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ecosperity 2015

Urbanisation: Developing Cities for a Sustainable Future

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ECOSPERITY 2015 REPORT

INTRODUCTION

The greatest challenge of the 21st century will be balancing urbanisation and ecological sustainability. Half the world's population live in cities today, and this number will climb to 75 per cent by 2050, the United Nations estimates.

As people move from villages to cities on an unprecedented scale – and cities double their collective size – the world must seek better ways to solve urban problems such as over-crowding, pollution and inadequate public services. Meanwhile, climate change is posing a grave threat to cities globally, with rising temperatures and more frequent and severe natural disasters threatening food, water and energy security.

Along with urban population growth, the strain on scarce natural resources will increase. Indeed, there is no industry that will remain immune to urbanisation.

To discuss these issues, Singapore investment company Temasek hosted the Ecosperity conference for the second consecutive year on September 18.

Some 300 leaders from business, government and academia gathered in Singapore's Shangri-La Hotel to deliberate urbanisation challenges from policy to urban planning, finance to infrastructure, and to imagine the cities of the future.

Held in partnership with Goldman Sachs, National University of Singapore's School of Design and Environment, NUS Institute of Real Estate Studies, and Centre for Liveable Cities, the conference was themed "Urbanisation: Developing cities for a sustainable future".

In his opening speech, Lee Theng Kiat, president of Temasek, declared that ecological sustainability and economic prosperity can co-exist. "We don't see these concepts as mutually exclusive; rather, they must go together," he said.

While the challenge is daunting, it is also exciting, giving older cities the opportunity to rejuvenate themselves through new infrastructure and urban planning. New cities will hopefully learn from history too, Lee added.

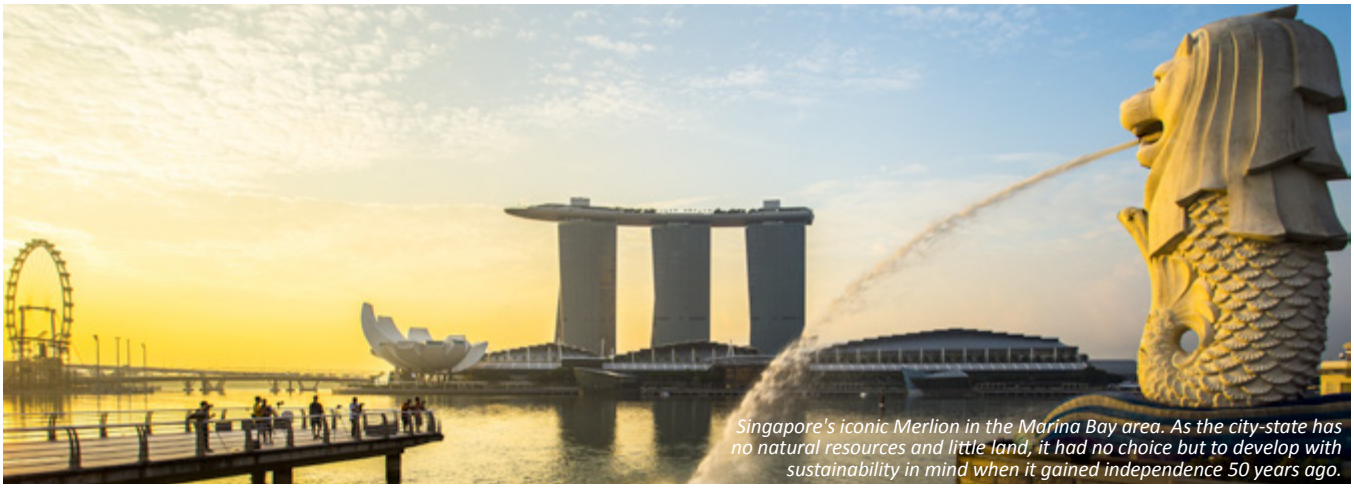
Gary Cohn, president and chief operating officer of Goldman Sachs, said the bank hopes to continue enabling global trends in sustainability and urbanisation, and to do so in an environmentally and socially responsible way.

"The theme of sustainable cities is important not only in Asia's developing economies, where urbanisation continues to be a key trend, but also in Asia's more developed economies, where sustainability is a key area of focus," Cohn told the audience.

As custodians of national borders, governments must shoulder the responsibility of dealing with the impact of rapid urbanisation. They must create policies to address social and environmental issues such as over-crowding, pollution, congestion, and socio-economic inequality.

"I don't think it is an exaggeration to say urbanisation will be the greatest social and ecological challenge of our time."

– LEE THENG KIAT, PRESIDENT, TEMASEK



Singapore's iconic Merlion in the Marina Bay area. As the city-state has no natural resources and little land, it had no choice but to develop with sustainability in mind when it gained independence 50 years ago.

As cities grow, governments must also provide residents with affordable access to food, energy, water, transport, and other public services. With resource scarcity and worsening climate change complicating the global picture, it is clear that achieving the multiple objectives will not be easy.

How will policymakers achieve growth which is not only economically productive but also environmentally sustainable, socially cohesive and resilient to climate change?

Experts speaking at the conference agreed that there is no tension between growth and sustainability. In fact, low-carbon, green growth models can create new economic opportunities for companies and governments.

Singapore is a good example. Dr Vivian Balakrishnan, Minister for the Environment and Water Resources and Minister-in-charge of the Smart Nation Initiative, said as the city-state has no natural resources and little land, it had no choice but to develop with sustainability in mind when it gained independence 50 years ago.

Singapore chose natural gas over coal, sought innovative ways to recycle water because of its scarcity, and eliminated the need for large landfills as there was not enough land. These planning strategies became urban solutions that are now part of Singapore's competitive advantage, he said.

Speakers at Ecosperity also agreed that building sustainable cities – comprising low-carbon transport systems, a compact and efficient layout, and a culture that enhances citizen well-being – requires a rethink of urban planning and governance strategies.

In other words, policy, finance, urban planning and infrastructure all have to be in place – and form a virtuous cycle – for sustainable urbanisation to take place.

Experts agreed that governments should create investor-friendly policies to encourage investment, not just in infrastructure and utilities, but also in technological research and development. Even as companies and governments fund projects and innovate, policy makers have to provide the right regulatory environment for the ventures and research to thrive.

Only when this is achieved, can the world begin to embrace new economic and social models that will underpin a sustainable city.

Lee said: "At Temasek, we are grateful for the opportunity to bring together such a gathering of minds... our key hope is that all of us leave here emboldened with new insights and ideas to make a little difference to sustain the way we live in cities."

"The theme of sustainable cities is important not only in Asia's developing economies, where urbanisation continues to be a key trend, but also in Asia's more developed economies, where sustainability is a key area of focus."

– GARY COHN, PRESIDENT AND CHIEF OPERATING OFFICER, GOLDMAN SACHS

PANEL 1

Policy and political dilemmas: Balancing sustainability and rising urbanisation

Ecosperity 2015 focused on the theme: "Urbanisation: Developing Cities for a Sustainable Future".

Opening the first panel of the day, Dr Andrew Steer, president and CEO of the World Resources Institute, declared: the 21st century is the era of cities. Many experts have billed this movement from rural to urban areas as the most important demographic transition in the history of humanity, said Dr Steer, who painted some stark statistics.

In 1800, four per cent of the world was urbanised. By 2050, this will be 70 per cent. Every year, 70 to 80 million people are added to the world's cities. By 2030, another 1.5 billion people will move into urban centres as they are the nexus of technology and ideas, growth and vitality, he said.

The problem is, the pace of urbanisation has been so rapid that "we have lost our way". For the last 50 years, cities have been built around cars rather than people, and this has resulted in urban sprawl which is eroding the economic benefits of cities, noted Steer.

In the United States, urban sprawl is costing the economy US$1 trillion a year. In many cities worldwide, 10 per cent of city income is lost due to congestion, another 10 per cent to pollution and four per cent is lost in traffic accidents.

So the question is, how do we address this challenge?

Tackling this question head on, Felipe Calderón, chairman of the Global Commission on the Economy and Climate, and former President of Mexico, said that there is a false dichotomy between economic growth and environmental sustainability in that they are not, as some economists claim, mutually exclusive. But in order to achieve both, politicians need to make bold decisions today. These include decarbonising economic growth by introducing reforms to the energy system and adopting more renewables, and also changing urban systems to focus on people.

To meet the demands of a growing global population, we will need to build a city equal to the size of Singapore every month for 15 years, he noted. "But what kind of cities will we build, and what will be the quality of life for these people?" The answer lies in compact, connected and coordinated cities, he said.

Echoing the need for change, former Prime Minister of the Netherlands, Professor Jan Peter Balkenende, said this can be achieved with the right mindset and policies.

"Everyone can make good declarations and have the best intentions, but it comes down to the implementation, follow up and concrete steps," he said.

He added that businesses play a huge role in helping cities cope with these outsized challenges and that sustainable growth has now come to dominate the corporate agenda. Corporate

"Because Singapore is so small, we never had the luxury of ignoring externalities."

– VIVIAN BALAKRISHNAN, MINISTER FOR THE ENVIRONMENT AND WATER RESOURCES, SINGAPORE

"Everyone can make good declarations and have the best intentions, but it comes down to the implementation, follow up and concrete steps."

– JAN PETER BALKENENDE, FORMER PRIME MINISTER, NETHERLANDS

"But what kind of cities will we build, and what will be the quality of life for these people? The answer lies in compact, connected and coordinated cities."

– FELIPE CALDERÓN, CHAIRMAN, GLOBAL COMMISSION ON THE ECONOMY AND CLIMATE

responsibility is not just charity, but about contributing to solutions for society, said Balkenende, who is currently Partner of Corporate Sustainability at EY.

"So governments must be open... there must be the right cooperation between governments and corporations. Let's be practical and work together, because we cannot wait," he said.

In China, for instance, the government is experiencing the brunt of this rapid urbanisation.

Xu Xianping, former vice chairman of the country's National Development and Reform Commission, noted that from 1978 to 2014, China's urban population grew from 172 million to 749 million. In the future, another 200 million will move from rural areas to the cities, potentially worsening pollution and further fuelling demand for energy and infrastructure services.

To ensure that the environment is protected alongside economic growth, the Chinese government last year unveiled a masterplan for sustainable urbanisation that is people-centric, which includes giving new arrivals to the cities equal rights to services. The plan also sets targets to control vehicle population and pollution, and regulation that ensures new buildings will be green, he shared.

"We are confident that we have the ability to realise all these plans, and we will be consistent on this development path," said Xu, who is also professor at Peking University's Guanghua School of Management.

In Singapore, its physical constraints have been a powerful driving force in its development, said Minister for Environment and Water Resources, Vivian Balakrishnan.

"Because Singapore is so small, we never had the luxury of ignoring externalities," he shared, citing the decision 50 years ago by Singapore's founding Prime Minister, the late Lee Kuan Yew, to power the country using natural gas instead of coal even though the latter was a cheaper source of fuel.

Lee made the decision almost instinctively because he understood the value of blue skies, said Balakrishnan. Because Singapore started from a constrained perspective, it had to be innovative in urban solutions such as recycling every drop of water, or creating an eco-sanctuary out of a landfill.

"After a while, we found that these same planning strategies gave us a competitive advantage," said the minister. "People want to live in cities which are clean, green, safe, secure and have

The Singapore skyline at the Marina Bay area at night.

Beijing, China. In a few years, another 200 million will move from rural areas to China's cities, potentially worsening pollution and further fuelling demand for energy and infrastructure services.

"We are confident that we have the ability to realise all these plans, and we will be consistent on this development path."

– XU XIANPING, FORMER VICE CHAIRMAN, NATIONAL DEVELOPMENT AND REFORM COMMISSION, CHINA

"The 21st century is the era of cities. Many experts have billed this movement from rural to urban areas as the most important demographic transition in the history of humanity."

– ANDREW STEER, PRESIDENT AND CEO, WORLD RESOURCES INSTITUTE

opportunities. Suddenly, blue skies, safe drinking water, good food and good nightlife are competitive advantages."

The key to this approach, he added, is thinking about the environment and economic opportunity as a virtuous cycle, and getting things right from the beginning through master-planning, and then converting constraints into global opportunities.

"That's been our strategy for the past 50 years. Now that we are faced with a world confronting food, energy and water crises... this is a world which will also have many opportunities for Singapore," he said.

The panellists also fielded questions from the audience including how to prioritise sustainable development investments amid competing priorities; and how to reconcile the gap between short-term policymaking influenced by short election cycles and long-term planning.

Calderon acknowledged that green growth projects can be capital intensive, such as those in renewable energy, but he reminded the audience that the operational cost is close to zero; and as such, these investments provided attractive returns.

The other thing that governments need to do is provide regulatory frameworks with clear rules that give certainty and a level-playing field to businesses, because the truth is, "private companies and funds will finance economically viable and profitable projects", said Calederon.

Balakrishnan prompted some laughs when he declared: "Contrary to popular belief, politicians are not stupid." As urbanisation continues at a breakneck pace and the level of transparency increases, governments will face mounting pressure from their citizens to take bold, long-term decisions for sustainable urbanisation, he noted.

"Frankly, the use of coal is going to come down because people are going to demand blue skies and healthy air," he said. "If there's one thing politicians respond to, it's pressure from their people."

"It's not the lack of understanding or clarity; everyone knows what needs to be done. But how do you align the political forces? If we can get it done in the next five to 10 years, the world will make a right turn."

PANEL 2

Urban planning for sustainable cities

An HDB (Housing & Development Board) estate in Singapore. About 80 per cent of Singaporeans live in public housing, and 95 per cent of them own their own homes.

A sustainable and liveable city should have a low-carbon transport system, a compact and efficient layout, and a culture that enhances citizen well-being, among other things.

But as a group of city mayors, property developers and government representatives noted at the second panel on urban planning, making this vision a reality requires a rethink of traditional city design and governance strategies.

Challenges include ensuring a good quality of life for city dwellers even as urban population density increases, and carving out funds from limited budgets to build sustainable infrastructure, said the panellists.

They identified housing as a key priority, because building affordable homes on a large scale is not an easy feat. Stuart Lipton, partner at British property firm Lipton Rogers Developments, said that London is an example of a growing city with “woefully inadequate” housing.

The city needs to double the number of new homes from 27,000 units a year to 50,000, he said. Homes also need to be more affordable. The average Londoner can only afford to buy his own home at age 36, and spends about half his income on rent; this is “too much”, said Lipton.

High-rise and high-density housing allow for more homes, he noted, citing Singapore’s tall residential blocks as an example.

Dr Cheong Koon Hean, CEO of Singapore’s public housing agency, Housing & Development Board (HDB), said that the government has committed to providing affordable homes because this leads to citizens’ well-being and is a key pillar for social stability.

About 80 per cent of Singaporeans live in HDB flats, and 95 per cent of them – an unusually high proportion – own their homes, she said. This “gives people a sense of ownership and belonging to Singapore, and enhances their quality of life”.

But this success would not have been possible without tough measures such as buying back land from local communities and resettling them in new homes, introducing subsidies to make apartments affordable, and investing in sustainable building technology research, she added.

"London's Crossrail is expensive and complex, built through the centre of a historic city, but it will make a huge difference to many people. Sometimes, we have to look at the greater issue of sustainability of cities above costs."

– STUART LIPTON, PARTNER, LIPTON ROGERS DEVELOPMENTS

"A city never stands still. Rejuvenating it all the time has to be in the mind of any government."

– CHEONG KOON HEAN, CEO, HOUSING & DEVELOPMENT BOARD, SINGAPORE

"Countries like Japan and Singapore have done well because of good infrastructure."

– LIEW MUN LEONG, CHAIRMAN, CHANGI AIRPORT GROUP; CHAIRMAN, SURBANA JURONG GROUP

Cyclists travel through London using public hire bicycles popularly known as Boris Bikes. Sustainable urban transport is one of the biggest challenges facing cities today.

Apart from housing, many cities also struggle with transport woes such as traffic congestion and pollution from motor vehicles plying the roads.

London has tried to address this through a weekday congestion charge for motorists driving into the city, and a public bicycle hire programme, shared Lipton.

Currently, about 11,500 public bicycles are available for hire across London as part of a scheme called Santander Cycles, named for the Spanish bank that sponsors it. It is popularly called Boris Bikes, after London's Mayor Boris Johnson, who is the public face of the initiative.

Bandung, Indonesia, is another city with a politician synonymous with sustainable transport. Mochamad Ridwan Kamil, who has been in office for two years, cycles to work every day, and told the audience that doing so helps him govern the city more effectively.

Cycling allows him to spot problems he would miss if driving, and to chat with residents about their needs, said Kamil, who is an urban planner and architect by training.

This daily interaction with residents is the new style of governance preferred by the people in Indonesia, said Kamil. Instead of top-down legislation, this "leadership from the middle" approach favours working closely with citizens to meet their needs.

In June, for example, Kamil banned car access to two streets in Bandung. Other roads in the city are also temporarily closed on weekend mornings and evenings as part of a 'car-free' culture.

"To my surprise, there were no resulting traffic problems," said Kamil. "People simply re-routed their travel." The street closures – along with newly-built benches on pavements – also created a space for people to meet, spend time together, and walk around safely, he said.

HDB's Cheong said that Singapore is also promoting sustainable transport, but noted that "it is a struggle to get people to switch from driving to public transport or bicycles".

A lack of cycling infrastructure – such as dedicated bicycle lanes – and the entrenched belief that cycling is unsuitable in hot and humid Singapore have discouraged the widespread adoption of bikes among commuters, she shared.

"The new governance style in Indonesia is "leadership from the middle", from among the crowd. That's what I do every day."

– MOCHAMAD RIDWAN KAMIL, MAYOR, BANDUNG, INDONESIA

"If we can build cities that are more compact, connected and sustainable, we can save six per cent in infrastructure investment in the next 15 years. That's about US $3 trillion, a huge economic opportunity."

– KHOO TENG CHYE, EXECUTIVE DIRECTOR, CENTRE FOR LIVEABLE CITIES, SINGAPORE

"We can't make the switch overnight – first, we have to put in place safe infrastructure," she added.

Singapore already has several long-term plans to support low-carbon transport, including a National Cycling Plan which aims to introduce 700 kilometres of cycling paths by 2030, and the Sustainable Singapore Blueprint 2015, which was launched in 2014 with a 'car-lite' vision for the country.

Well-planned infrastructure is the key to all these urban planning goals, said panellists. Liew Mun Leong, chairman of property development giant Surbana Jurong Group, noted that countries like Japan and Singapore have "done well because of (good) infrastructure" such as water, energy, and transport networks.

But Liew noted that it is tough for cities to secure funding for infrastructure development because it is expensive. In this regard, China's newly established Asian Infrastructure Investment Bank, a US$100 billion initiative, could provide the seed capital for future development in Asia, he added.

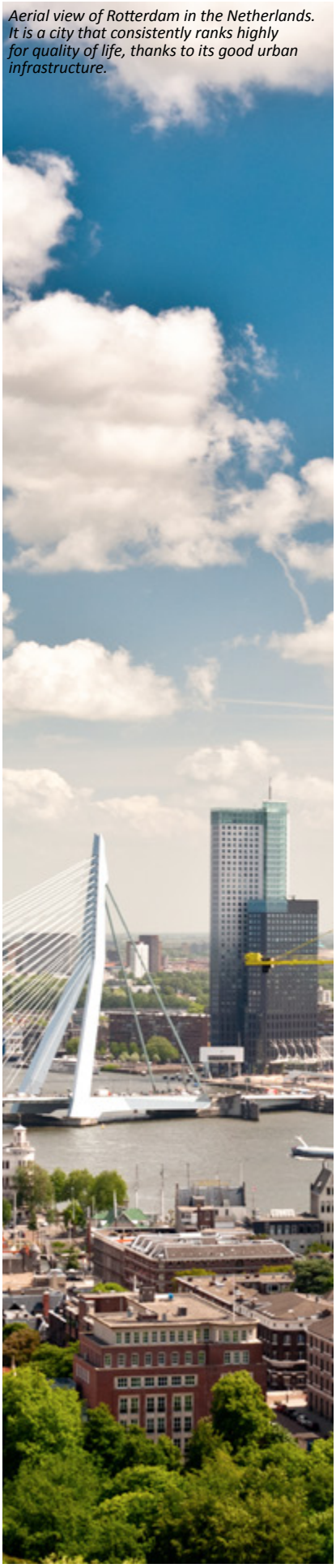
He also noted that in some countries, financiers are concerned that corruption will hamper project delivery.

Retrofitting old cities with new, sustainable infrastructure is another challenge facing urban planners, the panel said.

Lipton cited a new high-capacity rail service in London, Crossrail, as an example of a complex but important project. The train line is set for completion in 2018 and will connect London's suburbs to the city centre, easing pressure on existing underground services.

"It is expensive and complex, but it will make a huge difference to many people," noted Lipton. Sometimes, "we have to look at the greater issue of sustainability of cities above costs," he said.

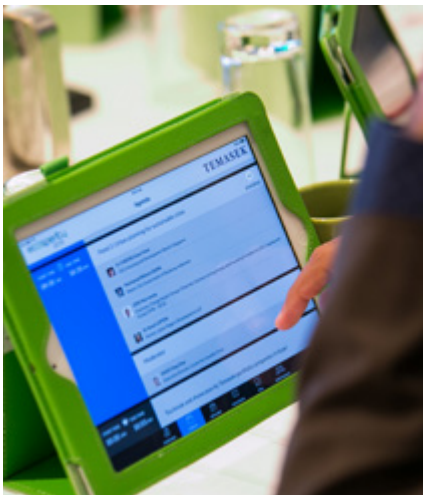
HDB's Cheong said that Singapore has tried to minimise the costs and challenges associated with new infrastructure by looking three or four decades into the future. This way, planners "know where to allocate resources and prioritise infrastructure," she added.



Aerial view of Rotterdam in the Netherlands. It is a city that consistently ranks highly for quality of life, thanks to its good urban infrastructure.

PANEL 3

The role of capital and partnerships



Delegates at Ecosperity 2015 viewing the conference programme and sending questions to the panellists.

Globally, there is a gap between the demand for infrastructure and the capital available to meet this demand. The Asian Development Bank (ADB) estimates that this shortfall is US$8 trillion for the Asia Pacific region, and panellists said that this mismatch must be addressed.

Traditionally, infrastructure projects have been funded by the public sector or by governments in partnership with multilateral organisations such as the World Bank Group and the ADB. Increasingly, however, there is a shift towards private-public partnerships (PPPs) as global private capital seeks projects that provide attractive, steady returns.

Jordan Schwartz, head of the World Bank Group's Global Infrastructure Facility, a platform focused on helping PPPs design, plan and structure the financial aspects of infrastructure projects, said that private sector financiers look for ventures that are, first and foremost, financially sustainable and stable over the long term.

They would then study whether the projects are environmentally and socially sustainable, he said.

Against a backdrop of rapid urbanisation, the challenge for governments and multilateral organisations is finding long-term infrastructure projects that tick all the boxes.

For instance, cities are growing more rapidly than local authorities can handle, especially at the fringes, Schwartz said. The result is urban sprawl, which makes it difficult for the authorities to efficiently deliver services such as water, sanitation, power and transportation.

"The more the sprawl, the less tight the configuration of your urban areas, the harder it is to provide services affordably to peri-urban communities and to where the poor are living," Schwartz said.

While large-scale infrastructure is crucial to sustainable development, there are other smaller projects that can also deliver positive impact.

These projects can be paid for by social impact bonds, a type of financing in which funds are raised from investors to effect positive changes in communities.

"We need to pose the hard questions: what are the components of these risks and how do we mitigate them?"

- NGOZI OKONJO-IWEALA, FORMER FINANCE MINISTER, NIGERIA

"We have a certain obligation to find ways to mobilise capital from the private sector."

– JORDAN SCHWARTZ, HEAD, GLOBAL INFRASTRUCTURE FACILITY, WORLD BANK GROUP

"Right now, we are mainly dealing with food. We want to protect the interests of farmers. We are also modernising our agricultural services, there is a lot of work to be done."

– ZHU SHUMIN, PRESIDENT, AGRICULTURAL BANK OF CHINA

Moderator John Macomber, senior lecturer in finance at the Harvard Business School, questioned if this segment of financing is growing and whether these bonds can deliver urban sustainability outcomes.

The answer is yes, said Andrea Vella, co-head of Asia ex-Japan investment banking at Goldman Sachs. He cited a pilot project that the bank is funding in New York City to build recycling infrastructure in several neighbourhoods.

The communities will use the money to buy bins, trucks, and carts; and also for increasing awareness around recycling within the districts.

"So there is definitely a social impact," he said. "Now, what's the return of that investment and how can that be financially viable?"

He said that the impact of recycling is easily measured by weighing the glass, paper, and different commodities that get refashioned into something useful. The cash flow will come from lower fees paid to the landfill and the company or municipality selling these recycled commodities.

Ultimately, though, it is up to the managers of such social programmes to design a feasible business model, Vella said. Many of these structures are still very much in their infancy, which is why Goldman Sachs decided to fund a pilot project to test the efficacy of these new business models and financing arrangements, he added.

Another advantage of social or green bonds is that they can reach individual wealthy investors who are interested to use their money for a good cause, he added.

Social impact is also one of the mandates of the Agricultural Bank of China, the country's third largest lender. It is a development bank set up to support the farming sector and one of its aims is to alleviate poverty.

"We are putting a lot of effort into beautifying the rural areas, and improving water supply and waste treatment systems," said Zhu Shumin, president of the bank. "We give preferential rates to anyone who wants to work on these areas."

Africa is undergoing rapid urbanisation and and cities across the region such as Kampala in Uganda (pictured) are straining to provide their people with much-needed services and infrastructure.

Cities are growing more rapidly than local authorities can handle, especially at the fringes. The result is urban sprawl, which makes it difficult to deliver services such as water, sanitation, and waste management efficiently.

"The private sector is thinking in very simple terms. We are accountable to shareholders. We do an analysis and then we decide if a deal is a good or a bad deal."

– ANDREA VELLA, CO-HEAD OF ASIA EX-JAPAN INVESTMENT BANKING, GOLDMAN SACHS

"What do you think is the primary component of risk? Is it political risk, is it forex risk, delivery risk, or all of the above?"

– JOHN MACOMBER, SENIOR LECTURER IN FINANCE, HARVARD BUSINESS SCHOOL

Regardless of the financial structure of a project, there has to be a viable business proposition that addresses inherent risks, the panellists said.

In a region like Africa, rapid urbanisation is a key development challenge. Currently, about 40 per cent of the continent's population live in cities and this will jump to 60 per cent by 2050, said Dr Ngozi Okonjo-Iweala, former finance minister of Nigeria.

She said that if the world really cares about poverty eradication and believes that economic growth can be achieved with a climate-friendly approach, then it will have to take a look at Africa.

"Since most of its infrastructure is yet to be built, this is a good opportunity to put in place infrastructure that's climate-resilient," she said.

The problem is that while there is a global pool of money, Africa does not know how to attract it to make the kinds of green investments the continent needs, she said.

To overcome this hurdle, governments therefore have a significant role to play in mitigating the various risks of doing business not just in Africa but globally, the panellists said. Political risk, for example, is something that a private investor or charitable foundation is not able to control on its own.

The challenge is in meeting the needs and expectations of all parties, and structuring deals in a way that makes sense for public-private players, they agreed.

"Executing something like this is a multi-year commitment and sometimes you don't have political stability over many years," said Vella. "The public sector is absolutely crucial to making a project a success."

PANEL 4

Urbanisation and utilities

Policy, finance and technology must all be in place for big cities to develop sustainably. London (pictured), with 8.5 million people, is an example of a city that is trying to accomodate a growing population while ensuring that the city is liveable and public services are widely available.

Moderator Dan Reicher, a law professor and executive director of the Steyer-Taylor Center for Energy Policy and Finance at Stanford University, kicked off the discussion with a motion: Sustainable development requires progress on all three points of the 'sustainability triangle' - that is, policy, finance and technology.

The idea of the triangle is that sound policies do not necessarily ensure that a country will be able to attract capital, and funds will only flow if a certain technology has been proven at commercial scale and is cost-effective.

In the same vein, technological innovation will not take place in a country that does not have rigorous regulations. This triangle applies to all new technologies from advanced turbines, natural gas fracking and solar panels to desalination, water reuse and water infrastructure, Reicher said.

Climate change is further complicating this equation as governments want a technology or utility that is not only affordable and effective but also environmentally friendly. "This (challenge) demands new technologies, additional finance and sometimes tough policies and political decisions", he added.

In recent years, the rise of information technology from smart software systems to big data applications is emerging as an important solution for authorities in providing key services over large areas more efficiently and cheaply.

This intersection of policy, finance and technology will be the new landscape that every business, organization and government needs to navigate if it wants to grow sustainably, Reicher said.

Indeed, the challenge of meeting the needs of the seven billion people on the planet today amid urbanisation, economic growth, and strong demand for raw materials is the main challenge facing the world, panellists said.

Tan Gee Paw, chairman of Singapore's national water agency PUB, said that having successfully closed the water loop – by treating and reusing every drop of water – the agency is now working on a new challenge: building climate resilience into the city-state's water supply.

"Is efficiency, on all of its levels, the first place that we should look?... The most efficient power plant is the one you never built because you didn't need it."

– ERIC DRESSELHUYS, EXECUTIVE VICE-PRESIDENT, SILVER SPRING NETWORKS

"We will need to secure new sources of water in order to be able to secure the future of the world. So we have quite a significant challenge ahead of us."

– THIERRY MALLET, GROUP EXECUTIVE VICE PRESIDENT, INNOVATION, MARKETING AND BUSINESS PERFORMANCE, SUEZ

"Sustainable, inclusive growth requires a long-term view. You can't be changing the rules every two years if you want to create PPPs and attract private capital."

– JOHN RICE, VICE CHAIRMAN, GENERAL ELECTRIC

Water is a basic need but close to 2 billion people on the planet still do not have access to clean, piped water. Between 2 billion and 3 billion also do not have sanitation.

Countries may have to learn to be less dependent on their reservoirs as the impacts of climate change - such as droughts - increase, he explained. "They (the reservoirs) will become less able to meet our water needs, therefore we must turn to technology and this is our research challenge."

Suez, the French multinational which specialises in water, energy and waste management, is among the companies that have turned to technology to address climate change and sustainable development while building a strong business.

Besides recycling materials and reducing consumption and waste, Suez has been working on the link between water and waste management, said Thierry Mallet, executive vice president of Innovation and Business Performance at Suez.

For instance, waste recycling and water treatment processes produce biogas, which can then be used as fuel to power vehicles and even the treatment plants themselves. Such processes cut emissions and sometimes create more energy than they consume, Mallet said.

"The Paris authorities are planning to use biogas generated by wastewater treatment plants to fuel all the buses the city operates," he cited as an example.

While technology is indispensable in addressing sustainability challenges, there are different ways of going about it, the panellists said.

For example, rather than focusing R&D money on efficiency and reuse – where there are already proven approaches – researchers could work on breakthroughs such as improving storage for renewables like solar and wind energy, said Eric Dresselhuys, executive vice-president of Silver Spring Networks, a provider of smart grid technology and networking.

"Electricity is a pretty temporal thing," he said. "You've got to generate it in real time to use it in real time. Getting storage right, in both large scale and also residential scale projects, will fundamentally change how we think about sources of generation."

Reicher added that this storage breakthrough will be necessary for electric vehicles to be more widely adopted.

"We are fortunate that we have political stability and therefore, policy consistency... For water resources, we don't plan just for 20, 30 years. We plan for 50 years in advance."

– TAN GEE PAW, CHAIRMAN, PUB, SINGAPORE

"Renewables are enjoying an unprecedented rate of growth in recent years, what are some of the challenges in integrating these energy sources into the grid and ensuring stability?"

– DAN REICHER, LAW PROFESSOR AND EXECUTIVE DIRECTOR, STEYER-TAYLOR CENTER FOR ENERGY POLICY AND FINANCE, STANFORD UNIVERSITY

Unfortunately, governments themselves can pose a major hurdle for technological innovation, said John Rice, vice chairman of General Electric, one of the world's largest industrial conglomerates.

"We operate in 174 countries, and everywhere I go, officials want to know what can be done quickly, not what's the best solution over 20 years," Rice said.

Yet time and again, it is long-term thinking and visionary policy that will deliver the most significant positive change, the panellists said. Rice cited the success of Europe's wind industry, which was heavily subsidised during its early days.

European companies and governments made a long-term decision to support the technology, a decision that was not necessarily popular everywhere and certainly not cheap, Rice said.

Eventually, more companies invested in the technology, driving wind power's cost per kilowatt from 25 US cents or more in the 1990s to between five and 10 cents per kilowatt now.

"It's how you make long-term decisions in a short-term world," Rice said. "Sustainable, inclusive growth requires a long-term view. You can't be changing the rules every two years if you want to create PPPs and attract private capital."

"You need to give investors a feeling that over the next 10, 15, or 20 years, they are going to get a return on their investment," he added.

Governments should create investor-friendly policies to encourage investment, not just in infrastructure and utilities, but also in technological research and development. Even as companies and governments fund projects and innovate, policy makers have to provide the right regulatory environment for the projects and research to thrive, the panellists said.

"We are not going to reach the sustainability goals we want unless you put those three pieces of the triangle - policy, finance, and technology - together," said Reicher.

Singapore's Gardens by the Bay located at the Marina Bay district. Singapore's national water agency PUB is now working on a new challenge: building climate resilience into the city-state's water supply.

PANEL 5

The future of cities

Delegates at Ecosperity 2015, held at Shangri-La Hotel in Singapore, visiting the exhibition area where leading Singapore companies showcased their latest urban solutions.

What will cities of the future look like, and how can we prepare for it? Experts speaking at this final, crystal ball-gazing panel of the day agreed that future urban centres will be built higher and denser to promote efficiencies, but the crucial difference will be the 'digital overlay' to come that will change how cities work and citizens live.

Kunal Bahl, founder and CEO of Snapdeal, one of India's largest online marketplaces, noted that the proliferation of smartphones and the advent of cheap connectivity will increasingly bring information and material goods to the consumer.

This will reduce people's average traveling time over the long term and help address transport woes such as congestion and pollution currently plaguing many cities across the world.

Professor Balaji Prabhakar of Electrical Engineering and Computer Science at Stanford University noted that this digitisation of services has also enabled the world to "see and sense objects" and to analyse the information collected to improve existing systems.

Transport is just the tip of the iceberg for this digital revolution. Big Data – large and complex data sets – is allowing transport operators to understand the "nuances and subtleties" of our transport systems and to make capacity more flexible so that hotspots can be handled without investing in too much infrastructure, he noted. Prabhakar is also co-founder and chief scientist of Urban Engines, a US start-up focused on using big data and spatial analytics to improve urban mobility.

Agreeing, Dr Chris Luebkeman, director for global foresight, research and innovation at Arup, said that the data is being transformed into knowledge, such that for the first time, people are able to see how a city actually works.

"Analytics is going to be able to predict behavior much more than it can now, and this is going to be exciting," he noted.

It will enable, for instance, fully electrified, autonomous vehicle networks that will "unclog many city arteries" so that hopefully, in a couple of decades, all our cities will have clean air and blue skies.

"What the world needs is not necessarily more government policy, but entrepreneurship, because entrepreneurial ventures have a far more efficient way of solving hard problems."

– KUNAL BAHL, FOUNDER AND CEO, SNAPDEAL

"Technology runs faster than any good policy."

– CHRIS LUEBKEMAN, DIRECTOR FOR GLOBAL FORESIGHT, RESEARCH AND INNOVATION, ARUP

"The digitisation of services has enabled the world to 'see and sense' objects and to analyse the information collected to improve existing systems."

– BALAJI PRABHAKAR, PROFESSOR, ELECTRICAL ENGINEERING AND COMPUTER SCIENCE, STANFORD UNIVERSITY

Apart from transforming city systems, data can also be used to "drive relevance" for citizens by matching their needs to services and products more accurately. Bahl estimates, for instance, that within the next decade, at least 10 per cent of India's trillion-dollar consumer market will move online.

"When that happens, automatic efficiency will kick in for all parties from consumers to businesses and for optimal infrastructure use", he noted. "We're talking about stopping leakages, addressing congestion, making systems more efficient using big data."

This data can also be used in the buildings of tomorrow, noted Luebkeman. Arup has been looking at climate change data to inform and "future-proof" the designs of their buildings so that they are resilient.

"Technology runs faster than any good policy," he added. "It's about how to get that data and making sure it's relevant for the future of cities."

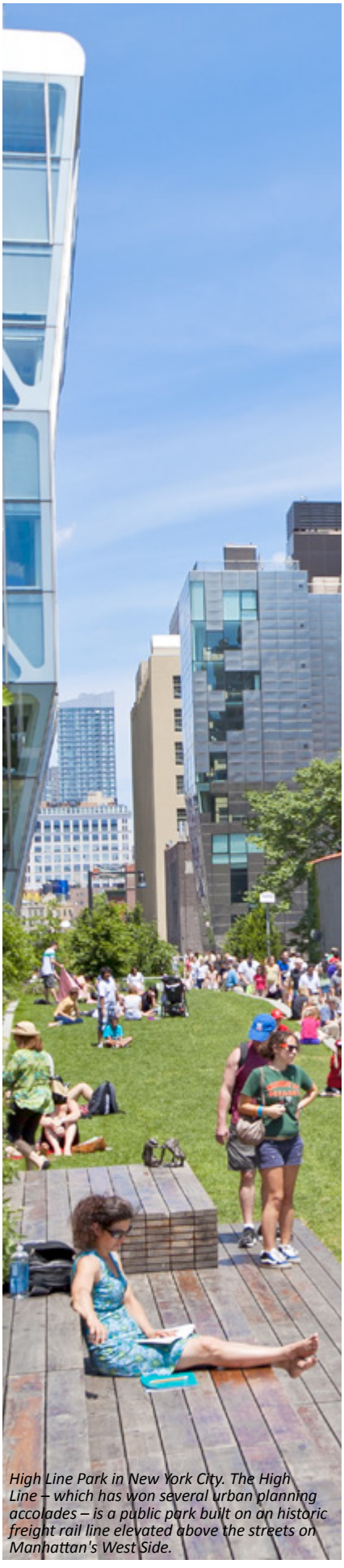
As technology becomes even more pervasive, will people become more distant? Moderator Haslinda Amin, news correspondent at Bloomberg Television, posed this question.

Prabhakar noted that interaction has to be promoted, "there's no question about that", but he emphasized that the quality of life will also be improved as frustration levels will come down significantly when congestion eases and efficiencies kick in.

Sharing an anecdote of how he noticed school kids constantly watching their phones instead of talking to each other, Dr Luebkeman acknowledged that youths today may seem more distant to the older generation, but in fact are "far more connected to and aware of the world" than ever before.

"It's a new dynamic that we have to confront," he said. City planners also need to respond by designing spaces that encourage human interaction even as technology becomes more pervasive, such that "teenagers and grandmothers alike" want to share these spaces.

Singapore Power (pictured brochure) is one of the Singapore companies featured at Ecosperity 2015's exhibition. It provides reliable energy to more than 1.4 million industrial, commercial and residential customers in the country.



High Line Park in New York City. The High Line – which has won several urban planning accolades – is a public park built on an historic freight rail line elevated above the streets on Manhattan's West Side.

"As technology becomes even more pervasive, will people become more distant?"

– HASLINDA AMIN, NEWS CORRESPONDENT, BLOOMBERG TELEVISION

Haslinda Amin interviewing Singapore's Minister for Environment and Water Resources, Vivian Balakrishnan, on the sidelines of Ecosperity 2015.

The panellists also highlighted the growing sharing economy as a disruptive force set to change the way cities work. Bahl noted that in the future, everyone is likely to be sharing everything from cars to beds to kitchens so as to generate incomes from their underused assets.

Governments should allow for such innovation to take place, even if it threatens existing industries, as it promotes efficiencies, he said. "Regulators generally lag behind innovation," but they should be open-minded in reacting to such disruptions, he added.

Responding to a question on what it would take for cities to transform and prepare for these scenarios, Dr Luebkeman said simply: great leadership and vision.

City authorities have become the new governments of the world, he noted, and in many places it comes down to local leaders and whether they have the vision to build great cities.

Citing former New York City Mayor Michael Bloomberg as an example, he said Mayor Bloomberg empowered his staff to start trialing sustainable city projects and "made things happen" to improve the lives of the city's residents.

"It's a combination of leadership from governments, businesses and universities... As what is required in successful investing, it's also the same for successful cities. You need to have this trilogy of leadership from these institutions," he said.

Bahl added that what the world needs is not necessarily more government policy but entrepreneurship, "because entrepreneurial ventures have a far more efficient way of solving hard problems". But businesses will need support from government and research, he added.

Dr Luebkeman concluded: "We have to be optimists and look at future challenges and confront them... Facing that square on, as humans in our intellectual capacity, we will make the world a better place."

Young Leaders' Dialogue

Are developed or developing countries more responsible for sustainable development? Are social or environmental needs more important in a city? These are the questions businesses and government officials grapple with daily, with no easy answers.

When 140 students from 15 countries at the Ecosperity 2015 Young Leaders' Dialogue were posed these same questions, they quickly rejected the notions that international finger-pointing has any place in a sustainable future, and that environmental protection and social development are mutually exclusive.

This lively discussion between corporate leaders and students from over 20 disciplines at the National University of Singapore's School of Design and Environment was the afternoon coda to the Ecosperity 2015 conference held in the morning.

Chris Luebkeman, director of global foresight, research and innovation at professional services consultancy Arup, told the students that if both developed and developing countries do nothing to promote sustainable development, "you, the future generations will bear the burden".

"Each one of us is a global citizen and equally responsible for creating a sustainable future," he added.

Students asked the speakers if the international community is right to insist that developing countries curb their rising carbon emissions to mitigate climate change, given that developed nations would not have reached their wealthy status without fossil fuels powering their economy for decades.

Jordan Schwartz, manager for infrastructure policy, World Bank Group, responded with a personal anecdote about his father, a chemical plant worker who was diagnosed with cancer – probably caused by exposure to industrial pollution.

"I wouldn't wish the same fate on developing countries," he said. "I cringe when I hear policy-makers insist that they have the right to do the same thing, and I wonder if there is a more sustainable way forward".

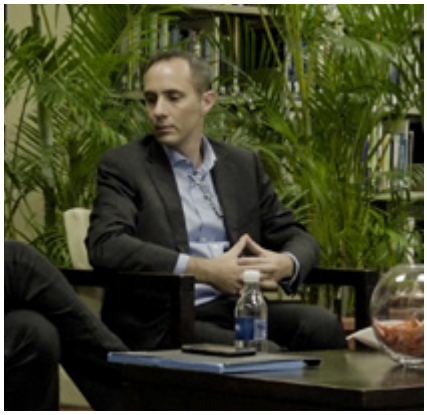
Many students – from a wide range of countries such as Japan, Singapore, the US as well as Bangladesh, India, Vietnam, and Laos – echoed this view.

"Fifty years ago, Singapore was forced to survive on its own. Despite our limited land and natural resources, we managed to pull it off together."

– KHOO TENG CHYE, EXECUTIVE DIRECTOR, CENTRE FOR LIVEABLE CITIES, SINGAPORE

"Each one of us is a global citizen and equally responsible for creating a sustainable future."

– CHRIS LUEBKEMAN, DIRECTOR, GLOBAL FORESIGHT, RESEARCH AND INNOVATION, ARUP



"I cringe when I hear policymakers insist that they have the right to (develop using unsustainable practices) and I wonder if there is a more sustainable way forward."

– JORDAN SCHWARTZ, HEAD, GLOBAL INFRASTRUCTURE FACILITY, WORLD BANK GROUP

Students at Ecosperity 2015's Young Leaders' Dialogue rejected the notion that environmental protection and social development are mutually exclusive.

As Yekaterina Shinkareva from New York University's Stern School of Business put it, it is not important whose responsibility it is. "The important issue is: who will dominate action to build a more sustainable planet?"

Unsustainable growth will affect the entire planet, the students noted. To stress that rich and poor countries are both responsible for curbing climate change, they compared the earth to a sinking ship and said that it was fruitless for passengers to argue about who should save it.

They also likened the planet to a child, and noted that both its parents were equally responsible for its care. These metaphors led to one key conclusion: Climate change, floods, and natural disasters are the "new normal", and everyone is responsible for addressing them.

Developing countries must make sure that economic growth is environmentally sustainable, while developed nations should provide funding to and share their clean technology expertise with the former, since they already possess many viable solutions today, said the students.

Abhimanyu Goel from the National University of Singapore added that developing countries could even take the lead in green growth, "because they are starting with a blank state" and can therefore avoid the mistakes made by developed nations.

Participants also questioned the binary nature of the debate between the needs of the environment and society. Goel noted that "there is no reason why one should be prioritised over the other. A sustainable environment is also crucial to society's well-being."

Ashirwad Gupta from the Indian Institute of Technology, Mumbai, added that "Singapore is a perfect example where a consideration for the environment had long-term benefits for society".

He was inspired by an account of Singapore's early years following independence shared by Khoo Teng Chye, executive director, Centre for Liveable Cities (CLC) at the discussion. CLC is a government think-tank on urban development.

Khoo explained that Singapore 50 years ago was far from wealthy, and had "floods, water pollution, and every urban ill you can think of".

Singapore lacked the resources and skills to address these challenges, but had to muster up whatever little manpower it had and plough ahead with the search for solutions because the

the reliable supply of clean water was an "existential issue" for the young nation, he added.

But over years of learning from international best practices, holistic planning, and investment in research development, the country managed to develop solutions such as water recycling and desalination, and is today renowned as a sustainable city and a leader in water technology, Khoo said.

In fact, Singapore also shares its water expertise with other countries, he added.

Other emerging industries with potential to help cities balance sustainability with growth include renewable energy and the Internet of Things, where devices communicate with one another through software, said students. These tools can help cities monitor and reduce their energy use, they added.

Participants also proposed looking at centuries-old urban design to solve today's problems.

Doito Bonotulshi from Brac University shared that in Dhaka, Bangladesh, newer parts of the city experience severe flooding every year, but the old quarters – whose drainage systems were built by the Mughals, a Middle-Eastern empire which colonised Dhaka in the late 16th century - do not.

This exemplifies how ancient practices can help today's cities make their infrastructure more sustainable and resilient, she said, adding that "the past is the future".

Participants also stressed the importance of environmental education in sustainable development.

New York University's Jacqueline Li shared that a fundamental problem in society today is overconsumption. Field-based environmental education should tackle the issues of consumerism and waste, she suggested. This could involve taking students to sites in forests and oceans to raise awareness of how much raw material is used to manufacture the goods they consume.

Dr Luebkeman noted that many of the solutions for sustainable cities already exist today, and that students should "learn as much as possible about technologies that are being used in other cities, and bring them home.

He also praised the students' focus on the future, rather than on who is to blame for past problems, saying that "it gives me great hope and inspiration, and I go away less cynical than I came".

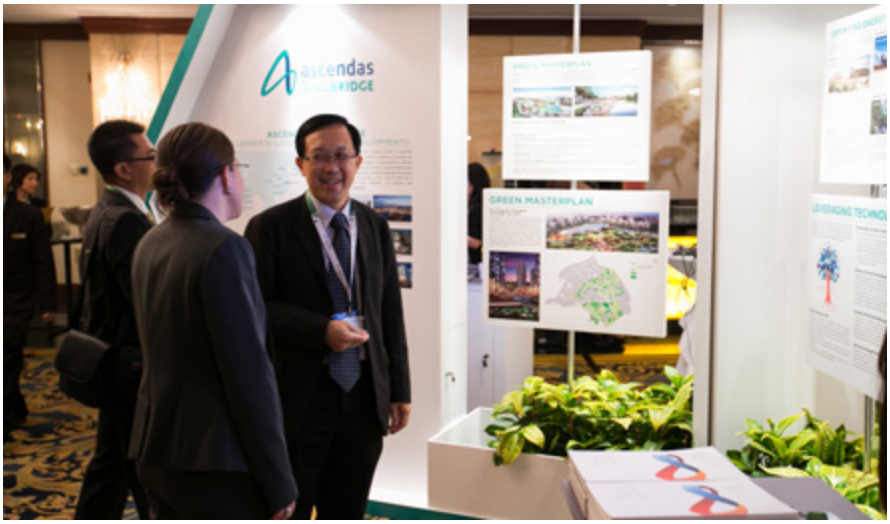
Mr Khoo, in his concluding remarks, encouraged the students to ignore suggestions that environment and socio-economic priorities are a zero-sum game – even when it seems difficult to balance these priorities.

"Your job is to help resolve trade-offs with innovative ideas," he said.

Dhaka, Bangladesh. The newer parts of the city experience severe flooding every year, but the older areas do not.

Ecosperity Exhibition

Ecosperity 2015 featured an exhibition that showcased the latest urban solutions and innovations from six leading Singapore companies. Delegates could experience some of these latest innovations for themselves, and in some cases, view scenes from the future through VR, or virtual reality, glasses.



ASCENDAS-SINGBRIDGE

Ascendas-Singbridge combines the capabilities of real estate developer Ascendas and investment firm Singbridge which focuses on sustainable urban development in the region. The company has built townships, mixed-use developments and business parks in 28 cities across 10 Asian countries. Its projects include Nusajaya Tech Park in Johor, Malaysia, and the Sino-Singapore Guangzhou Knowledge City in China. Each project integrates sustainability features such as solar power, energy and water efficiency devices, and green spaces. Ascendas-Singbridge also uses the latest digital technologies such as smart estate management systems and cloud computing to make its facilities more secure and connected.

CAPITALAND

Singapore-listed CapitaLand is one of Asia's largest real estate companies with a diversified global real estate portfolio that includes integrated developments, shopping malls, serviced residences, offices and homes. At Ecosperity 2015, it exhibited its #BuildSG2065 Virtual Reality experience (pictured) which takes viewers on a journey into the future, immersing them in an environment created with ideas crowd-sourced from the public during the company's #BuildSG2065 campaign. One of the concepts that stood out was smart buildings, with the public desiring buildings that are resource efficient even while being responsive to their needs through technology.

SEMBCORP INDUSTRIES

Sembcorp Industries is a leading water, energy and marine specialist with operations in 16 countries across six continents. Its key businesses are in utilities, the marine industry and urban development. Within utilities, renewable energy infrastructure such as wind, solar and biomass projects make up 15 per cent of the capacity it owns and manages. The firm is also a significant industrial water treatment and water supply expert. In the urban development space, Sembcorp Industries has more than 20 years of track record in planning and building infrastructure – from industrial parks to urban developments – from scratch, in countries such as Vietnam, China and Indonesia.

SINGAPORE POWER

Singapore Power provides reliable and efficient energy to more than 1.4 million industrial, commercial and residential customers in the country. Among its advanced energy efficient projects is the Singapore District Cooling, the world's largest underground district cooling network. Spanning a service area of 1.6 million square meters in the Marina Bay business area, the project has delivered up to 40 per cent energy savings compared to in-building chiller systems. The electricity saved is equivalent to carbon emissions reduction of 35 million kilogrammes of CO2 per year, or the equivalent of removing 10,500 private cars off the roads in Singapore annually.

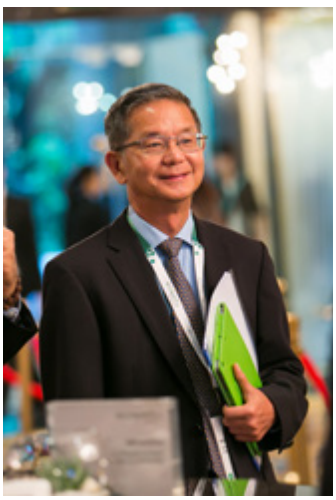
SURBANA JURONG

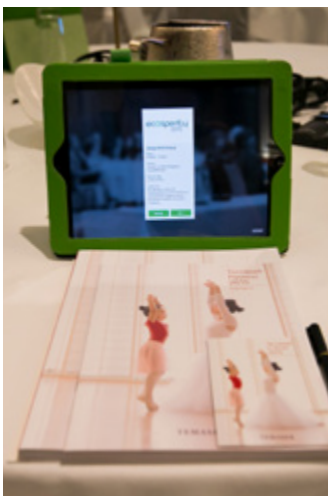
Jointly-owned by Temasek and Singapore government agency JTC Corporation, Surbana Jurong is Asia's consultancy powerhouse for urbanisation and infrastructure developments. Its expertise is backed by over 50 years' experience of building more than a million homes across 26 townships and shaping the urban landscape in Singapore. The company has also completed masterplans for over 30 countries and developed 49 industrial parks around the world. Surbana Jurong employs over 4,000 employees from 40 nationalities in 26 offices across Asia, Africa and the Middle East. Its philosophy, 'Building Cities, Shaping Lives' defines the company's approach to each new development – an opportunity to fulfil aspirations and enrich lives.

TEMASEK FOUNDATION

Temasek Foundation, a philanthropic organisation set up by Temasek, aims to build a more prosperous and connected Asia by supporting training programmes in healthcare, education, public administration, and disaster response capability. To help Asian leaders cope with the challenges of rapid urbanization, Temasek Foundation funds a Leaders in Urban Governance Programme. In this five-day course for city leaders, Singapore officials share lessons on how Singapore has evolved into a densely packed yet sustainable, liveable, and economically competitive city. The foundation also offers a Water Leadership Programme where policymakers discuss and develop strategies for finance, infrastructure, and policy challenges related to water and sanitation.

Ecosperity: In Pictures





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"I have always believed that a blighted urban landscape, a concrete jungle destroys the human spirit. We need the greenery of nature to lift our spirits."

- LEE KUAN YEW, SINGAPORE'S FOUNDING PRIME MINISTER

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