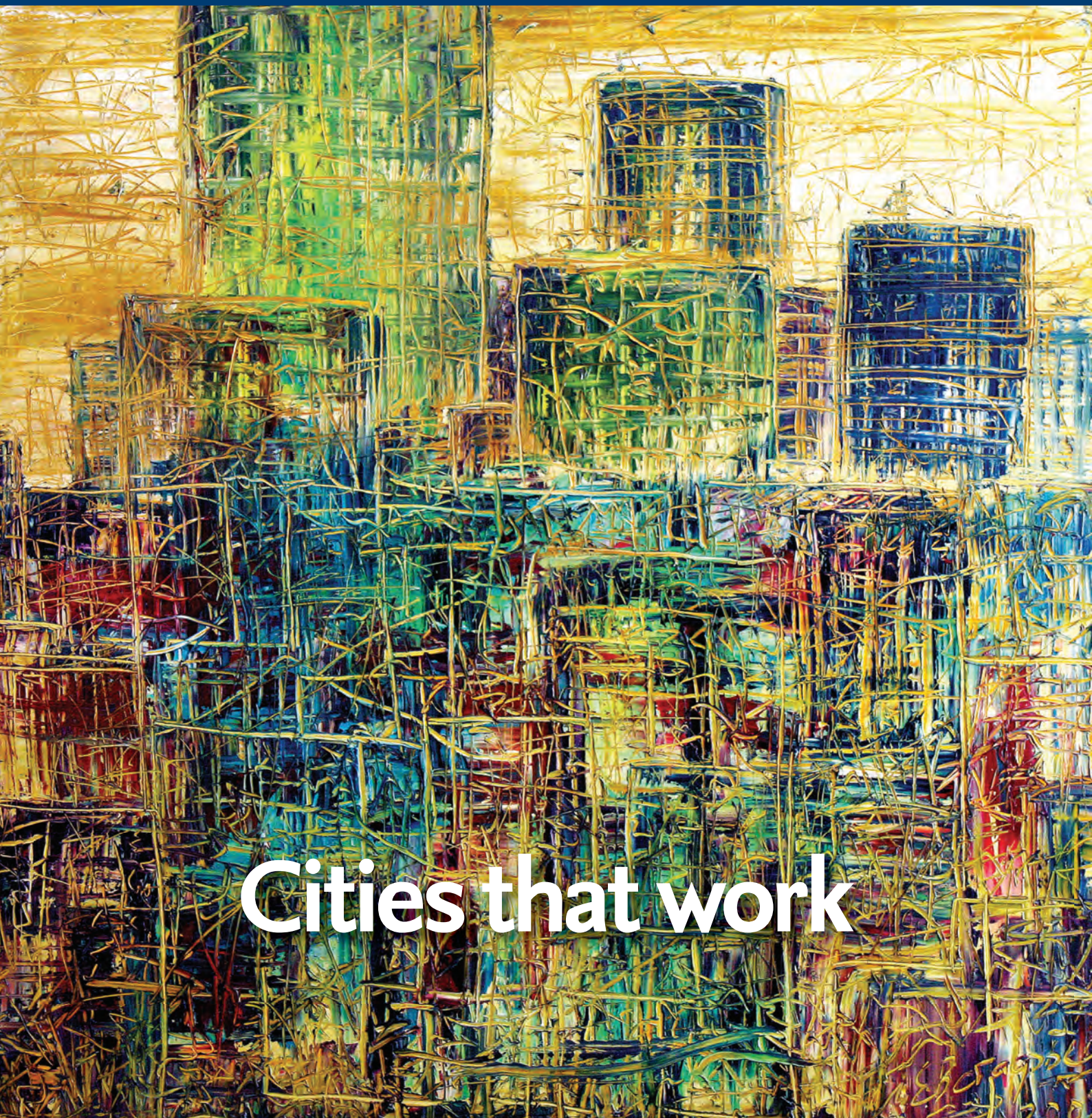
Number 18

Making It

Industry for Development



Cities that work

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A quarterly magazine. Stimulating, critical and constructive. A forum for discussion and exchange about the intersection of industry and development.

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Editorial

The conventional view holds that villages and towns first formed after the Neolithic revolution, some 12,000 years ago. If so, then we must acknowledge that urban settlements have not only endured but have spread and grown over thousands of years because their advantages have far outweighed the disadvantages, so far, at least. Today, with half of the population of the world living in cities and the rate of urbanization ever-increasing, cities occupy a special position in the global development agenda.

Cities can provide significant socio-economic benefits. By concentrating people, investment and resources, cities heighten possibilities for economic development, innovation and social interaction. As the United Nations Secretary-General, Ban Ki-moon, said, "The road to sustainability runs through the world's towns and cities. By building sustainable towns and cities, you will build global sustainability."

Yet, rapid urbanization poses some of the greatest challenges of the 21st century. For cities in developing countries, the main challenge is how to provide adequate public services and job opportunities to residents, including marginalized populations. In high-income countries, cities that already provide basic public services now have to pay particular attention to issues such as energy-efficiency, water and waste management, and smart governance.

Cities all over the world face the urgent requirement that they transition to ways of living and of working that no longer pollute the air and that result in a sharp reduction in the production of greenhouse gases. Many cities will also experience the impacts of climate change which are likely to compound the pressure on the use of natural resources and the environment already linked to rapid urbanization.

An expanding population with higher expectations will require innovative solutions to the questions of how industry can be greened, public infrastructure improved, and social services made available to all. Clearly, cities face a range of challenges to which they will respond with diverse priorities, objectives and solutions. There is no 'one-size fits all' approach towards urban sustainability, but all our urban areas must re-invent themselves and quickly adapt.

Photo: www.istock.com / Massimo Colombo

MakingIt
Industry for Development

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Cover illustrator, **MIKHAIL EVSTAFIEV**, is a Russian artist, photographer, and writer. His paintings and photographs have been exhibited in different countries, and are in the collections of galleries, as well as in private collections. His work has appeared in leading international magazines and newspapers and has been published in numerous books. www.evstafiev.com

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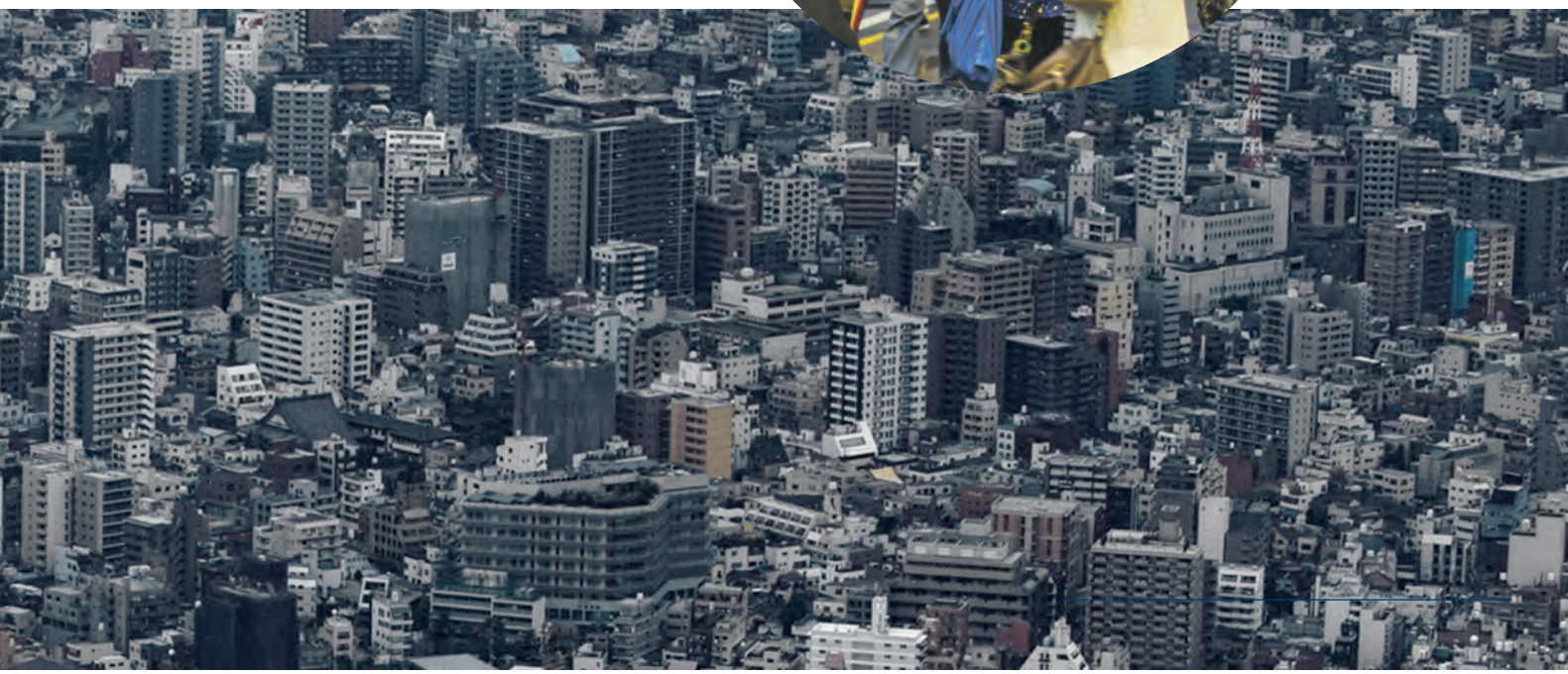

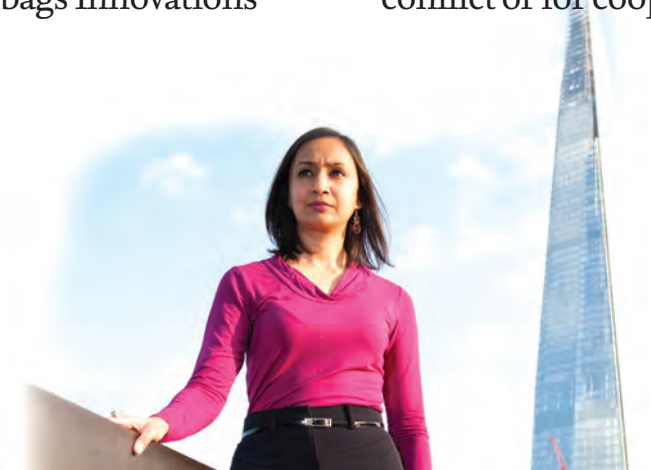

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GLOBAL FORUM

The Global Forum section of *Making It* is a space for interaction and discussion, and we welcome reactions and responses from readers about any of the issues raised in the magazine. Letters for publication in *Making It* should be marked 'For publication', and sent either by email to: editor@makingitmagazine.net or by post to: The Editor, *Making It*, Room D2142, UNIDO, PO Box 300, 1400 Vienna, Austria. (Letters/emails may be edited for reasons of space).

LETTERS

Banking on growth

In "BRICS bank – new bottle. How's the wine?" (*Making It*, number 16), Sameer Dossani admitted, "Even in a best-case scenario, initiatives like the [new BRICS development bank) are likely to take a GDP-centred, Northern development-model approach" but added "despite its many potential flaws, the proposal to establish the bank should be viewed with cautious optimism."

Well, we certainly need some new initiative for industrial development.

Global growth is slowing and well below the rate before the recession of 2008-09. Clearly, the US economy will be stuck in its current low growth trajectory, at best, unless businesses start to invest in new equipment, plant and technology.

As Dossani points out, "The period from 1980-2010 was in part defined by extremely slow growth globally. Where growth did occur in the North, it often turned out to be the result of speculative bubbles. This was because of what companies argued were relatively low rates of profitability on new productive investment, especially compared to returns on financial speculation. This coupled with low rates of interest allows companies to stack up cash and take out more debt to finance share buybacks and financial asset purchases."

Sameer Dossani's feature in *Making It* number 16 about the new BRICS development bank.

So, the stock market is booming while investment is at a standstill.

The cash that is stacked up is immense. I read recently that the top 2,000 capital investment spenders in 2013 had a staggering pot of US$4.5tn. Yes, four and a half trillion dollars! Yet global capital expenditure fell by at least 0.5% in real terms in 2014, having fallen by 1% in 2013.

Dossani also pointed out: "In the South, the only countries to grow were those that ignored Washington Consensus policies – China, Malaysia, Singapore and a few others – and used state-backed borrowing and investment to drive an industrial policy."

The International Monetary Fund's managing director, Christine Lagarde, said that the IMF has reduced its forecast again for global economic growth for 2015. Interestingly, Lagarde's answer to improving growth was "more public investment", which is ironic as most governments are cutting public investment in order to meet fiscal austerity targets. Now the IMF says that countries should boost growth by governments investing in infrastructure, education and health. "Without action," says Lagarde, "we could see the global economic supertanker continuing to be stuck in the shallow waters of subpar growth and meagre job creation."

● **Nicole Claes, website comment**

'Fragile middle'

Interesting issue on "Middle-income countries" (*Making It*, number 14), in particular Sumner and Vázquez's critique of how we classify what are "low and middle-income countries" and how the location of global poverty is changing. For example, only a quarter of the world's extreme poor live in countries classified as "low-income".

Can I direct readers to a fascinating report on the *Financial Times* website, by Shawn Donnan, Ben Bland and John Burn-Murdoch – 'A slippery ladder: 2.8bn people on the brink'. They point out, "In 2010, 40% of the world's population – 2.8bn people – lived on US$2-10 a day. In the developing countries, there were 2.4bn people surviving on less than US$2 a day and just 662m earning more than US$10 a day. In 1981, 58% of the world's population lived on less than US$2 a day. Just 20% of the world – 930m people – earned US$2-10 a day."

This reflects a remarkable shift.

But, as they go on to say, "extending the gains is becoming harder now that the great emerging-market growth spurt of the past 30 years appears to many to be coming to an end. As growth slows, the rise of an emerging-market middle class may look less inevitable."

"As poverty has fallen, the number of people clustered in a narrow band above the poverty line has grown. But only a relatively small number of people tend to make it beyond that. The result is that four in 10 of the world's people now live in its fragile middle."

It's a major worry that the slowing growth in 'emerging' economies like China may push many people back below the extreme poverty line.

● **Peter Baker, by email**

Inspiring and remarkable

Top marks for your series on "Good Business". Each issue you highlight a small company making waves in truly sustainable industrial

For further discussion of the issues raised in *Making It*, please visit the magazine website at www.makingitmagazine.net and our Twitter page, @*makingitmag*. Readers are encouraged to surf on over to these sites to join in the online discussion and debate about industry for development.

development. And they are fantastic stories:

• The Sri Lankan business which turns discarded coconut husks into useful material such as coir and husk chips.

• The Chinese company which manufactures water-efficient toilets. As the (female) owner says: "Shanghai has a population of 23 million people. Imagine if all of them used our water-saving toilets. Clean water wastage could be reduced by nearly 270 million tonnes in the whole city." Imagine that spread across the world.

• And my favourite, the guy in Haiti who, despite the 2010 earthquake destroying his newly-built factory, was driven on by the energy of his employees to start again. They manufacture cookstoves that require just half the amount of charcoal needed by traditional ones. Haiti's population has about two million households, most of which use these charcoal stoves. The production of charcoal has contributed significantly to the deforestation of Haiti, so EcoRecho stoves have a far-reaching environmental impact as well as a practical solution.

Power to the likes of Nimali Chips & Fibre Mill, the Yiyuan Environmental Group and D&E Green Enterprises. And thank you for bringing them to our attention. Truly inspiring.

● **Eva Thorstvedt, by email**

Spelling it out

I noticed a letter in *Making It* (issue number 16) which said it was pointless to create groupings like 'BRICS' and 'MINTs' to link countries which are "emerging" markets. I agree, they are too heterogeneous to be reduced to a simple acronym. However, I've just read about another one that makes sense. Some economies are "Without International Monetary Power" – they are 'WIMPs'. This is the reality most countries face because they are not able to use their national currencies freely in international financial transactions. They have to use "key currencies", such as the dollar or the euro. Such a constraint means these 'WIMPs' often have to subordinate national policy objectives to some external anchor and is why many policymakers complain about the effect that an increase in the Federal Reserve's policy rate can have on economies across the world, whether emerging or not.

● **Ricardo Real, by email**

Off the shelf

On your website it makes reference to "print editions" of *Making It* magazine – where can we buy them?

● **Teri Dyson, by email**

Editor's reply – A subscription to the print version of Making It *is available free of charge. Just send your name and address to* editor@makingitmagazine.net. *You can also request back issues.*

Scaling up business action on human rights

Filippo Veglio on how forward-thinking companies are operationalizing respect for human rights across their businesses

The global conversation on business and human rights has shifted and evolved since the endorsement of the UN Guiding Principles on Business and Human Rights (UNGPs) in 2011. We are no longer asking whether businesses have a responsibility to respect human rights, or even what that responsibility is. Together with the International Bill of Rights and the International Labour Organization's Declaration on Fundamental Principles and Rights at Work, the UNGPs clearly outline where businesses' responsibility lies. Now, the business community is asking what that responsibility means in practice – in which specific geographic locations, for what specific industries and in which specific contexts – and how businesses can most effectively meet that responsibility in their day-to-day operations. Businesses are now expected to be able to *know* and *show* what steps they are taking to meet this responsibility.

Over the last several years, leading businesses have been working to meet the corporate responsibility to respect human rights as defined within the UNGPs: to avoid infringing on the human rights of others, and to address adverse impacts when they occur. Why are businesses doing this? Many are responding to the growing expectations of investors, business partners and governments, who are increasingly asking hard questions of global businesses and incorporating respect for human rights into relevant policies, standards and regulations. Other businesses are responding to the growing risk of reputational harm which occurs when core business activities are linked to human tragedies, such as the collapse of apparel factories in Bangladesh.

In some sectors, there is a growing recognition of the commercial costs associated with failing to manage these issues, such as operational inefficiencies in supply chains and the operational costs of conflict with local communities in the extractives sector. For other businesses, it is simply about 'doing the right thing' and ensuring that their social footprint is aligned with core corporate values, as well as the values of individual employees. And finally, for some, the expectations of the UNGPs reflect leading practices, and the UNGPs, alongside a number of other sustainability themes, represent an opportunity to differentiate themselves from their industry competitors.

The barriers

However, global experience has demonstrated that this can be a lot more challenging in practice than it sounds. Despite extensive guidance material, companies and those responsible for human rights issues within those companies face a number of barriers to operationalizing respect for human rights across their businesses.

Working with over 20 member companies of the World Business Council for Sustainable Development (WBCSD) and Shift, an independent, non-profit centre for business and human rights practice, we analyzed the key barriers. They range from awareness and understanding of the relevance and meaning of human rights for the business, to the internal leadership and commitment necessary within the organization, to translating that

commitment into the policies and practices of the company's daily operations, amidst a diverse set of competing, and sometimes overlapping, business priorities. All of this takes place within a context marked by the complexity of today's global business models and value chains, and the uncertainty that necessarily accompanies the relatively new paradigm of business and human rights.

However, if we want to encourage more companies to take action, it is not enough to describe barriers. On the contrary, the focus must lie on distilling actual *solutions* devised and put in place within companies to overcome those barriers. In the same issue brief, we therefore set out to share solutions tried and tested by WBCSD members. Overall, we boiled it down to 15 sets of solutions, clustered around five sets of barriers. While some of the examples featured are success stories, the majority are ongoing sets of ideas and practical strategies.

Photo: istock.com/juanjones

"If we want to encourage more companies to take action,it is not enough to describe barriers. On the contrary, the focus must lie on distilling actual solutions devised and put in place within companies to overcome those barriers."

Actual solutions

The solutions are wide-ranging: from properly framing the 'business case' for respecting human rights, to assigning responsibility internally for taking the human rights agenda forward and developing a 'roadmap' to ensure that the business is respecting human rights. They include linking a policy commitment to respect human rights to existing internal strategic priorities, and leveraging the buy-in that those initiatives already enjoy. Other solutions are mapping human rights risks and looking at the actual impacts, as identified through company grievance mechanisms, from the findings of social performance compliance audit, from complaints from civil society or directly affected stakeholders or from media reports. Yet another solution is to transform human rights policy into practice by having each business function take up its part of responsibility.

Peer-to-peer insights are useful for companies at all stages of their human rights journey. Companies that are kick-starting their human rights activities – and trying to determine how best to 'dive in' – are looking for a menu of practical steps that might help them get started, steps that their peers have found to be most important and effective. For companies with greater experience, it is more about identifying additional strategies that may help them to overcome persistent challenges.

Looking ahead, it is safe to say that the management of human rights issues will become more important to companies in the coming years. Our ambition as a CEO-led organization of forward-thinking companies is to ever more strongly link human rights to the wider sustainability agenda. This in turn will enable us to lay the groundwork for moving beyond compliance and audit-based thinking. We will continue to enable "learning by sharing" by featuring both good practices and difficulties faced by companies, articulating how they can put the Guiding Principles into practice, and outlining the most effective actions they can take to prevent, mitigate and address human rights impacts. We will also work with partners to continue to advocate a progressive business perspective in view of creating the conditions where more sustainable companies will succeed and be recognized, including in terms of how they embed respect for human rights across their operations.

● **FILIPPO VEGLIO** is Director, Social Impact, World Business Council for Sustainable Development (WBCSD).

HOT TOPIC

Paper or paperless?

The other side of the page

The **Two Sides** initiative wants to dispel common environmental misconceptions and promote print and paper as an attractive, practical and sustainable communications medium.

Paper has been around for almost 2,000 years, and during this time it has undoubtedly established itself as the most effective and versatile means of communication. Even in today's digital age with the vast range of alternative media to choose from, the unique array of practical and aesthetic qualities of paper simply can't be matched by using electronic alternatives.

Environmental concerns have moved to the top of almost every agenda in recent years, and have an increasing influence over the decisions we make every day. As the environmental debate has gathered momentum, so have the myths and misconceptions suggesting that the paper industry is responsible for mass deforestation and has an adverse impact on the environment. It doesn't.

As always, there are two sides to every debate, and paper has a great environmental story to tell. This is an industry that depends on a renewable source for its principal raw material, and one that leads the world in recycling.

Paper isn't the enemy of the environment and it doesn't have to cost the Earth. Paper does use trees, its production does consume energy and, too often, waste paper ends up in landfill sites. But if managed in a different way, paper is also one of the few truly renewable and recyclable raw materials we have. The paper industry is facing up to its responsibilities and investing heavily in all areas of production and sourcing of raw materials to minimize its environmental impact.

Myth: Making paper always destroys forests

European forests have grown by over 30% since 1950 and are increasing by 1.5 million football pitches every year – an area four times the size of London.

In some countries, particularly in the tropics, issues over land rights and natural forest conversion to industrial plantations are cause for concern to the paper industry, NGOs and consumers alike. The Two Sides initiative supports solutions to these problems and recognizes the need to support products which can clearly be traced to sustainable sources.

In northern Europe, where almost all ancient forests are protected, paper comes from managed semi-natural forests where the cycle of planting, growing and logging is carefully controlled. Historical concerns in northern Europe and Canada have now been largely resolved through co-operation between legislators, campaigners and forest industries to protect ancient forests.

Well-managed forests provide a natural habitat for wildlife. There is always room for improvement and the European Environment Agency (EEA) has stated that 'Forestry practice in Europe is developing in a way that can be considered good for biodiversity.'

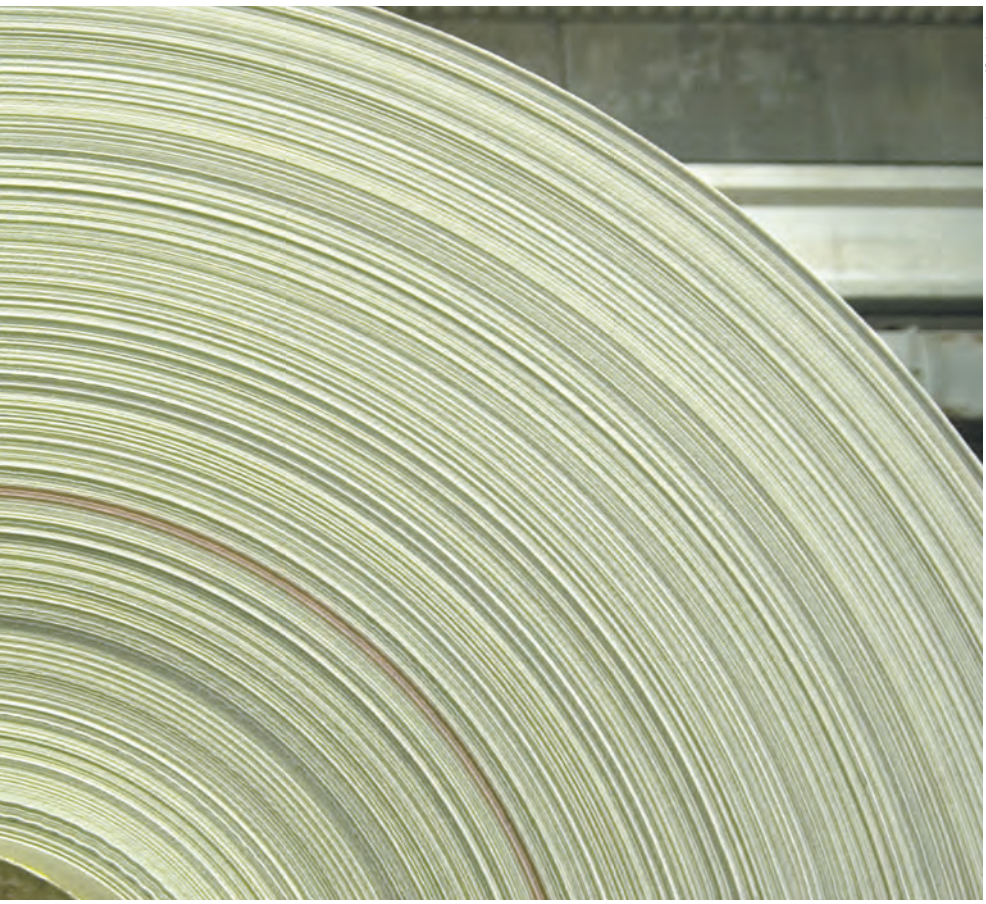


Photo: istock.com/fabphoto

Myth: Paper is bad for the environment

Paper is based on wood, a natural and renewable material, and as young trees grow they absorb CO2 from the atmosphere. Furthermore, as a wood product, paper also continues to store carbon throughout its lifetime. A well-managed forest, used and replanted, absorbs more carbon dioxide than a mature forest consisting of older trees.

The paper industry has a number of respected certification schemes ensuring the paper you use has come from a sustainable forest source. There are some 30 schemes in existence, but the two main auditable certifications that have emerged are the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). At the moment, too few of the world's forests are formally certified but Two Sides actively supports certification programmes and believes these provide consumers with reassurance.

Myth: Making paper uses a lot of non-renewable energy and has a high carbon footprint

According to the World Resources Institute, with 1% of the world's greenhouse gas emissions, the pulp, paper and print industry is one of the lowest industrial emitters.

On average it takes 500 kilowatt hours (Kwh) to produce 200kg of paper; the average consumption per head in Europe. This is comparable to driving an average family car 600 miles. The paper industry is the biggest user of renewable, low-carbon energy and 54% of the energy used in European paper-making is biomass-based – more than in any other sector.

Myth: Electronic communication is more environmentally friendly than print and paper

"Go paperless", "go green" and "save trees" are common themes these days as many corporations and governments encourage their customers and employees to switch to electronic transactions or communications. But are these appeals to help the environment made regardless of the facts?

Campaigns that seek to eliminate paper are often focused on a single characteristic and do not take into account every stage in the life cycle of both paper and online methods. Organizations that truly want to make responsible environmental choices should do so based on factual, verifiable information.

Customers' preferences and online access are also important. Rather than asking which is better – paper or electronic communication – we should use life cycle thinking to figure out which combination of the two has the least impact on the environment, while best meeting social and economic needs.

When considering that print and paper are based on wood, a natural and renewable resource, and that over 70% of print and paper is recycled in Europe for reuse, it can be concluded that, in a multi-media world, print and paper may be the sustainable way to communicate.

The amount of electronic products discarded globally has sky-rocketed ➤

HOT TOPIC

➤ recently with 20-50 million tonnes generated every year. In Europe, e-waste is increasing at 3-5% a year, almost three times faster than the total waste stream.

Myth: Packaging is wasteful and unnecessary

The primary function of packaging in all its forms – plastics, tins, glass and paperboard – is to protect goods whilst in transit, storage and distribution. It prevents waste through breakage, spoilage and contamination, and extends product shelf-life. A secondary, but important, purpose is to provide consumer information about the product and help with brand identity and differentiation.

Minimizing waste, particularly food, is a vital global challenge. As a result of efficient packaging, product damage in transit remains below 5% in the developed world, whereas, in the developing world, wastage rates can be as high as 30%.

Paper-based packaging has an excellent environmental record. On average, UK manufactured corrugated boxes contain 76% recycled fibre. Once used, paper based packaging is easy to recycle. In Europe, the collection of packaging is hugely successful with over 80% collected for recycling. This superb recycling rate prevents an area of board the size of Greater London from going to landfill every four months.

● **TWO SIDES** was established in 2008 by members from the graphic communications industry, creating a forum for the industry to work together and share experiences; improving standards and practices; and maximizing customer confidence in its products.

Reasons going paperless won't work

Kuang Chen thinks that paperless processes have their virtues, but warns against confusing the means with the ends.

Technologists have been striving to go paperless for at least 30 years, but it still hasn't happened. (The idea sounded good on paper!) The reality is that, for most organizations, there are multiple places in their workflow where the analog meets the digital, and where technology still hasn't been able to replace important legacy processes. *(Editor's note: a legacy process is an old method, technology or process.)*

Instead of throwing out legacy processes that are working, however, organizations would be wise to look to new solutions that include paper as an option in their digital workflows, embracing the old while ushering in the new. Here's why:

Paper is often still the best tool for the job

Although a lot of our tools and systems are now digital, many of the touch-points that businesses have with their customers and constituents remain analog. In many settings, paper will long remain the most practical choice for capturing information. In some situations, it is the only choice: paper does not break, run out of batteries, risk security breaches, or need upgrading.

New systems are not designed for all possible users

A recent survey of health insurance enrollees in the United States shows that a web-only self-service experience is not sufficient, and many still have to spend time in person or on the phone to purchase insurance. Systems that are meant for everyone must be designed for everyone, not just folks with iPads or latest-model computers with high-speed Internet access. The goal should be to meet customers where they are, not ask them to change behaviour that has been ingrained – and trusted – for decades.

Paperless is not a smart goal

Smart IT decision makers know that evolution, not revolution, is the sensible path forward. But when it comes to paper, there has not been a reasonable evolutionary path available. The choice has felt black or white – paper or no paper. In fact, the best solution is both/and. New technologies now make this possible, enabling a gentle, evolutionary path forward.

Throwing out legacy processes often results in project failure

The US Department of Veteran Affairs created the Veterans Benefits Management System (VBMS) to replace paper processes. When the system fails, which is regularly, patients turn back to paper, and the legacy paper processes are burdened more than ever. Systems that incorporate both paper and digital workflows, and integrate the resulting data in one backend store, can greatly increase both organizational

Photo: istock.com/kiddy0265

"Instead of throwing out legacy processes that are working, organizations would be wise to look to new solutions that include paper as an option in their digital workflows, embracing the old while ushering in the new."

efficiency and customer satisfaction. Rip and replace systems, like the VBMS, often force too much change, too quickly, throughout the organization. The failure rate is high.

Lots of valuable data remains on paper

The paperless mindset often overlooks a critical fact: vast stores of valuable information are still housed on paper. When we think of big data as only including the information we can easily access – like web logs and click streams – we are missing a huge opportunity. Both commercial and public sector organizations need solutions that help them analyze paper-based data with big data tools. This view embraces data in all its forms.

The idea of "paper vs. paperless" is a false dichotomy. Data comes in both forms, and we need to think more about how to get the data we need rather than about the form it comes in. As the digital and analog worlds increasingly meld together, we need to centre our thinking around "going paperless" as a means to use digital data, not an end.

● **KUANG CHEN** is co-founder and CEO of Captricity, a California-based technology start-up that transforms multi-channel data – including data generated by complex handwritten paper forms – into ready-to-process business information.

Today, there is no debate: resource productivity must be among the top priorities – if not the top priority – of industrial manufacturers around the world. Recent shifts in both supply and demand are squeezing these companies from both sides. On the supply side, raw materials are increasingly scarce, making them more difficult and more expensive to procure. At the same time, demographic changes – primarily in emerging markets – are increasing the demand for finished goods. These trends have been building over the past several years, and they will continue to gain momentum. As a result, industrial manufacturers will need to do more with less.

Compounding this problem is the fact that the easy gains have already been captured. Most organizations have already taken the obvious steps – for example, upgrading their lighting and automating their heating, ventilation, and air-conditioning controls. Yet they are now bumping up against the limits of what they can accomplish using a traditional approach. Why? The fundamental premise of that approach – in which resource productivity is subordinate to other operational priorities – is no longer valid. (McKinsey)

China's environment ministry is to consider whether the performance of provincial officials should take account of 'green GDP' – which measures the environmental damage caused by economic growth. The country's environmental crisis has been blamed in part on performance targets that have measured success in terms of the pace of economic growth, meaning that officials have raced to build new roads, factories, power plants and housing, without considering the environmental consequences.

President Xi Jinping has told officials: "We can no longer

BUSINESS MATTERS

Closing the gap

Fifteen years ago, Huda Janahi started her business, Global Cargo and Traveller Services, with start-up capital of 1,000 Bahraini Dinars (around US$2,600 at today's exchange rate). She ran the business single-handedly from an office in a small rented space in Muharraq, Bahrain's third largest city.

For the first year, all progress was blocked because her application for a commercial registration was rejected by the Ministry of Commerce. She was told that women could not receive a commercial registration to operate in the cargo industry. Undaunted, Janahi refused to accept no for an answer and she turned to the Manama office of the United Nations Industrial Development Organization (UNIDO) for help. In 2001, after graduating from the UNIDO entrepreneurship development programme, she applied again for registration and, with UNIDO's support, her application was finally accepted.

Within a few years, Janahi built up her company into a hugely successful enterprise and, in 2008, she signed a merger worth US$3m. with the Kuwaiti cargo company, Global Logistic Company, which serves the whole Gulf region and much of the rest of the Middle East. Today, Janahi is an award-winning businesswoman, one of the most influential women in the Arab world according to *Forbes* magazine, and is hailed as a role model for budding female entrepreneurs across the Gulf region.

Photo: Huda Janahi

Above: Huda Janahi, award-winning businesswoman.

Right: Palestinian schoolgirls at their graduation ceremony.

For UNIDO, the economic empowerment of women is key to building healthier, better educated, more peaceful and more prosperous societies, and the organization is working hard to ensure that women both help create, and benefit from, inclusive and sustainable industrial development.

Letting women participate more fully in economic life can yield enormous economic benefits but this is an area where the Middle East and North Africa (MENA) region as a whole lags behind. In the MENA region, the gap between men and women's participation in the labour force over the past decade was almost triple the average gap in the emerging market and developing economies. If this gap had simply been double instead of triple, the gains for the entire region would have been enormous – almost US$1trn in output, amounting to annual

www.flickr.com/photos / Michael Swan

decide who is succeeding based on nothing but GDP figures."

The government started researching the feasibility of implementing 'green GDP' measures 11 years ago. But the idea withered on the vine as the central government devolved more decisions on environmental planning to the provinces, which, in a rush to meet ambitious targets, gave to the nod to hugely-polluting projects. Now, heavily-industrialized provinces are coming under increasing pressure to shutter power plants, cement factories and steel works, particularly if these are inefficient or generate surplus capacity.

The closure of highly energy-intensive installations could mean big job losses and slash economic growth in many provinces – at least in the short term – which partly explains why the government has been reluctant to implement 'green GDP' so far. However, some studies make the case that the shutdown of polluting, wasteful industries will give greater encouragement to low carbon and green technologies, which in time would create many more jobs than those lost in mines, power plants and steel works. (ChinaDialogue)

There is a widespread, contagious conversation taking place today about Additive Manufacturing (AM), also known as industrial 3D printing. For a manufacturing process to generate this much excitement is pretty rare in contemporary times.

The enthusiasm is spreading so broadly because "additive" technologies that "grow" parts and products, rather than "subtract" material (via machining), are being embraced by young entrepreneurs and industry giants alike.

From the wings of a Victoria's Secret Angel to patient-specific cranial-plate implants for skull injuries to high-tech nozzles for aircraft jet turbines, the reach and attraction of AM is indisputable. Those who apply themselves can learn to make something unique, be they engineers or artists. And they can do it very quickly and relatively inexpensively at a local service bureau – if not from their home, lab or office. This is why additive manufacturing, industrial 3D printing and all the variations of growing parts by laser, electronic beam and other means, will dramatically change business! (Forbes)

gains of about 6% of GDP.

In the countries of the Gulf Cooperation Council, the regional intergovernmental union consisting of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates, UNIDO is spearheading an array of initiatives to help economically empower women.

Industry's role in forging green cities

The projected growth of cities coupled with higher energy demand spells trouble for both the urban poor and the environment if industry doesn't improve its energy efficiency, according to a new report by the Institute for Industrial Productivity. The report, *The Role of Industry in Forging Green Cities*, shows that sustainable cities that have cleaner local industries will be better poised to meet the environmental and social challenges associated with burgeoning populations.

To mitigate pollution, cities have typically sought to move heavy industry away from the urban core. This migration of industry to peri-urban areas has had positive effects but has also come at a social cost. In many developing country cities, stringent limits on density and an inelastic supply of housing have boosted housing prices in city centres and have pushed the working class out to the suburbs.

As the cities continue to expand outward and sprawl ensues, more and more people settle in close proximity to industrial energy users and emissions sources. In the rapidly urbanizing provinces of eastern China, studies have shown that suburban townships inhabited by large numbers of migrant workers suffer disproportionately high exposure to industrial sources of pollution such as factories, waste treatment facilities, and power plants. The impact of industrial pollution on the urban poor is not unique to developing countries and has been well-documented in US cities, where industrial facilities releasing toxics into the air, soil, and water tend to be concentrated in areas with higher numbers of low-income and minority residents.

Co-author Jigar V. Shah, Executive Director of the Institute for Industrial Productivity, said creating sustainable cities will be the key to reversing this trend. "We will need to develop more sustainable cities – that are compact, connected and well-managed – and manage their hunger for energy through industrial energy efficiency processes and technology, and the smart reuse of waste and energy," he said.

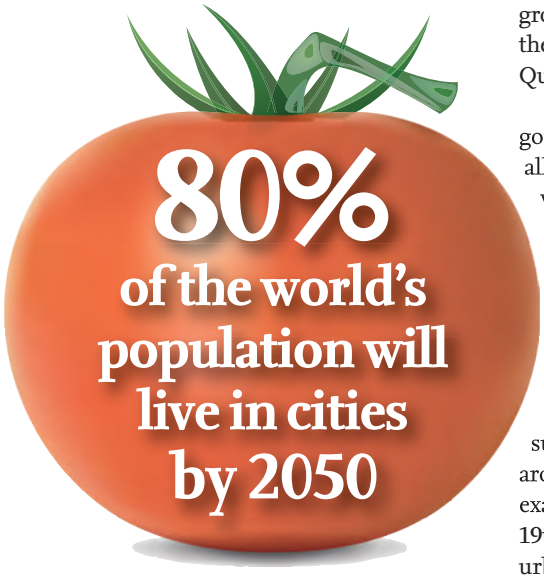
A greenhouse developed by Priva, an international company that provides innovative solutions for the more efficient control of energy and water within indoor environments.

Photo: Priva

Can cities feed their inhabitants?

David Thorpe looks at some of the options.

There are three dominant trends to which cities and national governments must respond in order to secure food supplies for their people. First, between 1980 and 2011 the global population not dependent on agriculture doubled to 4.4 billion, and, according to the Food and Agriculture Organization this population is growing at a rate about five times that of the agriculturally dependent population. ➤



➤ Second, the amount of agricultural land available for growing food is declining and will soon start to be adversely affected by climate change. Third, in 2011 agricultural subsidies in the world's top 21 food-producing countries totalled an estimated US$486bn. At the same time, agriculture and livestock remain a major source of greenhouse gas emissions – 4.7 billion tonnes of carbon dioxide-equivalent in 2010 (the most recent year for which data is available), an increase of 13% over 1990. While efforts are ongoing to reduce emissions from energy production and transport, food consumption is being ignored. The obvious point is that agricultural subsidies need to be redirected from unsustainable practices to sustainable ones.

The growing of food in cities won't mean that conventional agriculture will disappear. We might be able to keep chickens and produce eggs in urban environments but, at present, we cannot grow staple foods, such as grain, indoors or at a small scale. It seems that in any case our consumption of meat protein is going to have to decline considerably both because of the greenhouse gas emissions associated with meat production and because it is an inefficient use of land. Or perhaps we will find a way to grow meat-like protein in factories without the need for animals, as in the case of the Quorn mycoprotein.

For the remainder of our diet we are going to choose from a range of options: allotments, rooftop growing, growing on the vertical walls of buildings, and growing indoors with hydroponics, aquaponics and/or aquaculture. All of these are being practised now, and if supported by a switch of agricultural subsidies can produce perhaps as much as 30% of the city-dwellers' nutritional requirements. In many cases, they do not even need support. Add to mix the use of hinterlands around cities, as used to be the case (for example, Paris was able to feed itself in the 19th century from its hinterlands), and urban food production could provide multiple benefits, including: a drastic reduction in the carbon footprint associated with food miles; a reduction in food lost due to crop failure; an improvement in health and fitness when people participate in growing and have a better diet; a big reduction in water pollution due to nutrient recycling; and much greater water efficiency due to water recycling.

The corporate option

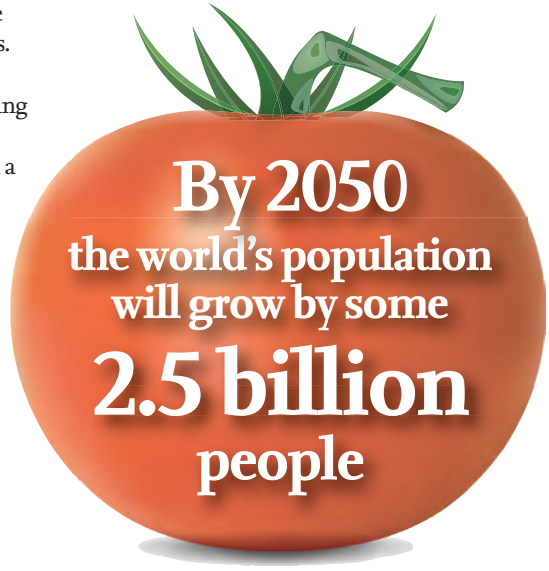
I am convinced that the vast majority of local food will come from giant warehouse-type buildings because growing crops outdoors, whether in vacant lots or on rooftops, without the use of polytunnels or greenhouses, leaves the growers vulnerable to the vagaries of the weather and the strictures of the seasons. On the other hand, in a controlled environment you can have several growing cycles during a year, and root vegetables can be continually harvested if grown in a soil-less environment where there is no need to dig up and kill the plant.

So, I foresee that there will be one or more of these giant sheds (with or without glazing) in every city, owned by the likes of Amazon, or perhaps in the form of franchises like McDonald's, Starbucks or Costa. They may include in their portfolios high street cafés, hotels and restaurants where you can pick your tomatoes and greens and eat them fresh because they are grown in the same building.

In these warehouses there will be tiers of rack after rack of vegetables being grown in precisely controlled conditions. Amazon already has the technology to monitor what is happening in remote, upper corners of its climate-controlled warehouses and to bring products down on demand for shipping. From a consumer point of view, you will be able to order your vegetables using an app, and they will be harvested and delivered to your door within hours: fresh, local and organic.

These warehouses will be fine-tuned to minimize energy use, to produce the maximum amount of nutrition and to produce for the minimum amount of inputs. They will be far more efficient than what happens in an open field. Some might find this a horrifying prospect, but the choice is stark: either this or starvation for many of the 10 billion people who will walk the earth in 2050 and beyond.

The technology to produce and operate these warehouses is already here. They are on the cusp of being commercially viable. A marketing push will be required to persuade people to buy the products – or perhaps they won't care where their food comes from.



Small-scale options

Farmed Here and Green Spirit, based in the state of Michigan in the United States of America, are two examples of pioneering urban-growing enterprises that support the local community, source everything locally and train unemployed teenagers. In Detroit, Farmed Here runs a profitable indoor vertical farm, the first and only US Department of Agriculture Organic Certified and HACCP-certified and audited aquaponic vertical farm in the US. Farmed Here's head of development, Paul Hardej, says that it has a greater than 95% success rate with plants, compared with 70% on traditional farms.

Green Spirit Farms near New Buffalo, targets under-used urban space to create its vertical farms and has designed a system that is simple to operate and harvest. It has a stacked indoor growing area that yields 12 harvests per year, compared to around seven harvests per year in California where many of the country's fresh vegetables are grown.

City administration

City administrations will need to change. At present, there are no widely used standards, no building codes and no proper regulations that allow city authorities to issue permits to developers who want to grow food or raise chickens or fish in cities. Right now, it's problematic to get permission. For example, in Chicago, Paul Hardej had to construct an undercover test farm as a pilot to develop his technology before he could persuade the city's mayor that his idea worked.

Research and development

In the United Kingdom, three entities are working together to validate work on plant responses, measuring the number of grams per mole of nutrients and working out how they can scale up. The three are: CambridgeHOK, a leading producer of retail structures, commercial glasshouses and associated equipment; Stockbridge Technology Centre, a centre of excellence supported by both the production and supply sectors of the horticultural industry; and the multinational Phillips Lighting company. Tim Haworth of CambridgeHOK says that the economic models "need to be worked out, factoring in how the model is affected by local situations, outside climate and expected prices. Automated processes also need to be refined to cut labour costs further and use space to maximize the productivity per cubic metre".

The Netherlands already boasts many experts in the required technology. Jan Westra, a strategic business developer for Priva, a multinational that manufactures control technology for indoor growing, travels the world looking for business opportunities. "We can completely control indoor climates. In Holland, we use underground heat storage to moderate internal temperatures, storing solar heat in the summer and releasing it in the winter. It's very efficient. We also control light levels and humidity."

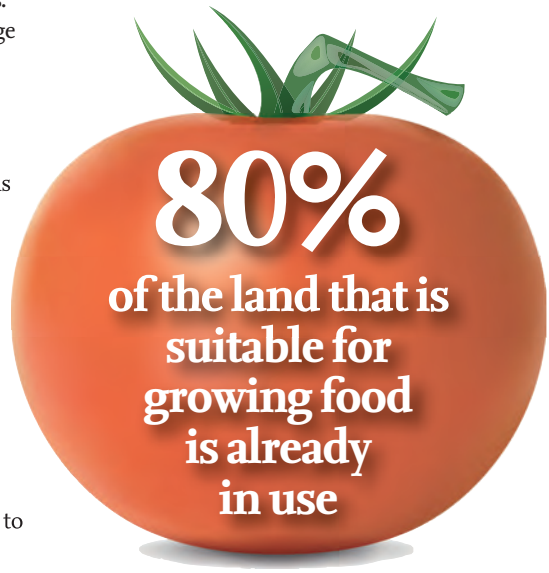
A rooftop growing experiment in Paris is testing the results of using different substrates made from urban organic waste. Given a choice of compost, vermiculture, coffee grounds with mycelium and compost or crushed wood, different root and leaf vegetables will thrive on different substrates. The same researchers from France's Institut national de la recherche agronomique have tested leaves of plants grown in cities for lead concentration and fortunately found them to be well below the danger threshold.

Community initiatives

Community growing brings communities together, generates links and makes people happy, but not everybody wants to do it. For many people, growing their own food is a drag, but when people actively participate in sourcing their own food, it galvanizes individuals, creates new respect for nature, and reconnects urbanized humanity to the soil with which it was once intimately familiar. For these reasons community growing initiatives are vital in whatever form they take.

Cities that adopt these practices will thrive and achieve greater food security. The pioneering cities may even be able to export their expertise. Every area will find their own patchwork of solutions.

● David Thorpe is the author of *The 'One Planet' Life: A Blueprint for Low Impact Development*; *Energy Management in Industry: The Earthscan Expert Guide*; and the 'climate fiction' novel, *Stormteller*. His personal website is: www.davidthorpe.info



Eco-cities: creating a common language

Jan Dictus considers the qualities that define an eco-city

Image: Zenata New City

Since the world woke up to the fact that the majority of the world's population already lives in cities, it has been proclaimed that all cities should be built as eco-cities in order to improve the well-being and health of the whole world. In the past, cities have been planned, if at all, for all kinds of reasons: for military use, as marketplaces, for the glory of the rulers, or for the well-being of citizens. Now, with the concept of the eco-city, planners give priority to citizens' quality of life, and that of future generations.

Cities are held responsible for a major part of climate change, and they are also regarded as the main problem-solvers. That's a big responsibility, especially when you realize that most cities have already been built. Most of the time, when city planners try to transform a city into an eco-city, they can only rearrange, restore and/or steer developments.

Artist's impression of a part of Zenata New City, an eco-city under construction in Morocco.

Cities are permanently evolving and developing. If not, they are standing still and cannot survive. An eco-city is often described as a city that develops in a sustainable way, and therefore planning an eco-city is like aiming at a moving target.

An eco-city is a city that you cannot know how it will look in 50 or 100 years' time. Because it is so difficult to plan what you cannot see, city governments tend to make their plans for the shorter term, for the next five or ten years. Or they concentrate on a few aspects, like cities that strive for 'zero-waste', or aim to become 'carbon neutral', or 'smart', or 'car-free'. As a result, a long-term vision of an eco-city is being approached with short-term, limited compromises.

A way around this problem is to approach it from another angle. I play a game with my grand-daughter where one of us describes an animal by giving its main characteristics, and the other has to guess what the animal is. Hardly ever are more than four characteristics needed to find the answer. In the same way, one could define an eco-city by summing up the main qualities, qualities that definitely would change a city into an eco-city.

- **Naturalness**: Cities, in principle, need resources from outside. The more 'natural' a city is, the less support it requires from outside, and the more robust it is. Two examples: passive houses use sun, shade and natural ventilation to regulate temperature; Vienna's drinking water flows by force of gravity from the Alps and arrives in the city without being pumped.
- **Diversity:** In a biological system, diversity has clear advantages over monoculture. The advantage of diversity is also clear in relation to the local economies of cities. Reliance on one energy source, on one big company as an employer, or on one transport system creates dependency. In eco-cities, diversity is everywhere.
- **Flexibility:** Cities are exposed to a vast number of different influences. Eco-cities are in a state of constant evolution which requires research and openness to new solutions and innovations. Eco-cities are able to adapt to changing circumstances.
- **Proximity:** The 'walkable city', 'compact city', 'dense city' and 'five-minutes city' are all terms used to refer to a city where distances are short and where different functions are close to one another, reducing the need for motorized transport. Accessibility may also be thought of in social terms, referring to the capacity of individuals to obtain jobs, education or health care. In terms of governance, proximity means subsidiarity – the organizing principle that matters ought to be handled by the smallest, lowest or least-centralized competent authority.
- **Co-elaboration:** Co-elaboration and participation are signs of joint responsibility. They are also a basis for solidarity. Communication, cooperation and coordination among all relevant players are imperative if joint responsibility is to become a reality. If more individuals feel responsible for the whole system, then the system becomes more sustainable.

A system with these qualities is a sustainable system. Looking at eco-city projects worldwide, one learns that many do indeed answer to these qualities: renewable energy is natural; compact cities aspire to proximity; smart cities prioritize flexibility; and so on. Using all the sustainability qualities as a set of leading principles for urban development is a way to create an eco-city.

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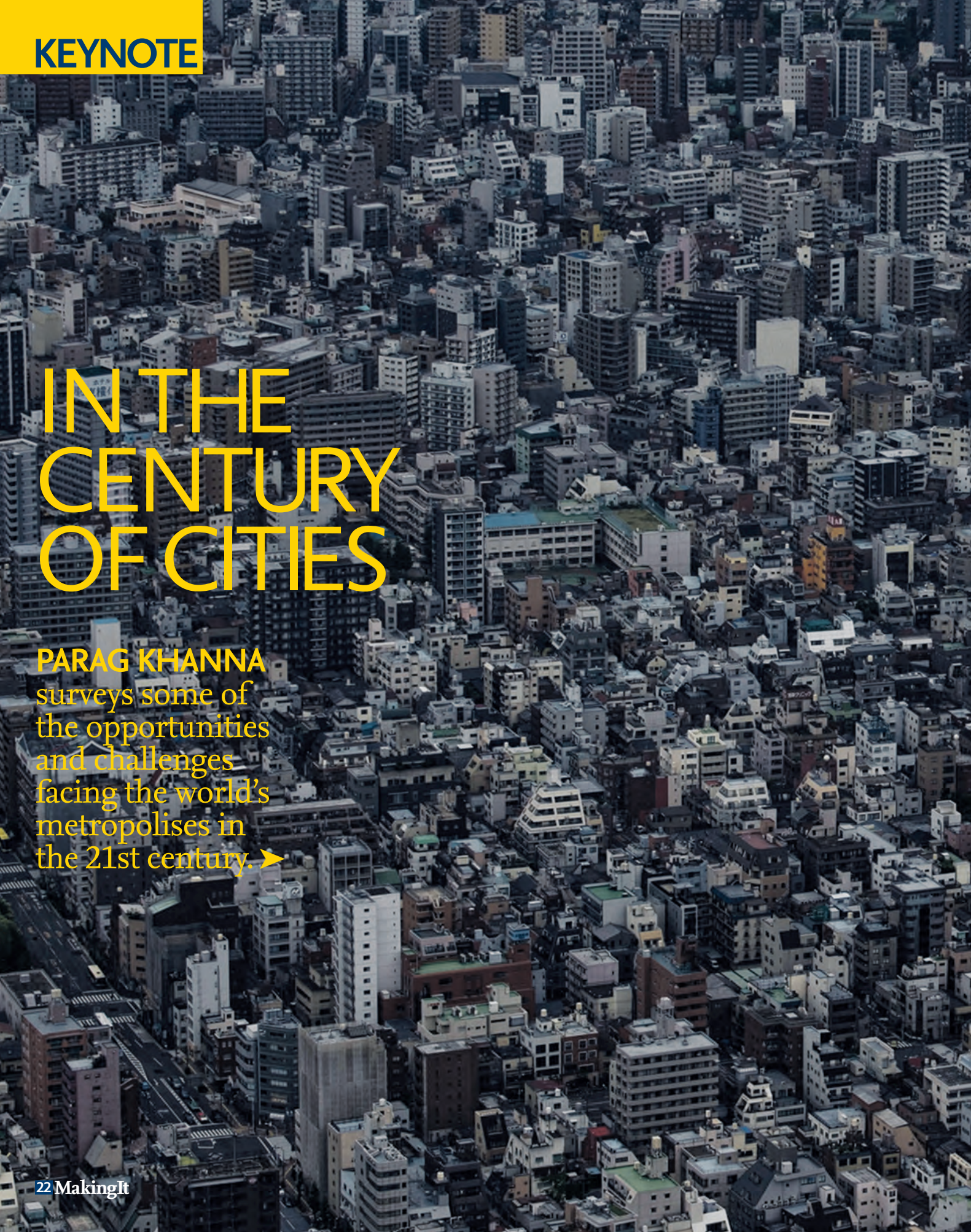
The local interpretation and meaning of the qualities and their consequences should be discussed within a team of planners and decision-makers. In such a way, the sustainability qualities can be adapted to cultural backgrounds or to specific needs. Once agreed, they can become 'common values', which serve as a broad guideline in all planning and development situations.

For example, for the new city of Zenata, in Morocco, the sustainability qualities serve as design principles. Zenata, which is currently under construction between Casablanca and Rabat, will be a new city for 300,000 inhabitants, with employment for 100,000 workers. The developers want Zenata to become an eco-city, and they have agreed on 'Six Principles for Sustainable Zenata'. (Optimization – the process or methodology of making something as functional or effective as possible – was a sixth quality added by the planning team.)

The sustainability qualities have also served as a reference for peer-reviews of five eco-cities in South-East Asia. Cebu in the Philippines, Danang in Vietnam, Iskandar in Malaysia, Map Ta Phut in Thailand and Pingtan in China were brought together by the United Nations Industrial Development Organization to form a network to promote the exchange of knowledge and sharing of best practices. Although each eco-city had a completely different background and level of progress in sustainability policy, the sustainability qualities created a common language as they were assessed by peer-review.

Starting with the above set of sustainability qualities, decision-makers and city experts should agree and adapt it to their own circumstances and needs. The sustainability qualities should be general enough that different disciplines and sectors – be they economic, social or ecological – can use them. City planners, energy suppliers, agriculture experts, industrialists, architects – each sector can define how it can best contribute to the sustainability of the city. Once there is an agreement on the sustainability qualities, discussions on sustainable development are much easier. They create a common language.



IN THE CENTURY OF CITIES

PARAG KHANNA surveys some of the opportunities and challenges facing the world's metropolises in the 21st century. ➤

Tokyo.

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➤ This is going to be a century of cities. Already 50% of world's population is urban and this rate is increasing by 10% per year, meaning that by 2035, 70% of world's population will be urban. The number of mega-cities, that is, cities with over 10 million people, is also increasing annually. By 2025, out of the top 600 cities in the world in economic terms, more than one hundred will be in China. They represent the majority of the world's gross domestic product (GDP). In terms of the pace of urbanization, if we combine China and India, the numbers become even more staggering. In the coming years, a population the size of the United States is moving into cities in China, and half of India's population will live in cities of more than one million people. The two largest countries in the world demographically are becoming collections of cities.

The rapid pace of global urbanization brings enormous challenges to cities. How are they going to re-invent and transform themselves? In particular, how are they going to build the capacity to absorb a larger population, to integrate new technologies, and to become more economically and culturally dynamic?

The world as city clusters

There are cities like Dubai, Shanghai and Singapore that are becoming magnets for investment, and magnets for hard-working people from around the globe. But as notable as they are for growing in a vertical dimension, there is also the horizontal dimension. A satellite view shows that cities are not just dots on the map, rather they are patches that are expanding. In other words, the world is effectively becoming city clusters or city corridors.

Think of the world as these city clusters that increasingly bond together as condensed infrastructure corridors. There are many of them around the world. "Abu-Dubai" is one of them. Back in the 1970s or 80s, Abu-Dhabi and Dubai were about 100 miles apart, separated by deserts. Today, if you travel between them you will see they are increasingly connected by built up urban corridors, and hence people now call it "Abu-Dubai". India has a couple of these as well – the Greater Delhi area, and Mumbai-Pune, two very important financial and technological centres connected by an expressway. And there is of course the original megalopolis, the Tokyo-Nagoya-Osaka corridor, which has over 80 million people.

If we zoom in on China, there are three major mega-city clusters: the Bohai Sea ring around Beijing; the Yangtze Delta around Shanghai; and the Pearl River Delta. The population of just those three is larger than the total of the top ten non-Chinese cities in the world today.

When one thinks of the Pearl River Delta region, we tend to think of Hong Kong, historically a place that embodies the model of "one country, two systems". But if you travel there today, you can see that terminology no longer works. You can start in Hong Kong, and very easily take the metro into Shenzhen, which is more state-run. So, you go from an open and liberal Hong Kong towards a more state-directed Shenzhen, up to the heavily industrialized Dongguan area, towards Guangzhou, the regional capital, which has really transformed itself from an industrial centre to a financial centre. Then over to the other side, to the more industrialized areas, the Shantou and Zhuhai special development areas, and down to the open, free-wheeling gambling haven of Macau. These belong to totally different political geographies, and yet mayors and local authorities have been collaborating to build the transportation that works, and the customs agreements that allow people and goods and trade to move so much more freely around the region. So, it's no longer "one country, two systems". It is becoming just one mega-region. And, in fact, in terms of its economy, per capital income of the Pearl River Delta is larger than of Shanghai, and its combined GDP would make this mega-city a member of the G20 group of countries. And this is just one part of China.

Photo: Nusrat Durrani

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Guangzhou.

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'Diplomacity'

Cities are not just based on their sovereignty, but also on their capacity to make their own decisions and set their own policies. Around the world, we can see that a diplomatic powerhouse doesn't have to be a capital city of a country. New York City, Dubai, Istanbul, Mumbai and Frankfurt, for example, are drivers of commercial diplomacy and environmental diplomacy in their respective countries.

And this is nothing new. In the history of diplomacy, from ancient Mesopotamia to the Renaissance in Italy, it has always been cities that are actually the driver of exchange and of communication across societies. Now this is happening on a whole different scale. There are more mayors serving as the heads of states today than ever in history, and that number is growing over time. We see from Mexico to Nigeria to Turkey to Indonesia, mayors are increasingly becoming leading candidates for nation-states or already are. They can demonstrate a municipal track-record and the ability to govern that they can take to a larger scale, and those accomplishments make them well-suited to be national and international leaders.

What does it take to be a leader of a global city today? There are certain challenges they have ➤

Illustration: Chappatte

➤ to be prepared for, and one of them is the ability to manage diverse and multi-ethnic societies. Today, cities like Dubai, Singapore and Toronto are really as much foreign as they are national. They are melting pots because they give new meaning to the term "cultural capital". Their leaders don't have the luxury of treating immigration as a temporary condition. It's a permanent reality. Their mayors cannot offer citizenship to foreigners but they have to find a way to make everyone feel like a stakeholder and be a stakeholder in that society.

Around the world, we see some countries are tearing themselves apart over ethnic, religious and sectarian differences, but successful cities cannot afford to do that, nor can they afford to be so stratified that the city feels like two, three or four cities at the same time, with walls dividing people based on their background or their income. This kind of inequality has consequences. We cannot separate the images of Occupy Wall Street, the London riots, Gezi Park in Istanbul and Tahrir Square in Cairo, the images that are defining our news today, from thinking about the context of young populations that are unable to access the promise of urban life.

New urban strategies

We are rapidly urbanizing our planet. We are building an urban civilization that is predominantly coastal. Most of the major cities in the world today, and most of the new cities that we are building today, are on the coast. This means the rising sea levels are going to affect at least four to five million people in the United States and upwards of 200 million people in Asia. For the first time, the Intergovernmental Panel on Climate Change is talking about the need for relocation, about relocation strategies for populations in the event of the kinds of major natural disasters that we are seeing with increasing frequency in Asia, in the Middle East and Latin America. This is going to require not just trillion of dollars of new investment, but entirely new urban concepts and strategies.

A quick scan across the world reveals that in the places where growth and innovation have been most successful, a hybrid public-private, domestic-foreign nexus lies behind the 'miracle'. These aren't states; they're 'parastates'- or, in one common parlance, 'special economic zones' (SEZs). Across Africa, the Middle East and Asia, hundreds of such zones have sprung up in recent decades. In 1980, Shenzhen became China's first; now they blanket China, which has become the world's second largest economy. The Arab world has more than 300 of them, though more than half are concentrated in one city, Dubai. These SEZs offer clues as to how unrelenting urbanization and sustainable production can co-exist but, when planning for future cities that work, we need to be aware of the challenges and benefits presented by SEZs.

Sustainability

Cities are designed to generate productive economic activities, but they also need to be designed in a way that is sustainable. For example, when it comes to economic sustainability, we have learnt that the economic zones that were designed for a single industry can be very vulnerable to changes in global supply chains. These 'demand shocks' have been devastating for some southern Chinese cities that were built on one industry and also for places like Detroit in the United States. So, building in some amount of diversification is important for economic sustainability.

When it comes to the environmental sustainability, again it is the choice of the parastatal entities. Government officials and investors can work together to ensure environmental sustainability. Or there can be projects that are very unsustainable and very exploitative. We have many decades of experience in both regards, particularly in the unsustainable dimension. For example, there is Guangzhou in China. If we look at the periphery of Guangzhou, and the new special economic administrative technology park that has been developed there, we find a lot of the periphery of Guangzhou has been built on prime agricultural land that was used especially for soybean cultivation. Now, people realize that they don't want to give up so much arable land in the context of China's rising food demand, so they have halted some development and decided to relocate it to other areas. That is an example of realizing that these SEZs should be more environmentally sustainable.

And, of course, one should add the issue of human sustainability. The garment factories collapsing in Bangladesh was an example of not having sustainable workplace practices from a human rights and labour rights point of view. However, we are starting to see that things are now improving in Bangladesh, in Viet Nam, and in some other countries due to domestic pressure, supply-chain pressure, and the scrutiny that comes when companies suffer reputational damages.

Build inclusive cities

New economic cities, such as Songdo in the Republic of Korea have been built 'from scratch' and don't have poor people living there. But in the established mega-cities, like Lagos, Nairobi, Mumbai, Karachi, Jakarta, Manila and Rio de Janeiro, we find teeming slums. While these are often called 'shadow economies', they are in fact self-organizing ecosystems with their own geographic patterns, political hierarchies, economic models and social structures. ➤

➤ Mike Davis and Robert Neuwirth are two of the greatest travellers and journalists who have observed life in the world's cities. They have written extensively about the so-called shadow economy but there is not a complete overlap between slums and shadow economies. For example, consider the recycling of plastics, aluminum and cardboard that takes place in the slums of Mumbai. People are taking legitimate assets – these wastes are assets – they are recycling and they are paid for doing it, so the term 'shadow economy' is unfortunate. It has multiple meanings and can mean an unregulated economy or a 'black' market or an untaxed economy. But the Mumbai recyclers are taxed and regulated. Therefore 'grey market' is a more appropriate term, and is one that cannot be considered as negative. A huge percentage of the world's population survives precisely in the grey market. It represents the means of survival for several billion people.

These slums are self-organizing ecosystems. To use again the example of recycling in mega-cities like Mumbai, this is an activity that would not otherwise take place. It is filling in for a market failure, and it is filling it as a very spontaneous activity that has developed these supply-chains that were not created or regulated by the State. In that sense, it is a self-organizing activity. It is a means to meet supply and demand that has occurred by virtue of entrepreneurial instincts.

Governments and industry

I strongly believe that governments should devote most of their attention to the issue of inequality between the slums and the glamorous side of a city. The fact that they don't devote as much attention as they should is precisely why it is important to continue to allow self-starting entrepreneurial activities to take place and to support them wherever possible. We see examples of it happening: Rio de Janeiro and Medellín are places where there have been government efforts to extend transportation and public services like sanitation and so forth into the slums. The new President of Indonesia, Joko Widodo, who was previously the mayor of Surakarta, is famous for having emphasized the importance of business firms engaging in community activities in that city. He is an example of the mayors who, with growing frequency, are becoming heads of state because they have a good track-record of focusing on the poorest part of the population.

And it is not only the government, but also the corporations which have an important role to play. I believe the private sector has and will have a dominant role in today's cities and in the cities of the future. Most of the people living in the mega-cities are not public sector workers. The public sector's responsibility is bringing in more public services and delivering better housing and transportation, and hopefully proving some kinds of cash transfer programmes to help micro-economic activities. However most of the delivery of these kinds of services is essentially done by the private sector. The most important thing is the division of labour and shared responsibility – what I call "hybrid governance" or multi-stakeholder collaboration. In this context, industry still plays an essential role in building sustainable and inclusive cities. It is true that some places in the world are post-industrial, but most countries in the world are not. While we should probably learn to prepare for a world that is not driven by human-centric industrial production, industry will still matter a lot – even if robots are doing the work. At least for now, most of the jobs created in the world are not going to be automated. For example, building construction is still done by humans.

Education, hospitality, construction, health care – none of these activities, which are the largest employers in the world economy, are being hurt by automation technology. This is where governments should spend their money. These are very essential factors in cities. They are in dire need all over the world, and they all need industry to support their functions. The technological revolution is on the way, but we should focus on the areas that are still very necessary and that are still creating a lot of jobs. These jobs are closely related to industry.

Image: ImagineChina

Huangpu River, Shanghai. Using a pioneering method of aerial photography, a location can be seen at a full 360 degree angle. After some skilful manipulation on Photoshop, known technically as stereographic projection, each sweeping panorama is then turned into a circular shaped image.

Sustainable consumption and lifestyle initiatives in Asian cities

Patrick Schroeder and **Uwe Weber** share some experiences from the European Commission's SWITCH-Asia programme.

Already in 2010, the Asia-Pacific region's urban inhabitants amounted to more than 750 million people, about 40% of the region's population. Today, seven of the world's ten most populous cities are located in the Asia-Pacific region: Beijing, Delhi, Dhaka, Kolkata, Mumbai, Shanghai and Tokyo. These mega-cities are generators of wealth and hubs for innovation and cultural activities. On the downside, these cities continue to harbour poverty and environmental disasters. Nevertheless, urbanization enhances productivity, increases gross domestic product per head and has turned into a major source of economic strength, illustrated by the fact that Asian cities contribute about 80% of the region's gross domestic product.

Small and medium-sized enterprises (SMEs) account for about 99% of all businesses in Asia and these companies are often concentrated in and around cities. Lacking awareness, finance and often operating with out-dated equipment, they are responsible for a significant share of urban pollution, which poses hazards to the health of citizens. This current concentration of economic activities in Asian cities can only be sustained if industry stakeholders implement essential cleaner production principles.

The SWITCH-Asia programme, the European Union's largest cooperation programme with Asia promoting sustainable consumption and production, supports more than 80 projects to develop innovations that help SMEs reduce their waste, improve their energy intensity or become more resource efficient. One example is the circular economy approach developed by an industrial symbiosis project implemented in the industrial development zone of Binhai New Area in Tianjin, China.

Middle class consumers

In addition to factory-level "end-of-pipe" solutions for SMEs, SWITCH-Asia projects also look downstream the value chain – to retailers and consumers. Asian cities resemble consumption hubs, linked to global supply chains and consumption in these cities is responsible for a significant share of the environmental footprint created elsewhere. They are home to new Asian middle class consumers, who follow global consumption patterns, with ever-larger shopping malls and supermarkets. In this respect, and considering their frequently deficient infrastructure, Asian cities are facing severe challenges. The potential solutions are hence similar to those needed in industrialized countries.

One such solution lies with retailers. Reducing the millions of plastic bags dispensed at the cash counters of retail stores every day would be a relevant first step.

A fortune teller serving his customers in the street market at Sai Yeung Choi Street in Mong Kok, Kowloon, Hong Kong.

Beyond this, retailers play a key role as intermediaries between suppliers and consumers. Retailers can influence both upstream and downstream value chains. For instance, through choice editing they can promote greener products or even remove high-impact products from their shelves. They can provide consumers with information about the environmental and health impacts of products in their shops through awareness-raising campaigns. Product labels are important information tools for these initiatives. Close cooperation with suppliers is crucial to make such labels work.

Greening retail and supply

One initiative implemented under the SWITCH-Asia programme in India is the Green Retail India project. Working with retailers in major cities, such as Bangalore, Chennai, Delhi and Mumbai, the project has used ambitious sustainability criteria to establish 30 pilot stores from four major Indian retail chains. A first baseline study estimates a 40% reduction in energy consumption in these pilot retail stores is possible through energy efficiency measures, which can often be as simple as putting doors on fridges and freezers and improving air-conditioning systems. An estimated reduction in solid waste by 30% in pilot retail stores by the end of the project is considered possible. The project not only looks at retail stores as such, but also works upstream with suppliers to initiate green supply chain measures. Based on the experiences from pilot stores, a roadmap for sustainability for the Indian retail sector is currently being developed.

Another example from China is a project aiming to increase consumer awareness about sustainable lifestyles and green products in the cities of Beijing and Tianjin, which is being implemented in close cooperation with the consumer associations of both cities. Consumer surveys carried out indicate that the main obstacles to greening consumption are that many consumers do not understand what green products are and that available information about green products is considered unreliable. In addition, the price of green products is perceived to be too high. Less than 10% of consumers would be willing to pay 10% more for energy-efficient appliances. For organic vegetables, the case is different, as more than three quarters of consumers are willing to pay up to one third more, reflecting concerns about contaminated food in China. Some of the challenges include Chinese consumers' lack of understanding and lack of trust in product labels. Third-party certification practices and independent product testing, which in other countries have proven successful in providing reliable product information, are still in the early stages.

Photo: catchlights_sg/istock.com

Consumption habits

In Indonesia, the SWITCH-Asia programme cooperated with the Surabaya and Yogyakarta city governments to develop sustainable lifestyle initiative pilot programmes. The specific approach used to change actual behaviour and habits was to motivate rather than educate the people involved through a co-design process, based on the belief that a self-enhancing movement would gain its own momentum. The goal is that by 2020 sustainable consumption habits will be well-established. In Surabaya, schools compete with each other as part of a campaign on energy and water-saving and other sustainable consumption patterns. Through the schools, these activities reach out to hundreds of households and families. The programme also includes training journalists on sustainable consumption and production, working with bloggers and photographers with competitions, and convening editor roundtables to discuss media policy and strategy on environmental issues. These pilot campaigns provide information and experiences that can be used for further replication and scaling-up.

These examples show that sustainable urbanization requires a comprehensive and integrated approach, looking at whole value chains. Improvements in urban infrastructure, such as transport and waste management systems, renewable energy installations, energy-efficient buildings and cleaner production by SMEs, need to be complemented by sustainable consumption and lifestyle initiatives.

Why we need more women engineers

Interview with **Roma Agrawal** a structural engineer at WSP | Parsons Brinckerhoff, one of the world's leading engineering professional services consulting firms.

Why do you think that it is important that more girls have the option to follow careers in science and engineering?

I studied physics at university, went on to become a structural engineer and worked on the design of The Shard in London. Being a scientist or an engineer means that you are working on real-life problems and helping people and, besides, you can have any career with a science degree. As the world becomes more technologically driven, science qualifications will become more and more essential to our way of life. We have to show young people, especially girls, that far from closing down options, studying maths and science actually expands them.

Apart from having a very rewarding career, you will be rewarded financially. Maths students can earn high salaries and in the UK, for example, careers in science and technology pay up to 20% more than average. We talk about the gender pay gap and are very aware that women earn less than men in full-time employment. One way we can try and improve this is by making sure girls aren't ruling themselves out of well-paid careers in science and engineering.

Then there's the skills shortage. In the West, we simply don't have enough engineers to meet the demands of employers. Careers in science, technology, engineering and mathematics (STEM) allow you to travel, to live in different countries and hopefully keep you employed for life, and we don't want girls to miss out on all this.

What can be done to encourage and support women in male-dominated industries such as science and engineering?

I believe there are a number of obstacles which people – especially women – face when it comes to careers in engineering. There are perception issues – science and maths are seen as being only for a 'brainy'

ROMA AGRAWAL has designed bridges, skyscrapers and sculptures, and spent six years working on The Shard, the tallest building in Western Europe. Agrawal was awarded 'Young Structural Engineer of the Year 2011' by the Institution of Structural Engineers and was a finalist for the 'Young Woman Engineer of the Year' run by the Institution of Engineering and Technology. She is a member of the UK's Construction Industry Council's Diversity Panel, which brings together key built environment stakeholders to attract, retain and promote a diverse group of professionals at every level across the construction industry. Outside work, she promotes engineering, scientific and technical careers to young people and particularly to young women.

Photo: Nicola Evans, WSP | Parsons Brinckerhoff

few and there are outdated assumptions that women are not as good at STEM subjects as men. The OCED's 2011 *Report on the Gender Initiative: Gender Equality in Education, Employment and Entrepreneurship* showed that there is no intrinsic difference in the ability of men and women in science and maths. Any difference that appears can be attributed to cultural issues. We need to make sure that no one in the work-place believes that one gender is better than the other, and that women are well-respected for their abilities.

We should keep an open mind about different educational backgrounds as the industry is comprised mainly of those with an engineering degree and that is limiting. Many women study science with a view to becoming doctors. We should tap into their motivation to help people and encourage those who don't go on to do medicine to consider engineering.

We need to keep a close eye on how we market our industry and the opportunities within it. There isn't just one right way to be a successful engineer – we can be technical specialists, managers of teams, business development leaders and many others. We should highlight these opportunities in order to attract and retain a diverse workforce. It is also important to mentor engineers throughout their careers. Where role models for minorities are scarce, it is even more important that this support is maintained.

In what ways do you think that engineering and the construction industry in general would be different if more women were employed?

In the ten years I've been in the industry, I've seen a change in the number of women, both in design offices and on site. At WSP | Parsons Brinckerhoff around 20% of the technical staff is female, which is much higher than the industry average of 8-10%. The site I am working on at present has two full-time female engineers, alongside three male engineers, but we still have a way to go.

I think that, in any industry, having a diverse workforce is important for ideas. As scientists and engineers we are working for people, and if our teams do not reflect society, then how can we come up with the best solution? It's important that the people designing or researching things aren't making assumptions about the way say women use a product. Why not involve women and get the right answer. I think women can bring a lot of creativity to the industry and also collaboration skills. Sometimes I go to site and am able to diffuse tense situations just by bringing a different perspective.

How do you think scientists and engineers can create greener, more energy-efficient cities in the future?

As more and more people move to the cities to live, we need to find a way to accommodate these people in increasingly tighter spaces. I believe there are two ways this can happen: either we as humans shrink our living space, reduce the amount of travel, the things we use and throw away, or, we continue to live the way we do today or in a more extravagant way, but force science, engineering and technology to make our impact smaller. They are two extreme possibilities, with reality no doubt somewhere in the middle.

From a structural engineering perspective, we're looking at new materials and how we can build in a modular way, quickly and efficiently. We as engineers have to come up with new techniques of construction. It is challenging to build in densely populated cities and it comes down to efficiency. Computers have revolutionized design. By using the mathematical powers of these machines, we can use less material, build taller and more intricate structures and open up possibilities that manual design simply couldn't. For example, we are using half as much material in high-rise structures today compared to the early 20th century.

Can you say more about how you think cities in the developing world will be in the future?

It has been estimated that 70% of the global population will live in urban settings by 2050. This is a complete U-turn from how we've lived previously, when only the minority of people lived in cities. Clearly, a large amount of pressure will be applied to existing transport, emergency services and the utilities that may already be stretched in these cities.

In developing countries where cities are being built from scratch, I can imagine that they will be very dense in order to try and restrict the ecological impact on the countryside. Skyscrapers will be a common sight and I like the idea of having a 'stacked' city with transport on one level underground, walking and cycling above ground and shops and homes above that with very few cars running on petrol or diesel in view.

With cities growing and opportunities increasing, **Fernando Casado Cañeque** considers the implications for innovation.

Getting the new urban agenda right

It is well known that over 50% of the world's population now lives in cities and it is estimated that we will reach 70% by 2050. With a modest projection of reaching a population of 9.6 billion by then, this implies having 6.72 billion citizens living in urban areas in around just 30 years' time.

We also know that this population growth will actually take place in middle and low-income countries, where 93% of new births are now taking place. Projections suggest that India will surpass China as the world's most populous country, while Africa's population will increase the most and by 2050 will make up the greater share of the global population (Europe and Asia's populations are expected to decrease, while that of the Americas will hold steady).

So, cities are growing and the urban population is increasing, especially in emerging economies but here we find some countries with significant institutional weaknesses and economic constraints that hinder their ability to meet citizens' needs.

The working population

The world is also getting older. The number of people aged 65 and over is projected to triple by mid-century, from 531 million today to 1.5 billion in 2050. Many countries, especially industrialized economies, will see their share of population aged 65 and older surpass the share of people aged younger than 15.

What does this tell us about working-age people? While white hair increases, the working population of many advanced economies will have to support more dependants (workers in countries such as Japan, South Korea and Spain will see their number of dependants double in this period). But countries like India, Nigeria and South Africa will have younger populations, thus bigger working-age populations and fewer dependants per worker. Interestingly, though, those countries with the bigger youth populations are not the ones generating jobs for young people.

In terms of the increase in opportunities, the world has become a single market with broader possibilities for all. Technology has allowed a drastic reduction in the costs of innovation; start-up incubators and accelerators are popping up everywhere; and social media is enabling entrepreneurs and start-ups to build brands and grow their businesses at very low cost.

Around three-quarters of global economic activity is urban and, as the urban population grows, the fruits of urbanization will accelerate innovation and boost the opportunities that are enhanced by human interactions. The urban share of global production and investments will also grow. Cities are currently responsible for the bulk of production and consumption, and are the primary engines of economic growth and development.

All this has generated a lot of enthusiasm among smart cities advocates, as well as big hi-tech corporations. But the question of whether urbanization and population growth can also positively impact small and medium-sized enterprises, slum dwellers, and community and neighbourhood associations in low-income countries is more pertinent than ever.

FERNANDO CASADO CAÑEQUE is the director and founder of GlobalCAD – www.globalcad.org – a strategic development consulting firm that focuses on promoting cross-sector partnerships to achieve the SDGs. Currently, he also co-directs the Towards the Human City Project, for which he is travelling around the world to document the 101 most innovative initiatives promoting a transition towards the concept of 'Human Cities'.

A new agenda in the making

The coming two years will be crucial to answer these questions and address the major challenges that urbanization will generate.

On the one hand, the transition from the Millennium Development Goals (MDGs) to the Sustainable Development Goals (SDGs) provides a unique opportunity to place cities explicitly in the conceptual framework of development plans for the first time. The possibility of having SDG Goal 11 – 'Make cities and human settlements inclusive, safe, resilient and sustainable' – is the first attempt to build a framework of targets and indicators for sustainable cities and human settlements. These bring the possibility of enhanced and effective local, national and regional implementation from a quantitative perspective.

On the other hand, we have Habitat III, the United Nations Conference on Housing and Sustainable Urban Development, taking place in Quito, Ecuador, in October 2016. Its purpose is to reinvigorate the global commitment to sustainable urbanization, focusing on the implementation of a "New Urban Agenda" that will renovate the Habitat Agenda designed in Istanbul in 1996. This will be the first United Nations global summit held after the adoption of the Post-2015 Sustainable Development Agenda and, hopefully, a new climate change agreement. Such an event offers another unique opportunity to discuss the challenges of planning and managing cities, towns and villages.

Getting the new urban agenda right and ensuring there is an SDG 11 on urban and human settlements can provide the incentives needed to encourage the role of cities as drivers of inclusive economic growth and sustainable development. However, we must ensure there are good governance systems in place, as well as robust public finance systems and effective institutions at the local level to make this happen.

Innovation as a driver of local productive capacities

Cities, located on the frontline of the battle for sustainable development, are not only the first entities facing direct challenges, but are also the best-placed to identify opportunities and deliver solutions. One of the issues most cities will have to address is how to become competitive and ensure employment for young people so they won't have to migrate to other cities to find opportunities. Given population trends, we could say that cities that are able to attract young people and offer them the possibility to develop have a brighter future.

Large corporations seem, to a large extent, to have lost their ability to innovate. Most of them are framing their strategies by buying start-ups for new technology and products. As a result, ensuring bottom-up innovation and decentralized local productive capacity is more relevant than ever.

Cities have also become innovation hubs for public policy, becoming responsible for providing enabling environments for innovation and entrepreneurship. Attracting innovative industries, especially small industries and start-ups, requires supportive infrastructure, which the market does not necessarily always offer. An important challenge, therefore, is to combine creative policy design with urban planning, in order to attract companies that generate new businesses for youth. Incentives should focus on getting the private sector to hire youth, on engaging with civil society organizations on strategies that address urban youth unemployment, and on enabling linkages between civil society and the private sector in commercial ventures. Most importantly, cities will need to encourage youth entrepreneurship, and this implies building marketable skills derived from the natural creativity and innovation of young people.

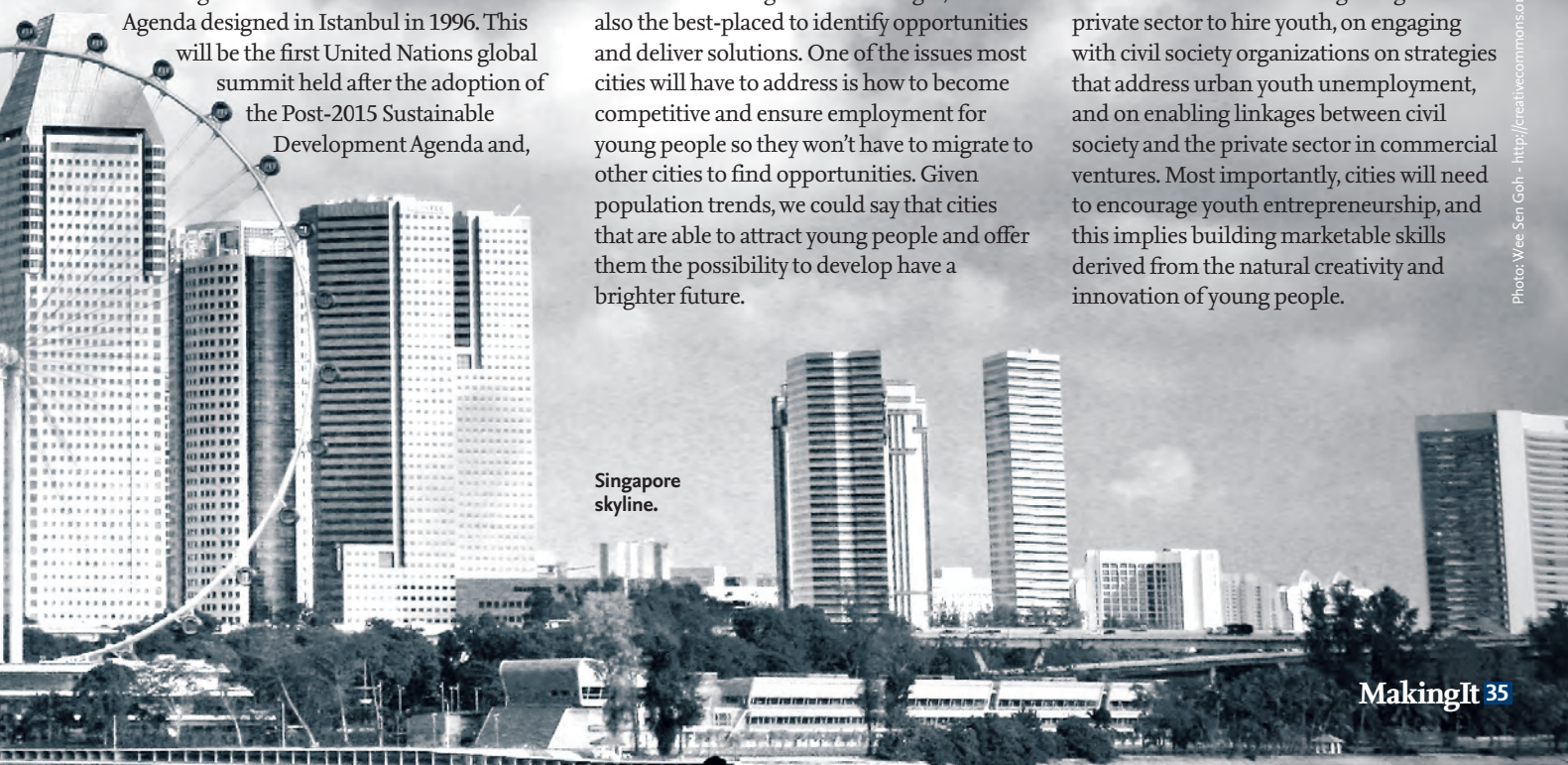


Photo: Wee Sen Goh - http://creativecommons.org/licenses/by-nc/4.0/

Singapore skyline.

Towards a knowledge-based economy

Chile has been one of the world's fastest growing economies over the past decades and is today an economic leader in Latin America, with a nominal GDP per capita of US$15,732. In May 2010, it became the first South American country to join the Organization for Economic Co-operation and Development (OECD). It is also member of the Asia-Pacific Economic Cooperation organization, and has signed free trade agreements with over 60 countries, including China, Mexico, India and South Korea, and with the European Union and Mercosur.

Traditionally the Chilean economy has heavily relied on mining. Exploitation of Chile's gold, silver and copper mines goes back to colonial times, but copper, above all, is the country's main resource. It became the top supplier in the 1980s, when the country was not only rich in copper, but could produce it quickly and at low cost. Today, the main buyer of Chile's copper is China, where the metal is used for industrialization – mainly for construction and infrastructure – and as collateral for financing loans. As of 2013, mining represented more than half of Chile's total exports.

Nonetheless, copper production has slowly started to decline. Even Codelco, the state-owned copper mining company and the world's largest seller of refined copper, is finding it difficult to expand. According to the National Institute of Statistics, from 2013 to 2014 copper production dropped by 7.3% as a consequence of more costly extraction, deeper mines, the use of substitute materials, and a drop in copper prices due to slower growth in China.

Manufacturing industry in Chile accounts for 11% of Gross Domestic Product (World Bank 2013). According to SOFOFA, the Federation of Chilean Industry, the country produces wood products, food, beverages, tobacco, plastics, rubber and chemicals, as well as paper and printing items, machinery and textiles. While it is mainly an export-oriented economy, some items are supplied to the domestic market too, including paper and printing products, chemicals, tobacco and food.

After copper, agriculture is Chile's second-largest source of exports. Exports of goods and services, including advanced retail, shipping and transport, account for an estimated one-third of the country's GDP. Among the top export products are wood and wine, with companies like

At a glance

President: Michelle Bachelet, former Executive Director of UN Women and previously President from 2006–2010

Government: Nueva Mayoría (New Majority), a coalition of centre-left political parties, took office on March 2014 for a four-year term

Population: 17.77M (2014)

Unemployment: 5.9% of labour force (2013, OECD estimate)

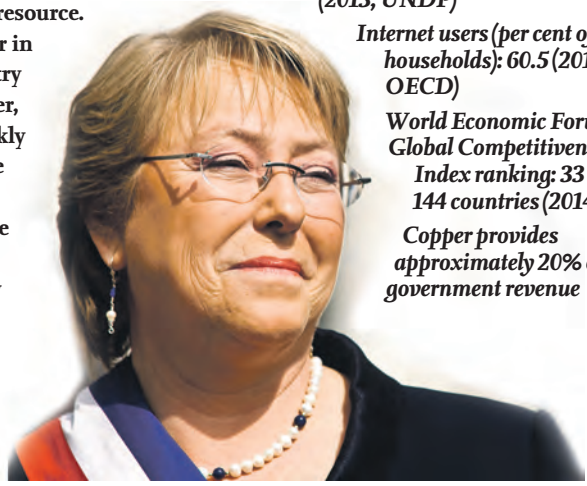
Self-employment (per cent of employment): 26.6 (2011, OECD)

Human Development Index ranking: 41 out of 187 countries and territories (2013, UNDP)

Internet users (per cent of all households): 60.5 (2012, OECD)

World Economic Forum Global Competitiveness Index ranking: 33 out of 144 countries (2014)

Copper provides approximately 20% of government revenue



Right: Michelle Bachelet, President of Chile.

Photo: SoulSense [Oscar Ordenes]

Jorge Rosario at work developing a way of producing organ implants through 3D bioprinting at Cells for Cells, the first Chilean stem cell therapy research company.

Photo: MIT International Science and Technology Initiatives

Celulosa Arauco y Constitución and Concha y Toro leading the respective markets.

Inclusive growth

Chile's economic growth is impressive, but the gap between rich and poor remains pronounced. In terms of income distribution, Chile scored a 0.5 Gini coefficient in 2011, placing it at the very top of the inequality list among all OECD countries. According to World Bank indicators, in 2011 the income share held by the richest 10% was 41.7%, whilst the poorest 10% only held 1.7%.

In an effort to address the challenge of achieving more inclusive growth, since the late 1990s, Chile – in common with a number of other Latin American countries – has been attempting to restructure the economy and to make knowledge and ideas more central to its national economic strategy. The political discourse in Chile has started to reflect the intention to undergo a transition: away from a reliance on finite natural resources towards valuing ideas and knowledge fueled by scientific and technological innovation.

One of the basic building blocks for a knowledge-based economy – and a way to reduce inequality – is education. However, while in 2012 Chile showed a more than 70% enrolment rate in tertiary education, tuition fees at Chilean universities are the highest among OECD countries. On top of this, both public and private universities had selection processes that automatically favoured the better-educated elite coming from private schools. This led some commentators to suggest that, only by investing in education holistically, would Chile be able to offer fair opportunities for all. In other words, public spending should not only go to public tertiary education, but aim at ensuring higher-quality primary and secondary schools too.

During months of massive protests that began in May 2011, students demanded major changes to an education system that had privatized during the dictatorship (1973-90) of General Augusto Pinochet. The protests helped shape the 2013 electoral campaign and propel Michelle Bachelet into power for a second stint as president. In 2014, the first part of a multi-pronged education reform, which includes an end to profits at state-subsidized schools and eliminates their selective entrance policies, was approved by the legislature. The government is now looking to bolster teacher pay and conditions, bring public schools, now managed and financed by townships, under national jurisdiction, and make university education free.

Start-Up Chile

Another key element of a knowledge-based economy is innovation. It is innovation in both products and processes that leads to real technological development, added value, productivity and competitiveness.

Over recent years, the government has launched a raft of public-private ➤

➤ **initiatives intended to increase the levels of new businesses launched by high-impact entrepreneurs who frequently innovate and then create a large number of jobs. The best-known is Start-Up Chile, an innovation experiment that began in 2010. Foreign entrepreneurs were invited to come to Chile for six months where they received US$40,000 seed capital, plus free office space, Internet access, mentoring and networking. In return, the foreigners were expected to interact with local entrepreneurs and to consider making the country their permanent home.**

The policymakers hoped that the foreign entrepreneurs would transform Chile's entrepreneurial culture by teaching the locals how to take risks, help each other and form global connections. As of early 2014, 810 start-ups from 65 countries had been admitted into the programme. Out of that total, 132 companies have chosen to stay in Chile, reporting that they had raised an impressive US$26m in funding.

The government has also made several less well-known structural changes. A national on-line platform enables entrepreneurs to start a new business in one day with zero cost, and a "re-entrepreneur law" makes bankruptcy proceedings straightforward and low-cost. The government has also worked to establish institutions that support scientific and technological work, and research and development.

Chile managed to jump into the 'high-income' country category in only a short span of time, making it one of the most impressive economic growth cases in the world. Today, national efforts to develop a knowledge-based economy – mainly by investing in education and innovation – are putting the country on the path to inclusive growth.

"We are according more value to ideas and knowledge"

Interview with LUIS FELIPE CÉSPEDES, Minister of Economy, Development and Tourism

What are the main characteristics of the new government's industrial policy?
Selective strategic policies aim to foster structural transformation of the economy through the promotion of new economic areas, as well as by enhancing competitiveness. A Strategic Investment Fund of US$1bn will fund relevant strategic investments and the elimination of bottlenecks in strategic sectors.

We are building public-private strategic cooperation tables, where roadmaps are being constructed and where gaps in, for example, human capital, technology and regulation, are being identified for support.

The sectors that we are supporting are:mining, logistics, tourism, aquaculture, solar energy, healthy foods, sustainable construction and creative industries. We are open to new proposals of public-private support, as long as they have growth potential and the technology that the country can learn and benefit from and have sustainability as an essential part of sector development, and as long as coordination or market failures exist that justify government action.

Why is enhancing the industrial sector good for social well-being and inclusion?
Supporting sectors that incorporate new and more advanced knowledge is a way to foster the structural transformation and democratization of market development and growth We are moving away from rents coming from the ownership and exploitation of natural resources towards according more value to ideas and knowledge which are much more democratic. For this reason, good quality of education, particularly public education, is an essential component.

The new government is significantly fostering education in the country. How will this impact on industry and on the economy in general?
It will have a positive effect on both equity and efficiency. Better public education will increase inter-generational equity, decreasing the probability that one's outcome in life is highly correlated to that of one's parents. It will also increase efficiency and productivity since it will allow the best minds in the country to actually achieve all their potential, something that a bad education system significantly curtails.

For us this is very important because it has been observed through numerous studies that the problem of the skills of the Chilean workforce is limiting our country's growth economy. Indeed, the Enterprise Survey of Chile of 2010 conducted by the

LUIS FELIPE CÉSPEDES is the minister of Economy, Development, and Tourism of Chile. Before his current appointment, he was a professor at the School of Business at the Universidad Adolfo Ibáñez. Previously, he has taught Macroeconomics and International Economics at the Universidad de Chile and the Universidad Católica de Chile. In the public sector, Céspedes served as the coordinator of economic policies and chief economic advisor to the Chilean Finance Ministry from 2006 to 2009. He was also manager of Economic Research at the Central Bank of Chile.

Organization for Economic Cooperation and Development, notes that the inadequately educated workforce is the second biggest obstacle to doing business. Moreover, the share of unskilled labour in companies stands at 47%, while in Latin America it is only 38% and just 29% worldwide. This is confirmed by the Global Competitiveness Index of the World Economic Forum, which states in its 2014-2015 edition that the second most problematic factor for doing business is indeed an inadequately educated workforce.

A better educated workforce will improve the productivity of manufacturing, also allowing for higher value products to be manufactured in the country. According to the Annual National Industrial Survey 2012 (ENIA) of the National Institute of Statistics (INE) only 26% of the workforce of Chile's manufacturing firms is skilled labour, so there is still room to grow and reach the level of developed countries.

How will Chile reconcile industrial and economic growth with environmental protection?

The industries in which we are competitive and the new ones that will follow will have sustainability at the centre of their development. Export development and sustainability necessarily require that we have high environmental and social standards. This is particularly relevant for a country that still bases its competitiveness on natural resource-intensive industries, which we are trying to slowly change.

> "A better educated workforce will improve the productivity of manufacturing, also allowing for higher value products to be manufactured in the country."

There are many options on how UNIDO could help, for example, by providing technical and financial collaboration. Currently, the Ministry of Environment receives technical and financial collaboration from various international agencies, such as Germany's Ministry of Environment, consisting mainly of technical assistance and financing of projects related to sustainable consumption and production.

How do you think Chile will be 20 years from now?

I think Chile will have an economy that is much more technology and knowledge-based, and that we will have evolved towards high-value services and products, which will have evolved from our current competitive sectors. It will be a country where much more knowledge is produced and used in our industry in a synergic way.

GOOD BUSINESS

In the latest of a series about remarkable companies, *Making It* talks to a young female Ugandan whose business transforms agricultural waste into fashionable bags.

Oribags Innovations

In 2007, the government of Uganda banned the import, sale and manufacture of plastic bags, leaving many Ugandans striving to find appropriate alternatives. In this context, in early 2009 Rusia Orikiriza Bariho, at that time freshly graduated from university, set up a business to transform agricultural waste such as straw, elephant grass, banana fibre and cotton waste into environmentally friendly bags.

The company, Oribags Innovation, quickly won plaudits and in 2010 it won the SEED Award for sustainable consumption and production recycling. (The SEED Initiative, funded by the United Nations Environmental Programme, the United Nations Development Programme and the International Union for Conservation of Nature, promotes innovative and locally led social and environmental start-ups in developing countries.)

Handing over the award to Orikiriza, the British High Commissioner to Uganda, Martin Shearman, stated, "This award is recognition of your particular achievements in innovation and entrepreneurship so far, of your promising efforts to promote economic growth, social development and environmental protection and, not least, of the potential of your project to inspire others."

More than making bags out of waste

Oribags Innovation has its head office at the industrial park in the capital, Kampala. Oribags workers collect and/or purchase agricultural waste from local farmers and the raw material is then taken to be processed at the incubation centre at the Uganda Industrial Research Institute (UIRI). The paper-making area is also located at UIRI's Kampala industrial incubation centre, which provides facilities to Oribags and 29 other Ugandan industrial entrepreneurs.

Orikiriza explains how the paper pulp is made into a bag, "If we are making a paper bag, after drying the paper, we have to smooth it because if it just dries under the sun, the paper will be very hard and inflexible. So, we use rollers to smooth it out. After that we do the measurement according to the size required by a client. After we've done that, we do the printing because the bags must be personalized according to the client's address and logo, or to have a specific trendy word that they need on the bag."

Photos: Oribags Innovations

While the world's paper bag industry heavily relies on wood, Oribags is saving Uganda's plunging wood resources. Besides being environmentally friendly, Oribags also takes pride in empowering women and young people from the local community. Employing 19 people, 13 women and six men, Oribags represents a model of social entrepreneurship that not only generates jobs and income, but also provides training on entrepreneurship skills.

Today, Oribags Innovations is getting increasing numbers of orders from gift buyers, corporate companies, schools, universities and so on. The cost of its products range from 25 US cents to five US dollars, depending on the size of the bag.

With business looking up, Orikiriza's vision for Oribags is "to become the leading producer of environmentally-friendly products and services in East Africa by 2020". In order to diversify and scale-up the existing range of products, she also envisions a paper-processing pilot plant that will process 40 tons of paper pulp per day for Oribags.

A humble start

Orikiriza was born and raised in the remote village of Kabale in south-western Uganda. The first child born to a humble family – her mother worked as a craftswoman weaving baskets and making beads and ornaments, and her father worked as a pineapple farmer, Orikiriza understood the importance of fighting poverty with her own hands from a very young age.

As a girl, she worked with her mother to produce a local alcoholic brew called 'tonto' which she sold to local bars. The money earned helped pay the school fees and other family necessities. But the family soon couldn't afford her secondary education, and it was only through a relative's help she managed to continue her studies.

"Throughout my education, I knew that the only way to stop the vicious cycle of poverty was to work hard, and start earning money as early as possible," said Orikiriza.

After starting Makerere University, Orikiriza used the skills she learnt as a child to make ear rings and broaches from waste paper. She earned some money to support herself and her siblings, but the business didn't prosper and she was on the verge of giving up. When the government banned plastic bags in 2007, Orikiriza saw new hope. She realized that she could transform waste paper into bags instead! So, in 2009, with about US$300 generated from her first business, she founded Oribags Innovations.

In a blog, Orikiriza revealed that making Oribags grow had been difficult. "It has been a result of strong commitment and sacrifice. For over two years, I operated with no profits and I had to struggle to maintain the business."

Her business got a break when she was recommended for training at the Uganda Industrial Research Institute. The Institute contributed around US$1,000 as start-up capital and offered her work space. The researchers also helped her find the best methods to process locally collected agricultural waste into paper pulp.

Role model for young entrepreneurs

Orikiriza's endeavour has been widely acknowledged in her country and internationally. In 2011, she won the International Alliance for Women's World of Difference Award for her efforts to promote women's economic empowerment, and in 2012, she was made a fellow of the US President's Young African Leaders Initiative.

Orikiriza is also actively involved in many social programmes. For instance, she is the leader and initiator for Youth Works! Uganda, a television programme supporting youth creativity and innovation in Uganda; the Young Entrepreneurs Director to the Board of the Uganda Women Entrepreneurs Association; and the Secretary-General of Women International Maternity Aid (WIMA) – to name just a few.

As a young, successful social entrepreneur, Orikiriza helps other young people in her country to empower themselves through entrepreneurship. She is now working to educate them about entrepreneurship and to help them build the skills necessary to start their own businesses.

Now 28 years old and a mother of two, Orikiriza thinks the biggest challenge for women's entrepreneurship in Uganda is that some women still look down on small businesses. "They forget that most of the successful global businesses started small. If we change our attitudes, then each woman will be empowered globally. There are enormous indigenous opportunities around us and in our communities that can change our lives," she said.

Orikiriza admits the cost of her bags is high, especially due to high taxes. "Oribags is a small enterprise, but we are treated as a big investor and we face the challenge of high taxes". In her opinion, governmental support, such as a more favourable taxation policy for start-ups, is pivotal to encourage youth entrepreneurship in Uganda.

Green industrial policy: a transition of values

By **ANNA PEGELS**, Senior Researcher, German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE)

Western society has traditionally been characterized as a market economy, a system in which the market is meant to correct itself. It stands for liberalization, not regulation. Yet the market is not an end in itself, but rather an instrument. As such, it should subordinate itself to societal goals such as fairness and prosperity for all. In light of climate change and environmental damage, environmental protection has become a part of our societal norms.

And yet this is precisely where the market fails in its current form. Since environmental costs are not usually included in the market, they do not appear in company balance sheets. The conventional market does not work according to the 'polluter pays' principle, and whether a particular company makes an effort to nurture a green image or not, the incentive to abide by new environmental standards is simply too low.

Thus, it is down to policy, and specifically industrial policy, to ensure that the market serves societal goals again. Green industrial policy is not just a minor amendment to traditional industrial policy – it goes far beyond. It is expanding its list of objectives, from economic success alone to creating an economically successful as well as an ecologically sustainable society.

We have been well aware of the ecological challenges for several electoral terms now, and environmental consciousness is rising. So why is the transformation so difficult?

Because the market fails in so many ways.
There is a whole range of costs that are still not yet part of the market. Policy needs to change this situation, for example through the introduction of emissions trading schemes with sufficiently tight caps. At the same time, there is a great deal of insecurity regarding exactly how the market can and should change. Individual companies struggle to decide if they should invest in one technology or another, because they do not know what tomorrow's markets will look like. Policy can help here by shaping the direction to take. And ultimately the focus is on public goods: climate, air, biodiversity and so forth. Policy plays a key role in ensuring that all of us take responsibility.

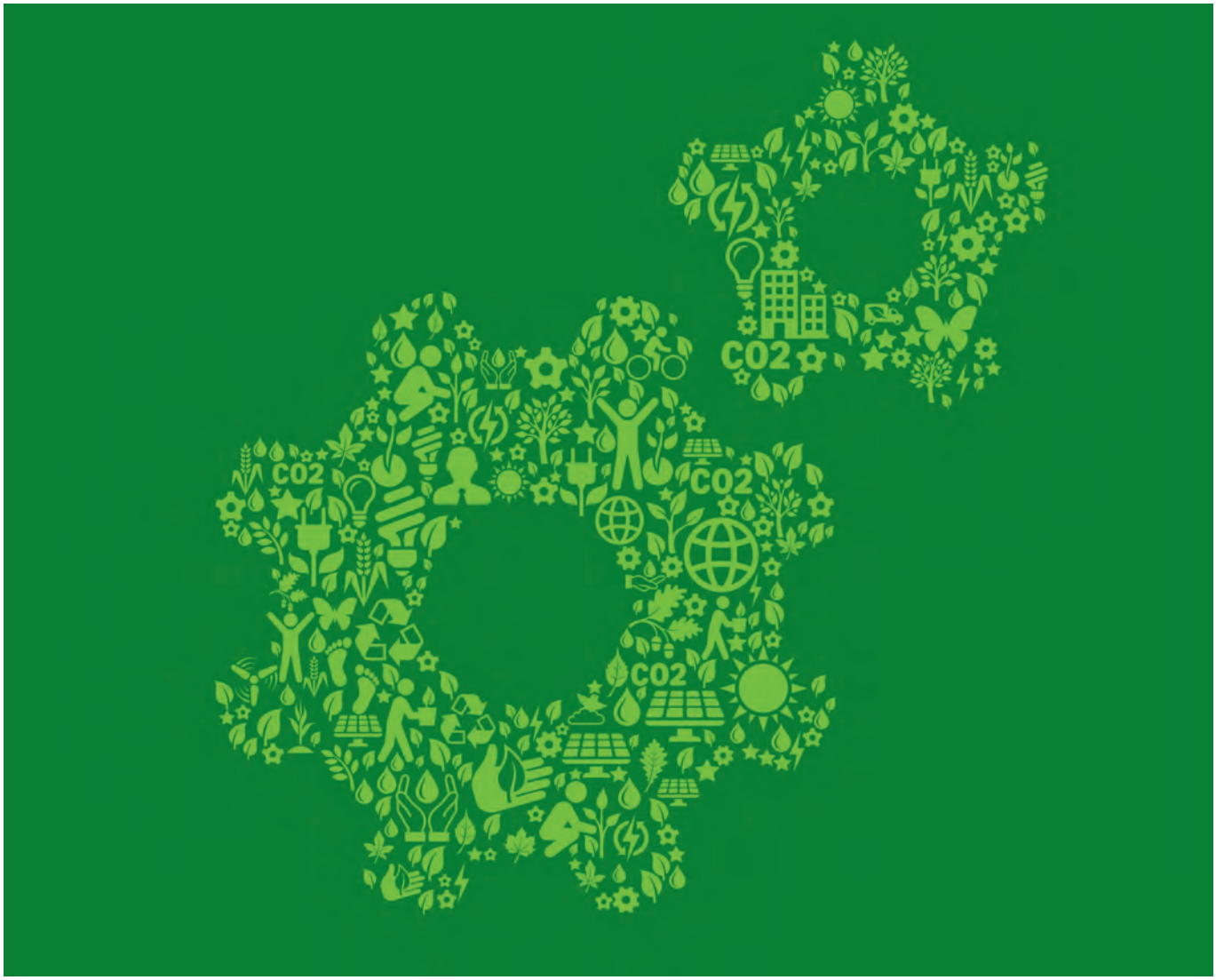
"Left to the market alone, the renewable energy revolution – with its rapidly decreasing costs and global investments in the billions – would never have occurred"

Because great uncertainty meets time pressure.
Policy operates in uncertain terrain. It needs to cater for societal demands of today and reach the correct conclusions for tomorrow – without knowing what tomorrow will even look like. Policy therefore has to cover an extremely broad period. Meanwhile, time pressure is high. We know that we have to lay the groundwork now if we are to stay within safe environmental operating space.

Because new paths have to be explored.
The current path is familiar and has been tested, but we now need to actively explore the unknown. Green industrial policies must create new industries and new patterns of demand. Take renewable energies: German policy stipulated that producers of electricity from renewable sources will receive guaranteed compensation for 20 years. Left to the market alone, the renewable energy revolution – with its rapidly decreasing costs and global investments in the billions – would never have occurred. At the same time, we cannot simply start over from scratch. We are heavily invested in conventional sources of energy, and we must take active steps to phase them out.

The transformation is also about power. And this is why we are facing a critical political challenge. Market transformation implies highly potent interests; the energy sector in particular is central to any economy. Green industrial policy is about shifting profit opportunities, risking that companies seek to influence policy rather than looking towards the customer. Experience shows that policy is not always able to resist. But we can do something to limit this risk:

- Transformational policy requires broad support and a mandate for the



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direction to take. In other words, we need a social contract for sustainability. Civil society must hold policy responsible for its part of the contract.

- A strategic coalition of key stakeholders is required. This includes new stakeholders, such as renewable energy businesses. But support can come from unexpected places, too. For instance when energy-intensive companies realize that renewables can quickly ease supply constraints.
- Policy must invest in systematic learning. Green industrial policy evolution means testing and adjusting policies, and learning from experiences of other countries. It also means that mistakes are allowed – so long as we learn from them.
- The market should remain the key instrument for policy. Once the direction and rules are clear, it must be fully used as an efficient tool.

This article was originally published at www.kreutz-partner.de and is based on the discussion paper, *Green Industrial Policy* by W. Lütkenhorst, T. Altenburg, A. Pegels and G. Vidican, published by the German Development Institute.

Networks for prosperity: advancing sustainability through partnerships

By **JOAQUÍN FUENTES**, Strategic Planning Expert, United Nations Industrial Development Organization

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Any strategic partnership should be underpinned by a solid institutional framework. This concept will be particularly relevant in the implementation phase of the post-2015 development agenda and its 17 proposed goals. In this connection, strengthened global partnerships will be a catalyst for the international community to advance towards an ambitious and transformative sustainable development agenda beyond the Millennium Development Goals. Needless to say, international organizations, and particularly United Nations specialized agencies, will play a critical role in further leveraging the knowledge and resources of all relevant actors in order to maximize the impact of any development strategy at global, regional and national levels.

Middle-income countries in particular need models of cooperation that better suit their development priorities and enhance their productive capacities, including through knowledge exchanges, better access to financing for development, environmentally friendly technology and capacity building. Partnerships and networks are therefore a major pillar for catalyzing and mobilizing action, and are the critical mass necessary for a tangible transformation towards inclusive and sustainable industrial development.

In view of the centrality of partnerships and networks as key means of implementation of the post-2015 development agenda, the new *Networks for Prosperity* report, entitled *Advancing Sustainability through Partnerships*, attempts to advance the understanding of these new and flexible forms of global governance.

This report also contains a new updated version of the *Global Connectedness Index*, which shows that the more connected a country is at all levels, the more developed that country will probably be at social, environmental and economic levels.

Building on the conclusions of previous Networks for Prosperity reports, as well as the experts' findings in the present edition, the report makes the following recommendations:

- The international community should encourage and prioritize initiatives and partnerships that promote innovation and knowledge networking among countries and industries as integral elements of any global and national strategy toward inclusive and sustainable growth and development. Network governance should be at the centre of the future international development framework, as a crucial means of tackling the complexities and challenges of today's globalization and development landscape.
- Countries should consider investing in institutional infrastructure, and in

networks and partnerships that allow industries and public institutions alike to diffuse and transfer knowledge, technology and investments with the objective of providing new knowledge and opportunities. Networks and partnerships are meant to complement, not replace, national governments. States must be willing to invest substantial resources in these new forms of governance. In return, networks can help them and their partners achieve global and national development aspirations, while maintaining their competence and serving their citizens.

- Technology innovation should be a priority for the international community to inform equitable, sustainable solutions to the most pressing issues currently confronting both developed and developing countries. Technology networks for global sustainability have the potential to support decision about and the implementation of the Sustainable Development Goals.
- Multi-stakeholder partnerships and networks should contribute to enhanced policy cooperation and coordination for a more coherent international financial architecture in support of sustainable development. Innovative financing modalities and cross-sector partnerships should embrace new actors and new donors in order to improve the mobilization and allocation of resources for sustainability across all relevant areas and processes of the post-2015 development agenda. Development finance can be a catalyst for change, especially when spurred by increased transparency and accountability.

Addressing global challenges such as climate change, poverty or loss of ecosystems is clearly beyond the individual capabilities of any single actor. Stakeholders and other involved parties must cooperate jointly in order to tackle these challenges by exploring a diversity of alternatives in a comprehensive manner with the ultimate goal of creating shared value.

"Addressing global challenges such as climate change, poverty or loss of ecosystems is clearly beyond the individual capabilities of any single actor."

Half full or half empty?

As a taster for the next issue of *Making It*, **ROBERT C. BREARS** looks at how water can be a catalyst for conflict or for cooperation

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By 2030, global demand for water is projected to outstrip supply by 40% as a result of numerous mega-trends including climate change, rapid economic and population growth, and urbanization. As such there is potential for water to become a catalyst for conflict between multiple users and uses. Conflict could occur inside nations with local water users competing for limited resources or it could occur at the nation-state level with nations competing over trans-boundary water resources.

Rather than being a source for conflict, water can be a catalyst for cooperation with all sections of society across political boundaries involved in the decision-making process of managing precious water resources. However, before we can reduce the potential for conflict over scarce water resources and promote cooperation we first need to understand how water scarcity can lead to economic loss, political instability and environmental degradation, which in turn can trigger conflict.

Water is a vital resource in the production of economic goods and services. Many industrial sectors, including the food, pharmaceutical and textile manufacturers, rely on large volumes of water for production of food, medicines and clothing, and therefore are exposed to the risk of drought. However, it is not only scarcity of water that can impact production of goods and services, too much water can as well. For instance, floods damage critical infrastructure and the excessive amounts of chemicals and sediments that get into water during floods make it unsuitable for industrial use. As such, both floods and droughts have the ability to impact businesses' revenue generation. At the aggregate level, floods and droughts can impact exports of goods and services, which in turn can affect overall employment and income levels leading to social unrest. Water is essential in the production of energy and so a lack of water from droughts can impact electricity production, while floods and extreme-weather events can damage energy infrastructure, further reducing economic output.

As the majority of the world's river basins cross political boundaries, political instability from floods and droughts can occur at both the intra- and inter-state level. At the intra-state level, conflict can occur when scarce water crosses local political boundaries. With numerous countries having internal ethnic disputes, these tensions have the potential to spark civil conflict between sections of society. Meanwhile, there is the potential for tension and even conflict over scarce water resources between nation-states sharing trans-boundary water resources. This can occur when upstream states divert water resources for hydropower, agricultural or industrial production. Even floods can cause tensions between states when upstream states fail to provide early warning of floods to downstream states.

At the local level, human activities, such as rapid urbanization and industrial

production, impact the health of waterways, which in turn impacts the availability of clean water for all users. For example, the impact of urbanization is increased surface runoff which causes non-point source pollution. Unlike pollution from industrial and sewage treatment plants, non-point source pollution comes from many diffuse sources and occurs when surface runoff picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and groundwater. In addition, the health of aquatic ecosystems, which provide vital ecosystem services to both humans and nature, is also degraded. This, in turn, impacts nature's ability to provide healthy water for human use. At the international level, contamination of water resources can lead to conflict between water users as polluted ground and surface water crosses international boundaries.

However, while water has the ability to spark conflict, it can also promote cooperation in and between nation-states. The Integrated Water Resources Management (IWRM) framework has been developed to promote the coordinated development and management of water, land and related resources at the river basin level in order to maximize economic and social welfare in an equitable manner. IWRM also promotes the sustainable use of water resources to ensure healthy ecosystems. IWRM promotes the participation of individuals, communities and water users in all aspects of water management policy and decision-making.

To ensure water is used sustainably, IWRM promotes management instruments to balance demand with supply. Management instruments include: water assessments with hydrological, demographic and socio-economic data collected for informed decision-making; demand management, including pricing of water, subsidies and rebates to encourage efficiency, and awareness campaigns on the need to conserve water; conflict resolution mechanisms to set water allocation rights, water-use limits and dispute resolution tools; regulations to cover pollution control and land-use; technology that increases the efficient use of water resources in domestic and non-domestic use; and finance with investments made by governments, private partners in implementing IWRM.

With demand for water likely to outstrip supply within the next decade and a half as a result of numerous mega-trends, including climate change, rapid economic and population growth, and urbanization, there is the potential for water scarcity to become a catalyst for conflict. This conflict can occur at the local level all the way up to the nation-state level. However, water has the power to be a catalyst for cooperation between all users, both inter- and intra-state. By implementing IWRM, scarce water resources can be managed in a sustainable way that maximizes economic and social welfare in an equitable manner, while ensuring the health of ecosystems.

● **ROBERT C. BREARS** is the founder of Mitidaption and an Associate Fellow of the NFG, Free University of Berlin. He is an expert on the impacts of climate change and environmental risks to business, governance and society and adaption strategies to mitigate these risks. He is a contributing author for the Johns Hopkins University's *Water* magazine, *China Water Risk* and *RepRisk*.

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FURTHER READING

Bloomberg, Michael R. – Advancing climate ambition: cities as partners in global climate action
Chang, Leslie T. – Factory Girls: From Village to City in a Changing China
Daniels, Steve – Making Do: Innovation in Kenya's Informal Economy
Davis, Mike – Planet of Slums
Fischer, Brodwyn, McCann, Bryan, Auyero, Javier (eds) – Cities From Scratch: Poverty and Informality in Urban Latin America
Gouldson, Andy, Colenbrander, Sarah, Sudmant, Andrew and Papargyropoulou, Effie – The Economics of Low Carbon Cities: Palembang, Indonesia
Harvey, David – Rebel Cities: From the Right to the City to the Urban Revolution
Hutchison, Elizabeth Quay, Klubock, Thomas Miller, Milanich, Nara B. and Winn, Peter (eds) – The Chile Reader: History, Culture, Politics
Jha, Saumitra, Rao, Vijayendra, Woolcock, Michael – Governance in the gullies: Democratic responsiveness and leadership in Delhi's slums
Khanna, Parag and Ayesha – Hybrid Reality: Thriving in the Emerging Human-Technology Civilization
Neuwirth, Robert – Shadow Cities: A Billion Squatters, a New Urban World
Neuwirth, Robert – Stealth of Nations: The Global Rise of the Informal Economy
Perlman, Janice – Favela: Four Decades of Living on the Edge in Rio de Janeiro
Shark, Alan R. and Toporkoff, Sylviane – Smart Cities for a Bright Sustainable Future: A Global Perspective
UN-Habitat – Islamabad, Pakistan: Climate Change Vulnerability Assessment

FURTHER SURFING

www.blogs.worldbank.org/sustainablecities – A space for urban development professionals to exchange ideas and engage some of the central questions of sustainable cities
www.c40.org – The C40 Cities Climate Leadership Group (C40) is a network of the world's megacities committed to addressing climate change
www.citiscope.org – Citiscope spurs innovations to help cities work better for all of their people through the power of independent journalism
www.masdar.ae – Masdar City is pioneering a "greenprint" for how cities can accommodate rapid urbanization and dramatically reduce energy, water and waste
www.newclimateeconomy.report – Better Growth, Better Climate: The New Climate Economy is a report by the Global Commission on the Economy and Climate
www.scp-centre.org – The Collaborating Centre on Sustainable Consumption and Production
www.sustainablecitiescollective.com – The Sustainable Cities Collective is an editorially independent, moderated community for leaders of major metropolitan areas, urban planning and sustainability professionals
www.unesco.org/new/en/culture/themes/creativity/creative-cities-network – The Creative Cities Network has a common mission for cultural diversity and sustainable urban development
www.unhabitat.org – UN-Habitat is the United Nations programme working towards a better urban future. Its mission is to promote socially and environmentally sustainable human settlements development and the achievement of adequate shelter for all

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