



# REGENERATIVE CITIES IN CHINA

A Roadmap for a Better Urban Future



The World Future Council consists of 50 eminent global change-makers from governments, parliaments, civil society, academia, the arts and business. We work to pass on a healthy planet and just societies to our children and grandchildren with a focus on identifying and spreading effective, future-just policy solutions. The World Future Council was launched in 2007 by Jakob von Uexkull, Founder of the 'Alternative Nobel Prize'. It operates as an independent foundation under German law and finances its activities from donations.

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# FOREWORD

**Dear Readers,**

The design and functioning of cities is the key to sustainable development. As the international community turns increasingly towards cities and calls upon them to find effective solutions to the world's most pressing issues, one thing remains certain: no substantial global environmental improvement can be achieved without cities on board.

Considering the scale and impact of urbanization and economic growth in China, ensuring the sustainable development of Chinese cities is becoming an increasingly important priority not only for policy makers in China but for the entire international community. More and more international attention is in fact gathering around China to provide support and help in this challenging yet necessary transition towards a more sustainable urban future. The Regenerative City Vision of the World Future Council outlined in this report is an attempt to offer a first conceptual foundation to guide this necessary transformation.

Although Chinese cities are facing some of the most serious environmental challenges such as air pollution, great hope still lies ahead. This hope lies in the transformative power of public policies, political leadership and innovation in effectively driving positive change forward. The key question with this regard remains: what policies work best? The World Future Council is particularly concerned with providing concrete answers to this question. Through the Future of Cities Forum held in Beijing and Tianjin in September 2015, through the launching of its China Cities Programme and through this first report, the WFC intends to advance the understanding of what is needed at the policy level to drive the transformation of Chinese cities into more sustainable, regenerative and liveable entities.

Behind the WFC work in China is the faith that China can really become the traction force behind the needed global transformation towards a sustainable future. A leading China can be in fact an invaluable source of inspiration, a real catalyser of progress from which many countries around the world can learn.

By taking on the challenge to work in China, the WFC wants to deliver a clear message: a global effort is urgently required, both to support China through this difficult yet unavoidable transition but also to learn from its successes and mistakes. The Future of Cities Forum as well as the WFC China were specifically designed to join this global effort by offering a platform to promote and facilitate exchanges of best policy solutions across countries, cities and parties around the globe. Bringing international experts and stakeholders to China and encourage them to share their expertise while also learning about China and the international relevance of Chinese urbanization stays at the bottom of the Future of Cities Forum and WFC China strategy and purpose.

While the policy recommendations highlighted in this report are certainly important and their implementation is indeed warranted, they are by no means unique nor final. A process of continuous learning promoted by an environment of active policy dialogue and exchange of good practices will be essential to find the best solutions to the huge challenges facing Chinese urbanization. International organizations such as the WFC are therefore extremely valuable to promote constructive policy dialogues and international dissemination of best practices. This report offers a first base to start this challenging yet necessary global dialogue and exchange.

We hope you enjoy the reading.



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**OLE SCHEEREN** SPEAKING AT THE FUTURE OF CITIES FORUM IN BEIJING

## ABOUT THIS REPORT

This report is based on contributions of urban planners, researchers, practitioners, city councillors and representatives of civil society and the private sector from around the world. The content of this report was developed following a series of Future of Cities Forums held yearly since 2011, and was specifically compiled following the Future of Cities Forum 2015 in China in September 2015.

The Future of Cities Forum 2015 was held in China on the 14<sup>th</sup> and 15<sup>th</sup> of September 2015 organized by the World Future Council (WFC), the United Nations Theme Group on Climate Change and Environment (UNTGCCE), the China Urban Research Center of Beijing Jiaotong University (BJTU) and supported by the All-China Environment Federation (ACEF), China (Binhai Tianjin) International Eco-City Forum & Expo, the Policy Research Center for Environment and Economy (PRCEE) of the Ministry of Environmental Protection (MEP) and CITYNET. The first day of the Forum was hosted in Beijing as an official sub-forum of the 11th Forum on Environment and Development, and the second day of the Forum took place in Tianjin as a supporting activity of the 6<sup>th</sup> China (Binhai Tianjin) International Eco-City Forum & Expo.

After briefly introducing some of the key opportunities for cities in relation to the Sustainable Development Goals and the Habitat III New Urban Agenda, this report outlines the most urgent challenges of sustainable urbanization in China. This report then summarizes some of the key recommendations to overcome these challenges and to pave the way towards the creation of Regenerative Cities in China. In order to better elucidate certain aspects of urban development, further research was carried out and integrated with the material discussed during the Forum.

## TABLE OF CONTENTS

<b>1. EXECUTIVE SUMMARY</b>	<b>7</b>
<b>2. URBANIZATION: A DEFINING TREND</b>	<b>10</b>
<b>3. SDGS AND HABITAT III: A GLOBAL CALL FOR CITIES</b>	<b>12</b>
3.1 KEY OPPORTUNITIES FOR CITIES IN RELATION TO SDGS AND THE NEW URBAN AGENDA	12
<b>4. URBANIZATION AND ECONOMIC DEVELOPMENT IN CHINA: AN UNPRECEDENTED SCALE AND SPEED</b>	<b>15</b>
4.1 THE BENEFITS OF CHINESE URBANIZATION	16
4.2 ENVIRONMENTAL DEGRADATION: THE GREATEST CHALLENGE OF CHINESE URBANIZATION	18
<b>5. THE NEW NORMAL: A NEW FRONTIER OF OPPORTUNITIES</b>	<b>20</b>
<b>6. THE CITY OF THE NEW NORMAL: THE REGENERATIVE CITY</b>	<b>22</b>
6.1 WHAT IS A REGENERATIVE CITY?	22
6.2 THE THREE FUNDAMENTAL REGENERATIONS	22
6.3 A NECESSARY ENABLING CONDITION: PEOPLE AND COMMUNITY ENGAGEMENT	26
6.4 THE KEY STEPS AND PROCESSES FOR IMPLEMENTATION	26
<b>7. TOWARDS REGENERATIVE CITIES IN CHINA: KEY CHALLENGES AND RECOMMENDATIONS</b>	<b>29</b>
7.1 INNOVATION	29
7.2 COORDINATION	32
7.3 GREEN	33
7.4 INTERNATIONAL COOPERATION	39
7.5 SHARING	41
<b>8. CONCLUSIONS</b>	<b>42</b>
<b>9. REFERENCES</b>	<b>44</b>
<b>10. SPEAKERS AND PARTICIPANTS OF THE FUTURE OF CITIES FORUM 2015</b>	<b>46</b>

# 1. EXECUTIVE SUMMARY

The upcoming two decades are critical for cities around the world. After the Sustainable Development Goals were ratified in September 2015 and a global agreement on cutting CO<sub>2</sub> emissions was approved at the COP 21 in Paris, a New Urban Agenda is expected to be agreed at the Habitat III conference in October 2016 in Quito. As the international community increasingly emphasizes the crucial role of cities in leading the transition towards a more sustainable future, it cannot responsibly overlook the challenges of the most populated and intensely urbanized country in the world: China. At the same time, Chinese authorities and stakeholders should not miss the chance to actively take part in these international processes both to ensure they have legitimate voice and input but also as an opportunity to learn and share their experiences with other countries. While it is undeniable that China benefited immensely from rapid economic growth and urbanization, particularly in terms of poverty alleviation and increase in standard of living, it also significantly suffered, especially from environmental burdens such as air pollution which is adversely affecting people's lives and endangering the long term stability of the Chinese economy.

A new type of urbanization is therefore needed. This new kind of urbanization needs to reflect a different type of development, also known as the New Normal which is currently gaining widespread support throughout China. The New Normal understands the substantial changes affecting China (namely a decline in the availability of inexpensive land and cheap labour, slower economic growth and, above all, increasingly exacerbating environmental distresses) and responds by promoting a new kind of people-centred development that favours slower economic growth, people well-being, innovation, domestic market development and that is particularly devoted to environmental protection and sustainability.

In order to ensure the successful implementation of the New Normal, a new model of urbanization that encourages and supports this new type of socio-economic development is needed. It is hereby recommended that cities in China start their transformation to become *Regenerative Cities*. Given the environmentally degraded conditions of many Chinese cities and ecosystems, a *regenerative* type of urban development that is able to establish a symbiotic and mutually beneficial relationship with the environment is not only recommended but urgently needed.

In order to move towards this new type of *regenerative urban development*, strategic policy recommendations were identified and grouped according to the five key words of the New Development Plan 2016-2020 recently outlined by the Chinese government, i.e. Innovation, Coordination, Green, International Cooperation and Sharing. Following these five key words, the main recommendations can be briefly summarized as follows:

1

## INNOVATION

FOSTER SYSTEM, FINANCIAL AND TECHNOLOGICAL INNOVATION

### SYSTEM INNOVATION

- Establish new mechanisms and criteria to evaluate government officials
- Invest in capacity building for government officials
- Create institutionalized multi-stakeholder task force and coordination bodies to facilitate cross-sectoral cooperation, particularly across city departments

### FINANCIAL INNOVATION

- Introduce innovative and alternative financing instruments for mobilizing financial resources at the city level
- Implement new mechanisms to internalize externalities at the city level
- Establish stable, long-term policy frameworks to incentivize private investments in the green sector

### TECHNOLOGICAL INNOVATION

- Support and encourage Chinese cities to become the leading centres for green technology development. Cities have the potential to become *testing laboratories* for the experimentation and implementation of innovative *regenerative* solutions. Key sectors of technological development include energy efficiency, renewable energy, water management, waste, transport, IT and smart technologies, urban agriculture, bio-remediation, sustainable construction and green buildings

2

## COORDINATION

SUPPORT MORE REGIONALLY BALANCED DEVELOPMENT

- Support small and medium sized cities
- Mitigate rural-urban differences (particularly by promoting small city development close to rural areas)
- Strengthen metropolitan governance to ensure improved coordination and cohesiveness between cities and hinterlands



## 3

**GREEN**

## PROMOTE REGENERATIVE URBAN DEVELOPMENT

Implement *Regenerative Cities*, i.e. cities that not merely have a neutral environmental impact, but a mutually beneficial effect on the ecosystems from which they depend

Support the design and creation of *Sponge Cities*, i.e. cities with a minimal impact on the natural water cycle and able to absorb and naturally filter storm water, refill urban aquifers and preserves healthy urban water resources

Reform the urban planning system in particular:

- Establish long-term national urbanization plans
- Prioritize urban renovation and regeneration of existing neighbourhoods rather than new developments and further sprawling
- Support mixed-used development, higher density and people-centred design that prioritizes pedestrians, cyclists, and public transport and focuses on social inclusion, public spaces, green areas and liveability

## 4

**INTERNATIONAL COOPERATION**SUPPORT EXCHANGE OF POLICY SOLUTIONS  
AND COLLABORATION ACROSS CITIES WORLDWIDE

- Establish city-to-city partnerships among Chinese and international cities
- Support platforms for policy solution exchange across cities
- Promote North-to-South and South-to-South international collaboration

## 5

**SHARING**

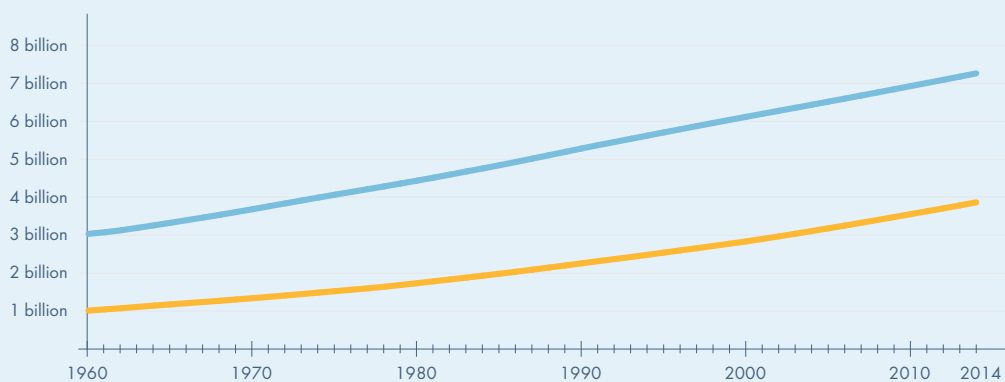
## CREATE CITIES FOR PEOPLE

- Strengthen local participation and engagement, in particular by creating taskforces and institutionalized platforms to coordinate multi-stakeholder engagement, public participation and cross-department collaboration
- Protect cultural, historical and geographical diversity

While these policy recommendations are certainly important and should be taken into consideration when discussing urban policy reform in China, they are by no means unique nor final. A process of continuous learning promoted by an environment of open policy dialogue and exchange will be essential to find the best solutions to the huge challenges facing Chinese urbanization. International organizations can help to build platforms promoting constructive policy dialogues and international dissemination of best practices.

## 2. URBANIZATION: A DEFINING TREND

World population has more than doubled in the past 50 years<sup>[1]</sup>. As populations grew, also cities expanded. In fact, population living in cities actually tripled in the past 50 years<sup>[1]</sup> (as shown in Figure 1 below).



**FIGURE 1:**  
WORLD POPULATION  
AND WORLD URBAN  
POPULATION (1960-  
2014). SOURCE:  
WORLD BANK DATA <sup>[1]</sup>

While half of humanity, i.e. about 3 billion people live in cities today, cities occupy only 2% of total land; yet they account for <sup>[2]</sup>:

- 70% of the world GDP
- 60% of total energy consumption
- 70% of waste production
- 70% of GHG emissions

Projections forecast that by 2030, almost 60 % of the world's population will live in urban areas. By 2050, this figure is expected to rise up to 70% <sup>[3]</sup>. The numbers are astounding. It is estimated that currently 200,000 people migrate to cities every day <sup>[4]</sup>. This means that every year around 70 million people move from rural areas to cities <sup>[4]</sup>. As cities expand at an ever faster pace, particularly in developing countries, significant issues have arisen. Still today informal settlements give shelter to almost 1 billion people. Estimates by UN-Habitat show that the number of people living in slum conditions in 2013 is estimated at 863 million, in contrast to 760 million in 2000 and 650 million in 1990 <sup>[5]</sup>. In fact, one third of the developing world's urban population currently live in slums with extremely poor health and sanitation conditions. Approximately 95 % of urban expansion in the next decades is forecasted to take place in the developing world. During the next two decades, the urban population of the world's two poorest regions (South Asia and Sub-Saharan Africa) is expected to double <sup>[5]</sup>.

Clearly enough, any discussion concerning the sustainability and prosperity of future generations must recognize the crucial role of cities and urban development.

## SOME KEY FACTS ABOUT WORLD URBANIZATION

[3] [4] [5]



2.5 BILLION  
MORE PEOPLE LIVING  
IN CITIES BY 2050



863 MILLION  
PEOPLE LIVING IN SLUMS



3 MILLION  
PEOPLE DYING FROM  
AIR POLLUTION EVERY YEAR



70 MILLION  
PEOPLE MOVING  
TO CITIES EVERY YEAR



95%  
SHARE OF URBAN GROWTH  
IN DEVELOPING COUNTRIES

### 3. SDGS AND HABITAT III: A GLOBAL CALL FOR CITIES

Aware of the critical role of cities in driving sustainable development forward, the international community is increasingly committed to define a new type of urbanization and to assign cities and local governments a chief role in leading this transition forward. As part of the 17 Sustainable Development Goals (SDGs) ratified in September 2015 by the UN General Assembly<sup>[6]</sup>, the 11<sup>th</sup> goal, also known as the urban SDG, specifically aims to “make cities and human settlements inclusive, safe, resilient and sustainable”.

Parallel to the SDGs, there is another major international process specifically concerned with urban settlement and cities. This is the Habitat Conference, a UN global summit held every twenty years. During this conference nearly 200 member states gather to finalize a New Urban Agenda providing agreed non-binding guidelines and strategies on how urban settlements around the world should unfold in the upcoming 20 years. This document is supposed to assist governments in addressing urbanization challenges by setting clear guidelines to support national and local development policy frameworks<sup>[2]</sup>.

#### 3.1 KEY OPPORTUNITIES FOR CITIES IN RELATION TO SDGS AND THE NEW URBAN AGENDA

The approval of SDGs, in particular of an urban SDG, and the upcoming agreement on a global New Urban Agenda can unquestionably offer a wide range of opportunities for cities around the world. Beyond providing strategic policy guidelines, a New Urban Agenda and an urban SDG can play a fundamental role in:



### 1. **RECOGNIZING THE KEY ROLE OF CITIES**

Firstly, an international call to emphasize the role of cities means focusing efforts on where they can have the greatest impact, i.e. cities. In fact, cities host more than half the world's population and are planned to host almost 70% of the world's population by 2050. Currently cities consume 70% of world's resources and emit 70% of the GHG <sup>[2]</sup>. It is clear that, in order to have any meaningful impact, the greatest efforts will need to concentrate on cities.

Secondly, recognizing the importance of cities within the international community means acknowledging the role of cities as engines of growth, progress and innovation. Cities offer the greatest opportunities for human development as they facilitate interaction, provide platforms for sharing ideas and solutions and are the hubs of local action and engagement. The density of cities does not only enable efficient use of resources and infrastructure but it also generates greater opportunities for information and knowledge sharing, cultural exchanges as well as more effective provisions of services such as health and education. Cities are also major centres of economic activities and social mobility as well as a great source of revenue for national governments. Recognizing their fundamental role is therefore extremely important particularly within an increasingly urbanized world.



### 2. **PROVIDING A ROADMAP TO IMPLEMENT SDGS AND COP21 AGREEMENTS**

The The New Urban Agenda is to be approved roughly one year after the ratification of the SDGs and the climate agreements following COP21 in Paris. This can be a great opportunity for the New Urban Agenda to build on these outcomes and provide a clear roadmap for cities on how the SDGs and the agreements of COP21 can actually be achieved through local action and concrete urban policy solutions.



### 3. **RECOGNIZING THE CRITICAL ROLE OF URBAN PLANNING AND DESIGN**

An urban SDG and a New Urban Agenda resulted from Habitat III offer the unique opportunity to put emphasis on the role of urban planning and on the impact it has in ensuring the well-being of people as well as sustainability, safety, inclusiveness and justice. It is known that urban form and spatial development have major consequences on sustainable development. The density for example affects energy use, transport modality but also interaction, social inclusion and liveability of spaces. Emphasizing the role of urban planning and design and bringing these at the centre of the global policy discourse is therefore crucial in the implementation of a more sustainable and liveable future.



### 4. **ASSIGNING CITIES A NEW LEADING ROLE**

SDGs and Habitat III are calling for cities to engage and take on greater responsibilities. Cities should respond to this call and take the lead in driving the transition forward. At the same time it is important that cities do not passively await input from international processes and national legislations but that they play an active role in the drafting of international guidelines and highlight their crucial responsibilities within the international arena. While national governments play an essential role in setting the overarching policy frameworks to allow these international goals to be implemented, cities and local governments will be the ones that will actually have to implement concrete solutions. Assigning cities leading responsibilities will therefore be essential to ensure these international guidelines are actually executed.





## 5. SETTING A COMMON VISION AND SHARED TARGETS

It is very important that countries around the world are able to set a common vision of what they jointly intend to achieve in the next 15 or 20 years. This unites people, stakeholders and interest groups and catalyses action by streamlining global efforts towards a common goal. Cities and countries around the world not only have the opportunity to look up at these international goals for inspiration and guidance but also as a chance to more effectively join their efforts towards an agreed goal.



## 6. SETTING A COMMON REFERENCE POINT TO TRACK PROGRESS

The goals allow countries and cities worldwide to have a common reference point which enables them to measure progress and to compare results relative to a common set of standards and objectives.



## 7. IMPROVING HORIZONTAL AND VERTICAL COLLABORATION

The Habitat III and the urban SDG offer great opportunities to foster new partnerships and collaborations across cities worldwide but also the chance to redefine governance structures. In particular they can be beneficial as they can help:

### Improving city-to-city collaboration:

Thanks to the SDGs and Habitat III collaborations among cities worldwide can gravitate around a common set of goals. This can facilitate cooperation across cities worldwide by allowing cities and stakeholders to work together while keeping a common reference point clear in mind.

### Improving multi-level governance:

The challenges to sustainable urban development cannot be solved by working in isolation but they will require improved dialogue and interaction across the various levels of government. Both the urban SDGs and in particular the Habitat III offer an opportunity for cities and national government to rethink about:

- *Relationship.* Establish a new reinvigorated relationship between national and city governments and rethink how best they can cooperate in order to jointly lead the transformation towards a better future.
- *Coordination.* How should coordination between different government levels improve to ensure that international, national and cities policies are in line and consistent with each other?
- *Decentralization.* How should the governance structure change to ensure greater power and authority to cities? Both the urban SDG as well as the New Urban Agenda will allow to better define how national governments can delegate both responsibilities and resources to cities to accomplish their goals. In fact, despite the increasing importance of cities, local governments and municipalities many times struggle to win the financial resources and legal authority to deal effectively with urban problems. While cities will have to face directly the greatest threats such as climate change, poverty and hunger, they are also the ones that will have the greatest opportunities to find the best solutions to their own problems. Besides, policies at the city level can many often be implemented much faster and can be more effective to tackle specific issues.
- *UN governance.* How should the UN governance structure change to ensure that a debate goes beyond member nations to include cities and local communities? A bilateral effort will be essential. On one side, the international institutions and national governments should provide clear guidelines and enabling frameworks to allow local governments and cities around the world to stick to a common vision and to have the mandate to take action. On the other side, cities should be committed to take up responsibilities in the actual implementation of goals while demanding to increase their representation within the international arena.

## 4. URBANIZATION AND ECONOMIC DEVELOPMENT IN CHINA: AN UNPRECEDENTED SCALE AND SPEED

The relevancy and significance of the international processes discussed so far could not be greater in China, a country whose scale and speed of urbanization is unprecedented. Given the scale and impact of Chinese urbanization, the creation of a sustainable urban China is a matter that should not only concern cities in China but all parties and countries around the world. For this reason, familiarizing with the challenges and opportunities related to sustainable urban development in China will be extremely important especially as the world paves its way towards the approval of a New Urban Agenda. Overlooking the issues and needs of Chinese urbanisation might make the new global agenda inadequate, if not irrelevant. At the same time, Chinese authorities and stakeholders should not miss the chance to actively take part in these international processes both to ensure they have legitimate voice but also as an opportunity to share their experiences as well as learn and get inspired.

In the past 50 years population in China has doubled, reaching almost 1.4 billion people today<sup>[1]</sup>. China is not only, and notoriously, the most populous country in the world but also the second world's largest economy. In 2014 its nominal GDP reached approximately \$10,360 Billion. Only in 1980, this figure was 60 times smaller; likewise GDP per capita was almost 40 times smaller than it was in 2014<sup>[1]</sup>. This huge economic expansion was driven by an astonishingly fast industrialization that led China to become the largest manufacturer in the world as well as the world's largest merchandise exporter, with more than \$2.2 Trillion worth of goods exported around the world every year<sup>[7]</sup>. Just in 1990 it produced only less than 3% of global manufacturing output by value, in 2014 this value reached nearly 25%<sup>[8]</sup>.



**"THE SCALE AND SPEED OF URBANIZATION IN CHINA IS UTTERLY INCOMPARABLE WITH THE ONE IN WESTERN COUNTRIES",** NEVILLE MARS, PRINCIPAL MARS ARCHITECTS, FUTURE OF CITIES FORUM 2015

As expected, industrialization came with urbanization. As more and more industries developed in and around cities, more and more people migrated into cities. In fact, the share of China's population living in cities went from 19% in 1980 to roughly 54% in 2014<sup>[1]</sup>. Cities in China are predicted to grow by roughly 13 million people every year until 2030<sup>[9]</sup>. This means that by 2030 they will house around 1 billion people – about 70% of China's population<sup>[9]</sup>. Cities in China also tend to be very large and are these larger cities that still today attract an increasingly higher number of people. Currently, China has 142 cities with a population of more than one million, while in 1978, these were only 29<sup>[10]</sup>. A recent OECD study<sup>[11]</sup> claims that, as of 2015, China has 15 cities with more than 10 million inhabitants. This clearly shows the difference in scale compared to many other countries in the world. It is important to keep this in mind as this has far-reaching implications on the type and magnitude of issues and needs that arise within cities in China compared to, for example, European cities.



Population:  
**1.4 BILLION PEOPLE**

GDP (Nominal):  
**\$10,360 BILLION**  
(World 2<sup>nd</sup> Largest)

GDP per capita in 1980:	GDP per capita in 2014:
<b>\$193</b>	<b>\$7,590</b>

Percentage of Global  
Manufacturing output by value:

1990:	2014:
<b>3%</b>	<b>25%</b>

Share of population living in Cities:

<b>19%</b>	<b>54%</b>	<b>70%</b>
in 1990	in 2014	in 2030 (expected)

Expected yearly urban population  
growth until 2030:  
**13 MILLION PEOPLE  
PER YEAR**

Cities in China with more than  
one million people:

1978:	2015:
<b>29 CITIES</b>	<b>142 CITIES</b>

## 4.1 THE BENEFITS OF CHINESE URBANIZATION

Before dealing with the issues related to urbanization in China, it is important to recognize the benefits that accompanied fast economic growth and urbanization in China during the past 30 years. These are briefly summarized in the following paragraphs.



A NEW **TRANSPORT NETWORK** ALLOWED IMPROVED MOBILITY AND CONNECTIVITY ACROSS THE COUNTRY AND ABROAD WHICH SHAPED AN INCREASINGLY MORE DYNAMIC AND OPEN SOCIETY. (NANPU BRIDGE, SHANGHAI. SOURCE: SHUTTERSTOCK)

### 1. IMPROVED MOBILITY, CONNECTIVITY AND ENHANCED LIFESTYLE

Urbanization in China was accompanied by the development of an extremely large network of new infrastructure such as water supplies, waste water treatment, roads, power lines, airports, ports, railways as well as service infrastructure such as schools and hospitals. Larger and more efficient communications infrastructures were also established as well as improved commercial and environmental services. All of this new infrastructure allowed a large number of people to leave farming for better lives in the cities which improved their lifestyles considerably. A new transport network allowed improved mobility and connectivity across the country and abroad which shaped an increasingly more dynamic and open society<sup>[12]</sup>.



CITIES ARE **TRANSFORMATIVE CENTRES** AND **INNOVATION HUBS** WHICH ULTIMATELY PROMOTE PROGRESS AND HUMAN DEVELOPMENT (TRAIN STATION IN SHENZHEN. SOURCE: SHUTTERSTOCK)

## 2. INNOVATION AND HUMAN DEVELOPMENT

The role of cities as engines of growth and development cannot be overestimated. The density of many Chinese cities did not only allow for greater efficiency, better competitiveness, improved social mobility and economies of scale but also for better interaction, information and knowledge sharing, cultural exchanges and improved provision of services. Cities are transformative centres and innovation hubs which ultimately promote progress and human development. This was certainly true also for China<sup>[12]</sup>.

Life expectancy in China  
(World Health Organization Data, 2015):

In 1960: **43**    In 2013: **75**

Proportion of China's population living  
on less than \$1.90/day (World Bank Data):

In 1990: **66.6%**    In 2010: **11.2%**

**70 MILLION PEOPLE**  
are planned to be taken out of poverty  
in the next 6 years in China

## 3. BETTER QUALITY OF LIFE

Economic growth and urbanization allowed hundreds of millions of people to escape poverty. Also thanks to the improved services and sanitation conditions offered by Chinese cities, standard of living and life expectancy of Chinese people has increased considerably. In 1960 average life expectancy was at around 43 years. In 2013 it was 75 years<sup>[11]</sup>. Between 1990 and 2010, the proportion of China's population living on less than \$1.90/day is estimated to have fallen from 66.6% to 11.2%. It was estimated that between 1981 and 2008 roughly 600 million people were taken out of poverty<sup>[13]</sup>. About 12.3 million people earned enough in 2014 to move above the poverty line, compared with 43.3 million in 2011<sup>[14]</sup>. Still today, China hopes to lift all its 70 million living beneath the poverty line to safety within the next six years according to a recent government official declaration by Hong Tianyun, deputy director of China's State Council Leading Group Office of Poverty Alleviation and Development of China in October 2015<sup>[14]</sup>.



## 4.2 ENVIRONMENTAL DEGRADATION: THE GREATEST CHALLENGE OF CHINESE URBANIZATION

As highlighted so far, it is undeniable that growth and urbanization in China has improved the standard of living and the life opportunities of hundreds of millions of people. However this has not come without burdens. Chinese cities are currently facing an increasing number of threatening environmental concerns. These are briefly summarized below.

### 1. AIR POLLUTION

Air pollution is probably the number one challenge affecting the health of millions of people living in cities in China today. Citizens of large Chinese metropolis are only rarely blessed with a blue, clear sky. For example, in 2013, good air quality days in Beijing were 176 days, 48.2% of the whole year - not even half<sup>[15]</sup>. A recent study carried out by Berkley University estimated that air pollution currently contributes to 1.6 million deaths/year in China, roughly 17% of all deaths in China<sup>[16]</sup>. Another study estimated that life expectancy in the northern part of China decreased by 5.5 years because of air pollution<sup>[17]</sup>.



POLLUTED DAY IN BEIJING, IN CHINA **AIR POLLUTION CURRENTLY CONTRIBUTES TO 1.6 MILLION DEATHS/YEAR.** SOURCE: BREAKINGENERGY.COM

### 2. WATER SCARCITY AND WATER POLLUTION

Challenges surrounding water resource in China are extremely severe, particularly in urban areas. Given the large amount of sprawling and lack of green areas, cities have become mostly impermeable. This means that groundwater is not refilled by storm water as most of it is intercepted by impermeable surfaces and diverted into natural streams and rivers. As a direct consequence, an increasing amount of water is discharged into rivers without treatment. This not only increases the pollution levels of rivers and groundwater, but is also prevents urban aquifers to be naturally refilled by storm water filtering through the ground, as this is intercepted by the extensive impermeable surfaces of the city instead. Consequently, considerable water stress issues are reported in many parts of China<sup>[17]</sup><sup>[18]</sup>. Climate change related droughts and water scarcity issues are also predicted to become ever more significant in the coming years. Currently, it was estimated that there are 11 provinces in China considered water scarce and six provinces are in state of acute water scarcity, with respectively less than 1,000m<sup>3</sup> and 500m<sup>3</sup> of water per person per year<sup>[18]</sup>. At the same time among the 4,778 spots in 203 cities monitored by the Ministry of Land and Resources in 2013, underground water quality was ranked "very poor" or "relatively poor" in nearly 60 percent of them<sup>[17]</sup>.

In order to tackle this issue the concept of the *sponge city* has gained considerable attention in China. The *sponge city*



IN 2013, **NEARLY 60% OF GROUNDWATER SITES MONITORED WERE REPORTED AS POLLUTED** BY THE MINISTRY OF LAND AND RESOURCES. SOURCE: BERT VAN DIJK



indicates a particular way to design and build a city. This approach attempts to transform cities from impermeable systems that only consume and pollute water, to structures well integrated with the natural water cycle. This is achieved by designing the city such that most of the storm water is absorbed by the ground, naturally filtered by the soil and allowed to reach into the urban aquifers that can be safely used as a source of clean water by the city. Further details on the concept of the sponge city will be presented in Section 7.3 of this report.

### 3. GHG EMISSIONS AND CLIMATE CHANGE

Unsurprisingly, given the scale of growth and industrialization, China has become the world's largest Greenhouse gas (GHG) emitter. In 2015 China was still the world's largest emitter of CO<sub>2</sub>, contributing to 28% of global energy-related CO<sub>2</sub> emissions<sup>[19]</sup>. This comes as no surprise particularly considering that almost 70% of China's entire primary energy supply comes from coal<sup>[20]</sup>. The effect in terms of global warming and climate change are already perceivable. Increase in average temperature in China (0.7° C increase from 1961 to 2000) and collapse in rainfall (between 22% and 33% in Northwest China) are already reported. More frequent floods and droughts are also a major source of concern<sup>[21]</sup>. Reports from the Ministry of Environmental Protection<sup>[22]</sup> highlights that in 2011 temperature in several Southern regions, including the urban area of Chongqing, reached all-time high.



A CHEMICAL PLANT IN ZHAIJIANG, CHINA. IN 2015 CHINA WAS STILL THE **WORLD'S LARGEST EMITTER OF CO<sub>2</sub>**, CONTRIBUTING TO 28% OF GLOBAL CO<sub>2</sub> EMISSIONS. SOURCE: SHUTTERSTOCK

### 4. SOLID WASTE AND SOIL CONTAMINATION

Problems related to solid waste and soil contamination are also raising concerns in China. Firstly, extensive industrialization led many industries to discharge huge amounts of contaminants directly onto the soil and into water bodies. This has afflicted the health of people in cities and villages throughout China<sup>[23]</sup>. According to a 2014 study by the Ministry of Land and Resources<sup>[24]</sup>, 16% of the country's land is contaminated by heavy metals or other pollutants and 19.4% of arable land is contaminated. Parallel to soil pollution, solid waste management issues in urban areas are also reason of growing alarm. The World Bank estimated that municipal solid waste (MSW) generation in China will reach 1,397,755 tons per day by 2025<sup>[25]</sup>. Recycling rates are still relatively low with only 22% of plastic being recycled by manufacturing industries in 2013<sup>[26]</sup>. As reported in 2012, around 50% of Chinese waste is legally landfilled, 12% is burned, about 10% used for fertilizer and the rest (almost 30%) is mostly left untreated, much of it simply dumped, many often illegally<sup>[27]</sup>. For example, in 2010 more than 500 illegal dumping sites have been recorded in Beijing's outskirts<sup>[28]</sup>, polluting soil as well as groundwater. In addition, approximately 3.3 to 5.6 million people are involved in the informal collection and recycling sector of municipal solid waste in China, and are responsible for recycling about 17-38% by weight of Chinese municipal solid waste<sup>[29]</sup>.



**PLASTIC WASTE** CLOGS UP A POLLUTED CANAL IN THE OUTSKIRTS OF BEIJING IN 2012. SOURCE: MARK RALSTON/AFP/GETTY IMAGES

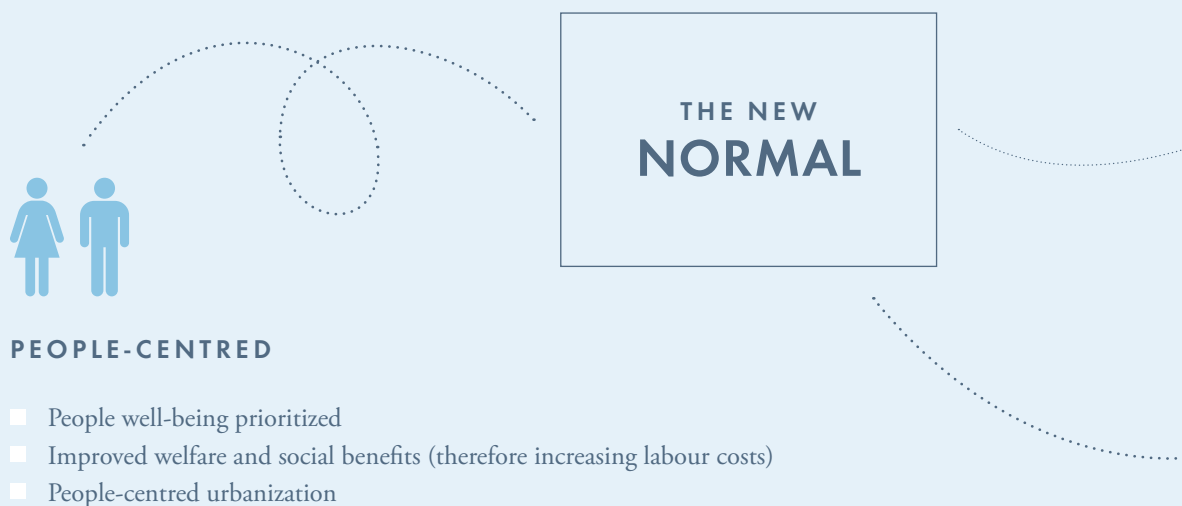
## 5. THE NEW NORMAL: A NEW FRONTIER OF OPPORTUNITIES

The fundamental conditions that have so far ensured fast urbanization and economic growth in China have changed. There are four main circumstances that are changing the foundations on which the current type of economic development in China was based upon <sup>[11]</sup> <sup>[30]</sup>. First of all, so far a great part of the environmental costs associated with industrialization and rapid urbanisation were externalized at the expenses of the environment and of future generations. Fast, GDP-based economic growth was prioritized while environmental problems were many times ignored and resolutions postponed indefinitely. Secondly, cheap labour costs that so far ensured much of the Chinese competitiveness will not remain unchanged particularly given the growing demand for greater welfare and social protection. Thirdly, the fast urbanization and sprawling of cities was so far enabled by the large availability of cheap rural land. This continuous sprawling and expansion into rural land

will not be able to sustainably endure. Lastly, as export demand decreases <sup>[31]</sup>, an ever growing export market cannot be the only motor of growth behind the Chinese economy. A shift from an export-driven economy to a domestic consumer-driven economy is expected.

It is clear that any form of sustainable growth and urbanization cannot possibly be based on the long term validity of the four above mentioned conditions. The Chinese government is increasingly aware of this and as a response to these changes a new type of development known as the *New Normal* is gaining momentum throughout the country.

The *New Normal* is a new kind of development that understands and responds to the effects of the above mentioned changing factors. This New Normal gravitates around three main core ideas.



## 1. PEOPLE AT THE CENTRE

There is a need to shift the focus of development towards a people-centred type of urbanization that seeks to improve the quality of life and social benefits of all urban dwellers. Most of all, this will require a reformed household registration system and basic public services for all.

## 2. BETTER QUALITY GROWTH

A frenetic pursuit of economic growth, a focus on quantity rather than quality and a tendency to grow faster disregarding long term effects have been affecting the Chinese economic culture for the past decades. Economic growth was also seen as the most important part of urban development. However as growth already decreased from a whopping 14% in 2007 to a 7% in 2014, the New Normal is focusing on better quality growth, less dependent on increasing exports, on large heavy-industrial investments and on real estate development and more attentive to improving equity and social services and expanding domestic consumption<sup>[32]</sup>. Government leaders need to work on promoting well-being, fostering more controlled growth and community-focused development alternatives. This new type of economic growth will concentrate on improving the service sector and on promoting innovation and technology development particularly within the green and eco-city sector.

Lastly it is also important to highlight that this type of growth might risk to remain irrelevant to many parts of China which are still poorer. In fact, in many of the poorer regions of China it could still be not pragmatic to talk about sustainability and environmental protection when the basic needs are still to be met. People are urged to increase their standard of living and to pursue traditional development before worrying about environmental matters. Therefore ensuring the establishment of a policy framework that allows them to leapfrog and avoid mistakes made by the richer parts of the country will be essential.

## 3. ENVIRONMENTAL SUSTAINABILITY

Given the huge environmental challenges highlighted in Section 4.2, reducing the negative effects of growth and urbanization on the environment is a top priority of the New Normal. Cities need to be promoting circular and low-carbon development, conserve water, land, and energy and use resources efficiently while intensifying ecological restoration and environmental protection. Given the huge environmental burden of cities, a new type of urban development in harmony with the ecological systems from which they depend will therefore be essential.



### BETTER QUALITY GROWTH

- Slower Growth
- Growing domestic market
- Smaller export market
- Quality over quantity
- Focus on Innovation, Research and Development and Green Technologies



### ENVIRONMENTAL SUSTAINABILITY

- Environmental protection prioritized
- Internalization of environmental costs
- Decreasing availability of cheap land
- Less land intensive urbanization (density over sprawling)

## 6. THE CITY OF THE NEW NORMAL: THE REGENERATIVE CITY

The role of cities and urbanization in ensuring the economic and environmental prosperity of China cannot be underestimated. Therefore in order to ensure the successful implementation of the New Normal, a new model of urbanization that encourages and supports this new type of socio-economic development is needed. It is hereby recommended that cities in China should start their transformation to become Regenerative Cities. This would allow them to effectively meet the priorities of the New Normal and in particular ensure their long-term environmental sustainability.

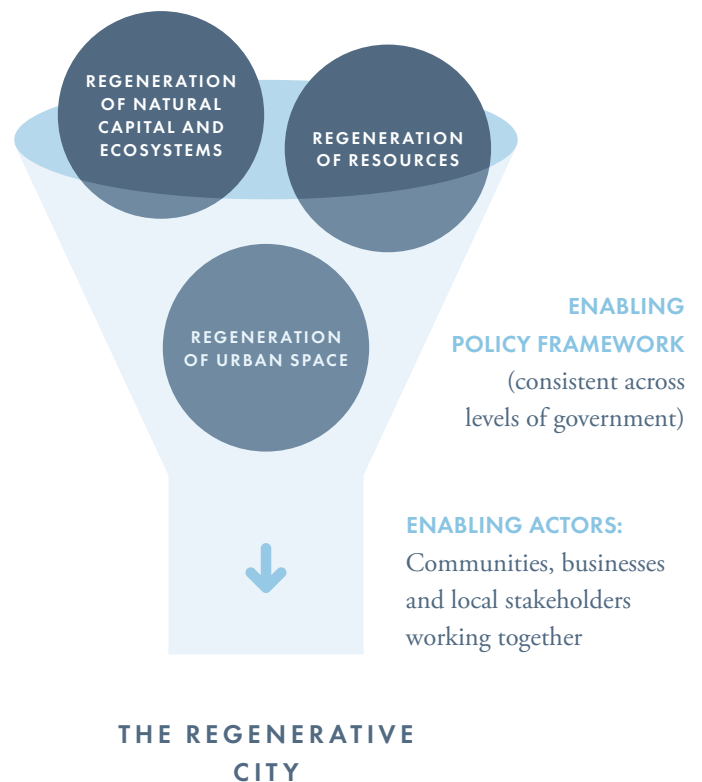
### 6.1 WHAT IS A REGENERATIVE CITY?

The Regenerative City can be defined as a city that regenerates the resources it consumes by maintaining an environmentally enhancing, restorative relationship with the ecosystems from which it draws resources for its sustenance. If urban areas are to continue to offer individuals the prospect of an improved quality of life and ability to realise their potential and aspirations, they must recognise and embrace their role in ensuring that the earth's life support systems remain healthy and sound. Considering the unprecedented scale at which cities consume and discard resources and how, especially in China, cities are already severely afflicted by environmental burdens such as water contamination and air pollution, it is clear that sustaining the current status is not sufficient. A further step is needed. This means moving beyond a restrictive definition of sustainability and embrace a broader model of urban development that puts the emphasis on the need for cities not to only to *sustain* but to actively *regenerate* the natural resources they need and consume. A Regenerative type of urban development transforms cities from systems that only deplete resources and damage ecosystems to dynamic systems that restore a mutually beneficial, symbiotic relationship with the sur-

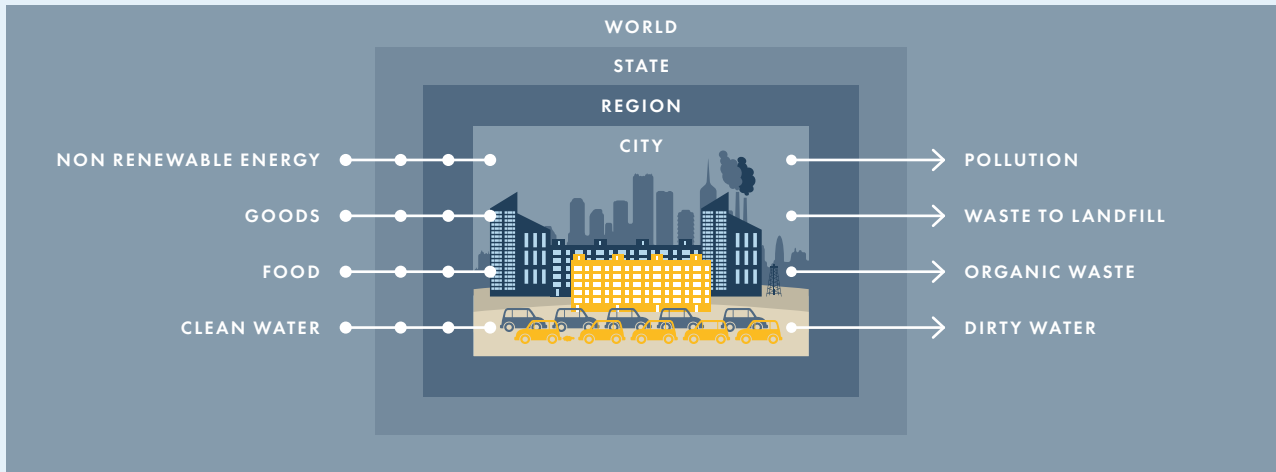
rounding environment. Using the expression used by the Canadian architect Craig Applegath during the Future of Cities Forum, regenerative means shifting the approach “from simply doing less harm to doing more good”.

### 6.2 THE THREE FUNDAMENTAL REGENERATIONS

The term *regenerative* explicitly hints at the role of regeneration as a fundamental feature of this type of urban development. The ultimate aim of a regenerative city is to be able to regenerate the resources that it absorbs. This is achieved by promoting the following three key interventions:

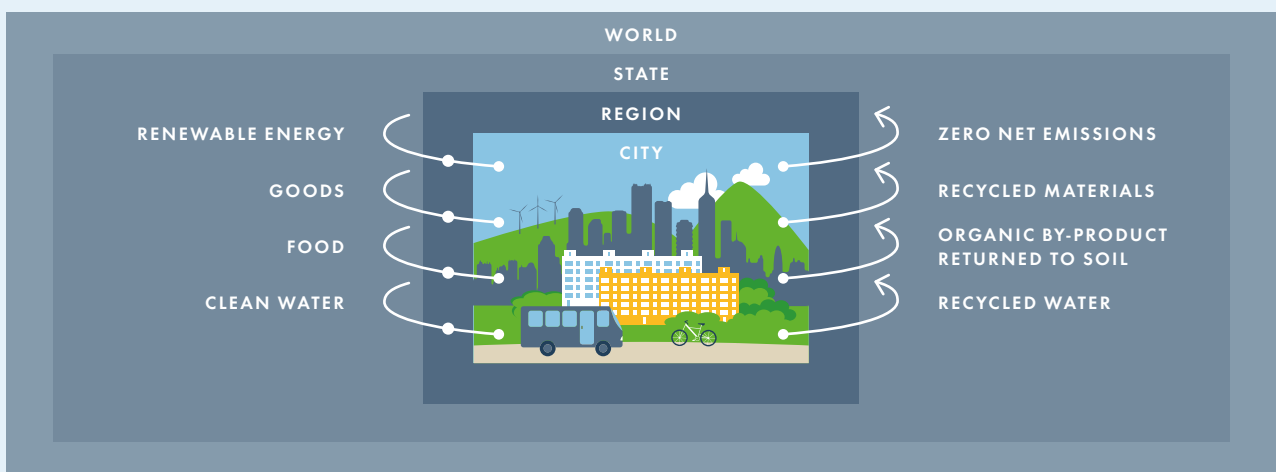


## LINEAR VS CIRCULAR METABOLISM



In a **LINEAR SYSTEM**, the city mostly consumes resources imported from far away and creates huge quantities of unusable outputs, mostly waste and pollution. This model assumes an infinite amount of resources is available and disregards the effects of pollution on the environment and on the stability of the climate.

In a **CIRCULAR, REGENERATIVE SYSTEM**, the city not only consumes resources but also contributes to producing and regenerating the resources it consumes. Materials and goods from the region are prioritized. Energy comes from local renewable energy sources. Waste is re-defined as a by-product that can always be recycled or reused in another processes. Water is also recycled or treated before discharged into natural water bodies. Organic waste is treated and used as soil fertilizer.





## REGENERATION OF RESOURCES: THREE KEY INTERDEPENDENT ELEMENTS

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### 1. CIRCULARITY

#### CREATING VALUE FROM WASTE:

- Re-design with the end in mind
- Upcycle
- Recycle

### 2. SERVITIZATION

#### FUNCTIONALITY OVER OWNERSHIP:

- Provide services instead of owned products
- Renting and leasing
- Repair and warranty (motivate design of durable, high-quality products)

### 3. SUFFICIENCY

#### REDUCE RESOURCE CONSUMPTION

- Energy savings and energy efficient technologies
- Sharing Economy
- De-materialized economy: less consumption-based

## 1. THE REGENERATION OF RESOURCES

Regenerative urban development seeks to mimic the circular metabolic systems found in nature. This will require a switch in paradigm away from the old linear metabolism (which allows cities to operate within an isolated segment of the resource cycle) to a new circular metabolism. This will mean closing the urban resource cycle by finding value in outputs that are conventionally regarded as waste and using them as resource inputs in local and regional production systems. For example, all the energy the city consumes needs to be able to be naturally regenerated by natural processes. For this reason, renewable energy is considered the only viable energy sources for regenerative cities, as it is continuously available and does not involve the consumption of a finite stock such as fossil fuels. Similarly all the material goods the city needs are not discarded into landfills but are kept in the resource loops by being upcycled, recycled, reused or by becoming a useful input in another processes such as energy production processes.

## 2. THE REGENERATION OF NATURAL CAPITAL AND URBAN ECOSYSTEMS

The regeneration of damaged ecosystems, the protection of natural capital and the improvement of the capacity of the city to generate the natural resources it needs are all fundamental features of the regenerative city. The city therefore is not only conceived as a consuming entity, but actively contributes to the production of the resources it needs and to the restoration of the natural capital and ecosystems from which it depends. For example, food supplies are complemented through urban agriculture (including vertical agriculture), energy through solar rooftops, geothermal and bio-waste, and water through storm water collection at the block level and by allowing urban aquifers to be replenished as water is allowed to permeate through the extensive green areas around the city. This enhanced ecosystem service infrastructure within the urban area improves the city's self-sufficiency as well as its resilience. For example, increasingly relying on urban agriculture and on food from the immediate hinterland improves self-sufficiency while extensive greener areas provide benefits in terms of pollution mitigation, CO<sub>2</sub> sequestration, water retention, natural filtering for cleaner urban aquifer, flood resilience etc. Similarly, relying on renewable energy sources from within

the city or from the immediate surroundings increases the city's resilience to energy prices fluctuation and dependency on imports. In addition, the regeneration of the productive capacity of the city and its ecosystems will lead to a renewed, enhanced relationship between cities and their hinterland and between urban and rural areas.

### 3. REGENERATION OF URBAN SPACES

The third type of regeneration is what is commonly known as urban regeneration. Rather than sprawling and expanding on virgin land, the focus of the urbanization process should be on creating denser cities by renovating the existing urban fabric and redeveloping existing sites. Increasing density has in fact huge benefits in terms of efficient use of energy, resources, infrastructures and transport. At the same time, the focus of urban regeneration projects should be on making cities more people-centred, increasingly functional for the community, more accessible and inclusive and at the same time able to positively enhance the natural systems of the city and of the surrounding areas. Retrofitting and renovation projects are prioritized while at the same time historical and cultural heritage is also conserved and revalued. Enhancement of urban ecosystem is paramount and it is achieved by making sure the city is rich of green areas and vegetation that, for example, help to block shortwave radiation, cool the ambient and create more comfortable urban microclimates. The latter can be highly beneficial, particularly given the risks of increase in temperature due to global warming. Improving urban ecology, promoting bioremediation of degraded areas and flora regeneration are also prioritized and have benefits beyond the environmental ones as they also increase the liveability and aesthetic value of the city.

## REGENERATION OF NATURAL CAPITAL AND URBAN ECOSYSTEMS: THREE KEY INTERDEPENDENT ELEMENTS

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### 1. CITY AS CENTRE OF ECOSYSTEM REGENERATION

- Expansion of urban and peri-urban green areas (afforestation, parks, rewilding, etc.)
- Green Rooftops
- Sponge City Design (Natural storm water infrastructure, storm water filtration, flood resilience, etc.)
- Urban Biodiversity protection and enhancement

### 2. CITY AS NODE OF PRODUCTION

- Energy: Citizens As Prosumers (local renewable energy)
- Food: Urban Agriculture, vertical farming, peri-urban sustainable agriculture
- Water: collection, treatment and recycling of storm water and wastewater

### 3. DECENTRALIZATION AND SUBSIDIARITY

- Priority given to local products
- Improved urban-rural relationships
- Increased self-sufficiency and resilience

## REGENERATION OF URBAN SPACES: THREE KEY INTERDEPENDENT ELEMENTS

### 1. COMPACT

#### REDEVELOPMENT OF EXISTING SITES RATHER THAN SPRAWLING:

- Density
- Mixed use development
- Human scale
- Connectivity

### 2. PEOPLE-CENTRED

#### CITIES FOR PEOPLE:

- Inclusiveness
- Liveability and Well-being
- Public Spaces as centre of community life and social interaction (Placemaking)
- Priority to pedestrians and cyclists

### 3. GREEN

#### GREEN URBAN AREAS FOR:

- Recreation and Aesthetics
- Improved Livability and health
- Improved storm water management
- Enhanced urban biodiversity
- Better urban micro-climates and CO<sub>2</sub> absorption

#### GREEN BUILDINGS DESIGN, INCLUDING:

- Passive building design
- Green Rooftops
- Locally sourced, sustainable and reusable building materials

## 6.3 A NECESSARY ENABLING CONDITION: PEOPLE AND COMMUNITY ENGAGEMENT

In order to achieve the regenerations mentioned so far, it is essential that citizens and communities are constantly engaged and encouraged to take part in the decision-making processes and activities within the city, and that they can fully benefit from these transformations. All groups should be considered and involved including the informal sector, local youth and marginalized groups. For this purpose, it is crucial to establish an enabling policy framework that promotes greater citizen participation, facilitates the processes of collaboration among stakeholders and actively supports engagement, innovation and formation of new activities, locally based projects, start-ups and community initiatives. All of these processes contribute to the creation of revitalized and regenerated communities and more dynamic, lively, people-centred and inclusive cities.

## 6.4 THE KEY STEPS AND PROCESSES FOR IMPLEMENTATION

Beyond understanding the general concept of a regenerative city and its main features, it is equivalently important to identify the recommended steps and processes that should be undertaken in order to implement the transformations needed within the city. The table below attempts to summarize the key steps and processes to ensure fast, effective and just transformations, in particular through the establishment of specific taskforces for each particular objective to be achieved within the city. Specific taskforces could be established for example for the implementation of a particular renewable energy target, or a waste recycling objective, or an agreed increase in public transport utilization rate, etc. It is important to keep these steps and processes in mind in order to understand their relevancy and usefulness in relation to the challenges and recommendations specific to the Chinese context highlighted in the following sections.

## THE KEY STEPS FOR IMPLEMENTATION

### STEP 1: DEVELOP A VISION

- Clear
- Shared
- Long term

### STEP 2: SET TARGETS

- Measurable
- Ambitious
- Long term

### STEP 3: SET UP A SPECIFIC TASKFORCE

- Institutionalized
- Diverse
- City-based

### THE TASKFORCE GROUP

#### PRODUCES

#### ROADMAP FOR IMPLEMENTATION

- Based on scientific study
- Target specific
- Region and city specific
- Needs accurate data collection and analysis

#### COORDINATES

#### MULTI STAKEHOLDER ENGAGEMENT

- Coordinated collaboration among:
- City departments
  - Private Stakeholders
  - Civil Society organizations
  - Interest groups
  - Citizens

#### FACILITATES

#### MULTI-LEVEL GOVERNANCE

- Coordination across levels of government
- Good cohesion, cooperation and communication between national, regional and city governments

#### SUPERVISES

#### MONITORING AND IMPLEMENTATION

- Long term monitoring
- Tracking progress compared to initial targets
- Feedback for improvement
- Adjustments and changes

## CASE STUDY I

# WHAT ARE THE KEY SUCCESS FACTORS OF ONE OF THE WORLD'S GREENEST CITY?



**THE DISTRICT OF VAUBAN IN FREIBURG, A LEADING EXAMPLE OF SUSTAINABLE URBAN DESIGN.** AMONG THE KEY SUCCESS FACTORS: GOOD COORDINATION AMONG DIFFERENT STAKEHOLDERS AND CITY DEPARTMENTS, POLITICAL COMMITMENT AND CREATIVE THINKING. SOURCE: SHUTTERSTOCK

Freiburg, a German city with a population of about 230,000 is considered to be one of the world's greenest cities. The former Head of the Energy Department of the City of Freiburg presented at the FCF 2015 and emphasized the key role of the processes adopted to achieve change and how these effectively enabled the city to become a world's leader in sustainability:

1. **POLITICAL WILL, LEADERSHIP AND COMMITMENT.** Undeniably the role of political leadership plays a crucial role in mobilizing the different actors and in streamlining action towards a common goal. Commitment and political will of the municipality were essential to start and drive the transition forward. Example of commitment included the introduction of building standards higher than the ones required by the national government. This shows how local government can challenge national policies and step forward demonstrating that greater achievements are possible.
2. **COORDINATED MULTI-STAKEHOLDER COOPERATION.** Although most departments tend to work independently it was crucial for Freiburg to undertake coordinated cross sectoral efforts that allowed different stakeholders to come together and jointly work towards a common goal.

3. **COMMUNICATION.** Improved communication across different city departments is essential to enable the establishment of partnerships and shared projects which are critical to find smart sustainable solutions.
4. **CREATIVITY.** Thinking outside the box is a common terminology to indicate the need to look beyond traditional roles in order to find best innovative solutions. This was an essential ingredient that allowed to find many of the best solutions that involved a variety of stakeholders working together, including synergies among different sectors that would normally not work together.
5. **CONTINUITY.** The commitment of the administration staff and of the citizens and the general cultural that developed in the city allowed to overcome the problems related to the short termism of the government mandate (4 years). This allowed to give continuity to a process that requires longer times to be implemented.



## 7. TOWARDS REGENERATIVE CITIES IN CHINA: KEY CHALLENGES AND RECOMMENDATIONS

In November 2015, the Chinese Government delineated the official framework of the 13<sup>th</sup> Five Year Plan (for 2016-2020). This new plan gravitates around five key words which will be guiding China's development for the next five years, namely Innovation, Coordination, Green, International Cooperation, and Sharing.

While the role of urbanization is not specifically elaborated within this plan, it is extremely important to acknowledge that cities will be the main protagonists of this development and will play a crucial role in ensuring the successful implementation of this plan. For this reason it is important to identify how the development of Regenerative Cities in China can support these 5 key priorities and what are the most significant policy recommendations that would need to be taken into consideration.

Below is an attempt to summarize the key challenges and recommendations specific to the Chinese context in order to pave the way towards the creation of Regenerative Cities in China. These were grouped following the 5 key words that will guide Chinese development in the coming years.

### 7.1 INNOVATION

The creation of regenerative cities will require a series of transformations that can only be fostered within a dynamic environment that promotes innovation and creativity.

#### Promote System Innovation

##### THE ISSUE

System innovation is stimulated by an environment that facilitates dialogue, cross-sectoral cooperation and multi-stakeholder engagement. It is also promoted by administrative structures that can flexibly and dynamically adapt to change and learn from experiences. System innovation is

also encouraged by a system which allows for experimentation and encourages timely correction of mistakes.

In practise, in order to tackle this issue, during the Forum it was suggested that the performance evaluation system of local government officials should be adjusted to give greater weight to more efficient, inclusive and sustainable urbanization. Many often the selection criteria for the promotion of government officials is favouring officials that endorse projects and buildings that are simply economically appealing and that can easily impress superior colleagues. A lack of sensitivity of government officials for sustainability matters is hindering the construction of buildings that fulfil their functionality and environmental performance.

A lack of solid, diversified and up-to-date knowledge and know-how particularly when it comes to urban and environmental matters were also emphasized.

Lastly, a lack of coordination and effective mechanisms to promote cross-departmental dialogue and creative thinking were highlighted.

### RECOMMENDATIONS

- **Establish new mechanism and criteria to evaluate government officials.** These mechanisms include new ways to penalize and reward officials<sup>[33]</sup>, by abandoning “economic growth as the only criterion in government performance assessment”<sup>[34]</sup> and establishing a “lifelong accountability system”<sup>[35]</sup>. The establishment of a formalized system through which local officials are assessed on environmental performance in their respective jurisdictions might become a greater incentive for them to prioritize environmental performance. This would also clarify responsibilities and accountability. Further not only result oriented indicators, but also process oriented indicators should be established. Considering the positive effects of environmental rehabilitation will mostly be appreciated over longer period of times, process oriented indicators will allow government officials not

only to evaluate their work in relation to short term results, but in relation to sound and effective processes for the achievement of sustainable long term results.

- **Invest in capacity building and system innovation.** Although China has worked to improve the quality and ability of the staff of administrative organs of government, rigidity in the system has prevented to dynamically change and provide the right skills to government officials to deal with the new challenges facing urbanization in China. Investing in capacity building for public administration staff will be therefore essential to ensure that those with responsibilities are well equipped with the tools and the skills to deal with new challenges affecting Chinese cities today.
- **Create multi-stakeholder task force and coordination bodies.** Much of the innovation and creative ideas come from an environment where ideas can freely move and solutions can be found jointly by working across sectors. Promotion of department to department partnerships (DDP) and more integrated approach to problem solving will be essential. For this purpose the creation of formal, institutionalized platforms that can promote and coordinate cross-departmental cooperation is highly recommended.

## Promote Financial Innovation

### THE ISSUE

Many cities in China have sprawled already beyond sustainable limits. This was also due to the fact that cities authorities have been relying too heavily on funds raised by selling arable farming land to single-use developers and companies. New innovative financial mechanisms to raise capital for cities will be needed. This will require the promotion of a diversified financial portfolio including improved public-private-partnerships (PPP) and private finance initiatives (PFI) as well as a broad financial reform to allow cities to have the necessary funds backing the transformations needed.

## RECOMMENDATIONS

Many times cities are given the mandate and responsibility to solve several problems but not the financial resources to effectively tackle them. During the Forum, few main points were discussed that could help local governments access the financial resources they need. These include:

- **Introduce innovative and alternative financing mechanisms to mobilize financial resources at the local level.** These include public private partnerships (PPP), private financing initiatives (PFI) and civic crowdfunding. Improved methods on how public money is spent is also recommended (e.g. participatory budgeting schemes). More taxes should also be raised at the local level such that more revenue is available directly to city governments.
- **Implement new mechanisms to internalize externalities at the city level.** Promote the adoption of innovative and locally based taxation systems such as carbon tax, waste tax or pollution tax and other financial or tax-based mechanisms to ensure that less polluting options are favoured as opposed to carbon and resource intensive processes.
- **Establish stable, long-term national and subnational policy frameworks** supporting sustainable economic development to incentivize private investors to invest in technologies and sectors that will be supported by the government.

## Advance Technological Innovation

As discussed earlier, a lot of emphasis is given to the need for China to develop a more diversified economy, less reliant on heavy industry and manufacturing and more focused on innovation and technology and on expanding its third sector, particularly green technologies and research and development.

The creation of Regenerative Cities will require major technological improvements. A new urban economy that gravitates around smart and high-tech solutions will be an essential ingredient of a regenerative city. While it is not

the purpose of this report to explain in details all the major technological innovations needed for the effective functioning of a regenerative city, a very brief summary of some of the major technical fields that will require considerable amount of development and expansion is outlined below.

## 1. RENEWABLE ENERGY

Transitions towards 100% renewable energy is a prerogative of regenerative cities. This will require considerable investments in technological innovation within the renewable energy field, for example, wave and tidal energy, or in the improvement of solar cells efficiency as well as the development of advanced storage options (for daily and seasonal storage). Development of new technologies and practices for the effective integration of intermittent sources of energy across the electricity, heating and transport sector will also be vital.

## 2. ENERGY EFFICIENCY

Transition towards the Regenerative City will require considerable improvements in energy efficiency. In cities this will involve three major sectors:

- **Buildings.** New improved design to decrease energy use in buildings, passive house schemes, improved insulation systems, natural ventilation systems for larger buildings, design based on indoor-outdoor climate modelling, etc.
- **Energy generation.** Improvements in co-generation and enhanced district heating systems are recommended to increase efficiency of energy generation.
- **Transport.** In the transport sector this will mean commercialization of electric and hybrid vehicles, but also more efficient transport logistics to minimize unnecessary trips and smarter IT solutions for public transport management.

## 3. WATER MANAGEMENT

Water conservation measures are prioritized and will require advancement in smart water management to monitor flow and manage the water cycle but also to detect leak-

ages and prevent unnecessary water losses. Recycling and re-use of water will require investments in technological solutions especially state-of-the-art wastewater treatment systems that allow water to be treated and safely discharged in natural streams while capturing essential nutrients which can be returned to farmland. Further, *sponge cities* and the technologies to support their development such as for example permeable concrete will need further advancements (see section 7.3.1 for more details on *sponge cities*).

## 4. SOLID WASTE MANAGEMENT

Recycling and particularly upcycling facilities will require improved technologies for enhanced treatment. Major improvements will need to take place in product design. From the very beginning, the design of goods and objects will need to start with *the end in mind*, i.e. designers will need to take into consideration how to make products useful at the end of their life such that they can reenter the resource loops and not simply being discarded to landfill. Improved design and assemblage methods will need to facilitate de-assembly at the end of life. All materials used in the production of goods will need to be recyclable or reusable. Considerable technological improvements will be necessary for example in the design and production of electric and electronic equipment that can be recycled or whose parts can be easily disassembled and reused at the end of life.

## 5. TRANSPORT AND MOBILITY

Substantial technological improvements will be needed to decarbonize the transport sector in particular heavy duty transport, shipping and air transport. Smart technologies in the mobility sector will also become more demanded, particularly driverless mobility and smart traffic technologies (for example improved sensors and optics technologies). Digital information and communication technologies for more efficient management of vehicular traffic as well as exploration of improved logistical systems for optimizing unused vehicle capacity will also boost technological innovation.

## 6. IT, DATA AND SMART TECHNOLOGIES

Regenerative cities are also Smart cities which rely on an increasingly high number of new technologies for data col-

lection, monitoring and feedback. The IT and high-tech sectors will be nurtured by the increasing needs of a regenerative city to become smarter and more efficient. Examples range from smart sensors for traffic data collection to intelligent street poles systems for more efficient management of street lightening to new apps for car sharing or for improved public transport monitoring.

## 7. URBAN AGRICULTURE

Farming and agriculture are currently many times unsustainable and heavily dependent on fossil fuel derived products such as fertilizer and pesticides. The transformation towards a new type of sustainable agriculture will require new innovative techniques for eco-friendly agriculture both in traditional rural areas but also within the city. Urban agriculture as well as vertical agriculture such as hydroponics solutions will become more popular but will also require further technological improvements.

## 8. BIO-REMEDIATION TECHNOLOGIES

Particularly considering the already degraded condition of land and water resources in China especially in and around large cities, new technologies and effective methods for the bio-remediation of contaminated land will be extremely important. For this purpose further research and new improved technological solutions are needed.

## 9. SUSTAINABLE CONSTRUCTION AND GREEN BUILDINGS

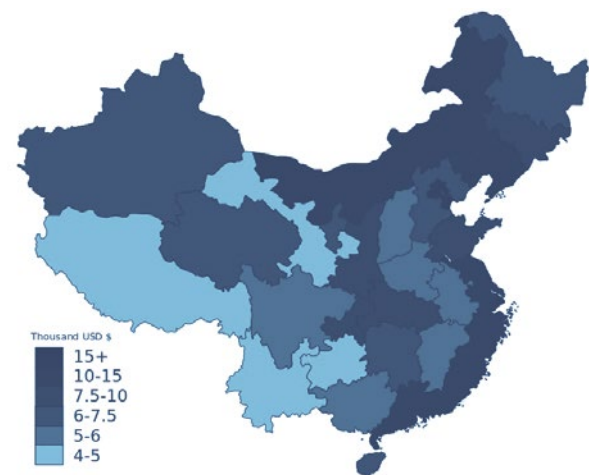
In a Regenerative City, buildings are not simply energy efficient but that aim to have an overall beneficial and positive impact on their surrounding environments. Materials used in construction are sustainably sourced and buildings should be designed considering possible reuse of materials and components after demolition. Improved life cycle assessment will be needed to guide more environmentally conscious design. Buildings will also need to become increasingly water and material efficient (less material used for same structural performance). Collection of storm water and green roofs can provide huge benefits in terms of water conservation and formation of cooling urban micro-climate. Waste reduction as well as optimized operations and maintenance should be considered from the very start

of the design phase. Ambient comfort including indoor air quality are also important and will need adoption of more eco-friendly construction material. All of these major changes in the building sector will require greater research and technological innovation.

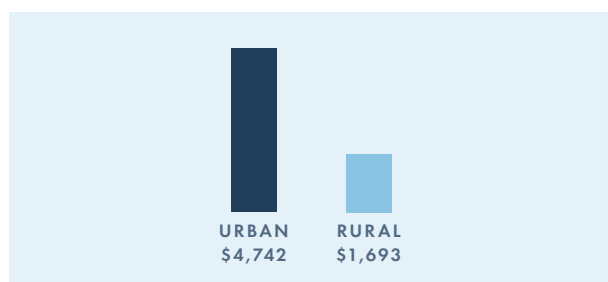
## 7.2 COORDINATION

China will need to take effective measures to ensure coordinated development between different regions in particular between urban and rural areas, and to accelerate sustainable growth of underdeveloped regions. This will be ensured by more coordinated development plans that safeguard smaller cities and promote a more balanced development across regions of the country.

### Promote regionally balanced development



**EAST-WEST GAP.** CHINESE ADMINISTRATIVE DIVISIONS BY GDP NOMINAL PER CAPITA IN USD \$ IN 2014. AS SHOWN, THERE IS CONSIDERABLE GAP BETWEEN RICHER EASTERN REGIONS ALONG THE COAST AND MORE CONTINENTAL REGIONS IN THE WEST. SOURCE: IMF/ ALI ZIFAN



**RURAL-URBAN GAP.** ANNUAL DISPOSABLE INCOME PER CAPITA (USD \$) IN URBAN AREAS AND IN RURAL AREAS IN 2014. THE GAP BETWEEN THE TWO IS STILL SIGNIFICANT ALTHOUGH, ACCORDING TO OFFICIAL SOURCES, IT DECREASED IN THE PAST FEW YEARS [56].

## THE ISSUE

In China there are considerable differences between urban and rural areas, between smaller and larger cities, and between different regions especially between the eastern and the western regions of the country. In particular, during the Forum it was highlighted that there are still very large differences between large cities and small and medium sized cities. Larger cities are favoured by the current administrative system which tend to allocate more resources to larger cities neglecting middle and small sized cities. Larger cities also tend to benefit favourable tax conditions. Similarly larger urban agglomerations attract more investments from abroad. Additionally, larger cities many often offer better health facilities, better schools and universities and generally better-quality services. Therefore they attract larger quantities of migrants from smaller cities and from rural areas <sup>[10]</sup>.

## RECOMMENDATIONS

- **Support small and medium sized cities.** Government policies should try to favour the development of small and medium-sized cities by making them more attractive and thus relieve the burden on larger cities. New strategies to attract migrants, investments, research institutions, and industries into smaller cities will be very important in order to make them attractive and avoid excessive sprawling of larger cities. Smaller cities should be well connected to larger cities and should be provided with competitive infrastructure and services and good public transport.

- **Mitigate rural-urban differences.** This can be achieved in different ways. In particular during the Forum it was suggested that supporting the development of smaller cities close to the rural areas and promote their infrastructural development and their connectivity to larger cities can help narrowing the gap between metropolitan areas and more rural regions.

- **Strengthen metropolitan governance** to ensure coordination and cohesiveness of policies throughout the metropolitan areas. As cities in China expand and grow together forming clusters, better coordination between central cities and the surrounding metropolitan areas will be essential and will require improved mechanism for coordination and cooperation among cities and within the metropolitan areas. This is essential to ensure greater efficiency, effective transport systems, improved connectivity and adequate infrastructure provision across clustering cities and metropolitan areas

## 7.3 GREEN

As highlighted in section 4.2, Chinese cities are currently facing a variety of environmental burdens. Given the pace of urban growth and the accumulation of environmental problems around urban areas, it is clear that the role of cities in leading the transformation towards a more sustainable future cannot be underestimated. As explained in more detailed in section 6, cities in China should aim to become Regenerative Cities. Particularly given the many often already damaged environmental conditions of Chinese ecosystems, it will be essential for Chinese cities to focus on regenerating the resources they consume as well as actively improve the damaged ecosystems without which they cannot continue to sustainably thrive.

Specific to the Chinese context, two priorities are below discussed. First, the importance of creating Sponge Cities; second, the essential role of better urban planning for improving environmental performance and liveability of Chinese cities.



## Sponge Cities: Reinventing Urban Design for Climate and Ecological Resilience

### THE ISSUE

As mentioned previously, a Regenerative City is able to have a positive impact on the ecosystems from which it depends. But how does it look like in practise, for example when it comes to critical issues such as water resources and conservation? How can cities become not only less water intensive but able to regenerate and conserve the water resources they need and consume? So far, extensive urbanization and urban sprawling in China led to the formation of thousands of square kilometres of impermeable areas made up of impervious roads, pavements, roofs and parking lots that do not allow water to be absorbed into the ground but that simply collect the rainwater through the urban drainage infrastructure and channel it into rivers, lakes or into the sea. This traditional type of design has been accompanied by a series of critical issues which are briefly summarized below <sup>[36]</sup>. These are particularly relevant today considering the growing water-related threats linked to climate change, such as extreme weather events, floods, droughts and increase in temperatures.

#### ■ **Less water available in urban and peri-urban areas.**

First of all, a key question we need to answer to explain this issue is: Where do we get the water that comes out of our taps? Many times it is actually coming from aquifers underneath our feet. As it rains, water is absorbed by the ground and naturally filtered by the soil. We can then extract this water by drilling wells into the ground and pumping water out of it. The water is then collected and treated before is distributed across the city and can reach every tap in each of our houses and offices. The problem is that extensive urbanization and urban sprawling led to the formation of thousands of square kilometres of impermeable areas made up of impervious roads, pavements, roofs and parking lots that do not allow water to be absorbed into the ground but that simply collect the rainwater through the urban drainage infrastructure and channel it into rivers, lakes or into the sea. This traditional type of design led to the creation of cities which are increasingly impermeable and have an increasingly greater impact on the natural water

cycle. In practise this means that since less rain water is allowed to filter through the urban soil, less water is available to be extracted from aquifers in urban and peri-urban areas. According to a study by the China Ministry of Housing and Urban-Rural Development, about 50% of Chinese cities are considered water scarce or severely water scarce by UN measures <sup>[37]</sup>.

■ **Polluted water discharged into rivers or the sea.** Another key issues is related to the fact that rain water and wastewater (namely water from our sinks and toilets) is collected by one single drainage system. This drainage system (imagine one big pipe) collects all the rain water (when it rains) and the wastewater from our houses and directs it to a wastewater treatment plant where it gets treated before it is discharged again into rivers or the sea. When it rains, many times the wastewater treatment plant cannot accommodate all the water that the drainage systems carries. Therefore much of the rain water mixed with the wastewater is discharged untreated into rivers. The more impermeable the city is, the more water will be mixed with wastewater and will not be able to be treated but discharged directly into rivers. This increases the level of pollution of local water bodies. A recent study by China Land and Resources Ministry estimated that about 60% of China's underground water condition is considered poor or extremely poor and that only 3% of the country's urban groundwater can be classified as "clean" <sup>[17]</sup>.

■ **Degradation of urban ecosystems and green areas due to sprawling.** This led to a considerable loss of urban biodiversity, a drop in available green areas for natural ground filtration of storm water, a decrease in CO<sub>2</sub> capture by plants, fewer spaces for natural cooling through urban green microclimates and generally less liveable, healthy, comfortable and attractive public spaces.

■ **Increase in the intensity and frequency of urban flooding** particularly considering predicted increase in extreme weather events due to climate change. As the absorbing capacity of the urban surface is decreased, storm flooding risk is increased. Flooding leads to increased groundwater pollution and has considerable impact in terms of damage to properties and health re-

## SPONGE CITY



A **SPONGE CITY** refers to a type of city which allows much of the storm water to be absorbed by the ground (from here the term sponge). Thanks to the vast amount of permeable surfaces across the city (green areas, wetland, lakes, gardens, etc.) the water is able to be absorbed by the ground which naturally filters the water. The naturally purified water can then be re-extracted for reuse through natural or artificial wells within the city. Adapted from gochengdu.cn



**THE 34 HECTARES URBAN STORM WATER PARK IN THE CITY OF HARBIN IN NORTHERN CHINA IS AN EXAMPLE OF SUCCESSFUL SPONGE CITY INTERVENTION.** THE STORM WATER PARK PROVIDES MULTIPLE ECOSYSTEMS SERVICES: IT COLLECTS, CLEANSSES AND STORES STORM WATER AND LETS IT INFILTRATE IT INTO THE AQUIFERS. AT THE SAME TIME IT PROTECTS AND RECOVERS THE NATIVE NATURAL HABITATS AND PROVIDES AN AESTHETICALLY APPEALING PUBLIC SPACE FOR RECREATIONAL USE. SOURCE: ASLA.ORG

lated issues. It was estimated that about half of Chinese cities fail to reach national standards for flood prevention. Only in 2013 more than 230 cities were affected by flooding, while 90% of older urban areas do not even have basic flood plans<sup>[37]</sup>. This will be an increasingly important issue particularly as flooding risk increases due to climate change<sup>[37]</sup>.

## THE SOLUTION: SPONGE CITIES

**What is a Sponge City?** The Sponge City indicates a particular type of city that does not act like an impermeable system not allowing any water to filter through the ground, but, more like a sponge, actually absorbs the rain water, which is then naturally filtered by the soil and allowed to reach into the urban aquifers. This allows for the extraction of water from the ground through urban or peri-urban wells. This water can be easily treated and used for the city water supply.

**What does a Sponge City need in practise?** A sponge cities needs to be abundant with spaces that allow water to seep through them. Instead of only impermeable concrete and asphalt, the city needs more:

- **Contiguous open green spaces**, interconnected waterways, channels and ponds across neighbourhoods that can naturally detain and filter water as well as foster urban ecosystems, boost bio-diversity and create cultural and recreational opportunities.
- **Green roofs** that can retain rainwater and naturally filters it before it is recycled or released into the ground.
- **Porous design interventions** across the city, including construction of bio-swales and bio-retention systems to detain run-off and allow for groundwater infiltration; porous roads and pavements that can safely accommodate car and pedestrian traffic while allowing water to be absorbed, permeate and recharge groundwater; drainage systems that allow trickling of water into the ground or that direct storm water run-off into green spaces for natural absorption.
- **Water savings and recycling**, including extending water recycling particularly of grey water at the building block level, incentivizing consumers to save water through increased tariffs for increase in consumption, raising awareness campaigns, and improved smart monitoring systems to identify leakages and inefficient use of water.





#### SPRAWLING SHANGHAI.

SPRAWLED CITIES ARE NOT ONLY LESS EFFICIENT IN TERMS OF ENERGY, RESOURCE AND INFRASTRUCTURE USE BUT THEY ARE ALSO PUTTING AN INCREASING AMOUNT OF STRESS ON VIRGIN LAND, RURAL AREAS AND WATER RESOURCES. SOURCE: MIKEL HEDGE

#### WHAT ARE THE BENEFITS OF A SPONGE CITY?

There is wide range of benefits associated with the implementation of sponge cities which include:

- **More clean water for the city.** Replenished groundwater and thus greater accessibility to water resources for cities. This also entails greater water self-sufficiency which allows cities to increasingly rely on water sources from within their boundaries
- **Cleaner groundwater** due to the increase volume of naturally filtered storm water. This means lower environmental and health costs due to considerable decrease in water pollution
- **Reduction in flood risk** as the city offers more permeable spaces for the natural retention and percolation of water. This leads to better resilience and in particular greater ability to deal with higher flood risks resulting from climate change
- **Lower burdens on drainage systems,** water treatment plant, artificial channels and natural streams. This also entails lower costs for drainage and treatment infrastructure

- **Greener, healthier, enjoyable urban spaces.** Greener urban spaces improve quality of life, create more pleasant landscape aesthetics and recreational areas that are enjoyable and attract people. This also means increase in land value due to aesthetically more pleasing, cleaner and healthier open spaces close to private properties
- **Enriched biodiversity** around green open spaces, wetlands, urban gardens and green rooftops

#### Urban planning and design

##### THE ISSUE

There are two major issues concerning how cities are designed, planned and developed in China.

1. **Sprawling and wasteful real estate development.** Cities in China have many often sprawled well beyond sustainable limits. Sprawled cities are not only less efficient in terms of energy, resource and infrastructure use but they are also putting an increasing amount of stress on virgin land, rural areas and water resources. The current urbanization process is mainly driven by local government which are heavily relying on selling lands

## INSIGHT

## DESIGN AGAINST SPRAWLING

**GREEN BLEEDING INTO THE CITY:**

GREEN AREAS SHOULD DEVELOP INWARDS NOT ONLY OUTWARDS, BLEEDING INTO THE CITY AND THUS CREATING GREEN CORRIDORS WITHIN THE EXISTING URBAN FABRIC. BENEFITS INCLUDE MORE SPACE FOR URBAN AGRICULTURE, WIND COOLING, BIODIVERSITY ENHANCEMENT, WETLANDS, NATURAL WATER FILTERING, AS WELL AS RECREATION AND AESTHETIC UPGRADING. SOURCE: DESIGN.EPFL.CH

While the dominant planning culture in China tends to favour the construction of new cities and neighbourhoods, this has contributed to further sprawling which is worsening the liveability and environmental performance of cities. As pointed out by architect Neville Mars during the Forum there are 5 key challenges in urban planning in China that require particular attention:

1. **MUD: MARKET-DRIVEN UNINTENTIONAL DESIGN.** Cities are defined by the planned as much as by the unplanned, unintentional and market driven growth. Given the many often organic, unplanned and disordered ways Chinese cities developed, planning needs to acknowledge the realities of organic growth and explore how best it can begin to actively consider the impacts of unintended development and plan for a more dynamic, adaptable type of urban environment
2. **REVERSING THE DIRECTION OF URBANIZATION.** In order to avoid further sprawling, cities need to focus their efforts on re-developing the existing urban fabric instead of expanding outward on virgin land. In particular planning should consider the existing areas and corridors to let the green zones grow inwards towards the centre. Industrial sub-centres in the peripheries of Chinese cities have been growing significantly but much of their space (up to 66%) is not used. Cities should consider redevelop these areas into green hubs progressively expanding inward towards the centre of the city.
3. **REGENERATIVE DESIGN.** As stated by Neville Mars, “Beyond carbon reduction, Chinese Eco-cities must remediated their environment”. Given the extremely precarious conditions of many parts of urban China, redevelopment of neighbourhoods need to consider how they can go beyond just being carbon-neutral or clean to become regenerative, i.e. being able to actively restore the initial uncontaminated status of the environment they depend on.
4. **NEW RENEWABLE ENERGY INFRASTRUCTURE FOR CITIES.** Pollution afflicting cities in China mostly derive from the fact that more than 70% of the energy needs are met through the burning of coal. However China is endowed with abundant renewable energy (RE) sources such as wind and solar. Developing the RE infrastructure in the areas where coal power plants are already present would be convenient as it would allow to use the already existing high voltage power lines to transfer the electricity from countryside areas to the cities.
5. **REFORM ECO-REGULATIONS.** Current environmental and planning regulations are outdated and do not respond to the urgency of creating more sustainable cities and the need to have policy framework able to favour an environmentally responsible type of urban development.



to private developers in order to finance their municipal expenditures. This has led to a type of development which does not match local market demand for new construction. It was recently estimated that local governments across China are planning to provide housing for 3.4 billion people which is clearly well beyond actual demand considering current China's population of less than 1.4 billion<sup>[38]</sup>. This is leading to an ever greater accumulation of buildings and newly constructed sites which remain vacant and unused<sup>[39]</sup>.

2. **Lack of systematic and integrated planning.** The very rapid development of Chinese cities driven by an increasingly faster economic growth accompanied by a lack of a systematic and coordinated urban planning which facilitated fast but many times disordered development that neglected functionality, connectivity, public transport and environmental impact.

## RECOMMENDATIONS

**Improve the urban planning system.** A more scientific, data based and rigorous way of planning and designing cities that responds to the public interests and the needs of people is needed. In particular in order to create more liveable, functional and sustainable cities, improved policy frameworks at the national and local level should:

- **Establish a long term plan.** The current 5 year plan system tends to favour short term goal and does not allow to set a common long term vision for Chinese cities crucial to sustainable development. Some cities already have longer term plans, however these should become more common both for cities and national government.
- **Promote improved urban planning regulations** focused on liveability and sustainability and make sure these have scientific basis. For this reason supporting accurate data gathering, monitoring and adoption new indicators will be essential.
- **Promote denser and mixed-use development.**
- **Promote urban renovation and regeneration** of existing sites instead of further expansion. For example focus

on new ways to transform excess industrial land into commercial and residential land.

- **Promote coordination among cities in metropolitan areas** and city clusters and support the planning of cities and surrounding urban settlements in a more integrated and cohesive manner.
- **Improve public and eco-friendly transport systems,** including promotion and expansion of pedestrian and bicycle friendly routes.

## 7.4 INTERNATIONAL COOPERATION

Best solutions and practises cannot be found in isolation but are fostered by cooperation and open dialogue across cities worldwide. Cities around the world should be open to share their solutions as well as their issues and challenges with other cities and countries. Platform that promote city to city cooperation and policy exchange already exist and should be supported both by cities and by national governments. For example, twinning of cities in China and around the world can be an effective option to improve knowledge sharing as well as constructive competition. The role of the UN platforms and initiatives mentioned previously including the upcoming Habitat III conference should be taken as a unique opportunity for China to both share experiences and lessons learnt but also to learn and get valuable input.

Cooperation across countries can be divided into:

### 1. NORTH TO SOUTH COOPERATION

Cities from western countries can offer great sources of knowledge and expertise. They can share their valuable lessons learnt while at the same time take the opportunity to learn and contribute in solving the challenges of developing countries.

### 2. SOUTH TO SOUTH COOPERATION

Cities from the global south many times share very similar issues and challenges. It is recommended that Chinese cities set open partnerships with other cities in other countries who are facing similar challenges, for example in South-East Asia.

## CASE STUDY II

# VANCOUVER AND FRANKFURT GO 100% RENEWABLE ENERGY (RE)



### THE CITY OF VANCOUVER

IS AIMING TO GET 100% OF ALL ITS ENERGY NEEDS ONLY FROM RENEWABLE ENERGY BY 2050. SOURCE: SHUTTERSTOCK

## SHARING EXPERIENCES ACROSS THE GLOBE

Both representatives from Vancouver and from Frankfurt presented at the FCF 2015. Cities around the world should get inspiration from these world leading cities which are both aiming to get 100% of their energy from renewable energy sources by 2050. Key lessons learnt and recommendations from these two case studies include:

### LESSONS LEARNT

- 100% RE is technically and economically possible.
- 100% RE can generate cost savings.
- 100% RE can mitigate risks and make countries more resilient.
- 100% RE can generate new economic activities, create jobs, improve quality of life and boost innovation.

### WHAT DO WE NEED?

- Leadership and clear target setting
- Dedicated taskforce to carry out the roadmap to achieve 100% RE target
- Considerable decrease in energy consumption by maximizing efficiency and decreasing demand
- Improved coordination and cooperation across sectors and levels of government
- Awareness raising, public support and engagement
- Clear energy and fiscal policies backing renewable energy
- Key technical and infrastructural changes. These include:
  - Increase installed capacity of various forms of RE prioritizing wind and solar
  - Increase the integration of the power, heating and transport sector and identify how best these different sectors can best work together.
  - Increase the thermal and electric storage both at the building and district level as well as seasonal storage (e.g. in the form of gas or hydrogen storage) to ensure security of supply also during winter.
  - Combined heat and power plants running on waste, biomass and biogas will also be essential to ensure higher efficiency and reliability
  - Electrify the cooling and heating sector

## 7.5 SHARING

The guideline of the Chinese 13<sup>th</sup> Five Year already highlights the role of sharing and of creating a more equal and inclusive economy where benefits are shared. Beyond ensuring the long-term environmental sustainability of urbanization, implementing the regenerative city also means creating opportunities for local economic growth, enhanced liveability and well-being, better public spaces, improved social equality, cohesion and justice.



**ENGAGING COMMUNITIES:** AN EFFECTIVE AND JUST TRANSITION CANNOT BE ACHIEVED WITHOUT ENGAGING PEOPLE, LOCAL BUSINESSES AND COMMUNITIES. POLICY FRAMEWORKS AND SPECIFIC TASKFORCES SHOULD BE IN PLACE THAT ENABLE A VARIETY OF STAKEHOLDERS TO BE ACTIVELY INVOLVED IN THE TRANSFORMATION PROCESSES WITHIN THE CITY

## Strengthen Local Participation

### THE ISSUE

In order to create cities that serve the interests and needs of their inhabitants, local citizens and stakeholders should be involved in the decision making process. This would enhance accountability of local governments and ensure that policies are responsive to local needs. The New Urbanization Plan issued by the government in March 2014 gravitates around the concept of a new type of urbanization that is people-centred. In order to achieve this people-centred vision it is essential to make people integral part of this new urbanization process.

### RECOMMENDATIONS

- **Improve education and raise awareness** on the importance of environmental sustainability through traditional educational platforms such as school and universities but also through the media and citizen engagement initiatives.
- **Improve and strengthen platforms to better inform** citizens of decisions taken in the city and when possible directly engage them.
- **Improve platforms and tools to gather feedback** from residents on decisions and projects within the city. These can include internet platforms or open meetings.
- **Establish specific taskforces for public consultations.** These taskforces should be established to coordinate public consultations with local stakeholders, such as businesses, citizens and civil society organizations.

## Protect cultural, historical and geographical diversity

### THE ISSUE

Cities in China have suffered from great demolitions in the past that led many historical centres to disappear and make space for new developments. This has created a widespread standardization of cities across the country. Many



### CULTURE, IDENTITY AND THE ENVIRONMENT.

CITIES NEED TO BRING OUT THEIR DIFFERENCES AND ENCOURAGE THEIR DEVELOPMENT ACCORDING TO THEIR OWN NATURAL, GEOGRAPHICAL, HISTORICAL AND CULTURAL CHARACTERISTICS. VIEW OF THE CITY OF HANGZHOU, CLOSE TO SHANGHAI. SOURCE: SHUTTERSTOCK

cities have lost their historical peculiarities, have become very similar to each other and with very little unique about them <sup>[10]</sup>. At the same time cities have sprawled and have often lost many public, walkable and bicycle-friendly spaces. However a new type of urbanization, which is, as often mentioned, people-centred will need to reinforce and give value to the historical characteristics of every city and create spaces that allow people to interact, to enjoy public living and their own cultural heritage.

### RECOMMENDATIONS

- **Promote diversification and characteristic development.** Shifting from standardization towards a type of development that is able to appreciate and emphasize the special features of different cities is drawing the attention of the Chinese government increasingly more and it was also highlighted in the last 5 Year Plan for Urbanization <sup>[10]</sup>. Cities need to bring out their differences and encourage their development according to their own natural, geographical, historical and cultural characteristics. This will also help to strengthen people's appreciation for Chinese culture and connection to their own territories and land. From an environmental perspective this can have great benefits as a sense of belonging and appreciation of one's own environment can increase awareness and sensitivity of citizens towards environmental matters.

## 8 CONCLUSIONS

The aim of this report was to summarize the key roles and opportunities of cities with regard to the upcoming international goals and in particular analyse the main challenges and policy recommendations for the creation of Regenerative Cities in China.

The significance and urgency of sustainable urbanization in China are of vital importance not only for China, but for the rest of the world. It is clear that without China on board, very little impact can be achieved particularly in terms of global greenhouse gas emission reduction. It is also clear that if China manages to effectively solve its problems related to sustainable urbanization, it can actually become an invaluable source of inspiration and leadership from which many countries around the world can learn - particularly developing countries which will be facing very similar problems. At the same time, a global effort is urgently required, both to support China through this difficult yet unavoidable transition but also to learn from its successes and mistakes. The purpose of the Future of Cities Forum 2015 and of the World Future Council China is exactly in line with this need: to bring international experts and stakeholders from around the world to China and encourage them to share their experiences and solutions while also learning about China, about the international relevance of Chinese urbanization and its far reaching implications on the rest of the world.

In conclusion, there are 6 key messages and recommendations that this report intends to highlight. These are summarized below.



1

## **REGENERATIVE URBAN DEVELOPMENT IS AN ESSENTIAL ELEMENT OF THE NEW URBAN AGENDA**

Especially in China, where cities are already severely afflicted by environmental burdens, it is clear that sustaining the current degraded environmental conditions is not sufficient. A further step is needed. This means moving beyond generic sustainable development and embrace a broader and more comprehensive model of urban development that puts the emphasis on the need for cities not to only to sustain but to actively regenerate the natural resources they need and consume.

2

## **REGENERATIVE URBAN DEVELOPMENT CARRIES A VARIETY OF BENEFITS WHICH GO WELL BEYOND THE ENVIRONMENT**

Particularly given the strong interdependency of urban issues, it is clear that creating regenerative cities is not just beneficial to the environment but offers a wide range of other benefits. As highlighted in the report, these include new opportunities for system, financial and technological innovation as well as for the development of new businesses and for local economic growth. Realizing regenerative cities also means creating more liveable and healthier cities, better public spaces, improved social services, greater community participation and more socially inclusive neighbourhoods. It also means strengthening environmental and climate resilience as well as the economic and resource self-sufficiency of cities.

3

## **INTERDEPENDENCY OF URBAN PROBLEMS NEEDS AN INTEGRATED, CROSS-SILOS AND MULTI-LEVEL GOVERNANCE APPROACH**

Urban problems tend to be multifaceted, extremely diverse and strongly interdependent. The wide range of recommendations highlighted in this report reflects this diversity. Creating sustainable development will mean working across silos and finding solutions that see improved collaboration and alliance building rather than further departmentalization and separation. Improved coordination across governance levels will also be essential. For example the creation of Sponge Cities, although it is strictly related to mainly the

water management sector, will only be able to be effectively implemented if various departments can work together and understand the possible synergies across divisions. The creation of a formal department or taskforce that is specifically concerned with the coordination of cross-sectoral and cross departmental collaboration is therefore warranted.

4

## **BUSINESSES AND LOCAL COMMUNITIES HAVE A FUNDAMENTAL ROLE TO PLAY**

An effective and just transition towards a more sustainable urban future cannot be achieved without engaging people, local businesses and communities. National, regional and municipal policy frameworks should be in place that are able to facilitate, encourage and enable citizens, businesses and communities to be actively involved in the transformation processes within the city.

5

## **CITIES SHOULD LEAD BY EXAMPLE AND BECOME TESTING PLATFORM FOR IMPLEMENTING INNOVATIVE LOCALLY-BASED SOLUTIONS**

Given their increasingly important impact and role, cities have the potential to become the actual leaders in guiding sustainable development forward. For this reason more support from the national and regional level should be assigned to cities to effectively take this leading position. At the same time cities should be ready to make greater efforts, set even more ambitious targets than national governments and become the testing laboratories for the trial of innovative urban solutions, potentially scalable across other cities in China and around the world.

6

## **EXCHANGE OF SOLUTIONS AND COLLABORATION ACROSS CITIES WORLDWIDE WILL BE ESSENTIAL**

Exchange of best policy solutions will be vital to facilitate and promote the transition that is needed across cities around the world. New solutions will need to be tested and if effective shared with other cities to promote further dissemination. Platform such as the WFC can be very valuable in promoting and facilitating exchanges of solutions across countries and collaboration across parties and nations.

## 9 REFERENCES

- [1] "World Bank Data," [Online]. Available: <http://data.worldbank.org/>. [Accessed October 2015].
- [2] "Habitat3.org," [Online]. Available: <https://www.habitat3.org/the-new-urban-agenda>.
- [3] U. N. Department of Economic and Social Affairs, "World Urbanization Prospects: The 2014 Revision, Highlights," United Nations (ST/ESA/SER.A/352), 2014.
- [4] DNV GL/Monday Morning Global Institute 2014, "Global Opportunity Network," [Online]. Available: [http://www.globalopportunitynetwork.org/resources/risks/urban\\_breakdown.pdf](http://www.globalopportunitynetwork.org/resources/risks/urban_breakdown.pdf). [Accessed October 2015].
- [5] UN Habitat, "unhabitat.org," [Online]. Available: <http://unhabitat.org/wp-content/uploads/2014/07/WHd-2014-Background-Paper.pdf>. [Accessed October 2015].
- [6] United Nations Department of Economic and Social Affairs, "Sustainable Development Knowledge Platform," [Online]. Available: <https://sustainabledevelopment.un.org/>. [Accessed October 2015].
- [7] D. Meckstroth, "mapi.net," [Online]. Available: <https://www.mapi.net/blog/2014/01/china-has-dominant-share-world-manufacturing>. [Accessed October 2015].
- [8] The Economist, "Made in China?," The Economist, pp. <http://www.economist.com/news/leaders/21646204-asias-dominance-manufacturing-will-endure-will-make-development-harder-others-made>, 14 March 2015.
- [9] The Economist, "China: Building the dream," The Economist, pp. <http://www.economist.com/news/special-report/21600797-2030-chinese-cities-will-be-home-about-1-billion-people-getting-urban-china-work>, 19 April 2014.
- [10] China.org.cn, "Transcript: Press conference on new urbanization plan," China.org.cn, 19 March 2014. [Online]. Available: [http://china.org.cn/china/2014-03/19/content\\_31836248\\_2.htm](http://china.org.cn/china/2014-03/19/content_31836248_2.htm). [Accessed October 2015].
- [11] OECD, "OECD Urban Policy Reviews: China 2015," OECD, Paris, 2015.
- [12] China Dialogue, "Reimagining China's cities: Towards a sustainable urbanisation," chinadialogue, London, 2013.
- [13] A. Shah, "Global Issues: Poverty Around The World," 12 11 2011. [Online]. Available: <http://www.globalissues.org/article/4/poverty-around-the-world#WorldBanksPovertyEste>. [Accessed October 2015].
- [14] M. Rajagopalan, "Reuters UK," Reuters, 12 October 2015. [Online]. Available: <http://uk.reuters.com/article/2015/10/12/uk-china-poverty-idUKKCN0S60K620151012>. [Accessed October 2015].
- [15] China Daily, "Beijing PM 2.5 reading fails national standard," China Daily, 1 March 2014. [Online]. Available: [http://www.chinadaily.com.cn/china/2014-01/03/content\\_17212743.htm](http://www.chinadaily.com.cn/china/2014-01/03/content_17212743.htm). [Accessed 3 December 2015].
- [16] R. A. Rohde and R. A. Muller, "Air Pollution in China: Mapping of Concentrations and Sources," PLoS ONE, vol. 10, no. 8, 2015.
- [17] J. Kaiman, "The Guardian," The Guardian, 13 July 2013. [Online]. Available: <http://www.theguardian.com/environment/2013/jul/08/northern-china-air-pollution-life-expectancy>. [Accessed October 2015].
- [18] China Water Risk, "China Water Risk," [Online]. Available: <http://chinawaterrisk.org/>. [Accessed October 2015].
- [19] Statista, "The largest producers of CO<sub>2</sub> emissions worldwide in 2015, based on their share of global CO<sub>2</sub> emissions," Statista, The Statistics Portal, 2015. [Online]. Available: <http://www.statista.com/statistics/271748/the-largest-emitters-of-co2-in-the-world/>. [Accessed 12 January 2016].
- [20] EIA, "EIA Beta: China," EIA, 14 May 2015. [Online]. Available: <http://www.eia.gov/beta/international/analysis.cfm?iso=CHN>. [Accessed October 2015].
- [21] WWF, "WWF: Climate Change Impacts in China," WWF, [Online]. Available: [http://wwf.panda.org/about\\_our\\_earth/aboutcc/problems/rising\\_temperatures/hotspot\\_map/china.cfm](http://wwf.panda.org/about_our_earth/aboutcc/problems/rising_temperatures/hotspot_map/china.cfm). [Accessed October 2015].
- [22] MEP, "Ministry of Environmental Protection. The People's Republic of China," MEP, 12 7 2013. [Online]. Available: [http://english.mep.gov.cn/standards\\_reports/soe/soe2011/201307/t20130712\\_255402.htm](http://english.mep.gov.cn/standards_reports/soe/soe2011/201307/t20130712_255402.htm). [Accessed October 2015].
- [23] H. Guangwei, "China Dialogue," 30 June 2014. [Online]. Available: <https://www.chinadialogue.net/article/show/single/en/7073-Special-report-The-victims-of-China-s-soil-pollution-crisis>.
- [24] J. China and B. Spegele, "Wall Street Journal: China Details Vast Extent of Soil Pollution," Wall Street Journal, 17 April 2014. [Online]. Available: <http://www.wsj.com/articles/SB10001424052702304626304579507040557046288>. [Accessed October 2015].
- [25] W. Bank, "World Bank," [Online]. Available: <http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/AnnexJ.pdf>.
- [26] Recycling Today, "China's plastic recycling rate falls to 22 percent," Recycling Today, 7 7 2014. [Online]. Available: <https://www.recyclingtoday.com/article/china-plastic-recycling-rate-decline>. [Accessed 12 1 2015].
- [27] D. Yu, "https://www.chinadialogue.net/article/4739-Chinese-waste-the-burning-issue," China Dialogue, 26 1 2012. [Online]. Available: <https://www.chinadialogue.net/article/4739-Chinese-waste-the-burning-issue>. [Accessed 12 1 2016].
- [28] W. Jiuliang, "Cross Current," [Online]. Available: <https://cross-currents.berkeley.edu/e-journal/photo-essay/beijing-besieged-garbage/statement>.
- [29] J. Li, "The Nature of Cities," 1 February 2015. [Online]. Available: <http://www.thenatureofcities.com/2015/02/01/ways-forward-from-chinas-urban-waste-problem/>.
- [30] World Bank, "Urban China: Toward Efficient, Inclusive and Sustainable Urbanization," World Bank, Washington, 2014.
- [31] Bloomberg News, "Bloomberg News: China Exports Fall as Lower Demand, Strong Yuan Hurt Growth," Bloomberg, 8 August 2015. [Online]. Available: <http://www.bloomberg.com/news/articles/2015-08-08/china-s-exports-drop-as-external-demand-fails-to-offer-relief>. [Accessed October 2015].
- [32] F. Green and N. Stern, "China's 'new normal': Structural Change, better growth and peak emissions," LSE Grantham Institute on Climate Change and the Environment, London, 2014.



- [33] Reuters, "China says retired officials can be punished for pollution," Reuters, 17 2015. [Online]. Available: <http://www.reuters.com/article/2015/07/01/us-china-environment-idUSKCN0P-B4RB20150701>. [Accessed 10 2015].
- [34] M. Ker and K. Logan, "New environmental law targets China's local officials," China Dialogue, 28 4 2014. [Online]. Available: <https://www.chinadialogue.net/article/show/single/en/6939-New-environmental-law-targets-China-s-local-officials>. [Accessed 10 2015].
- [35] Z. Chun, "China trials environmental audits to hold officials to account," China Dialogue, 18 6 2015. [Online]. Available: <https://www.chinadialogue.net/article/show/single/en/7990-China-trials-environmental-audits-to-hold-officials-to-account>. [Accessed 10 2015].
- [36] M. Merkelbach, N. She, S. Slaney and Y. Yau, "Sponge City," Terrain Studio, San Francisco, 2015.
- [37] M. Harris, "China's sponge cities: soaking up water to reduce flood risks," The Guardian, 1 October 2015. [Online]. Available: <http://www.theguardian.com/sustainable-business/2015/oct/01/china-sponge-cities-los-angeles-water-urban-design-drought-floods-urbanisation-rooftop-gardens>. [Accessed 15 November 2015].
- [38] China Dialogue, "China Is Still Building Ghost Cities," China Dialogue, 15 October 2015. [Online]. Available: <http://thediplomat.com/2015/10/china-is-still-building-ghost-cities/>. [Accessed October 2015].
- [39] China Dialogue, "Lack of affordable housing threatens China's urban dream," China Dialogue, 20 September 2013. [Online]. Available: <https://www.chinadialogue.net/article/show/single/en/6365-Lack-of-affordable-housing-threatens-China-s-urban-dream>. [Accessed 2015].
- [40] L. Jing, "South China Morning Post," South China Morning Post, 5 February 2015. [Online]. Available: <http://www.scmp.com/news/china/article/1701625/air-pollution-bigger-killer-mainland-china-smoking-says-new-greenpeace>. [Accessed October 2015].
- [41] Bloomberg News, "Bloomberg.com," Bloomberg, 31 December 2013. [Online]. Available: <http://www.bloomberg.com/news/articles/2013-12-31/china-says-arable-land-size-of-belgium-too-polluted-for-farming>. [Accessed October 2015].
- [42] Quartz, "qz.com The dubious distinction of China's newest cancer village: its residents were poisoned by soil," The Quartz, 31 July 2013. [Online]. Available: <http://qz.com/110264/the-dubious-distinction-of-chinas-newest-cancer-village-its-residents-were-poisoned-by-soil/>. [Accessed October 2015].
- [43] EY, "China: Planning for an Urban Future," EY, [http://inperu.pe/boletin/2015/mayo/China\\_Planing\\_for\\_an\\_urban\\_future.pdf](http://inperu.pe/boletin/2015/mayo/China_Planing_for_an_urban_future.pdf), 2014.
- [44] X. Zou, "National Center for Policy Analysis," National Center for Policy Analysis, 10 September 2014. [Online]. Available: <http://www.ncpa.org/pub/ba802#sthash.wvSzNgHE.dpuf>. [Accessed October 2015].
- [45] J. Maher and X. Pengfei, "China's New Urbanization Plan: Obstacles and Environmental Impacts," Sustainable Cities Collective, 13 May 2014. [Online]. Available: <http://www.sustainablecitiescollective.com/nature-cities/246981/china-s-new-urbanization-plan-obstacles-and-environmental-impacts>. [Accessed October 2015].
- [46] China Dialogue, "China's urban sprawl can only be stopped by fiscal reform," China Dialogue, 24 10 2013. [Online]. Available: <https://www.chinadialogue.net/article/show/single/en/6440-China-s-urban-sprawl-can-only-be-stopped-by-fiscal-reform>. [Accessed October 2015].
- [47] Z. Yangpeng, "Local governments reliance on land sales deepens," China Daily, 18 4 2014. [Online]. Available: [http://www.chinadaily.com.cn/business/chinadata/2014-04/18/content\\_17446047.htm](http://www.chinadaily.com.cn/business/chinadata/2014-04/18/content_17446047.htm). [Accessed 10 2015].
- [48] The Economist, "Where China's future will happen," The Economist, pp. <http://www.economist.com/news/leaders/21601027-worlds-sake-and-its-own-china-needs-change-way-it-builds-and-runs-its>, 16 April 2014.
- [49] H. Girardet, "Regenerative Cities," World Future Council, Hamburg, 2010.
- [50] H. Girardet, S. Schurig, A. Leidreiter and F. Woo, "Towards the Regenerative City," World Future Council, Hamburg, 2013.
- [51] F. Woo, J. Wortmann, S. Schurig and A. Leidreiter, "Regenerative Urban Development: A Roadmap to the City We Need," World Future Council, Hamburg, 2014.
- [52] S. Schurig, "La sostenibilidad a largo plazo es demasiado estática y se ha usado mal," El Pais, 7 October 2015. [Online]. Available: [http://elpais.com/elpais/2015/10/01/planeta-futuro/1443713293\\_311039.html](http://elpais.com/elpais/2015/10/01/planeta-futuro/1443713293_311039.html). [Accessed 10 November 2015].
- [53] World Future Council, "Imagine a Regenerative City," World Future Council, Hamburg, 2014.
- [54] "Financial Times," [Online]. Available: [http://www.ft.com/intl/cms/s/d096f594-4be0-11e5-b558-8a9722977189,Authorised=false.html?siteedition=uk&i\\_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd096f594-4be0-11e5-b558-8a9722977189.html%3Fsiteedition%3Duk&i\\_referer=&classification=conditional\\_](http://www.ft.com/intl/cms/s/d096f594-4be0-11e5-b558-8a9722977189,Authorised=false.html?siteedition=uk&i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2Fd096f594-4be0-11e5-b558-8a9722977189.html%3Fsiteedition%3Duk&i_referer=&classification=conditional_).
- [55] H. Liu, "China Water Risk," 24 September 2015. [Online]. Available: <http://chinawaterrisk.org/notices/bottled-water-in-china-boom-or-bust/>.
- [56] Y. Wanli, "Rural-urban income gap narrows," China Daily, 22 4 2015. [Online]. Available: [http://www.chinadaily.com.cn/china/2015-04/22/content\\_20509439.htm](http://www.chinadaily.com.cn/china/2015-04/22/content_20509439.htm). [Accessed 12 1 2016].

## 10 SPEAKERS AND PARTICIPANTS OF THE FUTURE OF CITIES FORUM 2015

Below are the speakers and participants that joined the Future of Cities Forum 2015 in Beijing and Tianjin in September 2015:

- **Craig Applegath**, Architect and Principal at DIALOG, Canada
- **Filippo Boselli**, Policy Officer, Climate, Energy and Cities, World Future Council
- **Youngmin Chang**, Director of Programs, CITYNET, China
- **Boping Chen**, Director of China Program, World Future Council, China
- **Arunava Dasgupta**, Head-in-charge, Department of Urban Design, India
- **Xuhui Dong**, Chief Engineer, Environmental Development Center, MEP, China
- **Kui Feng**, Director, Research Center for Urban Development, BJTU, China
- **Irene Garcia**, Project Manager, Climate, Energy and Cities, World Future Council
- **Klaus Hoppe**, Consultant, Former Head of the Energy Department of the City of Freiburg, Germany
- **Qing Ji**, Director, World Business Council for Sustainable Development, China
- **Nanqing Jiang**, UNEP China National Office, China
- **Suwanna Jungrungrueng**, Deputy Director General, Department of Environment, Bangkok City, Thailand
- **Tony Chan**, Associate Director, Arup, China
- **Vinay D Lall**, Director General & CEO, Society for Development Studies (SDS), India
- **Hailong Li**, Deputy Director, Eco-city Planning & Building Center of Chinese Society for Urban Studies, China
- **Rusong Li**, Director of Carbon Disclosure Project (CDP) China Office, China
- **Xiaojiang Li**, President, China Academy of Urban Planning & Design, China
- **Xiaoxi Li**, Deputy Director of Beijing Normal University Academic Committee; former Director of Department of Macro Economy Study, State Council; Member of CCICED, China
- **Zuojun Li**, Deputy Director, Institute of Resource and Environmental Policy, State Council Development Research Centre, China
- **Zhenjiang Liang**, District Director, Caofeidian District Tangshan City, China
- **Jun Liu**, Vice President, Beijing Jiaotong University, China
- **Neville Mars**, Principal MARS Architects, Director Dynamic City Foundation, Netherlands
- **Huang Ming**, Winner of Right Livelihood Award, Entrepreneur, China
- **Paul Recknagel**, Senior Programme Manager, Sino-German Cooperation on Renewable Energies (CoRE), GIZ, Germany
- **Hannah Ryder**, Deputy Country Director, UNDP China, Kenya
- **Ole Scheeren**, Architect, Germany
- **Stefan Schurig**, Director Climate and Energy, World Future Council, Germany
- **Micheal Small**, Executive Director, Renewable Cities, Canada
- **Gerhard Stryi-Hipp**, Coordinator Smart Energy Cities, Fraunhofer Institute for Solar Energy Systems, Germany
- **Shipra Narang Suri**, Co-Chair, World Urban Campaign, UN Habitat, India
- **Jakob von Uexkull**, Founder and Chairman, World Future Council, United Kingdom
- **Changyuan Wang**, Deputy Secretary General, China Association of Mayors, China
- **Litong Wang**, Vice Major, Tangshan City, China
- **Qi Wang**, Deputy Dean, College of Environmental Sciences and Engineering of Peking University, China

- **Yuqing Wang**, President of Chinese Society of Environmental Sciences and former Vice Minister at the Ministry of Environmental Protection of China, China
- **Zhijia Wang**, former Director General of Department of International Cooperation MEP, Coordinator of UNEP China, China
- **Gaodi Xie**, Researcher, Institute of Geographic Sciences and Natural Resources Research, CAS, China
- **Jinjin Xu**, Program Director, China Development Research Foundation, China
- **Qing Ye**, Dean, Shenzhen Academy of Building Sciences, China
- **Xiaolan Yin**, Deputy Director, International Cooperation Division, National Energy Efficiency Center, China
- **Jong-Soo Yoon**, Head of Office, United Nations Office for Sustainable Development, South Korea
- **Nicholas You**, Guangzhou Institute for Urban Innovation, China
- **Mengheng Zhang**, Division Chief, International Division of China Research Academy of Environmental Sciences, China

## THE FUTURE OF CITIES FORUM

Since 2011, the annual Future of Cities Forum (FCF) brings together city councilors, urban planners, researchers, practitioners and representatives of civil society and the private sector from around the world to discuss key challenges and solutions for Regenerative Urban Development. The FCF has been initiated by the World Future Council and co-hosted by cities around the world, including the German cities of Hamburg and Munich, the Ugandan capital Kampala and hosted by the WFC in partnership with other international organizations in Beijing and Tianjin, Dubai and Delhi ([www.futureofcitiesforum.com](http://www.futureofcitiesforum.com)).



PANEL DISCUSSION AT THE FUTURE OF CITIES FORUM 2015 IN TIANJIN, CHINA

