

A PUBLICATION OF THE



CleanEnviro Solutions

2014 -2015
edition

GROWING CITIES: SOLVING ENVIRONMENTAL & CLEANING CHALLENGES

INTERVIEWS

- Kirsten Brosbøl on Danish environmental engagement
- Vijay Jagannathan on cities tackling global pollution
- David Newman on a world without waste

WASTE MANAGEMENT

Transforming rubbish into resource

CLEANING

Advancing skills and technology

ABOUT THE EVENT:

CleanEnviro Summit Singapore is the global platform for government leaders, policy makers, regulators and industry captains to connect, examine and discover practical solutions to address environmental challenges for tomorrow's cities. A biennial event, CleanEnviro Summit 2014 facilitated the sharing of insights on the latest environmental market trends through a myriad of activities. These included the Clean Environment Leaders Plenary (CELP), Clean Environment Regulators Roundtable (CERR), Clean Environment Convention (CEC) and Business Forums that showcased the latest innovations in waste management, clean management, environmental technology and recycling solutions.

For more information, visit www.cleanenviros Summit.sg



PUBLISHER

Singapore Environment Institute
1 Kay Siang Road #08-01
Singapore 248922

CEO

Ronnie Tay

EDITORIAL ADVISER

Ong Eng Kian

EDITORIAL LEAD

Chris Tobias

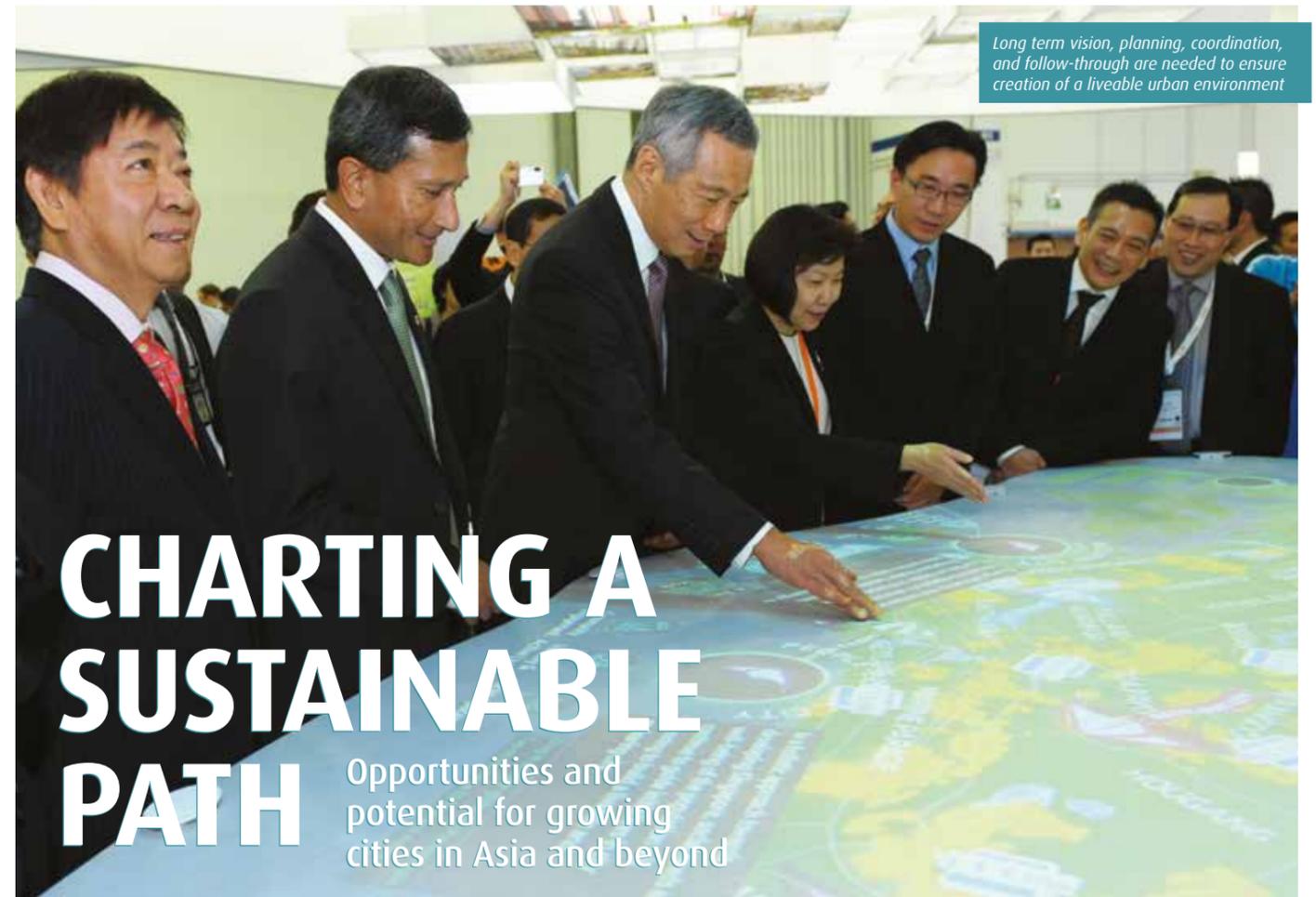
SPECIAL THANKS TO

CESS Working Committee
Foo Chee Yuan
Ho Cheng Hoon
Joanna Lim
Ong Yi Xuan
Wan Shi Ting

PHOTOGRAPHY BY

Keshav Sishtha
Tilt

Comments and opinions made by external contributors and parties interviewed by CleanEnviro Solutions do not necessarily reflect the views or policies of the National Environment Agency (NEA) nor the Singapore Government. While every effort has been made to ensure the accuracy of the information contained therein, the NEA bears no responsibility for correctness of content from external parties, unintentional errors, or omissions. All materials remain the copyright of the NEA, unless otherwise stated and no reproduction is permitted without the written authorisation of NEA and/or the contributors. CleanEnviro Solutions is printed on environmentally friendly paper stock.



Long term vision, planning, coordination, and follow-through are needed to ensure creation of a liveable urban environment

CHARTING A SUSTAINABLE PATH

Opportunities and potential for growing cities in Asia and beyond

CONTENTS

- 1 INTRODUCTION**
Charting a sustainable path
- 2 IN CONVERSATION**
Sustainable growth
- 3 OPENING PLENARY**
A tale of two cities
- 4 INTERVIEW**
Five minutes with... Kirsten Brosbøl, Minister for the Environment, Kingdom of Denmark
- 6 CLEAN ENVIRONMENT LEADERS PLENARY**
Environmental lessons for Asia
- 8 CLEAN ENVIRONMENT CONVENTION WASTE MANAGEMENT TRACK**
Waste: Whose problem is it anyway
- 10 INTERVIEW**
Five minutes with... Vijay Jagannathan, Senior Fellow, World Resources Institute
- 12 CLEAN ENVIRONMENT CONVENTION WASTE MANAGEMENT TRACK**
The consumption conundrum
- 14 INTERVIEW**
Five minutes with... David Newman, President, International Solid Waste Association
- 16 CLEAN ENVIRONMENT CONVENTION WASTE MANAGEMENT TRACK**
Developing waste management: What is the role of the informal sector?
- 18 CLEAN ENVIRONMENT CONVENTION CLEANING TRACK**
Goodbye to the mop and bucket mentality
- 21 CLEAN ENVIRONMENT CONVENTION CLEANING TRACK**
Partnering with the public
- 23 CLEAN ENVIRONMENT REGULATORS ROUNDTABLE**
A look behind closed doors
- 25 DEALS**
Business deals and partnerships

The world is urbanising on an unprecedented scale. Cities already house more than half the world's population, and as many as another 2.5 billion people are expected to move to urban areas in the first half of this century, primarily in Asia. This presents enormous challenges, but also opportunities to make cities with a high standard of living a reality. Already many cities globally are heeding the call to tackle the environmental and social problems that can arise with rapid growth.



"To generate vibrant economies, create good jobs, provide a safe and secure environment for residents, deliver good public services – whether it is waste disposal, clean and reliable water, or public transport – and to make all these individual pieces work, have effective governance so that the system as a whole functions well..."
– Prime Minister Lee Hsien Loong

Singapore has been one such example. "The challenge is to ensure a high quality environment, a high quality of life for the city dwellers, where they can live, work and play," says the nation's Prime Minister Lee Hsien Loong. He believes that there is no one size fits all solution – each country and each city faces challenges of its own.

"For Singapore, sustainability and reliability and liveability have always been important. We are a small country of 700 km²; the city is nearly the whole country... We have no resources, and are dependent on imports for necessities like water and energy," he says.

Its spatial constraints and resource limitations have forced Singapore to think differently from the outset to develop a more liveable and sustainable city. But in many respects, all cities will sooner or later face similar kinds of dilemmas in a crowded and

resource-limited world.

To create a sustainable city takes a number of factors carefully worked together. "To generate vibrant economies, create good jobs, provide a safe and secure environment for residents, deliver good public services – whether it is waste disposal, clean and reliable water, or public transport – and to make all these individual pieces work, have effective governance so that the system as a whole functions well," he says in short, are all necessary.

It is in that spirit that representatives from around the world have come to share their experiences, challenges, and solutions to global urban challenges.

REVISITING ECONOMIC GROWTH AMIDST ENVIRONMENTAL EXTREMES

Can our environment be respected without slowing badly needed economic progress for billions in poverty?

At first glance the numbers appear daunting: cities already account for three quarters of energy consumption and 80 per cent of CO₂ emissions. Yet at present only just over half of the world's population live in urban areas. By 2050 that will have increased to seven in 10.

Carbon dioxide levels in the Northern Hemisphere averaged more than 400 parts per million for the whole of April in 2014, the first time levels that high have been recorded for a full month.

At the same time, many people are in desperate need of opportunities and poverty alleviation. The World Bank calculates that over one billion people still live in absolute poverty, while in the rich world unemployment, particularly among the young, remains high as economies struggle to emerge from a protracted slump.

Is it possible for economies to grow at a politically acceptable level that is also genuinely environmentally sustainable?

That question receives an emphatic 'yes' from Jose Angel Gurria, Secretary-General of the Organisation for Economic Co-operation and Development (OECD).

"The choice is not between being green and growth," he says at the opening session of Clean Enviro Summit, the World Cities Summit, and Singapore International Water Week.

Stating that he has ignored advice to whisper the word 'green' when saying the phrase 'green growth', he insists: "It is nothing to be ashamed of."

Increasing urbanisation may on one hand be an environmental threat if done poorly, but it also offers opportunities, both for citizens to enjoy a higher quality of life, and for the public and private sector to work together to reduce society's planetary impact.

As Professor Tommy Koh, Ambassador-at-Large at Singapore's Ministry of Foreign Affairs puts it, "When done well, life in a city can be heaven on earth. But if we mismanage our city, it can be hell on earth."

The solution lies in collaboration and the sharing of ideas, and to "get out of our silos" he says.

That challenge is particularly acute in Singapore, an island of just 700 km² with a population of over five million. As a city state the country has no hinterland: its citizens cannot escape to villages or second tier cities to seek a lower cost of living or cleaner air and water, notes Khaw Boon Wan, Singapore's Minister for National

There is a global need to create liveable cities that balance economic development with environmental quality



Development. "If the city fails, the country fails," he says.

And both the public and private sectors have their role to play. Jean-Louis Chaussade, CEO of Suez Environnement Company, argues that this is nothing new. His company was founded in the 19th century in part to tackle emerging health concerns from rapidly expanding cities.

What is perhaps new is the increasing importance of high technology. "One of the biggest challenges in the coming decades will be how smart and green go together," said Chaussade. "If a city is not smart it cannot be green, and if it is not green it cannot be smart."

But ideas alone are not enough: they need the right regulatory environment to flourish. The solution may lie in price based instruments, such as carbon trading and emissions taxes, says Gurria, but politicians have shied away from sufficiently robust measures for fear of being seen to increase the burden on tax payers.

As one example, he notes that Europe's pioneering carbon trading scheme has seen little success in part because a glut of permits have seen prices plummet from 30 euros in 2008 to as little as 4 euros at the start of 2014.

But Gurria notes that potentially higher carbon taxes could be offset by reductions in corporation taxes, a potentially tax neutral solution that would benefit the economy while promoting environmentally desirable behaviour.

"If we agree where the problem is then let's create strong measures... We need bold decisions," he says.



Close collaboration is needed between governments and businesses to make environmentally sound development a reality

A TALE OF TWO CITIES

Cities can either be a force for environmental good or destruction. Are they up to the challenge, or is increasing urbanisation a fearful trend?

Cities make enormous contributions to society: they are responsible for as much as 80 per cent of global GDP, despite accounting for just over half of the population. They are centres of culture, of education, of ideas and innovation.

The evidence is strong that the density of cities alone increases the productivity of its inhabitants, even adjusting for 'urban sorting' – the fact that more productive people are drawn to more productive places.

For increasing numbers of us around the world, cities are a fact of life.

For our global environment, this can be a threat due to unmanaged development, mountains of waste, transportation woes and unchecked pollution to air, water, and soil. But there's also an environmental opportunity since with a large proportion of the world's population in relatively few places, small measures can have a disproportionately positive impact if done correctly.

"Are cities up to the challenge?" poses Helen Clark, Administrator of the United Nations Development Programme and Chair, United Nations Development Group. "Yes they are. Throughout history cities have been centres of growth, innovation, creativity and culture."

The natural response of central governments in the face of a urban and environmental challenge is to regulate, but Clark argues that actually the opposite is required.

"I've got a message for national governments, and that is they must give cities space to do their job. I think they need to loosen up so that cities can innovate on sustainable developments, and that's for the national benefit."

Clark references her time as Prime Minister of New Zealand, during which she implemented a Power of General Competence, giving local government the ability to take any powers away from central government for which their citizens were prepared to pay.

The UK has recently begun implementing similar policies, as part of what Greg Clark, Minister of State (Cities and Constitution),

describes as a shift in thinking from cities as sources of social problems to centres of economic opportunities.

But reduced central government control is not the same thing as no government control; nor is that necessarily a desirable aim.

In Sri Lanka, for example, the government has devoted much energy to improving conditions in unofficial dwellings built by the large numbers of people who moved to Colombo to escape the final stages of that country's civil war. With nowhere to live and little money to pay for it, many people settled on vacant land which was in areas prone to flooding. According to Gotabaya Rajapaksa, Secretary of Defence and Urban Development, the government is now building new housing for those people in areas that are safer but, crucially, still close to the places in which they want to work.

This need for good planning is reinforced by Kirsten Brosbøl, Danish Minister for the Environment, who argues that regulation is key. That is not enough in itself, however. She also points out the importance of a stable regulatory environment so that businesses are not afraid to invest lest the rules change, and for making it easy for citizens to act sustainably.

"It sounds simple, but if citizens don't understand the messages, then policies will fail," she says. Not only that, but she notes that campaigns must correspond to reality. Even the best thought out water saving campaign is doomed to failure if people cannot easily obtain even simple materials like flow reducing taps.

Clearly then business has a role to play, but to work together successfully, Peter Bakker, President of the World Business Council for Sustainable Development, argues that people must move beyond the idea that, in environmental terms, government is 'good' and business is 'bad'.

"We're all astronauts on a spaceship, and the spaceship is in trouble," he said. "We need to stop thinking about divisions between government, business and citizens. We need to save the spaceship and we need to move forwards in collaboration."



Five minutes with...
**KIRSTEN
 BROSBØL**
 Minister for the Environment, Kingdom of Denmark

What are your most pressing environmental concerns in Denmark right now?

We have experienced some heavy rainfall over the last couple of years, so like many countries in the world, we are confronted with the consequences of climate change. The adaptation to that is of course a big priority for us.

How does your country communicate about climate change with the public?

We have a long tradition of involving the public in political decision making, and much of this happens at a local level. Municipalities, being the local authorities, have a big responsibility in implementing the legislation and preparing the concrete plans for climate change adaptation. So people are heavily involved in that process, through hearings and public meetings, and that's key to sharing the responsibility and getting people involved in taking their part of the responsibilities.

Do you feel the public is quite cooperative in this process?

I think it is a great concern to Danes because we have easy access to nature in areas like beaches and forests—everyone can use them. This

helps make people recognise that these are nice places to be able to visit in the future, not just now, and helps them be more receptive to the political messages we try to send about issues like climate change.

Denmark is almost entirely surrounded by sea. What special challenges does this pose in environmental terms?

Rising sea levels are of great concern to us—it puts a lot of pressure on our coasts and coastal protection. Adaptation to that and to flooding is of great concern to us. We've started rolling out plans for climate change adaptation in all municipalities, so local authorities are responsible for local projects that will help us adapt and prepare for these realities.

Do you feel that events like CleanEnviro Summit also gives you the opportunity to get new insights on how to meet challenges like these?

Definitely – as much as we can, we try to exchange views and best practices. This week in Singapore, countries that share the same challenges are present here, so it's a great opportunity for me to exchange views on how other countries are handling the challenges.

As you travel around to Asian countries, what stands out to you as some regionally significant environmental trends?

The growing middle class is becoming wealthier, and having more money to spend in turn demands more energy and materials. Things like driving cars or having new diets puts enormous pressure on the environment and natural resources.

Denmark has certainly demonstrated itself to be an environmental leader internationally. What lessons do you think you can pass on to other developing nations, especially in Asia?

I think Denmark is recognised as one of the first movers in this field, and we have experienced many of the same challenges over recent decades as we industrialised. We are happy to share some of the technology we developed, and help others to jump some of the stages, that took us decades to work through.

Could you share any examples of unique Danish environmental innovations or technology?

Right now one of the areas we are looking at is waste water treatment, and we have an innovative project with a biorefinery in the small town of Billund. There we have a private-public partnership developing new ways to handle waste water, while also making use of the sludge produced in the process for energy, fertiliser, and fuel. I see a great future in this field, and it's my impression that many countries present here, including Singapore, are also looking at waste water sludge as a key area of interest.

What are you hoping to take away from your participation in this summit?

I hope that by being here, Danish companies that have also been involved this week together with Singapore companies, will make new connections and find new opportunities for collaboration. I also take home with me new ideas and inspiration from what I've seen from other countries present.



What do you think Denmark could share on preventing industrial pollution in developing countries?

We have a very strong regulation of emissions from industry and from our vast agriculture sector. Especially the pollution of inland and coastal waters is of great concern to us. We have a strong regime of regulation that has been in place for years, and I think that is key—governments have to be ready to use regulation and to put a very strict framework in place. This allows for industry to adapt and develop new technology, and has led to expansion of our “greentech” offerings as a nation.

“Denmark is recognised as one of the first movers in this field, and we have experienced many of the same challenges over recent decades as we industrialised. We are happy to share some of the technology we developed, and help others to jump some of the stages, that took us decades to work through.”

ENVIRONMENTAL LESSONS FOR ASIA

What countries in the region can learn from the environmental successes – and failures – of other nations

Asian economies are growing at a tremendous pace. The World Bank predicts that the region will grow by 7.1 per cent in 2014. China should grow at 7.6 per cent, Malaysia 4.9 per cent and the Philippines 6.6 per cent.

The temptation must be for Asian leaders to sit back and enjoy the fruits of this economic boom. But the nations of the region face a clear choice: either copy the development methods employed by Europeans and Americans centuries ago and grow at the expense of health, quality of life and environment, or chart a new course, rethinking the “business as usual” approach to growth.

It’s a decision Asian leaders cannot afford to put off. As Dr Vijay Jagannathan, Senior Fellow of the World Resources Institute, puts it: “There is a telescoping of time and space and what took Europe 100 years is taking a decade in Asia.”

Too often the need to do things differently has been dismissed as an attempt to hold Asia back: to limit its economic growth by imposing restrictions which Western nations were not subject to during the industrial revolution.

In fact the opposite is true, argues Helen Clark, Administrator of the United Nations Development Programme and Chair of the United Nations Development Group.

“The central assumption we make is that we cannot eradicate poverty in our world unless we link these efforts to maintaining and rehabilitating ecosystems,” she says of her work.

The UNDP Global Human Development Report 2011 predicted that under the worst case environmental scenario, not only would human development be dramatically slowed in the first half of this century: in the poorest countries, particularly Sub Saharan Africa and parts of Asia, it would actually regress.

While this sounds stark, the good news is that there are lessons to be learned from around the world from countries who have found ways to transgress this development dilemma – both from the perspective of developing nations and from more advanced economies that are attempting to lessen or eliminate their environmental impacts.

Denmark is famed for its pristine natural environment, but that was not always the case. Changing the country’s environmental impact required a strong commitment from government, industry and the general public, says Kirsten Brosbøl, the country’s Minister for the Environment.

The country has set an ambitious target: to wean itself off fossil fuels by 2050. Not only that, but to do so without compromising economic growth.

That might seem an impossible task, but Brosbøl points out that energy consumption from non-renewable sources is lower today than in 1980, but the economy has grown by 78 per cent in the same period. By 2020 nearly half of Danish electricity will come from wind power, while biomass is expected to account for another 20 per cent.

Inevitably that has involved a degree of compulsion: government has imposed taxes on utilities to encourage more efficient usage, for example. But Brosbøl argues that it’s important to encourage people to think for themselves and make green choices, by mandating things such as clear eco-labelling on appliances rather than simply banning inefficient models.

Far from being a constraint on economic growth, she argues that businesses have thrived in the stable regulatory environment. “When we spend public money we should spend it green and this has been very effective,” she says, pointing out that using work for the government as a case study provides an extremely credible sales tool for exporters.

At the other end of the scale is the UAE, which in 2006 was shown to have the highest ecological footprint per capita in the world. Stricter efficiency standards have been enforced since then, particularly on air conditioners, by far the largest consumers of electricity, but, short of packing up and moving to a cooler climate, there is a limit to what the country’s nine million people can do to reduce their environmental impact using existing technologies.

It was with this in mind that the UAE set up Masdar, an investment and research hub designed to change the country’s environmental course, says Dr Rashid Ahmed bin Fahad, the UAE’s Minister of Environment and Water. In 2008 it broke ground on Masdar City, which aims to be the world’s most sustainable eco-city.

Of course most of Asia does not enjoy the UAE’s oil wealth. Nor does it have such a developed economy as Denmark’s. So what lessons can regional governments glean from all this?

It may be here that Singapore provides the best example. When the country became independent in 1965 it was poor and, in



“We had the advantage of being so small that we had no choice but to be environmentally conscious from day one.”
– Dr Vivian Balakrishnan, Minister for the Environment and Water Resources

places, extremely polluted. There was no guarantee that it would be either successful or environmentally sustainable. But as Dr Vivian Balakrishnan, Minister for the Environment and Water Resources, puts it, the country’s small size forced it to think differently. “We had the advantage of being so small that we had no choice but to be environmentally conscious from day one.”

Much of that thinking has come as a result of government planning – as Dr Balakrishnan points out, Marina Bay Sands, where the conference was held, was built on reclaimed land in a development plan for the area first sketched out decades ago. And sometimes that means taking decisions that are politically unpopular: Singaporeans pay the market price for their water, meaning it is more expensive than elsewhere in the region, but “it sends the signal that water is a precious resource. Governments have a duty not to subsidise in a perverse manner.”

That can be easier said than done: as Clark points out, almost everyone would agree that governments should take action on environment issues, but the second it hurts their pockets their opinion changes.

But Dr Jagannathan argues that there are encouraging signs that countries in the region are opting for technology based not on price, but on efficacy. “People are voting with their feet not for the lowest cost but for the best technology,” he says. He points to Indian cement factories, where clear government policies meant that companies invested in advanced technology, dramatically reducing the environmental impact of what can be an extremely



polluting industry.

The question is often who will pay? Dr Jagannathan points to the example of those Asian cities that have intermittent power supplies, forcing anyone who can afford it to purchase a diesel generator as backup. Clearly this is a tremendous waste of resources, but it’s also an opportunity: if people are prepared to pay for noisy, polluting generators on their balconies or in their gardens, they would no doubt much prefer to spend that money instead on reliable grid electricity, which can be generated more sustainably.

Dr Balakrishnan argues that the challenge is not so much finding the money as a lack of government planning on infrastructure. “It doesn’t matter where the money comes from, but the decision to invest in top class infrastructure is government’s responsibility,” he says.

With proper planning and a clear and stable framework for businesses and citizens to operate in, it is possible to take a different path. Green growth is more than just a catchy phrase: it’s a viable, even essential option for developing countries, argues Clark.

“Traditionally development was about clearing all your land and putting it to other uses, but our world climate has paid a terrible price for that development.

“I want to state my conviction that green growth is very good for countries. I believe that green growth can be a huge source of innovation, of new growth, of new jobs, of development of new products and services and exports and all the things that countries want to achieve.”



In Indonesia, a scavenger collects recyclable materials from garbage thrown into a river

WASTE: WHOSE PROBLEM IS IT ANYWAY?

Waste management is one of the most daunting issues facing many developing cities today, and pressure is mounting on governments to tackle the problem. But who is ultimately responsible?

Asia's economic rise over the last three decades has been nothing short of remarkable, but that rapid growth now poses some serious environmental and social stumbling blocks. According to the World Bank, in 2012 China generated 520,548 tonnes of solid waste per day. This accounted for nearly 14.7 per cent of the world's total. By 2025, it's estimated that the country will generate three times this amount – nearly one-quarter of all global solid waste.

Governments globally are facing the same challenges as China associated with economic growth and urbanisation. As the region's middle classes grow they consume more and produce more waste. But while the problem is clear, deciding who should bear

responsibility is still widely debated. Increasingly, the burden is falling to city leaders.

"Megacities play a role in evolving waste management; they're innovation hubs and we're seeing the biggest mass migration to cities in human history," says Dr Janya Sang-Arun, Senior Policy Researcher at the Institute for Global Environmental Strategies based in Japan.

Singapore has been widely cited as a fast-growing city-state that has tackled its waste problem. "If we were all here in the '60s we'd see rubbish all over the place," says Loh Ah Tuan, Consultant and Director, Keppel Integrated Consulting. "We started our journey earlier than other megacities; it's an environment solution, not a waste solution."

"Singapore is an example of localisation: put your own house in order before you talk about globalisation."

The issue of globalisation versus localisation is a prominent theme facing municipalities worldwide, as well as independent global waste management organisations.

In contrast to Mr Loh's belief that waste is a local issue, Bruno Berthon, who is Managing Director at Accenture Strategy and Sustainability, believes: "In history we believed that waste management was a local issue, it starts with us, our homes, our



Rapidly developing cities require early intervention to ensure waste does not become environmentally destructive and negatively impact quality of life

offices, but in a more connected world, globalisation means waste management becomes an international issue."

"Waste has established trade routes," says Mr Berthon. "We are in a world of leaner economies, everything can count as GDP. The ideal world is a circular economy, where there is no waste."

Global trade and commerce means many new forms of waste, some of them hazardous if not properly disposed of, are ending up in parts of the world where they were previously unknown. A precious metal, for example, might be mined in Africa and manufactured in an electrical computer component in the US, before being shipped to China for extraction and re-use. In many respects, this globalised picture is increasingly seeing waste reframed as an important resource and a valuable commodity.



"We see waste not as something to dispose of but as a valuable resource. We look for technology to help us intensify the use of land for waste management"

– Ms Grace Fu Hai Yien Minister, Prime Minister's Office, Second Minister for the Environment and Water Resources and Second Minister for Foreign Affairs

For Dr Arab Hoballah, Chief of Sustainable Consumption and Production at the United Nations Environment Programme, capitalising on these business opportunities is key to the creation of a circular economy – whereby waste is recycled for energy or re-use. But this concept relies on private-public partnerships, especially in communities with waste management issues.

"Waste is a resource and once we understand that we can work with the private sector on business opportunities," he said.

Japan, South Korea, Singapore and Taiwan, for example, have been implementing waste management policies since the late 1990s to promote recycling and a more efficient use of resources.

But other developing Asian nations do not have the luxury of time afforded by pre-planning and early adoption of waste management practices. And neither do they benefit from a collective economy, like the US or Europe, where waste management is largely governed by national directives, which are then administered locally.

In Bandung, Indonesia – the nation's third largest city with a population of 2.5 million – waste recycling is largely informal. Roadside collectors and rudimentary recycling facilities absorb the bulk of the city's 1,500 tonne a day waste generation, 74 per cent of which is collected and transported to landfill.

For developing cities like Bandung, investing in waste-to-energy solutions is also a political decision. There's no single waste-to-energy facility in Indonesia, a nation with 500 cities and, according to Bandung's mayor Ridwan Kamil, no one wants to be the first to finance such programmes.

Technology sharing with developed nations is the interim solution: "Our city is still developing so we look to cities that have the technology, like those in Japan," says Kamil. Low-tech solutions, such as community cleaning whereby schools are mandated to clean a one-kilometre radius on designated days of the week, also play a vital role.

Based on his experience in the US, where landfill has been regulated since the 1970s, John Skinner, Executive Director and CEO of the Solid Waste Association of North America, emphasises the pressure of time on these rapidly expanding economies.

"In the US, open dumps were closed through a regulatory programme, but it took 30 to 40 years to change behaviour. Asia doesn't have decades available," he says. According to Dr Hoballah, changing behaviour in developing economies can be driven through the education of the middle classes: "The poor don't waste much if they can help it: the middle classes are the most wasteful. If we don't educate them properly it becomes very difficult."

It seems simple on the surface: educate, regulate, legislate, enforce. But as many have discovered, there's no 'one size fits all' solution when it comes to balancing the needs of emerging economies while tackling the issues already facing the developed world.



Five minutes with...
VIJAY JAGANNATHAN
 Senior Fellow, World Resources Institute

There is much uncertainty around climate change regulation. For example in the US the American Clean Energy and Security Act failed, and the UK government is talking about lowering or removing subsidies for wind power. What effect does this have on investment and development of new technologies?

Any kind of climate change regulation and political will to enforce those regulations will have an impact on where new technology stands. Against that, particularly in countries in Asia, there is a rising middle class demanding better quality urban services.

In today's context, where the state is often unable to supply high quality urban services demanded based on traditional technologies – such as meeting energy demand through coal-fired power plants in India or Indonesia – supply is unable to keep up with market demand. In these situations there are great opportunities for new technologies that are entirely demand driven, rather than by climate change regulation.

One has to see which of these two forces wins the battle so to speak: the lack of political will in Western countries to create or enforce climate change regulation versus the market responses that drive investments in new technologies.

Given the failure of some of these national and international measures, what opportunities are there for things to be done on a smaller scale: perhaps agreements between cities for example?

A real opportunity lies in cities because their residents demand in their own self-interest to do the right thing for climate. If you look at the way cities are developing say in China, what was achieved in terms of urbanisation in 150 years in Europe has taken barely 10 years. The same thing is happening in cities in India, Indonesia, the rest of Asia and Africa too. This is bringing forward a concentrated air and water pollution problem that is unacceptable to the rising

“Initiatives are in the local best interest, and also have an impact on the global climate – these become win-win options that no one is going to oppose. The challenge is really to convey the message in a way that all parties begin to get a common understanding.”

middle class who want change in terms of a better quality of life. The interesting thing is when you tackle a lot of local pollution problems that these people care about now, you are also taking care of a global problem. For example, when you take care of SO_x and NO_x you can also reduce greenhouse gas emissions.

I've seen that cities are really where one need not talk about politics between North and South, or developed and developing countries, but engage in substantive policy dialogue based on local self-interest.

Do you think globally binding agreements on the environment are ever going to be a realistic prospect, or should we be aiming at the local and regional level instead?

Obviously for political reasons, there has to be some kind of effort made at the global level, but I would say breakthroughs are really going to happen at the local level for the reasons discussed above. This requires tackling things on three fronts: decent regulation, best available technology adoption, and enough money flowing in to really affect change. These will require public-private partnerships.

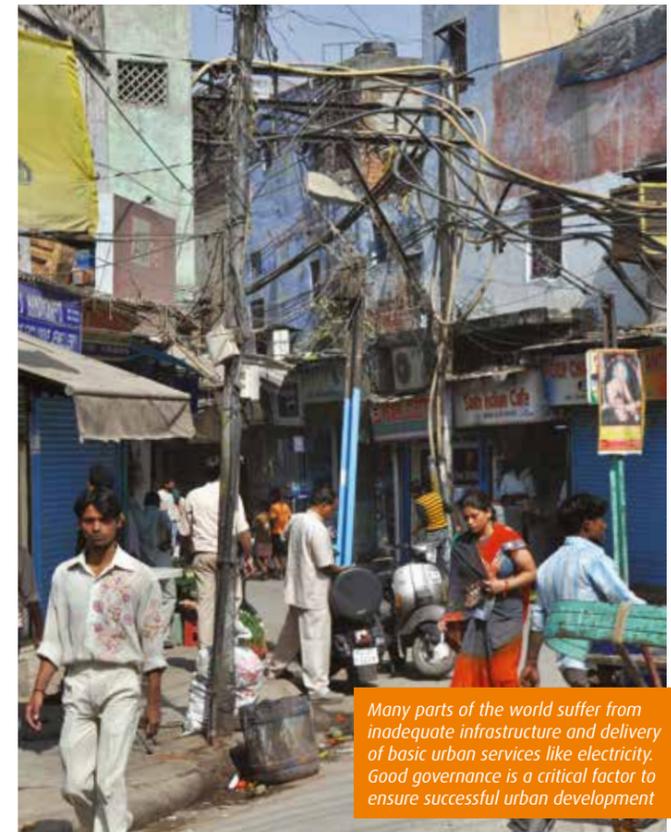
With that in mind, how can economic ministries and large businesses be convinced that low carbon is good business and good politics and loosen the wheels of finance?

Part of it is how we communicate and pass the message on. With most of the large ministries and work at national levels, people are not really aware of the kind of co-benefits that take place at the city level. So the story needs to be recast for approaching mayors at the local level. Initiatives are in the local best interest, and also have an impact on the global climate – these become win-win options that no one is going to oppose. The challenge is really to convey the message in a way that all parties begin to get a common understanding.

How are Asia's environmental challenges different to those historically seen elsewhere in the world?

The most interesting examples are what happens in China, where the governance and accountability mechanisms at the city level have taken an entirely different shape in part because the common person has become unwilling to accept Suspended Particulate Matter (SPM) levels in their cities, because pollution is affecting his/her lifestyle and quality of life. So you're already seeing this happening in a big way, with social media starting to affect relationships between regulators, the community, and the cities themselves.

In Asian cities, unlike the Western model, a lot of the liabilities for bad pollution are with the city administration because of governance gaps – you cannot simply say it is company X that caused the problem; it is because cities did not manage urban transport, waste generation and so forth in a sustainable manner.



Many parts of the world suffer from inadequate infrastructure and delivery of basic urban services like electricity. Good governance is a critical factor to ensure successful urban development

What can other countries learn from Singapore's achievements in managing a large population in a small and resource-challenged city-state?

I think the most important transferable lesson from Singapore is how objective management of these local environmental challenges is synonymous with good governance. What we find here is how the system involves measuring environmental outcomes to ensure they are fully consistent with national regulations. That sets in motion in a very powerful way by which the community starts to realise what is in their right to pollute and not. And in a sense, that is what you're seeing increasingly in China and India today too, where people are questioning the outcomes of the city management of the air, water and land – be it SPM, pollutant levels in water bodies and street litter. Singapore has much to offer, and many of the countries in Asia are very keen to learn. The accountability of city organisations to outcomes citizens care about is Singapore's most important contribution to all of Asia.

The WRI works in part to spread something called environmental democracy in developing countries. Can you explain more about this approach and why is it important?

In many developing countries, what you find is a lack of information as a major factor for the division between governments and communities. So a part of our work involves an access initiative – to simply give information so people know what are their rights and obligations. It makes an enormous difference in many cases for this data to be available and can be an important step in improving government accountability and how it functions.



Chinese workers manually sort plastic bottles for recycling

THE CONSUMPTION CONUNDRUM

Over-consumption is affecting more than our waistlines: it's adding to vast piles of food, packaging, and e-waste heading for landfill. How to resolve this situation? Experts from the public and private sector weigh in

When Unilever repackaged one of its most popular deodorant brands, it was meant to provide a win-win solution for the company and the consumer: the same amount of spray in a smaller can. But Unilever hadn't accounted for the behaviour change barrier. A smaller product, in the eyes of loyal customers, meant less of their favourite deodorant despite the package label indicating otherwise. Changing consumer behaviour that's built up over decades is a huge obstacle for brands that are trying to solve many waste issues, including the packaging puzzle. How do you create sustainable packaging, cut costs and keep customers happy?

"Consumer behaviour change is not easy," says David Kui, Vice President, Communications and Sustainability, Global Markets at Unilever. "You see an aerosol can half the size of one next to it, which isn't compressed, but they both do the same thing, how do you communicate that? It's a challenge." In the UK, the challenge has been taken up by the Waste and Resources Action Programme (WRAP). The organisation is responsible for communicating recycling and food waste programmes to consumers and retailers, from helping retailers to cut waste in their supply chains to encouraging the hospitality industry and households to reduce their own waste.

Its campaigns such as the 'Love food, hate waste' initiative have helped UK households and hoteliers recognise and tackle food waste, saving around £1.5 billion worth of food to date. "A third of all food in the world is wasted, that's one in four calories," says Dr Mervyn Jones, Head of Collaborative Programmes at WRAP. "The dangers of over-eating has not been aired properly, it's a debilitating problem for the 21st century." The cause of the sharp rise in packaging waste over the last three decades is clear: people in developed economies are over-consuming, whether it's food, electrical goods or other items. But Dr Jones is keen to remind people that although packaging can be environmentally problematic, it is vitally important to prevent food spoilage and product damage – the footprint resulting from either would be environmentally far greater.



"A third of all food in the world is wasted, that's one in four calories"
– Dr Mervyn Jones, Head of Collaborative Programmes at WRAP

"Let's not forget the role packaging plays, whether it's on the shelves in supermarkets or in the home," he says. But as many items criss-cross the world from origin to sale and use, waste problems beyond packaging get very complex. Today, 1.2 billion people live in countries with some form of packaging regulations, but formalising these waste disposal systems and deciding who should foot the bill is an economic and political hot potato. According to Russ Martin, CEO of the Global Product Stewardship council, retailers and brands play a crucial role in managing mounting waste levels. "The biggest role they [retailers] can play is in leveraging their supply chain to advise brands on packaging requirements," he says. But when it comes to targeting the consumer, it's more challenging than that. "It's difficult to boil it down to one bumper sticker message for action."

In Denmark, Croatia and Hungary, for example, packaging taxes apply but the onus is increasingly being placed on manufacturers to accept responsibility for products and packaging at 'end of life', particularly when it comes to electrical goods. Extended Producer Responsibility (EPR) programmes exist throughout Europe, Japan, South Korea and Taiwan. More than 30 US states have EPR laws and the world's biggest brands and manufacturers have signed up to bear the cost of recycling materials from plastic to palladium. Swedish-owned Ericsson is one company taking full cycle responsibility under an EU directive on e-waste recycling, which applies in 180 markets Ericsson operates in. "Ericsson's objective is to close the loop," says Stephen Rodgers, who is responsible for Ericsson's global product take-back programme. "All our products fulfil their lifetime and where they're fed back to us we recycle them. We know the raw materials we use are finite and

when they're scarce, prices go up, so we need to ensure we do this to remain competitive." While legislation has certainly aided the implementation of EPR schemes worldwide, manufacturers are wary of national directives becoming too heavy-handed for fear of pushing e-waste to cheaper, informal recycling sectors where they may not get handled properly. "On one hand we have a very regulated environment where everyone reports to everyone. On the other hand we have an enormous amount of e-waste being shipped to developing countries and burnt," says Christian Stiglitz, CEO, European Institute of Environmental Economics. In Asia, 85 per cent of e-waste is in the hands of the informal recycling sector. Greenpeace has dubbed China the 'e-waste dumping ground of the world'. According to United Nations figures, 70 per



A worker wraps a pallet of electronics for proper recycling at an event in Ann Arbor, Michigan, USA

cent of electronic waste globally generated ended up in China, and waste materials like these often provide the raw inputs for China's manufacturing sector. In recent years, Taiwan has chosen to tackle e-waste levels with tough laws. "Thirty years ago the picture we see of e-waste being burnt in Ghana was common in Taiwan, so we decided not to import e-waste and we regulated against it. This is a solution for other countries," says Chen Hung-Yi, Deputy Executive Secretary at the Recycling Fund Management Board, Taiwan EPA. But while Taiwan has its problem under wraps, it's not a one-size fits all solution, believes Garth Hickle, Product Stewardship Team Leader with the Minnesota Pollution Control Agency. "Are we able to move to a circular economy with decentralised systems or do we need different approaches for municipalities?" he says. For nations lacking even basic packaging and e-waste legislation, such as Asia's developing economies, Dr Jones called upon governments to take action. "When we think about behaviour change we think about time scales of five to seven years," said Dr Jones. "If you think there's a problem now, where will you be in five years? Many governments are not looking at this properly and it has to change."

Five minutes with...

DAVID NEWMAN

President, International Solid Waste Association



Tell us a bit about the International Solid Waste Association (ISWA) and your work globally?

ISWA is the only global network of people working in the waste industry whether they are government officials or professionals or whether they come from industry or researchers or scientists. It's a network of about 30,000-40,000 people around the world in the waste industry all trying to make a contribution to make the planet a better place to live.

How important is legislation in facilitating changes in waste management?

Where you look at really mature waste systems, these systems are being driven almost exclusively by legislation. Look at central and northern Europe, Japan, and Korea, where you see very high recycling rates, very high energy recovery rates: it's almost always been because legislation has pushed that. Legislation is driven by the public desire for greater environmental quality and so is tied to the debate within open societies on the quality of life.

Is there any instance where legislation is a hindrance to progress?

No, I think that this industry is driven by legislation. The problem is not legislation but there is another problem, if I may, and that's financial resources. You see legislation goes hand in hand with increasingly expanding financial resources, so where you see mature waste systems they're in very rich countries because rich countries can afford to pay for it. Therefore you see, in poorer countries, less legislation because there's less financial capacity to be able to enforce it.

Part of ISWA's vision is a world without waste. How realistic is that?

Well my old father would say 'how long is a piece of string'? It's a very, very difficult question to answer. I think that we are going through a period over the next 20-30 years where we will see a world with ever-greater quantities of waste and I don't know when that will peak but I guess around 2050. That's happening because developing

countries are consuming, they're urbanising and getting richer, and more waste is going into our environment. I think a world without waste is our objective and our mission but we're a long, long way away from seeing that.

What's the role of businesses in shaping consumer behaviour to shape change?

Business plays an absolutely fundamental role, sometimes for good and sometimes not for good. We've seen in very mature economies with mature waste systems how industry has played a strategic role in getting those waste systems in place. But we also see industry, particularly consumer goods industries, trying not to allow forward thinking and positive environmental actions happen. So we see industries, for example in North America, fighting against Extended Producer Responsibility (EPR) schemes, which they've accepted in Europe and I find this ethically very, very difficult to understand.

You touched upon urbanisation and the rising middle class in Asia, to what extent are the challenges in Asia different to the challenges in other parts of the world?

You have the mature economies of North America and Europe, where you have stable and rapidly aging populations, and of course in terms of our businesses, paradoxically, waste volumes are falling as people consume less as they get older. In Asia, you're in the exact opposite paradigm: very young populations, fast growing, urbanising,

Workers remove styrofoam boxes from a van at a recycling center at Tsukiji Fish Market in Tokyo, Japan



consuming more, very westernised and heavily consumer orientated. Yet you don't have the capacity at local level – especially in developing countries such as Indonesia, Malaysia, Philippines – to plan and budget for interventions to get things under control. So you have situations, like I saw in Jakarta last year, where I was shocked at people burning waste all over the city, and canals and rivers full of waste and that comes down to lack of financial, technical capacity and the very, very rapid urbanisation. They haven't had time to get to grips with it.

Singapore is often singled out when talking about Asia as a region. What can these other nations learn from Singapore's experience?

Singapore has really got fantastic examples, above all, its government. You have transparency, and honesty, and ethics in government and from there you can build a lot. And people are hardworking and conscientious. Where you have corruption and you don't have ethics within the political class I think it's difficult to build anything: industry will not invest and private companies are deterred from coming to those countries. So firstly, it's transparency of governments. Then you have a big technological industry here. Technology suppliers, engineering companies – some of the biggest in the world – so you can get together in places like CleanEnviro Summit because you have companies physically capable of doing that.

Thinking a bit further about technology, what are some examples of the most exciting advances in environmental technologies in the waste industry? Are there any disruptive technologies coming into play?

The waste industry is technologically very slow. It's the dinosaur of technology. The iPhone wasn't around 20 years ago but the incinerator was around 100 years ago. Ok, they've become cleaner but the technology is essentially not that different. Composting and anaerobic digestion has been around a long time, we're perfecting them but there is no technological change that I foresee over the

"I think a world without waste is our objective and our mission but we're a long, long way away from seeing that."

coming years. What we can see however is up streaming of the waste industry, certain things that are changing, for example, compostable plastics are coming into play where we don't need to recycle or burn them but we can compost them. And a lot of compostable packaging will come into the mainstream packaging industry over the next decade. That is a big change. Also we will see much more re-use of materials derived from recycling going back into industrial streams; it is happening widely already in northern

Europe, it will become a norm worldwide over the next decades.

You mentioned that change is decades away on a big scale. Are there any other examples of shifts in the waste industry that we can expect in the next 20 years?

The point about timeframes is that it does take a long time, even in the most advanced economies. Let's take Germany for example: I think the first advances in waste in Germany were in the 1980s. Take Denmark today: the Danes were pumping waste (from sewage for example) into the North Sea until the eighties. In London, which is now an extraordinarily clean city and beginning to be a model for waste treatment, it was taking it into the North Sea until 1982. The message is, it has taken even the advanced, wealthy economies 30 years – and they still don't have fully mature systems. The difference in Asia which wasn't happening in Europe are three things: vast population growth, fast consumption and rapidly changing waste streams. Until the eighties and nineties we didn't really have many plastics, and certainly not as much electrical waste as in Europe and North America. We've got all of that now and you've got to get to grips very quickly in Asia. It can't go into the ocean like it did back then.

How does collaboration, through events like this, help ISWA and the waste industry progress?

The value of an organisation like ISWA is we have members around the world and we can exchange information very quickly. We can learn from other people's mistakes, their successes and there's a network of information available. We do a lot of teaching and organise many events from places as far and wide as Angola to Malaysia, we hold summer schools and master classes. And I'm very pleased to announce that this year we signed an MOU with the WMRAS and NEA here in Singapore and I'm very pleased that the Waste Management and Recycling Association of Singapore is a member of ISWA and does a lot of good work. It's this international collaboration that our organisation is excellent at doing.

DEVELOPING WASTE MANAGEMENT: WHAT IS THE ROLE OF THE INFORMAL SECTOR?

Alongside formal industry, the informal waste and recycling sector plays a big role – though not without its downsides. What role should they play going into the future as governments encourage further recycling regulations?

Waste collecting may be low in the pecking order of career choices for many in the developed world, but in developing countries one per cent of the urban population – at least 15 million people – survive by salvaging recyclables from waste.

From roadside rubbish collectors seeking metals and cardboard to rudimentary e-waste recycling, whereby precious metals are stripped from circuit boards in questionable workshops, waste is a valuable commodity and a livelihood for millions.

In many countries, there exists a balancing act between the informal and formal waste sectors, and ongoing debate how best to manage and merge them to improve material, environmental, health and safety outcomes. One needn't look much further than the issue of e-waste to see why this is urgently necessary.

"Strengthening the informal e-waste recycling sectors in Asia is key to better e-waste management," says Venkathesha Murthy of Vans Chemistry. "Most Southeast Asian countries' recycling sectors are informal. It plays a huge role."

The United Nations' Solving the Problem of E-waste Programme, or STEP for short, estimates that 48.9 million metric tonnes of used electrical and electronic products were produced in 2013 – an average of seven kilograms per person on earth. UN experts predict



Burning of e-waste in Ghana as in many countries is done to harvest precious metals, but leaves a toxic legacy

Source: Stephan Rodgers, Ericsson

that by 2017 the total annual volume will rise by 33 per cent to 65.4 million tonnes – equivalent to 11 Egyptian pyramids.

The unregulated dismantling and recycling of e-waste items is a global environmental concern. Extraction of precious metals by informal means can be dangerous. Toxic emissions of material such as plastics, lead, cadmium, mercury and other harmful substances can result in contamination of water and soil. As well as posing an obvious environmental hazard, handling e-waste is a considerable occupational health and safety concern to those profiting from this as a profession. This has been an ongoing issue in many parts of Asia, but has also spread to other developing nations, including ones in Africa. Primitive burning methods are often used by the informal sector when handling e-waste, to disastrous ends.

"In Ghana, this dump is 10 kilometres away from the city, it's near the sea and the breeze blows the pollution inland," says Stephen Rodgers, who heads up Ericsson's global product take-back



"Waste management 100 years ago was not an accepted profession, now it's profit making for many companies. It's undergoing a transformation from informal to formal"
– Christian Stiglitz, CEO, European Institute of Environmental Economics

programme, referencing informal e-waste processing now rampant in the country. "They are adding fuel to the fire and the fuel is insulation material from refrigerators."

Dangers like these highlight the need for better oversight of the informal sector, but this needs to be handled carefully so to

not to disenfranchise millions from their livelihood options as economies develop. But the squeeze is already on: increasingly many large waste and recycling industry players are getting into the game.

"Waste management 100 years ago was not an accepted profession, now it's profit making for many companies. It's undergoing a transformation from informal to formal," says Christian Stiglitz, CEO, European Institute of Environmental Economics.

Taiwan is often touted as an example for the rest of Asia to follow. It has one of the highest household recycling rates in the world, roughly 42 per cent, up from 5 per cent in 1998, according to Taiwan's Environmental Protection Administration. While roadside rubbish collectors still make a valuable contribution to recycling efforts, the success of Taiwan's waste management industry can be traced to the 1998 establishment of a government fund to encourage recycling. Manufacturers and importers pay a fee based on the estimated cost of collecting rubbish, which the EPA then distributes to recycling companies to ensure proper processing.

While Indonesia is many years away from developing the sophistication of a market like Taiwan, there is a common theme: the need for community involvement in recycling endeavours is vital.

In the city of Bandung for example, where it's estimated that 3,000 people find work informally as waste pickers, the mayor encouraged 10,000 volunteers to dig Biopori holes across the city to better

handle organic and food waste materials. The 100cm deep holes improve groundwater retention and filtration, transform organic waste into compost, and reduce greenhouse gas emissions.

For many emerging markets, low-tech solutions such as this are vital for waste management. But how do you formalise practices like these without discouraging vital collection activities?

According to Joachim Quoden, Managing Director, EPR Alliance (EXPRA), it's about encouraging the informal sector, rather than formalising it. As one example, he notes that "The informal sector handles most packaging recycling today. The question is making it safe, recognising waste as dignified work, and legalising these activities so they don't have to avoid local laws," he says.

He also advises that education and training is crucial to bring these informal sectors into the value chain. "We need to educate and train them so they can play a better role in collection and regulation."

Advanced cleaning technology, such as the Intellibot being demonstrated to Singapore's Minister for the Environment and Water Resources, Dr Vivian Balakrishnan, can be used to boost workforce productivity in urban areas



From productivity boosts to improved health and cost savings: start thinking about cleaning in new ways

Think of unglamorous professions, and there's a good chance that cleaning will come to mind. While few would dispute its importance, it's often viewed at best as a necessary evil, with cleaners encouraged to rush their work or even come in at night to avoid disturbing office staff.

Building owners often go for the cheapest contractor, or use old-fashioned headcount-based contracts that leave little room for innovation or quality results.

That serves to drive down wages, which in turn means that recruitment can be difficult, and results substandard. Developed countries often rely on foreign labour to fill the gap as locals prefer to work in roles that pay better or are viewed as more prestigious.

And yet so much more is possible. New technologies can make cleaning both cheaper and more effective. Better designed buildings can be made more hygienic. Training and changed perceptions can make the industry more appealing, easing recruitment shortages.

These factors matter for many reasons. Globally, there is a huge emphasis on building sustainable buildings, yet cleaning those buildings with water, chemicals, plastic bags and the like can have a far bigger environmental impact over their lifecycle: the cleaning industry in the US alone uses over 2.5 billion kg of chemicals every year.



"For real change to take place, there needs to be a change in the way we think about cleaning... Procurement of services is still in the realm of buying cleaning at the cheapest possible price per metre..."
- Lionel Prodgers, Managing Director of Agents4RM International

But for real change to take place, there needs to be a change in the way we think about cleaning, says Lionel Prodgers, Managing Director of Agents4RM International, a facilities management consultancy.

"Procurement of services is still in the realm of buying cleaning at the cheapest possible price per metre," he says. He points to the example of a hospital: if healing people is the building's primary purpose, then making cleaning – which can kill antibiotic resistant bacteria – part of that central mission rather than a secondary consideration can actually improve these outcomes.

A hospital may be an extreme example, but the same is true of office buildings: if a building is cleaner, people are healthier and therefore more productive, which can generate real returns to building owners and their tenants.

"If you have an office, the real cost is not the construction cost or the cost of maintaining the building: the real cost is people sitting

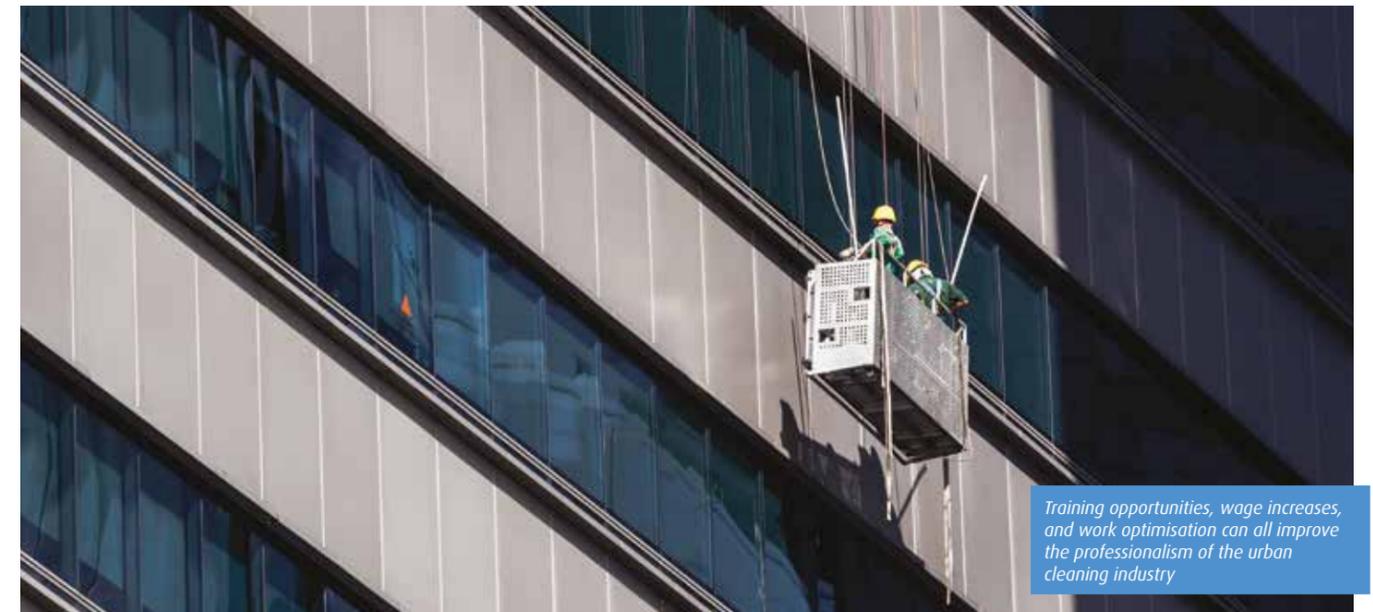
at a desk," says Dr Peter Hug, Managing Director of the German Engineering Federation.

Increasingly data are helping to improve the way that buildings are cleaned, from computer modelling that ensures no steps are wasted to tracking devices to monitor the location of cleaning equipment in real-time.

That enables new ways of cleaning. Instead of a cleaner visiting toilets every two hours whether they are dirty or not, existing security cameras can be used to monitor the number of visitors, allowing more frequent cleaning in busy periods and avoiding unnecessary work when it's quiet.

Singapore's Changi Airport has done away with hourly cleaning and instead uses a high-tech system to respond to problems within 20 minutes. Under an hourly schedule a toilet could be dirty for 59 minutes, but under the new system that time is reduced by two thirds.

That can result not just in higher levels of cleanliness, but in cost savings too. Prodgers estimates that users of smart cleaning systems that optimise cleaning processes can save on average around 19 per cent.



Training opportunities, wage increases, and work optimisation can all improve the professionalism of the urban cleaning industry

The challenge lies in educating procurement departments that headcount-based contracts should be a thing of the past, according to Oliver Anderssch, Director of Cleaning Excellence and Development at ISS Facility Services, who estimates that performance-based contracts in Asia Pacific can increase productivity by as much as 30 per cent, cutting overall costs while allowing higher salaries to be paid.

That matters if the image of the cleaning industry is to be improved, but higher wages alone are not enough. Training is vital too, both to raise productivity and to encourage people to view the industry as a career opportunity, rather than an employer of last resort. Raju Seth, Master Trainer at the German Engineering Federation's India office, says he has encountered companies that offer as little as 30 minutes' training to new employees.

While that may be an extreme figure, he is not alone in his general observation. "Many people assume that all you need to do is put a mop in someone's hand and send them on their way," agrees

Elaine Torode, CEO of Australia's Lennox Institute, a training provider that is working to increase skill levels in the industry.

One interesting example comes from Austria, where the industry has been regulated since 1959, making it part of the country's apprenticeship system, which around 40 per cent of teenagers enter. This guarantees a certain level of training, and government tenders stipulating education levels for cleaning contracts have encouraged employers to sign up, but challenges still remain. Oliver Andersch, Master Member of the Commercial Cleaning Academy of the Viennese Monument Façade & Commercial Cleaners, says that on average only 147 school leavers sign up for cleaning apprenticeships each year, compared to around 5,000 opting for retail sales.

The solution may lie in explaining career prospects to potential students: Seth states that graduates from the course he runs in India have won promotion to supervisor within just a few months rather than the two to three years it normally takes.

In Singapore, the Workforce Development Agency takes a long-term approach, with staff in the cleaning industry given the

opportunity to take bite-sized programmes throughout their careers. Employers are motivated with financial incentives. So far more than 35,000 cleaners have taken one or more of the 48 modules that make up three qualifications, each of which offers clear opportunities for career progression.

Training and career advancement opportunities are just part of the equation. Increasingly advanced technology is being applied to get better results, often at lower cost. As the years go on, it is less about the guy with a mop and bucket.

German cleaning equipment manufacturer Karcher has taken a lead from the country's car industry and standardised the platform for many of its machines, lowering production costs. By studying advances made in airflow on Boeing's Dreamliner, it has enabled the company to replace a 1,300w motor in its vacuum cleaners with a 750w model, reducing running costs by US\$32 a year with almost no reduction in performance.

GOODBYE TO THE MOP AND BUCKET MENTALITY

There is a sense that innovation only occurs at the top end of the market, and that technology can only be applied in wealthier markets. That's not true, argues Klaus Puehmeyer, CEO and MD of Karcher South East Asia. But the secret is offering the right products in each market.

"In a lot of markets in Asia our competitors are not other manufacturers, but manual labour," he says. "Machines may not be cheaper." He points to a simple floor cleaning machine, powered by a cleaner pushing it, that works around five times faster than a mop and bucket for just a fraction of the cost of some of the company's high end products.

"Innovation is very simple," he says. "It's looking at the needs of the market and doing what the customer requests."

Innovation does not just apply to the equipment used in a building, but to the building itself. Designers focus on aesthetics, sometimes on using sustainable materials, but rarely on designs that can be cleaned easily and therefore in an environmentally friendly way, says Stephen Ashkin, President of green cleaning consultancy The Ashkin Group.

"I've seen buildings where they have carpet, marble, wood, plastic, metal, because the interior designer wanted to demonstrate how creative they were," he says.

people who spend their time living, or working, or being healed or being educated, but a huge environmental impact as well."

Sustainable building codes are increasingly taking this into account: for example LEED now sets standards for the cleaning materials that can be used in a building. That's giving rise to what Dr Lim Lan Yuan, President of the Association of Property and Facility Managers in Singapore, describes as green leases, which govern the behaviour of a tenant once they have taken possession of a property – stating what kind of lighting can be used, for example.



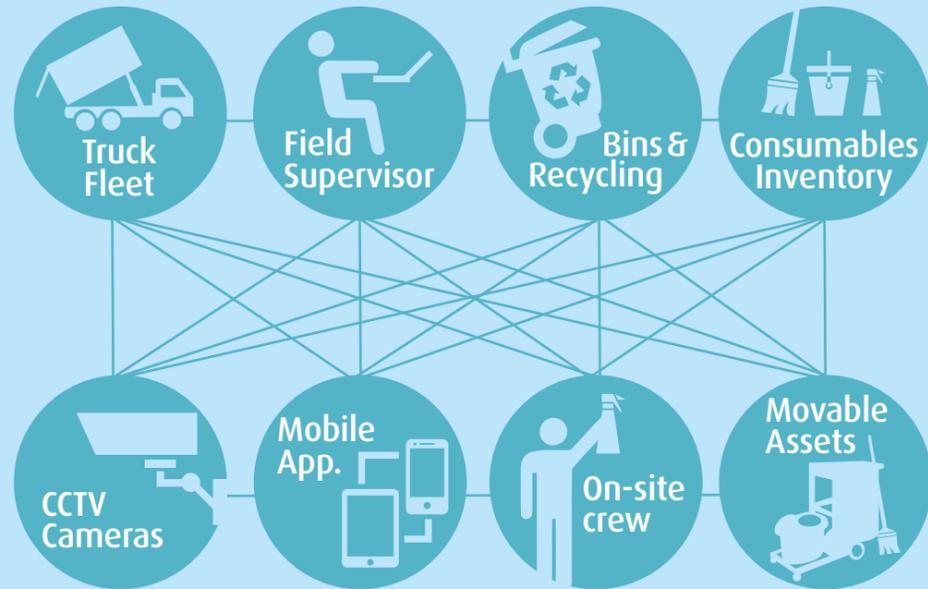
"There is a sense that innovation only occurs at the top end of the market, and that technology can only be applied in wealthier markets. That's not true."

– Klaus Puehmeyer, CEO and MD of Karcher South East Asia

A Smarter Cleaning and Waste Management Industry

Smart systems enable users to:

- Leverage information for better decisions
- Coordinate resources and processes to operate effectively
- Anticipate problems to resolve them proactively



Credit: IBM

"Each material you use requires a different cleaning compound and strategy to clean it, and using many different materials often results in it not being cleaned frequently enough or being done incorrectly." Even the design of outdoor areas can have an impact: for example avoiding flowering plants near the entrance can dramatically reduce the amount of debris brought into the building on people's feet, he says.

"Decisions that are made during the design process and during the maintenance of the building have huge impacts not only on the

The temptation may be to dismiss all this as something only the rich world can afford to worry about, but Dr Raj Rajan, RD&E Vice President and Global Sustainability Leader at Ecolab, argues that it's perhaps even more important in developing countries: he points to the sheer number of endemic diseases in Asia as an example.

"If you think of the loss of productivity attributed to diseases like dengue, that's a huge cost to society, so I would say it's probably even more valuable to developing markets," he says.



Students of Nha Trang University in Vietnam doing a beach cleanup exercise along their country's famed coastline

PARTNERING WITH THE PUBLIC

There is only so much cleaning governments can do without public support. How best to get citizens involved in caring for their local environment?

Japan's opening World Cup match against Ivory Coast was not high on the agenda of most football fans, and yet images from the game went around the world: not of the African side celebrating their victory, but of Japanese fans quietly cleaning the stadium after watching their team lose 2-1.

As if from nowhere, bags were produced, litter scooped up, and the stadium left looking as if no one had set foot inside.

Most policymakers would no doubt love to have citizens with a similar ethic, but cultures around the world differ wildly. Nevertheless public support is essential, whether for keeping streets clean or for countless other environmental efforts. How best to get citizens on board?

One interesting example is the Belgian city of Antwerp, where the average amount of household waste per person has been reduced from 555kg to 152kg a year in two decades.



"The more enforcement we have the more we forget the message about self-policing and working together."

– Associate Professor Paulin Tay Straughan, Vice-Dean, Faculty of Arts & Social Sciences and Deputy Head, Department of Sociology at the National University of Singapore

This was achieved with far more carrot than stick, according to Philip Heylen, the city's Vice Mayor for Culture, Economy, City Maintenance and Property Management. Householders were provided with multiple bins and encouraged to sort their waste – the city's diverse population mean that instructions were distributed in multiple languages.

Crucially though people were not forced to reduce the amount they throw away – a “pay as you throw” waste tax meant that those who wanted to continue as normal were free to do so, but those who wished could actually make financial savings.

That idea was reinforced by Associate Professor Paulin Tay Straughan, Vice-Dean, Faculty of Arts & Social Sciences and Deputy Head, Department of Sociology at the National University of Singapore,



“As soon as there is something in it for communities themselves then you get them involved. If you don't get them involved, then it will never work.”

– Philip Heylen, Vice Mayor for Culture, Economy, City Maintenance and Property Management, Antwerp, Belgian

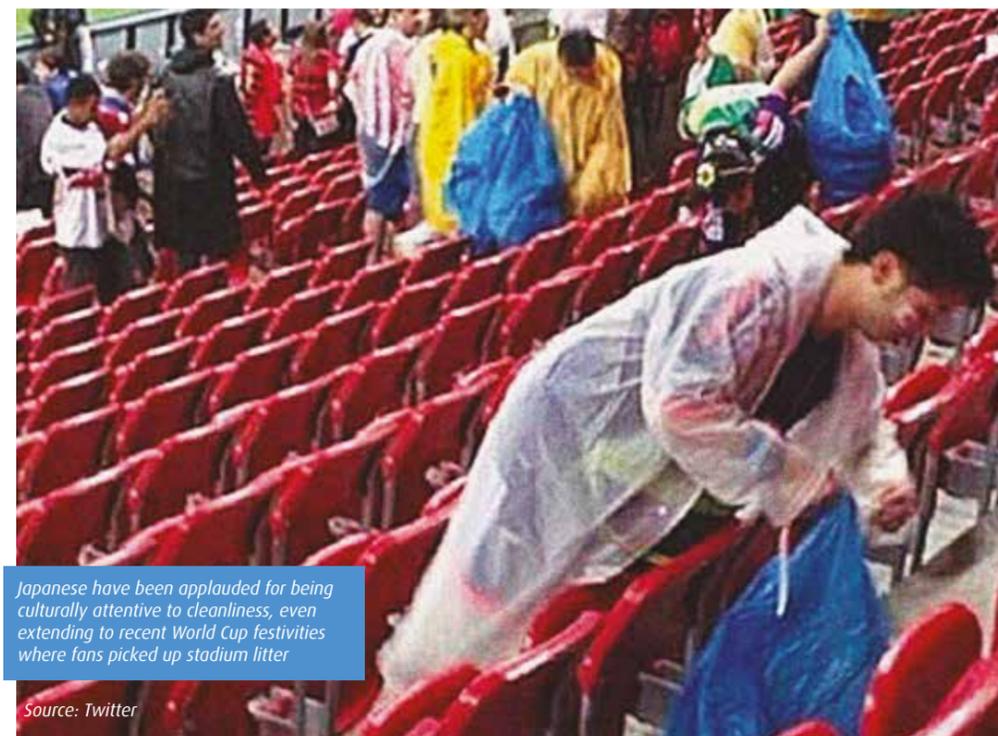
It's here that cultural differences come into play. Green Bird has succeeded in Japan by making its activities cool. Participants wear a coloured vest, sponsored by Nike, and celebrities have been keen to join in, making the uniform desirable. In other countries many passers-by would no doubt assume that a group of people collecting litter in brightly coloured vests were serving a community sentence, pointed out Professor Straughan, so what works in one country will not necessarily work elsewhere.

One way to reduce the volume of litter in the first place is to target the companies responsible for the discarded packaging. Peter McLean, CEO of Keep Australia Beautiful, runs

a National Litter Index surveying 1,000 sites across the country. To approach a brand and tell them that their wrappers account for 10 per cent of the litter, for example, results in what he describes with a smile as a “compelling conversation”. In eight years they have seen a 31 per cent fall in litter, though McLean is quick to point out that his organisation cannot take all the credit.

He says the key to changing behaviour is to make sure whatever you're doing meets local needs. After realising that many people had few opportunities to recycle their rubbish once they left home, his organisation worked with local schools, sports clubs and businesses to install recycling bins, diverting 500 tonnes of rubbish a year from landfill. Crucially, Keep Australia Beautiful provides funding and advice, but the final decision rests with the local community.

That, says Heylen, is vital. “As soon as there is something in it for communities themselves then you get them involved. If you don't get them involved, then it will never work.”



Japanese have been applauded for being culturally attentive to cleanliness, even extending to recent World Cup festivities where fans picked up stadium litter

Source: Twitter

who argues that education is far more effective than compulsion. “The more enforcement we have the more we forget the message about self-policing and working together,” she says.

The challenge though is in making sure everyone is on the same page: while most people would agree that littering is bad, what constitutes litter? She pointed to her own research in Singapore which showed that almost 20 per cent of young people felt that dropping small items did not count. A total of 52 per cent of the public felt it was fine to leave litter on the ground near a bin if that bin was full.

Yokoo Toshinari, CEO of Japanese social organisation Green Bird, feels that the best way to tackle that is to have people experience cleaning the streets for themselves. His organisation has more than 30,000 volunteers who roam the streets picking up litter – many of them will only attend once and never come again, but he argues that a smoker is far less likely to toss a cigarette butt in future if they have spent even a single hour attempting to pick up hundreds.



Sharing experience helps regulators quickly find solutions to common problems

A LOOK BEHIND CLOSED DOORS

International regulators share environmental challenges and solutions

Around the world, environmental authorities often face similar regulatory and enforcement challenges when dealing with pollution and waste management issues. When faced with unfamiliar industrial projects or complex environmental problems, they often lack access to peers for advice or consultation, even though badly needed solutions may have already been developed and successfully implemented in other countries.

In its third event, the Clean Environment Regulators Roundtable (CERR) 2014 aimed to provide a unique platform for government regulators to share problems and solutions with like-minded colleagues, through the discussion of case studies. As a closed-door forum, CERR encourages regulators to share frankly on both unsolved problems and solutions in a secure, confidential atmosphere as no official record of proceedings is produced. It is an opportunity to learn from experiences and use collective wisdom to develop solutions to common problems, find new solutions to emerging problems adapted to fit local circumstances, and shorten the learning curve for developing nations grappling with environmental pollution and waste management issues.

In contrast to previous events, CERR 2014 evolved into a two-day affair, as previous attendees found presentations and discussions very

useful and had requested more time. Covering two broad themes, “Waste Management in Urban Cities” and “Environmental Pollution Management in Urban Cities”, delegates took turns sharing their own examples, which were followed by frank roundtable discussions.

Delegates from Belgium, China, Hong Kong, Malaysia, Singapore, Thailand and Vietnam each presented experiences in waste management, covering waste minimisation, waste collection and recycling.

Singapore shared its efforts and the challenges faced in increasing household recycling, implementation of a centralised



“CERR has been an excellent forum for regulators from different countries with the focus on different topics, such as air and water pollution, to discuss ways to achieve environmental and public health benefits while providing flexibility (of compliance) to regulated industries.”

– Ms Jean Roggenkamp, Deputy Air Pollution Control Officer at the Bay Area Air Quality Management District, USA

utility billing system, the use of technology (ie GPS tracking and RFID tagging) to facilitate enforcement of public waste collection contracts and the new pneumatic refuse conveyance systems (PRCS) in Singapore.

The delegates also shared common recycling challenges such as promoting higher recycling rates and pilfering of valuable recyclables. Unique practices such as Belgium's textile recycling programme and Singapore's centralised billing system for utilities and waste collection fees were actively discussed.

Representatives from Australia, Cambodia, Hong Kong, Myanmar, Philippines, Singapore, Thailand, UAE and USA presented on air, water and noise pollution control and environmental planning.

On air pollution management, participants discussed principles behind the setting of air quality objectives, monitoring systems, inventory studies and the management of transboundary air pollution. Water pollution management was also discussed, where the most common challenge faced was enforcement. This led to discussions on possible regulatory approaches that could be taken, including routine inspections, intelligence gathering, setting discharge limits and having financial incentives linked to performance.



“A very valuable opportunity to share experiences, solutions and best practices for cities.”

– Mr David Wong, Assistant Director (Environmental Compliance) from the Hong Kong SAR Environmental Protection Department

Moving into the topic of environmental planning, participants shared their efforts in handling toxic waste management and prevention of pollution. During Singapore's presentation of its Integrated Environment System, some countries expressed interest in the management of feedback and the use of real-time noise meters and water quality monitoring stations. On land-use planning, participants also discussed at length about the challenges faced in imposing land use buffers and the need for proper siting of industries. Attendees agreed that while the specific issues faced were diverse, one of the most common challenges faced by them was the rising expectations of the public.

By way of these beneficial discussions, regulators were able to network and make arrangements for further collaboration after the event, aimed at helping them find environmental solutions. By the conclusion of CERR 2014, the prospect of having annual events was discussed. Vice Mayor of Antwerp, Belgium, Mr Philip Heylen expressed interest to host the 4th CERR in Belgium in conjunction with the ISWA World Conference 2015, from 7 to 9 September 2015. This would encourage more European participants to attend the Roundtable and help to grow the network of the regulators in future. NEA will be discussing with the Belgians the feasibility of holding CERR 2015 in Belgium.

PRACTITIONER VIEWS



Asia now is booming and gaining great attention all over the world. My view is, if we can implement good resource management in Asia it's a good example to the rest of the world. We see the same and similar challenges in Brazil as in Asia with the increasing amount of waste and economic growth. This event is really useful, not just for industry but for municipal and national representatives. Waste matter is not just a local issue. I don't say we're here to find solutions, because I believe there are no solutions but the issue is certainly global, because of the impact of globalisation, but local decisions can have global effects.

– Carlos RV Silva Filho, Chief Executive Officer, Brazilian Association of Waste Management Companies

I'm here looking at really new innovative ways to allow our city to develop. We can build contacts and solutions and hear about relevant policies for our city. We all face the same challenges when it comes to the environment and I really believe this is where the best in the world come. I'm blown away by the quality of the speakers here.

– John Chedid, Lord Mayor of the City of Parramatta, Western Sydney, New South Wales, Australia, visiting Singapore and attending the summit for the first time



The significance of holding this event in Singapore is that Singapore has many constraints, and many of the issues found here are faced worldwide on larger scales. But it has greater significance in the case of Singapore because of our small size and limited resources and this impacts how we respond, especially when it comes to how we make Singapore environmentally sustainable.

– Han Fook Kwang, Editor-at-Large at the Straits Times and board member of the National University of Singapore, National Environment Agency and Building & Construction Authority



BUSINESS DEALS AND PARTNERSHIPS

Alongside conference sessions were dozens of business meetings, leading to more than S\$300 million in new environmental project announcements and new partnerships

The second edition of CleanEnviro Summit Singapore saw almost

600

delegates exchanging views and ideas as well as more than

280

business meetings facilitated

That led to some concrete results: over

S\$318

million worth of projects announced and concluded, and an estimated

S\$369

million worth of potential deals in the pipeline.



One noteworthy development was a S\$15 million project to develop and operate a facility for recovery of metals from incineration bottom ash generated by Singapore's waste to energy plants.

The metal recovery facility, similar to the one depicted here, is part of the government's long-term strategy to manage solid waste in Singapore and move towards a resource efficient society.

Other announcements included the award of two separate Integrated Public Cleaning tenders for the north-east and south-east regions of Singapore, which aim to improve cleaning standards and service quality in public areas, with a combined value of

S\$301 million

Singapore's National Environment Agency (NEA) also signed an MOU with the International Solid Waste Association (ISWA) and the Waste Management and Recycling Association (WMRAS) to jointly partner in developing waste management training programmes.

The agreement will see training courses offered under the Training, Advisory and Promotion (TAP) Centre. The courses are run by the Singapore Environment Institute, the training and knowledge arm of the NEA.

There are significant synergies: ISWA has extensive international experience, while NEA is well versed at getting the most from public-private collaboration.

And it was straight into action: the signing ceremony took place on 3 June and the first training session was held just two days later, welcoming over 25 local and international waste management practitioners, some of whom had come from as far as the Sultanate of Oman.

The session, held over three days, focussed on sharing best practices from Europe and Singapore, and included a visit to the Tuas South Incineration Plant.





www.cleanenvirosummit.sg

Jointly organised with:



40 Scotts Road Environment Building #13-00 Singapore 228231
www.nea.gov.sg