher than fossil fuel for the first time in modern history. Another chapter has been opened by moving from an oil-dependent era to the next where people will increasingly depend on gas and renewable energies, more on public rather than private transportation means. In the United States as well as Australia, the private car dependency has peaked in 2004 showing decline in more recent years while the usage of public transportation is showing significant increase.

The Asian Development Bank (ADB), in recognition of the changing trends in the transport sector in the region, has embarked on very different transport initiatives since 2010. In the past, ADB's support in the road sector has focused on improving access, enhancing economic opportunities and increasing mobility especially for remote rural communities. At

present, ADB's portfolio includes scaling up operations and promoting underground railway systems in urban areas, mainstreaming climate change, improving cross-border transport and logistics, as well as supporting road safety and social sustainability. As a result, the proportion of urban transport lending is projected to increase enormously from 1% in 2009 to 30% in 2020.

On the other hand, according to 2009 data, more cars were sold in China than in the US. One solution is to aim to produce more energy-efficient vehicles that are also light, those that use gasoline-electric hybrid fuels or simply run on electricity. Transport sector is the biggest emitter of greenhouse gas in France and the conversion to electric cars is anticipated to help France achieve its Grenelle objective of bringing down GHG emission by 20% by 2020. The technology and infrastructure are all available. The main challenge is to effectively enhance training and knowledge sharing.

As the cities become denser, the fuel usage per capita for public transportation decreases. Sustainable, resilient, and smart cities in the future will adapt to new challenges and circumstances to become eco-friendly, carbon-neutral cities.

At present, 82 cities in China are building or planning to build underground train systems. China has committed to achieving 15% renewable energy by 2020 and plans to realize 6 zero-carbon cities are underway.

Integrated Approach

Many cities will grow into the size of mega-cities within the next decade. The cities will consume most energy in the transport and housing sectors and the trend will require major breakthroughs in energy generation, supply and distribution. Urban services and utilities are all interconnected and interdependent. Each confronts various climate change problems and fossil fuel shortages. Therefore, a holistic, systemic approach will be necessary to build the infrastructures and implement public services that can meet the increasing demand for energy and urban mobility. Reduce energy use for urban development call for more efficient buildings, and public transportation, lower pollution emission, water recycling and land and planning framework.

At present, as much as 80% of global energy consumption derives from cities or due to transport of goods between cities and at least half of greenhouse gas emissions are emitted in and by cities. With this in mind, *EDF (Electricité de France)* prioritizes enhancing the power grid reliability, improving the network's overall quality, and favors renewable energies and energy demand management by end-users. This also means instilling new energy culture, flexibility and emphasizing on the reduction of green house gas emissions on the demand side.

Urban Governance

According to UN-HABITAT, "good urban governance, based on the principle of urban citizenship, affirms that no man, woman or child can be denied access to the necessities of urban life, including adequate shelter, security of tenure, safe water, sanitation, a clean environment, health, education and nutrition, employment and public safety and mobility." Good governance is a combination of capacity and capability on the one hand and legitimacy on the other. Much of recent metropolitan governance has shown tendency to focus too much on technical and organizational skills and not enough on the skills and culture of collaboration and engagement required to ensure that the communities grant the 'license to operate.' To gain legitimacy is to achieve participatory governance engaging multi-stakeholders in the government, the private sector, and the civil society.

City managers have found that one of the main challenges is the collection, analysis and publication of accurate data on the different aspects of urban environment at a regular interval. Reasons vary from lack of financial, human, and institutional capacities but more could be done to educate and train the city officials and community residents of the urgency and available means to tackle the problems threatening urban sustainability. Difficulties arise also when urban managers try to reach consensus among large populations covering large space with their own emotional attachments and concerns about new initiatives and projects that are geared towards long-term sustainable urban planning.

Thereafter, another key is to better communicate the scientific assessment and policy initiatives to the general public in an integrated manner. Without effective communication and engagement with the individual end users, gaps between sustainable usage and expectations will grow. It can be said that less emphasis lies on leadership and more on the knowledge sharing enabled through alliances between local governments and communities in problem-solving and future planning.

New challenges emerge when addressing the situations where the consequences of one local government's decisions have ramifications beyond its own boundary. The engagement of local and regional communities in the circular economy is crucial as are the resource sharing and joint activities amongst councils that enable effective intergovernmental relations.

One also sees the need to apply new approaches and priorities in urban governance as new eco-cities emerge, engineered and constructed under circumstances that are quite different from the way conventional cities were built.

Environmental sustainability for cities needs governance, all levels of government and civil society are to be involved into the process. New technologies are needed to build green infrastructure and develop new models for services provision leading to a larger integration of urban services. Cities are not yet oriented towards new technologies; regional governance is required to develop integrated technologies as demonstrated by the city of Perth in the field of green transportation. The involvement of civil society is a crucial element.

New Eco City Developments	**Eco expansion of Existing Cities**
Characteristics	***Characteristics***
Developed in isolated location	Technology driven
Partners with local businesses with similar business models	Location is of prime importance to attract majority of people
Residents have similar values	Intensive planning to foster communities and sell the idea
Technology driven	Integration of eco values with present infrastructure
Governed by "green" rules and regulations	Importance of partnerships between public, private and the civil society
Aims in being a self-sustainable city	
Disadvantages	***Disadvantages***
Difficult to integrate to existing cities	Slow change
Values might be compromised with growth	Often not "green" enough to the radicals
Not comfortable for living due to isolation	The power might be centralised too much on the government. Not enough delegation during the actual implementation
Eco-values are compromised after leaving the city premises	

Some of them built over centuries, remodeling and retrofitting major cities into environmentally sustainable cities are proving to be extremely costly to local governments. Public-private partnership are seen as the only viable way, but even these initiatives have been marred by occurrences of corruption and mismanagement with lack of good governance, transparency and accountability on the part of both public authorities and private entrepreneurs in some instances around the world.

Barriers to turning major cities into environmentally sustainable cities:

- Lack of consensus among community residents
- High cost of building ESCs
- Inadequate human and institutional capacity for planning and implementation

Conclusion

History has shown that people learn to adapt and cope when faced with dire situations. Climate change and fossil fuel energy shortage will lead mankind to speed up the technological advances and adopt new ways of life that will allow us to sustain life.

Over the last couple of decades, people have come to a very different perspective in the way they view the importance of environmental protection. In the traditional mindset, protecting the environment and 'greening' the products or buildings meant costly and unwelcome initiatives that impede economic development. Significant improvements have been made in the technological advancements to allay such fears. Green technologies have not only opened up enormous potentials in the green growth industry, but are also proving to be increasingly conducive to the existing economic sectors and to the larger picture of reality. It is no longer just the environmentalists insisting on greening the livelihoods but the also the economists who are promoting green industry and radical changes to our daily behavior. Long past are the debates about greening being the right thing to do for ethical and moral reasons; it is really about survival and absolute necessity.

At the same time, as more cities turn eco-efficient, people will be offered zero-carbon living as an option in the near future. And for cities to become eco-cities, they must reduce their water footprint, carbon footprint, and energy footprint. For this to be realized, people will need reliable tools for assessing their own footprints, new solutions to urban water and sanitary supplies, as well as appropriate public policies to save natural resources. Innovative approaches are required of developing new technologies, innovations will be critical for better data management and sharing knowledge, as well as innovation in business offers and contractual arrangements. Most of these innovation potential lie at the intersection of several industrial and economic sectors. Recovery of energy from wastewater treatment and production of biomass materials from waste treatment plants are such examples.

From the seminar discussion, best practices in the field could be pointed out as follows:

- Use less energy for water and less water for energy: the water /energy nexus;
- Promote the reuse of waste into new secondary raw materials: accelerate the development of recycled materials into new products;
- Develop an economy at the city level with low energy/low carbon emission and high efficiency;
- Look for integrated solutions based on new economic models and open data; and
- Develop governance at the city level and increase reliance on the local government and the involvement of civil society.

Paris, Singapore (May 2011)